Preface

The DMRC has aimed to fulfil its overall mandate, identifying priority areas for health research in arid situations and developing infrastructure in terms of laboratory support using modern techniques. Dengue, malaria, tuberculosis remained the main diseases among the priority areas, besides development and demonstration of newer or alternate strategies for the prevention and control of communicable diseases. Non-communicable diseases too were dealt with focused approaches and full attention. Studies on nutritional deficiency disorders, related to micro-nutrients in certain vulnerable groups were given particular emphasis.

Laboratory for the molecular diagnosis of H1N1 virus was established for the patients suspected of Swine flu of Jodhpur region. A Dengue Action Plan was developed and demonstrated for prevention and control of dengue and DHF in Jodhpur. Attempts to type and sequence the virus of DHF developing molecular and genetic markers of virus transmission competence of dengue vectors were made. An alternate strategy for the surveillance and control of dengue vector, *Aedes aegypti* using different ovitraps, has been attempted. A Real-Time IT based intelligent health informatics management system for collecting real-time malaria data through existing infrastructure was also developed. Studies related to factors affecting incidence of malaria in children and association between socio-economic factors and transmission of malaria in desert were also undertaken. Sensitivity of nicotinamide to pyrazinamide against *M. tuberculosis* was explored. An intervention method for preventing delay in diagnosis and treatment of new PTB cases has been propounded. Insecticidal properties of certain indigenous plants of arid region were explored against vector mosquitoes.

Study of magnitude and impact assessment of selected musculoskeletal disorders and Control of Rheumatic Fever and Rheumatic Heart Diseases among school children as Task Force projects of ICMR constituted the main component of the non-communicable diseases. Other projects on meta analysis of non-communicable diseases and dermatoglyphic patterns in diabetes mellitus patients further strengthened the NCD arena.

Impact assessment of consumption of electrolyte products, Assessment of Iodine deficiency disorder and intervention in school age children, besides NNMB pattern were the main studies carried-out by nutrition group. Nutritional status along with morbidity and mortality of neonates & infants was covered under MCH.

DMRC has fetched the 'Running Shield' of '*Nagar Rajbhasha Karyanvayan Samiti, Jodhpur'* permanently for the excellence in Rajbhasha Karyanvayan for last five years.

A team of Senior Journalists from Press Information Bureau, Varanasi visited DMRC in January, 2010 and appreciated various research and developmental activities of the Centre.

Dr. Bela Shah
Director-in-Charge

Contents

1.1 Establishment of H1N1 diagnostic Laboratory at DMRC-*Vinod Joshi, Bennet Angel, Himmat Singh, Anil Purohit and Manju Singhi*

Commencement: November, 2009 **Duration:** One Year **Status:** Ongoing

Objectives

1. To provide Diagnostic support to the suspected cases of H1N1 at Jodhpur hospitals and adjoining areas.

2. Study of epidemiological trends of swine flue cases.

3. Study of incidence of viral genes vis-à-vis ecotypes and clinical conditions of patients.

Progress of Work

On the request of the State Health Department, diagnostic support to the patients of Swine flu reported in different hospitals of Jodhpur from, Jodhpur, Pali, Barmer, Osiyan, Jaisalmer and other places, have been provided. Following steps have been taken as the progress and proper functioning of the laboratory:

- The existing laboratory has been modified into designated areas such as Sample aliquoting, RNA extraction, Reagent preparation, Positive Control loading and PCR.
- A financial support, under extra mural funds head has been sanctioned by the ICMR.
- The standard protocol as developed by CDC, Atlanta and endorsed by WHO has been adopted. The PI and research student have been trained at National Institute of Virology, Pune. The diagnostic kits are being supplied by NIV, Pune.
- The diagnostic work of H1N1 virus is being regularly done for about three months in DMRC.

Findings:

So far (Up to 18.01.10), 1247 swab samples have been tested for the molecular diagnosis of H1N1 virus in human suspected cases of Swine flu. Of these 463 (37.1 %), have been observed positive (Table 1). Month-wise distribution of cases, their origin and types have been shown in Tables 2-4.

Table 1. Consolidated status of Swine flu incidence in Jodhpur hospitals

Samples tested	+ve for H1N1 virus	% Positive
1247	463	37.1

Table 2. Month-wise incidence of Swine flu cases in cases reported in Jodhpur hospitals

Month	Samples tested	+ve for H1N1 virus	% Positive
November '09	262	103	39.3
December' 09	812	346	42.6
January'10	287	68	23.6

Table 3. Month-wise cases of Swine flu cases reported in Jodhpur hospitals according to their residence.

Month	Rural area			Urban area		
	Ex	+ve	%	Ex	+ve	%
November	41	15	36.5	221	88	39.8
December	275	125	45.4	403	164	40.6
January	118	36	30.5	161	33	20.4

Table 4. Month-wise cases of Swine flu cases reported in Jodhpur hospitals According to their types

Month	+Ve cases	Sw A	Sw H1	SwA+SwH1
November	103	60 (58.2 %)	30 (29.1 %)	13 (12.6 %)
December	346	203 (58.6%)	35 (10.1%)	108 (31.2 %)
January	68	43 (63.2%)	5 (7.4%)	20 (29.4 %)

1.2 Development and demonstration of a surveillance design for control of dengue vectors in Jodhpur-*Vinod Joshi, Himmat Singh, Bennet Angel, Anil Purohit, Rashmi Chauhan and Manju Singhi*

Commencement: October, 2006 **Duration:** Three Years **Status:** Concluded

Objectives

1. Development of a surveillance design for dengue vectors as applicable for an arid town, Jodhpur, Rajasthan.
2. Demonstration of monitoring and control of dengue vectors using area specific design and involving local health agency and community participation.
3. Detection of virus maintaining foci in nature as crucial etiological niche contributing to maintenance and transmission of disease in a setting.

Progress of Work

Dengue Action Plan developed for Jodhpur town (In consultation with CMHO)

A dengue prevention plan was developed and discussed with the Chief Medical & Health Officer, Jodhpur, for prevention/control of dengue and DHF in Jodhpur town. The stratification criteria developed by DMRC and the observations made on existing vectors and virus foci, as detected by the research team of DMRC, were used to demonstrate control of dengue in the town. The plan developed has been sketched below:

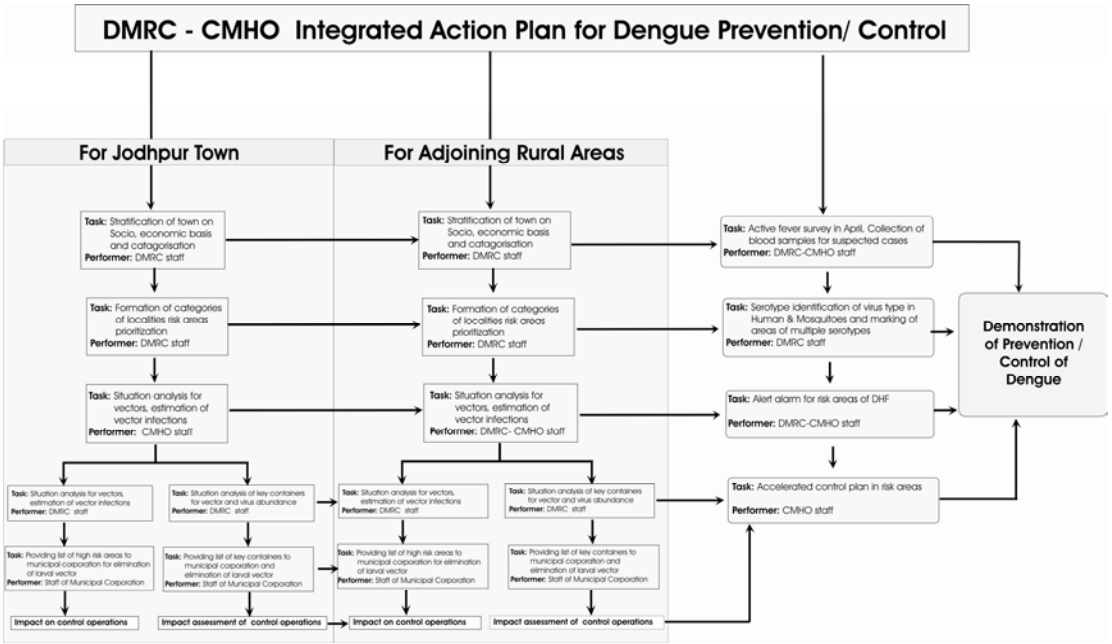

Figure 1. Sketch plan of demonstrative dengue control operations in Jodhpur

- Data collected from the Department of Micro Biology, SN Medical College, Jodhpur, showed high morbidity due to dengue in the eyars 2005 and 2006. The dengue control operations were lauched in February, 2008. In the year of control operations launched by DMRC-CMHO teams, a sharp fall in the dengue cases were recorded (Table-1).

- In 2009, no dengue case was reported from Jodhpur town.

- In control areas viz, Ajmer and Udaipur districts, as many as cases in Ajmer and cases in Udaipur districts were recorded during the year 2009.

Table 1. Observations on Impact assessment of dengue control operations in Jodhpur town vis-à-vis Control areas

Study Area	Year	Total tested	+ve for IgM	Percentage
Jodhpur City	2005	179	30	16.7
Jodhpur City	2006	923	221	23.9
Jodhpur City	2007	NA	NA	NA
Jodhpur City*	2008	594	14	2.3
Jodhpur City	2009	0	0	0.0
Control Areas				
Udaipur City	2009	120	100	83.3
Ajmer City	2009	36	31	86.1

* Control operations undertaken

Findings

- Based on the observations that dengue virus maintains itself during inter epidemic periods through vertical transmission across mosquito generations, the larval control measures taken during February-March, 2008, showed the remarkable results of reduction of cases 2008 in the Jodhpur town (Table-1).

- The dengue outbreaks have been reported from other areas of Rajasthan, viz; Ajmer and Udaipur where no control operations were undertaken.

- DMRC has demonstrated first dengue control operations where elimination of larvae during February-March has resulted to absence of disease during transmission season.

- The above study needs to be developed as "DMRC module of dengue control" as translational research, for whole of Rajasthan. The appropriate public health authorities need to be intimated for translation of DMRC results into public health actions.

1.3 Molecular characterization of extrinsic peri-urban dengue viruses contributing to cause DHF: A new concept for mechanism of DHF- *Vinod Joshi, Bennet Angel, Rashmi Chauhan and Manju Singhi*

Commencement: October, 2008 **Duration:** Two Years **Status:** Ongoing

Objectives

1. To confirm occurrence of Zoonotic cycle (ZC) of Dengue virus among tree hole breeding mosquitoes and inhabiting monkey populations. Study of its occurrence and epidemiological significance in desert settings of Rajasthan.

2. Study of role of Zoonotic cycle in maintaining and/or amplifying endemic cycle of dengue fever.

3. Study of possible role of Zoonotic cycle as factor causing Dengue Haemorrhagic fever.

4. To undertake experimental studies to confirm monkey – mosquito cycle of dengue in laboratory models of monkeys.

Progress of Work

Dengue viruses are the members of flaviviruses which are highly antigenic. Owing to this, net viremia available in human blood is around 10^5/ml of blood only. We hypothesize that with this stock of virus which is a challenged stock by immune system of humans, an infected human may not be able to provide sufficient unchallenged dengue antigen to a previously exposed case of DF to cause DHF. We believe that to cause DHF humans may be a dead end as they are in the case of another arbo-virus Japanese encephalitis. It is perhaps for this reason that in Delhi appearance of DEN-2 in 1996 and now appearance of DEN-4 in 2006 have not led to an epidemic of DHF. In Africa also with a gap of 10 years two strains of dengue infected the population, no DHF could be reported. We believe that for providing viraemically strong virus stock, a mosquito passaged virus in peri-urban foci, can only cause DHF. We thus need to type and sequence the virus of DHF patients and match sequences with available peri-urban viruses within mosquitoes to prove this hypothesis.

We have typed the *Aedes* mosquitoes of different species from selected urban, peri-urban and rural areas of Jodhpur (Table-1).

Table 1. Distribution of virus types in mosquitoes of urban peri-urban and rural areas of Jodhpur

Settings of Jodhpur	Species	Total tested	Total positive	% positive	Positive for DEN-1	% positive for DEN-1	Positive for DEN-2	% positive for DEN-2	Positive for DEN-3	% positive for DEN-3	Positive for DEN-4	% positive for DEN-4
Urban	*Aedes aegypti*	251	60	23.90	9	15.00	14	23.33	24	40.00	13	21.66
	Aedes vittatus	2	0	-	0	-	0	-	0	-	0	-
Peri-urban	*Aedes aegypti*	28	5	17.85	2	40.00	1	20.00	2	40.00	0	-
	Aedes vittatus	77	40	51.94	6	15.00	15	37.50	14	35.00	5	12.50
Rural	*Aedes aegypti*	20	2	10.00	1	50.00	0	-	1	50.00	0	-
	Aedes vittatus	72	5	6.94	3	60.00	2	40.00	0	-	0	-
Total	*Aedes aegypti*	299	67	22.40	12	17.91	15	22.38	27	40.29	13	19.40
	Aedes vittatus	151	45	29.80	9	20.00	17	37.77	14	31.11	5	11.11
Grand total		450	112	24.88	21	18.75	32	28.57	41	36.60	18	16.07

A. Findings

1. The mosquitoes belonging to species *Ae. vittatus* showed more in peri-urban localities. Den-2 and Den-3 strains were most common among infected samples of peri-urban area.

2. The PCR studies of infected mosquitoes and human patients of DHF, are in progress.

1.4 Study of pyrazinamide sensitivity of *M. tuberculosis* as compared to nicotinamide sensitivity- *M. L. Mathur and Aruna Solanki**

Commencement: June, 2009 **Duration:** Seven Months **Status:** Completed

Objective

1. To find out utility of results of direct method using nicotinamide against Wayne Method for pyrizinmide resistance in tuberculosis.

Progress of the work

Sensitivity of the proposed method using nicotinamide (0.1 mg/ml) in direct method was 50.0% as it detected only 5 resistant isolates out of ten resistant isolates as per Wayne method. Specificity of the proposed method using nicotinamide (0.1 mg/ml) in direct method was 85.7% as it detected 12 sensitive isolates out of 14 sensitive isolates as per Wayne method. Level of agreement between two methods was 70.8% (17/24).

This low performance of the new method using nicotinamide (0.1 mg/ml) in direct method was not acceptable hence the study was repeated using higher concentrations of nicotinamide from 0.1 mg/ml to 7.0 mg/ml. The results of this experiment are summarized in Table 1 below:-

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Table 1. Comparison between LJ slants with Nicotinamide and Dubos medium with PZA

Clinical isolate No.	Band appeared (sensitive to PZA)	Sensitive to Nicotinamide by direct method on LJ Medium
1	Y	Y
2	Y	Y
3	N	N
4	Y	Y
5	N	Y
6	Y	Y
7	N	Y
8	N	N
9	Y	N
10	Y	Y
11	N	Y
12	N	N
13	Y	Y
14	Y	Y
15	N	Y
16	N	N
17	Y	Y
18	Y	Y
19	N	N
20	Y	Y
21	N	Y
22	Y	Y
23	N	Y
H37Rv	Y	Y

Table 2. Distribution of 24 isolates of MTB as per their sensitivity by two methods

		Wyane Method (PZA)		
		Sensitive	**Resistant**	**Total**
Direct Method using Nicotinamide (0.1 mg/ml)	**Sensitive**	**12** (Cl. Isolate Nos. 1, 2, 4, 6, 10, 13, 14, 17, 18, 20, 22 and H37)	**5** (Cl. Isolate Nos. 5, 11, 15, 21, 23)	**17**
	Resistant	**2** (Cl. Isolate Nos.7 and 9)	**5** (Cl. Isolate Nos. 3, 8, 12, 16 and 19)	**7**
Total		**14**	**10**	**24**

Table 3. Comparison of results obtained about sensitivity of Mtb to various concentrations of nicotinamide and by Wyane Method

S. No.	Sample No	Concentration of Nicotinamide in LJ Medium in Direct Method						Concentrations of Nicotinamide giving results same as Wyane Method
		0.1 mg/ml	1.0 mg/ml	3.0 mg/ml	5.0 mg/ml	7.0 mg/ml	Wyane Method	
1.	CI 2	R	S	S	S	S	Sensitive	All except 0.1
2.	CI 8	S	R	R	R	R	Resistant	All except 0.1
3.	CI 9	S	R	S	S	R	Resistant	1.0 and 7.0
4.	CI 19	S	S	S	S	S	Sensitive	All
5.	CI 5	R	S	S	S	R	Resistant	0.1 and 7.0
6.	CI 24	S	S	S	S	S	Sensitive	All
7.	CI 25	R	S	S	S	S	Sensitive	All except 0.1
8.	CI 27	R	R	R	R	R	Resistant	All
9.	CI 29	R	R	R	S	S	Sensitive	5.0 and 7.0
10.	CI 100	R	S	S	S	S	Sensitive	All except 0.1
11.	CI 101	R	R	R	R	S	Sensitive	7.0

Results of sensitivity to 7.0 mg/ml nicotinamide was in agreement with results of Wyane method for all the eleven clinical isolates used in this experiment. This indicates possibility of using 7.0 mg/ml nicotinamide in place of pyrazinamide in sensitivity study of Mtb. A detailed study on larger sample size of 600 is therefore proposed to be carried out.

1.5 Evaluation of efficacy of different ovitraps for the surveillance and control of dengue vector, *Aedes aegypti* in Jodhpur city- *Karam V. Singh and S. K. Bansal*

Commencement: October, 2007 **Duration:** Three Years **Status:** Ongoing

Objectives

1. To evaluate the efficacy of ovitraps in determining the population dynamics of *Aedes aegypti* in surveillance programme

2. To determine the efficacy of different ovitraps containing either *Bti* or temephos in reducing the immature stages of *Ae. aegypti* and consequently to bring down vector population.

Progress of the work

For the field evaluation of different ovitraps Pratap Nagar locality of Jodhpur city has been selected on the basis of preliminary survey of the *Ae. aegypti* population and positivity of ovitraps. In this locality, three groups of 30 houses each have been considered for evaluation of lethal and non-lethal ovitraps. The non-lethal ovitraps contained only grass infusion (GI), whereas, the lethal ovitraps abate and *Bti* besides GI. The non-lethal ovitraps were evaluated in view to develop an alternate method for the surveillance of *Ae. aegypti*, whereas, the lethal ones were evaluated for controlling the vector population. The concentrations of abate and *Bti*, used in the experiments were 0.01 and 0.05 ppm respectively and these were the doses which caused 100 % mortality in the field populations of experimental areas.

The experiments conducted for the evaluation of GI ovitraps in experimental areas II and III during August and September months respectively revealed that the no. of larvae/pupae/adult positive houses are much more less than the no. of houses detected positive on the basis of positive ovitraps (Tables 1 & 2) and the difference was found statistically significant ($P=<0.001$). It indicates that for the surveillance of *Ae. aegypti* the ovitraps can be proved better than the conventional methods in the arid situations also. The experiments with GI ovitraps also revealed that these ovitraps are also responsible for reducing the *Ae. aegypti* population in the area, where GI ovitraps were used, which is reflected by the data collected on conventional parameters like larvae/pupae/adult positive houses, premises/density indices, container and Breteau indices (Table 1).

Table 1. Calculations of different Entomological Indices for Grass Infusion for August and September months, 2009

Entomological Indices	Time of Experiments			
	August Experiment Area-II		September Experiment Area-III	
	Pre-Exp.	Post-Exp.	Pre-Exp.	Post-Exp.
Total Houses Inspected	30	30	30	30
Total with immature *Ae. aegypti*	3	2	8	5
No. Water Holding Containers	308	308	333	333
Containers with immature	3	2	9	5
House Index	10	6.7	26.7	16.7
Container Index	0.9	0.6	2.7	1.5
Breteau Index	0.1	0.07	0.3	0.17
Larval Premise Index	10	6.7	23.3	16.7
Larval Density Index	0.5	0.5	3.2	1.5
Pupae Premise Index	3.3	3.3	16.7	3.3
Adult Premise Index	0.0	3.3	10.0	6.7

*Pre-exp. –Before Experiment; Post-exp. – After Experiment

Table 2. Calculations of different Entomological Ovitrap Indices for Grass Infusion for August and September months, 2009.

Entomological Ovitrap Indices	Different Areas	
	Expt.-II August	Expt.-I September
Houses Inspected	30.00	30.00
Ovitraps Installed	120.00	120.00
Houses with Positive Ovitraps	26.00	30.00
Positive Ovitraps with *Ae. aegypti* Eggs	53.00	83.00
No. Of *Ae. aegypti* Eggs	3424.00	5048.00
Ovitrap Positive Index	0.44	0.69
Egg Density Index	64.60	60.82

The experiments conducted for the evaluation of GI and Abate ovitraps in the experimental areas I & II in the months of August and September revealed that in case of these ovitraps also, like GI ovitraps, the no. of larvae/pupae/adult positive houses were less than the no. of houses detected positive on the basis of positive ovitraps (Tables 3 & 4) and the difference was found statistically significant (P=<0.001). The data collected during pre- and post-experimental conditions suggests that these ovitraps are mainly responsible for reducing the *Ae. aegypti* population in the area, where GI+Abate ovitraps were used, which is reflected by the data collected on conventional parameters like larvae/pupae/adult positive houses, premises/density indices, container and Breteau indices (Table 3).

Table 3. Calculation of different Entomological Indices for Abate during August and September months, 2009

Entomological Indices	Time of Experiments			
	August Experimental Area I		September Experimental Area II	
	Pre-Exp.*	Post-Exp.	Pre-Exp.	Post-Exp.
Total Houses Inspected	30.0	30.0	30.0	30.0
Total with immature *Ae. aegypti*	9.0	9.0	5.0	2.0
Total No. Containers	337.0	337.0	310.0	310.0
Containers with immature	9.0	9.0	6.0	2.0
House Index	30.0	30.0	16.7	6.7
Container Index	2.7	2.7	1.9	0.6
Breteau Index	0.3	0.3	0.2	0.07
Larval Premise Index	30.0	30	13.3	6.7
Pupae Premise Index	10.0	6.7	10.0	6.7
Adult Premise Index	20.0	10.0	6.7	3.3

*Pre-exp. –Before Experiment; Post-exp. – After Experiment

Table 4. Calculations of different Entomological Ovitrap Indices for Abate for August and September months, 2009

Entomological Ovitrap Indices	Different Areas	
	August	September
Total Houses Inspected	30.0	30.0
Total Ovitraps Installed	120.0	120.0
Total Houses with Positive Ovitraps	28.0	23.0
Total Positive Ovitraps with *Ae. aegypti* Eggs	63.0	45.0
Total No. Of *Ae. aegypti* Eggs	5041.0	2778.0
Ovitrap Positive Index	0.53	0.38
Egg Density Index	80.02	61.73

On the observations so far made it can be concluded that both types of ovitraps during their evaluation have revealed that they are the most suitable means for the surveillance of *Ae. aegypti* population in the arid situations and also help in reduction of vector populations in the areas of their use. It was also observed that the lethal ovitraps further help in reducing the vector densities as well as related entomological parameters/indices.

1.6 Evaluation of some plant species found in the arid region for the larvicidal/ repellant potential of their oils against the major mosquito vectors- *S. K. Bansal and Karam V. Singh*

Commencement: **June, 2009** Duration: **Three Years** Status: **New project**

Objectives

1. Determination of the larvicidal activity present in different parts of the plants after extraction in different organic solvents.
2. Extraction of oils present in different parts especially the fruits and seeds and evaluation of their larvicidal /repellant potential against mosquito vectors.
3. Identification of the active insecticidal constituents present in different parts and comparison of their larvicidal/repellant properties.

Progress of the Work

Susceptibility tests were carried out with larvae of three mosquito species viz. *Anopheles stephens*i, *Aedes aegypti* and *Culex quinquefasciatus*. For this purpose larvae of all the three mosquito species were collected from different areas of Jodhpur city and reared in the laboratory for further generations under controlled conditions of temperature (28±2°C) and humidity (75±5%). The different parts of the plant differ in their active constituents when extracted in different solvents. Samples of roots, leaves and fruits were chopped and shade dried between 30-40°C for 10-15 days. Dried plant material was powdered separately and dissolved in different solvents and stock solutions and duration and serial dilutions were made as per requirement. Third or early fourth instar larvae of these mosquito species were tested as per standard WHO method for determining the baseline data on their susceptibility status. Experiments were carried out in 500 ml beakers containing 249 ml of water by using 20-25 larvae of each mosquito species. Mortality was noted after 24 hr and corrected by using Abbott's formula. Average of four observations was taken and data subjected to log probit regression analysis.

