ANNUAL REPORT

2016

ICMR - Regional Medical Research Centre

Dept. of Health Research, Ministry of Health & Family Welfare
Govt. of India, Bhubaneswar - 751023

Cultural evening on the occasion of 35th RMRC Foundation Day, 2016

2nd International Yoga Day observed in the Centre

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Contents

Annual Report Editorial Team:

- Dr. Sanghamitra Pati, MBBS, MD, MPH — Scientist-G & Director
- Dr. M.R.Ranjit, M.Sc., Ph.D — Scientist-F
- Dr. B. Sahoo, M.Lib & Inf. Sc, Ph.D — Lib & Inf. officer

From the Director's Desk.....

It is indeed a moment of great pleasure to present this annual report for the year 2016, especiallywhen it is my directorial debut. More than an Annual Report, the publication presents a snapshot of the year's key research activities, various health system support and community engagement initiatives undertaken, academic and training programs, and the outstanding role and contribution of the centre towards improving health outcomes and addressing regional health priorities. At the outset, my strong accolades to the team for coming out with this publication through their untiring enthusiasm. There is a famous saying "*The Whole is Greater than the Sum of its Parts*"; and our annual report is an embodiment of the collective and cumulative efforts of all the members of RMRC Bhubaneswar Family.

Regional Medical Research Centre, Bhubaneswar since its very inception in 1981, has continued to deliver successfully on its strategic priorities, working in partnership with other organisations, including other ICMR institutes, medical colleges, extramural research institutions and state and central health department. We strongly believe that improving the healthcare of population at large requires both discovery, and implementation research, followed by effective communication policy and stake holder engagement to translate the findings into actionable and affordable health solutions.

The year 2016 has been yet another year of considerable growth and progress particularly in our efforts to address the growing burden of vector borne and viral diseases, Tuberculosis and Malnutrition. Besides initiating new research projects around zoonotic disease, antimicrobial resistance, and maternal and child health , we stepped up our efforts in advocacy and communications with key stakeholders including the state health department, community and academia thereby creating broad synergy to address the emerging and endemic public health challenges of the region. We made significant strides in increasing our peer reviewed publications and obtaining grants from diverse sectors. In our efforts to engage the scientific community, the centre's library has started the new and innovative weekly E-News bulletin "Monday Morning" and Digital Repository of our publications (DSPACE) in addition to daily article service.

The 2016 JE epidemic in Odisha, the dramatic spread of Dengue in both urban and rural parts of the state, the resurgence of Chikungunya, the steady increase in malaria and persistence of lymphatic filariasis have all drawn attention to the continuing challenge of vector borne diseases throughout the state across seasons. Majority of our initiatives are geared to strengthen the state's research response

to these challenges. In its capacity of National reference Laboratory, the centre is supporting the quality assured diagnosis of Tuberculosis, another daunting health challenge, in Odisha, neighbouring states of West Bengal and Assam as well as North East states. This year we initiated strategic implementation research projects to address the continuing problem of Tuberculosisin Odisha and Jharkhand. The launching of TB-Nutrition Project, is a major milestone in the road map to control TB and improve cure outcomes. We have been entrusted with three key nutrition projects including one from the department of School and Mass Education for evaluating their Mid-Day Meal program. The centre has been designated as the apex laboratory for viral infections investigations and diseases surveillance by the state Odisha. In the last year, our contributions to diarrhoeal diseases outbreak investigation and timely prevention of cholera has been appreciated by the state health department. Further, given India's changing demographics and the resultant increase in chronic conditions, the centre has started research on non-communicable diseases prevention and management.

I invite you to read through the report and visit our website to learn more about RMRC Bhubaneswar and explore the range of outstanding research and researchers that we have at the centre.

I do want to thank all scientists, researchers, and fellows, technical and administrative staff here at our centre and our project staff working in field for their tremendous contributions during the year who together make the centre a dynamic, focused and outcome-driven research environment. None of these high quality work would have been possible without their efforts. I extend my congratulations to all those who had grant successes and especially our scholars for bringing laurels in different conferences.I also take this opportunity to extend a special welcome to those who joined the RMRC Bhubaneswar family for the first time in 2016; we look forward to your involvement in our journey.

My special thanks to all our collaborating partners for their support in undertaking many joint inter disciplinary and cross-cutting research projects to tackle some of the critical health issues. I would like to thank the State Health and Family Welfare Departments of Odisha and Jharkhand, Central TB Division for their constant support and continuous cooperation. My special gratitude to the esteemed members of our Scientific Advisory Committee for strategically guiding us and providing the much needed directions through their insightful support. I extend our sincere thanks to the members of our ethical and other committees as well.

In particular, I would like to record my gratitude to Dr. Soumya Swaminathan, Secretary DHR and DG ICMR for her inspiring guidance towards prioritising our research responsive to the health needs of the community and engaging strongly with health system and policy.

As we move ahead with more energy and synergy, I would like to conclude with the very pertinent quote "*Willing is not enough, we must do it; Knowing is not enough, we must apply it*". Let this paradigm underpin all our current and future activities.

I look forward to the coming year 2017 to be another successful one for the RMRC, the scientists and staff and turn to be more productive in terms of contributions to build the research ecosystem in the region and bridge the research-practice- policy continuum as we move forward.

Dr. Sanghamitra Pati
MBBS,MD,MPH
Director

Ongoing Studies

Contents

1. Distribution and bionomics of '*Culex vishnui*' group of mosquitoes with reference to Japanese Encephalitis transmission in Odisha.

Prin. Investigator : Dr. N. Mahapatra
Co Investigator (s) : Dr. R. K. Hazra
Mr. N. S. Marai
Duration : 3 years
Starting Date : September 2015
Funding : Extramural (ICMR)

Objectives

1. To map the adult and larval distribution of *Culex vishnui* group of mosquitoes in JE affected areas of Odisha
2. To study the adult density, seasonal prevalence, gonotrophic cycle, resting, biting, breeding behavior and susceptibility status to insecticides used in the programme.
3. To find out the presence of virus in mosquitoes vector, pig and human population in the affected areas.

Background:

Japanese encephalitis (JE) has been a serious public health problem in Odisha since 2013. During the last two years, outbreak of Japanese Encephalitis occurred in three different geo-physiographical region of the state i,e Malkangiri (Eastern Ghat), Jajpur (Coastal belt), Keonjhar and Mayurbhanja districts (Northern plateau). Entomological studies were undertaken during the outbreak occurred at Malkangiri in December 2012, at Keonjhar in March 2014 and at Jajpur in November 2014. However no systematic study has been done on distribution, biology and transmission potentiality of the vector *Cx. vishnui* group of mosquitoes for developing control strategy. The present study entitled "Distribution and bionomics of *Culex 'vishnui'* group of mosquitoes with reference to Japanese Encephalitis transmission in Odisha" was initiated on September 2015 and findings of the outbreak studies before initiation of this one year study (Sep 2015 to Aug 2016) has also been present in the report.

Summary of Progress

During the study period there were two outbreaks in October 2015 at Mayurbhanj district (Northern plateau) and in the Puri district (coastal belt) in the month of June 2016 just before cart festival. The findings of the entomological survey are also included in the present report.

Fig. 1 Map of Odisha with JE outbreak reported districts.

Adult Mosquito Collection and Composition

A total of 6508 mosquitoes collected at dawn and dusk hours belonged to 4 genera and 19 species including 7 species which are known to be JE vectors in India. Among 19 species Cx. *vishnui* was the predominant species (66.41%) followed by *An.annularis* (6.97%), *Cx. quinquefasciatus* (5.43%), *Ma.uniformis* (5.11%), *An.aconitus* (4.39%), *An.hyrcanus* (2.55%) *and An. barbirostris* (2.44%). The remaining 12 species, which formed 6.7 percent of the total catches were

Table 1: Total no. of adult mosquitoes collected at dawn and dusk hour from animal shed and human dwelling of different districts (Odisha) during September 2015 to August 2016.

Sl.No	Species	Keonjhar	Mayurbhanja	Jajpur	Puri	Total	Species Composition(%)
1	*An.annularis*	282	100	71	01	454	6.97
2	*An.aconitus*	272	12	02	00	286	4.39
3	*An. barbirostris*	51	23	75	10	159	2.44
4	*An.culicifacies*	16	07	29	00	52	0.79
5	*An.fluviatilis*	05	00	00	00	05	0.076
6	*An.hyrcanus*	34	02	130	00	166	2.55
7	*An.jamsei*	05	00	00	00	05	0.076
8	*An.karwari*	02	00	00	00	02	0.030
9	*An.subpictus*	03	00	04	11	18	0.27
10	*An.vagus*	33	08	102	07	150	2.30
11	*Ma.uniformis*	15	05	268	45	333	5.11
12	*Ma.indiana*	01	00	00	00	01	0.01
13	*Ma.annulifera*	05	32	25	04	66	1.01
14	*Cx .vishnui*	**624**	**322**	**1325**	**2051**	**4322**	**66.41**
15	*Cx .tritaeniorhynchus*	00	00	06	11	17	0.26
16	*Cx .quinquefasciatus*	32	102	188	32	354	5.43
17	*Cx .gelidus*	04	02	21	07	34	0.522
18	*Cx .luchia*	05	01	04	00	10	0.15
19	*Armigeres*	08	07	40	19	74	1.14
	Grand Total	**1397**	**623**	**2290**	**2198**	**6508**	**100**

An.culicifacies, *An. fluviatilis*, *An. jamsei*, *An.karwari*, *An. subpictus*, *An. vagus*, *Ma.indiana*, *Ma. annulifera*, *Cx. tritaeniorhynchus*, *Cx. gelidus*, *Cx. luchia* and *Armigeres* details are given below in the table no.1.

Seasonal Prevalence of JE vectors (*Cx.vishnui* group)

The seasonal distribution of vector mosquitoes varies in time and space depending upon environmental conditions and availability of breeding habitats. The details of the seasonal

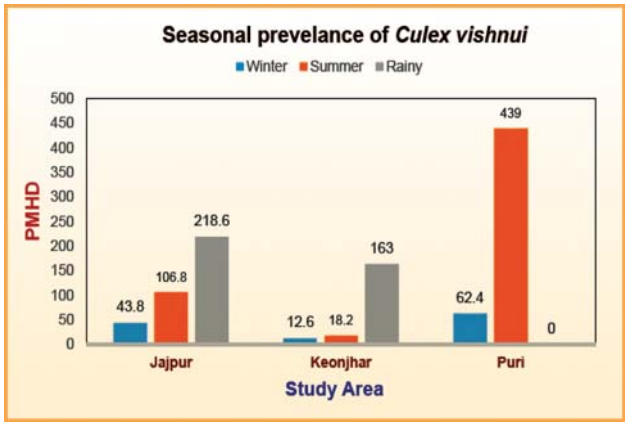


Fig.-2. Seasonal prevalence of *Culex vishnui* group in different study areas of Odisha.

prevalence were shown in the Fig.-2. The highest PMHD of *Cx.vishnui* was observed in rainy season when compared with other two seasons in Jajpur and Keonjhar districts (regular study area) whereas in Puri district PMHD of *Cx.vishnui* was high during outbreak of JE in summer season (2016).

Larval Survey

In the study sites, four different types of mosquito breeding habitats (irrigation channels, ponds, rice fields and pools) were examined for larval breeding from September 2015 to August 2016 larva were collected & dipping method was calculated following standard procedure. Details are given in the table no.2

The per dip density of larvae of *Cx.vishnui gr.* was 24.28 in rice field followed by 23.21 in irrigation channel, 21.66 in ponds and 18.40 in pools in Jajpur whereas in Keonjhar the per dip density of larvae of *Cx.vishnui gr.* was 12.2 in rice field followed by 11.12 in ponds, 9.45 in irrigation channel and 8.9 in pools. The density of mosquito larvae were recorded from different breeding sites and maintained in rearing laboratory for further research work. The species emerged from the immature samples included *Cx.vishnui*, *Cx. tritaeniorhynchus* and *Cx.pseudovishnui*.

Epidemiological Features

A total of 316 JE suspected cases were

Table 2 : The density of mosquito larvae recorded from different breeding sites from two districts of Odisha.

Mosquito Species	Jajpur				Keonjhar			
	Different type of Larval Breeding Sites							
	Rice Field	Ponds	Pools channels	Irrigation	Rice Field	Ponds	Pools	Irrigation channels
Cx.vishnui group (No. of larvae per dip)	24.28	21.66	18.40	23.21	12.2	11.12	8.9	9.45

Table-3 : Epidemiological Data of JE cases during the outbreak occurred in Odisha.

Study Area(District)	Year of outbreak	Total no of suspected human blood samples	JE positive case
Malkangiri	2012	45	12
Jajpur	2014	36	12
Keonjhar	2014	79	14
Mayurbhanja	2015	42	16
Puri	2016	123	51

reported from the study area i.e. five districts (Malkangiri, Jajpur, Mayurbhanja, Keonjhar and Puri) of Odisha. Details of the suspected cases and JE positive cases are given below in the table no.3.

The maximum no of cases (123) were registered in 2016 JE outbreak in Puri district. Brahmagiri block was the worst affected and maximum no of cases were reported from these areas. Out of 123 JE suspected cases 51 were positive for JE infection.

Generally the outbreaks were reported from various districts between August to November with a peak in October. But, during 2016 outbreak that occurred in Puri, JE cases were reported from June to September.

Detection of JE virus in mosquitoes:

Detection of virus in mosquitoes was done by two methods (i) RT-PCR and (ii) ELISA.

(i) RT-PCR Method

Infection rates in mosquitoes:

Minimum infection rate: - The virus infection rate in mosquitoes will be expressed as minimum infection rate (MIR) per 1000 females tested (Chiang & Reeves 1962).

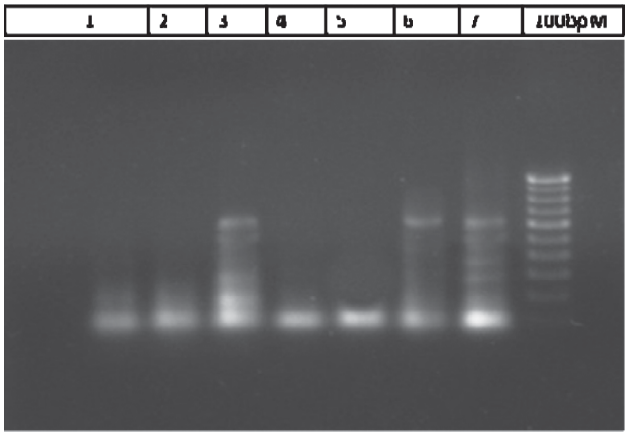
$$MIR = \frac{\text{Number of mosquito pools positive}}{\text{Total number of mosquitoes tested}} \times 1000$$

RNA isolation and cDNA transcription for JE detection

Total RNA was isolated from 590 adult mosquitoes sample in a pool (25 in each pool) basis, following the Guanidium Thiocyanate method (Chomczynski et al., 1987) using the TRIzol-Reagent (Invitrogen, Carlsbad, CA, USA) according to manufacturer's instructions with slight modifications. RNA was free from genomic DNA contamination with DNase (NEB, Ipswich, MA) treatment, and the integrity was checked in a 1% denaturing gel. Those RNA samples showing clear separation of the 28S and 18S bands in the gel were taken for further analysis. RNA concentration was measured spectrophotometrically using nanodrop and Stored at -80^{0}C for further analysis.

Reverse transcription and PCR using specific JE primer

PolyA $^+$RNA were reverse transcribed to cDNA using oligo dT primers. 5µg of total RNA was mixed with oligo dT primers (NEB England) was made up to 10µl and heated at 65°C for 10min and then immediately chilled in ice for 5min. Samples were adjusted to a final volume of 20µl by addition of RT buffer, M-MLV Reverse Transcriptase 5U/ µl, 100mM dNTP, RNAase Inhibitor and kept in 37°C for 60 minutes and then stored in -20°C before PCR. The touchdown PCR has done using specific primer. The resulting PCR products were visualized after electrophoresis on a 1% agarose gel in TAE buffer. The expected



Lane 1: *An.hyrcanus* (Hy1), **Lane 2**-*An.hyrcanus* (Hy2), **Lane 3**- *Cx. vishnui* (CV1), **Lane 4**- *Ma. uniformis*, **Lane 5**- *Cx. vishnui* (CV (I), **Lane 6**- *Cx. vishnui* (CV (II), **Lane 7**- Cx. gelidus.

Fig.-3. Gel picture showing the expected DNA product at 554 bp.

DNA product had a size of 554 nucleotides based on the nucleotide sequence of JE virus strain.

Out of 26 pools three pools showed positive result one from Jajpur i.e., *Culex vishnui* group and two pools from Mayurbhanja district i.e. *Culex vishnui* group and *Culex gelidus.*

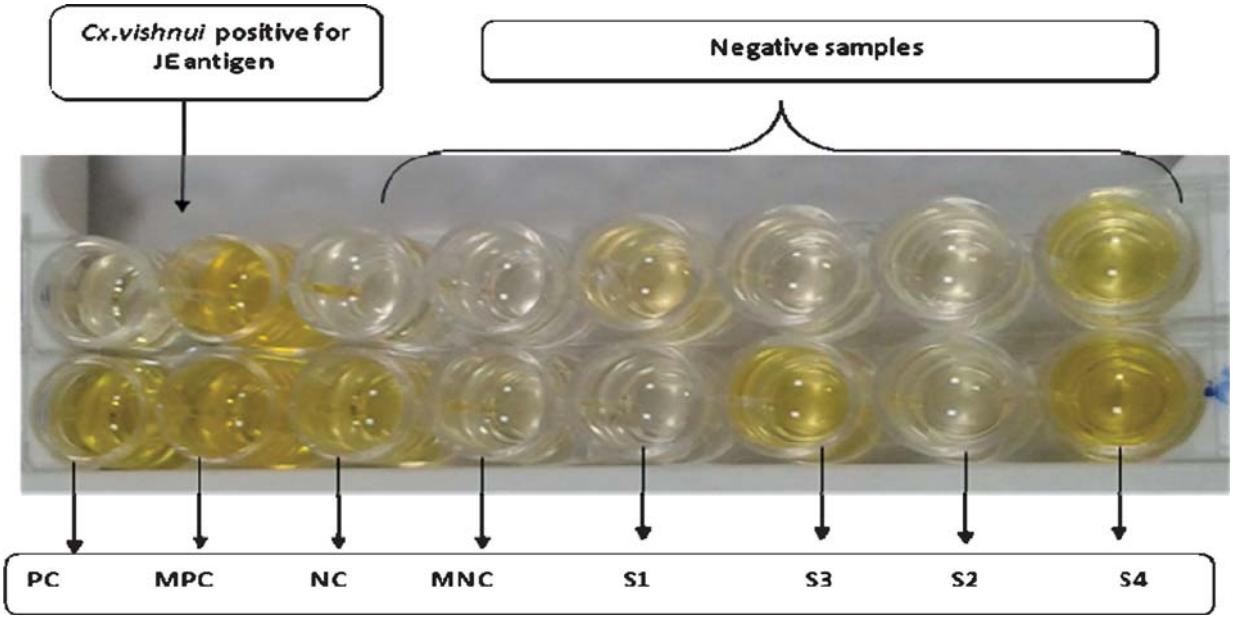
(ii) Detection of JEV antigen in mosquito by MAC ELISA Kit (NIV, Pune).

Mon oclonal antibody based antigen capture ELISA kit was used for detection of JEV from mosquito developed by NIV Pune (ICMR Annual Report 2014-15,: 18). The hybridoma cell line producing antibody against JEV is unique and the monoclonal antibody is highly specific. Due to the high specificity and reproducibility the kit was used.

A total of 4010 numbers of wild caught mosquitoes were sexed and pooled. The pools were homogenized with the diluents and centrifuged. The supernatant was subjected to ELISA for the detection of virus. Virus specific monoclonal antibody coated on the ELISA plate capture the virus antigen from the mosquito suspension. Another monoclonal antibody (usually against another epitope of the virus) would bind with the captured virus and forms a sandwich. The binding of the second antibody would be detected by a secondary antibody tagged with enzyme conjugate. Addition of a substrate would exhibit a colorful reaction and could be read visually.

Out of 4010 mosquitoes, 3600 mosquitoes were processed in pool basis (each pool contains 50 specimens) by JE antigen captured ELISA kit. Out of 72 pools, 1 pool of *Culex vishnui* group was found positive for JE virus from Puri district during JE outbreak in 2016. Details of ELISA plate reading at 450 nm were given below and

Fig.-4: ELISA plate showing visual positive mosquito sample for JEV.



PC -Positive Control, MPC-Mosquito Positive Control, NC - Negative Control, MNC-Mosquito Negative Control,

the results were sent to NIV, Pune for confirmation (Fig-3).

Recent JE Outbreak during 2016

Mayurbhanj

Around 215 Adult mosquitoes were collected from Mayurbhanja area for detection of Japanese encephalitis virus. Among them 185 were *An.hyrcanus*, 28 were *Culex vishnui*, one specimen was *Culex gelidus* and 2 were *Ma.uniformis*. We processed 80 samples, out of which two samples were positive for *Cx.vishnui* and one *for Cx.gelidus*. The study is in progress to find out JEV circulation during the inter epidemic period.

Puri

During the month of June 2016, JE outbreak was reported in Puri district and prolonged up to September. Age wise analysis revealed that the maximum number of cases occurred in children aged between 6-10 years. In Puri district PMHD of *Cx.vishnui* was high (66.4) during outbreak of JE in summer season (2016) and out of 41 pools, 1 pool of *Culex vishnui* group was found positive for JE virus.

Conclusion

MIR of *Cx.vishnui* was found to be 12 in Malkangiri, 10 in Jajpur, 2.72 in Keonjhar, 3.10 in Mayurbhanja and 0.48 in Puri during outbreak at different districts from Odisha.

From our study and the above result of MIR shows that there is an active transmission is going on in these areas (Jajpur, Mayurbhanja and Puri). So situation specific control measures needs to be developed.

Future work plan

Further work will be continued to find out the transmission pattern and circulation of JEV during inter epidemic period, GIS mapping of the vector and their distribution and study on the insecticide susceptibility status has also been initiated. Transovarial transmission will also be studied in the affected areas.

Recommendation

All the above study clearly indicates that the indigenous transmission of JE is going on in the state. The following necessary suggestion for controlling the diseases has been communicated to the state health department.

In situation-1 (Pigsty adjacent to the house) human vaccination/vector control can curtail the diseases transmission.

In situation-2 (Pig herd away from the village) vaccination of the pigs will be helpful in controlling the transmission.

2. Improving health of under five children in Rayagada Dist, Odisha.

Prin. Investigator	:	Dr MR Ranjit
Co-Investigator(s)	:	Dr B Dwibedi, Dr G Bulliya, Dr A Mohaptra, Dr A S Kerketta
Collaborator (s)	:	Dr A K Padhi, CDMO, Dr P Subudhi, DSMO, Raygada
Duration	:	3 years (March 2014- to Feb. 2017)

Background

Rayagada district is located between 82^0 54′ to 82^0 2′ east longitude and between 19^0 0′ to 19^0

58′ north latitude. The total geographical area of the district is 7,584.7km^2. As per the 2011 census the total population of the district is 961,959 and 55.8% of them belongs to scheduled tribes. The population of children up to the age of 5 years is 14.67% and the child sex ratio is 955 females per thousand males. As per the Annual Health Survey Report 2011-12 the IMR in Raygada is 61 and U5CMR is 103, while in Odisha it is 59 and 79 respectively. The present activity has been planned in the context of the MOA between Government of Odisha to improve the health parameters of under 5 children with special reference to reduction of morbidity and mortality (prenatal, perinatal, childhood mortality and MMR) through health system strengthening using innovative approaches.

Objectives

1. To train and improve the skills of grass root level health workers for early detection, management and referral of diarrheal diseases, acute respiratory infections (pneumonia), malaria, measles, diphtheria and under-nutrition.
2. To develop communication strategy for effective delivery of family and community interventions.
3. To educate and create awareness among the community on the preventive health care related to diarrheal diseases, acute respiratory infections, malaria, diphtheria, measles and under-nutrition through innovative approach and increase health seeking behavior.
4. To strengthen the maternal and child health services (antenatal checkup, institutional delivery, puerperal care and neonatal care) undertaken by the programme (RMNCH).
5. To strengthen health management information system (HMIS) for effective monitoring and evaluation.

Table 1: Distribution of under five children in intervention and control areas.

Intervention/ Control	High/Low Tribal Density	Block	Sub-centre	Total No. of under five children	No. of under five children covered under baseline survey
Intervention	High Tribal Density	Th. Rampur	Gunpur	4429	237
			Mahulpatna	5140	275
	Low Tribal Density	Kesinga	Utkela	8115	742
			Kandel	3805	348
Control	High Tribal Density	Lanjigarh	Biswanathpur	5758	222
			Lanjigarh	5136	198
	Low Tribal Density	Junagarh	Chiliguda	10906	477
			Nandol	8757	383
Total				**52046**	**2882**

6. To improve the procurement and flow of logistics relevant to MCH services.

Summary of Progress

9.1 Study Area

(A) ***Intervention area:*** Jagannathpur and Putasing Sectors of **Gunupur block** and Sectors of **Jamadeipentha /Raygada block**

(B) ***Control area:*** Therubali and Rekhapadar sectors of **Kolnara block** and Kashipur and Tikiri sectors of **Kashipur block**

General Information

During the survey the baseline information on the MMR, ANC rate and the drinking water facility available in the control area and intervention area has been collected as depicted in Table 1, 2 and 3.

Maternal mortality ratio (MMR) of the south zone of Odisha that includes Kalahandi District is 245 per one lakh live birth. The block-wise MMR is not available at the district level. The district specific data has not been calculated because the total live birth of district is below one lakh (around 30,000). The state average of MMR comes to 222 per lakh. During our baseline survey 251 delivery has been registered out of which no maternal death was recorded. During 2015-16 the district recorded 43 maternal deaths that included; abortion–1, sepsis-6, Hemorrhage –10, obstructed labour –6, Hypertensive disorder during pregnancy –4 and others -16.

According to our survey data drinking water facility was available in the form of tube well and open well in majority. The open well water was not considered as safe, while the tube well water was safe for consumption. However, at the house hold level storage of drinking water was noted to be in earthen pots as per tradition. There was no safe practice to bring out water from the pots

Table 2: Coverage of Antenatal & Post Natal Care in the surveyed area.

ANC – Ante Natal Care		PNC – Post Natal Care	
No. of Pregnant Mothers	219	No. of Delivery	251
ANC Registered	214 (97%)	Still birth	1
IFA tablet consumption	204 (93%)	Live birth	250
Immunization coverage		IFA tablet consumption in Post Natal period	141 (56%)
TT_1 / TT Booster	191 (87%)	Delivery at Govt. facilities	165 (66%)
TT_2	131 (59%)	Delivery at Private facilities	44
		Delivery at Home	42
		Delivery accompanied by ASHA	232
		Delivery by trained personnel	235
		Delivery by non-trained personnel	16
		Bleeding during Post Natal period	2

Supplementary food consumption was recorded as 348 (74%) of 470 pregnant/lactating mothers.

(no practice of ladle use or cleaning hand to take out water). All Anganwadi Centers has been supplied with water filters but there is minimal (<10%) in use. Besides above, people have the habit of drinking of water from streams at the work places. There is no record of consuming boiling water even for under five children.

Morbidity pattern of the under 5 children

The morbidity survey using the designed questionnaire was undertaken by door to door visit. The disease pattern and prevalence in the one year were recorded analyzed. In the selected areas about 263 (8.8%) children suffered from diarrhea, 1081 (36.3%) had fever and cough, 664 (22.3%) had malaria and 67 had measles (Fig. 2). Out of 664 children who had malaria, 22.78% children were taken medicine from the Govt. health system. Amongst 2975 children, 75 (2.5%) are malnourished and 66(2.2%) were suffering from different skin diseases.

Delivery and Under-five child feeding practices

From the IMNCI records available with the ANM at the sub center level it was observed that more than > 65 % of the delivery has been conducted in the home and about 24% were conducted at the hospital in the selected sub centers. **Amongst all the delivery 6.6% had experienced complications. About 96.7% babies cried immediately after birth and 26.6 % had low birth weight.** Infant and young child feeding practices were recorded from mothers and care takers of under five children (Fig.3). A considerable proportion of children had initiated early breast feeding. (Around 2677 (90.1%) children were practise breast feeding up to one year of age while 1844 (62.5%) are continuing breast feeding up to two years of age and 1408 (47.3%) continuing till five years of age.)

Skill development of ASHA and AWW

During the initial skill assessment it was observed that the assessment, classification and management skill of ASHA and AWW on IMNCI was around 4%. While around 58.1% of the health work forces know the correct procedure to operate the RDT test. But No ASHA/AWW had

Table 3: Source of drinking water in control & intervention area.

Intervention/ Control	High/Low Tribal Density	Block	Sub-centre	Tube Well	Non function tube well	Open Well	Total
Intervention	High Tribal Density	Th. Rampur	Gunpur	30	4	5	39
			Mahulpatna	17	4	13	34
	Low Tribal Density	Kesinga	Utkela	40	1	16	57
			Kandel	20	0	0	0
Control	High Tribal Density	Lanjigarh	Biswanathpur	12	0	NIL	12
			Lanjigarh	3	0	2	5
	Low Tribal Density	Junagarh	Chiliguda	25	0	1	26
			Nandol	6	0	5	11

knowledge on assessing breathing rate, or about the 5C of delivery. Based on this information training modules and ready recon for the ASHA/ AWW have been developed in consultation with the CDMO, ADMO (PH), Medical Officers I/C of IMNCI programme implementation and Health Supervisors of the district. Both the Training Modules and Ready Recon have been pretested on acceptability and feasibility of translating in to practice by ASHA/AWW at the field level.

One day Training programme was conducted twice at sub center level for ASHA and AWW. Total 64 AWW & ASHA have been trained on assessment, classification and treatment/ referral of diarrheal diseases, acute respiratory infections (pneumonia), malaria, measles, diphtheria and under-nutrition. The training assessment shows that around 50% of the ASHA and AWW trained have improved in their assessment, classification and management skill. The training of health workers had been provided during sector level meeting days and VHNDs of the respective subcentres AWCs. ASHAs, AWWs and ANMs were imparted separate sessions for their skill development during January and February 2016.

Improvement of Logistics

To improve the supply of logistics the community development officials (BDO and Anganwadi Supervisors) and health officials (MO and Health Supervisors) have been sensitized during the monthly inter-sector coordination meeting. To meet the logistic supply (kits and drugs) needs, monthly demand generation by the ASHA through ANM has been encouraged during the training programs.

Improvement Nutrition

To improve nutrition following measures have been incorporated to strengthen the current/ on going program:

i. Nutrition education to community and school children to promote consumption of locally available vegetables and fruits.

ii. Encouraging kitchen garden practice.

iii. Proper use of supplementary nutrition, i.e that is supplementary foods should not replace usual intake at household level

iv. Education to parents to support ICDS by regular visit to Anganwadi centers for anthropometry assessment of the children.

v. Reinforcement of preschool level nutrition

vi. Coordination with PHC for early management of severe malnutrition.

The intervention has been initiated in January 2016.

Action for Behavioral Change

For effective delivery of family and community interventions we have selected school children as vehicle. We have introduced a "*Thought of the Day*" discussion session for 10 minutes after the prayer everyday on hand wash practice, use of mosquito net, use of toilet and seeking of treatment at hospital for any ailment by the family members. We have created awareness among the community through the students by arranging procession with certain

slogans and placards on prevention and control of IMNCI related diseases.

Community awareness campaign on hand washing practice, use of safe drinking water, hygiene, use of mosquito net, immunization and treatment seeking in case of sickness due to diseases classified in IMNCI were organized through local health work force in each village. Along with awareness program, demonstration on hand washing and safe drinking water intake is being undertaken at school level and Anganwadi centers. The school children are used as the agent of transmitting healthy practice into the family. At Anganwadi centers mothers were encouraged to participate so that it will have a direct impact on adopting such practices.

In Anganwadi centers soap for hand washing is available and practice is ensured during consumption of cooked and uncooked food by the children. In village level meetings use of hand washing after toilet is being encouraged at the initial stage which will be subsequently taken up as a practice before taking meals especially when somebody returns from workplace to prevent infections.

As a measure for motivating to use Govt. health facilities; community participation in to the health program is being encouraged during awareness activities at the community level. Ensuring logistic supply, early management at household level and streamlining referral of severe illness to the PHCs through the GKS involvement has been included. GKS fund use for emergency referral have been agreed at the village level meetings to meet the deficiency.

The work is in progress and the following action plan has to be undertaken

1. Training of ASHA and AWW of remaining villages and refresher training courses (One day) for trained ASHA/AWW will be arranged at sub center (total 24 sub centers) level on IMNCI guidelines (assessment, classification and treatment / referral) in two intervention sectors
2. A Community volunteer from among the SHG or GKS members will be selected in each village and will be trained on IMNCI guidelines and maternal and child health services (antenatal checkup, institutional delivery, puerperal care and neonatal care) to act as a bridge between the community and service providers.
3. Community awareness campaign on hand washing practice, use of safe drinking water, hygiene, use of mosquito net, immunization and treatment seeking in case of sickness due to diseases classified in IMNCI will be organized through local health work force in each village (324 villages)
4. Inter-sector coordination meetings will be arranged to accelerate the procurement and flow of logistics relevant to MCH services
5. Strategies will be developed to strengthen health management information system (HMIS) for effective monitoring and evaluation
6. Interim survey will be conducted to assess the improvement in the delivery of IMNCI programme after the intervention.

3. Determinants of abdominal obesity and diet-related non-communicable diseases among scheduled tribes in nutrition transitions: implementation of community interventions for prevention.

Prin. Investigator : Dr. G. Bulliyya
Co-Investigators : Dr. A. S. Kerketta, Mr. R. K. Das
Starting date : October 2015
Closing date : September 2018
Funding : Intramural

Objectives:

1. To study the dietary and nutrition transition and lifestyle changes among the Kondh scheduled tribe in different settings of Rayagada district;
2. To estimate the burden of abdominal obesity and diet-related non-communicable diseases (DR-NCD) like hypertension, type-2 diabetes and dyslipidemia; and
3. To develop and evaluate evidence-based dietary and lifestyle advocacy interventions to reduce central obesity and DR-NCD risk factors.

Background

The Scheduled tribal (ST) population is generally known at risk for undernutrition and infectious diseases owing to their dependence on primitive agricultural practices, poverty, illiteracy and poor personal and environmental hygienic practices. In addition, lack of access to healthcare, poor communication, traditional beliefs and customs aggravate the situation. However, STs are now experiencing with lifestyle diseases. Acculturation due to marginalization or migration to urban settings affect the lifestyle (alcohol, tobacco) and traditional food habits (high in fats, sugar, salt) and has made people vulnerable to NCD (NNMB 2012). The nutrition transition is the shift in dietary consumption and energy expenditure implicated in the rapid rise of overweight and obesity resulting with socioeconomic development, people choose to follow a more palatable diet highly refined carbohydrates from polished white rice that enhance overall energy intake than their traditional staple foods, once rich in whole grains and dietary fibre (NNMB 2009). Consequent to nutrition transition is increased urbanization, communication and transport, and the economies are shifting away from physically active farming, mining, forestry, to more sedentary often office-based occupations. The life-style changes, hunter-gatherer communities became more settled, and traditional food gathering methods have been changed. The proportion of under-weight has declined over the years, on the other hand, overweight is increased giving way to the paradoxi-cal coexistence of both underweight and overweight in the same population. One-third of STs have access to an affluent diet that is energy dense and rich in fat/ saturated fat, salt, and refined sugars. These unhealthy lifestyles are associated with risk for hypertension, diabetes, dyslipidaemia and obesity. Tribal populations suffer 16-50% burden of hypertension (Manimunda 2011).

Odisha is home to maximum STs (62) and particularly vulnerable tribal groups (PVTG 13) that constitute 22.6% (8, 145, 081) of the state

(41,947,358) population against 9.7% of the country's ST population (Census 2011). The STs are experiencing nutrition transition and consequent double burden of malnutrition. Improvement in nutritional status of STs is attributed mainly due to non-nutritional factors. Although overweight/obesity is 3.5%, while abdominal obesity (waist to hip ratio >0.8) is very high (62.5%; males 52% and females 73%) in comparison to national (57.2%, males 38% & females 73%) average (NNMB 2012). Moreover, prevalence of hypertension among STs reported to be highest for Odisha (men 53.8; women 48.8%). Hypertension among the rural adults is lower (22%) than that of ST population associated with central obesity. In view of increasingly imbalanced diets, higher burden of DR-NCD influenced by migration, acculturation, modern lifestyle, several unmeasured factors that needs in-depth understanding. There is paucity of data on DR-NCD and double burden of malnutrition among tribals in nutrition transition, hence a research proposal designed to determine the dietary and modern lifestyle changes influence on overweight, obesity and DR-NCD in order to support health-promotion and disease-prevention efforts.

Table 1: Distribution of behaviour and physical risk factors among Kondh tribe in Rayagada district.

Risk factor	Gender	Setting		Chi-square	p-value
		Rural (n=180) M: 98, F:82	Urban (n=202) M: 110, F:92		
Current smoking	Male	56.1 (55)	48.4 (44)	1.91	.162
	Female	13.4 (11)	4.3 (4)	3.79	.051
	Total	36.7 (66)	23.8 (48)	4.07	.043
Ever use of alcohol	Male	83.7 (82)	50.0 (55)	5.37	.023
	Female	30.4 (25)	14.1 (13)	4.34	.037
	Total	59.4 (107)	33.7 (68)	9.44	.002
Physical activity	Low	6.6 (12)	28.2 (57)	21.12	.000
	Moderate	22.2 (40)	34.1 (69)	3.72	.053
	High	71.1 (128)	37.6 (76)	13.0	.000
Overweight/obesity BMI >25.0 kg/m2	Male	2.0 (2)	11.8 (13)	4.82	.024
	Female	3.6 (3)	22.8 (21)	10.32	.001
	Total	2.7 (5)	16.8 (34)	16.9	.000
Waist circumference >90cm(men) >80 cm (women)	Male	4.1 (4)	19.1 (21)	8.77	.003
	Female	8.5 (7)	27.2 (26)	7.60	.005
	Total	6.1 (11)	23.2 (47)	16.2	.000
Hypertension BP >140/90	Male	5.1 (5)	10.9 (12)	1.98	.158
	Female	6.1 (5)	10.8 (10)	1.05	.303
	Total	5.5 (10)	10.8 (22)	2.99	.083

Rationale

The study is based on the hypothesis that dietary acculturation accompanied by nutrition transition influence central obesity and DR-NCD among ST populations. Moreover, implemention of evidence-based dietary, lifestyle approaches are effective in reducing abdominal obesity and DR-NCD risk.

Summary of Progress

Community-based cross-sectional study is being conducted among the Kondhs, a dominant ST inhabiting in diverse settings in Rayagada district. Native villages and urban wards are the sample units selected by multistage random sampling. A total of 20 villages were randomly selected from 45 villages with a population of approximately 12,000 aged above 20 years. The sample coverage include both male and female adults aged 20-55 years of Kondh ST population from rural (180 M98, F82) and urban (202 M110, F92) areas. A pre-structured questionnaire used to collect household particulars, demographic, socioeconomic, dietary and lifestyle characteristics (smoking, alcohol, and physical activity), knowledge and awareness on health and nutrition and signs and symptoms of NCDs such as overweight, obesity, diabetes, hypertension, cancers etc. A food frequency questionnaire (FFQ) was used to assess foods and beverages with a frequency response section for subjects to report how often each item was

Table 2: Biochemical risk factors among Kondh tribe in Rayagada district.

Study indicator	Gender	Setting		Chi-square	P-value
		Rural (106)	Urban (178)		
		M=59, F=47	M:93, F:85		
Diabetes (FBS) 126 mg/dl	Male	6.8 (4)	22.6 (21)	4.55	.032
	Female	10.6 (5)	31.7 (27)	4.79	.029
	Total	8.5 (9)	26.9 (48)	9.84	.001
High total cholesterol (>190 mg/dl)	Male	-	4.3 (4)	-	-
	Female	-	10.6 (9)	-	-
	Total	-	7.3 (13)	-	-
High triglycerides (>150 mg/dl)	Male	-	5.3 (5)	-	-
	Female	-	4.7 (4)	-	-
	Total	-	5.1 (9)	-	-
Low HDL <40 in men, <50 mg/dl in women)	Male	-	10.7 (10)	-	-
	Female	-	21.2 (18)	-	-
	Total	-	15.7 (28)	-	-
Metabolic syndrome	Male	-	23.6 (22)	-	-
	Female	-	36.4 (31)	-	-
	Total	-	29.7 (53)	-	-

consumed over a specified period of time. Anthropometric measurements were taken by using standard equipment and procedures. Systolic and diastolic blood pressure (BP) was measured with an interval of 5 minutes by using Omron digital apparatus. Lipid profile (total cholesterol, triglycerides, LDL HDL, etc.) were measured by using Cholestech LDX equipment. Nutritional status was assessed as per Asian guidelines, overweight is defined by body mass index (BMI) 25 Kg/m2 and obesity by 30Kg/m2 and above, abdominal obesity as waist circumference of >90 cm for men and >80 cm for women [WHO 2016). Metabolic syndrome is defined according to International Diabetes Federation (IDF 2009) and WHO (2016) as the presence of at least three of the following five risk factors: systolic blood pressure >130 and/or diastolic >85 mmHg, WC >80 cm for women and >90 cm for men, triglycerides >150 mg/dl, fasting blood sugar (FBG) >100 mg/dl, HDL cholesterol <40 mg/dl in males and <50 mg/dl in females. The data was analysed and differences between the groups were tested by chi-square using SPSS package.

The distribution of lifestyle behavioural risk factors, abnormal physical measurements and biochemical risk factors is shown in Tables-1 and 2. Among Kondhs in rural settings are more likely to be smoking, use tobacco and alcohol, whereas Kondhs in urban setting were more likely to be inactive, overweight/obese, centrally obese and hypertension. Alcohol use was significantly higher among Kondhs in rural area, while physical inactivity, overweight/obesity, abdominal obesity and hypertension were significantly higher among Kondhs living in urban settings.

Considering 126 mg/dl, as the cut-off for defining diabetes, 6.8% rural males, 10.6% rural females, 22.6% urban males and 31.7% urban females are having diabetes. The prevalence of pre-diabetes and diabetes is significantly higher for both male and female Kondh in urban setting as compared to those stay in rural settings (Table -2). Comparing rural-urban differences, diabetes is significantly higher in Kondhs in urban than Kondhs living in rural areas (Table-2). The proportion with low HDL-cholesterol and metabolic syndrome is considerably high in Kondh living in urban settings.

Community Knowledge & Practices in relation to hypertension, diabetes and lifestyles carried out by using pretested and validated questionnaire among all the adults covered for blood pressure measurement. Majority of people from rural and urban settings not having the knowledge and practices on overweight, obesity, hypertension and blood sugar. The proportion of people suffering from hypertension (stage 1 and 2) is 5.5% and 10.8% for rural and urban Kondhs respectively.

Future plan

The study will be continued to cover total sample as per plan and specific formative strategy development for intervention. The intervention will be implemented with existing local health system and community health workers, monitored lifestyle and disease prevention efforts.

4. Effect of maternal filarial infection on infant's immune response following childhood vaccination.

Prin. Investigator : Dr A.K.Satapathy,
Co-Investigator(s) : Dr. M. S. Bal,
Dr B. Dwibedi
Duration : Three years
Starting date : Nov 2014
Status : Intramural

Objectives

(a) To assess the extent to which maternal filarial infection influences the B-cells response (antibody isotype) to TT and BCG in children

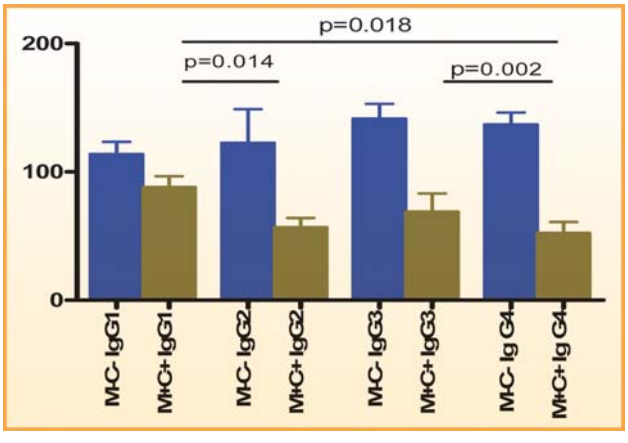
(b) To find out whether maternal filarial infection modulate cellular and cytokine production in respect to childhood vaccination in children

Back ground:

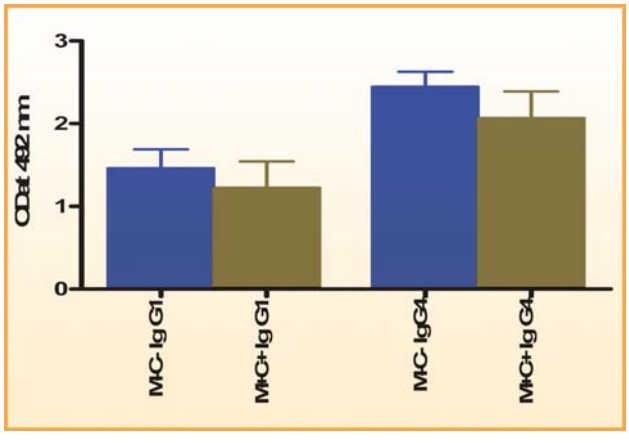
Helminth infections, particularly filarial infections are associated with cellular responses to specific parasite antigens characterized by poor lymphocyte proliferation, impaired production of Th1 cytokines, and a relatively enhanced production of Th2 cytokines (e.g., interleukin [IL]-4 and IL-5). This lack of proliferation and IFN-g response may be related to the production of the regulatory cytokines IL-10 and transforming growth factor (TGF)-b, which may be produced in significant amounts by circulating lymphocytes from subjects infected with filarial parasites.

This antigen-specific acquired cellular hyporesponsiveness may also extend to the cellular response to non parasite antigens. Experimental animal models of infection with helminths have demonstrated that concurrent helminth infection leads to the production of type 2 cytokines in response to antigens that usually stimulate the production of type 1 cytokines and diminished the effectiveness of vaccination.

Further, maternal parasitic infection such as Schistosomiasis and malaria during the period of gestation can suppress an infant's later immune responses to standard childhood vaccination. It is also presumed that sensitization to filarial antigens in utero may also influence the humoral and cellular responses induced by childhood vaccination. Therefore we evaluated the extent



IgG subclass response to BCG in newborn of filarial infected and uninfected mother.



IgG1 & IgG4 subclass response to TT in newborn of filarial infected and uninfected mother.

to which maternal filarial infection influences the humoral and cellular responses induced in children born to such mothers to TT and BCG.

Summary of Progress

Blood samples from mothers and respective cord sample were collected at the time of uncomplicated delivery from the O &G Department of the District Hospital, Khurda of Odisha, India and examined for CFA status using an Og4C3 ELISA. The samples were classified into three groups based on the presence/absence of CFA status of the mother and the respective cord blood: Group 1, mother and cord blood were CFA positive (M+C+); Group 2, mother was CFA positive and the respective cord blood was CFA negative (M+C″); and Group 3, mother and cord blood were CFA negative (M″C″). Earlier we detected decreased levels of IgG antibodies to BCG detected in cord samples born from infected mothers compared to uninfected mothers indicating down regulation of IgG response in cord blood of infected mothers. Further, no significant difference was observed in the Ig G antibodies levels to TT among filarial infected and uninfected mothers. Ig G antibodies to TT in children born from filarial infected and uninfected mothers were also measured. Decreased levels of IgG antibodies to TT were detected in cord samples born from infected mothers compared to uninfected mothers indicating that infection with *W. bancrofti* is associated with an impaired immune response to a vaccine antigen TT, as reflected by relatively impaired antibody responses to TT.

IgG subtype distribution is important for our understanding of the specific immune responses to infection and vaccination. IgG1, IgG2, IgG3 and IgG4 antibodies to BCG antigens were assessed in paired maternal and cord blood sera by ELISA. A comparison to the antibody responses of BCG was made in cord blood samples of filarial uninfected and infected mothers. Our results of isotyping and subclass determinations of anti-BCG antibodies in cord blood samples from filarial infected and uninfected mother are shown in Fig 1.IgG2, Ig G3 & Ig G4 responses were significantly more in cord blood samples of infected mothers compared to cord blood of infected mothers. Among the cord blood of filarial uninfected mothers Ig G3 and G4 were found to be substantially enhanced compared to IgG1 and IgG2. In contrast, among the cord blood of filarial infected mothers IgG1 & Ig G3 response was significantly higher followed by IgG2 and IgG4. Ig g1 and Ig G4 responses to TT in cord blood of filarial infected and uninfected mothers are shown in Fig-2. IgG4 responses to TT was found to be high in cord blood of uninfected mothers like BCG.

5. Estimate the burden of TB among the tribal population and develop an innovative health system model to strengthen TB control in the tribal areas (Multi-centric) funded by ICMR Tribal Task force.

Prin. Investigator : Dr. Tahziba Hussain
Co-Investigator : Dr. Dasrathi Das
Starting Date : 1st March, 2015
Closing Date : 31st May, 2017
Funding : ICMR (Extramural)

Background :

TB is a major public health problem in India but the information on TB situation amongst most of the tribal groups is hardly available. Hence, this study is proposed to assess the tuberculosis

situation amongst the tribal groups in the State of Odisha, in terms of prevalence of Pulmonary TB, risk factors for tuberculosis and the health seeking behaviour of chest symptomatics especially with relevance to the RNTCP in these areas. To obtain reliable epidemiological data on TB in different communities in tribal regions of Odisha, namely Balangir, Dhenkanal, Kandhamal and Mayurbhanj, this study aims to assess the burden of TB and the vulnerability of tribal population. This study further seeks to test out the various support mechanisms for early diagnosis, care and support for effective TB management. This study hopes to evolve a pragmatic implementation model on a collaborative platform with the social and behavioural framework being incorporated into the RNTCP.

Tribes of Odisha :

Odisha has 62 distinct tribal groups, making it the largest collection of tribal people in a single state in the country. Each of these tribal groups has its own indigenous customs and continues to practice them even today. More than half of their population is concentrated in four districts of ***Balangir, Dhenkanal, Kandhamal and Mayurbhanj.***

Summary of progress :

Field work was initiated in the 4 districts of Odisha, namely :

1. **Bhadua, Kasiabeda** and **Gandirabeda** villages in the Jashipur and Jharpokharia blocks of Mayurbhanj district.
2. **Jantaribola** village in the **Kamakhyanagar** block of Dhenkanal district.
3. **Maghamara** village in the **Patnagarh** block of **Balangir** district and
4. **Penagabaeri** village in the **Tikabali** block of **Kandhamal** district.

In order to study the burden, health seeking behaviour, KAP on TB among tribals and review

Table 1: Table depicts the number of households and individuals surveyed, sputum samples collected from chest symptomatic persons and sputum/culture positive TB patients.

Sl.	District	Block	Cluster	No of House holds surveyed	Individuals Surveyed	Sputum from Chest Symptomatic persons	ZN staining report	TB Culture positive
1	Mayurbhanj	Jharpokharia	Kasiabeda	288	889	19	06	04
2	Mayurbhanj	Jharpokharia	Bhadua	234	819	16	09	00
3	Mayurbhanj	Jashipur	Gandirabeda	209	819	17	09	02
4	Balangir	Patnagarh	Maghamara	248	805	11	00	01
5	Kandhamal	Tikabali	Penagaberi	218	939	06	00	00
6	Dhenkanal	Kamakhyanagar	Jantaribolo	203	874	02	01	01
		Total		**1400**	**5145**	**71**	**25**	**08**

the functioning of **RNTCP** in DMCs, TUs and DTC in tribal areas of Odisha, situational analysis of Clusters, Social mapping & District information collection of the respective clusters, qualitative and quantitative assessment, FGDs and Interviews with village heads, influential people, heads of the tribes, TB patients, Medical Officers and public health providers like STS, STLS, ASHA, AWW, etc. were carried out.

Apart from this, survey of 800 individuals per cluster, documentation of individuals regarding the presence of chest symptomatics related to TB was carried out. Sputum samples of chest symptomatics were collected and sent to National Reference Laboratory. Out of **5145** individuals surveyed, sputum samples were collected from **71** chest symptomatics. **25** were sputum/culture positive TB patients [confirmed at NRL, RMRC, Bhubaneswar]. The results were communicated to District TB Officers, STO, STLS, ASHAs and also to the patients of respective districts. The patients were referred to the nearest DOTS centre for treatment and followed up in the subsequent visits.

6. A Prospective Study to determine the Incidence of Tuberculosis among Patients with Type 2 Diabetes Mellitus (Multi-centric- intra-mural).

Prin. Investigator : Dr. Tahziba Hussain
Starting Date : 1st March,2015
Closing Date : 28th Feb.,2017
Funding : Intramural

Background:

The Diabetes epidemic has a major impact on the epidemiologic dynamics of tuberculosis and poses several challenges to control of TB in a resource-poor country like India. Diabetes/TB burden can be brought under control by timely diagnosis of TB among Diabetics by intensified case finding, by adequate and effective treatment of detected cases and preventive therapy. Given the serious threat posed by the Diabetes epidemic on control of TB, and the current gaps in knowledge related to diagnosis, prevention and treatment of TB among Diabetes persons in the Indian population, it is proposed to conduct this

FGD - Male (Kandhamal)

Meeting with DTO and MO, In-Charge at Kasiabeda, Mayurbhanj

Social Mapping

Female FGD

Kandhamal Awarness program

Female FGD

FGD- Female (Dhenkanal)

FGD- Male (Mayurbhanj)

FGD - Female and Male (Mayurbhanj)

cohort study. In populations, where diabetes affects the risk of tuberculosis to a greater extent, TB control might benefit from active case finding and treatment of dormant TB in people with diabetes and from increased efforts to diagnose and treat diabetes. The growing problem of Diabetes in India could make prevention of tuberculosis in this high-risk group a priority area in the years to come. Studies are needed to document TB incidence in this population and then evaluate different TB prevention strategies. This study was carried out to determine the incidence of TB among patients with Type 2 diabetes mellitus in an urban area of Bhubaneswar.

Study Design:

This was a prospective cohort study among patients with Type 2 Diabetes mellitus to study the prevalence of TB. A nested case control design was built into the main cohort to identify the risk factors for TB like duration and severity (HbA1c level) of diabetes, BMI, smoking, alcohol, socio-economic status, history of contact with TB patient and Latent TB.

Summary of progress:

In this study, **1200** patients with Type 2 Diabetes Mellitus (T2DM) attending the Capital Hospital of Bhubaneswar were screened for signs and symptoms of tuberculosis (TB). The socio-demographic and anthropometric profile and risk factors were documented at the time testing. The plasma and sera samples were used for various investigations namely HbA1C, random blood sugar levels, liver function tests, blood urea, serum creatinine and lipid profile. It was observed that **13** patients had active TB disease. This showed that the incidence of TB among patients with Diabetes is **1.08%** which is far less than that reported in other regions of the country (communicated).

It is feasible to screen patients with Diabetes for TB resulting in early detection. The early identification of patients with co-morbidity, especially among the newly diagnosed cases, helped us to link these patients to appropriate care, which could lead to improved TB treatment outcomes.

7. Targeted Intervention to Expand and Strengthen TB Control in Tribal Populations under the Revised National Tuberculosis Control Programme, India. (The TIE-TB Project).

Prin. Investigator	:	Dr. A. Mohapatra
Co-Investigators	:	Dr. Dasrathi Das
		Dr. D. Bhattacharya
Starting date	:	June 2016
Closing date	:	July 2018
Funding	:	Global Fund

A large and deprived tribal population in India estimated at an approximately 104 million (8.6% of the total population) with a huge burden of TB requires services which are, truly & certainly, accessible and available. The extreme remoteness, intense deprivation from even a day's square meal and the harsh and isolated living environments primarily contribute to high vulnerability of and poor access to healthcare by these populations. As such, provision of TB services to the tribal population is not simply an issue of reducing the burden of TB in numbers but is a **'Standard of Care'** issue.

Summar of Progress:

The gaps in service provision to the tribal population have been studied through two commissioned studies from the Central TB Division entitled 'Social Assessment Study under the Revised National Tuberculosis Control Programme' the first being conducted in 2005 and a follow up of the same concluded in 2011. To address these issues the project entitled 'Targeted Intervention to Expand and Strengthen TB Control in Tribal Populations under the Revised National Tuberculosis Control Programme, India (The TIES-TB Project)" is proposed. This project focusses on interventions of structured community engagement, focused involvement of traditional healers and spatially targeted usage of Mobile vans equipped with Digital X-ray and sputum microscopy services in an effort to improve access to TB care services and improve the health seeking behavior of the tribal populations. This effort essentially builds up further upon the tribal action plan being implemented under the RNTCP and will be a programmatic implementation.

The principal coordinator for this project will be the National JALMA Institute for Leprosy and Other Mycobacterial Diseases (NJIL&OMD), Agra The overall coordination of the project will be done by the ECD Division of ICMR. The NJIL&OMD; the National Institute for Research in Tribal Health (NIRTH), Jabalpur; the National Institute for Research in Tuberculosis (NIRT), Chennai; and the Regional Medical Research Centre for Tribals (RMRCT), Bhubaneshwar will undertake the project in the different sites. The NJIL&OMD will conduct the study in Rajasthan, the NIRTH in Madhya Pradesh and Chhattisgarh, the NIRT in Gujarat and RMRC, Bhubaneshwar in Jharkand.

Background

TB in the Tribal Population, the problem statement

The estimated tribal population in the country is an approximately 104 million which is 8.6% of the total population and is a sizable proportion of the total population of the country. However, a large majority of the tribal population is extremely remote, intensely deprived (of even a day's square meal), reside in scattered habitats (thereby being even more unreachable), have extremely low levels of literacy, low levels of awareness and continuing deep rooted belief in traditional healers. The Tribal are highly vulnerable and face a number of health risks. Their vulnerability can also be attributed, apart from the above mentioned factors, to high rates of poverty, illiteracy, smoking, and alcohol use, as well as harsh and isolated living environments and poor access to healthcare. The combination of increased susceptibility to health afflictions, scarce availability and accessibility to health services and poor health seeking behavior poses challenges in the management of highly prevalent, communicable diseases, such as TB.

As regards the prevalence of TB in tribal population a meta-analysis has provided a pooled TB prevalence estimate of 703 per one lakh for the tribal population, which is significantly higher than that estimated for India (256 per 1 lakh) (in press). This estimate greatly differs from the

RNTCP annual report's estimate of 80 positive smear cases per 1 lakh tribal population (4). The meta-analysis demonstrated a large variability in tribal TB prevalence estimates among the different studies with poor representation of the various tribal groups. The moderate level of heterogeneity found across the studies suggests that the pooled-estimate needs to be treated with caution. Furthermore with passive case finding under RNTCP and the profile of these hard to reach group these estimates do no provide the true picture. The RNTCP vision is for a "TB free India" with reduction in the burden of the disease through 'Universal Access' for quality diagnosis, treatment and quality of services to all persons diagnosed with TB while focusing on reaching the unreached, the tribal population being one such group that requires attention.

Gaps in Access

Insufficient/poor physical access to diagnosis and treatment due to difficult terrain, sparsely distributed population in forest and hilly regions, long distance travel to reach the health centres (8), weak health infrastructure, non-availability & limited accessibility of health care providers (9) remains a challenge. Public health services are often not client friendly because of variation in the timings and cultural beliefs. Insufficient community engagement, deep rooted belief in traditional healers continues to be major impediments in reaching out to the tribal populations.

Gaps in Awareness

Lack of awareness on TB, misconceptions of TB, lack of appropriate awareness building measures with language being a barrier, lack of integration with other health social and developmental sectors further limits their health seeking behavior delaying early initiation of TB treatment. Furthermore, limitations of **non-tribal health workers** familiar with the various dialects of the tribal population in motivating the tribal patients, poor commitment due to **lack of monetary rewards**, low literacy levels are some of the other issues identified. The service-beneûciary gap is particularly marked in the case of tribal populations in hilly and forested areas requiring local adaptations to ensure quality coverage.

Brief Summary of the Proposal and Institutional Arrangements for Implementation:

The delivery of effective RNTCP services to the tribal population is an issue of 'Standard of Care' and routine policies and strategies will continue to be ineffective in catering to these extremely remote populations. Clearly these populations 'need more' and bold strategies and initiatives need to be instituted to address the various challenges in reaching out to them.

The Indian Council of Medical Research (ICMR) under the Department of Health Research/Ministry of Health & family Welfare/ Government of India, in collaboration with Central Tuberculosis Division (CTD)/ Department of Health & Family Welfare/ MOHFW/GOI proposes to undertake this project in certain defined hard to reach, tribal areas spread over Western and Central parts of India. The project will be carried out in an implementation research mode wherein the interventions will be evaluated as per defined protocols through rigorous research methods

qualitatively and quantitatively, thereby serving evidence to RNTCP for decisions on further policy designing & scale up to the entire tribal population. Cost effective and cost benefit analysis will also be undertaken which will add to the decision making for scale up of the interventions.

The project will be implemented in 5 States and 19 districts covering a total population of approximately 17.65 million and is expected to lead to an additional case finding of 7940 TB cases from the tribal population and more importantly improve the 'Standard of Care' among these extremely deprived populations which will be measured through various programmatic and socio-economic indicators. The efforts will lead to early seeking of care and reduction in out of pocket expenditure of individual patients. The patients will have access to the correct and appropriate treatment regimen and will help in curbing of the individual patients from being directed to multiple providers for treatment which results in huge economic burden to the patient and his family. The effects of the intervention on various social aspects can also be underlined. For the programme and the country as a whole the efforts are expected to lead in more complete detection of TB cases in the tribal community and notified under the programme and reduction on indirect costs. Improved detection and notification of TB cases from the tribal population will imply more and more TB cases to have access to the correct and appropriate treatment regimen and thereby prevention of multi-drug resistance among these populations.

Each of the identified institute of ICMR will work in close collaboration with the respective District Tuberculosis Officer (DTO) and the State Tuberculosis Officer (STO) in the respective district/state. The respective DTOs and STOs will be equal partners in the project and will also be responsible for the smooth execution of the project. The DTOs and the STOs will be actively involved from the planning stage itself and during the whole execution of the project.

Objectives

Strengthening TB Control in Tribal Populations

1 Strengthen access to RNTCP services in the tribal population.

2 Promote early case detection and treatment adherence in the tribal population and overall improvement in the quality of the services.

3 Improve awareness on TB and RNTCP services through community based ACSM activities.

Strengthening TB Control in Tribal Populations- Interventions Proposed

The various interventions to be undertaken as against each of the objectives are detailed below.

Objective: Strengthening TB Control in Tribal Populations; -Strengthen access to RNTCP services in the tribal population

Mobile Digital X-ray and Sputum Microscopy Vans for Geographically Remote Places (Spatial Targeting)

Since the health services have limited reach to the extreme remote locations of the tribal population it is necessitated that measures be instituted to reduce the reach of these populations

in an effort to improve accessibility to health care services. Towards the same it has been planned to put in Mobile TB Diagnostic Van (MTDV) equipped with digital X-ray and sputum microscopy which will visit certain identified remote places in these tribal populations. These remote places will be mapped beforehand and the MTDV will visit these locations at a defined frequency and time interval. These remote places will be defined as not having a subcentre within a radius of 2 Km and/or lack of a convenient transportation (defined as availability of at least one to and fro transportation service per day). In defining these remote locations considerations will also be made of aspects of patients having been detected from the various villages/hamlets in the last two years. Villages/hamlets from which patients have not been detected/barely detected under the RNTCP during the last two years will also be included for visit by the MTDV. A beforehand situation analysis will be done of each of these areas and such hamlets/villages will be defined and listed.

It is assumed that for a population of 17 million an approximately 17000 villages/hamlets will be existing (assuming a village has an average population of 1000). Of these 17000 villages/hamlets, it is expected that an approximately 5100 villages/hamlets will qualify for the above mentioned definition for remoteness. Each of these identified villages will be visited once at least every three months. Considering that on average 2-3 villages will be visited on each day and an approximately 50 villages per month, each MTDV is expected to cover 150 villages in three months. Hence to cover the identified 5100 villages an approximately 35 vans will be positioned. This MTDV van will be procured on a hiring basis and will be so positioned so as to cover the identified villages/hamlets in each district proposed for intervention. The van will visit all such hamlets/villages at least once in three months and more depending on circumstances.

The identified Community workers under the project will be trained to create TB awareness in community in order to sensitize and prepare the community before this exercise. Before the day of the scheduled visit the Community Worker will mobilize the TB suspects to be available for examination on the scheduled day of visit. The identified opinion leaders and traditional healers will also be roped in for this activity.

For sputum microscopy attempts will be made to obtain a morning and spot sample and if not possible two spot samples will be collected. The collection of morning sample will be facilitated through community worker who will be sensitized in sputum collection and will be equipped with sputum containers. This will be given to all TB suspects a day before the visit of MTDV. The TB suspects will as far as possible be encouraged to collect morning sample on the day of the visit of the van. The results of the sputum microscopy will be provided during the same day. The positive patients diagnosed will be referred through the community worker for treatment to the nearest PHCs and STS will be intimated to ensure that the patient access the treatment centre and is initiated on treatment.

Sputum of patients who test negative on sputum for AFB but have abnormal chest X-ray

will be transported by the MTDV to district headquarters for testing by CBNAAT. It is expected that the CBNAAT machines will be installed in these districts by RNTCP. Alternatively also these patients will also be provided their sputum results and the image of the X-ray and will be referred to the nearest PHC through the community worker for further work up. All such patients diagnosed through the MTDV will be rigorously followed up for ensuring that the final diagnosis of each of these is established and the patient initiated on treatment. Attempts for tele-radiology will also be made where necessary. Required mechanisms for tele-radiology will be placed to facilitate the same.

The Laboratory Technician / X-ray technicians recruited for MTDVs will be as per the eligibility norms of RNTCP but relaxation will be made when this is not possible considering the difficult terrain and availability of such qualified personnel. Candidates having intermediate/graduation in science background will be considered as an alternative and will be adequately trained for sputum microscopy and X-ray. This intervention will not only help in reducing the access difficulties faced by this remote population but will also contribute to increase in case finding i.e. will also be serving to fulfilling of Objective 3.1.2.

Objective: Strengthening TB Control in Tribal Populations; Promote early case detection and treatment adherence in the tribal population and overall improvement in the quality of the services.

Community workers would be identified with the help and those concerned from community. These workers will be trained to create TB awareness in community and also identifying TB suspects. They will visit all the households in the defined population, identify chest symptomatic and make arrangement for their examination at the nearest microscopy centre/MTDV. For those who test positive they will also follow these cases for treatment initiation and adherence. They will also be considered for the role of DOT providers. In addition, other community members/groups such as Village Health Sanitation Committee (VHSC) members, Panchayati Raj Members, Anaganwadi Workers, Traditional Healers, ASHA workers, School Teachers and any other defined leaders/groups who form the integral part of tribal community will also be involved to promote early case detection and treatment adherence in the tribal population. This intervention is described in further details in the paragraphs below.

Objective: Strengthening TB Control in Tribal Populations; Improve awareness on TB and RNTCP services through community based ACSM activities.

Community Engagement– for an effective community engagement it is necessary that a structured implementation arrangement be put in place which will propel and motivate the community to perform and actively engage in improving TB patient care at community level. The following activities will be undertaken as a part of community engagement.

1. **Line listing of the following**
   (a) Village Health Sanitation Committee (VHSC) including its constituent members;
   (b) Panchayati Raj Members;
   (c) Anaganwadi Workers;
   (d) Traditional Healers;
   (e) ASHA workers
   (f) School Teachers
   (g) Any other defined leaders/groups in the community if existing.

Basically a closed defined group of community leaders and opinion leaders will be sensitized and involvement for the intervention assessed and enrolled.

2. Community meetings for each of the above groups at a defined frequency and time interval.
3. Deployment of staff exclusively for carrying out the above activities.
4. Identification of a community person for an average population of one per 1000; however this will vary based on geographical considerations. They will not only function as a DOT provider but will also be responsible for galvanizing all RNTCP services in his/her defined population.
   (a) The identification of this community person will be done through a consultative process with the community
   (b) This person will be paid a fixed honoraria @ Rs. 250 per month
   (c) Will perform a defined set of functions at a defined time interval and frequency
   (a) Active screening through house to house visit every three months
   (b) Referral of TB suspects to the nearest DMC with the help of referral slips. These referral slips will be in a book let form with three parts, two will be given to the patient who will submit one to the LT and preserve other one and the counterfoil will be maintained by the community worker. When the result is made available this will be communicated to the community worker through the counterfoil. The LTs will be informed to make entries of the sputum results in the portion carried by patient and to maintain the other part in the centre for future referrals. The community worker will use this as a tool for monitoring of the referrals.
   (c) Prepare the community for the visit of the MTDV if this is a chosen area.
   (d) Conduct of TB awareness activities.
   (e) Serve as a DOT providers and ensure treatment adherence for each TB patient initiated on treatment
5. Tailor made culturally materials and tools will be developed for Community meetings of the above listed community members.

Involvement of Traditional Healers– though listed as one of the groups for involvement for promoting community engagement as outlined above, this will be a specific group for focus and

attention. The activities for this group will be monitored separately. Evidence clearly shows that these are yet preferentially visited and are the initial points of contact for TB patients among the tribal population. These are readily available and are easily accessible (most importantly in terms of distance) to the patients which are the most important reasons for being preferentially utilized by the community for health care. The belief of the tribal population is deep and is set among the traditional values imbibed over generations and any confrontationist strategy with the traditional healers could only be counterproductive. Based on these premises it is strongly felt that the traditional healers need to be partnered with to improve the quality of the services in the tribal populations. The following activities will be undertaken in a structured manner for ensuring committed involvement of the traditional healers.

1. **Line listing of the traditional healers**

   (a) A careful search will be undertaken to ensure line listing of each of the traditional healer

   (b) Community meetings for each of the above groups at a defined frequency and time interval.

   (c) Staff appointed exclusively for undertaking community engagement will be undertaking this activity too.

2. **Preferential involvement as DOT providers**

3. **Tailor made materials and tools will be developed for Community meetings of the traditional healers.**

The interventions outline in para 4.1 and 4.2 will be carried out in active collaboration with the programme functionaries. Both the activities will be primarily undertaken by the STS/Staff of RNTCP of the respective areas. The project staff (Field Supervisor) provided for field level activities will have the role of more of oversight and coordination and in ensuring that the activities are undertaken as per plan. The field supervisor will be stationed as per requirements. Each district will be necessarily provided with a field supervisor, however, population and geographical considerations will be importantly considered in positioning of the field supervisors.

It is estimated that to effectively ensure the above activities outlined at least 1 field supervisor per 5 lakh population will be required when working in concordance with the RNTCP paraphernalia. The respective STO and DTO will ensure that the respective programme workers will actively and effectively contribute to these activities.

Each of these field supervisors will be strictly recruited from the local population. The inability of non-tribal workers to work effectively among the tribal populations and also lack of monetary awards in effectively engaging the community workers have emerged as identified issues in the social assessment studies. Both the aspects have been addressed in the project. Thus, both the staff to be engaged in the project and also the community workers will be recruited from the local population and the community workers will be paid limited honoraria for the various activities performed.

Strengthening TB Control in Tribal Populations- Monitoring and Evaluation

The monitoring and evaluation for the project will as far as possible be integrated with the existent monitoring and evaluation system of the programme. However, to measure the performance of the project few differential modules will need to be inserted in the existing monitoring and evaluation system. Relevant records and reports will be placed to monitor the activities of the project. The responsibility of the MIS will lie with the programme as well as the project staff.

Strengthening TB Control in Tribal Populations – measuring the success

The interventions to be carried under Objective 3.1 will be evaluated as per defined protocols through rigorous research methods qualitatively and quantitatively, thereby serving evidence to RNTCP for decisions on further policy designing and scale up to the entire tribal population. Cost effective and cost benefit research will also be undertaken which will add to the decision making for scale up of the interventions.

A base line study will be undertaken to understand the situation in the tribal population identified for implementation of the project and also obtain the baseline values for the indicators such as delay in seeking care, delay in treatment initiation, out of pocket expenditure, work absenteeism. During the end of the project, an end line study will be undertaken to measure the above values and various other aspects to measure the achievements of the project. Cost effective and cost analysis will also be undertaken which will serve as evidence to scale up the activities of the project to the entire tribal population. These studies will be done on an appropriate sample picked up from the intervention sites. Appropriate research methodologies will be used for conducting these studies. Both these studies will be conducted under a common protocol for comparison of the results of endline study and baseline study.

Strengthening TB Control in Tribal Populations- Activity Plan

The proposed project will be implemented for a period of two years. As mentioned in earlier paragraphs, primarily the intervention will be carried out in a tribal population of 17 million covering 5 states. A total of 19 districts have been selected for intervention where the tribal population is more than 50% of their total population (Data Source – website of Ministry of Tribal Affairs). The details are as under

1. The baseline study will also be undertaken up during the initial six to eight months.
2. Based on the programme capacity and various other factors the interventions will be initiated since six to eight month onwards and will be gradually expanded to cover all identified districts and sites.

So far the activities going on in Jharkhand state, the recruitment process is over and the base line survey is going on. The orientation training was carried out before carrying out the baseline survey. Presently the staff are busy in preparing line listing & rout maping the MTDV in each district.

8. A study on the effectiveness of food supplementation on treatment Outcomes and Nutritional status of Adults with Pulmonary Tuberculosis in Odisha.

Prin. Investigator : Dr. A. Mohapatra
Co-Investigators : Dr. G.Bulliya,
Dr. Dasrathi Das
Dr. Sanghamitra Pati
Starting date : Aug 2016
Closing date : Oct 2018
Funding : Tata Trusts

Background

Tuberculosis (TB) remains one of the major infectious causes of morbidity and mortality worldwide. Effective drugs are available, but a long period of treatment and high levels of compliance are necessary to achieve a cure. Addressing comorbid conditions has value for improving access and response to TB treatment and it should be considered as part of the standard of care for people with TB.

Nutrition and Tuberculosis:

Undernutrition is both an important risk factor for, and a common consequence of, TB. It is therefore a common comorbid condition for people with active TB and is associated with increased risk of mortality and poor treatment outcome (1-3). Most individuals with active TB are in a catabolic state and experience weight loss (2, 4) and some show signs of vitamin and mineral deficiencies at diagnosis (5). Weight loss among those with TB can be caused by several factors, including reduced food intake due to loss of appetite, nausea and abdominal pain; nutrient losses from vomiting and metabolic alterations caused by the disease. Undernourishment, low body mass index (lower than 18.5kg/m^2) and lack of adequate weight gain with TB treatment are associated with longer time to sputum conversion (6), higher risk of hepatotoxicity (7), higher risk of TB relapse (8,9) and also increased risk of

Objective-wise expected outputs from the project and indicators for measurement

S.No.	Objectives	Expected outputs	Indicators for Measurement
1	**Strengthening TB Control in Tribal Populations**		
	Strengthen access to RNTCP services in the tribal population	Improved convenience to TB patients in terms of accessibility for diagnostic services	Number of patients diagnosed through MTDV; decrease in out of pocket expenditure of patients
	Promote early case detection and treatment adherence in the tribal population and overall improvement in the quality of the services	Improved case finding under the programme; reduced default rates	Additional case finding from the project; Number of days required for patient to seeking health care after developing symptoms; Number of providers visited before coming to RNTCP
	Improve awareness on TB and RNTCP services through community based ACSM activities	Community workers involved and sensitized in TB services; Increased number of opinion leaders in the community made aware of programme services	Number of community workers registered for working in the programme; Number of traditional healers involved in the programme

mortality (2, 10). Undernourished patients have malabsorption of drugs like rifampicin and can contribute to treatment failure and development or drug resistance (11). Even among the contacts of TB patients, undernourishment is considered as a risk factor for development of active TB (12).

Social determinant of Malnutrition and TB:

Because under-nutrition increases the risk of progression from TB infection to active TB disease, food insecurity and poor general nutritional status in the population are important contributors to the global burden of TB disease (1,3). Majority of all TB cases are among people who are 15-54 years of age and in their prime working years. TB aggravates poverty as patients are often too sick to work and their families have to pay expenses associated with treatment like travel to treatment centre, nutritious diet.

Macronutrient requirements in active TB:

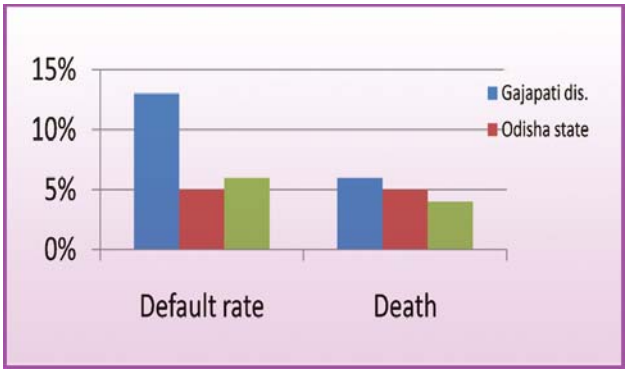
There is currently no evidence to suggest that the proportion of dietary energy from macronutrients is different for people with active TB than those without TB. It is generally recommended that all people consume approximately 15-30% of energy as protein, 25-35% as fat and 45-65% as carbohydrates (13). Studies have shown that subjects who receive food supplements during TB treatment tend to gain more weight compared with those not receiving food supplement (4, 14). However the increase in weight gain has not been associated with improvement of TB treatment outcome. Under nutrition is an important modifiable risk factor for TB at the population level. A large study from rural India where the nutritional status of rural patients with pulmonary TB was studied, showed 80% of women and 67% of male had moderate to severe under nutrition and weights did not return to normal even at the end of treatment (15). From earlier days to recent times, nutritional supplements to TB patients have not only shown weight gain but also shorter time to sputum conversion, higher cure rate and better performance status (6, 16, 17). India with highest burden of TB and under nutrition is yet to come up with a strategy to overcome this interlinked epidemic.

Gajapati District, Odisha:

Gajapati district is one of the poor performing districts of the State Odisha. As of I quarter of 2014, this district with a population of 6 lakhs, has 2 TUs and 11 DMCs. Each TU covers approximately 3 lac population. Every quarter approximately 150 smear positive cases of TB are detected under RNTCP; Cure rate of NSP is around 73% with a default rate varying from 7-13% in this district (18).

In the first quarter of 2014, 162 smear positive patients were diagnosed of whom 118 were new smear positives (NSP) registered for treatment (85 males, 33 females). Majority were between the age groups of 25 to 54 years. During the same period, the 3-month conversion rate of NSP was 79% and cure rate of NSP patients was only 70.9%, much below the national average. Initial defaulters were around 10%. Few of the blocks in the neighboring district of Rayagada and, Kandhammal also show similar low cure rates and high default rates. Difficult to reach areas, lack of pre-treatment counseling are few of the

reasons quoted for lack of follow-up, high default rates and hence low cure rate in this region.



Shows default and death rates among cases in I quarter (2013).

Objectives

1. **Primary Objective**:

To assess the **effectiveness of food supplementation on the treatment outcome of cure rates and loss to follow-up.**

Hypothesis: We hypothesize that a higher proportion of new sputum smear positive pulmonary tuberculosis patients, treated with anti-TB treatment along with a food supplement will go on to complete their treatment resulting in lesser loss to follow-up and a higher cure rates as compared to cure rates in this district prior to this intervention.

2. **Secondary Objective:**

To **evaluate the impact of a food supplement on the nutritional status** of adults with new sputum smear positive pulmonary TB attending RNTCP centers in Gajapati district and few blocks of Rayagada, Kalahandi and Kandhammal districts of Odisha.

Hypothesis: We hypothesize that tuberculosis patients with low body mass index (BMI < 18) treated with anti-TB treatment along with food supplement will have faster reconstitution of body weight and improvements in lean body mass and other anthropometric parameters as compared to those who receive only anti-TB treatment (historic controls).

3. **Tertiary objective:-**

To **assess the Quality of Life** and return to normal functionality among patients receiving food supplement along with anti-TB treatment

Hypothesis: We hypothesize that tuberculosis patients treated with anti-TB treatment along with food supplement will **return to work (normal functionality) much earlier and better quality of life** than those who receive only anti-tuberculosis treatment.

Methodology

Study site:

(i) 11 DMCs of the 2 TUs in Gajapati district of Odisha (DTC-TU and Chandragiri – TU) (6 blocks)

(ii) 2 blocks in Rayagada & Malkangiri and 1 Block each at Kalahandi and Kandhammal district of Odisha with 1 DMC each.

Now the Final sampling frame will be as follows: 12 Blocks in 5 Districts of Odisha.

Gajapati- Guma, Kasinagar, Mohana, Nuagarh, R. Udaygiri, Rayagad,

Rayagada-	Bisam katak & Munniguda
Kalahandi-	Lanjigarh
Kandhamal-	Kotgad
Malkangiri :	1. Mathili & 2. Pandripani

The oral food supplement will consist of

1. Rice (20 kgs) {Iron-fortified rice – if feasible & available},
2. Ragi (10kgs),
3. Local Arhar dhal (Kandol) (9 kgs)
4. Mustard Oil (2 kgs)
5. "Sathu" (flour made from groundnut, wheat, flat rice and chickpea)- 500gms/month.

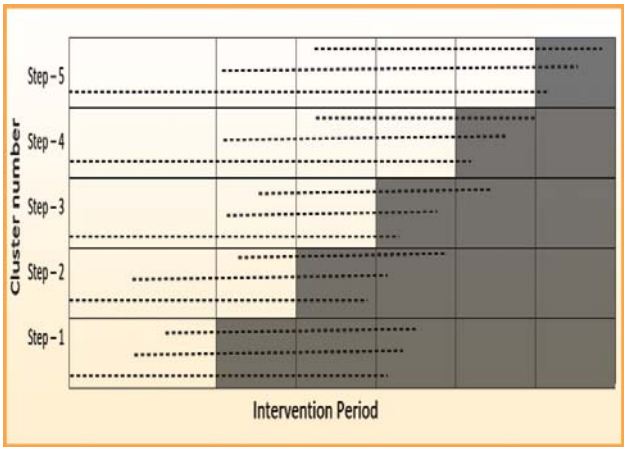
Study Design: **Step wedge design** (Phased Implementation)

Step wedge design (Phased Implementation) is particularly useful when it is not feasible to provide the intervention to every individual/ community at once. The intervention is rolled-out sequentially to the trial participants (either as individuals or clusters of individuals) over a number of time periods. The order in which the different individuals or clusters receive the intervention is determined at random and, by the end of the random allocation, all individuals or groups will have received the intervention. This design is for evaluating the effectiveness of interventions that have been shown to be efficacious in a more limited, research setting and are now being scaled up to the community level and also useful for evaluating temporal changes in the intervention effect.

Data analysis to determine the overall effectiveness of the intervention subsequently involves comparison of the data points in the control section of the wedge with those in the intervention section (19).

For this study, we will consider 5 clusters consisting of 4 DMCs each in first 4 clusters and 3 DMC in the last cluster {4, 4, 4, 4, 3}. While patients are being enrolled to intervention in cluster 1, the other 4 clusters will be the control group. After every three months, the next cluster will begin enrolling patients to the intervention until all the four clusters are enrolling. The enrolment to study will stop in all the clusters when the last cluster has been enrolling for three months.

The logistics of Step-wedge design trial design is shown below:



Eligible Patients

A patient will be eligible for the study if he/she

1. Is new sputum smear positive pulmonary TB yet to initiate ATT or recently initiated ATT (within ≤ 3 doses or 7 days).
2. Is willing to sign informed consent form; adhere to the follow-up schedule and to study procedures once food supplement along with ATT is initiated.

Ineligible population

A patient will not be eligible for oral food supplement if he/she:

1. Is allergic to pulses / nuts

2. Is unwilling to sign the consent form and is unable to attend or comply with treatment or follow-up schedule

Every attempt will be made to motivate such patients to participate in the study, find reasons for his denial and take corrective steps to rectify that. However, if patient is still unwilling to receive the food supplement, a note of that will be made along with reasons for his denial.