Observations on the results of the larval susceptibility to methanol extracts of red fruits of *Withania somnifera* are given in Table 1&2. With all the mosquito species mortality was dose and duration dependent i.e. mortality increased with increase in concentration. 24 and 48 hr LC_{50} values along with their fiducial limits, regression equation and chi-square were calculated. 24 and 48 hr LC_{50} values as observed for *An. stephens*i, *Ae. aegypti* and *Cx. quinquefasciatus* were 94.7, 94.5 & 1013 and 57.2, 53.5 & 790.5 mg/l respectively. Comparative susceptibility calculated on the basis of 24 hr LC_{50} value showed that larvae of *An. stephens*i and *Ae. aegypti* were about 10.7 times more susceptible than larvae of *Cx. quinquefasciatus*.

Larval susceptibility tests were also carried out with aqueous extracts of red fruits of *W. somnifera* with larvae of all the three mosquito species and the results have been given in Table 3&4. 24 and 48 hr LC_{50} values as determined for *An. stephens*i, *Ae. aegypti* and *Cx. quinquefasciatus* were 320.0, 227.8 & 425.5 and 149.2, 137.2 & 201.1 mg/l respectively which revealed that larvae of *An. stephens*i and *Ae. aegypti* are more susceptible than larvae of *Cx. quinquefasciatus*.

Larval susceptibility tests were also carried out with methanol extracts of leaves of *W. somnifera* with larvae of all the three mosquito species and the results have been given in Table 5&6. 24 and 48 hr LC_{50} values as determined for *An. stephens*i, *Ae. aegypti* and *Cx. quinquefasciatus* were 700.9, 744.8 & 593.4 and 672.5, 703.0 & 564.6 mg/l respectively which revealed that tests carried out up to 500 mg/l with leaves extracts show only up to 25-40% mortality indicating that active larvicidal principle may be present only in the fruits of *W. somnifera*.

Experiments are also being carried out with methanol, acetone and petroleum ether extracts of roots, leaves and seeds & fruits of this plant species in order to see the comparative efficacy of different organic solvents on these mosquito species in this arid region.

Table 1. Efficacy of methanol extracts of *Withania somnifera* (Red fruits) on larvae of different mosquito vectors

Mosquito species/ Conc. (mg/l)	No. Exposed	No. Dead		% Exptl. Mortality		% Corrected Mortality	
		24 hr	48hr	24 hr	48hr	24 hr	48hr
An. stephensi							
Control	94	5	6	5.3	6.4	-	-
25	95	9	21	9.5	22.1	4.4	16.8
50	92	29	43	31.5	46.7	27.7	43.1
100	93	51	71	54.8	76.3	52.3	74.7
200	91	74	87	81.3	95.6	80.3	95.3
400	92	86	90	93.5	97.8	93.1	97.6
Ae. aegypti							
Control	60	4	4	6.7	6.7	-	-
25	60	7	20	11.7	33.3	5.4	28.5
50	60	16	34	26.7	56.7	21.4	53.6
100	60	35	52	58.3	86.7	55.3	85.7
200	60	51	55	85.0	91.7	83.9	91.1
400	60	56	60	93.3	100.0	92.8	100.0
Cx. quinquefasciatus							
Control	100	6	6	6.0	6.0	-	-
50	96	8	13	8.3	13.5	2.5	8.0
100	96	17	22	17.7	22.9	12.4	18.0
200	98	26	33	26.5	33.7	21.8	29.5
400	98	33	39	33.7	39.8	29.5	36.0
500	97	37	43	38.1	44.3	34.1	40.7

Table 2. Log probit regression analysis of the mortality data of larvae of different mosquito vectors to red fruit extracts of *Withania somnifera*

Mosquito Species	Regression Equation	Chi-Square (DF)	24 hr LC_{50} (95% C. limits)	48hr LC_{50} (95% C. limits)
Anopheles stephensi	Y=2.70x ± -0.33	1.06 (3)	94.7 (74.6-120.2)	57.2 (44.8-73.0)
Aedes aegypti	Y=2.82x ±-0.56	0.29 (3)	94.5 (70.3-127.1)	53.5 (41.3-69.3)
Culex quinquefasciatus	Y=1.23x ± 1.30	0.68 (3)	1013 (439.4-2333)	790.5 (353.6-1767)

Table 3. Efficacy of aqueous extracts of *Withania somnifera* (Red fruits) on larvae of different mosquito vectors

Mosquito species/ Conc. (mg/l)	No. Exposed	No. Dead		% Exptl. Mortality		% Corrected Mortality	
		24 hr	48hr	24 hr	48hr	24 hr	48hr
An. stephensi							
Control	99	5	8	5.1	8.1	-	-
50	97	14	26	14.4	26.8	9.8	20.3
100	97	26	42	26.8	43.3	22.9	38.3
200	98	40	53	40.8	54.1	37.6	50.1
400	96	44	56	45.8	58.3	42.9	54.6
500	94	48	59	51.1	62.8	48.5	59.5
Ae. aegypti							
Control	80	4	6	5.0	7.5	-	-
50	79	6	14	10.1	17.7	5.4	11.0
100	77	20	30	26.0	39.0	22.1	34.1
200	79	31	40	39.2	50.6	36.0	46.6
400	79	42	53	53.2	67.1	50.7	64.4
500	77	45	53	58.4	68.8	56.2	66.3
Cx. quinquefasciatus							
Control	100	4	5	4.0	5.0	-	-
50	99	17	26	17.2	26.3	17.2	22.4
100	97	35	45	36.1	46.4	36.1	43.6
200	99	41	56	41.4	56.6	41.4	54.3
400	100	48	62	48.0	62.0	48.0	60.0
500	98	49	64	50.0	65.3	50.0	63.5

Table 4. Log probit regression analysis of the mortality data of larvae of different mosquito vectors to aqueous extracts of red fruit of *Withania somnifera*

Mosquito Species	Regression Equation	Chi-Square (DF)	24 hr LC_{50} (95% C. limits)	48 hr LC_{50} (95% C. limits)
Anopheles stephensi	Y=0.99x ± 2.50	1.83 (3)	473.5 (306.8-628.5)	324.8 (184.1-564.7)
Aedes aegypti	Y=1.41x ± 1.68	2.46 (3)	406.4 (267.9-1033.3)	303.6 (113.2-735.6)
Culex quinquefasciatus	Y=0.87x ± 2.71	1.39 (3)	445.2 (214.0-845.9)	266.2 (129.0-313.4)

Table 5. Efficacy of methanol extracts of *Withania somnifera* (leaves) on larvae of different mosquito vectors

Mosquito species/ Conc. (mg/l)	No. Exposed	No. Dead		% Exptl. Mortality		% Corrected Mortality	
		24 hr	48hr	24 hr	48hr	24 hr	48hr
An. stephensi							
Control	100	1	2	1.0	2.0	-	-
50	99	5	10	5.1	10.1	5.1	10.1
100	99	10	15	10.1	15.1	10.1	15.1
200	100	15	20	15.0	20.0	15.0	20.0
400	98	25	30	25.5	30.6	25.5	30.6
500	97	30	35	30.9	36.1	30.9	36.1
Ae. aegypti							
Control	80	0	0	0.0	0.0	-	-
50	80	0	4	0.0	5.0	0.0	5.0
100	80	4	8	5.0	10.0	5.0	10.0
200	80	8	12	10.0	15.0	10.0	15.0
400	79	12	16	15.2	20.3	15.2	20.3
500	80	20	24	25.0	30.0	25.0	30.0
Cx. quinquefasciatus							
Control	80	2	4	2.5	5.0	-	-
50	79	2	3	2.5	3.8	2.5	-
100	80	6	11	7.5	13.8	7.5	9.3
200	80	18	21	22.5	26.3	22.5	22.4
400	80	24	28	30.0	35.0	30.0	31.6
500	78	29	32	37.2	41.0	37.2	37.9

Table 6. Log probit regression analysis of the mortality data of larvae of different mosquito vectors to methanol extracts of leaves of *Withania somnifera*

Mosquito Species	Regression Equation	Chi-Square (DF)	24 hr LC_{50} (95% C. limits)	48 hr LC_{50} (95% C. limits)
Anopheles stephensi	Y=0.002x ± -1.57	1.38 (3)	700.9 (584.6-928.6)	672.5 (550.7-926.9)
Aedes aegypti	Y=0.003x ± -2.06	5.43 (3)	744.8 (544.6-1987.3)	703.0 (627.2-1090.8)
Culex quinquefasciatus	Y=0.003x ± -1.60	9.09 (3)	593.4 (424.4-1892.4)	564.6 (395.2-3057.1)

1.7 A study of factors affecting incidence of malaria in children in desert part of Rajasthan *S. P. Yadav and R. K. Kalundha*

Commencement: September, 2008 **Duration**: Two Years **Status**: On going

Objectives

1. To know the current status of malaria in children in desert part of Rajasthan.
2. To know the factors affecting incidence of malaria in children

Progress of the work

Jaisalmer district was having highest API among all the 12 desert districts. Among the PHCs of the district, Ramgargh PHC was on top as for as API concern. Therefore, villages of Ramgargh PHC in Jaisalmer district were selected for the study. During the report period investigations were extended in the three more villages. Thus the data of 15 villages namely Hamira, Tiban Sar, Chandane ki dhani, Raghawa, Raimala, Seowa, Tejpala, Nagga, Bada, Sultana, Mokal, Sanu, Habur, Kakab and Lanela was pooled. Fever was used as proxy for malaria.

In the studied villages, 1696 households could cover with positive malaria cases during the report period. Total population of the surveyed households was 10371. The positive cases of malaria were 1563. About twenty three per cent 356 (22.8%) cases were children less than 15 years of age (Table-1).

Table 1. Distribution of malaria cases in the children according to age and sex

Age in years	Male		Female		Total	
	No.	%	No.	%	No.	%
0-1	30	18.2	31	16.2	61	17.1
1-5	86	52.1	102	53.4	188	52.8
5-10	28	17.0	34	17.8	62	17.4
10-15	21	12.7	24	12.6	45	12.7
Total	**165**	**100.0**	**191**	**100.0**	**356**	**100.0**

Table 2 depicts the current situation of malaria in infants in the rural population of desert. These findings are the indication of answer of the question (Ann. Rep. DMRC 2006-07) for the problem of malaria in infants. It is proven that the data was inadequate so that it was unable to present the true picture of the universe.

Table 2. Distribution of malaria cases in the infants according to age and sex

Age in months	Male		Female		Total	
	No.	%	No.	%	No.	%
0- 3 months	2	6.7	4	11.4	6	9.8
3-6 months	6	20.0	5	14.3	11	18.1
6-9 months	10	33.3	9	25.7	19	31.1
9-12 months	12	40.0	3	8.6	25	41.0
Total	**30**	**100.0**	**35**	**100.0**	**61**	**100.0**

Inference

Malaria is alarming serious children health problem in desert region of Rajasthan. Children less than five years of age are more suffers. More emphasis needs to be given on children malaria control in the region.

1.8 A study of association between socio-economic factors and transmission of malaria in desert- *S. P. Yadav, A. K. Dixit and R. K. Kalundha*

Commencement: October, 2007 **Duration:** Two years **Status:** Ongoing

Objectives

1. To study the socio-economic factors associated with malaria transmission in desert and to find out the social solutions to control desert malaria.

Progress of the work

Low Socio-Economic Group (LSEG) and High Socio-Economic Group (HSEG) both were comparable with socio-demographic characteristics such as age, sex, education, occupation, religion and castes (Table-1). LSEG has the API all most 2 for the 6 continuative years from 2002-2007 which is alarming situation and nearly 3 times more than the HSEG. Children are more affected (Table 2). These pulmonary observations indicate statistically significant effect of malaria on low socio-economic group of the community. LSEG was less aware about causation of malaria and its signs and symptoms as compare to HSEG (Table 3 & 4). LSEG was less using the preventive measures to prevent the mosquito bite as compared to HSEG. This has direct relation with the level of knowledge about the disease and its preventive measures and affordability.

Table1. Socio-demographic characteristics of respondents in two different groups

Characteristics		LSEG*		HSEG*	
		No.	%	No.	%
Age (Yrs)	<20	38	6.2	41	6.7
	20-29	211	36.0	209	34.3
	30-39	266	43.7	270	44.3
	40-49	59	9.7	72	11.8
	>50	27	4.4	17	2.8
Sex	Male	453	74.4	432	70.9
	Female	156	25.6	177	29.1
Education	Illiterate	283	46.5	215	35.3
	Literate	326	53.5	391	64.2
Religion	Hindus	423	69.4	427	70.1
	Other than Hindus	186	30.5	182	29.9
Caste	General Caste	176	41.6	182	42.6
	Other Backward Caste	150	35.5	149	34.9
	Schedule Caste/Schedule Tribe	97	22.9	92	21.5
Occupation	Agriculture/Animal keeping	530	87.0	513	84.2
	Other than Agriculture/Animal keeping	79	13.0	96	15.8

*LSEG- Low Socio-Economic Group *HSEG- High Socio-Economic Group

Table2. Distribution of malaria cases according to age in two different socio-economic groups

Age group (Yrs)	LSEG		HSEG		Total	
	No.	%	No.	%	No.	%
<15	242	21.8	72	21.6	314	21.8
>15	866	78.2	261	78.4	1127	78.2
Total	**1108**	**100.0**	**333**	**100.0**	**1441**	**100.0**

Table 3. Level of knowledge about causation of malaria among respondents

Causation	LSEG		HSEG	
	No.	%	No.	%
Malaria parasite	102	16.7	378	62.1
Personal hygiene	157	25.8	66	10.8
Impure water and edible items	193	31.7	54	8.9
Changing environment	78	12.8	75	12.3
Multiple cause	49	8.0	27	4.4
Don't know	30	4.9	9	1.5
Total	609	100.0	609	100.0

Table 4. Level of knowledge about signs and symptoms of malaria among respondents

Signs and Symptoms	LSEG		HSEG	
	No.	%	No.	%
High fever with chill or sweating on alternate day	191	31.4	396	65.0
Fever with giddiness, vomiting and reddish on the face	256	42.0	112	18.4
Multiple signs and symptoms	103	16.9	71	11.7
Others	59	9.7	30	4.9
Total	609	100.0	609	100.0

1.9 A study of the suitable interventional methods for early detection of new PTB cases and bringing them for diagnosis and treatment under DOTS – *S. P. Yadav and R. K. Kalundha*

Commencement: November, 2007 **Duration:** Three years **Status:** Ongoing

Objectives

1. To study of the suitable interventional methods for early detection of new PTB cases and bringing them for diagnosis and treatment under DOTS.

2. To study cost effectiveness and acceptability of such strategy in the community.

Progress of the work

To find out the suitable interventional methods for the early detection of new PTB cases, one village, Gudelai was selected for the study and another village Deriabastawa was also selected for the control. The population of village namely Gudelai was 8230 and 8350 of the Deriabastawa respectively. The pre-tested schedules were used for collecting information on family composition, respiratory symptoms, KAP about disease, health seeking behaviour and so on of those who had chest symptomatic complaint. Chest symptomatic was used as a proxy of PTB. Chest symptomatic criteria was the basis of the Cough, Sputum, Breathlessness, Wheeze, Blood in sputum, Chest pain and Any or a combination of these. 600 symptomatic cases were registered from both the type of villages (300 from study village and 300 from the control village). Four cured PTB cases as the volunteers (2 volunteers in study village + 2 volunteers in control village) were taken for the study purposes. Head of the household was the informant for the chest symptomatic cases in the family. The chest symptomatic cases were interviewed separately. Three repeat visits were made to contact those who were not available on first or second visit for registration in both groups of chest symptomatic cases before start the intervention. Intervention was given by the volunteers in the study village only. Follow up was done of the registered cases in the both the type of the village. Based on data collected some observations and inferences were made.

Observations and Inferences

After over the registration in the month of September, 2009 intervention was started from the month of October, 09 and the impact assessment was started from the month of November, 09 and it is depicted in the table 1, 2 and 3 during the reporting period. After over the registration in the month of September, 2009 intervention was started from the month of October, 09 and the impact assessment was started from the month of November, 09 and it is depicted in the table 1,2 and 3 during the reporting period.

Table 1. Impact of intervention on reporting for diagnosis and treatment

Month	Study Group (n=300)		Control Group (n=300)	
	N	%	N	%
November	92	30.7	87	29.0
December	61	20.3	39	13.0
January	43	14.3	25	8.3
February	32	10.7	20	6.7
March	17	5.7	10	3.3
Total	245	81.7	171	57.0

Table 2. Status of sputum

Sputum Status	Study Group		Control Group	
	N	%	N	%
+ ve	51	20.8	29	17.0
- ve	194	79.2	142	83.0
Total	245	100.0	171	100.0

Table 3. Type of PTB cases

Type of cases	Study Group		Control Group	
	N	%	N	%
Cat. I	44	86.3	10	34.5
Cat. III	4	7.8	8	27.6
Relapse Case	2	3.9	6	20.7
Reoccurrence Case	1	2.0	5	17.2
Total	51	100.0	29	100.0

The results of the study revealed that the interventional method used in the study was found useful for the purpose. The method will not only reduce the suffering of the disease but also the chances of subsequent infections and in turn decrease the occurrence of new cases and the burden of the DOTS programme. Further the socio-economic losses of the family will be also minimized. Total cost per person may be Rs. 36/= by this intervention method which is very nominal as compared to the cost of the treatment. In the study villages Rashtriy Garanti Rojgar Yojana was in existence and volunteers were gladly ready to work on the same rate by giving Rs. 100/= per day as honorarium to the each volunteer.

1.10 Study of treatment seeking behaviour for malaria and its management in pre-school children in rural part of desert, Rajasthan, India- *S. P. Yadav, A. K. Dixit and R. K. Kalundha*

Commencement: November, 2009 **Duration:** Three years **Status:** Ongoing

Objectives

1. To identify different community belief and practices on the basis of which fever could be recognized and classified

2. To explore factors involved in selection of different treatment options in great Indian Thar Desert.

3. To compare with other studies in different parts of the country as well as world.

Progress of the work

Interview and observation techniques were used for data collection from mothers who have utilized health facility for their febrile children in 15 selected villages namely Seowa, Raghwa, Raimala, Sultana, Nagga, Bada, Mokal, Lanera, Habur, Kakab, Hamira, Tibansar, Chandane ki Dhani, Markh ka Ganv and Mohammad Khan ki Dhani and utilized health facility within 90 days. Focus Group Discussions (FGDs) were also held in the selected villages by the investigators with the mothers of febrile children. All the guide lines for FGDs were followed to control quality of data. The DILO (a day in the life of villagers) methodology was also adopted. Recall memory method was used for collecting the information from the respondents by carrying out door to door survey. FGDs were also held on some events such as marriage, birth day and so on in the study villages. Collected data from the field was computed in the computer for the appropriate analysis and interpretation. Quantitative data was processed and analyzed using SPSS computer software. Appropriate test were used to test for significance (x^2, t-test) in results for drawing the conclusions of the study. In each village before starting the study, rapports were established with the community leaders, head of the household, village official such as teacher, ward panch, Sarpanch, Patwari and the informants. The aims and objectives of the study were explained to them for their cooperation and participation in the study without any doubt.

Socio-demographic characteristics of the subjects

Majority of mothers (65.9%) were Hindus, 29.6% of whom belonged to Scheduled Castes & Scheduled Tribes (SC & ST) and 32.3% were Other Backward Caste (OBC). About three fourth (76.8%) of mothers were in age group of 20-39 year. More than half (51.8%) of the mothers were illiterate while 23.8% had primary or higher education. About eighty eight per cent (88.4%) subjects belonged to low and moderate socio-economic class (Table 1).

Table 1. Demographic characteristic of the respondents

Variables	Number	Percentage (%)
Age		
<20	3	1.8
20-29	71	43.3
30-39	55	33.5
40-49	35	21.3
Education		
Illiterate	85	51.8
Literate	40	24.4
Primary	21	12.8
Middle	8	4.9
Secondary	7	4.3
Senior Secondary and above	3	1.8
Occupation		
House wife	64	39.0
Agricultural Labour	43	26.2
Labour	39	23.8
Service	11	6.7
Others	7	4.3
Religion		
Hindus	108	65.9
Non-Hindus	56	34.1
Caste		
GC	39	36.1
OBC	37	34.3
SC/ST	32	29.6
Mothers according to Socio- Economic status		
Low	92	56.1
Middle	53	32.3
High	19	11.6
Mothers according to children (13-59 months)		
One child	12	7.3
More than one child	152	92.7
Children according to Age (months)		
<13	26	8.0
13-23	49	14.9
24-35	61	18.4
36-47	88	26.8
48-59	105	31.9

Identification, classification, symptoms of malaria and action taken for febrile child:
Mothers were observing illness of child by his or her dull appearance and inactiveness in routine activities and they were calling "TAV" to the fever in their local dialect. They explained TAV is *raised temperature of body (hot body)* as compare to normal. They confirmed fever by touching body of febrile child and classified as low, moderate and high. About seventy per cent 115 (70.1%) mothers confirmed fever by touching body and felt 'hot' and nearly nineteen per cent, 22 (19.1%) of mothers confirmed 'hot body' and other symptoms such as headache, restlessness, diarrhea, rash on the body as symptoms of the disease. Few identified fever or fever with other signs and symptoms as a common cause followed by cold and cough or chest infection. Besides in depth discussions they expressed fever is dangerous if it is not cured, it leads further complications in the body and ultimately death in focused group discussions of mothers. Without naming the disease, they explained signs and symptoms of malaria *i e* loss of appetite, vomiting, spleen enlargement, shivering and so on. About fifty five per cent (54.9%) mothers sought advice from sources other than health facilities initially; of those (62.3%) have given drug to their children.

Table 2. Mothers response to fever (n=164 unless indicated)

Variables	Number	Percentage
Mothers recognized fever as "hot body" or "hot body with others symptoms or signs"	115	70.1
Mothers defined malaria as "fever or fever with other symptoms or signs"	137	83.5
Mothers blamed malaria for the child current fever	65	39.6
Mothers believed that the common cause of fever in the area is malaria	113	68.9
Mothers seeking advice from any source before going to health facilities	90	54.9
Mothers give the child any sort of care before going to health facilities	61	37.2
The care given to the child was drugs (n=61)	38	62.3
Village is the source of the care given (n=61)	34	55.7
Duration (in hours) of response from the initiation of fever (Mean ± SD)	70.3 ± 40.1	
Mothers now in this facility because child condition deteriorated	126	76.8
Decision for going to health facility was the decision of :		
Mother	72	43.9
Father	25	15.2
Mother/father	55	33.5
Others	9	5.5

The mean duration was 72.3 hours between the time periods from child suffered from fiver and attended a health facility. Mothers at last utilized health facility due to non-response of the other sources of treatment of febrile child. They preferred to utilize nearest health facility when ever child was very serious. Majority of the mothers traveled more than 5 km for the nearest health facility and more than ninety per cent of which used hired/owned transport to reach the nearest

health facility. Jeep/Tractor/Camel Cart were the main transport used by the mothers. Nearly three fourth mothers were living in Dhanies (Dhani is hamlet away from the main village and situated mostly in farms) and 87.5% were connected with kacha road with the main village (Table 2).

Available options for treatment of children: Table 3 shows availability, preferred and actual practice related to treatment of fever in children in desert. Use of traditional medicine based on the knowledge and experiences of mothers or elderly women of family or experienced and practicing women with in their community, consulting health workers at Sub-Centre/ Primary Health Centre, use of herbs and self treatment were available options for selection of health care for the febrile children. The net out come of Focus Group Discussion of mothers, it was noted that, it was not necessary to follow the same pattern in all the cases. It was found that some ill people think about consulting health workers such as Doctor/ MPW/ANM at the health facilities or at health workers home or if the patient couldn't move they ask the health worker to visit him at home. During adverse weather such as extremes of summer, one of the patient's relatives visits the health worker at home and describes the patient symptoms and accordingly the drug is given to this relative for the patient. In some cases if the child did't recover they changed the health personal.