Methodology

Baseline assessment:

Prior to issuing the supplement baseline assessment will be done. A detailed clinical and demographic history will be collected including past medical history, family and personal history (smoking, alcohol and substance abuse). A brief physical examination will be done and anthropometric measurements (height, weight and mid-arm circumference) will be measured and recorded. Wherever feasible, food intake will be assessed by retrospective 24-hour dietary recall by a trained study staff. Nutrient intake will be calculated using "Digest" software (21), a specially designed software package to analyze Indian diets. Sputum results and current treatment detail will be collected from RNTCP lab register and Treatment card. 5ml of blood will be collected on a sub-set of patients to assess the nutrient content (both vitamins and micronutrients) in blood before initiating food supplementation, to assess protein, vitamin and micronutrient content in plasma. (the sub-set selection will be decided subsequently)

Patient will be counselled about the study and its procedures and informed written consent will be obtained before enrolling to the study. H/she will be motivated to be regular with treatment and sputum examination, need of nutritious diet and adherence to the food supplement.

Food Supplement:

The oral food supplement will consist of Rice (20 kgs) {iron-fortified rice – if feasible & available}, Ragi (10kgs), Local Arhar dhal (Kandol) (9 kgs), Mustard Oil (2 kgs) along with 500gms of "Sathu" (flour made from groundnut, wheat, flat rice and chickpea) per month. (The type of pulses and oil are added based on local tastes and preferences). This is planned in such a way so as to support a family of five for one month. This will be supplied to the Index patient as fortnightly packs and will be issued to him/her at his/her DOTS treatment center through the study staff till the end of his/her treatment period.

Nutrition counseling:

Staff will be trained to nutritionally assess, counsel and monitor the intake of nutritional supplement being provided to the patients on ATT at the DMC/DOTS treatment centers as well as their homes.

***Follow-up*:** While coming to collect the food supplement, patients will be followed up every month, with a brief clinical exam, anthropometry, dietary recall and drug adherence. All patients will be de-wormed once every month. Sputum results will be collected from RNTCP records where it will be done at pre-treatment, end of IP,

4th month and 6th month. (In case of extension of IP, sputum exam is done at 3rd, 5th and 7th month as per RNTCP guidelines). 5ml of blood will be collected on sub-set of patients to assess the nutrient content (both vitamins and micronutrients) in blood at end of 6 months of supplementation. Quality of Life and Lung health will be assessed by standardised and validated scales (like WHO BREF QOL scale) for Indian population. Adherence to the ATT and food supplement will be ensured by surprise home visits and requisitioning of patient during monthly visits.

Besides the study participants, additional food packets will be given to the other TB patients on treatment attending the study sites. They too will be followed as an observational cohort and minimal details like symptoms, weight, height, sputum smear status etc. will be collected from them. A technical advisory group (TAG) consisting of NIRT, RMRC Bhubaneswar, State focal point RNTCP Odisha, Tata Trust and Central TB Division / WHO representative will meet on a regular basis during the course of the study, to review progress and suggest mid-course corrections in case required.

Statistical Analysis

Sample size calculation:

From RNTCP's TB India 2014 - Annual Status Report, the treatment success rate of new smear positive cases in Gajapati district is 73%, as compared to the national average of 90%. We assume that with our food supplement, by improving the adherence rate, the treatment success rate will increase to 90%. In the study area, there are 19 Direct Microscopy centres (DMCs) (Average of 5 cases per month at each DMC) that record 285 new smear positive cases (NSP) per quarter i.e., approximately 1140 per year.

Stepped Wedge design is adopted for this trial of 12 months. We have 5 steps: 4 steps with 4 DMCs each (i.e., 4 clusters with 4 DMCs each) and 1 step with 3 DMCs (one cluster with 3 DMCs). There are one baseline measurement and 3 during-intervention follow-up measurements (t) (at 2, 4 and 6 month – as per RNTCP guidelines). The intervention will be rolled out among these clusters in a time interval of 3 months. Outcomes (sputum smears) are measured on the study participants in all clusters at every time period, hence measurement of outcomes takes place at each step in the wedge; each cluster provides data points in the control and intervention conditions allowing each site to act as its own control.

Assuming an intra cluster correlation of 0.05 (Lewin et al., 2005), 95% confidence level, 90% power and 20% of refusals/loss to follow-up, the required sample size is 703 patients over a period of 1 year. The clusters will be randomized to one of the 5 dates to start the intervention, time and hence the sequence of units (clusters) that will start the intervention at each period is determined by random allocation. The randomization occurs before the start of the trial.

Statistical Analysis plan

- With primary outcome as bacteriological conversion rate, comparison of the same in the pre and post intervention periods will

be reported. Baseline data collected from the first time period will be tabulated by order of implementation, grouping the clusters into five groups of nineteen clusters. This will include conversion rate, mean age, sex, and other process measures.

- In the primary analysis, conversion rate will be modeled using mixed effects logistic regression with random cluster effects allowing inclusion of baseline risk factors such as co-morbid disease etc., and adjustment for a fixed time effect between intervention periods.
- We will examine the adequacy of our randomization and include any DMC level variable unbalanced at baseline in our final model.
- The patient level covariates to be included in the model will be finalized prior to analysis. Time to event analysis will be carried out using a Cox proportional hazard's model with fixed and random effects.

Study Outcomes:

The study outcomes would be measured by increase in the cure rate and increase in the body weight & BMI.

i. Proportion of patients and amount of gain in the body weight, BMI, lean body mass and fat mass from pre-treatment level.

ii. Change in quality of life from the baseline as assessed using WHO BREF QOL scale and Time to return to normal (pre-treatment) physical activity level.

9. National Reference Laboratory for Tuberculosis

Prin.Investigator : Dr. Dasarathi Das
Funding : Central TB Division
Starting Date : October 2013

Background

RMRC, Bhubaneswar is one of the six National Reference Laboratories (NRLs) of the country which supervises 10 states namely Odisha, West Bengal and 8 North East states for quality TB diagnosis by RNTCP. The main focus of the activities is quality assessment of laboratories providing TB diagnosis by smear microscopy, Culture and genotypic methods like LPA and CB NAAT. In addition to quality diagnosis, NRL provides training to laboratory personnel working in state IRL and C & DST laboratories and technical support for establishment of new RNCTP laboratories. It also provides diagnosis and follow up culture for MDR TB patients on DOTS Plus regimen to 10 districts of Odisha (Bhubaneswar, Puri, Nayagarh, Khordha, Rayagada, Kalahandi, Malkangiri, Kopraput, Nuapada &, Nawarnagpur) & TB diagnosis based on smear microscopy, culture and CB NAAT through its Designated Microscopy Centre operating at OPD of RMRC, Bhubaneswar.

Summary of Progress

During this period pre-assessment visit was made to three states Sikkim, West Bengal and Tripura for finalization of liquid culture laboratory for TB diagnosis. The NRL team imparted CB NAAT training at IRL, Cuttack and

1st Line LCDST at IRL, Kolkata. The centre carried out proficiency testing for IRL, Guwahati, NBMC, Silliguri, IRL, Arunachal Pradesh and IRL, Sikkim. This year NRL became proficient in 1st line LC-CDST in addition to proficiency in LPA, 1st and 2nd line DST in solid Lowenstein-Jensen medium. During this period external quality assessment visits were made to West Bengal and Odisha. The staff employed in NRL were trained at NTI, Bengaluru in various technologies. The National Reference Laboratory Coordination Committee meeting was organized at this centre from 20th -21stSeptember 2016 in which work carried out by all the six NRLs was discussed and future course of action was planned.

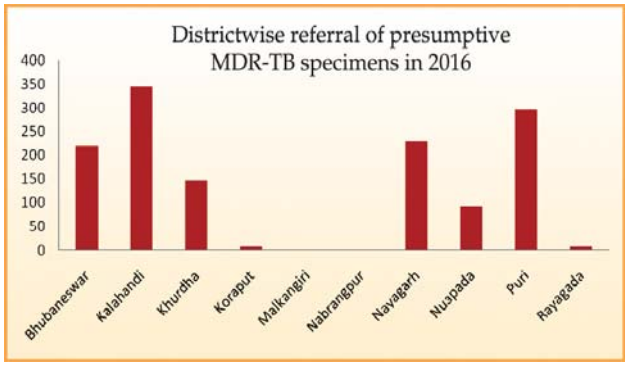


Fig. 1: During the year 2016, a total of 1337 presumptive MDR TB cases were tested for diagnosis of MDR TB from ten districts of Odisha.

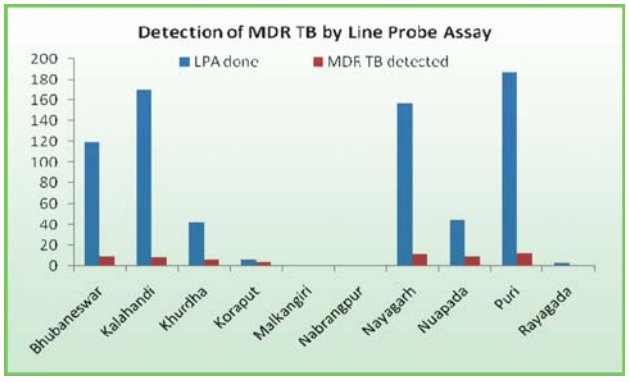


Fig.2: Out of 1337 specimens received at NRL,RMRC, 730 smear positive specimens were tested by LPA and 8.2% were detected as MDR TB patient and referred to DR TB sites for DOTS Plus treatment.

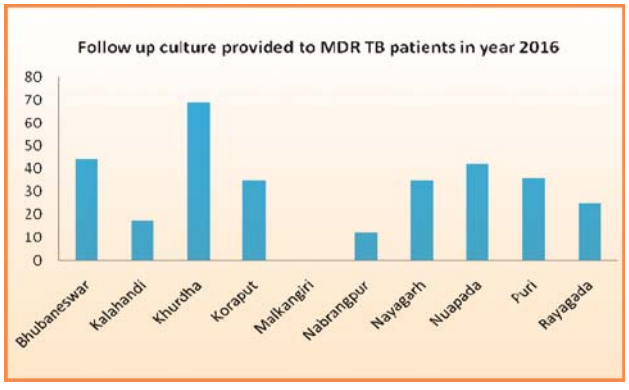


Fig. 3: In 2016, a total of 315 specimens of MDR-TB patients on DOTS Plus treatment were processed for follow up culture. Out of which, 18 patients were found as XDR suspects and sent for 2nd line DST.

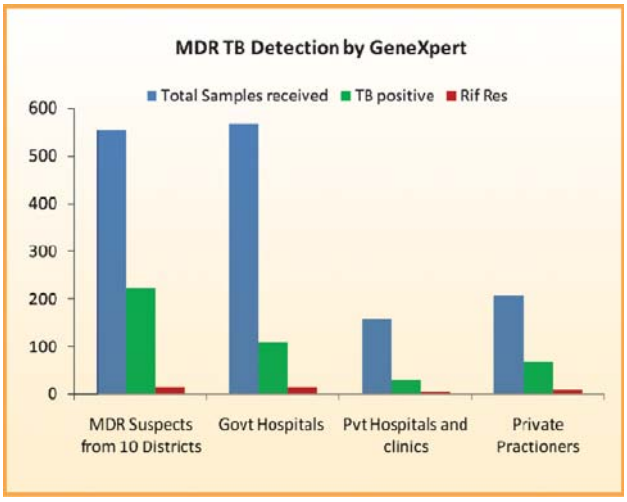


Fig. 4: In 2016, a total of 1486 samples were tested by GeneXpert and 3.02% were found as Rifampicin resistance. They were referred to districts for DOTS Plus treatment initiation.

Designated Microscopy Centre and DOTS site

The centre has opened a DMC in its OPD for diagnosis of suspected TB patients with pulmonary and extra pulmonary symptoms. In 2016, TB diagnosis was provided to 299 suspected TB patients.

10. Determinants of high MDR TB in Sikkim and its control: a multi-centric study.

Prin. Investigator (RMRC Site)	:	Dr. D Das, Sc-E, RMRC, Bhubaneswar
Prin. Investigator (NIRT Site)	:	Dr. K R Umadevi, NIRT, Chennai
Collaborator	:	Dr. Peggy Dadul, STO, RNTCP, Sikkim
Funding	:	Extramural

Prior to initiation of the study a pre-assessment visit was made to Sikkim state from 27.11.2016 to 8.12.2016. During which the questionnaire format was tested in two districts East and South of Sikkim state with the RNTCP functionaries. The questionnaire format was corrected accordingly. Since Nepalese is the local language spoken by majority, the consent form also was translated in to Nepalese. The logistics for visiting to the MDR TB patients at their homes were finalized with the State TB Officer, Sikkim. The project is to be initiated.

Survey of MDR TB patients on DOTS Plus regimen by P.I., DTO, South district Sikkim & RNTCP Staff.

11. Biology and Bionomics of malaria vectors in Kalahandi district, Odisha for malaria stratification with a view to develop situation specific malaria control strategy.

Prin. Investigator	:	Dr R. K.Hazra
Co- Investigator	:	Dr Namita Mohapatra
Duration	:	3 years
Funding	:	The project is approved by the ICMR Task force and awaiting funds. Work started with intramural support.

Objectives:

1. To assess the pattern of disease transmission and distribution of vectors at sub centre levels in Kalahandi district.
2. To study the bionomics and vectorial attributes of malaria vectors for malaria stratification.
3. To develop situation specific vector control strategy to curtail the transmission of malaria.

Background

Kalahandi district covering an area of 7920 km^2 is situated in south western region of Odisha **between Latitude** 19° 3' N to 21° 5' N and **Longitude** 82° 30′ E to 83° 74' E. The State

Government data shows that the deaths due to malaria are increasing in Kalahandi from 2008 to 2012 i.e. from 4 in 2008 to 13 in 2012. In spite of the control efforts malaria still persist though there is reduction in number of cases. Therefore, a study is proposed to be undertaken in some selected areas to assess the cause of persistence of malaria, pattern of disease transmission, bionomics and their vectorial attributes and to develop an appropriate demonstrable vector control strategy for further transfer of technology.

Summary of Progress

The study was undertaken in four villages under 5 CHC. Four villages were selected in each sub centre for routine entomological studies. Indoor resting and outdoor collections were done in each selected village and malaria vectors were identified morphologically. The *Anopheline* fauna in the villages studied consisted of 14 species of which *An. fluviatilis* species was caught throughout the year in indoor resting collections from the study sites (Table-1). During 2015 to 2016 a total of four villages having ecotypes foothill, riverine, plain and hilltop were surveyed.

An. culicifacies and *An. fluviatilis* were assayed for the presence of malaria parasite by employing PCR technique based on 18s rRNA target gene and intake of blood meal by using mitochondrial cytochrome b gene. DNA was isolated and sibling species identification was carried out using DNA sequences of D3 region. Out of 562 *An. culicifacies* and *An. fluviatilis* collected, 95 *An. culicifacies* and 60 *An. fluviatilis* were assayed by PCR (Table: 3, 4 and 5).

The susceptibility status of *An. culicifacies* on using DDT 4% and Cyfluthrin showed 15% and 13.3% mortality after 1hr exposure respectively. (Table-2)

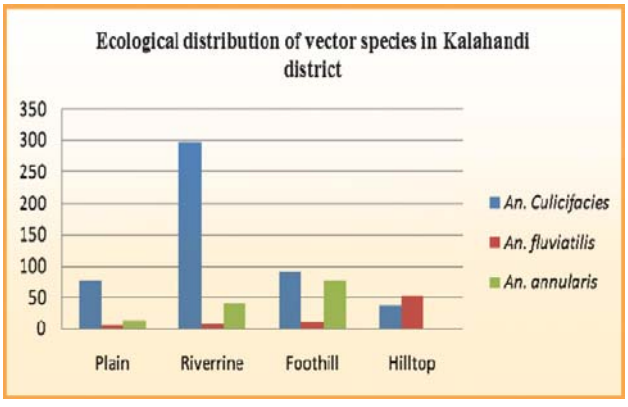


Fig-1: Prevalence of vector species in different ecotypes during 2015-16 in Kalahandi district.

Table-1: Number of villages showing different type of species.

Sl. No.	PHC	Village	Species name													
			An.culicifacies	*An. fluviatilis*	*An. hyrcanus*	*An.annularis*	*An. vagus*	*An.superpictus*	*An. pallidus*	*An.barbirostris*	*An.tessellatus*	*An. karwari*	*An. majadi*	*Cx.quinquefasciatus*	*Cx. vishnui*	*Mansonia*
1	Junagarh	Dedar		+	+	+	+		+	+				+	+	+
2	M. rampur	Urladani	+	+						+						
3	Th. rampur	Purnaguma		+				+		+	+	+	+		+	
4	Jaypatna	Pondi	+	+		+	+			+		+				

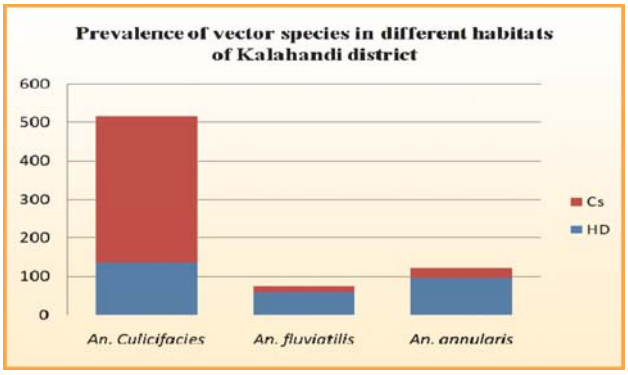


Fig-2: Prevalence of vector species in different habitats during 2015-16 in Kalahandi district.

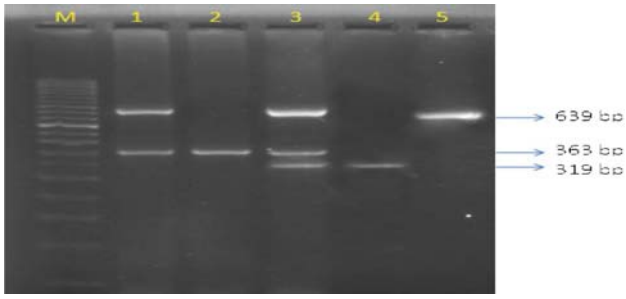


Fig-3: Ethidium bromide stained gel-electrophoresis of Multiplex PCR products for detection of host specific blood meal. Lane 1,3,5: Homo sapiens (Human) (639bp), lane 1,2,3: Capra hircus (Goat) (363 bp), Lane 3,4: Bos primigineius (Cow) (319 bp). Lane M: 50 bp DNA ladder.

Table 2: Susceptibility status of *An. culicifacies* mosquitoes in Kalahandi district.

PHC	Village	Ecology	Species	Insecticide used	Mosquitoes exposed	Time of exposed	Mortality	% mortality	Temp ^{0}C
Jaipatna	Pondi	Foothill	*An. culicifacies*	DDT 4%	15	1hr 24hr	0 2	0 13.3	34
Jaipatna	Pondi	Foothill	*An. culicifacies*	OC-CONTROL	15	1hr 24hr	0 0	0 0	34
Jaipatna	Pondi	Foothill	*An. culicifacies*	CYFLUTHRIN	15	1hr 24hr	2 9	13.3 60	34
Jaipatna	Pondi	Foothill	*An. culicifacies*	PY-CONTROL	15	1hr 24hr	0 1	0 6.6	34

Table 3: Malaria parasite positive by PCR in *An.culicifacies*

	Kalahandi	
	Mosquitoes tested	Total Positive
TOTAL	95	0

Table 4: Malaria parasite positive by PCR in *An. fluviatilis.*

	Kalahandi	
	Mosquitoes tested	Total Positive
TOTAL	60	3

Table 5: Blood meal sources of indoor/ outdoor resting *Anopheline* mosquitoes.

Species	PHC	Village	No. of mosquitoes tested	Total positive		
				Human	Cow	Goat
An. fluviatilis	Jaipatna	Pondi	5	2	2	-
	Th. Rampur	Purnaguma	5	3	2	-
	M. Rampur	Urladani	3	2	-	1
An. culicifacies	Jaipatna	Pondi	35	14	9	8
	Th. Rampur	Purnaguma	0	-	-	-
	M. Rampur	Urladani	40	15	17	4

12. Comprehensive vector mapping in different ecotypes of Odisha.

Prin. Investigator : Dr R. K. Hazra
Co- Investigator : Dr. N. Mohapatra, Dr. M.M. Pradhan, Dr.Kirti Mishra, NVBDCP, Odisha
Duration : 1 years
Funding : The project is approved by the ICMR Task force and awaiting funds works started with intramural support.

Background:

Odisha lies between Latitude 19° 3' N to 21° 5' N and Longitude 82° 30′ E to 83° 74' E covers 16,000 square miles (41, 400 square km). The malaria data available from NVBDCP, Odisha though shows a low API from the coastal districts, yet there are reported death cases with low transmission of malaria from these districts (NVBDCP, 2014-15). Therefore, a study was proposed in 9 coastal districts of Odisha to map the mosquitoes responsible for transmission, their bionomics, and vectorial attributes which will help to develop an appropriate demonstrable vector control strategy.

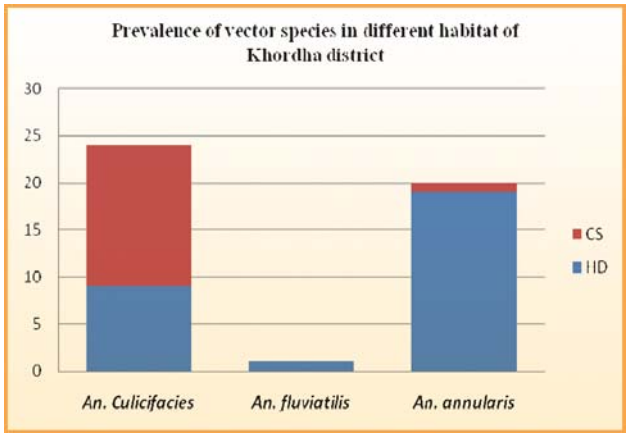


Fig-1: Distribution of different vector species in Khordha districts of Odisha.

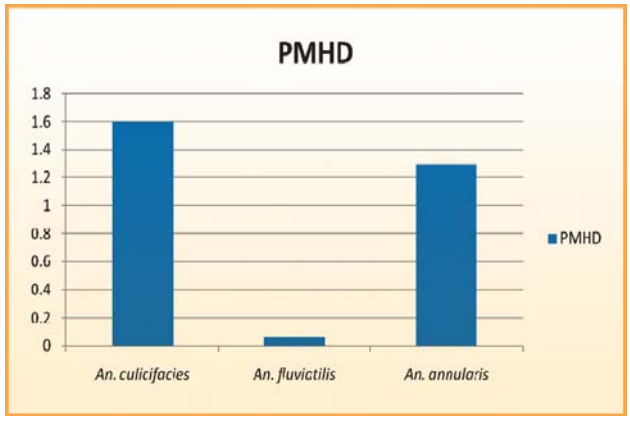


Fig-2: Per man hour density of vector species in Khordha Districts of Odisha.

Objectives:

1. To assess the pattern of disease transmission and distribution of vectors at sub center levels in coastal districts of Odisha.
2. To study the bionomics and vectorial attributes of malaria vectors in the coastal districts of Odisha.
3. To develop situation specific comprehensive malaria control strategy in Odisha.

Summary of Progress

The study was undertaken in Khordha district with two sub centres under one CHC. Three villages were selected in each sub centre for routine entomological studies. In these villages routine collection of mosquitoes by different methods was done and their vectorial attributes and bionomics will be studied.

13. Virology Network Laboratory (Grade-I) at RMRC, Bhubaneswar.

Prin. Investigator : Dr. B. Dwibedi
Co-Investigators : Dr. R. K. Hazra, Mrs. S. Dixit
Duration : 7 Years
Funding : Extramural (ICMR)

Background

It was aimed at creating regional facilities to be involved in laboratory diagnosis, surveillance and research in viral diseases of importance.

The proposal involves construction of the laboratory, procurement of equipments, training of involved staff, establishment of laboratory techniques like serology, molecular diagnosis, sequence analysis, cell culture and isolation etc. in phased manner. Outbreak investigation, surveillance during epidemic and inter epidemic period and sporadic disease diagnosis of important viral diseases of the region and emerging infections would be carried out which will be strengthened by research subsequently.

Objectives

To establish a grade I diagnostic virology laboratory for investigation of viral diseases of regional and national importance including but not limited to

1. **Viruses transmitted by respiratory route**: Measles, Rubella, Mumps, Influenza viruses (A, B and C), Parainfluenza virus, Adenoviruses, Respiratory Syncytial Virus, Rhinoviruses, Coronaviruses.
2. **Viruses transmitted by intestinal route**: Poliovirus, Hepatitis A & E viruses, Rotavirus, Astroviruses, Calciviruses, Norwalk viruses, Enteroviruses.
3. **Vector Borne Disease Viruses**: Dengue, Chikungunya, Japanese encephalitis, West Nile, Kyasanur Forest Disease, Chandipura, Zika viruses.
4. **Zoonotic viruses**: Rabies virus, Nipah virus, Hanta virus
5. **Viruses transmitted by body fluids**: HIV, Hepatitis B and C viruses.

Summary of Progress

I. Networking for information, Sample receipt, Investigation and Reporting

Network has been established with the State Health Department, Medical Colleges and Hospitals of the region for referral investigation of sporadic cases and outbreak investigation. Outbreak investigations are being undertaken along with the state health team upon getting information through media or health system. Immediate report is being communicated to the concerned hospital within 3 days of sample receipt.

II. Sample collection

The Centre is continuing surveillance and outbreak investigation of important viral diseases in the region through the established Grade-I viral lab as a part of network of viral research and diagnostic laboratories in India. Diagnostic services have been provided to >31000 patients till date covering more than 50 viruses important for public health. Since Jan, 2016 the centre received around 3777 samples from 40 different hospitals, 6 medical colleges and outbreak investigations from various districts of Odisha. Network has been strengthened from State

Health Department to District Health level for getting immediate out break information and investigating the outbreaks within 24 hours. The viruses investigated were HSV I, HSV II, JE Virus, Dengue, CHIK, Rota, Astro, Adeno(Enteric), Noro G1, Noro G2, Coxsackie, Measles, Varicella, Mumps, Rubella, Entero, HAV, HEV, HBV, HCV, HDV, HPV, EBV, CMV, Adeno, Influenza A (FluA), FluA (H1N1), Flu B, HMPV A/B, Rhino, Para influenza 1, Para influenza 2, Para influenza 3, Para influenza 4, RSV A/B, Corona viruses(Cor63,Cor229,Cor43, HKU1), Parecho virus, Boca Virus(HBoV), EV and Zika.

Investigation of sporadic referred cases

Sporadic referral cases were received by the centre from different hospitals of different districts. During 2016, 2765 numbers of samples were received by the lab from different Govt. and Private hospitals of Odisha. The major diseases investigated are summarized below:

Enteric viruses

Among enteric viruses Rota antigen was detected in 40% (n=204) of cases. Genotype G1 (25.3%), G2 (13.3%), G3 (30.6%) G8 (5.3%) and G12 (6.6%) and P4 (21.3%), P6 (1%) P8 (33.3%) and were detected as major genotypes. G3P8 was the most common combination found in 15% of antigen positive cases. Hepatitis A Virus was detected in 28% (n=169) and Hepatitis E Virus was detected in 20.6% (n=170) of cases with acute hepatitis.

Hepatitis Viruses

Among the cases of jaundice screened for hepatitis virus infection, HBV (n=206) and HCV (n=183) were detected serologically in 11.2% and 2.2% respectively and genotyping was done in positive cases where the major was HBV genotype D along with A and C and HCV genotype 1b were identified as the genotypes circulating in this region.

Respiratory Viruses

Viral respiratory infection was another important disease which was covered for laboratory diagnosis. Through Real Time PCR assay, a total of 129 cases were investigated for respiratory viruses like , Influenza A (FluA), FluA (H1N1), Flu B, HMPV A/B, Rhino, Para influenza 1, Para influenza 2, Para influenza 3, Para influenza 4, RSV A/B, Corona viruses (Cor63, Cor229, Cor43, HKU1), Parecho virus, Boca Virus (HBoV) and EV analyzed. The viruses those detected were Flu A 5.1% (n=98), H1N1 1.02% (n=98), Para influenza 22.6% (n=31) and HMPV in 3.2% (n=31). Emerging viruses like Boca, Parecho viruses were detected with low prevalence.

Air borne Viral Diseases

Among air borne diseases Measles IgM was detected in 40% (n=55) of the cases the circulating genotype was identified as D8. Varicella IgM was detected in 13.3% (n=15) of cases. Rubella IgG (n=434) was detected in 46.08% of cases.

Encephalitis

Neurotropic viruses causing acute encephalitis admitted to different hospitals were investigated and clinical manifestations described. HSV, Measles, Dengue and Varicella Zoster virus were seen as the major causes of viral AES either as single or co-infection. Viruses that cause encephalitis were also investigated in a total

of 880 cases and Herpes simplex virus I was detected in 9.9%, Herpes Virus II in 3.5% and Japanese encephalitis was detected in 5.5% of cases. Other encephalitis causing viruses detected in low prevalence were Entero virus, WNV, Dengue, Measles.

Zika

A total of 427 cases have been screened by PCR and RTPCR for Zika Virus and none has been found positive till date.

Outbreak investigations

Outbreaks were reported from different parts of the state and investigation was done in collaboration with the state health department. The team collected the samples both by direct investigation and through collection by the primary health centre/district hospital of the concerned area. During this period outbreak of Measles, Varicella, Hepatitis, Dengue, Chikungunya, AES including JE infection has been investigated with immediate reporting to State Health Department along with recommendations for timely prevention. From Jan 2016 - Jan 2017, 16 outbreaks were investigated along with State Health Departments covering 11 districts of Odisha.

The major outbreaks investigated from Jan 2016- Jan 2017 are summarized below:

- ***Jaundice Outbreak Investigation***

A total of 316 samples suspected for jaundice collected from Kalahandi, Khurda, Cuttack, Kandhamal and Sonepur districts were investigated in the laboratory. Out of 89 samples subjected to test for presence of HAV IgM, 26 were found positive and out of 283 samples tested for HEV IgM, 135 were found positive. The source of infection was identified and necessary recommendations to isolate the source were given to the state health authorities.

- **Outbreak investigation for suspected Chickenpox in Bolangir district.**

Investigation was done for suspected Chickenpox infection at Bolangir during 3rd week of Jan, 2016. Out of ten cases investigated, six cases were positive for Varicella Zoster antibody. The laboratory investigation report has been sent to the concerned authority with recommendations.

- ***AES outbreak Investigation***

A total of 404 samples were laboratory investigated suspected for AES from districts like Jajpur, Kalahandi, Keonjhar, Koraput, Malkangiri, Mayurbhanj, Nuapada, Puri, Rayagada and Sundergarh. Presence of JE IgM was detected in 34.4% (n=404), HSVI 20% (n=5), HSV II was not detected in all five cases and HSV PCR was positive for one out of 14 cases tested.

- ***Investigation for cases with Measles***

Investigation for Measles outbreak was carried out in Nagada village, Sukinda, Jajpur districts in collaboration with CDMO, Jajpur. Blood samples (n = 8) and 4 throat swabs suspected with Measles/ Varicella were referred/ collected by VDL investigating team. Samples were tested for Measles IgM (7 positive). 4 throat swabs were tested for Measles PCR but none was found positive. Samples (n=11) were collected from Mahanga, Cuttack for suspected Measles during first week of December, 2016. Blood (n=8),

throat swab (n=9) and urine samples (n=1) were subjected to laboratory test. A total of 8 samples were tested for presence Measles IgM antibody and 7 were found positive. One sample was positive for Measles IgG antibody. No samples (n=9) were found positive for measles through PCR.

- ***Investigation for cases with Dengue***

Investigation for Dengue outbreak was carried out in Jagatpur, Cuttack district. Blood samples (n = 110) suspected with Dengue fever were collected subjected to laboratory test. In 35 out of 94 cases, NS1 antigen and in 23 out of 69 cases IgM antibody was detected. Serotype D1 and D2 were detected in a subset of samples. A total of 70 NS1 positive samples were received from CDMO, Angul, Jagatsinghpur, Cuttack and Keonjhar for serotyping. The samples were subjected to RT-PCR. Serotypes 1, 2, 3 and 4 were detected.

- ***Chikungunya outbreak investigation***

Investigation for Chikungunya outbreak was carried out in Kalahandi district during second week of October. Blood samples (n=19) from suspected cases were collected subjected to laboratory test. In 14 out of 19 cases, Chik IgM antibody was detected.

H1N1 Lab investigation

During this period 98 samples were received from 23 health facilities across the state and the patients were admitted in these hospitals from 27 districts. Out of 98 samples tested through Real Time PCR one was positive for H1N12009.The infection was not indigenous from Odisha but a case of traveler from Delhi, who recovered with treatment. No family spread was there with prophylactic anti-viral.

Laboratory investigation support to neighbouring state

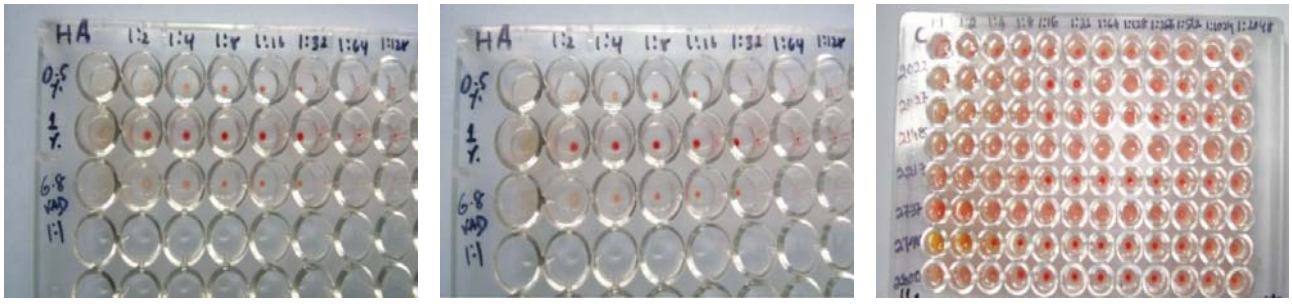
A total of 74 blood/CSF samples were received for lab investigation through Andhra Medical College, Vishakhapatnam collected from patients presenting with fever & rash, jaundice, and encephalitis.

New techniques standardized

- Titration of HA antigen for JE extracted from mouse brain and HI for JE antibody in samples were done by using one day old chick blood.
- Trioplex for Dengue, Chik and Zika virus was standardised through RealTime PCR.

HRD Activity

1. One Research Scientist and one Laboratory Technician were trained on Laboratory



Haemaglutination Assay and Haemaglutination Inhibition Assay for JE antigen extracted from mouse brain

diagnosis of ZIKA virus at NIV, Pune during Feb, 2016

2. Six students from Utkal University and SOA University, Odisha completed 6 month training program for partial fulfillment of their M.Sc. thesis.

3. Workshop was organised on Good clinical practice and Bioethics on 1st and 2nd August, 2016 at RMRC, Bhubaneswar and attended by various scientific staff of VRDL.

4. Three Ph.D scholars and two M.D. scholars are continuing their research work.

Subsequent Plan

The above activities will continue for the next year. More emphasis will be given on creating multi skill paramedical and health professionals to deal with viral disease surveillance and timely investigation/ management of outbreaks. Periodically training will be provided to the technical and supportive paramedical staff for laboratory diagnosis of some of the important disease of public health concern which will support state public health system.

Cell culture will be established for Chik, Dengue and Measles Viruses, sequencing and typing will be established for Measles, Varicella and Influenza H1N1 viruses. Outbreak investigation will continue along with sporadic case investigation in collaboration of state hospitals. Network will be further strengthened to cover southern and western parts of Odisha.

14. Improving health of under five children in Kalahandi District, Odisha.

Prin. Investigator : Dr. B. Dwibedi
Co-Investigators : Dr. M. R. Ranjit, Dr. G. Buliyya, Dr. A.S. Kerketta, Dr. A. Mahapatra, Dr. A. S. Acharya
Collaborators : Dr. S. Mohapatra, CDMO, Dr. B. N. Das, ASMO, Dr. B. K. Kampa, Paediatric Specialist, Kalahandi DHQ Hospital
Duration of the proj. : 3 years
Starting Date : March 2014
Closing Date : Feb 2017

Background

Odisha which is one of the most backward states in India that recognizes the need of addressing health inequity existing in the state. Since the state has maximum percentage of socio-economically disadvantaged population, the disparities among the different sections of population are quite prominent. In view of this, the Odisha health Sector Plan (OHSP) aims to achieve equity in health outcomes and has a key focus on access and utilization of services by vulnerable and marginal groups including women, schedule caste (SC) and schedule tribe (ST) populations. It aims at delivering accountable and responsive health care to reduce maternal mortality; infant and child mortality; reduce the burden from infectious diseases; under nutrition and nutrition related diseases and disorders.

The study looks into the determinants of health access, delivery and utilization that can be

improved upon the existing health program and structure.

Aim

To improve significantly the health parameters of under-5 with special reference to reduction of morbidity and mortality (prenatal childhood mortality and MMR) through health system strengthening using innovative approaches.

Objectives

1. To train and improve the skills of grass root level health workers for early detection, management and referral of diarrheal diseases, acute respiratory infections (pneumonia), malaria, measles, diphtheria and under-nutrition.
2. To develop communication strategy for effective delivery of family and community interventions.
3. To educate and create awareness among the community on the preventive health care related to diarrheal diseases, acute respiratory infections, malaria, diphtheria, measles and under-nutrition through innovative approach and increase health seeking behavior.
4. To strengthen the maternal and child health services (antenatal checkup, institutional delivery, puerperal care and neonatal care) undertaken by the program (RMNCH).
5. To strengthen health management information system (HMIS) for effective monitoring and evaluation.
6. To improve the procurement and flow of logistics relevant to MCH services.

Summary of Progress:

The study area has been identified and the population census has been noted (Table-2). The total population of study area is 1, 91, 285

Table 1: Study area (Low tribal density)

Block	Sector	SC	No. of Village	Population
KESINGA	UTKELA	3	26	14952
	KANDEL	5	40	21782
Study area (High tribal density)				
TH.RAMPUR	GUNPUR	7	117	26858
	MAHULPATNA	4	59	28429
Control area (High tribal density)				
LANJIGARH	BISWANATPUR	6	126	26118
	LANJIGARH	6	85	39229
Control area (Low tribal density)				
JUNAGARH	CHILIGUDA	5	52	22319
	NANDOL	5	48	11598
Grand Total		**41**	**553**	**191285**

covering 4 blocks with 553 villages. The area will be randomized in two intervention and control blocks before implementation of innovative strategy.

Study Area

Out of 4 blocks T. Rampur & Lanjigarh have high (more than 70%) population density of tribal population.

Table 2: Morbidity of under five children.

Area	Total Children		Diarrhoea		Fever		Cough		Malaria	
	M	F	M	F	M	F	M	F	M	F
			%	%	%	%	%	%	%	%
Low Tribal density-Kesinga	311	345	12.5	13.93	41.91	43.46	33.82	34.89	11.76	12.08
High Tribal density-T. Rampur	207	163	14.98	17.18	47.34	49.08	55.07	51.53	20.77	17.18
Low Tribal density-Junagarh	349	336	6.01	0.89	8.02	11.01	1.71	1.19	0.28	0.89
High Tribal density-Lanjigarh	201	189	1.99	4.23	22.88	23.8	7.46	11.11	1.49	1.05
Total	**1068**	**1033**	**35.48**	**36.23**	**120.15**	**127.35**	**98.06**	**98.72**	**34.3**	**31.2**

Table 3: Severe clinical presentation in U5 children according to presence of danger signs.

	Low Tribal Density - Kesinga		High Tribal Density - T. Rampur	
Danger sign	Present	%	Present	%
Fast breathing	0	0	184	49.46
Convulsion	0	0	40	10.75
Pus discharge from ear	1	1.52	36	9.68
> 10 skin pustule	3	4.55	71	19.09
Lethargic/Unconscious	0	0	24	6.45

Table 4: Severe clinical presentation in U5 children according to presence of danger signs.

	Low Tribal Density - Junagarh		High Tribal Density - Lanjigarh	
Danger sign	Present	%	Present	%
Fast breathing	8	1.16	36	9.23
Convulsion	3	0.43	2	0.51
Pus discharge from ear	0	0	0	0
> 10 skin pustule	1	0.14	4	1.02
Lethargic/Unconscious	0	0	0	0

Morbidity of under five children

The morbidity survey using the designed questionnaire was undertaken by door to door visit. Parents were interrogated and morbidity records available with the field level health worker were reviewed. The disease pattern and prevalence during one year were recorded & analyzed.

Drinking water and Toilet facility

Drinking water facility was available to the entire household in low tribal density area (Kesinga & Junagarh) where as it was 100% and in high tribal density area (T. Rampur & Lanjigarh) was 94.57% and 93.16% respectively. Toilet facility was available in 15.86% and 10.75% of household in low & high tribal density and areas respectively.

Nutritional status of under five children was assessed by anthropometric measurement and compared with standard growth curve.

Training needs assessment:

Sixty three health workers (ANM-02, AWW-41 & ASHA-20) were assessed. Among them 10

Table 5: .

Practice of Delivery			
Institutional Delivery	**Home Delivery**	**Others**	**Total**
1534 (82.11%)	289 (15.47%)	45 (2.40%)	1868

Out of the total 1868 deliveries, 1534 (82.11%) were institutional and 289 (15.47%) were home delivery and others 45 (2.40%). Complication was reported in one of the case.

Postnatal Care	
Any Complication in Post Natal Period like Fever, Septicemia, Hemorrhage?	**Baby cried immediately after birth?**
16 (2.13%) out of 749 mothers	1810 (97.73%) out of 1852

Drinking water and Toilet facility in 4 Blocks		
Area	Drinking water facility	Toilet facility
	Present in Households (%)	Present in Households (%)
Low Tribal Density Kesinga	100%	8.33%
Low Tribal Density- Junagarh	100%	7.53%
High Tribal Density T.Rampur	94.57%	5.94%
High Tribal Population- Lanjigarh	93.16%	4.81%

were 0-7th class pass (15.87%), 43 were 8-10th class (68.25%) and 10 were above 10th (15.87%) pass. The health staffs had undergone training on at least one health program. ASHAs were not provided training on IMNCI.

The observations made on knowledge assessment on IMNCI illness as follows:

Knowledge regarding Malaria:

- Correct symptoms – 64.28%
- Correct management – 47.62%
- Decision on danger signs – 14.28%
- Steps of RDT use – 50%

Knowledge regarding ARI:

- Fast breathing criteria – 14.28% of ANM/AWW and 4.76% ASHA
- Management of ARI serious illness – 16.66%
- Mild illness management – 11.90%
- None of the health workers/AWWs understand about 7breathing rate

Knowledge about nutritional status:

- Anthropometric measurement of under five children – 19.04%
- Poor knowledge about frequency of breast feeding in a day, Vit-A supplementation up to 5 yrs.
- No worker knows about 5 C in delivery except ANM
- 57.14% workers trained in child health program anytime during their service
- Management of diarrhea in severe dehydration – inadequate knowledge.