Table 3. preferred and actual practice related to treatment of febrile children

Variables	**Number**	**Percentage**
Mothers **prefer** to seek advise from:		
Health worker such as Doctor/MPW/ANM	123	75.0
Grandmothers, grandfathers, neighbours, community	11	6.7
Village volunteers	7	4.3
Others	5	3.1
Mothers **actually** seek advise for this event from:		
Health workers such as Doctor/MPW/ANM	130	79.3
Grandmothers, grandfathers, neighbours, community	13	7.9
Village volunteers	2	1.2
Others	4	2.4

Practices to treat febrile children in desert: It was the common practice among the study mothers to treat febrile child herself at home. The justifications were given by the mothers for health practices with full confident and beliefs that they were able to get rid off suffering from fever within or before the time period of reaching health facility, non availability of public transport from the dhanies of febrile child to the health facilities, it was costly for them to use the transport on the individual hire basis, some mothers expressed non availability of transport facility in and around their dhanies and very few mothers told that health personals were not available at health facility at the time as per urgency of the febrile child due to off time of the health staff at the place. In some cases mothers were not sure about the febrile child suffered from malaria and they consulted the elderly people in the community, if they agreed that the

sickness of the child was malaria they administered antimalarial drugs. They used chloroquine, aspirin and paracetamol to treat the child. These medicines were purchased from the nearest medical shops. The antimalarial dosages were given based on the experience of the mothers and conditions of the child.

Reasons for selection of different treatment options: The health seeking behaviour of the children was based on the level of educational status of the parents. There was significant association between father education and consulting health workers within 24 hours of the onset of fever ($p<0.05$). Further more in detailed investigations average delay period was reported nearly 10 hours for consulting health workers in case both the parents were educated as compared to one. In most of cases it was based on severity of the child illness. If the child was suffering with high fever, repeated vomiting, unable to stand or walk, unable to suck mother's milk, stopped eating, loss of consciousness, yellowish sclera, severe diarrhoea, and deteriorating conditions of the febrile child compelled to take child to the health facility. In this situation they felt helpless themselves and wanted to consult health workers without delay. But at the same time if it happens during the night they wait till morning. Severity of illness and situational compulsion did not show significant association with the education of febrile child parents.

Certain foods avoided and preferred during illness: Majority of the mothers restricted dietary intake of febrile child during illness and about half (52.4%) of the mothers avoided to give fried foods but at the same time they preferred to give 'rabadi' (local preparation made from millet flour and yogurt), 'Khichadi' (a semi-liquid preparation from the mixture of rice and pulses) and 'mateera' (fruits of a cucurbitaceous plant akin to water melon) to their febrile children. Almost all the mothers gave milk to febrile children during their illness and as well as after cure for the period of one to two weeks for recovery of health.

1.11 Studies on larvicidal ingredients of *Calotropis procera* and its possible role in blocking intracellular replication of dengue virus in mosquitoes-

Manju Singhi and Vinod Joshi

Commencement – August 2007 **Duration-** Two years **Status-**On going

Objectives

1. Study of possible impact of latex on intracellular structure and bio chemical profile of *Ae. aegypti* treated with larvicidal compound and dengue virus

2. Development of plant based anti-larval and anti viral compound.

Progress of the work

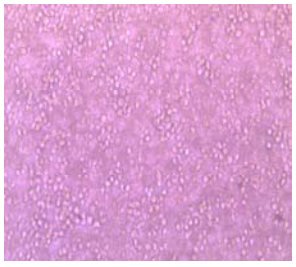
Exclusion of harmful effects of latex to mouse cell lines

As per the recommendation of last SAC meeting, Mouse cell lines (L_9 29) were acquired from NCSS , Pune and maintained in the Dulbeuos modification of Minimum essential medium(Egle) in the laboratory. Sub cultures were obtained from the primary cell cultures.

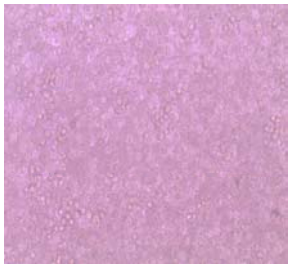
These cell lines were exposed to sub-lethal doses of water and methanol extracted latex of *Calotropis procera* to test possible toxicity effect of latex over cells. After 72 hours of exposure, cell lines were observed under inverted microscopes.

No effect was observed on morphology as well on viability of cell lines treated with latex when compared with controlled set of cell lines. Further anti- viral assays will be in progress.

Photomicrograph of L9 29 mouse cell line treated with aqueous and methanol extracts of latex.



Water extracted latex



Methanol extracted latex

Histo-Chemical studies for studying intracellular effects of sub-lethal doses of latex on mid gut cells.

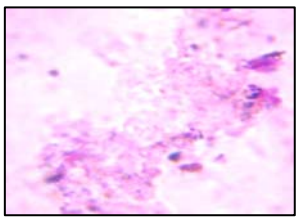
- 3 rd instar larvae of field collected *Aedes aegypti* were exposed to the sub - lethal doses of latex of *Calotropis procera* at room temperature.

- The exposed larvae were allowed to develop into adult mosquitoes. Mid gut of adult mosquitoes reared from larval stock exposed to sub-lethal doses of latex were dissected out, processed for dehydration series and fixed into wax blocks.

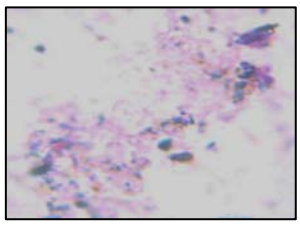
- The serial sections of mosquito mid guts of 10 microns were obtained employing ultra Microtome.

- The tissue sections were processed for reverse dehydration series and stained.

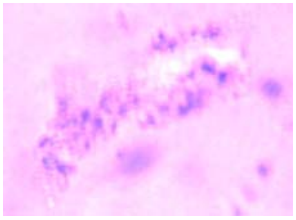
Studies for cellular structure of mid gut –



Control



Methanol extracted



Water extracted

Our earlier work on proteomic analysis of latex of *Calotropis procera* and bio- chemical studies of trypsin inhibition in larvae treated with latex have shown the use of proteolytic enzymes of latex as possible anti-viral protein for inhibition of viral replication in mosquitoes. Based on these lines a new proposal entitled "Characterization, isolation and purification of trypsin inhibitory enzymes as possible anti-viral protein from latex of *Calotropis procera* for inhibition of viral replication in mosquitoes has been developed and submitted to National Medicinal Plant Board, Department of Ayush , Ministry of Health & Family Welfare, Government of India for extramural funding.

1.12 Development of a Real-Time IT based intelligent health informatics management system in Desert with special reference to malaria - *Manjeet Singh Chalga and A. K. Dixit*

Commencement : April 2009 **Duration : Two Years** **Status** : Ongoing

Collaborator : Joint Director, Health & Medical Department, Jodhpur Zone

Objectives

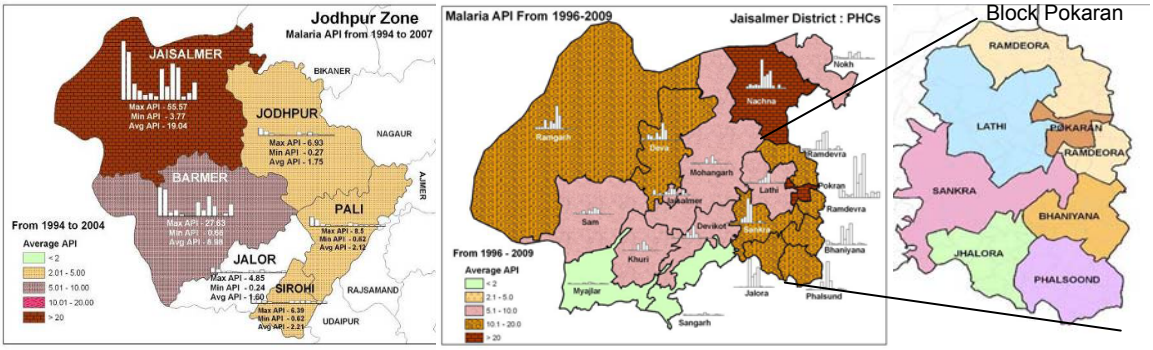
1. To develop a Real-Time IT based intelligent health information management system (RT-HIMS) for collecting real-time malaria data through existing infrastructure
2. To organize the RT-HIMS system to integrate real-time parameters with baseline parameters and environmental parameters and produce an interactive report.
3. To compare the developed system in terms of cost effectiveness, feasibility, acceptability and performance over the present information system

Progress of Work

Information technology is increasingly being applied in all dimensions of health sectors. Even after many advances in Information Technologies, manual reports and registers are the primary method of data collection in health sector in India. The health data is being generated at the local level, compiled and sent to national level successively through next higher administrative unit. The present system and various studies intends to computerize the whole health information system to improve the reporting system. But this computerization needs hardware, software, UPS, networking, skilled workers etc., thus having substantial financial implications. Therefore, there is immense need of an easy to implement, efficient information management system by choosing local available Information and Communication Techniques and solutions. The present study envisages a Real-Time IT based intelligent health information management system (RT-HIMS) with its all time ready analysis and reporting system.

Study Area: Malaria API data from 1994 to 2007 at district level in Jodhpur zone shows that Jaiselmer is facing maximum burden of malaria disease. In Jaiselmer district, malaria API data from 1994 to 2009 at PHC level shows that the population of Block Pokaran is at highest risk. Thus, block Pokaran in Jaiselmer district has been selected for the study on the basis of prepondance of malaria.

Under Block Pokaran there are two CHCs : Pokaran & Sankra and six PHCs : Bhaniyana, Ramdeora, Loharki, Lathi, Jalora & Phalsoond and 181 villages. Only one computer is working at CHC Pokaran.



Under existing System : Flow of Health Information (Malaria)

The current reporting system in block pokharan in Jaisalmer

Health workers at village level

↓

Sub Centre

↓ Reporting weekly the manual report

PHC/ Hospital

↓ Reporting weekly the manual report

Block PHC

↓ Reporting weekly the computer generated manual report

District HQ

↓ Reporting weekly the computer generated manual report

Zone

↓ Reporting weekly the computer generated manual report

State Health Authority

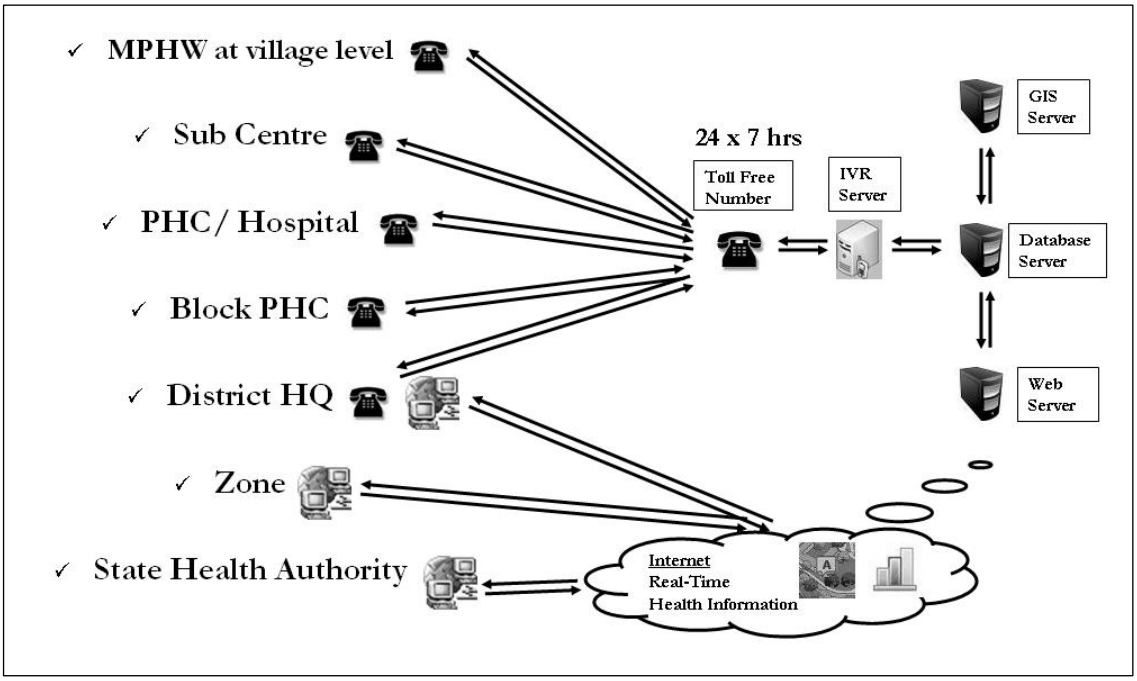
The present reporting system in Block Pokaran indicates that information flow is a manual process and it moves weekly from one health unit to other health unit.

RT-HIMS Server

The RT-HIMS Server is being developed by combining IVR Server(Interactive Voice Responce Server), Database server, GIS Server and Web Server. In India at present the IVR technology is being used for receiving complaints and marketing surveys but it has never been used for health data collection. In RT-HIMS server, the IVR Server is programmed to interact with health workers and to store the received information into Database server. The analyzing system of

RT-HIMS server is being programmed to integrate real-time parameters from IVR server with baseline parameters from Database server and with environmental parameters from GIS server. The reporting system of RT-HIMS server is being programmed to produce interactive reports on the web site through integrated Web server and interactive response through IVR server.

After full fledge implementation of the RT-HIMS Server, the present flow of the information will transform into a system as shown below.



Data Collection Method

1. Data Collection through IVR Server

   When a health unit dials out the telephone number connected to IVR Server, the IVR server is programmed to ask the questions to the caller and accordingly stores the answer received from the caller into following three log books.

   a) First log book is programmed to store the date, time of call and the telephone no. of all the callers.

   b) Second log book is programmed to store each and every interaction of IVR server with the caller during interactive session.

   c) Third log book is programmed to store processed information along with date, time of call, telephone no. into relevant log files.

2. Data transfer from IVR log files to Database server

   The RT-HIMS server is programmed to automatically transfer the processed information from IVR third log file into Database server. This information is primarily stored into database named as unchecked database.

3. Data Consistency Check, Modification and Cleaning

   The web pages in the integrated web server are programmed to facilitate user to check and edit the information stored in unchecked database from anywhere through internet. The RT-HIMS server is programmed to automatically identify some predefined consistency errors. The user can rectify the minor correction and if needed, can ask the caller for the correct information. The user manually sends the correct information into checked database and other information into recycle database.

Implementation of the RT-HIMS Server

Since the procurement of the softwares/ equipments required for full fledge implementation of the project is under process, RT-HIMS server has been developed using available trial version of softwares & compatible small devices.

To design the program of the RT-HIMS server, the secondary data from CHC-Pokaran was collected for the period Jan, 2009 to Oct, 2009. This secondary data contains Daily Slide Collection, Test Reports and Detail of the positive cases of CHC-Pokaran. Then each CHC, PHC and villages of Block Pokaran are given unique codes.

Technical training was imparted to the nominated health workers at Block Pokaran on 19th of Nov, 2009. Detail & Working of the project, method of interacting and providing information to RT-HIMS through telephone was explained to the participants. During training it is observed that PHC Loharki, Lathi, Jalora and Phalsoond collect slides and sends them for examination in other PHCs.

Accordingly interactive questionnaire programmed in the RT-HIMS server are re-designed and incorporated into the IVR server and Database server. From 1st December 2009, the trained Lab Technicians of PHCs of Block Pokaran started providing their malaria daily reports to RT-HIMS server through telephone. RT-HIMS server is successfully recording these real-time reports.

Real-Time interaction problems are examined in the IVR second log file. The Real-time interaction errors raised due to callers fault are minimized by explaining the caller telephonically. The Real-time interaction errors raised due to RT-HIMS fault are solved by reprogramming the RT-HIMS server. The callers making more mistakes are analysed through IVR second log file and agenda for the second technical training designed accordingly.

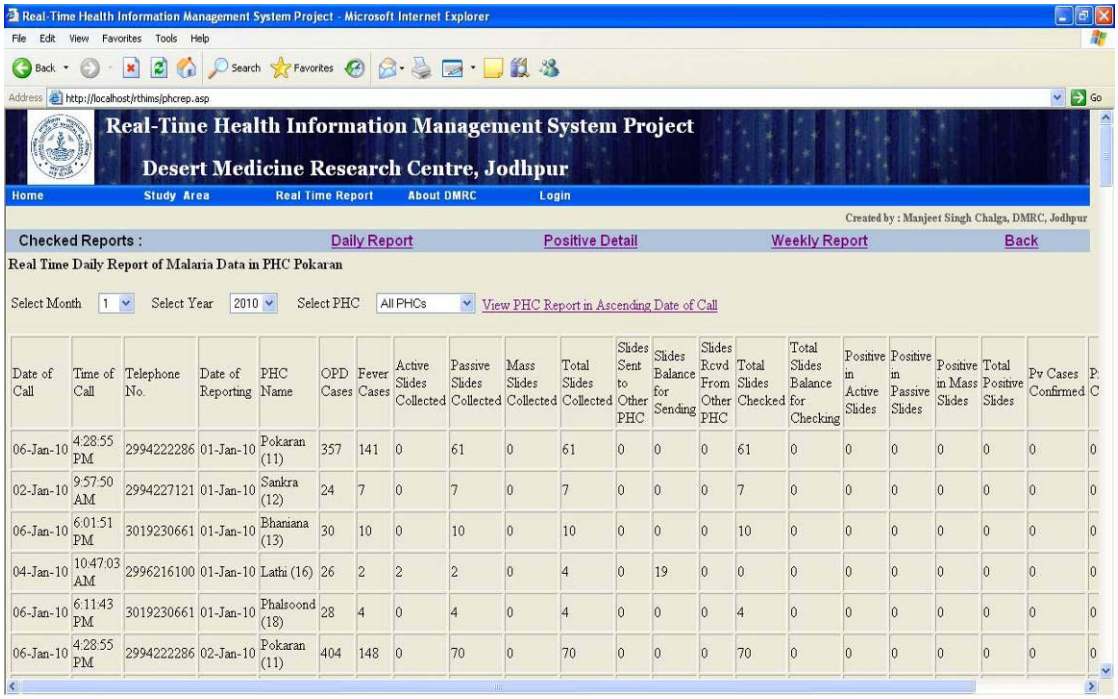
Second Interactive training was organized again at Block Pokaran on 21st of January, 2010. During the training the progress of the project and the data storage technique being used in the project were discussed. The errors made by the callers and technical limitations of the RT-HIMS server are discussed and solution to problems are provided to the health workers. Toll Free No. is launched.

BCMO, Pokaran asked to add the ANM report to RT-HIMS server as ANMs play an important role in the identification, treatment and control of the malaria. BCMO, Pokaran also asked for the full fledge implementation of the RT-HIMS server.

After data consistency check, Real-Time information is made available on website, which is being browsed by health authorities. Website has been programmed and launched over the static IP available with the Centre. The information available on website is follows.

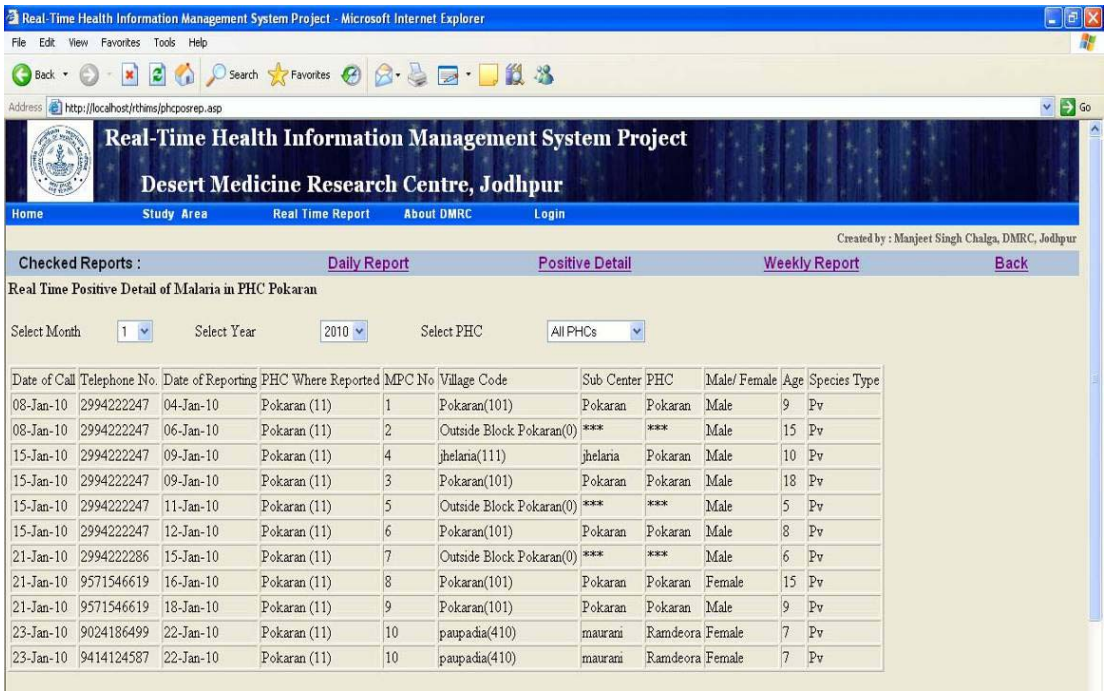
- ✓ Project and Study Area Detail
- ✓ Daily Report showing OPD Cases, Fever cases, Slide Collection and their testing report etc. as per MF-8 register available with CHCs/ PHCs.
- ✓ Daily Positive Case Detail showing MPC No.(Unique No.), Village, Sex, Age etc. of the patient and the species of malaria.
- ✓ Unchecked and Checked reports available as PHC wise, Month/ Year wise.
- ✓ Customized graphical report having option to compare two variables.
- ✓ Weekly Reports

Fig : Website showing Daily Report



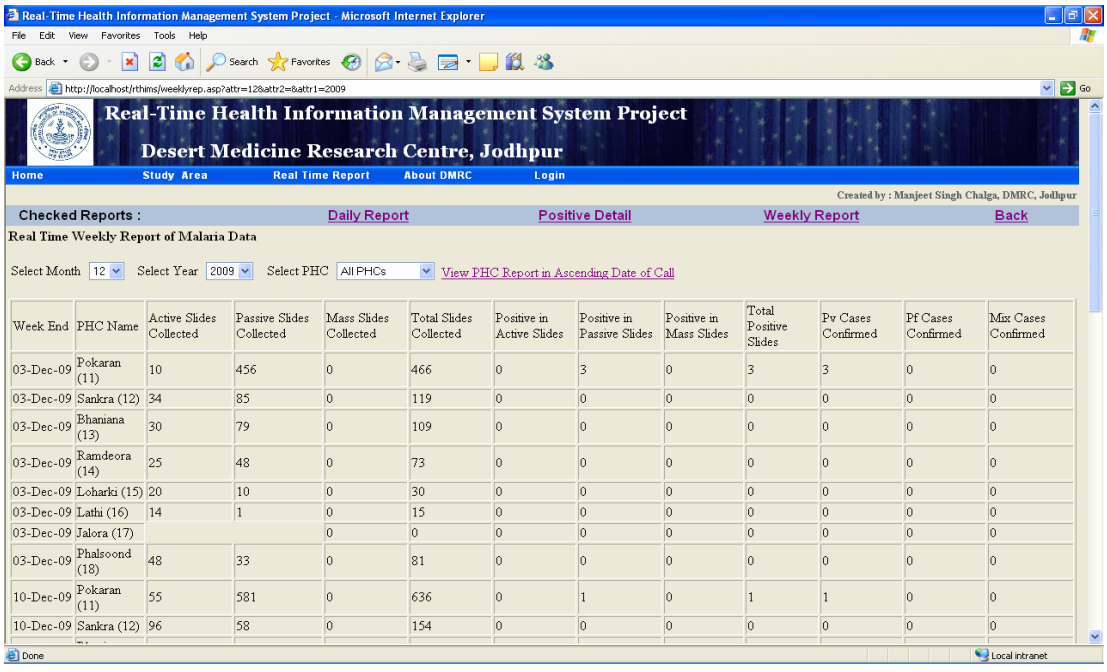
Date of Call	Time of Call	Telephone No.	Date of Reporting	PHC Name	OPD Cases	Fever Cases	Active Slides Collected	Passive Slides Collected	Mass Slides Collected	Total Slides Collected	Slides Sent to Other PHC	Slides Balance for Sending	Slides Rcvd From Other PHC	Total Slides Checked	Total Slides Balance for Checking	Positive in Active Slides	Positive in Passive Slides	Positive in Mass Slides	Total Positive Slides	Pv Cases Confirmed	P: C
06-Jan-10	4:28:55 PM	2994222286	01-Jan-10	Pokaran (11)	357	141	0	61	0	61	0	0	0	61	0	0	0	0	0	0	0
02-Jan-10	9:57:50 AM	2994227121	01-Jan-10	Sankra (12)	24	7	0	7	0	7	0	0	0	7	0	0	0	0	0	0	0
06-Jan-10	6:01:51 PM	3019230661	01-Jan-10	Bhaniana (13)	30	10	0	10	0	10	0	0	0	10	0	0	0	0	0	0	0
04-Jan-10	10:47:03 AM	2996216100	01-Jan-10	Lathi (16)	26	2	2	2	0	4	0	19	0	0	0	0	0	0	0	0	0
06-Jan-10	6:11:43 PM	3019230661	01-Jan-10	Phalsoond (18)	28	4	0	4	0	4	0	0	0	4	0	0	0	0	0	0	0
06-Jan-10	4:28:55 PM	2994222286	02-Jan-10	Pokaran (11)	404	148	0	70	0	70	0	0	0	70	0	0	0	0	0	0	0