Availability of Logistics

With respect to the availability of various logistics on IMNCI at the sub centre and AWC, it was found that in 90% of sites it was available but not throughout the year.

PLA for development of IEC/BCC

PLA study was conducted to assess the community response and acceptability of the program towards the improvement of IMNCI program.

We have carried out focus group discussion (FGD) with community at four selected villages, one from each block. At the time of focus group discussion (FGD) people from different age groups have participated in the discussion. Important suggestions and views noted during the PLA were as under;

(a) Community wanted display of stock of drugs and kits available with ASHAs and

Nutritional status of under five children

Nutritional indicator	Boys	Percentage	Girls	%	Total	%
N (Total No. of Children)	1207	50.24	1195	49.76	2402	100
Under weight (Yellow)	226	18.72	262	21.92	488	20.31
Severe under weight (Red)	50	4.14	75	6.27	125	5.20
Severe acute malnutrition (SAM)	40	3.31	42	3.51	82	3.41

AWWs, so that people can approach the health system at need.

(b) While putting posters for display of health related information, community gathering should be arranged and materials be explained. It would help people to understand and practice the given message.

(c) Display of action points on "Swasthya Kantha" (Health Wall) should be pictorial and easy for understanding.

Use of ladle to take out drinking water from storage pots which was proposed by the team was found to be acceptable to people. However, cost of ladle was a factor that needs to be convinced to the people.

Interventions (following baseline survey and Pla):

Intervention was initiated following the baseline survey and generating evidence on community participation scope.

Interventions were targeted on–

(a) Development of training modules in local language

(b) Skill development of village level health workers through training

(c) Improvement of logistic supply through interaction with the local health system

(d) Facilitating referral of cases to the PHC by community participation

(e) Promotion of preventive health practices.

Activities undertaken are summarized below:

Development of training modules in local language:

The ASHA training module on IMNCI pertaining to identifying the illness, severity assessment, treatment and home based care/ prevention was translated into local language with feedback from the State Health officials. A ready reckoner was also developed for daily use by the village health staff. These were developed keeping in view the locally understandable language and education level of the ASHAs in the area. In addition disease specific modules (malaria, diarrhea and ARI) were translated in local language (Kalahandia) for use by the trainers while giving reorientation training to the health staff at village level.

Skill development of village level health workers through training:

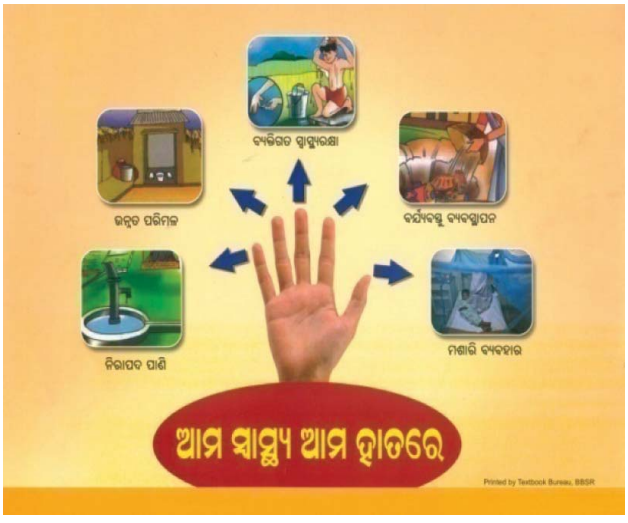
Re-orientation training of the ASHA (n = 38) and AWW (n = 26) was conducted in the intervention area by the RMRC investigating team in collaboration with the district health personnel. The monthly sector meetings were used for such sessions where the village health staff was asked to participate in the training program. They were trained specifically on the IMNCI illnesses and use of the training module developed in local language for easy understand ability. Video-graphic demonstrations were also used on computer aid to demonstrate the signs and symptoms of the disease and severity assessment.

Following training, a short skill assessment was also made for each staff which shown satisfactory improvement in expected knowledge in 65% of health workers following one re-orientation training/ session.

The training session also covered scopes and difficulties in referral of patients to PHCs and coordination with the PHC medical officer regarding treatment of referred patients **using the**

mobile service provided to the ASHAs by the health administration.

Training manual, ready reckoner and IEC materials.



Photographs of intervention

School teacher demonstrating hand washing

Training to AWWs

Health worker demonstrating ORS preparation

Community meetings on participation on patient referral

Improvement of logistic supply through interaction with the local health system:

The village level health workers were trained to improve upon their reporting of illnesses and stock of drugs and diagnostic kits supplied to them on weekly basis by using a small weekly report form. These activities were made to be supervised by the respective ANM who acted as the link with PHC MO. Interactive discussion was made with district health officials and the PHC medical official for monitoring regular supply of drugs and kits depending upon the seasonal variations observed for different diseases in the area.

Facilitating referral of cases to the PHC by community participation:

Severe cases of diarrhea, ARI, malaria and under nutrition requiring doctor's advice or hospitalization was a problem in the study area. It was discussed in the village level community meetings with Gram Kalyan Samiti (GKS) members, Self Help Groups (SHGs) and ward members, for use of GKS fund for this purpose (local transportation) it was agreed to support the needy people in the village. It was made into practice in the study area.

Promotion of preventive health practices:

This was targeted to improve the immunization coverage especially for measles. For easy follow up of the new born up to complete immunization the ASHAs were provided with the three fold ready reckoner, on one page of which the immunization schedule is tabulated in easily understandable form. This was used by the ASHA for regular household visit.

15. Effectiveness of diet and lifestyle intervention through Information Education Communication (IEC) tools with Angan Wadi Centres (AWCs) as the centre of knowledge dissemination for hypertension (including hypercholesterolemia and diabetes) risk reduction – a cluster randomized controlled trial.

Prin. Investigator	:	Dr. B. Dwibedi
Co-Investigator	:	Chief District Medical Officer, Kalahandi, Odisha
Starting Date	:	December 2013
Closing Date	:	November 2017
Duration	:	3 years
Funding	:	ICMR (Extramural)

Background:

General Objective:

To assess the effectiveness of diet and lifestyle intervention through Information Education Communication (IEC) tools with Angan Wadi Centres (AWCs) as the centre of knowledge dissemination for Non-communicable Disease risk reduction.

Specific Objectives:

Primary objective:

- To assess the effectiveness of intense versus usual IEC interventions on diet and lifestyle modifications delivered by existing community-level health-workers (ASHA or equivalent) on population level blood pressure.

Secondary objectives:

- To assess the operational feasibility of integrating NCD risk reduction in

community health programs through existing community level healthcare volunteers such as ASHA or equivalent.

- To assess the usefulness of trained healthcare workers to affect changes in dietary fat, fibre and salt, tobacco and alcohol consumption and increasing physical activity.
- To assess the efficacy of these interventions to evaluate changes in lipid levels and glycemia.

The sequence of study

(1) The base line population based survey in intervention and control communities

All the subjects aged 18 and above were included in the study after taking consent or assent. It has following components.

Interview

- Name, age, sex, socio-economic, and other core demographic details of the individuals
- Knowledge, Attitude, Practice in relation to NCD risk factors and NCDs: A structured and pre-tested questionnaire was used.
- Knowledge, Attitude, Practice in relation to physical activity (Yoga, non-yoga exercises):
- Physical activity: For assessing the physical activity WHO STEPS questionnaire will be used (G-PAQ).
- Tobacco use frequency and pattern. Tobacco use frequency and pattern was collected through structured questionnaire.
- Alcohol consumption: quantity and frequency
- General Health Questionnaire (GHQ 12): to assess the mental health status of the individual.

Measurements

- *Weight:* Weight of the subjects was measured by lever activated electronic weighing scale with accuracy of 100 gm.
- *Height:* Height of the subjects was measured by anthropometry rod with accuracy of 2mm.
- *Waist circumference:* Waist circumference of the subjects measured by non-stretchable inch tape by adopting proper technique as suggested in WHO STEPS protocol.
- *Body fat percentage:* Body fat percentage of the subjects measured by bio-impedance machine.
- *Diet survey:* Diet survey conducted in the 30% (i.e., 75 households in each cluster) by following 24 hour recall method for single day (as followed by National Nutritional Monitoring Bureau (NNMB), India). i.e., every third household was surveyed. 30% of the households were selected randomly (Systematic random sampling, first household being a random choice). Along with diet survey the details of frequency of consumption of different food groups was documented.
- *Blood pressure:* Blood pressure measured by digital automatic blood pressure monitors, which have been validated and approved by International agencies such as WHO, British Hypertension Society and International Hypertension Society. Three blood pressure

readings taken and WHO STEPS guideline will be followed.

Blood test:

- Fasting glucose, total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides **5ml of venous blood was taken:** The fasting glucose estimated by glucose oxidase method in the field conditions at Centre for Nutrition, ICMR, New Delhi.
- For rest of the parameters, serum was separated in pre-labelled eppendorf vials indicating the sample ID and the date of collection and transported in dry ice to at least maintain a temperature of -20°C to NABL accredited laboratory at ICMR Centre for Nutrition, New Delhi for analysis of total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides and glucose on automatic Chemistry Analyzer (Roche Hitachi 902).
- *Haemoglobin estimation* 20 ul of blood taken in the pipette and spotted on the filter paper from each participant and the dried filter papers were then be sent to within one week of collection to ICMR Centre for Nutrition, New Delhi. The analysis carried out by cyanomethemoglobin method using spectro-photometer.

All materials used in sample collection were discarded using appropriate color coded bins/ bags following WHO guidelines.

(2) *Intervention*

In both the groups the standard regimen for the control of hypertension, diabetes, and dyslipidemia including counselling for life style modification was followed as medically indicated.

In the intervention group IEC campaign was launched in April 2016 for hypertension/NCD risk reduction. All the risks were targeted like overweight/obesity, physical inactivity, psychological stress, alcohol and tobacco consumption, dietary fibre, saturated fat and t-fat in the oil, dietary salt consumption etc. An earnest attempt was made to disseminate available scientific knowledge to the community for hypertension/NCD risk reduction. One of the investigators with ASHA or equivalent will visit each house hold in all the intervention clusters (about 200-250/cluster) and make an approximate assessment of dietary oil, dietary salt, and dietary fibre consumption and physical activity level. Our targets were the following.

- Based on the base line data if the community consumes oils rich in saturated fats our IEC targeted to change the consumption by oils rich in MUFA & PUFA at least in 50% of the households.
- The IEC targeted an increase of 50% in the amount of dietary fibre consumption up to a maximum of 20gm/day/individual (or in other words try to increase the population mean by 50-100%).
- It aimed for dietary salt consumption of less than 9gm/day/individual at least among 50% of the population in intervention

community (or in other words try to decrease the population mean by 50-100%).

- The IEC targeted to increase physical activity level in rural areas where ever sedentary behavior is observed and in urban areas to increase the population mean of the physical activity by 50% in urban areas.
- The IEC targeted to decrease the mean consumption of tobacco and alcohol by 25%.

Summary of progress:

1. **Recruitment of project staff and man power development:** The project staffs were recruited. They were trained at Centre for chronic disease control, New Delhi.
2. **Purchase of equipments:** Equipments to be used in the project work were purchased and some could not be purchased in 1st year and aimed for permission to procure in the 2nd year.
3. **Odia translation of consent form and questionnaire:** The Consent form was prepared in the local language. Similarly, the questionnaires to be used in the study were translated to Odia language for easy understanding of the local people.

Prevalence of Hypertension in study group:

Among these 3173 individual studies, 47.17% of individuals were found to be hypertensive. Hypertension is calculated from blood pressure data. A person is said to be hypertensive if SBP ≥ 140 or DBP ≥ 90 or both. Blood pressure was measured thrice at intervals and average was taken. From percentage-wise

Table-2: Prevalence of hypertension.

Age group	Male (%)	Female (%)	Total (%)
18-30	38.33	41.42	40.10
31-45	44.38	50.75	47.77
46-60	46.37	54.18	50.47
>60	54.28	58.55	56.48
Total	44.38	49.55	47.17

Table-1: Intervention Cluster.

Cluster id and name	Number of households	No. Of Members>=18 years in HH
Cluster 07 Sargiguda	160	425
Cluster 08 Mahima	113	326
Cluster 09 Khaliabhata	119	302
Cluster 10 Urladani	139	358
Cluster 11 Dedar	102	276
Cluster 12 Mukundpur	108	323
Total clusters (06)	741	2010

data, hypertension was found to be more prevalent among female than male. The prevalence of hypertension was found to increase with age and almost 50% of the individuals after 45 years of age were found to be hypertensive.

Body Mass Index (BMI) among study group:

BMI of individuals were calculated as previous reports have proven that individuals having high BMI are prone to hypertension. The analysis suggests that 18.37% of individuals included in this study have BMI more than 25 and hence they are at risk of developing hypertension in future. This increases with age as in 18-30 age group 7.61% of individuals have more than 25 BMI whereas it increases to 35.64% in more than 60 years of age.

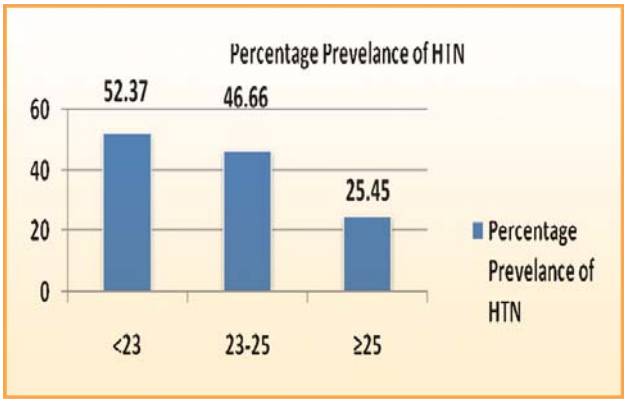


Fig.-1: Percentage Prevelance of HIN.

BMI and Hypertension:

An analysis was done to observe relationship between BMI and hypertension among the studied population and it was found that hypertension is also prevalent in BMI ≤ 25.

Table-3: BMI & Hypertensiion.

Age	BMI < 23			BMI 23-25			BMI ≥25		
Group	Male	Female	Total (%)	Male	Female	Total (%)	Male	Female	Total (%)
18-30	227	301	528(89.34)	05	13	18(3.04)	21	24	45 (7.61)
31-45	283	320	603(81.15)	20	23	43 (5.78)	44	53	97 (13.05)
46-60	168	168	336 (64.24)	06	19	25 (4.78)	74	88	162 (30.97)
> 60	66	69	135 (62.5)	01	03	04 (1.85)	38	39	77 (35.64)
Total	744	858	1602 (77.27)	32	58	90 (4.34)	177	204	381 (18.37%)

Table-4: Distribution of various physical parameters: Related to CVD risk.

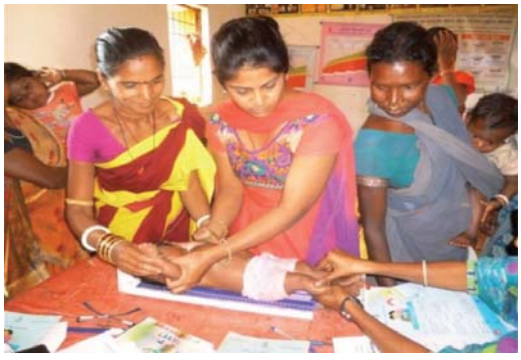
Age	Mean body fat %			Mean bone mass			Mean body muscle mass			Mean visceral fat %		
Group	M	F	Total	M	F	Total	M	F	Total	M	F	Total
18-30	14	24.07	19.78	46.86	40.2	43.0	8.55	8.30	8.41	2.3	1.73	1.99
31-45	15	24.75	20.33	40.76	36.4	41.2	7.87	6.77	7.28	3.7	2.44	3.04
46-60	14	24.38	19.77	44.79	37.5	40.9	7.88	7.61	7.74	4.1	2.96	3.52
>60	14	24.75	19.88	44.71	37.0	40.8	7.76	7.35	7.53	5.3	3.38	4.35
Total	14	20.45	19.99	46.05	37.9	41.6	8.04	7.50	7.75	3.6	2.45	3.00

Table-5 : Community risk behavior of Hypertension the studied population various community risk behaviour of hypertension was calculated.

Parameters	Prevalence(%)
Tobacco Consumption	58.33
Alcohol Consumption	39.21
Low Physical Activity (sedentary)	42.85
Iodine Salt Intake (≥ 5 gm per day)	88.1
Iodine Salt Intake (≥ 10 gm per day)	46.42

Applied value of the project:

The study gives an idea on prevalence of hypertension in Tribal population along with risk factors. This will be useful in developing a community intervention strategy for use in the National program especially for Tribals.



16. Enhancing biorisk mitigation awareness in public health community and creating laboratory networks for enhanced diagnostic capabilities to deal with surveillance and outbreaks of high-risk group viral pathogens causing viral hemorrhagic fevers and respiratory infections.

Prin. Investigator : Dr. B. Dwibedi
Starting date : September, 2015
Closing date : September, 2020
Duration : 5 Years
Funding : CDC, Atlanta (Extramural)

Background

Viral hemorrhagic fever (VHF) refers to a variety of viral diseases, which are characterized by fever and bleeding in humans. Most of the VHF diseases are caused by RNA viruses belonging to the families; *Filoviridae*, *Arenaviridae*, *Bunyaviridae*, and *Flaviviridae*. These viruses cause an acute infection and there is no evidence of chronic courses.

It was aimed at creating regional facilities to be involved in laboratory diagnosis, surveillance and research in viral hemorrhagic fever coordinated by NIV, Pune.

The proposal is to create infrastructures for timely identification of highly infectious viruses causing significant mortality & morbidity at public health level and specific agents causing epidemics and/ or potential agents for bioterrorism. Outbreak investigation, surveillance during epidemic and inter epidemic period and sporadic disease diagnosis of important viral diseases of the region and emerging infections would be carried out which

will be strengthened by research subsequently.

Objective

1. **Component-1:** Increasing awareness as well as conducting various levels of teaching and training programs on Biorisk management and engineering controls required for safely operating biomedical laboratories and infection control practices in the public health settings.
2. **Component-2:** Creating laboratory network for enhancing diagnostic capabilities for surveillance, outbreaks and epidemics investigations of high-risk group of viral pathogens causing viral hemorrhagic Fevers.

Table1: Age Group Analysis

Age Group	Frequency	Percent
0 - <5	42	22.34%
5- <15	65	34.57%
15- <30	41	21.81%
30- <45	16	8.51%
45 - <60	15	7.98%
≥ 60	9	4.79%
TOTAL	**188**	

Summary of Progress

A. Networking for information, Sample receipt, Investigation and Reporting.

Table2: Clinical Symptoms Analysis

Symptoms	Frequency
Fever	188
Myalgia	7
Arthralgia	7
Headache	75
Pain behind eyes	0
Nausea & Vomiting	72
Diarrhea	1
Abdominal pain	14
Anorexia	2
Jaundice	3
Cough	17
Sore throat	1
Difficulty Breathing	2
Conjunctivitis	6
Seizures	10
Skin Rash	21
Any Bleeding	47

Table 3: Annual Report of test cases and its outcome.

CDC-VHF Project (Annual Report)									
Center - Bhubaneswar				Duration/Period - September'16 to January'17					
S.No	Month	Dengue		Chikungunya		Zika		Total	
		Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive
1	Sep-16	2	1	0	0	0	0	2	1
2	Oct-16	73	27	41	3	54	0	73	27
3	Nov-16	64	15	40	5	29	0	70	15
4	Dec-16	32	6	11	1	9	0	33	6
5	Jan-17	9	0	6	0	10	0	10	0
							Total :-	188	49

Network has been established with the State Health Department, Medical Colleges and Hospitals of the region for referral investigation of sporadic cases and outbreak investigation. Outbreak investigations are being undertaken along with the state health team upon getting information through media or health system. Immediate report is being communicated to the concerned hospital within 3 days of sample receipt.

B. Subject enrollment and Sample collection

Diagnostic services have been provided to 188 patients till date covering more than 5 viruses (Dengue, Chikungunya, ZIKA are tested in RMRC, Bhubaneswar and other viruses i.e. CCHF and KFD are tested in NIV, Pune) important for public health which cause viral hemorrhagic fever. Since October, 2016 the centre received 188 samples from 9 different hospitals and outbreak investigations from various districts of Odisha. Testings were done through ELISA Method (Dengue IgM and NS1 Ag, Chikungunya IgM) and by RT-PCR (Trioplex CDC for Dengue, Chikungunya and Zika Virus). Network has been strengthened from State Health Department to District Health level for getting immediate out break information and investigating the outbreaks within 24 hours.

C. Results

HRD Activity

1. One RA and One Lab Technician have undergone training on Biorisk Management & Study methods at NIV, Pune.
2. Data Entry Operator was trained on Epi-Info Software at NIV, Pune.
3. Administrative staffs have been trained for administrative and financial management of the project.

Subsequent Plan

The above activities will continue for the next year. More emphasis will be given on creating multi skill paramedical and health professionals to deal with viral disease surveillance and timely investigation/ management of outbreaks. Periodically training will be provided to the technical and supportive paramedical staff for laboratory diagnosis of some of the important disease of public health concern which will support state public health system.

Outbreak investigation will continue along with sporadic case investigation with collaborations of state hospitals.

17. Effect of maternal infection on children during their postnatal exposure to filariasis.

Prin. Investigator : Dr. M.S. Bal
Co-Investigators : Dr. A.K. Satapathy,
Duration : Three years (2013 – 2016)
Funding : Intramural

Objectives:

1. To follow-up the children born to filarial infected and non infected mother for observing parasitological, antigenical and clinical out come
2. To determine the influence of maternal infection on subsequent B cell response (antibody isotype) to filarial antigens among follow-up children
3. To find out the extent of modulation of parasite specific cellular reactivity and

cytokine production in children during their natural exposure to infection.

Background:

To eliminate LF globally by 2020, WHO has introduced annual mass drug administration (MDA) in different endemic countries since one and half decades. But studies have shown that the infection remains highly prevalent among children below five years of age even after several rounds of MDA. Here question arises what makes these children more susceptible to infection even though infection levels have come down below threshold in these endemic areas. Further, Pregnancy and early childhood are critical periods in determining the disease outcome in older age, the present study was undertaken to find out the influence of maternal filarial infection at the time of pregnancy on the susceptibility outcome of children born in a community after implementation of MDA for the first time. In our earlier observation we found that children born from filarial infected mothers are comparatively more susceptible to filarial infection than the children born to uninfected mothers. But the mechanism of such increased susceptibility to infection in early childhood is not exactly known. Several studies have shown the association of active filarial infection with T cell hypo-responsiveness which is mediated by regulatory T cells (Tregs). Since the Tregs develop in the thymus from CD4+ $CD25^{hi}$ thymocytes at an early

Table 1 : Characteristic of CFA positive and CFA negative mothers and their children in the study during follow-up.

Participant Mothers	*CFA positive	*CFA negative	P value
Number of subjects	28	21	
Characteristics of mother			
Age in years, median (range)	27 (22-35)	25 (21-36)	P=0.33
Multiparity status, n (%)	13 (46.4)	11 (52.38)	P=0.776
Occupation (House wives) n (%)	24 (85.7)	17 (80.9)	P=1.0
Education (Primary School) n (%)	22(78.5)	16 (76.1)	P=1.0
Microfilariae status n (%)	0.0	0.0	
Clinical sign and symptom of Filariasis (%)	4 (14.2)	0.0	NA
Circulating filarial antigen +ve n, (GM, Range)	18 (245.3, 127-7762)	0.0	NA
Characteristics of Children			
Age in years, median (range)	4 (2-7)	3(2-7)	P=0.40
Female n (%)	12 (42.85)	10(47.61)	P= 0.778
Microfilaraemia	0.0	0.0	
Circulating filarial antigen +ve , n(%), (GM, Range)	12 (42.8) (144, 120-223)	1 (4.7)(124)	P = 0.003
Clinical sign and symptom of filariasis n (%)	0.0	0.0	

*** Status of mother at the time of** enrol**ment, NA: Not applicable.**

stage of the human fetus, it can be hypothesized that the maternal infection during pregnancy affects the development of Tregs in children at birth as well as early childhood. The immune suppressive capacities of Tregs are due to production of down regulatory cytokines to inhibit inflammatory responses and facilitate the parasite survival. Moreover a highly skewed Th2-type cytokine pattern, with a prominent role for the regulatory cytokine interleukin (IL-10) has also been marked in neonates born to helminth-infected mothers. Hence the present study was designed to test the hypothesis by selecting a cohort of pregnant mothers and children born to them subsequently in a filarial endemic area of Odisha, India.

Summary of Progress:

A total number of 179 pregnant women admitted to hospital for delivery from July 2009 to July 2011 were evaluated for inclusion in this study. During the study period total 130 mother-child pairs have been dropped because they are either non traceable, decline to participate, death of the children, moved out of study area or non availability of immunological parameter. Finally 49 pregnant mothers and their subsequently born children have been followed up during 2015-16. The mean duration of follow-up was 4.4 years (range, 2-7 years). Amongst 49 follow up mothers 28 were CFA positive and 21 were CFA negative at the time of recruitment. The characteristics of the enrolled mothers and their children has been depicted in Table-1. Out of 28 children born to the infected mothers, 12 (42.8%) children have acquired filarial infection and become CFA positive. In contrast one of the children (1/21, 4.7%) born to the uninfected mothers has acquired filarial infection and become CFA positive. (OR=15, 95% CI: 1.75-127.9, Z= 2.47, p = 0.013). While analyzing the infection status of cord of these 28 children it was observed that 21.4% (6/28) of them were CFA positive. Also none of the children born to either infected or uninfected mother have detectable microfilariae and/or with any clinical signs/symptoms of filariasis.

The expression of Tregs in infected mother–cord pairs was significantly high as compared to mother-cord pairs of uninfected mother (mother: p=0.016, cord: p<0.001). Similarly Tregs cell expression was significantly high (p < 0.0001) in children born to enrolled CFA positive group of mothers in comparison to children born to enrolled CFA negative group of mothers (Fig.1). Further we have observed a decreasing trend in the level of Tregs in children born to both infected and uninfected mother as compared to the cord blood (p <0.0001 for CFA+ve and p < 0.0001 for CFA-ve) in Fig. 1.

To evaluate the impact of maternal infection on development of Tregs in children during their

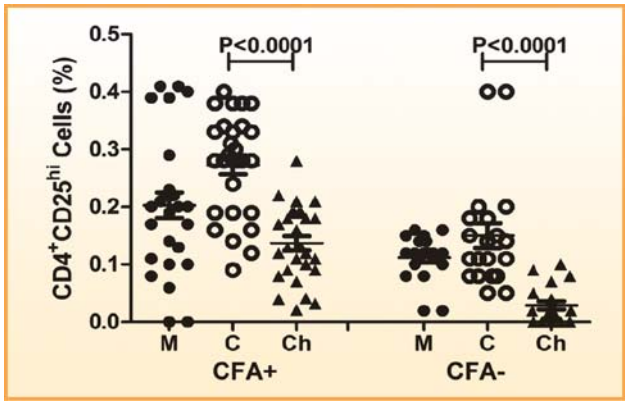


Fig.1: Expression profile of Tregs (CD4+CD25^{hi}) cells in mother and cord at the time of enrollment and in children during follow-up.

early childhood, we have analyzed the Tregs in mothers as well as children born to two groups i.e. CFA positive and CFA negative group during follow up. Irrespective of the CFA status of mother at the time of follow-up, Tregs cells were significantly high (p=0.01) in mothers who were CFA positive at the time of enrollment compared to enrolled CFA negative mothers. But no significant difference (p=0.14) in Tregs cell expression was observed among mothers of four different subgroups belonging to CFA positive group. Children born to four sub-groups of CFA positive mothers showed significant (p= 0.01) difference among themselves. Further, children born to these four subgroups of mothers had higher levels of Tregs expression than children born to M-Ch- of CFA -ve mother (Fig.2).

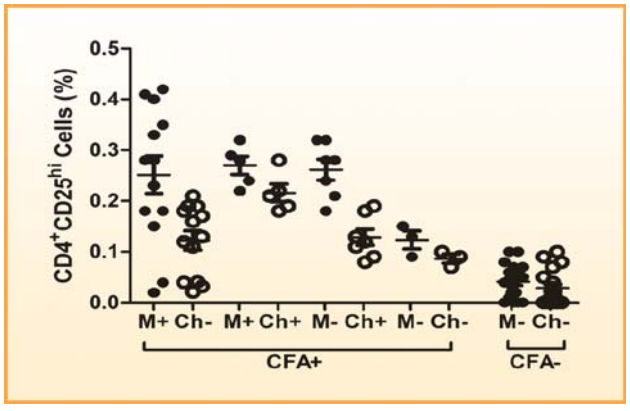


Fig.2. Treg frequency of CFA+ve and CFA-ve mother and their children (Ch) at the time of follow up.

At the time of enrollment level of IL-10 was significantly higher in mother as well as cord blood of CFA positive mothers as compared to cord and mother of CFA -ve group (mother: p<0.0001, cord: p<0.0001) as shown in Fig. 3. Further a decreasing trend in level of IL-10 has been marked in children compared to cord (p < 0.001 for CFA+ve and p=0.007 for CFA-ve group).Similarly during follow up significantly higher level of IL-10 was observed in CFA +ve mother as well as their children in comparison to CFA –ve mothers and their children (p<0.0001 for mothers, p<0.0001 for children).

But IL-10 level in the subgroup of enrolled CFA positive mothers was significantly higher compared to enrolled CFA negative mothers during follow up. More than that IL-10 level was significantly higher in children born to all four sub-groups of CFA positive mothers than born to CFA negative mother as evident in (Fig. 4).

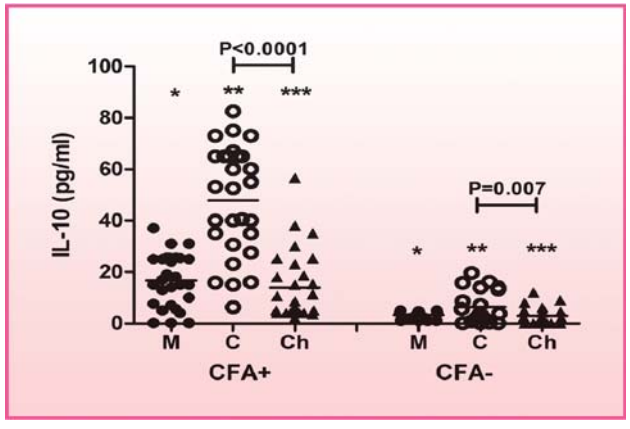


Fig.3. Plasma level of IL-10 in CFA +ve and CFA-ve mothers and their children at the time of delivery and during follow-up.

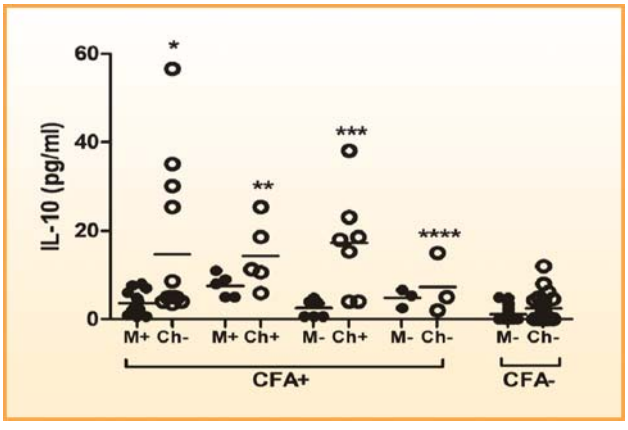


Fig.4. IL-10 levels in mother and their children at the time of follow up.).*p = 0.001, ** p = 0.002, *** p = 0.002, **** p = 0.03 as compared to children (M-Ch-) of CFA –ve group.

To find out the effect of Tregs cells on IL-10 secretion in infected and uninfected mother as well as their children, a correlation was made between percentage of CD4+CD25^{hi} cell expressions and IL-10 level during the follow up. From Fig 5A, it is evident that a significant positive correlation ($p < 0.0001$, $r^2 = 0.6987$) exists between IL-10 level and Tregs in children of infected mothers. In contrast no correlation was marked between IL-10 level and Tregs in children born to CFA negative mothers (Fig 5B, p=0.8541, $r^2 = 0.001$).

Inference of the Results & conclusion

The current study reveals that maternal *W bancrofti* infection during pregnancy up-regulates the production of Tregs and IL10 in offspring from infancy to early childhood and children born to infected mothers are at greater risk of acquiring filarial infection than children born to uninfected mothers. Further, evaluation of cord blood response and their correlation with infection status of children born to infected mothers suggests that in-utero sensitization rather than transplacental transfer of filarial antigen leads to increased susceptibility to filarial infection after birth. These findings supports the notion that immunologic memory established by priming of prenatal T cells with antigens that pregnant women encounters the infection that persists from gestation to childhood. This might be the cause of high incidence of infection among the younger age children (2-4 years old) in this cohort. From this we can speculate that increased level of Tregs and high production of IL-10 initiates a cascade of hyporesponsive mechanism in children from the time of birth that down regulates the inflammatory responses and lead to a Th2 type of response so as to make them susceptible for parasite survival and ultimately determines the disease outcome in children. Hence the present findings relates to a greater impact on mass treatment programs aimed at elimination of transmission of *W bancofti* infection. To prevent the prenatal immune priming and tolerance supervised therapy can be introduced at the child bearing age of the women. Our study recommends incorporating supervised MDA into Adolescent Reproductive and Sexual Health

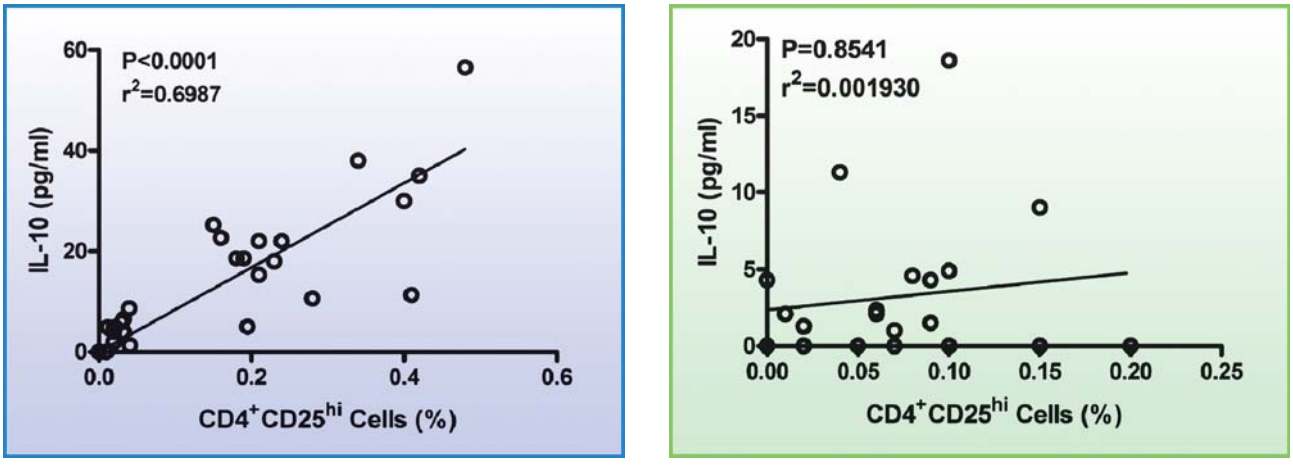


Fig. 5. The relationship between regulatory Tregs (CD4+CD25^{hi}) with IL-10 level of children born to mother who were CFA +ve and CFA –ve at the time of enrolment.

Programme (ARSH) to make the adolescent girls free from infection by the time of pregnancy so as to achieve the goal.

18. Characterization of post mass drug administration residual microfilaraemics using anti sheath antibodies.

Prin. Investigator : Dr. M.S. Bal
Co-Investigators : Dr. B. Dwibedi, Dr. A. K. Satapathy
Duration : Three Year
Funding : ICMR (Extramural)

Background:

The Global Programme to Eliminate Lymphatic Filariasis was begun in 2000 and Odisha has experienced 10 rounds of MDA since 2004. Though majority of the population have cleared microfilariae (MF) due to mass drug effect, some are yet harboring the infection. They are known as "residual microfilariae". To achieve the goal of GPELF it is very important to know the factors responsible for clearing the MF in some and not in others. We have demonstrated a significant inverse association between presence of anti-sheath antibodies and absence of active filarial infection. The antibodies to the sheath of microfilariae have been demonstrated to play a central role in the elimination of circulating MF in human filariasis. But the specific mechanism that plays this role and gives immunity to the individual is not known in filariasis. So there is a need to evaluate the antibodies to microfilarial sheath and relate it to parasitological and CFA levels in the DEC treated microfilaraemic and amicrfilaraemic individuals. To understand the behavior of the residual microfilaraemia in a community where the threshold level off microfilaria is achieved through repeated MDA is one of the research priorities of WHO. This project is formulated to characterize the residual microfilariae using natisheath antibody.

Primary objective

To evaluate the anti-sheath antibody levels in individuals with or without microfilaraemia after DEC treatment in comparison to the control group.

Secondary objective

To find out the association of anti-sheath antibodies with the expression of cellular responses, T-regulatory cells, and cytokine production (Th1 and Th2) in individuals with or without W bancrofti infection after DEC treatment in comparison to the control group

Summary of Progress:

During this period 7 villages have been selected for the study where 4 rounds of supervised MDA (DEC+ALB) in addition to regular MDA have been undertaken and the baseline information is already with us and the district has MF below threshold level. Night blood survey has been conducted in 7 villages through a "door-to-door" census between 7-10 PM. Briefly 50 µl of peripheral blood was collected aseptically from the finger prick and thick blood smear was prepared for microscopic examination after Giemsa staining following appropriate protocol. Informed consent has been obtained from each individual before collection of blood sample for inclusion in the study. Upon enrolment, individuals underwent a detailed questionnaire that queried their age, clinical

history of filariasis and history of drug consumption. W. bancrofti infection was detected either by detection of Mf in thick blood smear of peripheral blood collected at night between 20:30 and 22:30 by microscopy or by detection of CFA in serum samples using commercially available ICT kit.

A total number of 102 individuals were followed up who had taken 4 rounds of supervised MDA (DEC+ALB) in addition to regular MDA. Out of them 79 were infected at the time of baseline the study. During follow-up 35 individuals are positive for circulating filarial antigen as assessed by ICT test kit. Of them 17 individuals still harbouring microfilaria in their circulation after consumption of DEC distributed during MDA. Out of 79 individuals, 32 individuals have cleared Mf after DEC consumption distributed during MDA. The physical assessment was done by the physician to find out the clinical signs/symptoms of filariasis Out of the followed of cases, who were positive initially during implementation of the MDA 12 has developed acute clinical signs/ symptoms of LF (Table 1). The rest individuals were who had no Mf during base line survey and till now negative but have consumed DEC during MDA. At least 3 ml of venous blood has been collected from all these individuals for circulating filarial antigen assay and other immunological parameters as per the project protocol.

Table 1. Characteristics of microfilaraemic individuals grouped according to the present status after six rounds of MDA in filarial endemic area of Odisha.

Groups	N	Age in yrs (range)
MF positive	17	16 – 57
ICT positive (MF –ve , symptom –ve)	18	23 – 56
MF –ve, ICT –ve and Symptom -ve	32	27 – 55
Acute symptoms	9	52 – 56
Hydrocele	2	53
Elephantiasis	1	22 -59
Control	23	23 -61

Table2. Prevalence of anti-sheath antibodies in microfilaraemics after six rounds of MDA.

Present status	N	Previous status	Antisheath antibodies	
			(Positive)	(Negetive)
MF positive	17	microfilaraemics	4 (23.5%)	13(76.5%)
MF–ve ICT +ve	18	microfilaraemics	2(11.1%)	16(88.9%)
MF –ve and ICT –ve	32	microfilaraemics	25(78.1%)	7(21.8%)
Control group	23	microfilaraemics	19(82.6%)	4(17.4%)

Significance: The study has shown development of anti-sheath antibody / correlate with the MF and circulating filarial antigen clearance.

Anti-sheath antibody was assessed in the post MDA microfilaraemic and amicrofilaraemic individuals by immuno-peroxidase assay (IPA) using the microfilariae fixed slide. Out of 17 only 4 individuals (23.5%) microfilaraemic individuals are found to be anti-sheath antibody positive and 11.1% of ICT positive individuals are ant-is heath antibody positive. However out of 32 individuals (MF –ve, ICT –ve) who have cleared both microfilariae and CFA, 78.1% of them have developed ant-is heath antibody and became anti-sheath antibody positive at par with the control group. (Table-2)

19. Molecular dynamics simulation based study of RND Efflux Pump mediated antibiotic resistance in gram negative Bacilli and search for remedies from plant resources of North East India.

Prin. Investigator	:	Dr.Debdutta Bhattacharya (RMRC) & Dr. Pankaj Chetia (Dibrugarh University)
Co-Investigator	:	Dr. N. Mahapatra (RMRC) & Prof. Bijoy Neog (Dibrugarh University)
Date of initiation	:	18th October, 2016
Period	:	3 years
Funding agency:		Biotech Consortium India, Limited Dept. of Biotechnology, Govt. of India. (Extramural)

Background:

The aim of this project is to investigate the various types of antibiotic resistant gram negative bacilli found in different hospitals in Assam. In recent past, the antibiotic resistance among different bacteria has raised alarge-scale health issue. To avoid this crisis, identification of suitable compound(s) or remedial measure(s) has become essential. Principally, antibiotic resistance in gram negative bacteria is efflux pump mediated and herbs may become a better supplement to combat this pump affect. As the proposed study area is Assam, the state wellknown for the richness in floral diversity and till date different tribes of this state rely on the locally available medicinal plants. Hence, this project focuses to identify the medicinal plants and their active principles which may help in fighting the efflux pump mediated antibiotic resistance in gram-negative bacilli.

Though, the North Eastern India is rich in ethnic diversity and their traditional knowledge, the proper value addition to this rich culture is left pending. Many medicinal plants are still unexplored. On the other hand, due to the lack of awareness and improper use of antibiotics, many pathogenic microbes are getting resistant to different antibiotics in the course of time. In addition, no proper study has been undertaken till date to sort-out this problem in this region.

Therefore, considering the need of the hour, this proposal has been designed to carry out extensive study to understand the threat scenario of antibiotic resistance of different microbes, especially gram negative Bacilli in the region as well as to identify potential medicinal plant(s) and herbal compound(s) which may help in fighting the resistant microbes. The project also aims to study the mechanism of different efflux pumps and the proteins involved using molecular dynamics simulation. This will help in identifying a proper mechanism to overcome the threat of antibiotic resistance. This piece of research will not only explore the scenario of antibiotic resistance of pathogenic microbes in the region,

it will also help in some way to overcome the threat of antibiotic resistance problem in near future.

(a) *Rationale of the study supported by cited literature*

Resistance to antibiotics is increasing dangerously worldwide (Carlet *et al*., 2011). The development of antibiotic resistant (AR) bacteria in any country is of global importance. It has become a leading challenge in infectious diseases management. The effectiveness of current drugs is restricted by emergence of multi-drug resistant bacterial strains and they have become the major reason for treatment failure of infections. Antimicrobial agents were initially highly successful in treating infections; however, their unsound use leads to rise in antimicrobial resistance frighteningly, especially in the developing countries. The efforts to fight multi drug resistant (MDR)microorganisms mainly focused on gram-positive bacteria, namely, methicillin-resistant *Staphylococcus aureus*(MRSA) and vancomycin-resistant enterococci during the last decade. Parallel to the developments in gram positive bacteria, infections caused by MDR gram-negative bacilli have also become a growing problem. Gram negative bacteria are the most important nosocomial pathogens, as they are involved in major septic shock, resulting higher mortality rate. The emergence of resistance to different antibiotics among Gram-negative bacteria has become a serious health threat in recent years (Liu, 1995). The World Health Organisation in their report "Antimicrobial Resistance: Global Report on Surveillance" (June 2014) critically examined and for the first time reported the current status of surveillance and Antimicrobial resistance (AMR) with special reference to Antibacterial resistance (ABR) worldwide. They have termed the antibiotic resistance among different pathogenic microbes "a major global threat". The rate of resistance of gram negative bacteria like *Pseudomonas aeruginosa, Acinetobacter baumannii, Klebsiella pneumoniae* etc. to third-generation cephalosporins and also to fluoroquinolones has alarmingly increased since the beginning of this millennium. This resulted in an increased use of carbapenems in intensive care units (ICU) in developing countries, and subsequently to the emergence of resistance to carbapenems (Ntagiopoulos *et al*., 2007). The global emergence of multi-drug resistant (MDR) bacteria is increasingly limiting the effectiveness of currentdrugs and significantly causing treatment failure (Hancock, 2005). Bacterial resistance to chemically unrelated antimicrobial agents is public health concern (Sharma *et al*., 2005) and may be caused by over-expression of MDR efflux pumps (Li & Nikaido, 2004).The resistance nodulation division (RND) of efflux pumps are common throughout the Bacteria, Archaea and Eukaryotes. In Gram-negative bacteria these RND efflux pumps are situated within the inner membrane. They function in complex with two other proteins, an outer membrane channel and a periplasmic adaptor protein forming a tripartite efflux pump spanning both the inner and outer membrane (Blair, 2009).

The RND efflux pumps are highly responsible for the gram negative pathogenic bacteria to get resistant to different antibiotics. Regrettably, no antibiotic from a new class has been developed specifically for multidrug resistant (MDR) gram negative bacteria. Treatment has to be switched to second or third line drugs, when infections become resistant to

first choice or first line antimicrobials. The cost of these second or third line antibiotics is quite high and in many underdeveloped countries, some diseases can no longer be treated in areas where resistance to first line drugs are widespread. With such a challenge, there is an urgent need to the search for new antimicrobial compound(s) for alternative approaches. Such approaches might include strategies that target resistance mechanisms coupled with antibiotics. The northeast India harbour enormous germplasm of endemic medicinal flora, some of which are still to be explored. These lesser known medicinal plants are, however, utilized sustainably by the traditional societies of this region. The rich traditional knowledge on medicinal plants can be scientifically validated through systematic evaluation. Therefore, the antimicrobial properties of Capsicum chinense, Flacourtiajangomas and species of Garcinia are widely used by the traditional medicines for their antimicrobial activities.

The present project proposal aims to study the structure and role of different RND efflux pumps of the gram negative bacilli isolated from major hospitals of Assam and to find suitable herbal inhibitors mainly from these three plants so that these can be used with standard antibiotics to fight resistant microbes.

Objectives of the study

Dibrugarh University

1. To isolate and identify the MDR gram-negative bacilli from various clinical cases admitted/attending different wards of Assam Medical College & Hospital, Dibrugarh and Jorhat Medical College & Hospital, Jorhat.
2. Collection of medicinal plants like Capsicum chinense, Flacourtiajangomas, Garcinia spp. and extraction and screening of efflux pump inhibitory (EPI) activity and antimicrobial activities.
3. In silico studies to understand the role of RND Efflux pump proteins and to study the EPI activity using isolated natural products.

RMRC, Bhubaneswar

1. To study the drug resistance pattern of the bacterial isolates.
2. Bacterial susceptibility determinations:

Methodology

For objective 1

Antimicrobial susceptibility of the isolates

Antimicrobial susceptibility tests of the isolates will be performed in accordance with CLSI guidelines on Mueller-Hinton agar plates by the disc diffusion method (Bauer *et al.*, 1966) using commercially available discs. Any isolates which will show resistance to more than 3 classes of drug will be considered multidrug resistant (MDR).

Determination of Minimum Inhibitory Concentration (MIC)

The MICs of antibiotics in question will be determined for each strain by using the E-test (AB Biodisk), and the readings will be interpreted using the Clinical and Laboratory Standards Institute (CLSI) breakpoint criteria.

Detection of ESBL production

CLSI recommends performing phenotypic confirmation of potential ESBL-producing isolates of Enterobacteriacae by testing both cefotaxime and ceftazidime, alone and in

combination with clavulanicacid. All the isolates, resistant to third generation cephalosporins will be tested for the production of extended spectrum â lactamase using the combination disc test following CLSI recommendation. For disk diffusion testing, a >5 mm increase in a zone diameter for either antimicrobial agent (third generation cephalosporins) tested in combination with clavulanic acid versus its zone when tested alone will be confirmed an ESBL-producing organism (Bhattacharya *et al.,* 2014).

Role of efflux pump in resistance mechanism

Fluoroquinolone resistant strains will be grown to mid-exponential phase in LB (OD600 0.4) and harvested. Carbonyl cyanide m-chloropheny-lhydrazone (CCCP) will be added to Muller Hinton Agar (MHA) at a concentration of 20µg/ml. The MHA agar plate without and with CCCP (20µg/ml) will be used to test the minimum Inhibitory concentration of the fluoroquinolone (ciprofloxacin and norfloxacin) using E-test (AB Biodisk, Solna, Sweden). Experiments would be performed in triplicate after the addition of CCCP to the culture media, as an inhibitor of the proton-motive force, at a final concentration of 100 mM(Pazhani *et al.,* 2008).

For objective 2

The minimal inhibitory concentrations (MICs) of the three plant extracts will be determined using a rapid p-Iodonitrotetrazolium chloride (INT; Sigma-Aldrich) colorimetric assay (Eloff, 1998; Kuete *et al*., 2008). Briefly, the test samples will be first dissolved in dimethylsulfoxide (DMSO, Sigma-Aldrich)-Mueller Hinton Broth (Hi-Media). The solution obtained will then be added to MHB and serially diluted two fold (in a 96-well microtiter plate). One hundred microliters of inoculums (1.5× 106 CFU/ml) prepared in MHB will be then added. The plates will be covered with a sterile plate sealer and then agitated with a shaker to mix the contents of the wells and incubated at 37°C for 18 h. Wells containing MHB, 100 ìl of inoculum, and DMSO at a final concentration of 2.5% will serve as the negative control (this internal control with DMSO 2.5% was systematically added). Chloramphenicol (Sigma-Aldrich) will be used as reference antibiotic. The MICs of each extract will be detected after 18 h of incubation at 37°C following addition of 40 µl INT (0.2 mg/ml) and incubation at 37°C for 30 min. Viable bacteria reduced this yellow dye to pink. The MIC of each sample will be defined as its lowest concentration that prevented this change and then resulted in the complete inhibition of microbial growth. The Minimum Bactericidal Concentration (MBC) will be determined by sub-culturing samples from the wells with concentrations above the MIC on new plates of Mueller Hinton broth (MHB). The MBC will considered as the lowest concentration of the extract associated with no bacterial culture. Each assay will be performed three independent times in triplicate. In case of any difference, the MIC or MBC will be taken as the most frequently occurring values. Chloramphenicol will be tested alone and in the presence of Phenylalanine arginine-ß-naphtylamide (PAßN) at a final concentration of 30 ìg/ml, as described previously (Ghisalberti*et al.,* 2005).

Work progress

1. Recruitment of the JRF is underway
2. Revival of old strains are being done for testing against the plant extract.

20. Identification of biomarker in male infertility patients due to *Chlamydia trachomatis* infection.

Prin. Investigator : Dr. Prakash Kumar Sahoo
Co-Investigator(s) : Dr. B Dwibedi
Collaborator : Dr M Padhi
SCB Medical College, Cuttack
Duration : 1 year
Funding : ICMR, Extramural

Background

Infertility affects at least 60-80 million couples world wide and 15-20 million of them remain in India. One third of them are attributed to male cause of infertility. The factors affecting the male infertility are (i) Primary testicular failure (Sperm dysfunction, ii) Secondary testicular failure (Endocrine system), iii) Post testicular obstructions (Infection/chemotherapy). However, the sperm dysfunction of unknown etiology of the most male infertility remains obscure. Amongst the unknown causes, infection due to Mycoplasma and Chlamydia cannot be excluded. The role of *Chlamydia trachomatis* in development of uretheritis, epididymatis and orchitis in men is well known. Though the role of this infection in prostatitis is not exactly known, but 35-50 prostatitis patients have been found to harbor this infection. Infection of testes and the prostate is implicated as a factor for deterioration of sperm viability and ultimately affecting fertility. Since currently there is no easy method to detect the infection, identification of an immunological biomarker can be used as a tool to identify the Chlamydia infection among infertility male members. In this context the proposed study has been designed to investigate the relationship between *Chlamydia trachomatis* infection and unexplained infertility in male.

Primary objectives:

To find out the prevalence of *Chlamydia trachomatis* among infertile males.

Secondary objective:

To measure the antibodies (IgG/IgA) to know the history of infection and cytokines among the fertile and infertile males.

Summary of Progress:

The project is awaiting funding from ICMR. Initial chemicals and reagents are being procured by intramural support to start the work.

21. Quadruplex PCR for diagnosis of *V. cholerae* O1 and/or O139 Serogroup causing cholera. (Translational Research)

Project Investigator : Dr. H. K. Khuntia,
RMRC, Bhubaneswar

Objectives:

1. (a)To optimize, inter and intra observer variations of the Qudruplex PCR assay will be checked for detection of *V. cholerae* O1 and O139 serogroups.

   (b) An easy Qudruplex PCR kit will be prepared for detection of V. cholera O1 serogroups
2. To map out the *V. cholerae* strains found in Orissa by Quadruplex PCR by examining both hospital and outbreak samples
3. Transfer of the Quadruplex PCR technology from laboratory to the field.

Summary of Progress:

Intra observer variation of the Quadruplex PCR:

To study the intra observer variation of the PCR technique, an in-house validation was conducted with coded *V. cholerae* O1 and O139

strains. A total of five PCR expert Research Scholars of RMRC, Bhubaneswar were assigned each with five coded *V. choleare* strains and three control strains (Positive control: *V. cholerae* O1 and O139 and Negative control: Salmonella spp). Each student was taught in detail about methodology and a protocol of Quadruplex PCR assay was given before the experiment. The results of Quadruplex PCR assay of all 25 coded *V. cholerae* strains confirmed genetically their serogroup encoding *rfb* O1 / *rfb* O139 sreogroup that matched with their respective actual serogroups showing positive for other genes *ctx*A, *tcp*A, and *Tox*R. (Fig-1)

Mapping of *V. cholerae* strains found in Odisha by Quadruplex PCR assay by examining both hospital and outbreak strains.

A total of 332 rectal swabs sample in Carry Blair transport (CBT) medium were collected/ referred from hospitalized diarrhoea patients. Rectal swab sample were inoculated on TCBS plate and incubated at 37^{0}C for 18 hour. DNA was extracted from the typical colonies resembling the *V. cholerae* strains and subjected for Quadruplex PCR assay for genetic confirmation of serogroup and other virulent genes. Of the 332 rectal swabs, 23 *V. cholerae* strains were confirmed by PCR assay with the detection of *rfb* O1 gene encoding surface antigen that matched with the conventional method of sero-diagnosis. All the *V. cholerae* strains showed positive for *ctx*A, *tcp*A (El Tor) and *Tox*R genes.

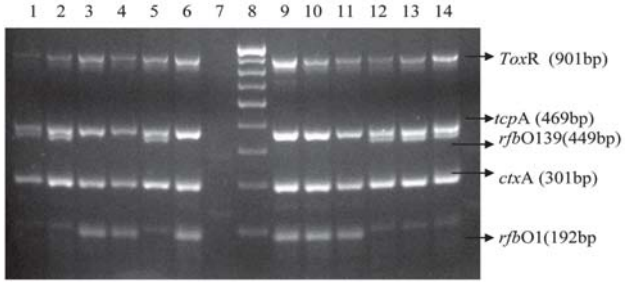


Fig.-1: Shows results of in-house validation of Quadruplex PCR assay of *V. cholerae* O1, O139, positive control (*V. cholerae* O1 and O139) and negative control (Salmonella spp.)

Preparation of a test kit (Objective 1B)

Currently since most of the epidemics and outbreaks are caused by *V. cholerae* O1 and *V. cholerae* O139 has not isolated over a considerable period, hence we planned to design a PCR Kit,that can detect *V. cholerae* O1. We developed an easy Quadruplex PCR Kit that can be easily used by technicians for detection of *V. cholerae* O1 causing cholera. The Kit gives correct results and can be used up to one year if will be preserved at -20^{0}C.

Third party Validation of Quadruplex PCR Kit

SAC-2013, suggested for third party validation of the Quadruplex PCR Kit in three independent neighboring institutes, where PCR assay for cholera diagnosis is performing, like (1) NICED Kolkata, (2) ILS, Bhubaneswar and (3) MKCG medical college Berhampur.

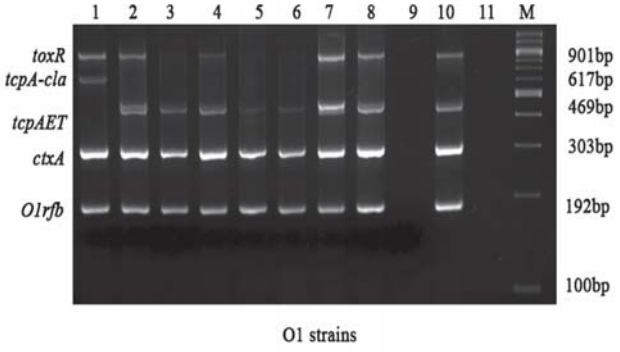


Fig.-2: Ethidium stained agarose gel of Quadruplex PCR products (a)Lane M 100bp ladder; lane 1, *V. cholerae*O1 El Tor strain N16961; lane 2, *V. cholerae* O1 classical reference strain O395; lane 3-11, V. cholerae O1 El Tor clinical strains; lane12, V. choleraenon-O1and non-O139 strain; lane 13, V. cholerae O1 classical reference strain O395 (Chromosomal DNA); Lane 14, V. cholerae O139 strain MO10 (Chromosomal DNA) and Lane15, V. cholerae O1 El Tor N16961 (Chromosomal DNA). Domain expert committee report prior to commercialization.

Validation at ILS, Bhubaneswar:

The kit was validated in ILS that gave appropriate results with 100% sensitivity and specificity as revealed in (Fig-2).

Validation at NICED Kolkata

The kit was validated in NICED, Kolkata that gave appropriate results with 100% sensitivity and specificity as follows. (Fig-3)

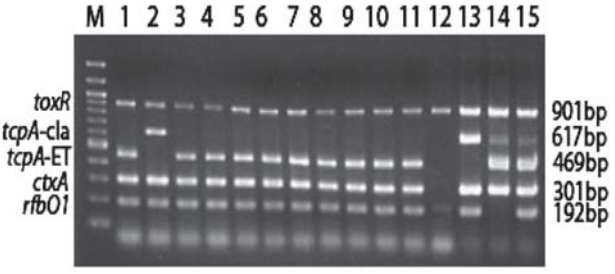


Fig.-3: Lane1, V. cholerae O1, classical strain 569B; Lane2 through lane 8: *V. cholerae* O1 El Tor strain; Lane 9: E coli DH? negative control; Lane 10:V. cholerae O1 El Tor reference strain N1696.

Table-1:

Serogroup	No of strains	Specificity	Sensitivity
V. cholera O1	07	100	100
V. cholera O1, 569B	Positive control, classical	100	100
V. cholera O1, N16961	Positive controlEl Tor	100	100
E.coli?	Negative control	0	0

Report of Domain expert committee:

As per the recommendation of the Consultant Innovation & Translational Research committee, ICMR, a Domain Expert committee meeting was held on 31st Aug, 2016 to review this technology. Domain expert committee, constituted by Dr. G. B Nair, THSTI (Chairman), Dr. T Ramamurthy, THSTI and Dr. D.V. Sing, ILS, recommended that, this technology is appropriate and well equipped entrepreneur may be contacted for commercialization.

22. Biomedical Informatics Centre of ICMR at RMRC, Bhubaneswar.

Project Investigator : Dr. N. Mahapatra, Sci-F
Co-Investigator : Dr. B. Dwibedi, Sci-D
Funding : ICMR

Objectives of the BIC

- To identify genetic loci associated with diseases of National interest such as Diabetes, Cancer, Stress, Mental illnesses etc. in Indian population.
- To develop solutions for controlling pathogens causing diseases of National interest such as Tuberculosis, Malaria, and AIDS etc.
- To develop a National Repository of clinical information/data, high-throughput data, genotype and phenotype.
- To promote applications of cutting-edge technologies in medical research.

Background

BIC, RMRC, Bhubaneswar is one among the 19 centres sanctioned by the second phase Task Force Biomedical Centre's of ICMR. The centre was sanctioned on 01/04/2013 with a primary mission to promote, support and accelerates the research activities in the field of medical science research through informatics. Since last four years from its inception, the centre is actively involved/ engaged in catering the needs of Bioinformatics in Biomedical research of RMRC, Bhubaneswar as well as other medical/research institutes of Eastern region of Odisha. Apart from catering the need of Bioinformatics, the centre also supports analysis of the in-house epidemiological,

anthropological data and NGS data generated at RMRC. Keeping in view the objectives of the ICMR-task force in mind, the centre has undertaken several research worksand conducted workshop-cum-training programs at RMRC, Bhubaneswar during session 2016-17, which are highlighted below.

Summary of the progress:

Project 1

Structural dynamics of Casein Kinase I (CKI) from malarial parasite *Plasmodium falciparum* (Isolate 3D7): Insights from theoretical modelling and molecular simulations.

Casein kinases (CKs) are vastly expanded in various organisms, where, the malarial parasite *Plasmodium falciparum* possesses a single member *i.e.*, *Pf*CKI which can phosphorylate various proteins in parasite extracts *in vitro*. The study was undertaken to unravel the structure-function mechanism and mode of ATP recognition in *Pf*CKI through a combinatorial approach involving theoretical modelling, docking, molecular dynamics (MD) simulations and MM/PBSA binding free energy estimation.

Results

The Bi-lobed catalytic domain of *Pf*CKI shares a high degree of secondary structure topology with CKI domains of rice, human, and mouse indicating co-evolution of these kinases. Molecular docking study revealed that ATP binds to the active site where the glycine-rich ATP-binding motif with few conserved residues plays a crucial role maintaining stability of the complex. Principal component analysis (PCA) displayed that the overall global motion of ATP-bound form is comparatively higher than that of apo form.

Conclusion

The important residues identified in this study i.e., Ser17, Gln48, Tyr51 and Phe150 aid in tight anchoring of the ligand within the bi-lobed cavity of *Pf*CKI through strong H-bond, which is consistent with the closest structural homologs. It is assumed that further studies involving site-directed mutagenesis and biochemical studies of this important enzyme would open up better avenues to under-stand the mode of catalysis and can answer important questions related to malarial parasite's protein phosphorylation mechanism in near future.

Project 2

***In silico* screening and molecular docking of phytochemical compounds to identify novel mosquito/insect repellent compounds targeting the odorant binding proteins (OBPs) of malarial vectors**

Odorant binding proteins (OBPs) are considered as important targets for structure-based rational approaches towards discovery of new repellent or other olfaction inhibitory compounds with desirable features. As of now little effort has been made to screen phyto-chemicals compounds with desired activity to design novel mosquito/insect repellents using high-throughput computational biology tools. Henceforth, in this study, an attempt was made to screen phytochemicals from 10 plants with mosquito repellent activity from published literature and public domain through theoretical modelling and molecular docking studies targeting OBPs of *Anopheles gambiae* and *Anopheles stephensi*.

Results

Among 40 phytochemical compounds, a total of 17 compounds showed higher binding energy along with more numbers of hydrogen-bonds as compared to DEET. Few compounds identified in this study i.e., azadirachtin, lycopersin, khusimol, khusimone, gamma-sitosterol, phenol-2-methoxy-3-(2-propenyl), beta-humulene and alpha-vertivone displayed higher binding energy than that of DEET and needs further investigation for design of safe and more effective insect/mosquito repellents.

Conclusion

The study on OBPs, determination of their three-dimensional structures and binding specificities of various plant based compounds with mosquito repellent activity could help us to understand the molecular basis of odorant detection and is expected to pave the way for development of safe, effective, and environmentally friendly strategies for mosquito control.

Project 3

Novel insights into to the structure-function and substrate binding mechanism of *Bacteroides fragilis* mucin-desulfating sulfatase (*Bf*MDS) of human gut: A computational structural biology approach.

A body of evidence suggests that the sulfation of mucins is protective against degradation by bacteria, and desulfation is one of the important rate-limiting steps in mucin degradation. Sulfatases desulfating N-acetylglucosamine-6-sulfate, galactose-6-sulfate and galactose-3-sulfate have also been reported. Therefore, molecular insights into the mode of catalysis by mucin-desulfating enzymes (MDS) are quite useful. Herein, the structure-function mechanism of mucin desulfating sulfatase (*Bf*MDS) of gut microbe *Bacteroides fragilis* was explored through theoretical modelling, docking, molecular dynamics simulations and binding free energy estimation.

Results

The modelled structure folds like a crescent-like architecture divided into two domains by a deep cleft. Docking analysis showed a binding energy of -5.91 kcal/mol, -4.52 kcal/mol and -7.91 kcal/mol for galactose-3-sulfate, galactose-6-sulfate and N-actylglucosamine-6-sulfate respectively. Few critical residues i.e., Asp214, Lys216, Arg251, Gln308, Arg311 and Tyr322 identified in this study were found to be indispensable for tight anchoring of ligand within the active site.

Conclusion

This is the first ever report on structural information depicting molecular basis of recognition of substrates and provides insights into the mode of catalysis by mucin desulfating enzymes in gut microbiota. We assume that future studies involving site-directed mutagenesis and biochemical studies of this important enzyme of gut microbe could open up better avenues to under-stand the mode of catalysis and can answer important questions related to desulfation mechanism.

Project 4

Design of potential epitope-based peptide vaccine candidates targeting the non-structural protein1 (NS1) of Japanese encephalitis virus (JEV): An immunoinformatics approach applied to emerging infectious diseases.

With availability of genome sequences of JEV, immunoinformatics-driven approach to systematically search for key determinants of immunity, and design peptide based vaccine is considered as one of the promising approach to treat JEV. Herein, a computational approach was adopted to identify a multi-epitope vaccine candidate targeting the important non-structural protein NS1, which plays a crucial role in virus replication and elicits protective immune responses during infection.

Results

A total of 9 promiscuous peptides were found to be most potential epitopes targeting highest number of HLA alleles with high cumulative population coverage, ranging from 78.88% to 93.87%.

Conclusion

The immunoinformatics study to design epitope-based peptide vaccine against JEV allows us to determine novel peptide antigen targets in non-structural proteins on intuitive grounds, albeit the preliminary results thereof require validation by *in vitro* and *in vivo* experiments.

Project 5

Involvement of gut microbiota in non-communicable diseases and mucosal immunity.

The gut microbiota is composed of four major phyla, where, Firmicutes (49–76 %) and Bacteroidetes (16–23%) dominate both in humans and rodents followed to a much less extent by the Proteobacteria and Actinobacteria. Alteration in these major phyla results in inflammation and ultimately results in many diseases. The microbiome studies are nowadays used to identify reliable biomarkers of disease risk and therapeutic indexing of many diseases. In this study association of gut microbiome with various non-communicable diseases have been explored.

Results

Mucosal layer and microbial composition possess a tremendous potential as therapeutic usage of gut microbiota in non-communicable disease control or/and control of morbidity associated with it.

Conclusion

Understanding of the relationship between gut microbiota and human health nowadays gaining momentum for targeting new pre/probiotic treatments and novel strategies in treating and managing a wide variety of human diseases and their morbidities. Mucosal sulfation and desulfation in relation to specific microbial presence needs to be studied in detail which can unravel the basis of many late onset inflammatory diseases.

Project 6

Evaluation of phytochemical compounds from *Carica papaya* as potential drugs against Dengue virus: an *In-silico* approach.

Dengue virus (DENV) infection is an important vector-borne viral infection infecting about 2.5 billion people worldwide with potential fatal complications, of which approximately 975

million belong to large and small cities of tropical and subtropical countries in Southeast Asia, the Pacific and America. The role of antiviral drugs in the treatment of dengue fever has been limited, but is currently widely studied. In the current investigation an attempt was taken to screen phytochemical compounds of *Carica papaya* against potential targets of DENV.

Results

Out of the 56 phytochemical compounds screened in this study, a total seven compounds namely 1-sitosterol, stigmast-5-en-3-ol, 9-cis-violaxanthin, saponin, flavanone, dicoumarol and terpin showed relatively higher binding affinities than the other compounds. A total of three compounds viz., flavanone, dicoumarol and terpin were inferred as the potential compounds based on their binding affinity, drug likeliness, ADMET property, toxicity and bioactivity.

Conclusion

Further analysis of these phytochemical compounds from *Carica papaya* is needed to confirm their efficacy and to evaluate their anti-viral drug potency.

Project 7

Identification and characterization of differential expressed genes (DEGs) from human microglial cell (CHME3) samples infected with Japanese encephalitis virus.

So far very few studies have been undertaken to identify differentially expressed genes microarray data on *Japanese encephalitis* (JE). The aim of the present study was to identify and characterize differentially expressed genes from microarray data of human microglial cells (CHME3) samples infected with JEV (P20778) strain.

Results

Microarray data analysis revealed that STAT1 gene gets down-regulated during JEV infection. Further STAT1 was found to interact with Tyr protein kinase family members and plays crucial role in important JAK-STAT pathways of JEV infection.

Conclusion

The identified transcription factors and the binding sites in the promoter region of the STAT1 may act as potential drug targets of JEV in near future.

Human Resource Development Activities

This year the centre has selected one dissertation trainee (for six months) for cutting-edge research activities in Biomedical Informatics.

Ms. Trupti Rekha Panda (Dissertation Trainee)

Workshop-cum-training programme

This year the Centre has organized three day's training programme on "**Systematic Reviews & Meta-analysis: A Synthetic Approach in Biomedical Research**" from 31st October to 2nd November, 2016. The workshop-cum-training was attended by 30 participants those were mostly medical faculties from AIIMS, SUM Hospital, SCB Medical College and MKCG.

List of workshops/training programs/courses attended

- Dr. Santosh Kumar Behera, Scientist-II, BIC, RMRC has attended and Participated in the "Pre-Symposium Tutorial on Health GIS"

Conducted at Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun on 6th December, 2016.

- Dr. Santosh Kumar Behera, Scientist-II, and Mr. Manoj Kumar, RA, BIC has attended the Short term Course on "Software-Assisted Quantitative Data Analysis" organized by Indian Institute of Public Health, Bhubaneswar from 16th -20th January, 2017.

Future Plan of Work

The developed collaborative extramural research projects on Dengue and Japanese encephalitis will be submitted to funding agencies for extramural funding. Apart from the other research and development activities, the Centre will conduct short term and long term training programmes in biomedical informatics for the clinicians, researchers and faculty members of this region.

Dr. G. Buliyya, Scientist-E won 1st Prize in Cochrane Library Quiz (iPad-Mini) from Wiley India

Working in Virology Lab.

Training workshop on Clinical Pratice

Hindi Diwas celebration

Other Scientific Activities

1. Outbreak of Cholera in Aguana sahi village, Oupada block, Balasore district, July-2016.

Prin. Investigator : Dr. B. B.Pal, Sci-E

As per the information from the IDSP, DHS, Govt. of Odisha, a team consisting of Dr. B. B. Pal, Mr. S. K. Mallick (Lab. Attendant) proceeded to Aguana sahi of Oupada block on 12.7.16 &18.7.16 to 19.7.16 twice for the situation analysis and sample collection to find out the probale source of infection and spread of infection. The PI discussed with the medical and para medical staffs regarding the date wise incidence of diarrhoea cases, index case, location of the village, drinking water sources, hygienic condition of the areas etc.

About the village

The Aguansahi is located in the Agirapada GP of Oupada block ,Balasore district. The village is having 144 households, 844 population and all are ST belong to **Bathudi tribe** . There is one road connecting from Oupada block to this village and towards west side of the village one small mountain exists. The village is having 3 sahis. From entry point to end point the sahis are Nuasahi, Natapada and Badasahi which are sequentially located. The Nuasahi and Natapada are having two open well, 3 tube well, whereas the Badasahi is having 3 open wells, 2 tube wells (including one in school), one solar tube well and one chua located near the base of the mountain which is perennial. The people use this water for bathing, cooking, drinking purposes. It was interesting to note that the villagers from Badasahi were diarrhoea infected who consumed the water from the chua and open well water.

Index case

A girl, aged 14 yrs from Badasahi of Aguansahi village went to that chua located in the paddy field near the mountain on 6/7/16 at 4 pm. She brought water for cooking and drinking purposes and drank water also there. She developed the symptoms of profuse watery diarrhoea with rice water stool, vomiting, severe dehydration with abdominal cramping and muscular pain at about 10 pm. She took some medicine from ASHA but not cured but died on 7/7/16 at 4 am morning at home. Gradually the cases spread in the same house and nearby houses of that village.

Date wise case in Aguansahi village

Date of onset : 6.7.2016
Date of last cases : 18.7.2016
Total cases : 51
Total Death : 4
Tube well : 1
River : 1
Pond water : 2
Open well : 4
Solar water : 1
Chua : 1

Bacteriological Analysis:

Rectal Swabs:

Total samples : 5
E. coli : 1
V.cholerae O1 Ogawa : 3

Water samples: Before chlorination

Total samples : 7
V cholerae O1 Ogawa: 1(Open Well)
After chlorination: 10
All negative for *V.cholerae*

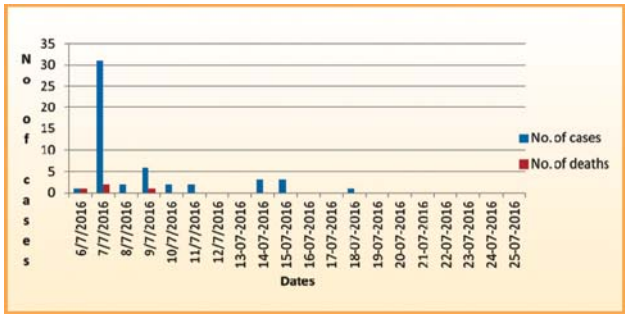


Fig-1: Epicurve showing date wise Severe diarrhoea cases in Aguanasahi village, Balasore district.

Source and Spread of Infection:

The people of Nuasahi were cleaning utensils, clothes and bathing in the open well water. These open wells were dirty which were used by the people for bathing, cooking, cleaning utensils. One out of four well water was positive for *V. cholerae* O1 Ogawa. There was a leakage to the well from the paddy field water. The infected people's diarrhoea clothes were washed in the paddy field water and passed through the leakage to the well water and contaminated it which became the major source of spread of infection. This is again supported by the death of 3 persons who used water from that well which was positive for *V.cholerae* O1 Ogawa.

Confirmation of the Outbreak

So far the hospital record of Oupada CHC was concerned there was no clustering of diarrhoea cases reported during last six months. Only few simple diarrhoea cases were reported sporadically from different villages that area. During discussion among the villagers it was found that there was no report of clustering of severe diarrhoea cases reported in that village for 50 years.

2. Cholera outbreak in Kalyansinghpur block, Raygada district (26.07.2016 to 29.07.2016).

Prin. Investigator : Dr. B. B.Pal

A team of scientists consisting of Dr. B. B. Pal (Scientist-F), Dr. B. Dwibedi (Scientist- D), Dr. D. Bhattacharya (Scientist- C) along with Mr. S. K. Mallick (Lab. attendant) visited the cholera affected villages of K. Singhpur block, Rayagada Dist. from 26.07.2016 to 29.07.2016 for situation analysis and collection of rectal swabs and water samples used by the human habitation for analysis.

The team discussed with the CDMO I/C of Rayagada District about present situation, diarrhoea cases and affected villages on 26.07.2016 afternoon. We met the collector, Rayagada in the evening and discussed with her regarding previous history of cholera outbreaks in Kasipur, K. Singhpur, Gunpur, B. Cuttack during 2007, 2010, 2012 and the reported publications were handed over to her regarding source of infection, mode of transmission and also the causative organisms of the outbreaks. Next day morning the team visited the K. Singhpur CHC and medical staffs to obtain the date wise incidence of severe diarrhoea cases; index case/ index village and visited the cholera affected villages like Polama, Pedua, Pongli and Dantiling to find out the active cases; to find out source of infection and mode of transmission and spread of diseases through discussion among the villagers. The team approached the school children, villagers including males and females attending Anganwadi and discussed with them regarding cause of infection, mode of transmission and practising hygienic practices in the house on cleaning diarrhoeal clothes, regarding drinking water and food preparation. During discussion, it was found that people while going to farming they took bath, cleaned clothes and sometimes drank water from nearby nala/ stream. It was found that one perennial stream is flowing from Polma to Pedua then Pongly and lastly Dantiling village. The cases were reported in these villages from Polma to Dantiling at the downward flow of stream /nala water.

Index Case

Though there was first case and death was reported from Pedua village on 16.07.2016, but the index case occurred in Polma village on 13.07.2016. A female named Jammi Ulaka aged 21 yrs female, (sister of Raghu Ulaka aged 27yrs. male) went to the paddy field on 13.07.2016 morning and used the water for face washing. She suffered from severe diarrhoea, vomiting once at the field in the afternoon and cleaned her clothes in the nala water, returned at 3.00 PM on the same day. She had loose motion near the nala side and there was intermittent rainfall on those days. As a result of which the faeces along with vomitus mixed with nala water and moved downwards. On that night she had more than 20 times loose motion, vomiting muscular pain, abdominal cramping and became severely

dehydrated. On 14.07.2016 morning she along with her brother and Asha went to K. Singhpur CHC for treatment which was evident from the OPD ticket. As the patient was severely dehydrated, she was referred to Dist Head quarter hospital immediately. Her brother developed severe diarrhoea on 14th morning and the Asha suffered from severe diarrhoea on 15th morning, both treated and cured. The index case did not visit earlier any relatives house suffering from diarrhoea before or any relatives suffering from dia1hoea visited her house before.

In K.Singhpur block Pedua, Polama, Chaluniguda and Pongali villages were affected by severe diarrhoeal outbreak. Highest number of cases were reported from Pedua village and lowest cases from Chaluniguda. Age & sex wise distribution of diarrhoea cases revealed that more number of people >10 yrs of females were affected by severe diarrhoea

Probable source of Infection:

During discussion among the villagers it was observed that people were using nala water for bathing, cleaning utensils, cleaning clothes including diarrhoea clothes etc. During farming they sometimes drink water from the nala water. It was evident from the index case that the lady went to the field for farming. She suffered from severe diarrhoea and vomiting once in the afternoon, discharged the faeces near the nala site. Due to raining in those days the faecal materials might had mixed with the nala water contaminating it and flowed downwards towards Dantiling and cases were increased downwards in the adjacent villages. Due to unhygienic practices and contact in the family the cases increased within the family and in the villages.

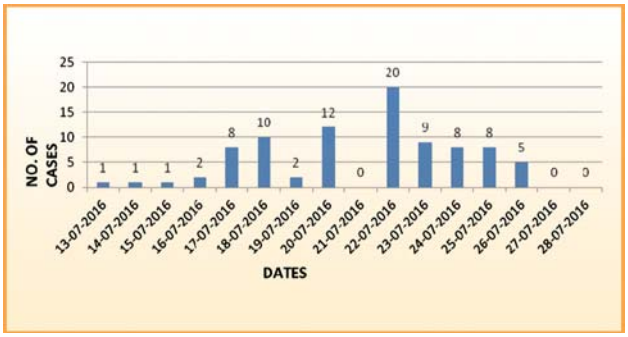


Fig-1: Date-wise incidence of severe Diarrhoea cases in K. Singhpure Block.

Awareness and chlorination

The awareness regarding safe water, good health practices and putting bleaching bags at the ghat areas of the nala and chlorination in the household of the villages near the tubewells and affected houses were done regularly by the State Govt. The boiling drinking water was provided to the people of the affected villages which were reported during the field visits.

Drinking water sources

The majority of the drinking water sources were tube wells found in the villages mostly functional used by the people for drinking, cooking and bathing purposes. The environmental water sources like stream, river, chua and household storage water were collected to test the presence of *V. cholerae*.

Bacteriological analysis

Stool samples: Out of total 9 samples collected from severe diarrhoea patients *E. coli* were 4 and 3 were *V. cholerae* O1 Ogawa.

Water samples: 15 water samples collected from river, nala / stream, chua and household storage water were negative for *V. cholerae*.

The team discussed among the villagers like school children, Angawadi workers including females present in the Anganwadi, regarding source of infection, modes of transmission, safe drinking water, good hygienic practices, safe disposal of faeces and carefully cleaning of diarrhoeal clothes. The villagers were advised to carry drinking water in the bottles while going for farming to the fields.

Now, the disease is in declining stage. If the people will be made aware regarding source and spread of infection, safe drinking water, good hygienic practices and use of toilets for defecation then there will be less chances of diarrhoeal outbreaks in this tribal areas.

Completed Studies

Contents

1. Development of a LAMP assay for diagnosis of human malaria.

Prin. Investigator : Dr M R Ranjit
Co-Investigator : Dr S K Kar
Funding : DHR, ICMR
Staring Date : 29/11/2014
Closing Date : 29/11/2015

Background

Microscopy is the gold standard for diagnosis of malaria even though various rapid and simple tests have been developed in recent years. But loop-mediated isothermal amplification (LAMP) of nucleic acids seems to be a promising new technique, which enables to detect malaria parasites in a setting with limited resources. However, LAMP assay in its current form lacks sufficient accuracy in detection of the end product. Therefore, optimization of the current method for visualization of LAMP end products is important. The proposed project will help to develop a suitable method for detection of end product.

Objectives

(i) To standardize the LAMP assay for detecting malaria infection in direct finger prick blood sample

(ii) To investigate the repeatability of the test in a laboratory and reproducibility between laboratories (ruggedness)

(iii) To determine the capability of a CHC level laboratory personnel to perform the assay (proficiency testing)

(iv) To detect the predictive value of the assay in the field condition

Work Done

We have standardized the LAMP assay to perform in fingerpick blood and the internal validation of the test. The efficacy of the test was compared to PCR which was found to be low compared to PCR. The SOP prepared for the technicians is used efficiently by them without any mistake.

Salient Findings

1. **Sensitivity:** The LAMP can detect 5parasites/µl of blood when PCR is able to detect 2 parasites/µl of blood and microscopy 20 parasites/µl of blood in case of *P falciparum*. In case of *P vivax* LAMP is able to detect 10 parasites/µl of blood, PCR 5 parasites/µl and microscopy 10 parasites/µl of blood

2. The ***Intra Observer Variation*** ranges from 90-100% in case of *P falciparum* and 80-100% in case of *P vivax* while ***Inter Observer Variation*** is 80 % in case of *P falciparum* and 90% in case of *P vivax*.

3. **Cost Efficacy:** As per the present costing the cost of LAMP will be Rs 850.00 per test, while PCR is costing Rs 195.00, RDK Rs 125.00, QBC Rs 95.00 and Geimsa is Rs Rs1.50

Conclusion

The LAMP assay is superior to microscopy but not as efficacious as the PCR and the cost of LAMP is very high compared to the available tests. Hence it will not be economical for field use. The result have been discussed at the ICMR translational research committee and was recommended for completion.

2. National Hospital based Rotavirus Surveillance Network at RMRC, Bhubaneswar.

Prin. Investigator : Dr. B. Dwibedi, Scientist–D
Co-Investigator : Dr S. S. Satapathy
Starting Date : January, 2014
Closing Date : December, 2016
Duration : 3 years
Funding : ICMR (Extramural)

Objectives

1. To establish a national hospital based surveillance to examine long term trends and pattern of diarrhea attributable to rotavirus among children < 5 years of age seen at in-patient facilities.
2. To determine the age, seasonal distribution and outcomes of rotavirus-associated disease among the population under surveillance, including monitoring trends over time.
3. To characterize (G and P genotyping) prevalent strains of rotavirus in the population under surveillance, including strains not identified/typed by standard techniques.

Materials & methods

Subjects were enrolled and relevant information was collected as per the predefined questionnaire. Stool samples were collected after obtaining written consent from the parents/ guardian at the peripheral site (Capital hospital, Bhubaneswar) as per the criteria defined in the project during the surveillance period. The

Table-2. Rotavirus antigen positivity in patients during 2014-2016.

Duration	2014	2015	2016	Total	%age
Jan.-March	22	73	63	158	18.74
April-June	20	19	9	48	5.69
July-Sept	29	19	4	52	6.17
Oct.-Dec.	135	50	ND	185	21.95
Total	**206**	**161**	**76**	**443**	**52.55**

The age-wise and gender-wise prevalence of rotavirus infection among children with diarrhea are presented in table 2 and 3 respectively. The result suggests that children of 7-24 month age groups are most susceptible to rotavirus infection and male children were reported to be more affected by rotavirus infection.