Fig : Website showing Positive Case Detail



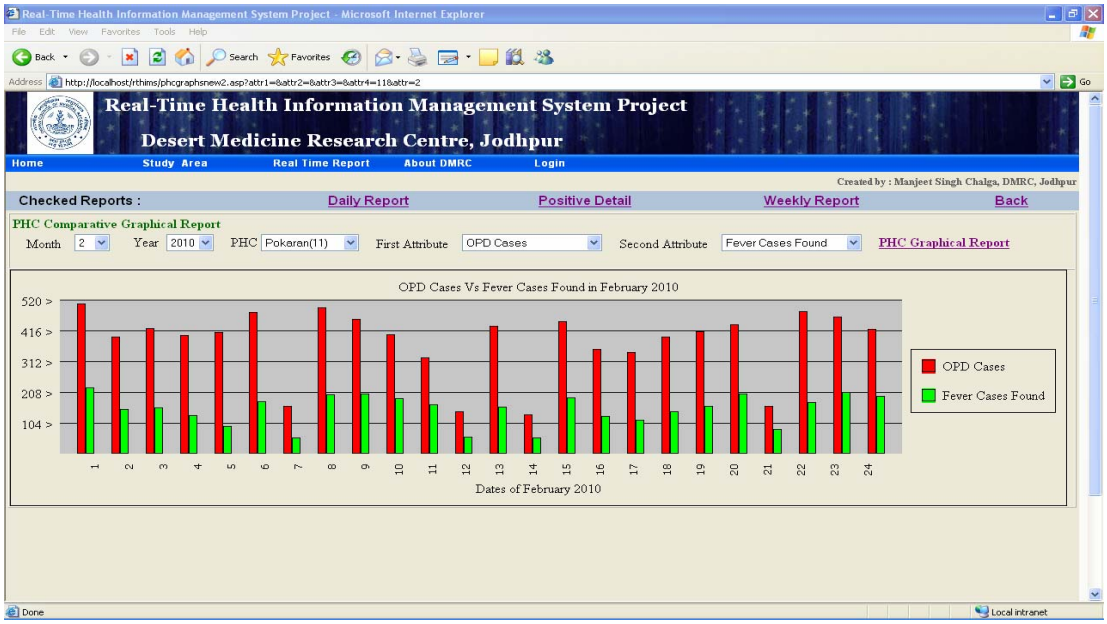
Date of Call	Telephone No.	Date of Reporting	PHC Where Reported	MPC No	Village Code	Sub Center	PHC	Male/ Female	Age	Species Type
08-Jan-10	2994222247	04-Jan-10	Pokaran (11)	1	Pokaran(101)	Pokaran	Pokaran	Male	9	Pv
08-Jan-10	2994222247	06-Jan-10	Pokaran (11)	2	Outside Block Pokaran(0)	***	***	Male	15	Pv
15-Jan-10	2994222247	09-Jan-10	Pokaran (11)	4	jhelaria(111)	jhelaria	Pokaran	Male	10	Pv
15-Jan-10	2994222247	09-Jan-10	Pokaran (11)	3	Pokaran(101)	Pokaran	Pokaran	Male	18	Pv
15-Jan-10	2994222247	11-Jan-10	Pokaran (11)	5	Outside Block Pokaran(0)	***	***	Male	5	Pv
15-Jan-10	2994222247	12-Jan-10	Pokaran (11)	6	Pokaran(101)	Pokaran	Pokaran	Male	8	Pv
21-Jan-10	2994222286	15-Jan-10	Pokaran (11)	7	Outside Block Pokaran(0)	***	***	Male	6	Pv
21-Jan-10	9571546619	16-Jan-10	Pokaran (11)	8	Pokaran(101)	Pokaran	Pokaran	Female	15	Pv
21-Jan-10	9571546619	18-Jan-10	Pokaran (11)	9	Pokaran(101)	Pokaran	Pokaran	Male	9	Pv
23-Jan-10	9024186499	22-Jan-10	Pokaran (11)	10	paupadia(410)	maurani	Ramdeora	Female	7	Pv
23-Jan-10	9414124587	22-Jan-10	Pokaran (11)	10	paupadia(410)	maurani	Ramdeora	Female	7	Pv

Fig : Website showing Weekly Report

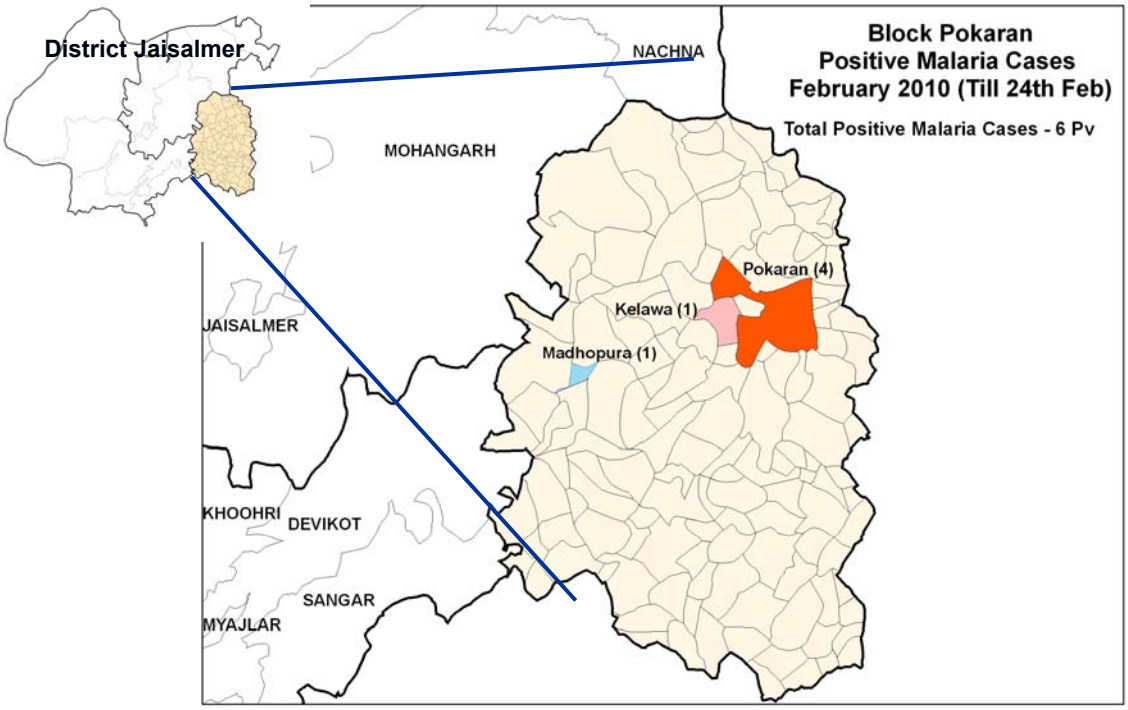


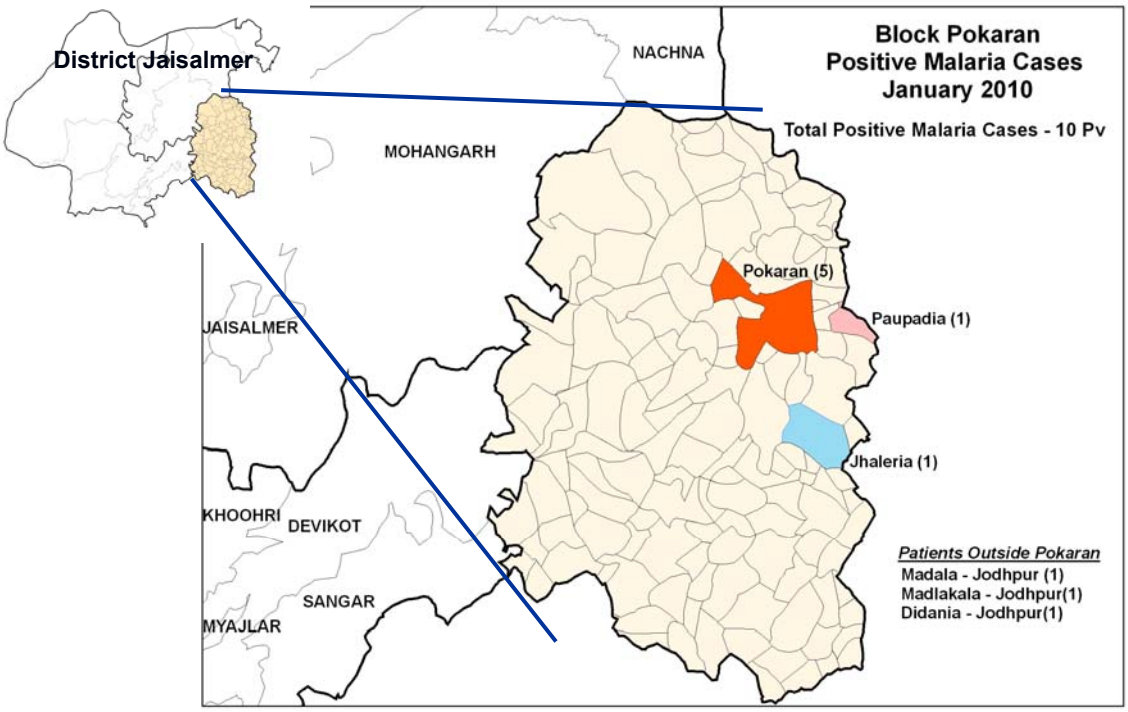
Week End	PHC Name	Active Slides Collected	Passive Slides Collected	Mass Slides Collected	Total Slides Collected	Positive in Active Slides	Positive in Passive Slides	Positive in Mass Slides	Total Positive Slides	Pv Cases Confirmed	Pf Cases Confirmed	Mix Cases Confirmed
03-Dec-09	Pokaran (11)	10	456	0	466	0	3	0	3	3	0	0
03-Dec-09	Sankra (12)	34	85	0	119	0	0	0	0	0	0	0
03-Dec-09	Bhaniana (13)	30	79	0	109	0	0	0	0	0	0	0
03-Dec-09	Ramdeora (14)	25	48	0	73	0	0	0	0	0	0	0
03-Dec-09	Loharki (15)	20	10	0	30	0	0	0	0	0	0	0
03-Dec-09	Lathi (16)	14	1	0	15	0	0	0	0	0	0	0
03-Dec-09	Jalora (17)			0	0	0	0	0	0	0	0	0
03-Dec-09	Phalsoond (18)	48	33	0	81	0	0	0	0	0	0	0
10-Dec-09	Pokaran (11)	55	581	0	636	0	1	0	1	1	0	0
10-Dec-09	Sankra (12)	96	58	0	154	0	0	0	0	0	0	0

Fig : Website showing Graphical Report



Positive case reported by health workers to RT-HIMS server through telephone mapped using GIS for the month January 2009 & Februray 2010 are shown below.





Remaining Work to be Done

- Full Fledge implementation of RTHIMS Server
- Set up of SMS system
- Making RT-HIMS intelligent
- Setup of root level reporting (Sub Centre-ANMs report)
- Adding more Analytical Reports
- More GIS Reports
- Web Data Security & User Authentication
- Training to State Health Workers

Possible Outcome and Utilization

The main advantage of this study over other studies is its real-time data collection, analysis, networking of different parameters, robotic nature and cost effectiveness. Malaria disease can be addressed at its development stage. Effect of intervention can be addressed. Any number of variables can be added or deleted as and when desired. Prepared model is quite flexible and can be extended for any number of diseases and health units viz. other states, private hospitals etc. IT skilled staff is required only at RT-HIMS server. Non-IT skilled staff can send and extract information from RT-HIMS server.

2.1 Epidemiology of Musculoskeletal Conditions in India- *K. R. Haldiya, M. L. Mathur, N. C. Mathur* and Arvind Mathur**

Commencement: August 2007 **Completion:** March 2010 **Status:** Completed

Objective

1. To study the magnitude and impact assessment of selected musculoskeletal disorders in the community with a focus on osteoarthritis, rheumatoid arthritis and spinal disorders, and trauma.

Progress of Work

The objective of the project is to study the magnitude and impact assessment of selected musculoskeletal disorders in the community with a focus on osteoarthritis, rheumatoid arthritis and spinal disorders, and trauma. The house to house survey was carried out in five selected villages and five urban wards of Jodhpur district. The first phase of study was completed. A follow up of suspected cases was carried out in which confirmation of diagnosis was done. A total of 10015 subjects were interviewed and examined during first phase of survey. The data have been analyzed using Epi Info 2002.

A total of 3944 households were covered from selected rural and urban areas of Jodhpur district of Rajasthan (Table-1). The coverage of selected persons was 75.1% which was similar in rural and urban areas. The average age of the covered population was higher than eligible population which was not statistically significant ($p>0.05$).

The rural population was more illiterate (76.2%) than urban population (34.9%). The married (85.6%) and widowed (7.8%) population was higher in rural area than urban area (77.9% & 6.8%) respectively.

The personal addiction of smoking and drug use was higher in rural area than urban area while tobacco chewing was higher in urban area than rural area which is statistically significant ($p<0.05$). (Table-2)

The major occupation of head of households of Jodhpur district was agriculture (35.3%) followed by others i.e. labour, driver, mechanics etc. (26.3%), shop business (13.4%), service work (7.3%), field work (8.5%) and retired (4.9%).

The majority of households have income of less than 5000 rupees per month (74.2%) and 1.2% households have income of Rs. 20000 and above.

*Dr. S. N. Medical College, Jodhpur

The major occupation among males of rural area was agriculture (54.8%) while in urban shop business (21.8%). Among females, it was housework i.e. 91.2% and 88.3% in rural and urban area respectively.

The majority of nature of work in study population was moderate (68.6%) followed by light work (19.0%) and heavy work (12.4%). The subjects doing heavy work was higher in rural areas (19.1%) than urban area (6.8%) which is statistically significant ($p<0.05$).

The percentage of musculoskeletal complaints in study population of rural area was 11.6% which was higher than urban population (9.5%). The percentage of musculoskeletal complaints was increasing with age i.e. 2.3% in 18-30 years of age to 26.5% in 70 years and above (Table-3).

The major present musculoskeletal complaint in study population was joint pain (8.2%) followed by spine/back pain (6.2%), joint stiffness (2.1%), joint swelling (1.6%) and muscle pain (0.8%) (Table-4). The complaints of joint pain (8.9%) and back pain (6.9%) were higher in rural area than urban area (7.5% &5.5%). The complaints were higher in females than males in rural and urban area but the difference was higher in urban area (25.6% and 10.2%) than rural area (24.3% and 16.2%).

The musculoskeletal complaints were higher in females (13.5%) than males (9.3%). The musculoskeletal complaints were higher in males of rural area (9.8%) than urban area (6.8%) whereas in females it was similar in urban (12.7%) and rural area (12.9%). (Table-5)

A total of 237(2.3%) subjects have history of injury among the studied population (Table-6). Among 237 subjects, nature of injury was fracture (61.6%), followed by (32.5%) and paralysis (4.6%). The majority of mode of injury was fall (46.3%) followed by vehicle accident (30.5%) and agriculture accidents (6.7%).

Among 492 suspected subjects in urban areas, commonest musculoskeletal disorder was osteo-arthritis (69.3%) followed by spinal disorders (30.9%), non specific body ache and pain (25.8%) and rheumatoid arthritis (7.5%) while in 560 suspected subjects of rural areas, it was 67.7%, 47.7%, 13.6% and 5.5% respectively (Table-7).

There was significant difference in self reported intensity of pain and physician perception in suspected subjects in both rural and urban areas (Table-8).

The associated co morbid conditions with musculoskeletal disorders were higher in urban areas (30.1%) than rural areas (5.5%). The females were having higher co morbid conditions than males in urban areas while in urban areas it was similar (Table-9)

Only 33.2% suspected subjects were not having functional limitation due to musculoskeletal conditions while 1.2% subjects were not able to do normal activities (Table-10).

The detailed analysis of data is under progress. The project will be completed by 31st March 2010.

Table 1. Distribution of Households

S. No.	Characteristics	Urban	Rural	Total
1.	Total No. of household covered	1853	2091	3944
2.	Total no. of Eligible persons ≥ 18 yrs	6722	6619	13341
3.	Total no. of Eligible persons covered	5051	4964	10015
4.	Total percentage of coverage	75.1	75.0	75.1
5.	Average age of Eligible population (Yrs.)	37.6 ± 15.4	38.6 ± 16.0	38.1 ± 15.7
6.	Average age of coverage population (Yrs)	37.7 ± 15.8	39.9 ± 16.4	38.8 ± 16.1

Table 2. Distribution of Population according to Addiction

Addiction (Present)	Urban N= 5051	Rural N= 4964	Total Population N= 10015
Tobacco Smoking	185 (3.7)	495 (10.0)	680 (6.8)
Tobacco Chewing	866 (17.1)	555 (11.2)	1421 (14.2)
Alcohol Use	130 (2.6)	151 (3.0)	281 (2.8)
Drug Use	5 (0.1)	122 (2.5)	127 (1.3)

Table 3. Percentage of Musculoskeletal symptoms according to Age and Residence

Age-group (Yrs.)	Urban		Rural		Total	
	N	Symptoms	N	Symptoms	N	Symptoms
18-30	2184	44 (2.0)	1911	50 (2.6)	4095	94 (2.3)
31-40	1101	101 (9.2)	1055	101 (9.6)	2156	202 (9.4)
41-50	758	117 (15.4)	846	154 (18.2)	1604	271 (16.9)
51-60	515	126 (24.5)	620	138 (22.3)	1135	264 (23.3)
61-70	339	44 (23.0)	342	89 (22.3)	681	167 (24.5)
>70	154	49 (31.8)	190	42 (22.1)	344	91 (26.5)
Total	5051	481 (9.5)	4964	574 (11.6)	10015	1089 (10.9)

Table 4. Prevalence of Musculoskeletal symptoms in Study Population

Musculoskeletal Symptoms (Present)	Urban N=5051 %	Rural N=4964 %	Total N=10015 %
Joint Pain	381 (7.5)	441 (8.9)	822 (8.2)
Joint Swelling	99 (2.0)	65 (1.3)	164 (1.6)
Joint Stiffness	107 (2.1)	108 (2.2)	215 (2.1)
Muscle Pain	47 (0.9)	38 (0.8)	85 (0.8)
Spine/Back Pain	276 (5.5)	341 (6.9)	617 (6.2)
Difficulty in Daily Self Care Activities	46 (0.9)	33 (0.7)	79 (0.8)
Loss of Mobility	12 (0.2)	4 (0.1)	16 (0.2)
Deformity of Joint	2 (0.1)	4 (0.1)	6 (0.1)
Deformity of Spine	1 (0.01)	1 (0.01)	2 (0.02)
Total complaints	971 (19.2)	1035 (20.9)	2006 (20.0)

Table 5. Prevalence of Musculoskeletal symptoms according to Sex and Residence

Sex	Urban		Rural		Total Population	
	N	Symptoms	N	Symptoms	N	Symptoms
Male	2090	139 (6.7)	2112	207 (9.8)	4202	344 (8.2)
Female	2961	376 (12.7)	2852	367 (12.9)	5813	743 (12.8)

Table 6. Percent distribution of screened positive cases according to nature of injury

Nature of injury	Urban N =124	Rural N=113	Total N=237
Fracture	54.0	69.9	61.6
Sprain	38.7	25.7	32.5
Paralysis	2.4	0.0	1.3
Others	4.8	4.4	4.6

Table 7. Percent Distribution Disease Profile of Total Patients

Diagnosis	Urban N=492	Rural N=560	No. of Diagnosis N=1052
Rheumatoid Arthritis	7.5	5.5	6.5
Osteoarthritis	69.3	67.7	68.4
Spinal Disorder	30.9	67.1	50.2
STR	1.6	1.4	1.5
Non Specific Body ache & pain	25.8	13.6	19.3

Table 8. Distribution of Patients According to Intensity of Pain

Intensity of Pain	Urban		Rural	
	Patient (self reported)	Physician	Patient (self reported)	Physician
Mild	127 (24.7)	213 (43.3)	143 (24.9)	261 (46.6)
Moderate	253 (49.1)	196 (39.3)	256 (44.6)	172 (30.8)
Severe	114 (22.1)	64 (13.0)	166 (28.9)	124 (22.1)
Very Severe	0	0	3(0.5)	0
Nil	21 (4.1)	19 (3.9)	6 (1.1)	3 (0.5)

Table 9. Distribution According to Co-morbid Condition

Factors	Urban N= 515	Rural N= 574	Total N= 1089
Co-morbid condition	148 (30.1)	32 (5.5)	180 (17.1)
Diabetes	29 (5.9)	4 (0.7)	33 (3.1)
Hypertension	95 (19.3)	19 (3.4)	114 (10.8)
IHD	12 (2.5)	6 (1.1)	18 (1.7)
Sex Male	21.4	5.6	11.9
Female	33.2	5.4	19.3

Table 10. Distribution of Patients according to Functional Status

Functional Status	Urban N=492	Rural N=560	Total N=1052
No Functional limitation	138 (28.1)	215 (38.4)	353 (33.6)
Limited Office Work	45 (9.1)	5 (0.8)	50 (4.8)
Limited House Work	161 (32.7)	58 (10.4)	219 (20.8)
Limited Activities Daily Living	141 (28.7)	276 (49.3)	417 (39.6)
Unable activities	7 (1.4)	6 (1.1)	13 (1.2)

2.2 Jaivigyan Mission Mode Project on Control of Rheumatic Fever and Rheumatic Heart Diseases in Jodhpur district- *M. L. Mathur, K. R. Haldiya, Sanjeev Sanghvi* and Aruna Solanki***

Commencement: March, 2007 **Duration:** Three years **Status:** Completed.

Objectives

1. To determine the prevalence of RF/RHD in school children of age 5 to 14 years
2. To determine the profile of Group A Beta Hemolytic streptococcal strains prevalent in school children age 5 to 14 years
3. To study the Blood Pressure distribution in school children age 5 to 14 years
4. To establish a registry of RF/RHD cases in selected area
5. To monitor secondary prophylaxis to RF/RHD in selected area
6. To sensitize community for primary prophylaxis by providing relevant health education in selected area

Rationale

Rheumatic fever is the most common cause of acquired heart disease in children and adults worldwide. Acute rheumatic fever is expressed as an inflammatory reaction that involves many organs, primarily the heart, the joints, and the central nervous system. The clinical manifestations of acute rheumatic fever follow a Group A Streptococcal (GAS) infection of the tonsillopharynx after a latent period of approximately 3 weeks. The major importance of acute rheumatic fever is its ability to cause fibrosis of heart valves, leading to crippling hemodynamics of chronic heart disease, heart failure and death. A recent meta-analysis of ten clinical trials concluded that antibiotics appear to be effective in reducing the incidence of acute rheumatic fever following an episode of suspected GAS pharyngitis. This effect may be achieved at relatively low cost if a single intramuscular penicillin injection is administered. Where primary prevention fails, a secondary prevention plan also relying on antibiotic therapy is recommended for preventing the progression of cardiovascular complications. Implementation of a wide scale, cost-effective public health strategy is required for adequate control of the devastating sequelae of group A streptococcal pharyngitis.

In the year 2007, Desert Medicine Research Centre, Jodhpur was identified as a satellite centre attached to the nodal centre at PGIMER Chandigarh for Rheumatic Fever and Rheumatic Heart Diseases (RF/RHD) registry under Task Force Project of Indian Council of Medical Research. This is a multicentric study, which was already continuing at many centers, including PGIMER, Chandigarh.

*Professor and Head, Department of Cardiology, Dr. S. N. Medical College, Jodhpur,
**Professor and Head, Department of Microbiology, Dr. S. N. Medical College, Jodhpur.

Progress of work

Study Area:

Advise of Statistical Experts Dr. Padam Singh and Dr. R. M. Pandey, Professor of Biostatistics, All India Institute of Medical Sciences, was obtained through Meeting of Project Advisory Group. As per advice of the group three adjacent blocks of Jodhpur district with population of 10 lakh were selected for study. These blocks are Bilara, Bhopalgarh and Osian. The literacy rate in these blocks is 43.8%, 45.0% and 54.3% respectively. Estimated population of this area in year 2006 was 1019571 as shown in Table 1. The selected area has three community development blocks, two towns and 374 villages. It has 30 primary health centers (PHCs), four Block CHCs, two Community Health Centers and one referral hospital.

All doctors in the selected area were involved in the study. Under the passive surveillance, initial training programmes were conducted for government and private doctors practicing in the selected area, who were then requested to refer all suspected cases of RF/RHD to Dr. Sanjeev Sanghvi, cardiologist at teaching hospital and inform the project office about the same. All suspected cases were seen and confirmed by cardiologist. Free Echocardiography was done by Dr. Sanjeev Sanghvi, cardiologist as and when indicated. Then confirmed cases were included in the registry. A representative sample of 10000 school children in the area was examined for RF/RHD. Throat swabs of selected children were inoculated for culture of streptococci. The colonies of streptococci were subjected to grouping and all strains of pure Group 'A'Streptococci were sent to PGIMER, Chandigarh for emm typing. Prevalence of RF/RHD was thus determined in general population by passive screening and in school children by active screening.

Table 1. Population of selected blocks of Jodhpur district

Block	Population in Year 2001			Expected population in 2006	No. of revenue villages
	Male	Female	Total	Total	
Osian	183431	169434	352865	411088	159
Bilara	129734	121109	250843	292232	92
Bhopalgarh	139909	131551	271460	316251	123
Total	**453074**	**422094**	**875168**	**1019571**	**374**

Involvement of State Health Services: Director, Medical and Health Services, Rajasthan, Joint Director, Medical and Health Services Jodhpur Zone and Chief Medical Officer, Jodhpur district and Block Chief Medical Officers of Osian, Bhopalgarh and Bilara were informed and briefed about the project. They directed all Medical Officers of the selected area to actively participate in the project. Co-operation of all Medical Officers was thus sought for the project through official Channel. Frequent meetings were held with Joint Director, Medical and Health Services Jodhpur Zone, Chief Medical Officer, Jodhpur district and Block Chief Medical

Officers of Osian, Bhopalgarh and Bilara. They were frequently invited to deliver talks in workshops for doctors.

Project Staff: Following Project Staff was recruited in the project:

1. Research Officer (Medical) - One
2. Field Investigator (Microbiology) - One
3. Field Investigator (Social Sciences) - One
4. Data Entry Operator - One

The Research Officer (Medical) resigned in October 2008 and new Research Officer (Medical) was recruited who joined in December 2008. He was also trained. Data entry operator resigned in December 2007, and a new Data Entry Operator was recruited, who was also M. Sc. Biotechnology. She was also trained to work in the team.

Training Programmes for Project Staff

- Initial training of project staff was carried out at PGIMER Chandigarh to ensure similar pattern of functioning a all centers of multicentric study. Project Staff was trained as per their role in project.
- Field Investigator (Microbiology) was trained in biosafety pcodures and practice at National JALMA Institute for Leprosy and Other Mycobacterial Diseases.
- Field Investigator (Microbiology) and DEO were trained in collection of sheep blood, preparation of blood agar plates, inoculation from throat swabs, identification and purification of BHS and their grouping to grow Group 'Á' streptococci (GAS). This training was imparted at Dept. Of Microbiology, Dr. S. N. Medical College, Dr. S. N. Medical College, Jodhpur.
- Field Investigator (Sociology) was trained in anthropological measurements, school health forms filling and IEC of RF/RHD. This training was carried out at DMRC, Jodhpur.
- Research Officer (Medical) was trained in clinical examination of throat, throat swab collection, and diagnosis of rheumatic fever and heart disease. He was trained at M. G. Hospital, Jodhpur under Dr. Sanjeev Sanghvi.

Workshops Organized for Doctors and Health Workers working in the study area

- Fifteen workshops were organised for Doctors working in study area and at Pediatrics Department of Teaching Hospital at Jodhpur. All the participants were briefed about stereptococcal sore throat, rheumatic fever, rheumatic heart disease, objectives and activities of the project. They were requested to refer all suspects of rheumatic fever and rheumatic heart diseases to Dr. Sanjeev Sanghvi, Professor of Cardiologist, M. G. Hospital/ M. D. M. Hospital, Jodhpur.

- Eight training programmes for health workers were organized. The health workers were explained about symptoms based on which rheumatic fever or rheumatic heart diseases can be suspected. They were briefed about the project and were requested to refer all suspects to the Medical Officer, who in turn would after examination refer the suspects to Cardiologist.

Field Work

- Field investigator (sociology) visited all Primary health centers in the area and affixed posters there. The pemphlets, health workers module and IEC-1 were distributed to all to all paramedical staff and health workers at PHCs. All doctors at PHCs were contacted and briefed about the project and were requested to refer every suspected case of Rheumatic fever or Rheumatic heart disease to Dr. Sanjeev Sanghvi, Cardiologist. Field investigator (sociology) also provided Printed Referral cards and physicians module to all doctors. He also met all private doctors in the area and requested them similarly. Every medical officer was requested to fill the referral card in duplicate and send one card by post to DMRC (stamps need not be affixed) and another copy of same was be carried by the patient to cardiology OPD at teaching hospital. The Injections of benzathene penicillin were also made available to every PHC in the area.

- When a referral card was received by post at DMRC, the referring doctor was thanked by phone. If referred patient did not come to cardiology OPD, field worker sociology used to telephone him and reminded him/her to come to cardiology OPD. This process of telephoning continued till patient reported at cardiology OPD of M. G. Hospital/ M. D. M. Hospital.

School health survey

- List of all schools including private schools, in the selected area was obtained from Offices of Education Department at Jodhpur. These included all primary schools, middle schools, secondary schools and senior secondary schools in the area. Every fifth school from list of all schools in rural area was selected for this purpose and all schools of urban area were selected. At the end number of children in 13 and 14 years age examined was quiet less, therefore some more senior secondary schools were selected from Bhopagarh and Osian blocks.

- The team visited 201 schools in all. Of these 201 schools, 53 schools were from urban area and rest 148 were from rural area. There were only two small towns with Municipality, namely Bilara and Piparcity, which were taken as urban areas. Thirty schools were from urban area of Bilara and twenty-three schools were from urban area of Piparcity. Of 148 schools from rural area, 65 were from Osian block, 42 were from Bhopalgarh block and 41 were from Bilara block. Fifty students were to be selected from each school. One class was randomly selected from the school and all students from that class were included in study. If the number of students was less then all students of next class were selected and process continued till required number of fifty was arrived.

- The team visiting school consisted of one Medical Officer and two field investigators. On reaching school, the team introduced itself to the Headmaster and sought cooperation of class teachers for school health examination. Teachers and students were explained the signs and symptoms of RF/RHD and facilities provided under Jai Vigyan Mission Mode Project. The role of teachers within school as well as in their community for detecting suspected RF-RHD cases was also explained. IEC-1 was distributed to children and teachers. One class was randomly selected from the school, if it did not

complete desired number of 50 students, another class was also selected. If number of students thus selected were less than 40, one more class was selected and this continued till 50 students were selected. The team was seated on two benches viz. BENCH 1 (Field Investigator), BENCH 2 (Medical Officer). On bench one, Field investigator with the cooperation of class teacher, entered the name, age, sex, address etc. of student in school health form and allocated ID No. Another field investigator measured height, weight, waist circumference and hip circumference and recorded the same. Body weight was measured (to the nearest of 0.5 Kg) with the participant in standing position on weighing scale, feet about 15 cm apart and equally distributing weight an both lower limbs with minimum out wear and no footwear. Height was measured with the subject in standing position and with the head positioned so that the top of the external auditory meatus level with the inferior margin of the bony orbit. Waist circumference was measured in centimeters (cm) at the level of umbilicus. Hip circumference was measured at the trochenteric level in cm. MO took history if student was old enough to tell some thing. All students were given a printed paper which contained questions about their medical history. The child was asked to get it filled by his/her parent and return the same to the school teacher the next day. These papers were collected by the team after a few days. MO examined the student clinically and entered findings in school health form. For suspected RF-RHD cases, MO filled up the Referral Card and requested class teacher to call parents of the suspected case, who were then explained about disease of the child and were requested to consult senior cardiologist at teaching hospital with the referral card. Initially cardiology department was at M. G. Hospital Jodhpur, later it shifted to M. D. M. Hospital Jodhpur. MO took three readings of BP measurement of all students in sitting position with a minimum gap of 2 minutes per reading. Mercury Sphygmomanometer was used for this purpose. Every third child and the child with sore throat were asked to sit in a separate row for collection of throat swab. At the end MO collected throat swab of the selected children which were immediately inoculated on blood agar plates in the school. The inoculated plates were carried to DMRC Laboratory.

- Poster printed under the project was affixed in every school visited. IEC-1 was one page printed matter describing sore throat leading to rheumatic fever, leading to RHD, symptoms of these conditions, actions to be taken by teachers and parents for preventing these conditions. These IEC-1 papers were distributed to teachers and children in schools visited by the team.

Cardiology OPD

- Every Monday and Thursday, all referred patients were seen at cardiology OPD of M. G. Hospital. In 2009, department of cardiology shifted from M. G. Hospital to M. D. M. Hospital, Jodhpur. Every patient reaching with referral card was seen on priority. The Research Officer (Medical) appointed under project was always present in cardiology OPD, who first attended the referred patients. Patient was then seen by Dr. Sanjeev Sanghvi, Professor of cardiology. All details of patient were collected and recorded in Form-II (Appendix-II). Free Echocardiography, throat swab culture and ASO tire was done for those where indicated. Expert advice of cardiologist was made available for best possible treatment of the individual patient. The patients from project area, with confirmed diagnosis of rheumatic fever or rheumatic heart disease were

registered and were provided Form IV. Patients were explained to take secondary prophylaxis regularly every 21 days. The Form IV was in form of a diary, front page had all details about patient and his disease and inner pages had tabular columns for monthly dates of secondary prophylaxis. The patient was sent back to report to the referring physician for further follow up of treatment.

Observations

In all 10011 students of 5-14 years from these selected 201 schools were examined of which 3151 (31.5%) were from urban area and 6860 (68.5%) were from rural area. Out of three blocks of study area, urban area was only in Bilara block, therefore all children covered from urban area were from Bilara block. Out of 6860 children examined from rural area, 2968 (43.3%) were from Osian block, 1963 (28.6%) were from Bilara block and 1929 (28.1%) were from Bhopalgarh block. Age and sex distribution of examined children is shown in Table 3.

Table 2. block wise distribution of students examined

Block	Expected population in 2006		No. of children examined from Rural area		No. of children examined from Urban area
	No.	%	No.	%	
Osian	411088	40.3	2968	43.3	0
Bilara	292232	28.7	1963	28.6	3151
Bhopalgarh	316251	31.0	1929	28.1	0
Total	**1019571**	**100.0**	**6860**	**100.0**	**3151**

Table 3. Age and sex distribution of students examined

Age in completed years	Males	Females	Total	
			No.	Percent
5	439	336	775	7.7
6	523	427	950	9.5
7	517	484	1001	10.0
8	554	551	1105	11.0
9	582	522	1104	11.0
10	596	524	1120	11.2
11	621	544	1165	11.6
12	641	532	1173	11.7
13	474	507	981	9.8
14	295	342	637	6.4
Total	5242	4769	10011	100.0

- Out of all 10011 school children, examined, 110 children were referred to cardiology OPD of teaching hospital, because heart sound was not normal or history of rheumatic

fever was present in them. They were given referral card. Out of 110 referred children 90 reported at cardiology OPD and cardiologist confirmed diagnosis of Rheumatic Fever or Rheumatic Heart Disease in 9 children after echocardiography. Their details are given in Table 4. Thus prevalence of rheumatic fever or rheumatic heart disease in school children of 5-14 years age as determined by active screening in study area was 0.9/1000 children.

Table 4. Diagnosis of all cases of RF/RHD registered from school health survey

S. No.	Diagnosis	No. of cases		
		Males	**Females**	**Total**
1.	Severe Mitral Regurgitation	2 (One with Mitral Valve Prolapse)	2 (One with Mild Mitral Stenosis	4
2.	Moderate Mitral Regurgitation and Moderate Tricuspid Regurgitation	1	0	1
3.	Mild Mitral Regurgitation	0	2 (One with Mitral Valve Prolapse)	2
4.	Severe Mitral Stenosis	0	1	1
5.	Past History of Rheumatic Fever	0	1	1
	Total	**3**	**6**	**9**

- Out of all 110 children referred from school health survey, to cardiology OPD of teaching hospital, 90 reported at cardiology OPD and 81 of them did not have RF/RHD. Fortyseven (37 males and 10 females) of them had functional murmur, six had mitral valve prolapse, one (male) was case of poluarthritis and one was case of hypertension (male), remaining 26 had congenital heart disease. Their details are given in Table 5. Thus prevalence of congenital heart disease in school children of 5-14 years age, as determined by active screening in study area was 3.2/1000 children. This high prevalence of CHD indirectly indicates that cases of abnormal heart sound were not missed at school level and supports the fact that prevalence of RF/RHD was low (0.9 per 1000) in these children.

Table 5. Diagnosis of all cases of congenital heart diseases referred to cardiology OPD from school health survey

S. No.	Congenital Heart Disease	No. of cases		
		Males	Females	Total
1.	Atrial Septal Defect (ASD)	4	3	7
2.	ASD Mitral Valve Prolapse	0	1	1
3.	ASD with trivial MR and Mod TR	0	1	1
4.	Ventricular Septal Defect (VSD)	10	1	11
5.	VSD with Pulmonary Stenosis	0	1	1
6.	Coarctation of Aorta	0	1	**1**
7.	Pentology of Fallot	0	1	**1**
8.	Pulmonary Artery Hypertension	0	1	**1**
9.	Pulmonary Stenosis	1	1	**2**
	TOTAL	**15**	**11**	**26**

- Throat swabs were collected and transported to the laboratory where these were inoculated on blood agar. Throat swabs collected during July 2007 to September 2007 were processed same day as this was suited to school timings. From October, 2007 to December 2007 as the school time was changed the samples were collected and transferred to filter paper strips which could be processed within one week of sample collection. Any colony of Beta Hemolytic Streptococcus did not grow from throat swabs up to December 2007. These data were therefore not included in calculation of throat-swab positivity.

- From January 2008 blood agar plates were carried to schools, where they were directly inoculated from the throat swabs immediately after collection of throat swab. Then 3 or 4 sets of streaks were spread from the primary inoculum with a sterile wire loop to obtain well-spaced single colonies. The plates were then incubated overnight at 37°C in Candle jar.

- After required time of incubation the plates were observed for morphological identification of the colonies and the appearance of hemolytic zone around the colonies of beta hemolytic streptococci (BHS). Gram's staining was done for microscopic examination of colonies. The observations were recorded in laboratory reporting forms. Morphological and microscopic observation of colonies appeared on blood agar plate showed variety of microorganism including yeast, alpha hemolytic bacteria, gram positive bacilli, gram negative cocci and betahemolytic cocci.

- From January 2008 to November 2009, throat swabs were collected from 1213 students, out of which 443 had sorethroat. Twenty eight out of these 443 (6.32%) throat swabs of symptomatic children yielded growth of Group A Streptococci (GAS). Twentyfive throatswabs out of 769 non-symptomatic (healthy) children (3.25%) yielded growth of GAS. All 53 strains of GAS were sent to PGI, Chandigarh for detailed study of prevalent strains of GAS. Group G streptococci grew from throat swabs of 3.16% children with sorethroat and 2.21% non-symptomatic children. Group C streptococci grew from throat swabs of 0.68% children with sorethroat.

Blood Pressure pattern in school children:

Table 6. Percentile distribution of school children of age 5 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=439)	Females (n=336)	Males (n=439)	Females (n=336)
5th	90	90	58	58
10th	96	94	60	60
20th	98	100	60	60
30th	100	100	60	60
40th	100	100	62	62
50th	104	102	64	64
60th	108	106	66	68
70th	110	110	68	70
80th	114	114	70	70
90th	120	120	74	76
95th	124	124	78	80

Table 7. Percentile distribution of school children of age 6 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=523)	Females (n=427)	Males (n=523)	Females (n=427)
5th	90	92	58	58
10th	98	98	60	60
20th	100	100	60	60
30th	100	100	62	62
40th	100	106	64	64
50th	106	108	66	68
60th	110	110	70	70
70th	110	114	70	70
80th	118	120	72	72
90th	120	124	78	80
95th	128	130	80	80

Table 8. Percentile distribution of school children of age 7 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=517)	Females (n=484)	Males (n=517)	Females (n=484)
5th	96	94	60	60
10th	100	98	60	60
20th	100	100	62	60
30th	100	100	62	62
40th	106	104	64	64
50th	110	108	68	68
60th	110	110	70	70
70th	114	112	70	70
80th	120	118	72	72
90th	124	124	80	78
95th	130	128	84	80

Table 9. Percentile distribution of school children of age 8 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=554)	Females (n=551)	Males (n=554)	Females (n=551)
5th	98	98	60	60
10th	100	100	60	60
20th	100	100	62	62
30th	106	100	66	64
40th	110	108	68	68
50th	110	110	70	70
60th	114	110	70	70
70th	120	116	72	72
80th	120	120	76	76
90th	124	128	80	80
95th	130	130	82	84

Table 10. Percentile distribution of school children of age 9 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=582)	Females (n=522)	Males (n=582)	Females (n=522)
5th	100	98	60	60
10th	100	100	60	60
20th	100	100	64	64
30th	108	110	68	68
40th	110	110	70	70
50th	110	112	70	70
60th	116	118	70	70
70th	120	120	74	74
80th	120	122	78	80
90th	128	130	80	80
95th	130	130	80	84

Table 11. Percentile distribution of school children of age 10 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=596)	Females (n=524)	Males (n=596)	Females (n=524)
5th	100	100	60	60
10th	100	100	62	62
20th	104	104	64	64
30th	110	110	68	68
40th	110	110	70	70
50th	110	112	70	70
60th	116	118	70	70
70th	120	120	74	74
80th	120	120	78	78
90th	130	130	80	80
95th	130	130	82	82

Table 12. Percentile distribution of school children of age 11 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=621)	Females (n=544)	Males (n=621)	Females (n=544)
5th	100	100	60	60
10th	100	100	62	62
20th	106	110	64	68
30th	110	110	68	70
40th	110	110	70	70
50th	112	116	70	70
60th	118	120	70	72
70th	120	120	74	78
80th	120	124	78	80
90th	130	130	80	82
95th	130	130	82	88

Table 13. Percentile distribution of school children of age 12 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=641)	Females (n=532)	Males (n=641)	Females (n=532)
5th	98	100	60	60
10th	100	100	62	62
20th	104	110	64	66
30th	110	110	68	68
40th	110	110	70	70
50th	114	116	70	70
60th	116	120	70	72
70th	120	120	74	74
80th	120	124	78	80
90th	130	130	80	80
95th	130	136	88	84

Table 14. Percentile distribution of school children of age 13 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=474)	Females (n=507)	Males (n=474)	Females (n=507)
5th	98	100	60	60
10th	100	100	62	64
20th	108	110	66	68
30th	110	110	68	70
40th	110	112	70	70
50th	114	116	70	70
60th	118	118	72	74
70th	120	120	76	78
80th	120	122	80	80
90th	130	130	80	80
95th	130	136	86	86

Table 15. Percentile distribution of school children of age 14 years according to their systolic and diastolic blood pressure

Percentile	Systolic BP (mm of Hg)		Diastolic BP(mm of Hg)	
	Males (n=295)	Females (n=342)	Males (n=)	Females (n=342)
5th	96	100	58	60
10th	98	100	60	62
20th	100	108	64	68
30th	108	110	68	68
40th	110	112	70	70
50th	110	116	70	70
60th	116	118	70	72
70th	118	120	74	78
80th	120	120	80	80
90th	126	130	80	80
95th	130	132	84	84

- Median weight of boys and girls for each year of age are given in Table 16 with WHO reference standards.

Table 16. Median Weight of students according to age and sex

Age in completed years	Males			Females		
	N	Median Weight in Kg.	WHO Ref Median	N	Median Weight in Kg.	WHO Ref Median
5	439	16.9	18.5	336	16.0	18.3
6	523	19.0	20.5	427	17.6	20.2
7	517	20.6	22.9	484	20.2	22.4
8	554	22.9	25.4	551	21.8	26.0
9	582	25.0	28.1	522	24.1	28.2
10	596	28.1	31.2	524	27.1	31.9
11	621	29.6	-	544	29.5	-
12	641	33.0	-	532	34.05	-
13	474	36.0	-	507	36.7	-
14	295	40.0	-	342	40.2	-

- Median height of boys and girls for each year of age are shown in Table 17 with WHO reference standards.

Table 17. Median height of students according to age and sex

Age in years	Males			Females		
	N	Median Height in Cms.	WHO Ref Median	N	Median Height in Cms.	WHO Ref Median
5	439	110.4	110.3	336	108.7	109.6
6	523	116.8	116.0	427	113.6	115.1
7	517	122.4	121.7	484	120.5	120.8
8	554	126.8	127.3	551	125.4	126.6
9	582	132.0	132.6	522	130.2	132.5
10	596	136.9	137.8	524	135.4	138.6
11	621	140.9	143.1	544	142.5	145.0
12	641	146.8	149.1	532	146.7	151.2
13	474	150.6	156.0	507	149.6	156.4
14	295	155.4	163.2	342	152.4	159.8

- Median BMI of boys and girls for each year of age are shown in Table 18 with WHO reference standards.

Table 18. Median BMI of students according to age and sex

Age in years	Males			Females		
	N	Median BMI	WHO Ref Median	N	Median BMI	WHO Ref Median
5	439	13.9	15.3	336	13.8	15.2
6	523	13.9	15.3	427	13.7	15.3
7	517	14.0	15.5	484	14.0	15.4
8	554	14.1	15.7	551	14.0	15.7
9	582	14.3	16.0	522	14.2	16.1
10	596	14.6	16.4	524	14.8	16.6
11	621	14.9	16.9	544	15.2	17.2
12	641	15.4	17.5	532	15.9	18.0
13	474	15.8	18.2	507	16.5	18.8
14	295	16.4	19.0	342	17.4	19.6

Table 19. Mean hip circumference of students according to age and sex

Age in years	Males		Females	
	N	Mean Hip Circ. in Cms.	N	Mean Hip Circ. in Cms.
5	439	56.6 ± 3.9	336	56.41± 3.7
6	523	58.7 ± 4.0	427	58.1 ± 3.7
7	517	60.3 ± 4.4	484	60.7 ± 4.3
8	554	62.3 ± 4.6	551	62.0 ± 4.6
9	582	64.5 ± 5.3	522	64.6± 5.3
10	596	66.5 ± 5.2	524	67.3 ± 5.7
11	621	69.0 ± 6.1	544	71.0 ± 6.6
12	641	71.8 ± 6.4	532	73.9 ± 6.8
13	474	74.2 ± 6.9	507	76.1 ± 6.5
14	295	76.5 ± 6.8	342	79.7 ± 6.3

Table 20. Mean waist circumference of students according to age and sex

Age in years	Males		Females	
	N	Mean Waist Circ. in Cms.	N	Mean Waist Circ. in Cms.
5	439	49.8 ± 3.4	336	48.9±3.2
6	523	51.1 ± 3.7	427	50.1±3.6
7	517	52.3±4.0	484	51.7±4.3
8	554	53.5±4.0	551	52.3±3.9
9	582	54.5±4.3	522	53.5±4.4
10	596	56.4±4.6	524	55.9±4.9
11	621	58.4±5.6	544	58.3±5.9
12	641	60.5±5.7	532	60.1 ±5.9
13	474	62.1±5.5	507	62.0±6.0
14	295	63.8±5.6	342	63.7 ±5.7

Table 21. Mean waist hip ratio (WHR) of students according to age and sex

Age in years	Males		Females	
	N	Mean WHR	N	Mean WHR
5	439	0.88±0.04	336	0.87±0.04
6	523	0.87±0.04	427	0.86±0.04
7	517	0.87±0.04	484	0.85±0.05
8	554	0.860±0.039	551	0.84±0.04
9	582	0.85±0.04	522	0.83±0.04
10	596	0.85±0.05	524	0.83±0.04
11	621	0.84±0.04	544	0.82±0.05
12	641	0.84±0.05	532	0.82±0.05
13	474	0.83±0.05	507	0.81±0.05
14	295	0.83±0.05	342	0.80±0.05

Table 22. Distribution of school children (5-14) according to Waist-Hip Ratio (WHR)

Percentile	WHR	
	Males	Females
5th percentile	0.78	0.75
10th percentile	0.80	0.77
20th percentile	0.81	0.79
30th percentile	0.83	0.81
40th percentile	0.84	0.82
50th percentile	0.85	0.83
60th percentile	0.87	0.85
70th percentile	0.88	0.86
80th percentile	0.89	0.87
90th percentile	0.91	0.89
95th percentile	0.92	0.91

Registered RF/RHD cases

In all diagnosis of ECHO confirmed RF or RHD was made in 220 patients reporting at cardiology OPD of M. G. Hospital later shifted to M. D. M. Hospital, from the project area. Among these 220 registered cases number of females was 128 (58.2%). Seven cases had rheumatic fever or history of rheumatic fever. Among remaining 213 cases of RHD, at time of registration, 127 (59.6%) were severe cases of RHD, 52 (24.4%) were moderately severe. Thirtysix cases had already undergone cardiac surgery for RHD. Table 23 shows detailed categorization of all registered cases.