Table.3 Distribution of enrolled cases and rotavirus Ag positive cases in different age group.

Age group	Total	%age
0-6 month	32	3.80
7-12 month	201	23.84
13-24 month	181	21.47
25-36 month	22	2.61
37-48 month	5	0.59
49-60 month	2	0.24
Total	**443**	**52.55**

Table-1. Distribution of total hospitalization, enrollment and no of sample collection during 2014-2016.

	Total Hospitalization				Total Enrollment				Sample collection			
Months	**2014**	**2015**	**2016**	**Total**	**2014**	**2015**	**2016**	**Total**	**2014**	**2015**	**2016**	**Total**
Jan-march	63	234	215	512	62	175	155	392	40	106	87	233
April-June	49	210	164	423	50	130	84	264	47	70	31	148
July-Sep	218	270	57	545	133	165	42	340	89	91	16	196
October-Dec	476	161	-	637	278	121	-	399	190	76	-	266
Total	**806**	**875**	**436**	**2117**	**523**	**591**	**281**	**1395**	**366**	**343**	**134**	**843**

Most of Rota virus antigen positive cases were reported during the period of October-December (21.95%) and January-March (18.74%). There was increase in record of cases from 2014 to 2016.

samples after collection from the hospital were transported to the RMRC, Bhubaneswar laboratory on the same day in cold chain. In the laboratory they were made into 3 aliquots, labeled and stored at -70°C until further use. The samples were then tested for presence of group A rotavirus antigen by EIA technique using primere Rotaclone ELISA kit (Meridian Bioscience). In each test one positive control (supplied with the kit) and negative control (only sample diluents) was included for quality control purposes.

Salient finding

During the period of surveillance 2117 hospitalization were recorded and 1395 patients were enrolled as per the criteria. A total of 843 samples were collected. Majority of the hospitalization and enrollment were recorded during winter season i.e from November to January of each year. The month-wise sample collection along with total hospitalization, enrollment and sample collection is presented in table 1 and 2.

Genotyping:

As per the mandate of the project every third rota positive sample were sent for genotyping to referral laboratory (NICED, Kolkata).208 Rotavirus positive samples (January, 2014 to August, 2016) were sent to NICED, Kolkata for genotyping. Out of these 208 samples, 139 samples and 151 samples were typed for P and G genotype respectively while the rest samples were untypeable. G1 (42%) was the most common genotype followed by G2 (11%) and G3(9%) genotypes. Likewise P[8] (45%) and P[4](18%) were the most common among the P genotypes. It is notable that G and P genotypes could not be ascertained in 28% and 45% respectively. G1P[8] genotype combination was most common. Multiple genotype infection was also reported in one case for G1, G3 and G2, G8 genotypes and P[4], P[8] multiple genotype. Percentage wise prevalence of different genotypes as well as untypeable has been shown in figure no.1 & 2.

Quality Control:

Quality control was ensured by taking positive and negative control for each time when

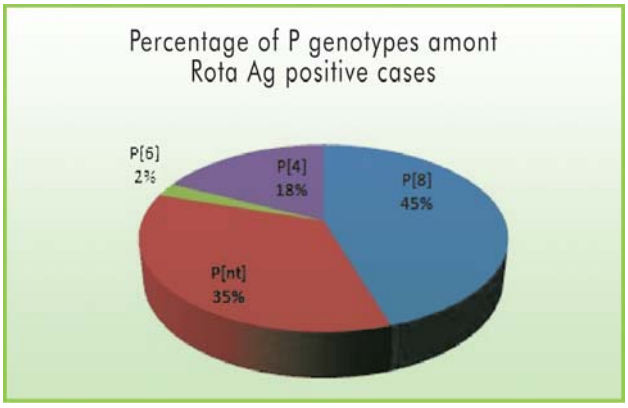


Fig.1 Percentage of P genotype.

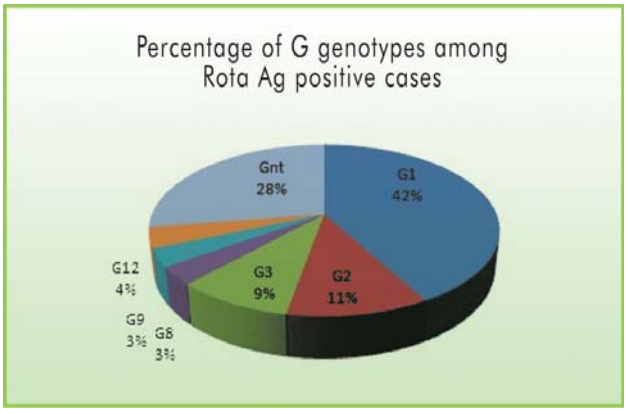


Fig.2 Percentage of G genotype.

Table.4 Gender based year wise distribution of enrolled cases and positive cases.

	2014	2015	2016			
	Tested cases	Positive cases(%)	Tested cases	Positive cases	Tested cases	Positive cases
Female	127	74(20.21)	124	57(16.6)	45	26(19.4)
Male	239	132(36.06)	219	104(30.3)	87	50(37.3)
Total	**366**	**206(52.55)**	**343**	**161(46.9)**	**134**	**76(56.7)**

Rota antigen ELISA was performed. Coded samples (both positive & negative) were tested in duplicate to check for inter observation variation. The first 10 samples collected in January and July in each year were sent to CMC, Vellore for external quality control exercise. Similarly, 10 coded samples received from CMC, Vellore were also tested and the result was sent to NIE, Chennai.

Discussion:

A total of 1395 cases have been enrolled and 843 samples have been collected till the month of August, 2016. Rota virus prevalence among children was found to be 52.55%. Children among 7-24 month age group are most susceptible to rotavirus infection. Male were more affected than female. Rotavirus prevalence is more during winter season. Common genotypes circulating in this region is G1(42%) and P[8](45%) and G1P[8] was the most common genotype combination reported. The result of the surveillance was useful for central health policy to implement rotavirus vaccination in the country and as the first phase vaccination in Odisha in the month of April, 2016.

3. End line house-hold survey in Odisha and Andhra Pradesh.

Prin. Investigator : Dr N. Mohapatra
Co-Investigator : Dr A.S. Kerketta
Staring date : March 2015
Closing date : December 2015
Status : Extramural

Overall objective:

To track changes / impact over the baseline after interventions carried out by National Malaria Control Program in the selected states of India.

Specific objectives:

- Promptness of treatment for fever/malaria
- Sources of treatment for fever (health seeking behaviour)
- Household ownership of mosquito bed nets
- Use of bed nets among the households, particularly by pregnant women and children under five
- Effective coverage of Indoor Residual Spraying (IRS)
- Whether the malaria programme especially caters to the needs of the vulnerable and marginalized.

Methodology:

The study was conducted as per the scheduled plan in both the study states. It was proposed for household surveys in two states namely Andhra Pradesh and Odisha. In each state 10 endemic Block PHCs were randomly selected.

- Eight villages (with API >5) from each of the 10 blocks were randomly selected (total 80 villages from 10 blocks in each states)
- 22 households (clusters) from each of the 80 villages were selected for household Survey, making the total households selected as 1760 in each state.
- A maximum of 22 last fortnight fever cases (Recall of 15 day's fever) would be interviewed.

In each village mapping and listing was done to ensure all the households in the clusters covered by list. Village was the primary sampling unit (PSU), the boundaries of villages were identified, and detailed maps were drawn to locate the households in each village with nearer identification land mark. After which the households were listed and all the structures were numbered. A village having 150-250 households was considered as standard village. In case of having more than 300 households, the village was sub-divided into segments and 2 segments were selected randomly. In case of very small village or segment, merging was done.

In each clusters from the households list, 22 households were randomly selected using selection interval and random number-R for detailed interviews related to Bed net usage, IRS indicators, awareness and socio-economic status. A responsible adult in each selected household was interviewed for household survey. From the list of 2-week fever cases identified during house listing in each village, 22 cases were selected using similar random selection for a detailed interview,

in case of less than 22 fever cases in the village all were selected.

Key Indicators for the survey:

The key indicators were the name of the patient, age, sex, marital status and in case of married females pregnant status.

Indicators for fever in last fortnight:

Prevalence of fever:

History of fever in the preceding fortnight, its diagnosis and treatment (form to be filled for each member separately who were reporting fever during the preceding fortnight). The information was sought on

- Number of fever cases during the preceding fortnight
- Person did diagnosis and provided the treatment
- The time that elapsed between the onset of fever and performance of the blood test for malaria
- Result of the blood test
- Time that elapsed between collection of the test and reporting of results
- Name of drug
- Was the individual still getting the treatment
- Proportion of cases who completed the treatment
- Designation of the first person contacted for diagnosis and treatment.
- Designation of the second person contacted for diagnosis and treatment.

Indicator for fever on the day of survey (Fever today):

- Person(s) in the household who have fever today.
- Person in the household who has fever with an accompanying diarrhea, cough, runny nose.
- Blood test done- RDK/microscopy
- Persons with *falciparum* malaria recognized by RDT
- Persons with *vivax* malaria diagnosed by microscopy.
- Persons who were given ACT for the treatment of malaria
- Persons who have completed the treatment
- Persons who were given chloroquine for the treatment fo *vivax* malaria.

Indicator-possession and use of Long lasting nets (to include all villages and households targeted for LNs):

- Total number of household members
- Total number of nets (including plain nets) in the household that in good condition
- Total number of Long lasting nets (LNs)
- Total number of Insecticide treated nets (ITNs) which were treated during last 6 months.
- Number of nets which had not been treated
- Number of persons who slept in a net last night (to be identified according to age, sex, marital status and pregnancy status)
- Number of persons who slept under an LN/ treated net previous night ((to be identified according to age, sex, marital status and pregnancy status).

Indicator- Indoor Residual Spraying (IRS):

- Number of rounds insecticidal spraying was done
- last spraying done
- coverage of spray
- Spray uniformity (physically verified)
- Spraying uniformity and completeness.

Result:

A simple verbal autopsy was undertaken for all deaths occurred during last one year, and was discovered during house-listing. The profile of the village, including information related mainly to the geography and access to health services were noted using a village schedule.

The data collection in both Odisha and Andhra Pradesh has been completed. In Odisha, 10 districts namely Sungargarh, Keonjhar, Dhenkanala, Anugul, Ganjam, Bolangir, Kalahandi, Rayagada, Nabarangpur and Malkangiri were included for the study. In each districts 8 villages were covered. Thus a total 80 villages covered in a state. Thus a total of 14163 households were covered in entire 10 districts. In each village 22 households were selected for

detailed household survey which ranges from 160 to 175 based on the presence of interviewee on the day of visit. Thus an average of 12% households was included in household survey. The detailed district wise household coverage is given in table-1. In Andhra Pradesh Ganguwada of Srikakulam, Regidi of Vijayanagaram, M Madugula of Visakhapatnam Duppulapelem of East Godavari, Kusumi of Srikakulam and Boduluru of East Godavari were included in the study. The data had been sent to central data management team, NIMS for further analysis. The report is awaited.

4. To identify the high risk behavior among the primitive tribal groups.

Prin. Investigator : Dr A. Mohapatra
Co-Investigator : Dr B. Dwibedi
Staring date : March 2015
Status : ICMR (Translational)
(The project is discontinued)

Table-1: District wise house hold under coverage Vs household selected.

Study Districts	Household covered N= 14163	Household selected for detailed interview N=1703 (12.0%)
Sundargarh	1295	170 (13.1)
Keonjhar	929	170 (18.3)
Dhenkanal	1036	168(16.2)
Angul	954	160(16.7)
Ganjam	1277	175(13.7)
Bolangiri	1589	173(10.9)
Kalahandi	1849	176(9.5)
Rayagada	1691	166(9.8)
Nabarangpur	1561	175(11.2)
Malkangiri	1982	170 (8.6)

Table-2: District wise distribution of fever cases encountered.

Districts	Fever 2 WeeksN=539	Fever TodayN= 330
Sundargarh	72	13
Keonjhar	119	97
Dhenkanal	39	36
Angul	19	9
Ganjam	33	2
Bolangir	31	39
Kalahandi	46	74
Rayagada	92	19
Nabarangpur	47	27
Malkangiri	41	14

Ph.D Scholars Research Works

Contents

1. Role of Gut Microbiota In Type Two Diabetes Susceptibility

Name : Ardhendu Bhusan Praharaj
Status : JRF(DST)
Guide : Dr.Santanu Kumar Kar
Co-Guide : Dr.Namita Mohapatra
Dr. Sapna Negi
Date of Joining : December 2013

Background

Gut microbiota which present densely in the digestive tract, plays a pivotal role in the normal structure and development of healthy mucosal immune system and affects uptake of nutrients, regulation of metabolism, angiogenesis and development of enteric nervous system. Gut microbiota is involved in the process of energy harvest accounting for the development of obesity. As one of the most concerned obesity-related disorders, Type 2 diabetes (T2DM) is associated with abnormal energy metabolism and low-level chronic inflammation in fat tissues. Essentially, the gut microbiota plays an important role in the progression of pre-diabetes conditions, such as insulin resistance. Growing evidence in clinical studies suggested that obese people with insulin resistance were characterized by an altered composition of gut microbiota, particularly an elevated *Firmicutes/ Bacteroidetes* ratio compared with healthy people. Furthermore, transplantation of the obese gut microbiota in animals greatly affect the energy harvest of hosts. Consequently, it is proposed that altered microbiota in obesity modulates intestinal permeability and increases metabolic endotoxins secretion that lead to chronic low-level inflammation, the pathogenesis of insulin resistance and onset of T2DM.

T2DM is believed to be caused by a series of multiple risk factors such as genetic liability, age, overweight or obesity, and an unhealthy lifestyle. Recently, accumulated evidence has suggested that the intestinal microbiota plays an important role in the pathogenesis of T2DM as a potential novel contributor. Emerging studies are examining how gut microbiota may contribute to T2DM risks. If proven to be associated with T2DM, probiotic treatments towards diabetes can be developed.

Objectives

1. To study the biochemical and anthropometric data of Diabetes Type II patients.
2. The Molecular sub typing and quantification of microbiota from fecal samples of patients and controls.
3. To study association between clinical and anthopometric data with that of gut microbiota strains obtained.

Summary of Progress

As of now (January 2016 to December 2016), a total of 401 newly detected type 2 diabetes patients within the age group of 30 to 65 year were enrolled in this study from Medicine OPD of IMS & SUM Hospital, Bhubaneswar by the help of physician. From the community we enrolled 386 healthy control participants of the matched age group as control. 0.5ml fasting blood samples were collected in Fluoride vial, 3 ml in serum vial and 1ml in EDTA vials after taking informed written consent from both patient and control groups. All the demographic data including their age, sex, occupation, income status, diseases status, family history, dietary pattern etc., anthropometric data like height, weight and waist

circumference were collected. Blood pressure of patients and controls was also recorded. As of now 300 number of stool samples were collected from diabetic group and 300 stool samples from the control group were collected. Serum samples were separated and kept at -80°C for long term storage till analysed. All the blood, serum and stool samples were coded by specific laboratory coding number. Stool samples were kept at -20°C .All the biochemical profiles and Insulin estimation were analysed by using Biochemical Analyzer and ELISA reader respectively. Insulin resistance was calculated by using Quantitative Insulin Sensitivity Check Index (QUICKI). Total bacterial DNA was extracted from 250 patient and 200 control fecal samples by using the QIAamp DNA Stool mini kit (Qiagen GmbH, Germany) according to the manufacturer's protocol.

A total of 401 newly diagnosed type II diabetics individuals (Male=266, Female=135) and 386 healthy controls (Male=243, Female=143) were included in the study. From anthropometric data, it was found that the mean BMI and weight was found to be high in diabetic population rather than control (Table-1).

The higher value of FBS, TG, Cholesterol, LDL and VLDL in healthy individual as compare to healthy controls. HDL value is higher in control rather than diabetic individual. From insulin analysis of diabetic individuals the insulin resistances were more in the age group of 41-50 yrs in comparison to other groups.

For meta-genomic analysis DNA was extracted from 250 diabetic individual and 200

Table 1 Demographic data of newly diagnosed type II diabetic individual and healthy controls**.**

	Diabetic(N=401)	Control(N=386)
Ht in cm	162.52 ± 10.16	164.66 ±7.63
Weight in kg	68.65 ±14.29	65±9.62
Waist circumference	100.67±14.71	82.39±13.74
BMI (Kg/m^2)	26.1±5.24	23.84±3.91

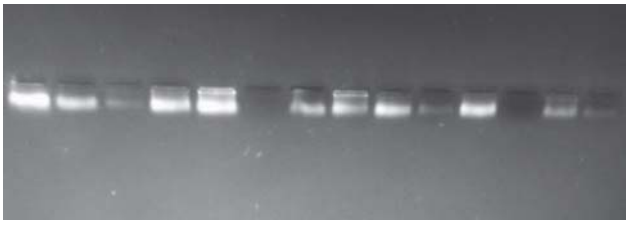


Fig. 1: DNA from Fecal sample of Type II diabetics population.

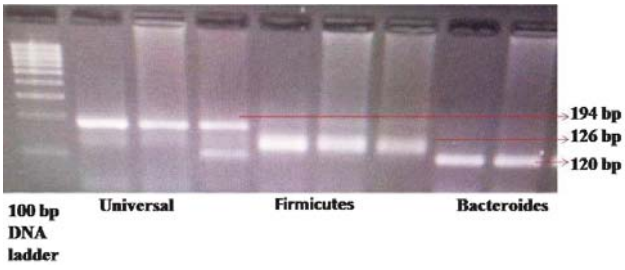


Fig.3: Gel-electrophoresis from amplified product of bacteriodes (120bp) and firmicutes (126bp).

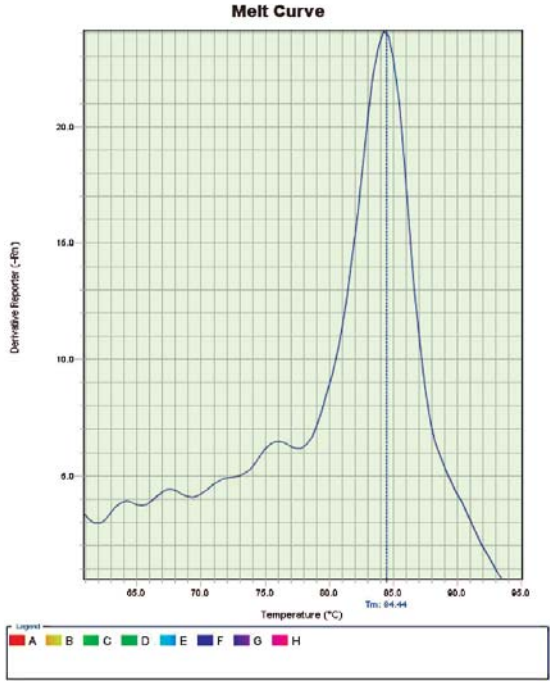


Fig. 2: Amplification and melt curve result for *Bacteroides* and *Firmicutes* (melting point 85°C) in Real Time PCR.

from control healthy individual stool sample (Fig. 1).

Seven numbers of *Bacteroides*, and thirteen numbers of *Firmicutes* were depicted as the bacterial phylum out of 25 no. of samples investigated through standardized Real time PCR analysis for Gut microbiota. The results of the this analysis is presented at Fig. 2.

Result of real time PCR was conformation by running the PCR product by gel electrophoresis Amplification (Fig .3)

Plan of work for the next year:-

- Continuation of biochemical analysis of control groups.
- Continuation of DNA isolation from stool samples of control groups.
- Real time PCR for quantification of gut-microbe population in control and diabetic group.
- Next generation sequencing of gut-microbiota in diabetic and control population to understand the diversity at species level.

2. Study on Risk factors for persistence of malaria in Odisha with special reference to molecular analysis of Anophelines species complex and malaria transmission.

Name : Barsa Baisalini Panda
Status : JRF (DST)
Guide : Dr. Rupenangshu Kumar Hazra,
Date of Joining : 3rd March 2015

Objectives:

- To identify different risk factors for persistence of malaria transmission.
- To identify malaria vectors and its species complex, bionomics, feeding habit and susceptibility status in four geographical regions of Odisha.
- To incriminate the vectors and to find out entomological inoculation rates (EIR).
- To study the incidence of malaria and screening the population by parasite diversity MSP1/MSP2, GLURP and the drug resistance strain.

Background:

In India approximately 1.5 million cases of malaria and 1000 deaths are reported annually, of which Odisha state, a part of peninsular India has consistently been the major contributors towards morbidity and mortality. The favourable climate, vast tract of forest with tribal settlement, poverty, high prevalence of drug resistant falciparum malaria and insecticides resistant *Anopheline* mosquitoes, etc are responsible for high malaria morbidity and mortality in the state despite several control measures. The state is divided into four distinct geo-physiographical regions on the basis of physical features and agro-climatic conditions. The different geo-physiographical regions show variable endemicity of malaria with highest burden in Eastern Ghats followed by Northern plateau and Central tableland, while Coastal tract has the lowest and unstable malaria.

Summary of Progress

The study was undertaken in 3 geographical regions of Odisha viz Northern Plateau, Coastal Belt, and Eastern region. Mosquitos' sample was collected from 5 districts viz, Mayurbhanj,

(Northern plateau), Kalahandi (Eastern region) and Khordha (Coastal belt). From each district 2 PHC's representing all ecotypes were selected. 2 villages were selected in each PHC for routine entomological studies. 1687 mosquitoes (*Anopheles culicifacies, Anopheles fluviatilis,*

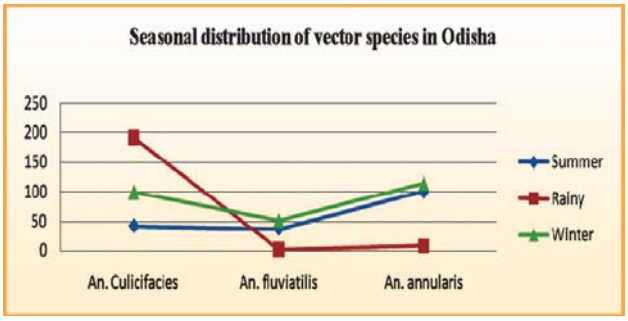


Fig-1: Seasonal distribution of vector species in 3 districts (Mayurbhanj, Khordha and Kalahandi) of Odisha in the year 2015-16.

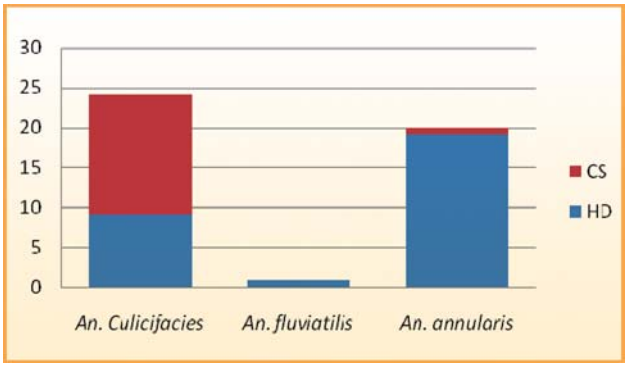


Fig-2: Prevalence of vector species in different habitat of Khordha district in the 2015-16.

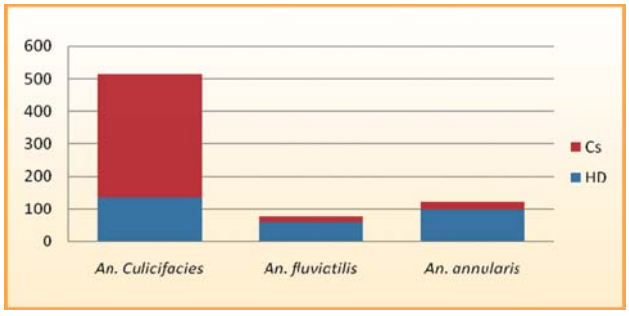


Fig-3: Prevalence of vector species in different habitat of Kalahandi district in the year 2015-16.

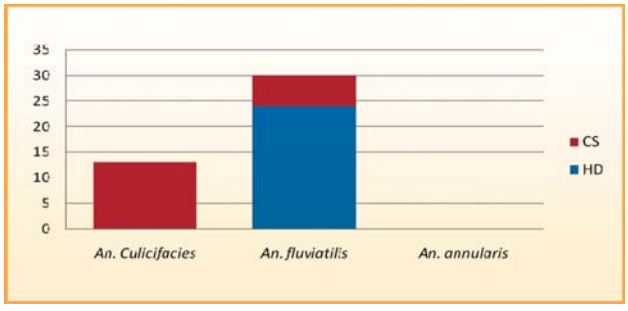


Fig-4: Prevalence of vector species in different habitat of Mayurbhanj district from the year 2015-16.

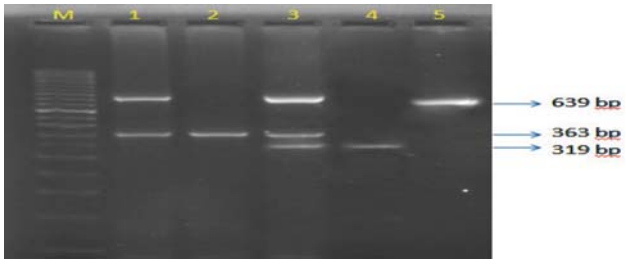


Fig-5: Ethidium bromide stained gel-electrophoresis of Multiplex PCR products for detection of host specific blood meal. Lane 1,3,5: *Homo sapiens* (Human) (639bp), lane 1,2,3: *Capra hircus* (Goat) (363 bp), Lane 3,4: *Bos primigineius* (Cow) (319 bp). Lane M: 50 bp DNA ladder.

Table 1: Susceptibility status of vector species in ecological paradigm during Sep 2015.

PHC	Village	Ecology	Species	Insecticide used	Mosquitoes exposed	Time of exposure	Mortality	% Mortality	Temp ^{0}C
Jaipatna	Pondi	Foothill	An. culicifacies	DDT 4%	15	1hr 2	0 13.3	0	34
Jaipatna	Pondi	Foothill	An. culicifacies	OC-Control	15 24hr	1hr 0	0 0	0	34
Jaipatna	Pondi	Foothill	An. culicifacies	Cyfluthrin	15 24hr	1hr 9	2 60	13.3	34
Jaipatna	Pondi	Foothill	An. culicifacies	PY-Control	15 24hr	1hr 1	0 6.6	0	34

Anopheles annularis, Anopheles pallidus, Anopheles vagus, Anopheles subpictus, Anopheles barbirostris, Anopheles superpictus, Anopheles karwari, Anopheles majadi, Anopheles tassellatus and Anopheles hyrcanus) were collected from human habitation and cattle shed. The seasonal prevalence of *An. culicifacies, An. fluviatilis* and *An. annularis* were studied. *An. culicifacies* and *An. fluviatilis* were assayed for the presence of malaria parasite by employing PCR based on 18s rRNA target gene. Sibling species identification was done. Mammalian blood meals (human, cow, goat, buffalo) were identified from a single mosquito by using multiplex PCR assay. Susceptibility status of mosquito against different insecticide was done.

Out of 1687, mosquitos' (12 species) collected *An. culicifacies, An. fluviatilis* and *An. annularis* were found to be the dominant species (46.2%, 3%, and 9.8% of total collection respectively) in the studied area. Out of 55 specimen collected from Human dwelling, 23 were positive for Human blood with an Anthropophilic index of 41.8%. From 48 specimen collected from Cattle shed, 11 were positive for Human blood with an Anthropophilic index 29.1%, 15 samples positive for Cow, 19 for Goat while 2 specimen were positive for both Human and Goat blood and 1 for human, cow and goat blood. No mosquito sample was found positive for sporozoites. The insecticide susceptibility test conducted for *An. culicifacies* during September 2015 in Pondi village of Kalahandi district concluded that the former being resistant to 4% DDT and completely susceptible to Cyfluthrin where as the susceptibility status carried out during March 2016 in laboratory reared mosquitoes on *An. stephensi* using DDT 4% and Cyfluthrin showed 10 and 30% respectively mortality after exposure of 1hr.

Discussion:

An. fluviatilis and An. annularis were predominantly found more in and around human habitation than cattle shed but An. culicifacies was found mostly in cattle shed. Total man hour density calculation revealed that An. fluviatilis and An. annularis were most prevalent during the winter season and An. culicifacies was most prevalent in rainy season. Blood meal analysis showed that the An. fluviatilis and An. annularis preferred human blood than that of other animals. Multiplex PCR detected An. culicifacies sibling species A, B, C, D, E and An. fluviatilis S, T in the malaria endemic regions of Odisha. Highest Human blood fed percentages was observed in An. culicifacies E and An. fluviatilis S in comparison with other sibling species.

3. Distribution, antibiogram and virulence study of etiological agents associated with Acute Respiratory Infection among the children below five years age in tribal and coastal areas of Odisha.

Name : Bhagyalaxmi Biswal
Status : SRF(ICMR)
Guide : Dr. S. K. Kar
Co-Guide : Dr B.Diwedi
Date of joining : 10-04-2014

Background

Children represent the future and their healthy growth and development should be the

prime concern of all societies. Particularly care of young children should be taken as they are vulnerable to malnutrition and infectious diseases, many of which can be effectively treated. About 10 million children under the age of five die globally each year (WHO, 2008). The 'Child Mortality Estimates Report 2012' released by Unicef in New York has said that in 2011, around 50 per cent of global under-five deaths occurred in just five countries like India, Nigeria, the Democratic Republic of the Congo, Pakistan and China. In India according to National family health survey (NFHS,2005-06) the child mortality rate is less than 5 years age groups is 74 per 1000 live birth among which acute respiratory tract infections (ARI) contribute 69% of all death followed by Diarrhea.

Objectives

1. Culture, Isolation and characterization of bacterial pathogens causing Acute respiratory infections in under five children.
2. Antibiogram profile for the identified bacterial pathogens.
3. To identify viral pathogens associated with ARI.
4. To record the seasonal trend of etiological agents of ARI in under five children presenting to hospital setup in tribal and coastal areas.

Summary of Progress

Sample collection initiated from 2nd week of June 2014 after getting permission from the respective hospitals for sample collection and after preparation of clinical sheet and consent form (English/Oriya) for data collection of the patients. Then samples were collected from Capital hospital Bhubaneswar and Sisubhaban Cuttack and DHS,Rayagada from hospitalized children below 5 year age group having one or more of the Symptoms like cough, runny-nose, sore throat, chest pain, breathlessness, noise

Total 603 samples and organisms identified are as fallows -

Month	Sample No	E. Coli	S.Aureus	Moraxilla Spp	k.pneumonie	Pseudomonas Aure.	GABHS	S.Pneumoniae	Sallmonella spp
June	51	3	3		3				
July	61	2	9		0				
Aug	86	6	9	6	6			6	
Sep	74	1	3	3	12	2	6	7	
Oct	66		0		8	1		9	
Nov	62	6	6	0	9	0	0	5	2
Dec	44	9	0	0	6	0	0	3	
Jan	46	3	2	0	6	0	3	0	
Feb	48	3	0	0	0	0	0	5	
Mar	65				1		2	1	
Tota1	**603**	**33(5.47%)**	**32(5.30%)**	**9(1.49%)**	**51(8.45%)**	**3(0.49%)**	**15(2.48%)**	**36(5.97%)**	**2(0.33%)**

breathing, Fever has been taken into the study to know the etiological agents of ARI.

From each patient two numbers of samples (throat swab/nasal swab) were collected for bacterial and viral analysis in respective media with the consent of guardian of the patients. Samples were collected and immediately transported to RMRC laboratory for analysis. For viral analysis samples were collected in VTM (viral transport media) media and immediately transported to laboratory in cooling condition and stored in -70^{0}C at virology lab for analysis.

Total 500 samples were collected from Capital hospital, Bhubaneswar, Sisubhaban, Cuttack and 103 from District head quarter hospital, Rayagada. After reaching at laboratory the samples were inoculated in different media [Blood agar for *S.pneumoniae*, Chocolate agar for *Himophilus influenza*, Mac Conkey agar for *K.pneumoniae, E.coli* and other gram negative organisms and nutrient agar plates].After inoculation the inoculated plates were kept for incubation, the chocolate and blood ager plates are kept in Co2 incubator for isolation of *s.pneumoniae* and *Himophillus influenza* and other related organisms. MacConkey, Blood ager and nutrient ager plates were kept in incubator for isolation of *e.coli, K.pneumoniae ,s.aureuse* and other related organisms. Isolation and identification of bacterial isolates was done as per the procedure, (Manual of Medical Microbiology, ASM press) by colony morphology, gram stain and different biochemical tests. Antibiogram of the different identified organisms was carried out by disc diffusion method (Kirby, 1966). For *S.pneumoniae* Antimicrobial susceptibility was tested by the disc diffusion method (Kirby, 1966) using 5% sheep blood supplementation on Mueller-Hinton agar.

Antibiotic successibility pattern of S.pneumoniae

Antibiotic	Sensitive	Resistant
Ceftriazone	30(83%)	6
Ceftazidim	28(76%)	8
Vancomicin	25(69%)	11
Amikacin	32(88%)	4
Penicilin-G	6(16%)	30
Methicillin	2(5%)	34
Azithromycin	30(83%)	6
Ofloxacin	10(27%)	26
Ciprofloxacin	22(61%)	14
Erythromycine	16(44%)	20
trimethoprim/ sulphamethoxazole	14(38%)	22

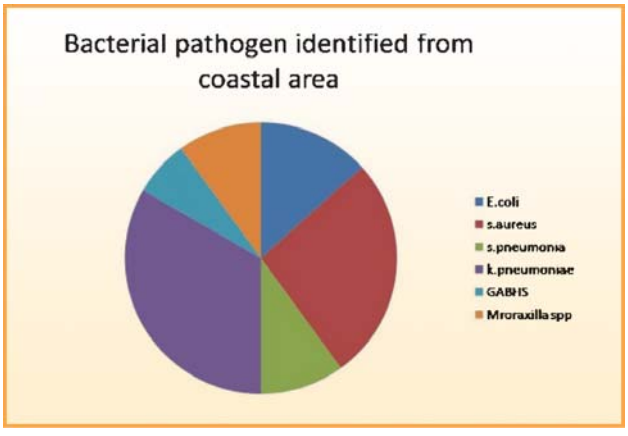
Discussion

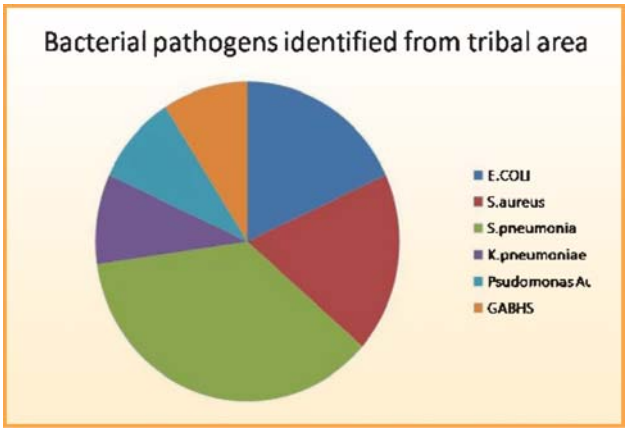
Total 603 samples were collected from both coastal and tribal areas of Odisha. Out of them various bacterial etiological agents were isolated. The sample collection was done throughout the year but it gradually declined in the winter. In hospitals, the ARI patient admission was decreased. The significant difference is that throughout the year *S.pneumoniae* was predominant and especially in case of tribal population of Odisha. *K.pneumoniae* and *E.coli* were also isolated from the patients who have the symptoms of sever pneumonia. The isolation of bacterial pathogens are significantly high in tribal population in *comparison* to coastal population.

Antibiotic sensitivity

The antibiotic sensitivity study was done for the bacterial pathogens isolated from the samples.

For S.pneumoniae, Antimicrobial susceptibility was tested by the agar-dilution method according to the NCCLS recommendations, using 5% sheep blood supplementation on Mueller- Hinton agar. The following antimicrobial drugs were included in the tests: Penicillin, Erythromycin, Tetracycline, Amikacine, Trimethoprim/ Sulphamethoxazole, Ceftriaxo, -Methicilin, Ofloxacin, Ciprofloxacin and Vancomycin. Among them few antibiotics are mostly sensitive like Ceftriazone, Vancomycine, Azithromycin and Amikacine. The antibiotics which are resistant to S.pneumoniae are Methicilline, Penicillin, Ofloxacine and Erythromycin. One of the major differences in case of bacterial pathogens isolated from coastal population and tribal population is the antibiotic sensitivity is much higher in tribal population than coastal population. As tribal population are not aware about the disease as well as their treatment. Also in tribal population the health facility is not much developed and people are getting the facilities hardly so antibiotic intake is not so frequent.





Viral analysis

The throat swabs collected in VTM media for analysis of viral etiological agents associated with ARI. PCR was done for different viruses like respiratory syncytial virus (RSV), measles virus, human para influenza viruses type 1, 2, 3 (PIV-1, PIV-2 and PIV-3), influenza virus and varicella virus. Mostly RSV and Human para influenza type 1 was isolated.

Conclusion

During the study period the bacterial etiological agents isolated from the coastal and tribal ARI patients are *E.coli, S.aureus, Moraxilla spp, S.auroginosa, Salmonella spp*, *GABHS* (group A beta hemolytic s.pneumoniae) and *S.pneumoniae.* The novelty of the study is the detection of methicilline resistant s.pneumoniae which Pose a significant threat in treatment aspect of ARI patients affected by *s.pneumoniae* in odisha.

4. Role of *Wolbachia* in *Aedes* mosquitoes and its effect in transmission of Dengue and Chikungunya.

Naqme : Ipsita Mohanty
Status : SRS-LTMT
Guide : Dr. Rupenangshu Kumar Hazra
Date of Joining : 21st Aug 2014

Objectives

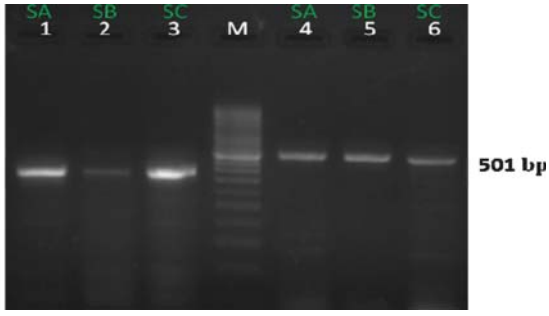
- To study the prevalence of *Wolbachia* and its characterization in four different species of *Aedes* found in Odisha.

- Establishment of *Wolbachia* colonies in *Aedes* mosquitoes and study of its dynamics both in laboratory and field conditions.
- To evaluate the factors responsible for cytoplasmic incompatibility.

Background

Aedes mosquitoes mostly *Ae. aegypti* and *Ae. albopictus* are known vectors for numerous viral infections like Dengue, Chikungunya and Zika, etc. *Wolbachia*, a gram negative endosymbiont, harboured in many insect species is responsible for reproductive alterations (Cytoplasmic Incompatibility, Male killing, Parthenogenesis and Feminization) in the host. These modifications typically give a reproductive advantage to infected individuals and allow for the spread of *Wolbachia* in a population mainly through vertical transmission. Population dynamics deals with the studies of size and age composition of a population its fecundity, adult survival longevity and reproductive potential. A life table depicts the development and fecundity of a given population and supplies a basic data on population increase parameters (Ma and Bechinski, 2009). Therefore, the present study is focused on the population dynamics of *Aedes* species in the presence and absence of *Wolbachia* via the construction of life table in laboratory conditions. Taking advantages of the "reproductive parasitism" and "transovarian

Detection of Wolbachia Superinfection in Ae. albopictus:



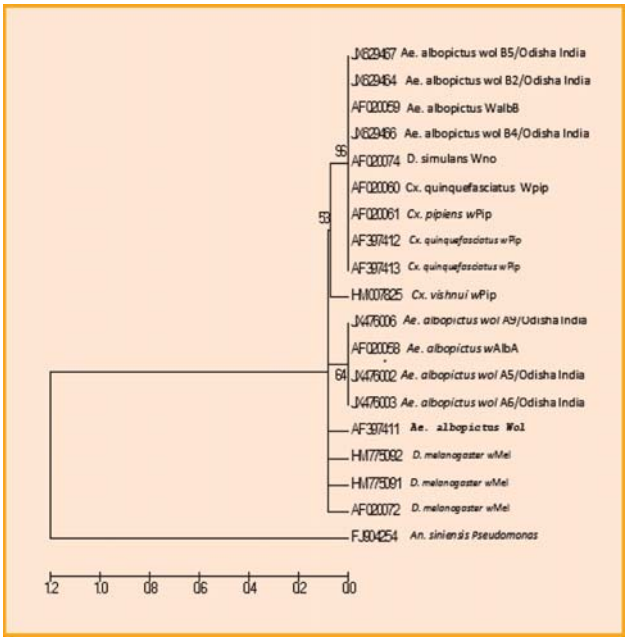
Aedes albopictus collected from Cuttack district of Odisha showing superinfection of *wsp* A subgroups (wAlbA) strains of *Wolbachia* specific primer that amplifies around 379bp in lane 1,2 and 3; and showing wsp B subgroups (wAlbB) strains of *Wolbachia* specific primer that amplifies around 501bp in lane 4, 5 and 6 (M-50 bp DNA ladder; SA- Sample A, SB-Sample B, SC- Sample C).

Table 1: Showing Aedes Indices.

Area	Number of houses inspected	Number of houses infested	Number of containers inspected	Number of positive containers	Number of pupae	House Index (HI)	Container Index (CI)	Breteau Index (BI)	Pupal Index (PI)
Cuttack	18	12	27	19	12	66.67	70.37	105.56	66.67
Kendujhar	19	12	45	32	18	63.16	71.11	168.42	94.74
Puri	25	16	42	31	22	64	73.81	124	88
Jajpur	27	17	27	14	8	62.96	51.85	82.35	47.06
Dhenkanal	12	4	14	8	11	33.33	57.14	66.67	91.67
Sundergarh	13	5	15	7	10	38.46	46.67	53.84	76.92
Ganjam	10	6	12	7	8	60	58.33	70	80
Gajapati	11	7	9	5	7	63.64	55.56	45.45	63.64

transmission" of *Wolbachia*, prevalence of *Wolbachia* along with it superinfection detection and phylogenetic analysis is being carried out as described below.

Phylogenetic analysis: Phylogenetic tree based on *wsp* sequence of *Wolbachia*, constructed by Neighbour Joining algorithm confirmed the circulation of *w*AlbA and *w*AlbB in *Ae. albopictus* mosquitoes of Odisha.



Summary of Progress

Entomological Collection: The collection was carried out in 8 districts of Odisha.

Life Table Study: The mean number and duration in days and mortality in percentages (F1, F2 and F3 generations) of different stages of *Ae. albopictus*, *Ae. aegypti* and tetracycline treated *Ae. albopictus* are tabulated in Table-3.

Discussion

Wolbachia is responsible for reproductive alterations in the host. In this study, more areas are covered to know the prevalence and characterization of *Wolbachia* in different mosquito species found in Odisha. Along with monoinfection (*w*AlbA or *w*AlbB) superinfection (*w*AlbA + *w*AlbB) is detected in *Ae. albopictus*. *Aedes* infestation calculation revealed all areas

Table 2: Showing presence of superinfection from field collected mosquitoes.

Species	No. of mosquitoes tested	*Wolbachia* presence	*WAlbA*	*WAlbB*	Superinfection
Ae. albopictus	20	16 (80%)	1(6.25%)	3(18.75)	12(75%)
Ae. aegypti	10	0 (0%)	0(0%)	0(0%)	0(0%)
Cx. quinquefasciatus	15	11(73.3%)	0(0%)	11(100%)	0(0%)
Ae. vittatus	5	0 (0%)	0(0%)	0(0%)	0(0%)
Anopheles sp.	12	0 (0%)	0(0%)	0(0%)	0(0%)

Table 3: Mean of F1, F2 and F3 generations of different developmental stages and mortality percentages of *Aedes albopictus*, *Aedes aegypti* and tetracycline treated *Aedes albopictus*.

	Species	Egg		Mortality%	Larvae		Mortality%	Papa		Mortality%	Total	Adult		Total	Mortality%
		No	Du		No	Du		No	Du		Duration	Male(%)	Female(%)	Adult	as compared
Mean of F1,	Ae. albopictus	172.33	3.33	14.21	148.33	9.33	35.38	94.33	3.67	14.07	16	31.67(18.78)	49(28.30)	81	52.91
F2 and F3	Ae. aegypti	206.67	2.33	20.82	169.67	9.33	31.9	125.67	3.67	18.69	15.33	47.33)23.02)	56.67(23.61)	102	48.91
Generations	Tetracycline Treated Ae. albopictus	105.33	2.67	11.92	93.33	9.34	37.53	58	4	53.33	16.01	18(19.16)	35.33(33.74)	53.33	49.7

studied are highly dengue sensitive (HI >5%; BI>20, WHO, 2003) with a maximum risk in Kendujhar and Cuttack. An assessment of pupal indicator for the most productive container revealed that earthen pots had most ideal productivity in comparison to other containers. Phylogenetic tree based on *wsp* sequence of *Wolbachia*, constructed by Neighbour Joining algorithm confirmed the circulation of *w*AlbA and *w*AlbB in *Ae. albopictus* mosquitoes of Odisha. It appeared from the study that maximum mortality occurred in the larval stages. Life table study with and without *Wolbachia* in *Aedes* may help in analyzing the factors responsible for reproductive alterations. *Ae. albopictus* naturally harbours *Wolbachia* but still it prevails to be a vector of Dengue. The reason underlying this is yet to be known.

5. Study on HPV genotype distribution in Odisha and association of viral integration into host genome with cervical carcinoma.

Name : Rashmirani Senapati
Status : (SRF-ICMR)
Guide : Dr.Bhagirathi Dwibedi
Date of joining : Sept. 2013

Objectives

- To determine the HPV genotype distribution in the cases attending hospital with different grades of cervical malignancy.
- To study the viral integration into the host genome relating to the stage of carcinoma and treatment out come.

Summary of Progress

Study population and sample collection

Acharya Hari Hara Regional Cancer Center and SCB medical college, Cuttack, Odisha, the two apex referral hospitals of the state were considered to enroll subjects and cervical sample collection. Married women, above 18 years showing any of the symptoms like abnormal vaginal bleeding/discharge, pain during coitus, lower abdominal pain and clinician suspicion of cervical malignancy were included in the study after clinical examination by a gynecologist. Unmarried women, pregnant cases and patients undergoing treatment were excluded. Subjects were enrolled after getting informed written consent from them.

Cervical swab specimen was collected using cytobrush and stored inside the viral transport media (Hi-Media) and transported to Virology laboratory, Regional medical research center, Bhubaneswar, Odisha for further analysis. Pap smears were prepared from the collected cervical sample for cytological analysis. Cytological classification was done according to Bethesda system. Part of the tissue biopsy samples which was taken for diagnostic and patient management purpose were collected from confirmed cases of cervical carcinoma for histopathological analysis.

A total of 607 participants were being enrolled in the study. Among all the enrolled cases 12 cases were excluded from further analysis as they were negative for beta globin PCR. Cytological information was known for 440 cases only which includes normal (n=68), cervicities (n=162), invasive carcinoma (n=210). Mean and median age of the enrolled cases were 48.47(SD =12.47) and 48.5 years respectively with an age range of 19-86 years. The mean age of marriage was 19.97(SD=3.98) years with an age range of 14-37 years. 401 cases were with parity d" 3 and 255 cases were in the postmenopausal state. A majority of the cases (83.52%) were illiterate / just literate and belongs to low socio-economic class (60.33%).

The common clinical features recorded were abnormal discharge with or without blood stain (55%), postmenopausal bleeding (20%), bleeding and pain during coitus (2%), lower abdominal pain (17%), intermenstrual bleeding (14%), prolapse (6%), and swelling abdomen (1%).

Clinicopathological characteristics of ICC cases

As per the International Federation of Gynecology and Obstetrics (FIGO), ICC cases were classified into different stages which include IB (n=9), IIA (n=8), IIB (=38), IIIB (n=111), IIIA (n=2) and IVA (n=4). The histopathological result of 172 cases showed that 167 cases belonged to Squamous cell carcinoma (SCC) and only 5 cases identified with Adenocarcinoma (ADC). Based on the available data for 89 cases, only 30 cases had tumor size e"2 cm and 59 cases had <2cm. Similarly, out of 86 available reports 30 cases had lymph node metastasis whereas 56 cases didn't have lymph node metastasis.

Prevalence and analysis of risk factors for HPV infection

The overall prevalence of HPV infection was found to be (359/595) 60.33 %. Prevalence of HPV

Table-1: Socio-demographic and personal characteristics of the population (n=595) as risk factors for HPV infection (n=595).

Factors	HPV+ve n=359	HPV –ve n=236	OR(95% CI)	P
Age > 45 N=369	236	133	1.4(1.06-2.08)	.02
Age dd 45 n=226	123	103		
Parity >3 n=194	136	58	1.87(1.29-2.69)	.0008
Parity dd 3 n=401	223	178		
Contraceptive Yes n=557	335	222	0.88(.44-1.73)	.71
No n=38	24	14		
Age of marriage d" 18 n=234	153	81	1.42(1.01- 1.99)	.043
Age of marriage > 18 n=361	206	155		
Tobacco/betel Yes n=289	179	110	1.13(0.81- 1.58)	.43
No n=306	180	126		
Education No n=497	304	193	1.18(0.76- 1.83)	0.4567
Yes n=98	56	42		
Low socioeconomic condition n=359	245	114	1.62(1.13- 2.31)	0.0081
High socioeconomic condition n=200	114	86		
Rural n=361	322	39	20.97(12.65-34.76)	< 0.0001
Urban n=131	37	94		
Poor Menstrual hygiene n=492	306	186	1.55(1.01-2..37)	0.0437
Good Menstrual hygiene n=103	53	50		
Post menopause n=255	170	97	1.85(1.33 to 2.57)	0.0002
Pre menopause n=340	165	175		

infection was 93.80% (197/210) in invasive cervical cancer (ICC) cases, 54.3% (88/162) in inflammatory smear and 19.11% (13/68) in normal cases (fig-1). Risk factors for HPV infection were analyzed by multivariate logistic regression analysis (Table 1). Age group > 45 years, parity e"3, low socio-economic condition, rural residential and postmenopausal states were found to be significantly associated with HPV infection.

HPV genotype distribution

346 samples were processed for genotyping by type-specific nested multiplex PCR. The most commonly detected genotype was HPV16 (87.28%) followed by HPV18 (24.56%) (Table S1). Other detected genotypes in descending order were HPV 51(3.46%), HPV 39(3.17%), HPV 66(2.8%), HPV 68(2.3%), HPV 35(1.7%), HPV 45(1.7%), HPV 44(1.1%), HPV 58(1.1%), HPV 52(.57%), HPV 6/11(.57%), HPV 42(1.1%) and HPV 43(.57%). Prevalence of single and multiple genotypes was 76.58% and 23.41% respectively.

Cytology-wise HPV genotype distribution was done in 286 samples which includes normal cytology (n=13), inflammatory smear (n=88) and ICC (n=185). Among the women with normal cytology, 53.84% were infected with single genotype of HPV16 while rests were infected with coinfection of HPV16 and 18. No other genotypes were observed in this group.

Table-2 Distribution of high-risk and low-risk HPV genotypes.

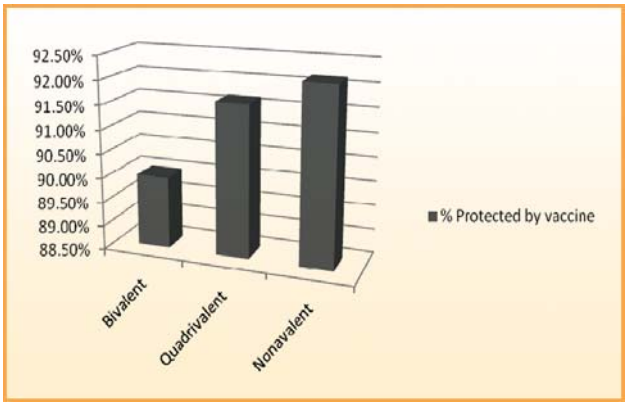
Genotypes	Normal n=13 (%)	Inflammatory n= 88 (%)	Invasive n=185 (%)
High risk HPV	All	All	All
HPV 16	All	79(89.77)	155(83.78)
HPV 18	6(46.15)	25(28.4)	39(21.08)
HPV 35	0	2(2.27)	4(1.08)
HPV 39	0	0	10(5.4)
HPV 51	0	3(3.4)	9(4.8)
HPV 52	0	0	2(1.08)
HPV 68	0	6	2(1.08)
HPV 45	0	2	4(2.16)
HPV 58	0	0	4(2.16)
Low risk HPV	0	0	12(6.4)
HPV6/11	0	0	2(1.08)
HPV44	0	0	4(2.16)
HPV43	0	0	2(1.08)
HPV 42	0	0	4(2.16)
Intermediate risk	0	6(6.8)	4(2.16)
HPV 66	0	6(6.8)	4(2.16)

Impact of 2v, 4v and 9v vaccine in preventing cervical carcinoma in Odisha

Among the women with inflammatory cytology HPV 16(89.77%) was the most predominant genotype followed by HPV 18(28.4%). Other genotypes detected among this group were HPV 66(6.8%), HPV 68(6.8%), HPV51 (3.4%) and HPV35 (2.27%) . In this group 70.45% cases were infected with single genotypes while 29.54 % cases were infected with multiple HPV types. Infections with double genotypes found in 19.31% of cases while 10.22% cases were infected with triple genotypes combinations. The most common combination of coinfection in this group was HPV 16+18 (14.72%) followed by HPV16+ 66+68(6.81%).

Among invasive cancer cases the most prevalent genotype was HPV16 (83.78%) followed by HPV 18(21.08%) and HPV 51(5.4%). Other genotypes in invasive cancer were HPV 45, HPV35, HPV66, HPV68, HPV44, HPV43, HPV42, HPV58 and HPV 52. Among the ICC cases78.9 % cases were infected with single genotypes while 21.08% cases were with multiple genotypes including double (11.89%), triple (5.94%) and quadruple (3.24%) combinations of genotype. The most prevalent genotype combination as coinfection among ICC cases was HPV16+ 18(4.32%) followed by HPV16 +39(2.16%).

No low-risk genotypes were detected among the cases with normal and inflammatory cytology. All the cases with inflammatory cytology were infected with high risk genotypes except 6 cases which were infected with HPV66, an intermediate risk genotype. High risk genotypes were detected in all the ICC cases. Besides, low-risk (6.4%) and intermediate-risk genotype (2.16%) were also detected in ICC cases but in association with the high-risk genotypes. The low risk genotypes detected were HPV6/11, HPV44, HPV43 and HPV42 while HPV 66 was the only intermediate risk genotype.



Low estimates of genotypes targeted by 2v, 4v, and 9v vaccine were 152(82.16%), 152(82.6%) and156 (84.32%) respectively. High estimates of genotypes targeted by 2v, 4v, and 9v vaccines were 181(97.83%), 183(98.91%) and 185(100%) respectively. Absolute impact of 2v, 4v and 9v were 89.99, 91.65 and 92.16% respectively. The additional impact of 9v was increased when compared with 4v and 2v.

6. Molecular characterization of *Mycobacterium tuberculosis* strains isolated from pulmonary tuberculosis cases of Odisha.

Name : Prakasini Satapathy
Status : SRF, ICMR
Guide : Dr. Dasarathi Das
Date of joining : September 2013

Objectives of the Project:

- To assess the Drug resistance profile of MTB isolates from clinically infected TB patients in Odisha.
- To correlate the phenotypic drug resistance using genotypic methods.
- Molecular characterization of MTB isolates using Spoligotyping.

Summary of Progress

The research work was started from 9.9.2013 to 8.09.2016. During this period, I have collected sputum specimens form 4 ecological divisions of Odisha namely from Coastal plane, Eastern Ghats, Central Tract and northern plateau

Methodology

Study population

Study population consists of all smear positive pulmonary tuberculosis cases of both new and retreatment pulmonary TB patients.

Clinical Characteristics

Demographic and epidemiologic data were obtained from the medical records of all patients with AFB-positive specimens, including medical history of mycobacteriosis, signs, symptoms, of patients with tuberculosis.

Sample collection

Sputum samples were collected from District Head Quarter Hospitals of the respective districts. Two samples (morning and spot) were collected from Cat I & II smear positive patients attending OPD of District Hospital of the designated four districts. Sputum samples were collected in 50 ml plastic centrifuge tubes (Falcon tubes) with triple pack to RMRC Bhubaneswar.

Specimen culture

Briefly the freshly prepared NALC solution (0.5gm NALC powder added to 100ml of equal proportion of 4% NaOH and 2.9% sodium citrate) was added to collected sputum samples in a 50ml sterile plastic centrifuge tube. Specimens were Vertex and allowed to stand up to 15 minutes. The tubes were filled up to 50ml with sterile phosphate buffer (pH 6.8) and centrifuged for 15 minutes at 3000rpm. The supernatant discarded and the deposit was inoculated in to two LJ and one LJ containing PNB slants. The slants were incubated at 37^0C and growth was observed up to 8 weeks. The *M. tuberculosis* isolates were confirmed by rate of growth, optimum temperature of growth, colony morphology, pigmentation, growth in PNB, catalase and niacin test.

Drug Susceptibility Testing (DST)

The drug susceptibility testing of the first line drugs was carried out by Proportion Sensitivity Test (PST) method.The drug concentration used was Isoniazid (H) 0.2 ìg/ml, Ethambutol (E) 2 ìg/ml, Streptomycin (S, dihydrostreptomycin sulfate) 4 ìg/ml, Rifampicin (R) 40 ìg/ml.

Line Probe Assay for rapid drug resistance testing for Isoniazid and Rifampicin

The Genotype MTBDR*pius* line probe assay (Hain Lifescience GmbH, Nehren, Germany) was carried out according to the manufacturer's instructions. Smear positive sputum sample (based on RNTCP guide line) was taken for LPA.

The test is based on DNA strip technology and has three steps: DNA extraction, multiplex polymerase chain reaction (PCR) amplification, and reverse hybridization.

- A 500-µl portion of the decontaminated sediment was used for DNA extraction that included heating and centrifugation.
- The amplification procedure that consisted of preparation of the master mix and addition of the DNA. These steps were carried out in separate rooms with restricted access and unidirectional workflow.
- Hybridization was performed with the Twin incubator (Hain Lifescience)

- After hybridization and washing, strips were removed, allowed to air dry, and fixed on paper. All tests were performed independent of culture and DST and before the culture and DST results were available.
- Each strip consists of 27 reaction zones (bands), including six controls (conjugate, amplification, *M. tuberculosis* complex, r*poB*, *katG*, and *inhA* controls), eight*rpoB* wild-type (WT) and four mutant (MUT) probes, one *katG* wild-type and two mutant probes, and two *inhA* wild-type and four mutant probes (Figure 1). Results were interpreted according to the manufacturer's instructions.

Spoligotying

It is a PCR-based method to simultaneously detect and type *Mycobacterium tuberculosis* complex bacteria. The genome of *M tuberculosis* complex contains the DR region consists of directly repeated sequences, which are interspersed by non-repetitive DNA spacers, each 35 to41 base pairs in length. Spoligotyping can detect the presence or absence in the DR region of 43 spacers of known sequence by hybridization of PCR-amplified spacer DNA to a set of immobilized oligonucleotides, representing each of the unique spacer DNA sequences.

I. The first step in this method was to amplify the DR region from the genomic DNA by PCR. The primers used were based on the sequence of the DR, which allow the amplification of the spacers between the DR targets. A biotin labeled reverse primer is used, so that all the reverse strands synthesized are biotin labeled.

II. A properly cleaned Miniblotter and an activated Spoligomembrane were used for hybridization. Oligonucleotides derived from the known spacers in the DR cluster are covalently linked to an activated Spoligomembrane in parallel lines. PCR products are hybridized perpendicular to the oligo lines.

III. After hybridization the membrane was incubated in streptavidin peroxidase, which binds to the biotin label on the PCR products. Detection of hybridization signals was optimized by the enhanced chemiluminescence (ECL) detection. The peroxidase present on the streptavidin catalyzes a reaction resulting in the emission of light which was detected by autoradiography of the membrane.

IV. The obtained spoligotype patterns were analyzed by SpolDB4.0 international database.

Isolation of genomic DNA

Genomic DNA will be extracted by CTAB (Cetyl-trimethyl ammonium bromide) method using 10% Ctab-NaCl as described previously **(21)**. A loopful of *M. tuberculosis* growth will added to the tube containing T.E buffer and heat killed at 80°C for 45 min. SDS and CTAB for degradation of proteins and carbohydrates will be added to it. The suspension will be treated with chloroform-isoamyl alcohol (24:1). The mixture will be centrifuged and the supernatant containing nucleic acid will be precipitated using isopropanol. The precipitant will be given an ethanol washing followed by air drying and re-suspension in TE buffer. The extracted DNA will be stored at low temperatures for future use.

Amplification of the DNA by PCR

Amplification of the spacers is accomplished by using the primers Dra (5'-CCAAGAGGG

GACGGAAAC-3′) and Drb (5′biotin-GGTTTT-GGGTCT- GAGGAC-3′). Chromosomal DNA of *M. tb* strain H37RV and *M. bovis*BCG was used as a positive control and molecular grade water was used as negative control. Reaction mix was prepared as followes: 5ul of template DNA, 3ul of Dra (0.2 umol/ul) 3ul of primer Drb (0.2umol/ul) 16ul of PCR master mix and 23µl of MQ water (for a final volume of 50µl). Amplification was carried out with following cycling temperature. 5min 95°C 1cycle, {95°C 1min, 55°C 1min, 72°C 30 sec, 35 cycles) 5mins 72°C 1 cycles.

Hybridisation with PCR product and Detection

Following buffers are pre warmed before use: 2xSSPE/0.1% SDS, 42°C, 2xSSPE/0.5% and it was cooled on ice SDS, 60°C. 2xSSPE/0.5% SDS, 42°C, 2X SSPE, room temperature. 25ul of the PCR product was added to 150ul of 2xSSPE/0.1% SDS and heat denatured for 10 min at 100°C and it was cooled on ice immediately. Pre coated membrane was washed for 5 min at 42°C in 250ml 2x SSPE/0.1% SDS and placed on support cushion onto the mini blotter, in such a way that the slots are perpendicular to the applied oligonucleotides. Residual fluid from the slots of the mini blotter was removed by aspiration and the slots were filled with the diluted PCR products and hybridized for 60 min at 60°C on a horizontal surface. Samples from the miniblotter were removed by aspiration and take the membrane was washed twice in 250ml 2xSSPE/0.5%SDS for 5min at 60°C.The membrane was placed in a rolling bottle. Membrane was washed twice to get rid of the conjugate in 250ml of 2x SSPE for 5 min at room temperatue for the chemiluminescent detection of the hybridizing DNA, the membrane was placed in ECL detection solution for 5min. then the membrane was covered with saran-wrap and exposed to light sensitive film for 20 min.

Regeneration of the membrane

The hybridised PCR product was dissociated from the membrane in order to regenerate the membrane for the next hybridisation. A membrane can be regenerated atleast 10 times. Membrane is washed twice by incubation in 1% SDS at 80°C for 30min and subsequently washed with 20mM EDTA pH 8, for 15min at room temperature to remove the SDS. The membrane is stored at 4°C until use.

Genotyping Analysis

All results were entered in to Microshoft Excel (Version) in a digital format. For spoligotping the dots were digitalized to 1 and the absence to 0. Further the binary code of 43 digit is simplified to a 15 digit octal code, which were compared to SITVIT2 database (Pasteur Institute of Guadeloupe, France), which is an updated version of the previously released SpolDB4 database. At the time of the present study, SITVIT2 contained more than 3000 SITs (Spoligotype International Type) with global genotyping information on about 75,000 *M. tuberculosis* clinical isolates from 160 countries of origin. In this database, SIT designates spoligotypes shared by two or more patient isolates, as opposed to "orphan" which designates patterns reported for a single isolate. Major phylogenetic clades were assigned according to signatures provided in SpolDB4, which defined 62 genetic lineages/sub-lineages.

Results

A total of 395 smear-positive sputum samples were isolated from suspected pulmonary tuberculosis patients (156 new cases and 206

previously treated cases) from the four districts. Among these samples 200 cases from Bhubaneswar (156 new cases and 44 retreated cases), 56 retreated cases from Rayagada, 106 retreated cases from Kalahandi and 33 retreated cases from Mayubhanj districts.

Patterns of gene mutations of the isolates resistant rifampicin and isoniazid by LPA

Out of 395 specimens collected for the study, LPA for drug resistance was carried out on 309 specimens. (Table-1)

Of the total 10 MDR strains obtained by MTBDR*plus* assay, a missing of WT8 in the *rpo*B RRDR region covering base pair 530-533 with corresponding S531L mutation were found in seven cases. Whereas *rpo*B WT7 with corresponding H526Y mutation were found in one strain. Missing of *rpo*B WT 3 and 4 without any corresponding mutations and missing of *rpo*B WT 7 without any corresponding H526Y mutation were found in two isolates. For isoniazid resistance a missing of *kat*G WT with corresponding S315T1 mutations were found in 5 MDR strains. There were two MDR strains in which the WT was present as well as mutation 1 in the *kat*Ggene suggesting a mixed infection. From the remaining two MDR strains in one strain *inh*A WT1 & 2 were absent without any corresponding mutation and missing of *inh*A WT1 with C15T mutation was found in the other strain.

Out of the four Rifampicin mono-resistances found in 3 districts were similar type of mutations i.e. missing of *rpo*B WT3 with corresponding S531L mutation.

Among 16 isoniazid mono-resistance obtained, one strain was missing *kat*G WT without any corresponding mutation. Nine strains were missing katG WT with S315T1 mutation. Whereas two strains in which the WT as well as S315T mutation was present in the *kat*Ggene. One of the INH mono-resistant strains had resistance detected simultaneously in the katG and inhA gene regions (Table-2). In three strains there were missing of *inh*A WT 1 & 2 without any corresponding mutations.

MDR- Multidrug resistance, RR-Resistance to Rifampicin, RH-Resistance to Isoniazid, WT+ Presence of Wild Type band, WT-: Absence of Wild type band, MUT+: Presence of mutation band & MUT-: Absence of mutation band.

Table-1: Detection of Rifampicin and Isoniazid resistance by genotype MTBDRplus Assay in smear positive sputum samples (n=309).

No of samples tested (Districts)	Resistance pattern			Sensitive	NTM
	MDR	R-Mono Resistance	H-Mono Resistance		
89(Bhubaneswar)	2	1	6	71	9
60(Rayagada)	1	2	4	51	2
160(Kalahandi)	7	1	6	141	5
Total (309)	10	4	16	263	16

Phenotypic DST

A total of 341 culture positives on LJ media were taken for the phenotypic DST (Table-3). Among them 141 were new cases and 200 were retreated cases. The overall prevalence of MDR-TB was 8 (2.34%). A majority of single drug resistance occurred by isoniazid (4.1%) followed by streptomycin (2.93%). Rifampicin and ethambutol mono resistance were found in 0.58% and 0.29% respectively. Resistance to both isoniazid and streptomycin were found in 5 (1.46%) cases.

Comparison of the spoligotypes with those in the international database:

138 isolates were genotyped by spoligotyping (Fig-1). Among them 33 isolates are form Bhubaneswar, 37 isolates from Rayagada, 30 isolates from Mayurbhanj and 38 isolates are from Kalahandi districts. The obtained spoligotyping results were compared with the

Table-2: Pattern of gene mutations in resistant Mycobacterium tuberculosis strains (n=30) using genotype MTBDRplus Assay.

Gene Band	Bhubaneswar (9)	Rayagada (7)	Kalahandi (14)	Total (30)	GeneRegion/ Mutation
rpoBWT3,4-, katGWT- &MUT1+	-	-	1(MDR)	MDR(10)	513-519, S315T1
rpoBWT7-, MUT2A+, kat GWT- & MUT1+	1(MDR)	-	-		526-529, H526YS315T1
rpoBWT7-, No MUT &inh AWT1-,MUT1+	-	-	1(MDR)		526-529, C15T
rpoBWT8-, MUT3+ katGWT- &MUT1+	1(MDR)	-	2(MDR)		530-533, S531L, S315T1
rpoBWT8-, MUT3+,kat GWT+ & MUT1+	-	-	1(MDR)		530-533, S531L, S315T1
rpoBWT8+, MUT3+,kat GWT+ & MUT1+			1(MDR)		S531L, S315T1
rpoBWT8-, MUT3+ ,inh AWT1 & 2-	-	-	1(MDR)		530-531. S531L -15 / -16, -8
rpoBWT8+, MUT3+ &inh AWT1-,MUT1+	-	1(MDR)	-		S531L, -15, C15T
rpoBWT8-& MUT3+	1(RR)	2(RR)	1(RR)	RR(4)	530-533, S531L
katGWT- & MUT-	1(RH)	-	-	RH (16)	315
katGWT- & MUT1+	3(RH)	1(RH)	5(RH)		315, S315T1
katGWT+ & MUT1+	-	2(RH)	-		S315T1
katGWT1-, MUT1+,inh AWT1-,MUT1+	-	-	1(RH)		315, S315T1, -15, C15T
inhAWT1&2-	2(RH)	1(RH)	-		-15/-16, -8
Total	**9**	**7**	**14**	**30**	

SITVIT2 data base showed that 103 isolates were distributed in 15 clades. Out of 15 clades the most frequent clade observed were EAI5 in 41 isolates.

Among the EAI isolates predominant share type is SIT256 EAI5 found in 8strains. ST126, ST340, ST355, ST413, ST934, and ST907 were found in other 13 strains of EAI. SIT26 is only share type for CAS1_DELHI lineage found in 8 isolates. ST48 EAI1_SOM was identified in 7 isolates where as ST177 EAI1_SOM was identified in one isolates. ST1 Beijing was identified in 4 strains and ST250 Beijing like lineage found in one isolates. ST654 and ST11 of EAI3_IND were identified in 2 and 1 strains consecutively. ST142CAS, ST598CAS, ST43EAI3_BGD1, ST100MANU1, ST54MANU2, ST172U and ST1188U were identified each in one isolates.

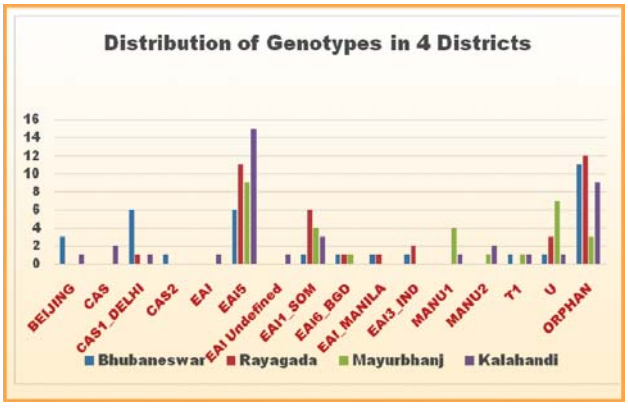


Fig-1 Distribution of different genotypes of *M tuberculosis*in Odisha.

The remaining 35 isolates were not reported earlier to the database; these were classified as orphans.

7. Characterization of Rotavirus strains affecting Odisha based on VP8 region: a possible additional candidate for new virus vaccine.

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Status : SRF (ICMR)
Guide : Dr. B. Diwedi
Date of joining : August 2013

Rotavirus infection in young children particularly in those below five years of age,

Table-3: Drugsusceptibility patterns of M. tuberculosis isolates for 1st line anti TB drugs.

Resistance status	Bhubaneswar(n=161) (New =117&Retreated =44 cases)	Kalahandi (n=110)Retreated cases	Rayagada (n=40)Retreated cases	Mayurbhanj(n=30) 24-new &6-retreated cases	Total (n=341)
Any Susceptible	140	95	36	30	301(88.26)
Any Resistance	21	15	4	-	40(13.28)
S	5	4	1		10(2.93)
H	9	4	1		14(4.10)
R	1	-	1		2(0.58)
E	1	-	-		1(0.29)
HS	2	3	-		5(1.46)
HR	2	-	1	-	3(1.209)
SHRE	1	3	-	-	4(1.173)
HRE	-	1	-		1(0.29)

S-Streptomycin, H- Isoniazid, R-Rifampicin, E-Ethambutol

resulting in severe diarrhea, is a cause of large number of infantile deaths all over the world, more so in developing countries such as India. It is well known that there are many different types of the virus and that some may be localised to certain areas while othershave a global prevalence. Emergence, disappearance and re-emergence seems to be common with certain types (O'Ryan., 2009, WHO 2010). Reassortment of genomes in virus strains belonging to the same group can lead to evolution of new viruses (Patton, 2012). Global rotavirus surveillance programmes, combined with advanced sequencing technologies have revealed the immense diversity of circulating rotavirus strains in different parts of the world (Patton, 2012).

The Indian Rotavirus Surveillance Network (IRSN) has helped, in collating data on the clinical, epidemiological and virological features of rotavirus gastroenteritis from various parts of the country (Kang, et al., 2009). Studies in eastern India have been mostly in Kolkatta centres of IRSN (Das, et al., 2004, Mullick, et al., 2014). A high disease prevalence has been reported from Bhubaneswar, another centre in eastern India (Kar, et al, 2014., Sarangi, et al., 2015).

RotaTeq and Rotarix, live attenuated oral rotavirus vaccines have been licensed in India and more recently the Rotavac vaccine has also been introduced in Bhubaneswar. Given the significant diversity in circulating strains as observed in different regions of the country (Ramachandra, et al., 1996, Jain et al., 2001) as well as in localities where the vaccines have been introduced (Kang, et al., 2013, Kulkarni, et al., 2014), identification of the circulating strains in Bhubaneswar assumes importance. There is no information on the strains circulating in Bhubaneswar.

Objectives

1. To genotype rotavirus strains isolated from odisha.
2. Sequence the VP4 region of each of the different VP4 genotypes to analyse the complete gene of the strains affecting the region.
3. Determine whether the sequence mutations that lead to different genotypes are present within the VP8 region or some other region of the VP4 gene and presence or absence of conserved regions within the VP8 region.
4. Designed peptides to be checked for immunogenicity in mice models.

Summary of Progress:

1. ***Sequencing of the VP4, VP7 and VP6 genes of the G1P[8] strains circulating in Odisha and phylogenetic analysis and comparison with rotavirus vaccines.***

The VP4 sequences were submitted to GenBank under the accession numbers KX498069, KX498070, KX498071, KX498072, KX498073, KX498074, KX498075, KX498076, KX498077, KX498078.

The VP7 sequences were submitted under the accession numbers KX498089, KX498090.

The VP6 sequences were submitted under the accession numbers KX498079, KX498080, KX498081, KX498082, KX498083, KX498084, KX498085, KX498086KX498087, KX498088.

The VP7, VP4 and VP6 sequences of the G1P[8] reference strain and the sequences of Rotarix and Rotateq vaccine strains were accessed from GenBank.

The ten G1P[8] strains sequenced for the VP4 gene were more similar to the Rotateq vaccine P[8] (91-93% nucleotide and 92-96% amino acid identity) than to the Rotarix vaccine VP4 (89-91%

Table-1:

rotavirus strain	epitope 7-1a														epitope 7-1b						epitope 7-2								
amino acid position	87	91	94	96	97	98	99	100	104	123	125	129	130	291	201	211	212	213	238	242	143	145	146	147	148	190	217	221	264
rotarix	T	T	N	G	E	W	K	D	Q	S	V	V	D	K	Q	N	V	D	N	T	K	D	Q	N	L	S	M	N	G
rotateq	T	T	N	G	D	W	K	D	Q	S	V	V	D	K	Q	N	V	D	N	T	K	D	Q	S	L	S	M	N	G
KX498090RMRCB	T	T	N	N	S	W	K	D	Q	D	A	V	D	–	Q	D	T	N	N	N	K	D	A	T	L	S	E	A	G
KX498089RMRCB	T	T	S	G	D	W	K	D	Q	N	V	V	D	K	Q	N	V	D	N	T	K	D	Q	N	L	S	T	N	G
DQ886943(pune)	T	T	S	G	D	W	K	D	Q	N	V	V	D	–	Q	N	V	D	–	–	K	D	Q	N	L	S	T	N	–
DQ886953(pune)	T	T	S	G	D	W	K	D	Q	N	V	V	D	–	Q	N	V	D	–	–	K	D	Q	N	L	S	T	N	–
GRAVP732(kolkatta)	T	T	S	G	E	W	K	D	Q	N	V	V	D	–	Q	N	V	D	N	T	K	D	Q	N	L	S	T	N	G
GRAVP718(kolkatta)	T	T	S	G	E	W	K	D	Q	N	V	V	D	–	Q	N	V	D	N	T	K	D	Q	N	F	S	T	N	G
MANI-375/07(manipur)	T	T	S	G	E	W	K	D	Q	N	V	V	D	R	Q	N	V	D	N	T	K	D	Q	N	L	S	T	N	G
Dan279(delhi)	T	T	S	G	E	W	K	D	Q	N	V	V	D	–	Q	N	V	D	N	T	K	D	Q	N	F	S	T	N	G
JN192129(Pune)	T	T	S	G	E	W	K	D	Q	N	V	V	D	R	Q	N	V	D	N	T	K	D	Q	N	L	S	T	N	G
JN192119(Pune)	T	T	S	G	E	W	K	D	Q	N	V	V	D	R	Q	N	V	D	N	T	K	D	Q	N	F	S	T	N	G
BE1520(belgium)	T	T	N	G	E	W	K	D	Q	N	V	V	D	K	Q	N	V	D	N	T	K	D	Q	N	L	S	M	N	G
BE1175(belgium)	T	T	N	G	E	W	K	N	Q	S	V	V	D	K	Q	N	V	D	N	T	K	D	Q	N	L	S	M	N	G
Dhaka16	T	T	S	G	E	W	K	D	Q	N	V	V	D	R	Q	N	V	D	N	T	K	D	Q	N	L	S	T	N	G
JX406755(USA)	T	T	N	G	D	W	K	D	Q	N	V	V	D	K	Q	N	V	D	N	T	K	D	Q	S	L	S	M	N	G

Table-2:

rotavirus strain	epitope 8-1											epitope 8-2		epitope 8-3										EPITOPE 8-4		
amino acid position	100	146	148	150	188	190	192	193	194	195	196	180	183	113	114	115	116	125	131	132	133	135	87	88	89
rotarix	D	S	S	N	S	S	A	N	L	N	N	E	R	N	P	V	D	S	S	N	D	N	N	T	N
rotateq	D	S	S	N	S	N	A	N	L	N	D	E	R	N	P	V	D	N	R	N	D	D	N	T	N
KX498075	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498070	–	G	S	N	S	N	A	N	L	N	D	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498077	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498073	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498072	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498069	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498071	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498074	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498076	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
KX498078	–	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
HQ881575(pune)	D	G	N	S	G	N	S	D	L	T	S	E	G	–	–	–	–	–	–	–	–	–	–	–	–
NIV-9217930(pune)	D	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
DAN103(delhi)	D	G	S	N	S	N	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
MANI375(manipur)	D	G	S	N	S	S	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–
GRAVP432(kolkatta)	D	G	S	N	S	S	A	N	L	N	G	E	R	–	–	–	–	–	–	–	–	–	–	–	–

Table-3:

Rota infection positive (P) Genotype	Histo-blood group antigen					
	TOTAL	A	B	AB	O	P value
P[4]	1	0	0	0	1	0.239
P[6]	1	1	0	0	0	0.570
P[8]	16	7	5	2	2	0.091
P[11]	2	0	0	2	0	0.091
P[9]	1	0	0	1	0	0.386
Total	21	8	5	5	3	

nucleotide and 90-92% amino acid identity).Our rotavirus vp7 gene sequenceshad comparatively higher identity with the Rotarix vaccine strain than the Rotateq vaccine strain.

2. Comparative analysis of the VP7 and VP4 antigenic epitopes of GIP[8] rotavirus strain from Odisha and rotavirus vaccine.

All the three epitopes of the VP7 region were prone to variations when compared with both the vaccine strains while the two epitopes of the vp4 which could be compared with the vaccine strains also showed variations as shown in table 1 and 2.

***3. Association between blood group and P genotype of rotavirus strains* :**

No statistically significant association between blood group and P genotype of the virus was noted as shown in the table 3.

Work to be done:

Designed peptides to be checked for immunogenicity in mice models.

8. Prevalence and genetic diversity of Staphylococcus aureus associated with hospitalized septic patients from Odisha.

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Co-Guide : Dr. K. C. Mohapatra SCB, Cuttack
Date of Joining : February 2015

Objectives:

1. Isolation and identification of *Staphylococcus aureus* isolated from ssepsis patients of Puri, Bhubaneswar, Cuttack areas.
2. Antibiogram of *Staphylococcus aureus* with special reference to Methicillin Resistant strains.
3. Detection of various toxic genes from *Staphylococcus aureus* isolated like *hlg*, *sea*, *tst* and *mecA* by PCR assay.

Summary of Progress:

The incidence of different bacterial pathogens and their antibiogram profile isolated from septic patients from Khurda, Bhubaneswar and Cuttack areas was studied from March 2015 to October 2016. Out of 730 patients 683(91.1%) were culture positive for different bacterial pathogens and 47(8.9%) were culture negative. Bacteriological analysis of the culture positive cases revealed 135(18%) *were Staphylococcus aureus,* coagulase negative Staphylococcus (CoNS) species- 36(4.8%). Most of the infections were associated with single pathogens and few were with multiple pathogens. In accidental infections, ulcer and soft tissue infection multiple bacterial pathogens were isolated. Important etiological agent found in most infections was *Staphylococcus spp*. especially *Staphylococcus aureus*. Isolated from accidental infections and ulcers were primarily *Staphylococcus aureus* and b-hemolytic *Streptococcus spp. Staphylococcus aureus* were resistant to most of the antibiotics. *S. aureus* isolated were resistant to azithromycin, doxycycline, ciprofloxacin, tetracycline, gentamycin, ofloxacin, chloramphenicol,

Table 1: Age and sex distribution of *S. aureus*positive cases.

Age Group	Gender	
	Male	**Female**
>18 - <25	2 (1.5%)	3(2.2%)
>25- <40	31(22.9%)	26(19.3%)
>40 - <60	43(31.8%)	30(22.2%)
Total	**76 (56.3%)**	**59 (43.7%)**

ampicillin and Oxacillin. 83.7% of the *Staphylococcus aureus* isolated were methicillin resistant *S. aureus*(MRSA) strains as they are resistance to Oxacillin as per CLSI guidelines and vancomycin resistant strain were 14.8% Further detection of various toxic genes and their clonality of *Staphylococcus aureus* with special references to Methicillin Resistant strains (MRSA) will be done in the upcoming months.

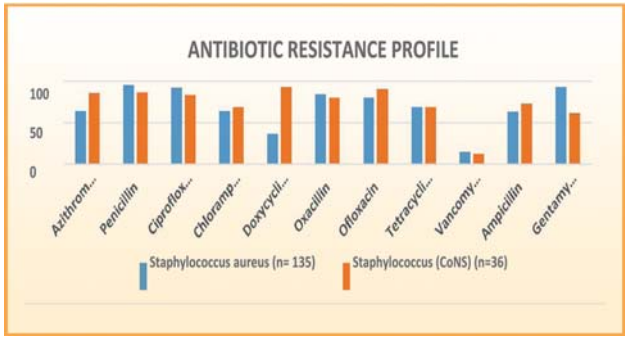

Fig.1: Comparison of resistance Profile (%) of S.aureusand Coagulase negative Staphylococcus (CoNS).

Table 2: Prevalence of *Staphylococcus aureus* from different septic patients.

Clinicalcases	Total cases	Culture +ve	S.aureus	MRSA	Staphylococcus (CoNS)
Accidental	76(10.1%)	70(10.3%)	9 (11.8%)	6(66.7%)	3(3.9%)
Burn	45(6%)	45(6.6%)	3 (6.7%)	3(100%)	0
Soft tissue Infection	105(14%)	98(14.4%)	38 (36.2%)	35(92.1%)	9(8.6%)
Abscess	124(16.5%)	106(15.5%)	16 (12.9%)	14(87.5%)	6(4.8%)
Ulcer	320(42.7%)	308(45.1%)	50 (15.6%)	42(84%)	12(3.8%)
Surgery	45(6%)	41(6%)	18 (40%)	13(72.2%)	4(8.9%)
Gangrene	15(2%)	15(2.2%)	0	0	1(6.7%)
Total	**750**	**683 (91.1%)**	**135 (18%)**	**113(83.7%)**	**36 (4.8%)**

Table 3: Resistance and sensitivity profile (%) of *S.aureus* for different antibiotics.