Table 23. Patients registered in different categories

Categories		No. of patients
1A.	ARF with carditis	3
1B.	ARF without carditis	1
2A.	RHD with rheumatic activity	7
2B.	RHD without rheumatic activity	206
3A	Documented past RF without RHD	2
3B.	Not Documented past RF without RHD	1
Total no. of RF/RHD cases registered		**220**

Age group wise trend of registration

Table 24. Age and sex distribution of registered RF/RHD Cases

Age Group	No. of RF/RHD Cases			
	Males	Females	Total	
			No.	%
0-4	0	0	0	0.0
5-9	3	5	8	3.6
10-14	11	17	28	12.7
15-19	7	10	17	7.7
20-24	11	11	22	10.0
25-29	10	20	30	13.7
30-34	8	20	28	12.7
35-39	9	12	21	9.5
40-44	9	13	22	10.0
45-49	12	9	21	9.5
50-54	6	3	9	4.1
55-59	2	3	5	2.3
60-64	3	4	7	3.2
65-69	1	0	1	0.5
70-74	0	0	0	0.0
75-79	0	0	0	0.0
80 & above	0	1	1	0.5
Total	**92 (41.8%)**	**128 (58.2%)**	**220**	**100.0**

Specific Valve involvements

Table 25. Sex wise distribution of patients according to specific valve Involvement as per ECHO diagnosis of RF/RHD patients registered

RHD:- Valve involved:-	Males	Females	Total	
			No.	%
Mitral Alone	48	67	115	52.2
Mitral+Aortic	17	20	37	16.8
Mitral+Aortic+Tricuspid	10	19	29	13.2
Mitral+ Tricuspid	10	16	26	11.8
Aortic alone	3	2	5	2.3
Aortic + Tricuspid	1	0	1	0.5
RF (Documented/Undocumented)	3	4	7	3.2
Total	**92**	**128**	**220**	**100.0**

Monitoring of Secondary Prophylaxis (SP):

Out of 220 registered cases of RF/RHD, 23 have died, two have migrated, 44 are not advised by cardiologist to take SP as they are above age of 45 years or are operated cases or have other problem like hypersensitivity to penicillin. Two have migrated. Out of remaining 151 patients put on SP, one is taking oral penicillin, and others are put on injectable benzathene penicillin every three weeks. Information from 126 of 151 (83.4%) subjects, could be gathered that all of them have taken last dose of due SP in March 2010, only two reported that they could not take SP because of some confusion, who were persuaded to take regular SP. Remaining could not be contacted and information about them is not available, though many of them might also be taking SP regularly.

2.3 Meta Analysis of non communicable diseases and their Mapping in Western Rajasthan, India- *J. Lakshminarayana, Madhu B .Singh and K. R. Haldiya*

Commencement: August, 2009 **Duration:** Two Years **Status:** Ongoing

Objectives

1. Meta Analysis of available published or unpublished information of non communicable diseases namely Diabetes Mellitus and Hypertension

2. To study regional/ecological variations of these non communicable diseases in Rajasthan by systematic reviews and

3. To map out the districts for Diabetes Mellitus and Hypertension in the western region.

Progress of the work

The data for meta analysis was collected through literature search through INFO BASE, PUB MED, MEdlars, EMBASE, Cochrane data bases for the NCD's like diabetes mellitus and hypertension. A total of 32 studies on case control studies were collected by Systematic reviews of these 10 studies only met the criteria for meta analysis Diabetes mellitus and 12 studies for hypertension and the re-analysis has been carried out. For 10 publications on the diabetes and 10 studies for hypertension to see the problem. The duration was considered to be for a period of 10 years. In India many studies have been carried out on diabetes and hypertension and published. All the published literature has been collected by using different search engines. The odds rations and weights Effect size were calculated and reported.

The re-analysis of the data revealed that the intervention and combined intervention and the cohorts were non-homogeneous ($P < 0.01$ and $P < 0.01$, respectively); however, the behavioral intervention cohort was homogeneous ($Q = 25.08$, d.f. = 9, $P=0.36$).The hypertension cohorts were homogeneous ($Q=22.48$. D.f.=9. The overall ES for behavioral interventions was 0.06 (95% confidence interval [CI] = 0.03–0.08); there were no significant differences among the behavioral & educational interventions which had an overall ES of 0.10 (95% CI =0.05–0.16). The overall ES of the combined interventions was 0.08 (95% CI = 0.04–0.14). While stratifying the combined interventions the behavioral had the largest impact (ES = 0.38). Meta Analysis of studies of interventions improved the heterogeneity among the studies and gave valid Conclusions. The mapping of districts will be done from the data collected by using GIS and reported by maps separately.

Table 1. Calculation of estimates of different studies & odds ratios on diabetes mellitus

Study Ref.	a	b	c	d	Sample Size(n)	Var.	Wt.	O.R.	Wt. X O.R.	Q
1	5	14	33	22	74	0.15	6.15	0.1	0.62	2.88
2	7	6	11	13	37	0.56	7.18	0.37	2.68	1.07
3	8	12	25	30	75	0.25	4.00	0.22	0.88	3.52
4	14	41	42	22	119	0.07	14.29	0.74	10.57	4.16
5	35	39	34	32	140	0.11	0.91	0.14	0.13	3.62
6	46	23	97	115	281	0.13	100.2	0.82	82.17	4.75
7	20	16	28	25	89	0.20	8.62	0.48	4.13	1.89
8	5	17	35	24	81	0.14	7.14	0.32	2.28	2.54
9	23	32	26	28	109	0.13	7.69	0.41	3.15	2.22
10	33	27	36	31	127	0.13	7.69	0.38	2.92	1.96

Q=25.08, d.f.=9

Table 2. Calculation of estimates of different studies & ODDS Ratios for hypertension

Study Ref.	a	b	c	d	Sample Size(n)	Var.	Wt.	O.R.	Wt. X O.R.	Q
1	6	14	33	22	75	0.15	6.15	0.1	0.62	2.88
2	7	8	11	13	39	0.56	7.18	0.37	2.68	1.07
3	8	12	25	30	75	0.25	4.00	0.22	0.88	3.52
4	14	41	42	22	119	0.07	14.29	0.74	10.57	4.16
5	35	39	34	32	140	0.11	0.91	0.14	0.13	3.62
6	46	23	97	115	281	0.13	100.2	0.82	82.17	4.75
7	20	16	28	25	89	0.20	8.62	0.48	4.13	1.89
8	6	17	35	24	82	0.14	7.14	0.32	2.28	2.54
9	23	32	26	28	109	0.13	7.69	0.41	3.15	2.22
10	33	27	36	31	127	0.13	7.69	0.38	2.92	1.96

Q=22.48, d.f.=9

Table 3. Calculation of estimates for diabetes mellitus and hypertension

Studies	O.R	95% C I	test	P-value	Effect Size
Diabetes	1.06	0.69-1.82	T=2.14	P<0.05	0.08 (0.04-0.14)
Hypertension	1.02	0.42 – 2.56	T= 2.54	P<0.05	0.38 (0.05-0.61)

Important Leads and / outcomes from the study

The study has provided information of diabetes mellitus and hypertension through Meta Analysis for the entire state of Rajasthan with variations in different ecological/ geographic regions The mapping for these deficiencies will be done for the state of Rajasthan with ecological variations among the districts.

Appendix

Formulae for Calculation of various parameters are as follows:

Estimate the variance of the ORs for each study

$Variance_i = ni/(bi*c_i)$ for i=1,2,3,….

Calculate the weights for each study

Weight = 1/Var

Calculate the product of the weights * ORs

Product = ORs * W

Calculate the sum of the weights

Calculate the sum of the product of Weights & ORs and

OR_h = Sum of - products wt/sum of the wt

Calculate Q = Sum $W(\text{Log ORs-Log ORh})^2$

Test the hypothesis by Chi-square tables with (n-1) d. F

2.4 Dermatoglyphic Patterns in Diabetes Mellitus Patients and Non-Diabetics: A preliminary study- *P. K. Dam, Vinod Joshi, Anil Purohit and Himmat Singh*

Commencement: June, 2006. **Duration**: Three years. **Status:** On going

Objectives

1. To identify patterns of dermal ridges on the fingertips and palms of diabetics and non-diabetics.

2. To focus the predictive strength of dermatoglyphics of diabetics.

Progress of Work

Present study demonstrated, dermatoglyphics characteristics of the diabetes mellitus patients were different as compared to the non-diabetics among the families of Mathur population group inhabiting Jodhpur city and adjoining area. Dermatoglyphic data collection of right and left hands, vis a vis determination of blood sugar status of 101 probands of T2DM cases (i.e.46 male, 55 female) and 149 controls (i.e.70 male,79 female) were undertaken. Total readable prints from these 250 informants were 248 and result of data analysed from 248 respondents are presented in Table 1-9.

Study reveals that, among the Mathurs, frequency of patterns are highly reduced in 3rd inter-digital area on palm of the left hands of the female diabetics (29.1%), as compared to the female non-diabetics (54.4%), confirming strong significant association ($p<0.05$) (Table-1; Fig.1 & Fig.2). Consistent with this, there is reduced frequency of patterns (37.2%) among the male diabetics also, in their left 3rd inter-digitals, than the male non diabetics (50.0%), though these relations were not statistically significant. As this is a general trend that females are having smaller proportion of whorls than males, the present study also reveals the similar trend. The male cases (45.4%, right hand; 50.7%, left hand) and controls (49.6%, right hand; 48.4%, left hands) outnumber the female cases (38.7%, right hand; 45.4% left hands) and controls (37.7%, right hand; 42.8% left hand) in terms of occurrence of Whorls. Strict adherence to clan exogamy both from father's and mother's side in order to prevent consanguineous marriage in the family has been observed while analysing previous three generation's pedigree data from extended families of Mathur T2DM probands. The intensity of inbreeding in a population is very high, in which there is an excess of whorls in females over that in males, because female individual can be homozygous for X-linked genes in addition to being homozygous for some autosomal genes, whereas the males can be homozygous for autosomal genes only. Occurrence of whorls are observed higher in both right (38.7%)(Table.2) and left (45.4%)(Table.4) hand fingertips of diabetic females, than female non-diabetics in their Right hand fingertips(37.7%)(Table.2) and Left hand fingertips(42.8%)(Table.4). Ulnar Loops, were observed higher in right (58.4%) hands of diabetic females, than the female non-diabetics

(55.4%)(Table.2). Their left hands, however shown reverse trend (cases: 46.9%, controls: 48.6%) (Table.4). In the right hands of male diabetics, Whorls were found lesser (45.4%), than Ulnar Loops (46.8%), whereas, right hands of male controls show reverse (Whorls: 49.6 %, UL:44.3%) (Table.2). Frequency polygon type distribution of Whorls and Ulnar Loops in five hand digits of right hands of female cases and controls are presented (Fig.3 & 4).

Female T2DM cases are higher (70.9%) to have more fingertip whorls (i.e.3-10 whorls), as compared to female non diabetic controls (56.9%). Similarly, lesser number of fingertip whorls (i.e.0-2 whorls) is higher among female non-diabetic respondents (41.8%), as compared to female diabetics (29.0) (Table-3).

Pattern Intensity Index (PII) was calculated by counting total number of triradius present on ten fingertips of total number of respondents in each group (i.e. male case, male control, female case, female control, and so on) and then dividing the summation by total number of respondents in each group. Total number of triradius on ten fingertips ranges from 0 to 20 (eg. Arch: 0* 10=0, Loop: 1* 10 = 10, Whorl: 2*10=20). Although the PII value between cases and controls did not show any statistically significant difference, but certain directional indication has been observed between a) cases and controls and b) respondents from two communities i.e. Mathurs and Raikas having variation in occurrence of diabetes (Table.9).

The frequency distribution of three different angles of 't' triradius (eg. <atd, <dat and <adt) in palms of male cases and controls as well as female cases and controls of the Mathur respondents(in a subset of total sample size covered) were calculated and presented in polygon graphical form to assess risk of T2DM with respect to magnitude of different degrees found in three respective angles. A) Frequency distribution of degrees in 'dat' angle (Table.5, Fig.5) of 29 female case's left hands and 29 female control's left hands reveal that pattern is significantly different among the cases and controls ($p<0.05$, $x^2=21.67$). It has also been found from here that 1) in 'dat' angle, occurrence of 50 to 52 degrees is rarely available (3.4%) among the cases and abundantly available among the controls (20.6%).2) occurrence of 62 to 64 degrees is more abundant among the cases (10.3%) than the controls (3.4%). B) Frequency distribution of degrees in 'dat' angle of 27 male cases and 31 male controls (Table.6, Fig.6) in their left hands indicates that pattern is significantly different among the cases and controls ($p<0.05$, $x^2=50.73$). Also we note from here that 1) in 'dat' angle, occurrence of 56 to 58 degree is lesser among the cases (14.8%) than the controls (38.7%). 2)similarly, occurrence of 59 to 61 degree is also lesser among the cases (25.9%) as compared to the controls (32.2%). 3)Occurrence of 50 to 52 degree is more abundant in cases(11.1%)than the controls(3.2%).4)Among controls none was found having 62 to 64 degree, as compared to 18.5% among cases.5)Both in cases and controls, none was found having 47 to 49 degrees. C)Frequency distribution of degrees in 'atd' angle of right hands of 27 male cases and 29 male controls (Table 7,Fig.7) shows pattern is significantly different among the cases and controls ($p<0.05$, $x^2=48.73$). It has also been observed from here that 1) both in cases (33.3%) and controls (41.3%)there is highest occurrence of 40 to 42 degrees and 2) lowest occurrence of 46 to 48 degrees (cases 3.7%, controls 13.8%). 3) however, occurrence of both of the said degrees are lesser among cases (3.7%, 46 to 48 degrees; 33.3%,

40 to 42 degrees) as compared to the controls (13.8%, 46 to 48 degrees; 41.3%, 40 to 42 degrees). 4)Further, occurrence of 37 to 39 degrees are also lesser among the cases (18.5%) than the controls (24.1%).D) Frequency distribution of degrees in 'atd' angle of left hands of 27 male cases and 29 male controls (Table 8,Fig.8)reveals that pattern is significantly different among the cases and controls ($p<0.05$, $x^2=13.97$). It has also been observed from here that 1) the cases (18.5%) outnumbers the controls (6.9%) in terms of occurrence of 34 to 36 degrees. 2) the occurrence of 40 to 42 degrees is lesser among cases (14.8%)as compared to the controls (51.7%). 3) The occurrence of 43 to 45 degrees is more among cases (29.6%) than the controls (20.7%). 4) Although among controls, none were found having 49 to 51 degrees and 52 to 54 degrees, but occurrence of both of the degrees were observed among the cases (3.7% each in both of the degrees).

In desert part of Rajasthan, the Raikas are well known for annual migration along with their domesticated Camels/ & cattle, and consumption of Camel milk for partial fulfilment of religious norms and daily dietary intake. This is believed that occurrence of Diabetes Mellitus is very rare among the Raikas, on account of their habitual intake of Camel milk. Therefore, the association of dermatoglyphics and T2DM has been attempted among 65 respondents from Raika community of Keru and Salawas village, Jodhpur. Total readable prints from these 65 Raika respondents were 58, as 7 respondent's hand surface were observed dilapidated for their occupation as labour/ road leveller. There is strong association between male (53.6%) and female (37.8%) whorl occurrences in right hand digits of the Raikas ($p<0.05$)(Table.10). Consistent with this, their left hand digits also revealed differences between the male (50.3%) and the females (41.0%), though these relations were not significant.

Normally, Whorls are distributed on the 1st and 4th digits predominantly. Out of total 75 whorls on right hands of 28 Raika non-diabetic males, the higher frequency of Whorls were observed on 1st (78.6%) and 4th (64.3%) fingers. Similarly, out of 55 whorls on right hands of 28 female non-diabetics of Raika, the 1st (60.7%) and 4th (53.6%) digits contained higher frequency of Whorls.

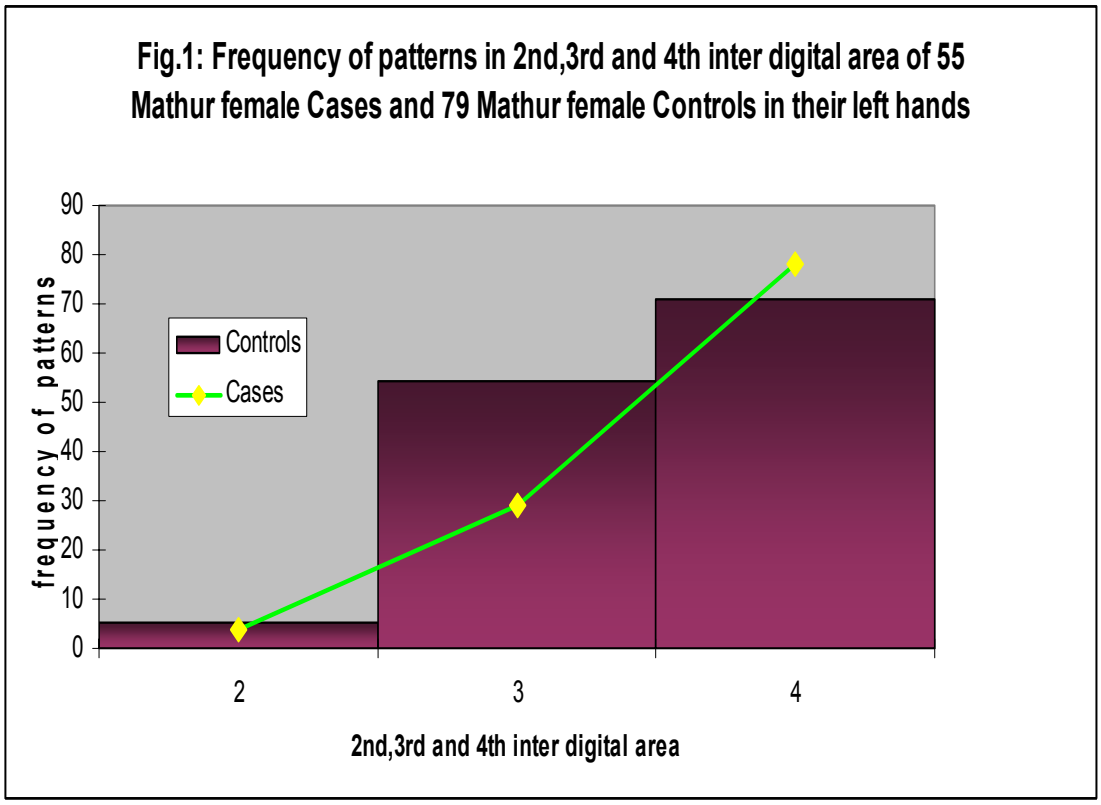
Utilization of the findings

Multiple parameters of dermatoglyphics, emerged as prime significant factors (e.g. reduced frequency of patterns in 3rd inter-digital area of palm, reduced 'a-b' ridge counts on palm, reduced ridge count on 3rd digit, occurrence of respective degrees in dat and atd angles and their relative difference among the Cases and controls etc.) involved with T2DM cases and controls will be analysed and degree of enhancement will be measured step by step statistically so that the appropriate combination of the prime powerful factors can be derived through Logistic Regression Analysis and that will focus the predictive strength of dermatoglyphics of diabetics among the Mathur, which is one of the Mendelian population groups of Rajasthan, investigated under present study.

Table 1. Frequency of palmar patterns in interdigital area of cases and controls of Mathur families

Palm area	Sex	T2DM N=99				Control N=49			
		Left		Right		Left		Right	
		No.	%	No.	%	No.	%	No.	%
2nd interdigital	M	2	4.6	6	13.6	4	5.7	10	14.3
	F	2	3.6	2	3.6	4	5.1	6	7.6
3rd interdigital	M	16	37.2	22	50.0	35	50.0	42	60.0
	F	16	29.1 *	26	47.3	43	54.4*	51	64.5
4th interdigital	M	27	62.8	26	59.1	51	72.8	48	68.6
	F	43	78.2	36	65.4	56	70.9	52	65.8

*P<0.05



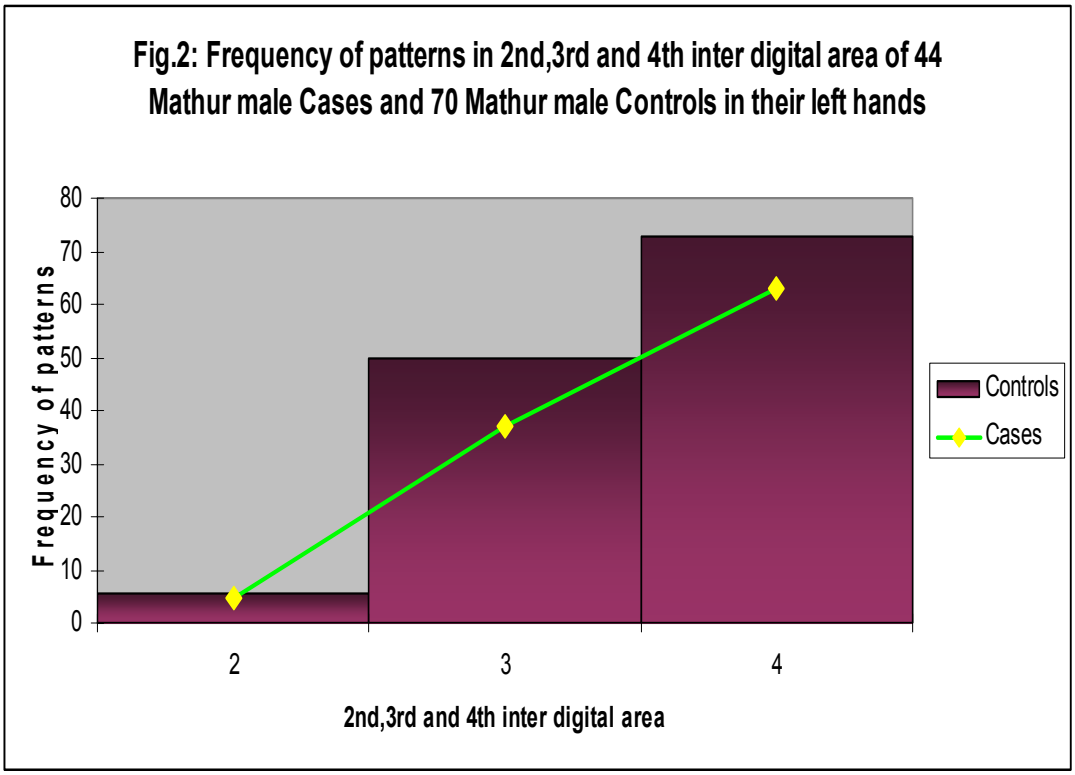


Table.2. Frequency of fingertip patterns in Right hands of cases and controls of Mathur families

Patterns	Female cases N=55		Controls N=79		Male cases N=44		Controls N=70	
	Total (Right)	%	Total (Right)	%	Total (Right)	%	Total (Right)	%
Whorls	106	38.7	149	37.7	100	45.4	171	49.6
Ulnar Loop	160	58.4	219	55.4	103	46.8	153	44.3
Radial Loop	1	0.4	6	1.5	1	0.4	4	1.1
Arch	0	-	5	1.3	4	1.8	1	0.3
Tented Arch	3	1.1	5	1.3	3	1.4	1	0.3
Imploding/Falling Loop/Arch with Loop/Flame	4	1.4	11	2.8	9	4.1	15	4.3
Total readable prints	274	100	395	100	220	100	345	100

*NS.p>0.05

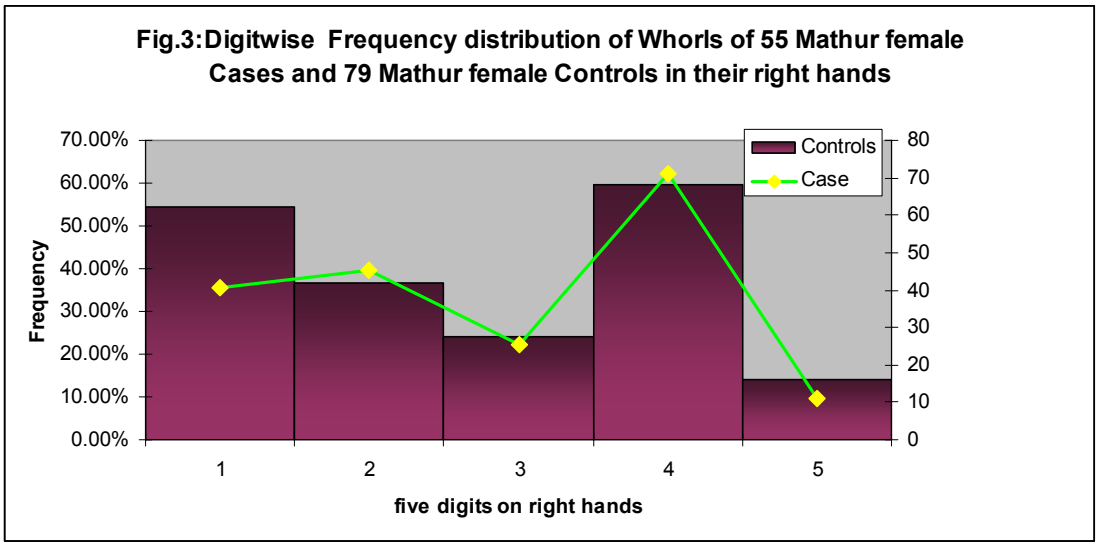


Table 3. Frequency Distribution of Female Cases and Controls in Mathur families according to number of whorls on 10 digits

Patterns	T2dm females		Female controls	
	Right & left hands digits	%	Right & left hands digits	%
3-10 Whorls	39	70.9	45	56.9
0-2 Whorls	16	29.0	34	43.0
Total	55	99.9	79	99.9

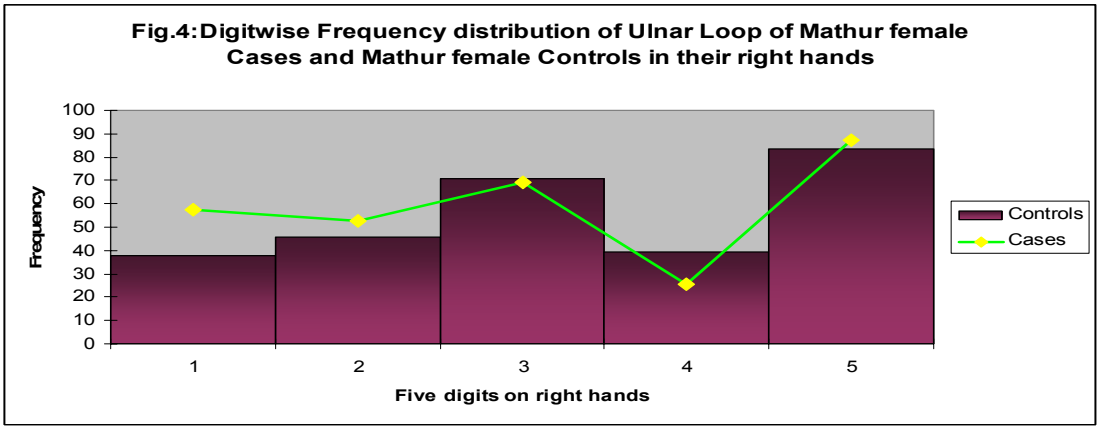


Table 4. Frequency of fingertip patterns on Left hand digits of Mathur families

Patterns	Female Cases N=55		Controls N=79		Male Cases N=44		Controls N=70	
	Total (Left)	%	Total (Left)	%	Total (Left)	%	Total (Left)	%
Whorls	123	45.4	169	42.8	109	50.7	167	48.4
Ulnar Loop	127	46.9	192	48.6	85	39.5	159	46.1
Radial Loop	4	1.5	8	2.0	2	0.9	0	0
Arch	5	1.8	7	1.7	10	4.6	4	1.1
Tented Arch	6	2.2	9	2.3	3	1.4	2	0.6
Imploding/Falling Loop/Arch with Loop /Flame	6	2.2	10	2.5	6	2.8	13	3.8
Total readable prints	271	100	395	100	215	100	345	100

Table 5. Frequency distribution of degrees in 'dat' angles of left hands of Mathur families (female)

Degrees	Controls N=29		Case N=29	
	No.	%	No.	%
44-46	0	0	1	3.4
47-49	1	3.4	1	3.4
50-52	6	20.6	1	3.4
53-55	4	14.0	4	14.0
56-58	10	34.5	9	31.0
59-61	6	20.6	7	24.1
62-64	1	3.4	3	10.3
65-67	0	0	3	10.3
68-70	1	3.4	0	0

*P<0.05, $x^2 = 21.67$

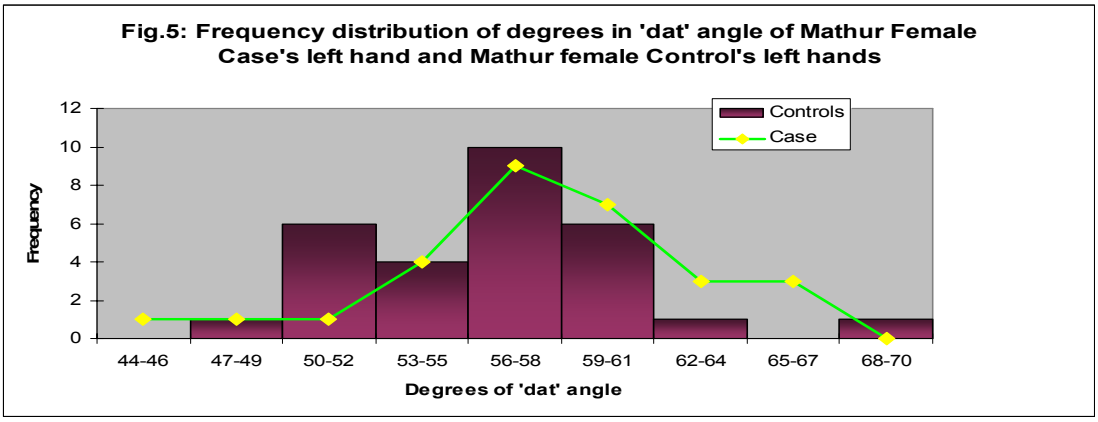


Table 6. Frequency distribution of degrees in 'dat' angles of left hands of Mathur families (male)

Degrees	Controls N=31		Case N=27	
	No.	%	No.	%
44-46	1	3.2	1	3.7
47-49	0	0	0	0
50-52	1	3.2	3	11.1
53-55	7	22.6	7	25.9
56-58	12	38.7	4	14.8
59-61	10	32.2	7	25.9
62-64	0	0	5	18.5

*P<0.05, x^2 =50.73

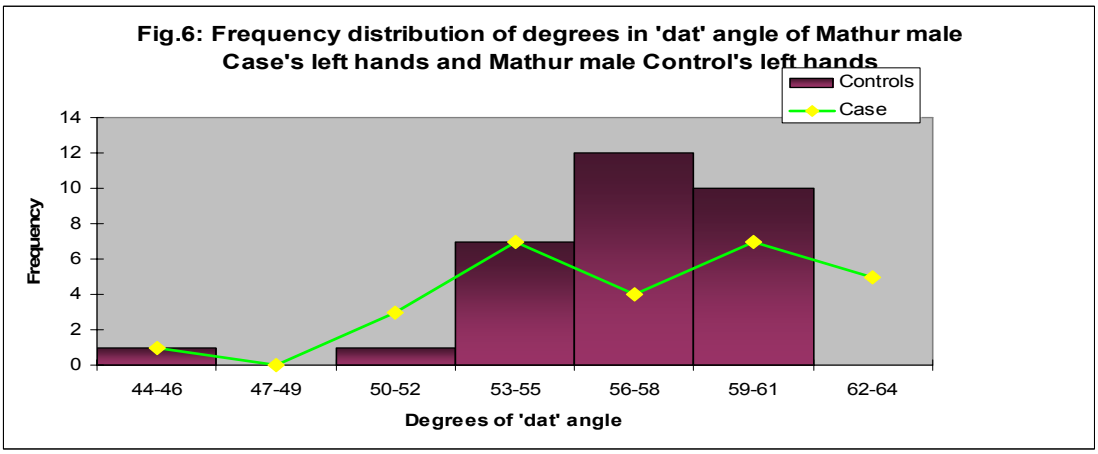


Table 7. Frequency distribution of degrees in 'atd' angles of right hands of Mathur families (male)

Degrees	Control N=29		Case N=27	
	No.	%	No.	%
34-36	0	0	5	18.5
37-39	7	24.1	5	18.5
40-42	12	41.3	9	33.3
43-45	6	20.7	5	18.5
46-48	4	13.8	1	3.7
49-51	0	0	2	7.4
52-54	0	0	0	0

(*p<<0.05), x^2 = 48.73

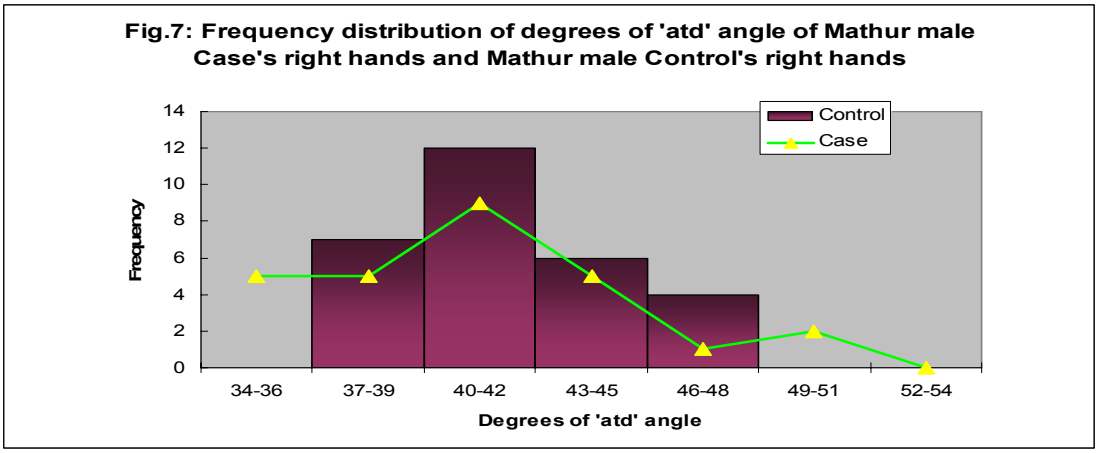


Table 8. Frequency distribution of degrees in 'atd' angles of left hands of Mathur families (male)

Degrees	Controls N=29		Case N=27	
	No.	%	No.	%
34-36	2	6.9	5	18.5
37-39	4	13.8	5	18.5
40-42	15	51.7	4	14.8
43-45	7	20.7	8	29.6
46-48	2	6.9	3	11.1
49-51	0	0	1	3.7
52-54	0	0	1	3.7

*P<0.05, x^2 = 13.97

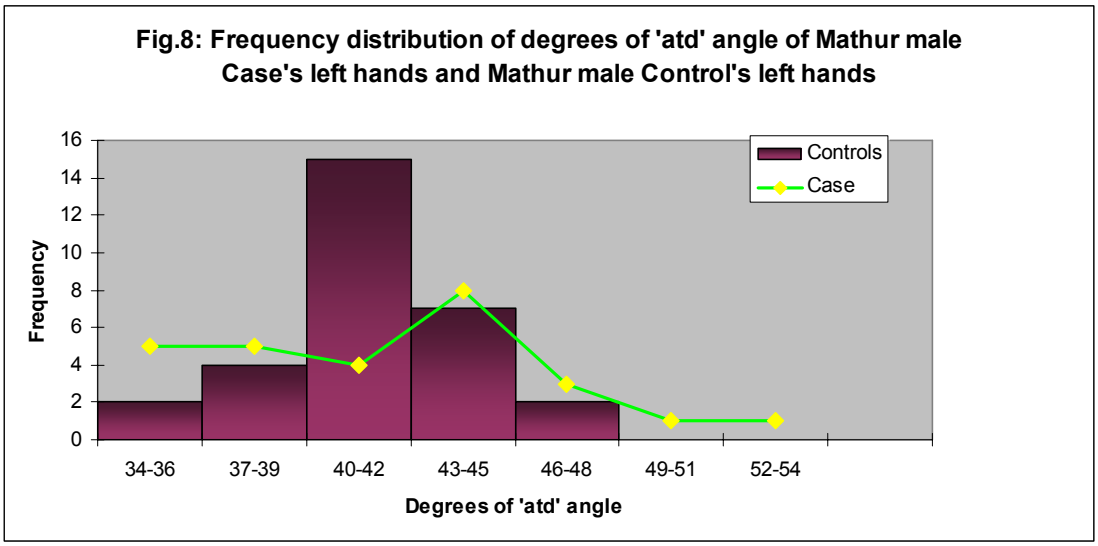


Table 9. Frequency distribution of Pattern Intensity Index (PII) among Cases and Controls of Mathur and Raika families

Study Group	No.	Triradius in Right hand	Triradius in Left hand	Total Triradius in 10 digits	PII
Female cases (Mathur)	55	368	380	748	13.6
Female controls (Mathur)	79	534	552	1086	13.7
Male Cases (Mathur)	44	303	304	607	13.8
Male controls (Mathur)	70	493	496	989	14.1
Female controls (Raika)	29	186	180	366	12.6
Male controls (Raika)	29	203	207	410	14.1

Table 10. Percentage distribution of fingertip patterns on 10 hand digits of Raika community

Patterns	Male Control N=29		Female Control N=29		Male Control N=29		Female Control N=29	
	Total (Right)	%	Total (Right)	%	Total left)	%	Total (left)	%
Whorls	75*	53.6	53*	37.8	73	50.3	57	41.0
Double Loop Whorl	8	5.7	8	5.7	9	6.2	9	6.5
Shell Whorl	2	1.4	11	7.9	8	5.5	17	12.2
Target Whorl	6	4.3	10	7.1	6	4.1	5	3.6
Central Pocket	13	9.3	5	3.6	12	8.3	8	5.7
Elongated Whorl	12	8.6	0	-	5	3.4	2	1.4
Plain Whorl	31	22.1	18	12.8	24	16.6	16	11.5
Accidental whorl	3	2.1	1	0.7	9	6.2	0	-
Ulnar Loop	56	40.0	73	52.1	63	43.4	67	48.2
Radial Loop	3	2.1	1	0.7	1	0.7	2	1.4
Arch	1	0.7	6	4.3	1	0.7	8	5.8
Tented Arch	2	1.4	2	1.4	2	1.4	5	3.6
Imploding/Falling Loop/Arch with Loop/Flame	3	2.1	5	3.6	5	3.4	0	-
Total readable prints	140	100	140	100	145	100	139	100

*P<0.05

2.5 Study of Bio-Cultural Risk Factor Assessment for Type 2 Diabetes: Consortium for the Family Studies of Genetics of Type 2 Diabetes in Indian Populations. (The Anthropological Survey of India) - *Bela Shah and P. K. Dam*

Commencement: June, 2008 **Duration**: Three years **Status**: Concluded

Objectives

1. Initiate a consortium for multidisciplinary genetic epidemiologic studies of type 2 diabetes (T2DM) and its correlated disease conditions such as obesity and the metabolic syndrome (MS) in three genetically and culturally diverse endogamous caste communities at high risk for T2DM and related phenotypes from the states of Karnataka, Andhra Pradesh, and Rajasthan by establishing a mutually beneficial collaboration.

2. Conduct a complex pedigree-based study from each of the three communities to examine the genetic determination of susceptibility to T2DM and its related disease conditions by recruiting 1,000 individuals from about 50 large families from each community that will be ascertained on type 2 diabetic probands. Approximately 50 families with a minimum of 20 individuals per pedigree will be included. Thus, for a given community, the total target is 1,000 individuals. All first, second, and third degree relatives of probands aged 18 years or above will be asked to participate in the study.

Progress of Work

Demography, Pedigree, Anthropometry, Dietary and Psychological protocols / schedules were finalized and pre- tested. During first phase of the study, it was decided to cover 1000 individuals from 50 Proband's families in Jodhpur and to collect data for pedigree and demographic aspect, which has been carried out. Four, out of 29 proband's family Pedigree/demographic data collected so far, have been analyzed and presented here (Table1-2.). Further analysis of data is being carried out to assess what percentage of T2DM probands is having two diabetic parents or one diabetic parent. The Anthropological Survey of India, Kolkata closed the study during August, 2009.

Table. 1. Frequency distribution of T2DM cases and non-diabetics in bilateral pedigrees of 4 probands

Probands	T2DM Male	T2DM Female	Control male	Control female	Total Respondents in the family (Family=Household+kin)	Deceased	below 18 yrs	Respondents migrated	Non cooperative families	Total Respondents interviewed
1	22	24	123	110	279	70	26	52	35	96
2	10	15	95	84	204	22	17	37	20	108
3	15	11	111	92	229	30	14	72	5	108
4	1	7	62	45	115	5	0	21	0	89
Total	48	57	91	331	827	27	57	182	60	401

Table 2. Frequency distribution of age specific T2DM cases in the families (Family= Household+ Kins)

Age (years)	Total members in family (household and kins)	No. of diabetics in family	Prevalence (%)
Below 20	75	0	0.0
20-29	35	1	3.3
30-39	32	4	12.5
40-49	43	12	25.6
50-59	42	15	33.3
60-69	21	8	38.1
70-79	18	7	38.8
80+	7	1	14.3
Temporarily migrated/deceased/age to be confirmed	554	*57	10.3
TOTAL	827	105	12.6%

*Known cases of T2DM, as reported by family members & confirmed by prescriptions, etc.

3.1 Impact assessment of consumption of the two electrolyte products on the mineral profile and general health & nutrition profile of Adult population in desert areas of Rajasthan - *Madhu B. Singh and K. S. Premavalli**

Commencement: August, 2008 **Duration:** Nine months **Status:** Completed

Project Coordinators: Dr. Bela Shah, Director, DMRC and Dr. A. S. Bawa, Director Defence Food Research Laboratory

Objectives

1. To observe the impact of supplementation of the two electrolyte products on mineral profile (blood) of Adults of the desert areas

2. To study the effect of supplementation of the two electrolyte products on the general health & nutrition profile of Adults of the desert areas

Progress of the work

Two products i.e. two natural electrolytes, Tender coconut water and Ashgourd juice have been developed by the Defence Food Research Laboratory, Mysore and the two products have been taken up for the study. These products have been supplied by DFRL, Mysore. Double blind randomized controlled trial has been conducted to test the efficacy of the two products separately i.e. Group one- Tender coconut water and group two-Ashgourd juice. Third group to which only mineral water has been supplied. A household (HH) served as one single unit for the purpose of administration of products. Each HH under study has been followed up every month up to two months. Based on the reported 40 percent prevalence of MDDs based on Urinary Iodine Excreture level (UIE levels) in desert area, we need to administer 112 HHs for administration of one product. Allowing for non-response error, we need to cover 130 HHs for administration of one preparation. It was proposed to select 2 villages forming a contiguous field in rural part of Jodhpur, which represents a desert district.

In this project, two villages namely Salwa and Kharwali forming a contiguous field in rural part of Jodhpur tehsil of Jodhpur district have been selected. The HHs of these villages first listed fully, then allocated randomly in to three groups. Each group was then administered one product. Norms of double blind trial were adhered to. Two products i.e. two natural electrolytes, Tender coconut water and Ashgourd juice have been taken up for the study. Double blind randomized controlled trial has been conducted to test the efficacy of these two products separately i.e. Group one- Tender coconut water and group two-Ashgourd juice. Third group was controlled group to which mineral water was supplied.

*Defence Food Research Laboratory, Mysore

Information for demographic and socio-economic aspects has been collected. Before and after supplementation, all the enrolled adults have been examined for the general health and nutrition profile i.e. morbidity profile for last 15 days with special emphasis on Gastritis, Muscle weakness, Burning of foot, Over breathing, Muscle irritability, Urinary Tract Infection (UTI) and Thirstiness and anthropometry i.e. height and weight. All the anthropometric measurements were taken following standard techniques.

In this project, 390 adults (15-45 years) have been registered and categorized into three groups for supplementation of two products and mineral water (Table 1). The data was collected on 390 adults (15-45 years) from selected households (HHs) located in two villages. The data have been collected on all the parameters mentioned below in all the enrolled adults before initiation and also after the completion of the intervention program in this area. These villages were visited to supply the products to all enrolled adults for two months. All the registered adults were instructed to consume one bottle (200 ml) of the supplied electrolyte products empty stomach early in the morning every day up to two months. They have been instructed that they should not consume anything up to half an hour after consumption of the electrolyte product.

After the completion of the intervention program in this area, overall non response was 17.7 percent. Non response for Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water was 17.4, 21.1 and 14.4 percent respectively. A total of 321 adults were examined for all parameters after intervention. Reasons for non response were 'non co-operation', 'not good taste' and 'gone outside due to urgent work'. Even in these 321, 45 adults had not given their blood samples due to fear but given rest of the information i.e. product wise non response excluding those adults who had not given their blood samples after supplementation were 28.5, 32.8 and 26.3 percent in product No. 1 i.e. Tender coconut water, product No. 2 i.e. Ashgourd juice and product No. 3 i.e. Mineral water respectively (Tables 2-5)

Table 1. Age and sex wise distribution of population covered before supplementation

Age Group	**Product No. 1 Tender coconut water**			**Product No. 2 Ashgourd juice**			**Product No. 3 Mineral water**		
Years	M	F	T	M	F	T	M	F	T
15-25	23	42	65	19	38	57	24	30	54
26-35	10	35	45	13	21	34	11	26	37
36-45	16	18	34	16	21	37	14	13	27
POOL N=390	**49**	**95**	**144**	**48**	**80**	**128**	**49**	**69**	**118**

Table 2. Age and sex wise distribution of population covered after supplementation

Age Group	Product No. 1 Tender coconut water			Product No. 2 Ashgourd juice			Product No. 3 Mineral water		
Years	M	F	T	M	F	T	M	F	T
15-25	18	32	50	16	29	45	20	27	47
26-35	9	30	39	9	17	26	7	23	30
36-45	13	17	30	11	19	30	12	12	24
POOL N=321	**40**	**79**	**119**	**36**	**65**	**101**	**39**	**62**	**101**

Table 3. Age and sex wise distribution of population given blood samples after supplementation

Age Group	Product No. 1 Tender coconut water			Product No. 2 Ashgourd juice			Product No. 3 Mineral water		
Years	M	F	T	M	F	T	M	F	T
15-25	15	28	43	12	23	35	19	25	44
26-35	7	27	34	8	15	23	3	20	23
36-45	11	15	26	10	18	28	9	11	20
POOL N=276	**33**	**70**	**103**	**30**	**56**	**86**	**31**	**56**	**87**

Table 4. Product wise Non response in population covered after supplementation

Product	Male	Female	Total	Percent
Product No. 1 Tender coconut water	9	16	25	17.4
Product No. 2 Ashgourd juice	12	15	27	21.1
Product No. 3 Mineral water	10	7	17	14.4

Table 5. Product wise Non response excluding those adults who have not given blood After supplementation

Product	Male	Female	Total	Percent
Product No. 1 Tender coconut water	16	25	41	28.5
Product No. 2 Ashgourd juice	18	24	42	32.8
Product No. 3 Mineral water	18	13	31	26.3

Data collected in the field have been computerized under the supervision of biostatistician. The computer program has been developed in FOX- PRO and EPI-INFO-2002 software and used for analyzing the data. As regards to the specific analysis, the extant of increase in mineral profile of Na and K in serum have been carried out and the same have been compared before and after the initiation of the supplementation of the products using students t-test in order to observe its impact. Statistical test of significance has been applied in other associated parameters such as anemia, UIE, Morbidities, Nutritional deficiencies and Chronic energy deficiencies in order to observe the impact of electrolyte products before and after the supplementation.