Antibiotics	Resistance	Sensitivity	Resistance	Sensitivity
	Staphylococcus aureus(n= 135)		Staphylococcus (CoNS) (n=36)	
Azithromycin	63.7	36.3	85.2	14.8
Penicillin	94.8	5.2	86.2	13.8
Ciprofloxacin	91.8	8.2	82.8	17.2
Chloramphenicol	63.7	36.3	68.9	31.1
Doxycycline	36.3	63.7	92.3	7.7
Oxacillin	83.7	16.3	80	20
Ofloxacin	80	20	90	10
Tetracycline	68.2	31.9	68.9	31.1
Vancomycin	14.8	41.5	12	88
Ampicillin	63	37	72.4	27.6
Gentamycin	92.6	7.4	61	39

Publications and Information

Publications

Publications 2015

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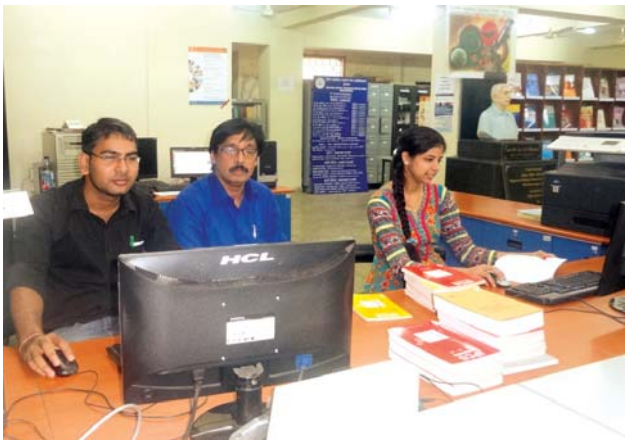
Central Facilities:

1. E- Library (Knowledge Resource Centre)

RMRC, Bhubaneswar Library & Information Centre known as Laxmi Narayan Memorial Library acts as Knowledge Resource Centre (KRC) of the Institute. It plays a vital role in the collection development and dissemination of scientific and technical information to meet the present and future needs of the centre, and also provides facilities and support to the scientists, researchers, students, staff and its networked centres. The library has a good collection of Journals, books and other relevant research material on Clinical Medicine, Immunology, Microbiology, Molecular Biology, Epidemiology, Entomology, Public Health, Biostatistics, Bioinformatics, Nutrition, and Genetics & Medical Anthropology.

During this period, for improving library and information services, the head of library, Dr. B. Sahoo, Lib & information Officer have attended training program on ICMR Library Modernization training workshop held on 11-12 August 2016 & 25-26 Nov. 2016 at National Institute of Virology, Pune. Dr. Sahoo has demonstrated live on Koha and DSPACE (IR) of RMRC Library during the training workshop.



Weekly E- Bulletin Monday Morning being prepared in Centre's Library.

E-Journals:

The Centre's Library is the member of ICMR E- Consortia which subscribes world's top weekly research journals in the field of Science, Technology & Medicine. Nature (http://www.nature.com), Science (http://www.sciencemag.org) (3) New England Journal of Medicine (http://www.content.nejm.org) (4) Lancet (http://www.thelancet.com).

The E- library subscribes ERMED consortia (www.ermed.in) which carried 242 E- journals from 5 publishers like

1. Bmj publishing group
2. Cambridge university press
3. Lippincott w. & w.
4. Oxford university press
5. Wiley-blackwell

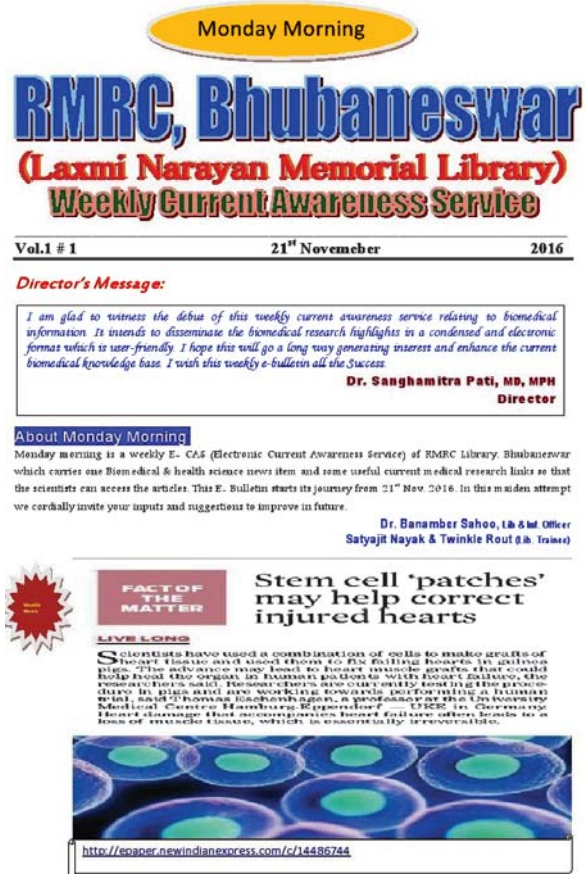
Besides that library is accessible to J-Gate@ICMR. J-Gate is an electronic gateway to global e-journal literature provided by by Informatics India Limited, Bangalore. J-Gate in collaboration with ICMR, G-Gate@ICMR has formed for Biomedical resource sharing among ICMR Libraries as well as e- journal accessibility.

Daily Article Service (DAS) : The Centre's Library continues to its daily Article service to ICMR scientists and doctors of the country continuously. During this period total 242 articles

have sent to scientists/ doctors in daily article service..

Monday Morning:

During this year the library has started a new Electronic Current Awareness Service (E-CAS) known as **"Monday Morning"** which is a weekly E- Bulletin of RMRC Library carrying one Biomedical & Health science news item and some useful current medical research links relating to biomedical information. It intends to disseminate the biomedical research highlights in a condensed and electronic format which is user-friendly. This E- Bulletin starts its journey from 21st Nov. 2016.


Monday Morning

RMRC, Bhubaneswar

(Laxmi Narayan Memorial Library)

Weekly Current Awareness Service

Vol.1 # 1 | 21st November | 2016

Director's Message:

I am glad to witness the debut of this weekly current awareness service relating to biomedical information. It intends to disseminate the biomedical research highlights in a condensed and electronic format which is user-friendly. I hope this will go a long way generating interest and enhance the current biomedical knowledge base. I wish this weekly e-bulletin all the Success.

Dr. Sanghamitra Pati, MD, MPH
Director

About Monday Morning

Monday morning is a weekly E- CAS (Electronic Current Awareness Service) of RMRC Library, Bhubaneswar which carries one Biomedical & health science news item and some useful current medical research links so that the scientists can access the articles. This E- Bulletin starts its journey from 21st Nov. 2016. In this maiden attempt we cordially invite your inputs and suggestions to improve in future.

Dr. Banamber Sahoo, Lib & Inf. Officer
Satyajit Nayak & Twinkle Rout (Lib. Trainee)

FACT OF THE MATTER

Stem cell 'patches' may help correct injured hearts

LIVE LONG

Scientists have used a combination of cells to make grafts of heart tissue and used them to fix failing hearts in guinea pigs. The advance may lead to heart muscle grafts that could help heal the organ in human patients with heart failure, the researchers said. Researchers are currently testing the procedure in pigs and are working towards performing a human trial, said Thomas Eschenhagen, a professor at the University Medical Centre Hamburg-Eppendorf ... UKE in Germany. Heart damage that accompanies heart failure often leads to a loss of muscle tissue, which is essentially irreversible.

http://epaper.newindianexpress.com/c/14486744

Library Trainees:

The library & information division of the Centre have recruited two Library Trainees for the period of one year for Library automation purposes. The two trainees (Twinkle Rout and Satyajit Nayak) are recruited as per Govt. of India apprentice scheme. During their practical training they have attended the workshop on ***Koha*** being conducted by Odisha Library Academy and OUAT library to learn various facets Koha implementation in RMRC library. They are also working on DSPACE for institutional repository along with working on Library Automation software KOHA, News clipping activities, and day to day job of the library.

2. Insectarium:

At Present the centre has one insectorium which was developed before 19 years. Here cyclic colony of three genus of mosquitoes i.e. Aedes aegypti (LV strain), Anopheles stephensi and Culex quinquefasciatus maintained. The reared mosquito species were used in insecticide susceptibility status test, larvicidal bioassay plant extract bioassay test.The different plant extract having larviciding properties tested in our insectorium by our scientist and scientist from other Institute also send their material for testing. Cyclic development of Brugia malayi L3 developed and different aspects of and immunological studies were carried out by our scientist of the Institute. The insectorium was used for giving training to different persons time to time.

Now we are proposing for conducting virology work ie on Chikungunya, Dengue, West Nile and JE so proper maintenance of Aedes aegypti, Ae.albopictus and Culex vishnui group of mosquito will be maintained so a special infected room will be maintained with utmost care so that a single mosquito can not be escaped.

3. Animal House:

Animal facility provides animal care, breeding and maintenance of experimental animals. The facility works under the guidance of Institutional Animal Ethics Committee to ensure excellent animal care. The facility has been registered (No. 70/1999/CPCSEA) for breeding and experiments on animals under the Committee for the purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Environment & Forests (Animal Welfare Division), Government of India. Animal facility of the center continues to be

used for all relevant on-going projects. Currently M. Coucha, Balb/c mice, Guinea pigs and Rabbits are available for experimentation. All the projects concerning animal use/ experimentation are discussed in Animal ethical committee of the center and work progress also review periodically by the committee. This facility is maintained regularly with periodic inspection and health monitoring by veterinarian. The detail record is kept in animal facility.

International/National conferences / meetings / seminars attended by Scientists

Dr. Sanghamitra Pati, Director

1. Scientific Evaluation Committee Meeting on 7th September 2016 of AIIMS, Bhubaneswar as a Chairperson.
2. India-Africa Health Sciences Meet in New Delhi from 1st – 3rd September 2016.
3. National Conference on "New Horizon in Nursing Research: Qualitative Research" on 30th September 2016 at SOA Annex, IMS & SUM Hospital, Bhubaneswar.
4. Inaugural Session of two-day Orientation Programme on 09-10th September at Bhubaneswar organized by Indira Gandhi National Open University (IGNU).
5. Attended the Regional PMDT Review for North East States from 13th-15th September 2016 at Guwahati.
6. Attended the SRC meeting at UDPS, Vani Vihar on 7th October 2016 at 11:30 AM.
7. Attended Consultative Workshop, Odisha Draft Bio-Technology Policy 2016, at Bhubaneswar on 24th October 2016. Organized by Federation of Indian Chambers of Commerce and Industry.
8. Attended Board of studies meeting on 27th October 2016 at 11:00 AM at Utkal University Examination Meeting Hall.
9. Attended visceral Leishmaniasis Consortium in New Delhi from 3rd-5th November 2016, Organised by ICMR, New Delhi.
10. Attended initial stake holders meeting for initiating preparatory activities towards NABL accreditation of 15 selected TB C&DST laboratories on 14th November 2016 organised by Pune, Maharastra.
11. Invited as a panelist of Tribal Conclave, 2016-held at Jamshedpur, Jharkhand from 15th-19th November 2016.
12. Attended a meeting at ICMR, New Delhi on 17th November 2016 for the present AES/JE outbreak in Odisha.
13. Attended Cholera Surveillance Network Meeting on 22nd November 2016 in New Delhi, Organised by Translational Health Science and Technology Institute (THSTI), Faridabad.
14. Invited as a Chief Guest for 2 day Orientation Training programme on "Identification of Sickle Cell Anemia and their follow UPS" at STST Research and Training Institute, Bhubaneswar on 29th-30th November 2016.
15. Invited as a Guest for Seminar-Cum-Panel discussion and Poster Competition at Autism Therapy Centre (ATC), Bhubaneswar on 04.12.2016 on the occasion of Autism Awareness Day.
16. Invited as a panelist for the "National Symposium on Universal Health Coverage in India", 12th December 2016 organized by School of Public Health, KIIT University, Bhubaneswar.
17. Attended the ICMR-WHO National Consultation for Draft National Ethical Guidelines for Biomedical and Halth Research involving Human Participants on 14th December 2016 at ICMR Headquarters, New Delhi as a member of panel Discussion on Public Health Research, Socio-Behavioral Sciences, and Humanitarian Emergencies/ Disasters Research.
18. Attended Bhubaneswar Biotechnology Summit on 15th December 2016 organised by ILS, Bhubaneswar.
19. Invited as a Guest Lecturer on 17th December 2016 by Asian Institute of Public Health,

Bhubaneswar on the occasion of Student Research Day.

20. Attended TB Call to action to Odisha on 17th December 2017 (9:30 AM) at Utopia Hall of Sandey's Tower, Bhubaneswar.
21. Attended Odisha Environment Congress 2016 at Regional Museum of Natural History, Acharya Vihar, Bhubaneswar on 20th December 2016 at 10:00 AM.
22. Attended as a special invitee for the 30th SAC of RMRC, N.E. Region (ICMR) w.e.f. 27th-28th December 2016.

Dr. N. Mahapatra, Scientist-F

23. Attended meeting on 15th ISP Conference "PERI'O'DISHA on 11th, 12th, & 13th March at KIIT, University, Bhubaneswar, Odisha.
24. Meeting attend on 25.07.2015 at Cuttack CDMO, Office regarding Chronic Kidney Disease.
25. Attended Director meeting on 4th September 2015 at NIC, Chennai.
26. Attended Brain storming workshop on 2nd November 2015 at NCDC Campus, at New Delhi
27. Attended meeting on 33rd Odisha State Annual Dental Conference on 18th to 20th December 2015 at KIIT, University, Bhubaneswar, Odisha.
28. Meeting attend on 08.01.2016 to for procurement of LLIN at Govt. of Odisha Health & family Welfare Department.
29. Meeting attend on 11.01.2016 to for procurement of LLIN at Govt. of Odisha Health & family Welfare Department.
30. Meeting attend to constitute external committee for Biotechnology for award for Biju Pantnaik Research Fellowship for Ph.D on 12.01.2016.
31. Meeting attend at Odisha Bigyan Academy Sahid Nagar for Sub-committee on 28.01.2016 Research & Development in Biotechnology.
32. Meeting attended on ANNUAL STATE CONFERENCE ("OSASICON-2016") at INS & SUM Hospital on 5th, 6th & 7th February 2016.
33. Attended meeting on 15th Indian Society of Period ontology as chief Guest at PG Convention on 25.02.2016.

Dr. M. R. Ranjit, Scientist-F

34. Invited as Subject Expert to Sub-committee on Research & Development in Biotechnology, Dept of Science & Technology, Govt of Odisha to evaluate the progress and review of ongoing and new project proposals on 28.1.2016 held at Odisha Bigyan Academy, Bhubaneswar.
35. Invited as Expert Member to the IEC of Department of Zoology, North Odisha University, Baripada held on 13.02.2016.

Dr. A. Mahapatra, Scientist-E

36. Convener of Research Committee– 12 "Population, Health & Society" of the All India Sociological Conference, Organised by Indian Sociological Society (ISS) (2012 – 2017).
37. Delivered a Key Note address in the National Seminar On, "Development and Future of Social work", being Organized by The Department of Social work, Gujarat University, Ahemedabad, Gujrat during 29th-30th October, 2015.
38. Invited Speaker in the National Conference on the theme "Fulfilling the Dream of Hon'ble Prime Minister to Provide Toilet in Each Household by 2019 – Challenges and the way ahead", at Constitution Club, New Delhi, on November 19&20, 2015.
39. Attended National Seminar on "Science and Technology for Indigenous Development in India" under the Edges of Indian Science Congress Association (ISCA) Bhubaneswar Chapter, held at KIIT University, Bhubaneswar, during 9th – 11th Dec 2015.
40. Convener of Research Committee – 12 "Population, Health & Society" of the 41st All India Sociological Conference, Organised by Indian Sociological Society (ISS), at KIIT & KISS campus, Bhubaneswar, during Dec 27,28 & 29th Dec 2015.

41. Invited Speaker in National Conference on, "State, Civil Society and Development: Tribals of Western India" Organised by Western Regional Social Service Forum (WRSSF) and Indian Council of Social Science Research (ICSSR) at WRSSF- Mumbai University, Mumbai during 6-7th Jan 2016.
42. Delivered Key Note Address: In The National Seminar on, "Development and Future of Social Work, Organized by Gujarat University, Ahemadabad during 29th – 30th Oct 2015.
43. Delivered Key Note Address: In the National Conference on "Conservation of Eastern Ghats" Organised by Utkal University & Council for Green Revolution& Green's Alliance for Conservation of Eastern Ghats on 16-17th April 2016.
44. Delivered a Talk as Invited Speaker on "A Situational analysis of Suicides in India" as Invited Speaker on the National Seminar on "Suicides in India: Tendencies, Prevention and mitigation of the Social Crisis", organized at Nizam College, Hyderabad on 5-6th Oct 2016.
45. Chaired a session on Health and Nutrition in tribal areas at Anthropological Survey of India, Western Regional Centre, Udaipur, during the National Seminar on "GOVERNMENT AND TRIBAL DEVELOPMENT: APPROACHES, ROLE AND REALITY" from 18th – 20th January 2017, at Udaipur.

Dr. G. Bulliyya, Scientist-E

46. Attended a Meeting on Reducing Malnutrition in the Tribal Region through Community Volunteer organized by South Orissa Voluntary Action (SOVA), Koraput on 10th March 2016.
47. Attended a Meeting on 'Sharing of Best Practices on Nutrition: Early Child Care Development' and given opening remarks on public health significance of maternal and child nutrition organized by ChildFund India at Swosti Premium, Bhubaneswar on 19th April 2016.
48. Attended 12th Meeting of the State level Steering-cum-Monitoring Committee Meeting under Mid-Day Meal Programme held at 2nd Floor Conference hall of the secretariat building, Bhubaneswar on 19th April 2016.
49. OrganisedOrientation meeting on Implementation and monitoring and evaluation of MDM in Odisha and Tools development held at RMRC, Bhubaneswar on 22th April, 2016.
50. Attended a meeting on project review 'Amulspray: Agri-food value chain consumer survey' held at MSSRF, Chennai on 27th May, 2016.
51. OrganisedOrientation workshop on Piloting MDM Tools for Expert Committee Stake holders on Evaluation of MDM Implementation in Odisha held at RMRC, Bhubaneswar on 01st July, 2016.
52. Attended Cost Committee Meeting of Mid-Day Meal Programme under the Chairpersonship of Commission-cum-Secretary held at chamber of Commissioner-cum-Secretary, S&ME Department (10.30AM) on 26th Oct. 2016.
53. Attended 13th State-level Steering-cum-Monitoring Committee Meeting of Mid-Day Meal Programme held at 2nd Floor Conference Hall of Planning & Convergence Department (1pm), Bhubaneswar on 26th October 2016.
54. Attended Pre-Conference Meet on National Seminar Tribal Peoples Health and Quality of Life in India of 15th Indian Social Science Congress and presented RMRC-Bhubaneswar Scientific activities in Annual Meeting of ICMR Tribal Health Research Forum held at NIRTH, Jabalpur on 1-2nd November 2016.
55. Attended the 48th Annual Conference of Nutrition Society of India as a Convener of Bhubaneswar Chapter, Executive Body Meeting and Chaired the Young Scientist's Community Nutrition Awards Session at St.John's Research Institute, Benguluru on 4-5th October 2016.
56. Meeting of Nutrition Experts on cooking cost under MDM Scheme at Office Chamber of

State Project Management Office, SRC Building, Bhubaneswar on 23rd Dec. 2015.

57. Attended a Meeting to present project proposal on Concurrent Monitoring and Evaluation of Mid Day Meal Programme in Odisha' held at Commissioner-cum-Secretary, School & Mass Education Department, Govt.of Odisha on 27th December, 2016.

Dr. B. B Pal, Scientist-E

58. Attended meetings and presented the Odisha data in the meeting on evidence of cholera in India, organized by THSTI, Gurgaon, Delhi on 22nd November, 2016.
59. Attended and presented the paper on "Outbreaks/ Epidemics of cholera in the tribal areas of Odisha" the 40th Annual Conference of Indian Association of Medical Microbiologists (*MICROCON*) on 23rd-27th November, 2016, PGIMR, Chandigarh.

Dr. D Das, Scientist-E

60. Attended initial stake holder's meeting for NABL accreditation of TB laboratories at Pune from 13th Nov. 2016- 15th Nov. 2016.
61. Attended meeting of National Strategic Plan for TB Control in India (2017-23) at Delhi 18th & 19th October 2016.
62. Attended Pre SAC review committee meeting of NIRT as a member from 6th Oct. 2016- 9th Oct. 2016.
63. Attended Programmatic Management of Drug Resistant TB meeting for North Eastern region at Guwahati from 12th Sep. 2016- 15th Sep. 2016.
64. Visited IRL, Imphal, Babina Diagnostics, JNIMS, Manipur and assessed the three sites for providing follow up culture support to the state of Manipur from 31st Aug. 2016- 3rd Sep. 2016.
65. Pre-assessment visit for establishment of liquid culture for TB diagnosis at Agartala Medical College, Tripura was made from 26th July 2016- 29th July 2016.
66. Pre-assessment visit for establishment of liquid culture for TB diagnosis at IRL, Gangtok, Sikkim was made from 3rd July 2016- 7th July 2016.
67. Pre-assessment visit for establishment of liquid culture for TB diagnosis at Burdwan Medical College, West Bengal from 23rd June 2016- 25th June 2016.
68. Attended the World TB Day function on 21st Mar. 2016 which was inaugurated by Honorable Health Minister Sri J P Nadda from 20th Mar. 2016- 21st Mar. 2016.

Dr. T. Hussain, Scientist-E

69. Annual review meeting of TB-Tribal project on 29th & 30th August, 2016 at Pondicherry Institute of Medical Sciences (PIMS), Puducherry.
70. 4th Annual Conference of Research Society for the Study of Diabetes in India (RSSDI) - Odisha State Branch held on 24th & 25th Sep., 2016 at Blue Lily Beach Resort, Puri.

Dr. R. K. Hazra, Scientist-E

71. Attended 9th National Conference on Medical Arthropodology on Emerging and re-emerging vector borne diseases: Surveillance and control, Osmania University, Hyderabad held on 20th and 21st Aug 2016.
72. Attended Brainstorming Meeting on "Future Scopes and Challenges on Research in Medical Entomology in India" at CRME, Madurai held on 26th and 27th October 2016.

Dr. B. Dwibedi, Scientist-D

73. Attended a Conference on Anti-Microbial Resistance (AMR): Public health challenge & priority on 25.02.2016 at New Delhi.
74. Invitation to participate as an expert member in a Clinical experts meeting on Lymphatic Filariasis at ICMR New Delhi from 22.02.2016 to 23.02.2016.
75. Invitation for a lecture on research methodology at RRIUM, Bhadrak on 04.08.2016.
76. Attended a Seminar on Sustainable Food & Nutrition Security on 29.06.2016 at RMRC Bhubaneswar.

77. Attended a Training /workshop on Medical Ethics and Good Clinical Practices (GCP) at IMS & SUM Hospital, SoA University, Bhubaneswar on Mar'2016.
78. Organized a Training /workshop on Good Clincal Practices (GCP) and Bio-ethics at Regional Medical Research Centre, Bhubaneswar on Aug'2016.
79. Attended a review meeting of MRHRU held at ICMR New Delhi on dated 19.01.2016.
80. Attended a meeting held at DHR on 17.04.2016 to 18.04.2016.
81. Attended a PI meeting organized by NIV Pune in respect to CDC-VHF project on 29.08.2016 to 30.08.2016 organized by NIV Pune.
82. Attended Expert group meeting on research cum intervention project on AES/JE on 17.011.2016 held at ICMR New Delhi.
83. Attended 4th Review meeting of MRHRU on 22.012.2016 held at ICMR New Delhi.

Dr. A. S Acharya, Scientist-C

84. Participated in PHFI/ILRI workshop on basic skills for conducting Eco-health research held at Hotel Ramada, Gurgaon during 24th & 25th November, 2017.
85. Undertook lectures at Regional Research Institute of Unani Medicine (RRIUM) , Bhadrak pertaining to Research methodology and Biostatistics programme during September and October 2017.

Dr. D. Bhattacharya, Scientist-C

86. Attended the project proposal review committee meeting at NER-BPMC office in New Delhi and presented a project before the Expert Committee on 7th March, 2016.
87. Attended Research capacity building workshop conducted by Public Health Foundation of India and presented a project proposal on Anthrax on 24-25th November, 2016 in Gurgaon.
88. Attended CDC funded hand on training programme conducted by Manipal centre for Virus Research, Manipal on Laboratory Diagnosis of Scrub Typhus &Rickettsial Diseases during 17-19th January, 2017.

Dr. P. K Sahoo, Scientist-B

89. Participated the International forum "Bio Asia 2016: The Global Biobusiness Forum" from February 8-10, 2016 at Hyderabad International Convention Centre, Hyderabad, India. The forum was meant for the application of new products, technology and instruments to the biomedical research.
90. Participated the training /workshop on "Good Clinical Practices & Bioethics" at Regional Medical Research Centre from 1st-2nd August 2016 at Bhubaneswar. The workshop was about the ethical issue during the sample collection, about informed consent and handling of human biological sample.
91. Participated in workshop on "Conduction EcoHealth Research: Basic Skills" from 24th-25th November 2016, organized by Public Health Foundation of India and International Livestock Research Institute as a part of research capacity building program at Gurgaon.
92. Participated in training on "A Mendeley Presentation" hosted by Mendeley advisor from 24th-25th November 2016, organized by MENDELEY to better understanding Mendeley and improve the research workflow at Gurgaon.
93. Participated the workshop on "Foundation and Strategies of IPR for the startups" organized by KIIT University on 10th Dec' 2016 at Bhubaneswar.

Dr. B. Sahoo, Lib & Inf. Officer

94. Attended training program on ICMR Library Modernization held on 11-12 August 2016 at National Institue of Virology, Pune.
95. Participated the advanced training on ICMR library Modernization program and presented a paper on "Digital repository of RMRC, Bhubaneswar" during 25-26 Nov. 2016 at National Institute of Virology, Pune.

Ph. D Awarded:

1. Rashmi Mishra has been awarded Ph.D degree on "Role of B-1 lymphocytes and autoantibodies in human lymphatic filariasis" under the guidance of Dr. A.K.Satapathy, Scientist-E under Utkal Univ, Bhubaneswar .
2. K Gopinath Achary has been awarded Ph.D degree on "Investigation on the effect of maternal infection on humoral and cellular immune responses of neonates in lymphatic filariasis" under the guidance of Dr. A.K.Satapathy, Scientist-E under Utkal Univ, Bhubaneswar.
3. Manisha Patnaik has been awarded Ph.D degree on "Studies on Genetics aspects of essential hypertension among the natives of Odisha" under the guidance of Dr. M.R.Ranjit, Scientist-F under KIIT University, Bhubaneswar.

M. Sc. dissertation program:

RMRC, Bhubaneswar under took six month M.Sc. dissertation program in the subject areas of Biotechnology/Microbiology/Life Sciences/ Bioinformatics/from Jan- June 2016. During this period total 17 M.Sc. dissertation students from various universities/ Institutions have undertaken 6 month M.Sc. dissertation program under scientists of RMRC.

Training program/Workshop Conducted

1. Workshop on Good Clinical Practice:

Regional Medical Research Centre, Bhubaneswar, has organized a 2 days training/workshop on Good Clinical Practices (GCP) and Bio-ethics on 1st and 2nd August 2016. About 55 participants were participated. The members of Human Ethical Committee, Scientists, Researchers, Doctors from Regional Medical Research Centre, Bhubaneswar, AMRI Hospital, Bhubaneswar and JPM Rotary club of Cuttack eye hospital & Research Institute, Cuttack attended this workshop. Dr Paul Kumaran of NIRT, Maduria Unti and Dr. S. Swarnalakshmi of IRB, YRG CARE, Chennai were the resource persons for this training.

2. NRL Coordination Meeting:

NRL Co-ordination Committee meeting has been organised at NRL-RMRC Bhubaneswar on 20th and 21st Sept, 2016. Dr. Sanghamitra Pati, Director, RMRC, Bhubaneswar gave the inaugural speech and Dr. V S Salhotra, ADG, CTD, New Delhi chaired the meeting. Dr. Ranjani Ramchandran and Dr. Malik Parmar from World Health Organisation highlighted the development of new TB diagnostic techniques and short TB regimen. Dr. Jacek, CDC, India presented about whole-genome sequencing (WGS) as a tool for the diagnosis and clinical management of tuberculosis (TB). Representatives of all the six NRLs presented their findings of On-site Evaluation of respective states.

3. Systematic Review Workshop

Workshop on systematic review & meta analysis:A synthetic approach in biomedical research was organised in RMRC, Bhubaneswar from 31 oct - 2 Nov. 2016. Dr. Soumyadip Bhoumik, BMJ public health, London was the resource person. Dr. Sanghamitra Pati, Director RMRC, Bhubaneswar gave the opening remarks on the workshop followed by remarks by Dr. Namita Mahapatra, Head Bioinformatics division. 25 participants from AIIMS, Bhubaneswar & Raipur, SCB Medical college, Cuttack, KIMS, Bhubaneswar, SUM Hospital, VSS Med college, AIPH, Bhubaneswar, MKCG, Berhampur, Utkal university, Bhubaneswar and other inst. have participated in the workshop.

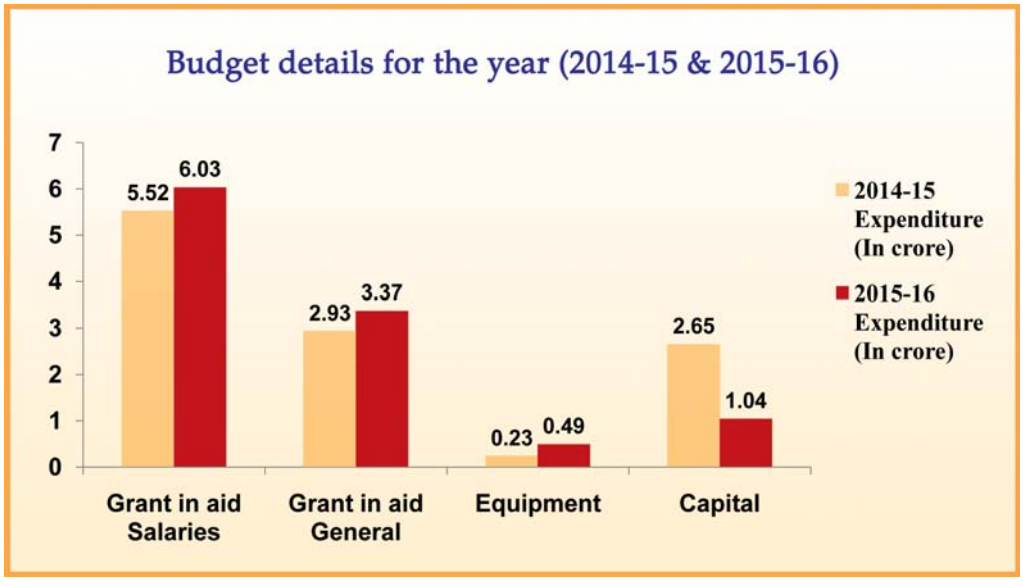
4. Training on E- Governance:

E- Governance & E-office Training Programme in RMRC, Bhubaneswar, on 15-16, December 2016. Dr. Manjit Singh chalga, Mr. Kumar Dron Srivastuv, Mr. Krishnakanth Azad from ICMR are Resource Person for the E-office training. All administratative personnel and scientists have participated the 2 days training program.

Events in RMRC

1. On the occasion of International Yoga Day, RMRC, Bhubaneswar observed 2nd International Yoga Day on 21 st June 2016 in RMRC Seminar with Yoga tips by Yoga Guru Sri Pranabandhu Behera followed by Practical session.
2. RMRC, Bhubaneswar organized Swachh Bharat Mission on 2nd Oct. 2016 (Gandhi Jayanti). Scientists & Staff of RMRC cleaned up the RMRC Building and its roof area on this occasion as as Karseva.
3. On the eve of World Mental Health Day, RMRC Bhubaneswar organised a talk on" Effect of Stress on work places" on 17th October, '016 in Seminar Hall. Dr. Pranab Mohapatra, eminent psychiatrist of KIMS Hospital, Bhubaneswar was the invited speaker.
4. Guest Lecture by Dr. C.R.Kar, Professor& Head, Dept. of Nephrology, S.C.B. Medical College, Cuttack was held on 22nd Sept. 2016.
5. A Seminar on "Malaria Agenda in Maternal child Health" was held on 21.10.2016 in RMRC Seminar. Dr. A.K. Sen for UNICEF was the guest speaker of the seminar.
6. Vigilance Awareness Week Meeting was Organised on 7th November, 2016 in RMRC BBSR, Sri S.N. Tiwari, Ex-Police D.G., Govt. of Odisha delivered a talk on Vigilance Awareness week.
7. A state level sensitization meeting regarding TB Control activity under NUHM was organized in RMRC Auditorium on 11th Nov. 2016.
8. Dr. Sunita Sahoo, Microbiologist from Apollo Hospital, Bhubaneswar delivered a guest lecture on "Scrub typhus" on 15th Nov. 2016.
9. RMRC Library launched the "Digital Repository of RMRC, Bhubaneswar" online Dspace a digital repository of scientific publications of RMRC scientists and a weekly Current Awareness bulletin "Monday Morning" on biomedical information service on 21st Nov. 2016. (http://14.139.217.189:8090/jspui).
10. World AIDS Day being observed in RMRC, Bhubaneswar on 1st December, 2016. Dr. Amitabh Das state epidemiologist from Odisha State AIDS Control Society addressed to RMRC scientists on "Current Status Of HIV/AIDS in Odisha.

RMRC Budget



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16. Dr. Sanghamitra Pati *Member Secretary*
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Human Ethical Committee

1.	Prof. Dr. Jadunath Prasad Das Sr. Consultant Cardiologist 656, Mahanadi Vihar, Cuttack-753004	Chairman (Clinician)
2.	Prof. Aruna Kumari Misra 68/1, Laxmi Vihar, PO: Sainik School, Bhubaneswar	Basic Scientist, Life Science (Member)
3.	Prof. Dr. Prasanna Kumar Dash Formerly, DMET, Govt. of Odisha, Rajendra Nagar, Cuttack-10	Medical Scientist(Member)
4.	Mrs. Kasturika Patnaik 1, Lewis Road, Bhubaneswar	Lay Person(Member)
5.	Dr. Pramod Kumar Acharya N-1 A/10, IRC Village, Near CRP square, Bhubaneswar - 751015	Clinician (Member)
6.	Dr. Sisir Kumar Mahapatra Surya Nivas, Plot no: B-1/91, Lingaraj Vihar, Pokhiriput, Bhubaneswar 751020	Clinician(Member)
7.	Sri Santanu Das 202, Block-C, Nageswar Residency, Bhubaneswar-751024	Legal Expert(Member)
8.	Prof. Rita Ray 423, Swarnapuri road, Opposite Kanan Vihar Phase-II, Bhubaneswar - 751024	Social Scientist(Member)
9.	Prof. Dr. Sudhanshu Sekhar Mishra IMS & SUM Hospital SOA University, Bhubaneswar	Basic Medical Scientist (Member)
10.	Dr. Prakash Kumar Sahoo Regional Medical Research Centre, Bhubaneswar-751023	Alternative Member Secretary
11.	Dr. Bhagirathi Dwibedi Regional Medical Research Centre, Bhubaneswar-751023	Member Secretary

Animal Ethical Committee

1.	Dr. Sanghamitra Pati Director ICMR-Regional Medical Research Centre Bhubaneswar	Chairman
2.	Dr. S. K. Ray Qr. No M-109, Baramunda Housing Board Colony, Bhubaneswar - 751003	Member (Veterinarian)
3.	Dr. Arabinda Behera V.A.S , MKCG Medical College, Berhampur- 760004, Ganjam, Odisha	Member (Main Nominee-CPCSEA)

4.	Dr Ramesh Chandra Pradhan Department of Microbiology, SCB Medical College, Cuttack-753007	Member (Link Nominee-CPCSEA)
5.	Ms. Trupti Rekha Swain Associate Professor in Pharmacology, SCB Medical College, Cuttack-753 007	Member (Scientist from outside Institute-CPCSEA)
6.	Mr. N. R. Mansingh Gundicha Vihar (3rd lane)Left side, Sarvodaya Nagar, Puri - 752 002	Member (Socially aware nominee-CPCSEA)
7.	Dr. M. R. Ranjit Scientist-F, Regional Medical Research Centre (ICMR), Bhubaneswar	Member (Scientist from different discipline)
8.	Dr. A. K. Satapathy Scientist-E, ICMR-Regional Medical Research Centre Bhubaneswar	Member(Member secretary)
9.	Dr. B. Dwibedi Scientist-D, Regional Medical ICMR-Research Centre Bhubaneswar	Member(Biological scientist)
10.	Dr. P. K.Sahoo Scientist-B, ICMR-Regional Medical Research Centre Bhubaneswar	Member (Animal House I/C)

Technical Purchase Committee

1.	Dr. P. Das Principal Scientist CIFA, Kausalyagang, Bhubaneswar- 751 002	Chairman
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3.	Dr. N. K. Debata Prof. Microbiology SUM - Hospital, Bhubaneswar	Member
4.	Mr. R. C. Muduli Administrative Officer ICMR-Regional Medical Research Centre Bhubaneswar	Member
5.	Accounts Officer RMRC, Bhubaneswar	Member
6.	Dr. Madhusmita Bal Scientist - B, ICMR-Regional Medical Research Centre Bhubaneswar	Member Secy

Staff position

(As on 31st December 2016)

Scientists:

1.	Dr. Sanghamitra Pati, MBBS., MD., MPH	Director
2.	Dr. (Mrs.) N. Mahapatra, M.Sc., Ph.D.	Scientist-F
3.	Dr. M. R. Ranjit, M.Sc., Ph.D.	Scientist-F
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5.	Dr. B. B. Pal, M.Sc., Ph.D.	Scientist-E
6.	Dr. A. Mahapatra, M.Sc., M.Phil., Ph.D.	Scientist-E
7.	Dr. G. Bulliyya, M.Sc., Ph.D.	Scientist-E
8.	Dr. Taziba Hussain, M.Sc., Ph.D	Scientist-E
9.	Dr. (Mrs.) A.S. Kerketta, M.B.B.S.	Scientist-E
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12.	Dr. Bhagirathi Dwibedi, M.B.B.S, M.D	Scientist-D
13.	Dr. Debdutta Bhatacharya, M.Sc., Ph.D	Scientist-C
14.	Dr. A.S.Acharya , M.Sc., M.Phil, Ph.D	Scientist-C
15.	Dr. Madhusmita Bal, M.Sc.M. Phil, Ph.D	Scientist-C
16.	Dr. P. K.Sahoo, M.Sc., Ph.D	Scientist-B

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2.	Mr. R.K. Das, M.Sc.	Technical Officer-A
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8.	Mr. R. C. Parida, M.Sc.PGDCA	Technical Asst.
9.	Miss Sujata Dixit, M.Phil, M.Sc	Technical Asst.
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12.	Mr. H. S. Naik, Dip. MLT	Technician-C
13.	Mr. T. Moharana	Technician-C
14.	Mr. M. Barik, Dip. MLT	Technician-C
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16.	Mr. K. C. Dalai, B.A., ITI	Technician-B
17.	Mr. B. K. Kanhar	Technician-B
18.	Mr. N. Sahoo	Technician-B
19.	Mr. B. Pradhan	Technician-A
20.	Mr. C. S. Tripathy, B.Com. LL. B.	Technician-A
21.	Mr. S. S. Beuria	Technician-A
22.	Mr. G. Simhachalam	Technician-A
23.	Mr. K. C. Parichha	Technician-A
24.	Mr. S. K. Mallick	MTS (Lab. Technical)
25.	Mr. Banamali Nayak	MTS (Lab. Technical)
26.	Mr. K. G. Samal	MTS (Tech. Maintenance)

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2.	Miss. Twinkle Rout, M. Lib & Inf. Sc.	Apprentice Library Trainee
3.	Mr. Satyajit Nayak, M. Lib & Inf. Sc.	Apprentice Library Trainee
4.	Mr. Rajim Sur Rai	MTS (General)

Administration & Accounts

1.	Mr. R. C. Muduli, B.A.	Administrative officer
2.	Mr. B. Sutar, M.Com	Section officer
3.	Mr. P. C. Nayak, B.A.	Personal Assistant
4.	Mr. A. P. Parida, B.A	Assistant
5.	Mr. S. K. Satapathy	U.D.C.
6.	Mr. R. Rath	UDC.
7.	Mr. D. K. Mohanty, B.A	Stenographer
8.	Mr. S. Nayak	U.D.C
9.	Mr. S. K. Das, B.Com.	L.D.C.
10.	Mr. S. K. Majhi, M.A., LL.B.	L.D.C.
11.	Mrs. S. Beuria, M.A	L.D.C
12.	Mr. Sankar P. Sharma	MTS (General)
13.	Mr. M. B. Thappa	MTS (General)
14.	Mr. T. Bahadur	MTS (General)
15.	Mr. D. C. Rao	MTS (General)
16.	Mr. Sankar Bisoi	MTS (General)
17.	Mr. Baburam Behera	MTS (General)
18	Mrs. Triveni Nayak	MTS (General)
19.	Mr. R. K. Hembram	MTS (Lab. Technical)
20.	Mr. Pandaba Sahoo	MTS (Lab. Technical)

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2.	Mrs. R. Varghese	Personal Assistant
3.	Mr. K. C. Nayak	MTS (General)
4.	Mr. H. K. Jena	MTS (Lab. Technical)

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2.	Mr. S. Sutar	Technician-A
3.	Mr. J. Behera	MTS (Tech. Maintence)
4.	Mr. B. K. Moharana	MTS (Tech. Maintence)

Animal House Staff

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2.	Mr. S. K. Das	MTS (Lab. Technical)
3.	Mr. Jaladhar Naik	MTS (Lab. Technical)
4.	Mr. Banamali Sahoo	MTS (General)

Transport Staff

1.	Mr. Sibaram Patra	Driver
2.	Mr. Anakar Nayak	Driver
3.	Mr. A. R. Khan	Driver
4.	Mr. P. K. Behera	Driver

Swachh Bharat Mission in RMRC Campus

Participants in Systematic Review & Meta Analysis workshop

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Printed at Textbook Bureau, Bhubaneswar