Results

It was revealed from analysis that illiteracy was high among women i.e. ranging from 65.2 to 68.7 percent, whereas, in case of males, the range was from 18.4 to 25 percent. It was also observed that 13.6 percent of population belong to low income group (monthly income less than Rs. 900/=), 25.9 percent belong to low middle income group (monthly income between Rs. 901-1500) and 16.7 percent belong to upper middle income group (monthly income between Rs. 1501-2500).

Distribution of adults according to percent increase in serum K before and after supplementation in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water have been done. Overall increase in serum K was 65 percent which is significantly higher than decrease ($P< 0.01$) in Product No. 1 i.e. Tender coconut water. Increase was 69.6 percent in males and 62.9 percent in females. Overall increase was 61.6 percent, significantly higher than decrease ($P< 0.05$) in Product No. 2 i.e. Ashgourd juice. Increase was higher in females i.e. 64.3 percent as compare to males (56.7 %). Increase was also observed in Product No. 3 i.e. Mineral water 70.1 percent. The range of percent increase in serum K before and after supplementation was observed mainly in the range of 0 to 5 mEq/l for all three products.

The overall increase in mean values of serum K before and after supplementation. Overall mean value of serum K raise from 5.06 mEq/l to 5.23 mEq/l in Product No. 1 i.e. Tender coconut water, 5.01 mEq/l to 5.17 mEq/l in Product No. 2 i.e. Ashgourd juice ($P<0.05$) and from 5.05 mEq/l to 5.22 mEq/l in Product No. 3 i.e. Mineral water. In Product No. 1 i.e. Tender coconut water, increase in mean values was more in 15-25 years age group followed by 26-35 years age group and the increase was observed more in males as compare to females.

Distribution of adults according to percent increase in serum Na before and after supplementation in three products. Overall 53.4 percent adults showed increase in serum Na in case of Product No. 1 i.e. Tender coconut water and increase was observed more in 15-25 years age group and 26-35 years age groups. In case of Product No. 2 i.e. Ashgourd juice, increase was observed only in 48.8 percent of adults which was more in case of females (53.6 %) than males (40.0 %). In case of Product No. 3 i.e. Mineral water, increase was observed 56.3 percent.

Analysis revealed that in Product No. 1 i.e. Tender coconut water, maximum rise in serum Na was in the range of 5 to <10 mEq/l (19.4 %), followed by equal or more than 10 mEq/l (17.5 %), whereas, in Product No. 2 i.e. Ashgourd juice, maximum rise was in equal or more than 10 mEq/l range (18.6 %). In case of Product No. 3 i.e. Mineral water, maximum increase was only in the range of 0 to 5 mEq/l (25.3 %).

The rise in mean values of serum Na before and after supplementation in all the three products. Overall rise of mean values of serum Na was from 136.42 mEq/l to 139.02 mEq/l in Product No. 1 i.e. Tender coconut water, whereas, from 136.9 mEq/l to 137.43 mEq/l in Product No. 2 i.e. Ashgourd juice. No change was observed in Product No. 3 i.e. Mineral water. Overall rise in serum Na mean value was observed more in case of Product No. 1 i.e. Tender coconut water i.e. 2.60 mEq/l in comparison to Product No. 2 i.e. Ashgourd juice (0.44 mEq/l).

The distribution of adults according to anemia on the basis of Hb estimation as prescribed by WHO in different products before and after supplementation was analyzed. In Product No. 1 i.e. Tender coconut water, significant decline of anemia (Hb <13 mg/dl in males & Hb <12 mg/dl in females) was observed i.e. from 60.5 percent to 34.5 percent ($P<0.01$). The decline was found significant in 15-25 years age group in females as well as in pool group. The percentage of non anemic adults before and after supplementation was 39.5 percent and 65.5 percent respectively. In Product No. 2 i.e. Ashgourd juice, overall anemia reduction was from 60.2 to 33.0 percent ($P<0.05$). Overall anemia declined in both males and females. The percentage of non anemic adults before and after supplementation was 39.8 percent and 67.0 percent respectively. In Product No. 3 i.e. Mineral water too, the anemia was found declined from 55.0 to 25.5 percent.

Casual urine samples of all registered adults were collected before and after supplementation. Estimation of Urinary Iodine Excretion (UIE) level was determined in laboratory by WET digestion technique. The percentage of adults deficient in UIE levels declined significantly from 61.1 percent to 22.6 percent ($P<0.001$) in Product No. 1 i.e. Tender coconut water. In Product No. 2 i.e. Ashgourd juice, decline was observed i.e. from 63.1 percent to 13.8 percent, which was found statistically significant ($P<0.001$). Decline was significant in both males and females. In Product No. 3 i.e. Mineral water, the decline was from 64.3 to 18.6 percent.

Anthropometrically, height and weight were taken of all adults before and after supplementation of different products and on the basis of which Body Mass Index (BMI) was as prescribed by WHO in different products before and after supplementation. Before supplementation, Chronic energy deficiency (BMI<18.5) was observed in 42.8 percent adults in case of Product No. 1 i.e. Tender coconut water, 60.4 percent for Product No. 2 i.e. Ashgourd juice and 53.1 percent in Product No. 3 i.e. Mineral water. After supplementation Chronic energy deficiency (CED) declined from 42.8 to 36.9 percent, 60.4 to 57.6 percent and 53.1 to 48.7 percent in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively, however, were found statistically

insignificant. Slight decline in obesity was also observed i.e. from 8.3 to 7.8 percent and 7.8 to 7.3 percent in Product No. 1 i.e. Tender coconut water and Product No. 2 i.e. Ashgourd juice respectively, but found statistically insignificant.

All the registered adults were examined before and after supplementation for general health profile i.e. morbidities for last 15 days with special emphasis on Gastritis, Muscle weakness, Burning bf of foot, Over breathing, Muscle irritability, UTI and Thirstiness. It was observed that the percentage of Gastritis declined from 52.1 to 40.3 percent and the decline was more in males (16.9 %) than females (9.1 %), but statistically insignificant in Product No. 1 i.e. Tender coconut water. In case of Product No. 2 i.e. Ashgourd juice, decline was from 50.0 to 29.7 percent, which was statistically significant ($P<0.05$) in both males and females. In Product No. 3 i.e. Mineral water, the decline was from 52.5 to 34.7 percent but statistically insignificant.

Muscle weakness declined significantly from 42.1 to 30.4 percent in females ($P<0.01$), whereas, overall decrease from 37.5 to 24.4 percent was in case of Product No. 1 i.e. Tender coconut water. In case of Product No. 2 i.e. Ashgourd juice, it declined from 38.3 to 21.8 percent whereas in Product No. 3 i.e. Mineral water, the decline was from 37.3 to 33.7 percent but statistically insignificant.

Overall burning of foot declined from 34.1 to 11.8 percent, 28.9 to 17.8 percent and 26.3 to 22.8 percent in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively but statistically insignificant.

Over breathing declined from 22.2 to 5.0 percent, 25.0 to 5.0 percent and 18.6 to 6.9 percent in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively but statistically insignificant.

Muscle irritability declined from 37.5 to 22.7 percent, 29.7 to 16.8 percent and 42.4 to 26.7 percent in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively but statistically insignificant.

Overall Urinary Tract Infection (UTI) declined from 34.7 to 16.0 percent in case of Product No. 1 i.e. Tender coconut water, 37.5 to 12.9 percent in Product No. 2 i.e. Ashgourd juice and 27.1 to 17.8 percent in Product No. 3 i.e. Mineral water respectively though statistically insignificant.

The percentage of Thirstiness declined significantly in case of males from 97.2 to 80.6 percent in case of Product No. 2 i.e. Ashgourd juice ($P<0.05$) whereas overall decline was from 87.1 to 83.2 percent though statistically insignificant. No significant change was observed in Product No. 1 i.e. Tender coconut water and Product No. 3.

Sickness at the time of survey was recorded in all registered adults before and after supplementation in different products and decline was also observed though statistically insignificant. Decline was from 18.8 to 11.8 percent in Product No. 1 i.e. Tender coconut water, 21.9 to 5.0 percent in Product No. 2 i.e. Ashgourd juice and 28.0 to 8.9 percent in Product No. 3 i.e. Mineral water.

Morbidities were recorded in all registered adults before and after supplementation of different products. Main morbidities reported were Fever, Gastrointestinal (GIT) and respiratory complaints. In case of Product No. 1 i.e. Tender coconut water, decline was observed in fever from 11.1 to 5.9 percent, GIT from 4.2 to 2.5 percent and upper respiratory infection (URI) from 2.8 to 2.5 percent, though statistically insignificant. In case of Product No. 2 i.e. Ashgourd juice, decline was in fever from 12.5 to 2.0 percent and GIT from 4.7 to nil, though statistically

insignificant. In case of Product No. 3 i.e. Mineral water, decline was observed in fever from 10.2 to 4.9 percent, GIT from 6.8 to 1.0 percent and respiratory from 6.8 to 3.0 percent though statistically insignificant.

All the registered adults were examined for clinical nutritional deficiencies before and after supplementation in different products. In case of Product No. 1 i.e. Tender coconut water, signs of Protein Energy Malnutrition i.e. Hair dispigmentation declined from 2.1 to 1.7 percent, Glossitis (Vitamin B- complex deficiency) from 7.6 to nil, Vitamin C deficiency from 9.0 to 0.8 percent, Thyroid enlargements from 3.5 to 2.5 percent and calf tenderness from 40.3 to 1.7 percent, though statistically insignificant. In case of Product No. 2 i.e. Ashgourd juice, decline was observed in Glossitis (Vitamin B- complex deficiency) from 7.1 to 0.9 percent, Vitamin C deficiency from 6.2 to 2.8 percent, thyroid enlargements from 5.5 to 1.9 percent and calf tenderness from 37.5 to 1.9 percent, though statistically insignificant. In Product No. 3 i.e. Mineral water, slight decline was observed in Glossitis (Vitamin B- complex deficiency) from 5.1 to 2.9 percent, and Vitamin C deficiency from 9.3 to 2.8 percent, though statistically insignificant.

All registered adults were requested to bring salt samples consumed in their households for estimation of iodine in salt only before supplementation. Analysis revealed that only 19.8, 18.1, and 14.2 percent in Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively consumed adequately iodized salt in their households. It was observed that high percentage of adults i.e. 80.2 to 85.8 percent consumed inadequately iodized salt in their households.

Important Findings

The residents of the desert areas are in a constant state of stress due to extreme environmental conditions of desert area which in turn affects the mineral (K & Na) and general health and nutritional profile of the adults of this area. Supplementation of two electrolyte products has affected the mineral profile (blood), general health & nutrition profile of Adults of the desert areas, in the following manner.

- Demographic profile of registered adults revealed that illiteracy was high among women i.e. ranging from 65.2 to 68.7 percent, whereas, in case of males, it ranged from 18.4 to 25.0 percent. Population belonging to low income group (monthly income less than Rs. 900/=) was 13.6 percent, whereas, 25.9 percent belong to low middle income group (monthly income between Rs. 901-1500) and 16.7 percent belong to upper middle income group.

- Study revealed that electrolyte products had positive effect on the increase of serum K among adults of this area. Overall significant increase in serum K was observed in Product No. 1 i.e. Tender coconut water (65.0 %) and Product No. 2 i.e. Ashgourd juice (61.6 %) as both the products are rich in natural source of potassium ($P< 0.05$). In Product No. 1 i.e. Tender coconut water, increase was higher in males. Maximum adults showed increase in serum K in the range of 0 to 5 mEq/l in all three products. Overall increase in mean values of serum K before and after supplementation was observed in Product No. 1 i.e. Tender coconut water (raise from 5.06 mEq/l to 5.23 mEq/l), Product No. 2 i.e. Ashgourd juice (5.01 mEq/l to 5.17 mEq/l) and Product No. 3 i.e. Mineral water (5.05 mEq/l to 5.22 mEq/l). In Product No. 1 i.e. Tender coconut water, increase in mean values was more in

15-25 years age group followed by 26-35 years age group and the increase was observed more in males than females.

- The impact of supplementation of electrolyte products was also seen in enhancing the Na in serum before and after supplementation. Overall increase was seen in 53.4 percent, in case of Product No. 1 i.e. Tender coconut water and 48.8 percent in Product No. 2 i.e. Ashgourd juice. In Tender coconut water, the increase was observed more in 15-25 years age group and 26-35 years age groups. Maximum rise in serum Na was in the range of 5 to 10 mEq/l (19.4 %) followed by ≥ 10 mEq/l (17.5 %) in Product No. 1 i.e. Tender coconut water, whereas, in Product No. 2 i.e. Ashgourd juice, it was in ≥ 10 mEq/l range (18.6 %). Increase was also seen in case of Product No. 3 i.e. Mineral water which may be due to the fact that adults of this area never take mineral water in their routine life. But maximum increase of serum Na was only in the range of 0 to 5 mEq/l (25.3 %).
- Rise in mean values of serum Na between before and after supplementation was also observed in case of Product No. 1 i.e. Tender coconut water and Product No. 2 i.e. Ashgourd juice but no change was observed in Product No. 3 i.e. Mineral water. Overall rise was more in Product No. 1 i.e. Tender coconut water i.e. 2.60 mEq/l in comparison to Product No. 2 i.e. Ashgourd juice (0.44 mEq/l).
- The supplementation of electrolyte products also had positive effect on enhancing the Haemoglobin values of adults i.e. reducing the percentage of anemia after supplementation. Significant decline of anemia was observed ($P<0.01$) in Product No. 1 i.e. Tender coconut water (60.5 to 34.5 %), Product No. 2 i.e. Ashgourd juice (60.2 to 33.0 %) and in Product No. 3 i.e. Mineral water (55.0 to 25.5 %). Decline was observed in males and females both.
- The supplementation of electrolyte products also had positive effect on Iodine nutriture. The percentage of adults deficient in UIE levels declined significantly ($P<0.001$) in case of Product No. 1 i.e. Tender coconut water (61.1 to 22.6 %), Product No. 2 i.e. Ashgourd juice (63.1 to 13.8 %) and Product No. 3 i.e. Mineral water, (64.3 to 18.6 %). Decline was significant in males and females both.
- The supplementation of electrolyte products also had positive effect on malnutrition i.e. reducing the Chronic energy deficiency (BMI<18.5) after supplementation. Chronic energy deficiency (CED) declined from 42.8 to 36.9 percent, 60.4 to 57.6 percent and 53.1 to 48.7 percent in case of Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively, but statistically insignificant.
- The supplementation of electrolyte products also had positive effect on general health profile i.e. morbidities for last 15 days with special emphasis on Gastritis, Muscle weakness, Burning of foot, Over breathing, Muscle irritability, UTI and Thirstiness. Gastritis declined significantly from 50 to 29.7 percent ($P<0.05$) both in males as well as in females in case of Product No. 2 i.e. Ashgourd juice whereas in Product No. 1 i.e. Tender coconut water, decline was from 52.1 to 40.3 percent though statistically insignificant. Muscle weakness declined significantly from 42.1 to 30.4 percent in females ($P<0.01$) whereas overall decrease was from 37.5 to 24.4 percent in case of Product No. 1 i.e. Tender coconut water and 38.3 to 21.8 percent in case of Product No. 2 i.e. Ashgourd juice, though statistically insignificant.
- Overall burning of foot declined from 34.1 to 11.8 percent, 28.9 to 17.8 percent and 26.3 to 22.8 percent in case of Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water respectively. Over breathing declined

from 22.2 to 5.0 percent, 25.0 to 5.0 percent and 18.6 to 6.9 percent in case of Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water, respectively. Muscle irritability declined from 37.5 to 22.7 percent, 29.7 to 16.8 percent and 42.4 to 26.7 percent in case of Product No. 1 i.e. Tender coconut water, Product No. 2 i.e. Ashgourd juice and Product No. 3 i.e. Mineral water, respectively. Overall Urinary Tract Infection (UTI) declined from 34.7 to 16.0 percent in case of Product No. 1 i.e. Tender coconut water, 37.5 to 12.9 percent in Product No. 2 i.e. Ashgourd juice and 27.1 to 17.8 percent in Product No. 3 i.e. Mineral water, respectively. Decline was observed in all these morbidities, though statistically insignificant. The percentage of Thirstiness declined significantly in case of males from 97.2 to 80.6 percent in Product No. 2 i.e. Ashgourd juice ($P<0.05$).

- The supplementation of electrolyte products also had positive effect on Sickness at the time of survey after supplementation in different products and decline was also observed in case of Product No. 1 i.e. Tender coconut water (18.8 to 11.8 %) and Product No. 2 i.e. Ashgourd juice (21.9 to 5.0 %) though statistically insignificant. Decline in Gastrointestinal (GIT), fever and respiratory complaints were also observed though statistically insignificant. Decline in nutritional deficiencies was also observed in adults after supplementation mainly in Vitamin B- complex deficiency, Vitamin C deficiency, signs of Protein Energy Malnutrition, thyroid enlargements and calf tenderness in case of Product No. 1 i.e. Tender coconut water and Product No. 2 i.e. Ashgourd juice, though found statistically insignificant. High percentage of adults i.e. 80.2 to 85.8 percent consumed inadequately iodized salt in their households.

Recommendations

1. The supplementation of electrolyte products had positive effect on mineral profile i.e. serum K and serum Na in rural adults residing in desert areas of Rajasthan who are in a constant state of stress due to extreme environmental conditions of desert. This will be helpful to health functionaries in designing operational pack rations for residents of this area.
2. The supplementation of electrolyte products had improved haemoglobin levels and declined anemia significantly in adults of the desert area. The findings suggest that the electrolytes can also be included, in the ongoing national programs in the study/arid areas.
3. The supplementation of electrolyte products also had positive effect on iodine nutriture, malnutrition and general health profile especially gastritis and muscle weakness of desert area. Efforts should be made further research in this direction.
4. Study suggests large scale field trial to validate/strengthen these findings in desert area.

3.2 Assessment of Iodine deficiency disorder, Anemia and Nutrition Intervention in school age children of Jodhpur district of Rajasthan-

*Madhu B. Singh and K. S. Premavalli**

Commencement: **July, 2008** **Duration:** two years **Status:** Ongoing

Project Coordinators: Dr. Bela Shah, Director, DMRC and Dr. A. S. Bawa, Director Defence Food Research Laboratory

Objectives

1. To study the distribution and magnitude of the Iodine deficiency disorders and anemia in school age children of Jodhpur district.

2. Assessment of the extant of use of iodized salt by the community of Jodhpur district.

3. To study the effect of supplementation on micronutrient deficiency disorders

Progress of work

Project activities included working on sampling plan in detail. According to WHO/ UNICEF/ICCIDD, for school based survey, 30 cluster sampling approach have to be adopted keeping in view the operational feasibility. Recently DGHS (2005) has given new guidelines for sampling according to which sample size is calculated on the basis of prevalence of IDD as 10 %, level of confidence - 95 %, relative precision- 20 % and design effect - 2. Using formula $(Z\alpha)^2 Q / (L^2) P$, sample size worked out to be 1800 children from the district or 1800 / 30 = 60 children per cluster for goiter and cretinism. Salt and urine samples along with blood on filter paper for haemoglobin estimation have been collected from 30 % of the children examined. At first step, listing of all the government and private schools with children 6-11 years of age from both rural and urban areas have been listed from district education office of Jodhpur. Secondly cumulative enrollment has been determined. Finally schools have been selected using PPS sampling technique as recommended by WHO. In the selected schools, children have been selected randomly using Tippets random number table. Equal proportion of boys and girls and proportionate distribution of children from 6-11 years have been covered in the selected school. Till now data has been collected from 23 schools covering 1380 school age children.

From each selected child, information for socio-demographic aspects has been collected. Each child interviewed / examined for the nutritional deficiency signs. Iodine deficiency disorders have been assessed by clinical examination of thyroid gland using the

*Defence Food Research Laboratory, Mysore

standard method as recommended by the joint WHO / UNICEF / ICCIDD consultation. A casual urine sample has been collected for estimation of Urinary Iodine Excretion (UIE) levels to asses the Iodine nutriture status. Iodine has been determined by wet digestion method using standard laboratory technique. UIE level less than 10 mcg/dl have been considered as indicator of iodine deficient nutriture. 30 percent of children selected randomly were requested to bring their urine sample and sample of 20 gm.salt consumed in their families in auto seal LDPE pouches. Iodine content of salt sample was estimated using standard iodometric titration method. Salt samples having iodine content less then 15 ppm was classified as with inadequate iodine. Anemia was be assessed by clinical signs (platinichia and koilonichia). Hemoglobin levels were estimated using Cyanmethaemoglobin technique and have been classified as per WHO classification.

Nutrition intervention will be conducted on 15 percent of school children i.e. 270. These children will be supplied with supplements daily for the period of 180 days. These supplements have been developed in Defense Food Research Laboratory, Mysore. These products 180 days supplementation for all above mentioned parameters observing the impact of the supplements on reduction of micronutrient deficiency disorders on school children of Rajasthan.

Analysis of 1380 school age children is under process. Data will be collected from 7 schools covering 420 school age children. Nutrition intervention will be conducted on 10 percent of school age children i.e. 260. These children will be re-examined after period of 180 days supplementation for all above mentioned parameters observing the impact of the supplements on reduction of micronutrient deficiency disorders on school children of Rajasthan. Nutrition intervention will be started after receiving the supplements from DFRL, Mysore. It is under process.

3.3 Nutrition Monitoring Survey on NNMB pattern in Jodhpur district of Rajasthan - *Madhu B. Singh, J. Lakshminarayana and Ranjana Fotedar*

Commencement: January, 2005 **Duration:** Long Term **Status:** Ongoing

Objectives

1. To develop continuous monitoring service to study the nutritional status, dietary habits, food availability and the effect of changing social and environmental factors on the health status of the population.

2. Aim at doing comparisons with other states data so as to assess the percentage of variation among the states.

Progress of the work

Project activities included working on sampling plan in detail. Similar sampling design and protocol was adopted for the Nutrition Monitoring type of survey for carrying out in Rajasthan, as it is being done in other states where NNMB is in operation. The sampling adopted here was two stage stratified random sampling method in which the villages in selected district formed the first stage units (FSU's) while in the village households (HH's) formed the second stage units. For the study purpose the district has been divided in to different strata in rural areas as per the tehsils with agro-economic regions and based on the population size of the village i.e. <2000 and >=2000 populated villages. In the urban area three wards were selected.

From each stratum i.e. Tehsil, five villages were chosen randomly for the purpose of the survey in different direction one each from North, South, East, West and central part, to have proper representation of the tehsils in the district. Households in each village have been selected by adopting cluster sampling procedure for the purpose of the survey. A total of five clusters of four households each were selected from each village. Generally, the households in a village can be divided into natural "groups/areas" by geographical location such as streets/mohallas/areas. The SC/ST population often lives in a separate group/area in the villages. One cluster was selected from SC/ST group/area while the remaining 4 clusters were selected by systematic random sampling procedure, probability proportion to size of the group. In each cluster, by selecting a random start, 4 contiguous households were covered. For logistic reasons Jodhpur district was decided to be covered first and later on to expand horizontally in other districts of the state in the similar pattern.

Third phase has been completed in which 30 villages were covered from six tehsils of Jodhpur district i.e. Jodhpur, Osian, Phalodi, Shergarh, Bilara and Bhopalgarh (five villages from each tehsil), covering 600 households. Fourth phase has been started in which 50 percent new villages and 50 percent old villages have been selected randomly in view to cover variation. A total of 20 villages were covered from six tehsils of Jodhpur district i.e. Jodhpur, Osian, Shergarh, Bilara and Bhopalgarh, and Phalodi covering 400 households. The entire selected household was examined for Socio-demographic and Socio- economic aspects. All the members

in the household have been examined for nutritional deficiency signs, anthropometric measurements (Height, weight, arm circumference and FFT), Dietary intake (24 hours recall method) and examination of nutritional morbidities in preceding 15 days. Dietary intakes of the individuals information were recorded in alternate houses i.e.10 households from each village are covered.

Analysis of 600 households covering 3478 individuals of the third phase has been done. Table 1 showed age and sex wise distribution of population (1811 males and 1667 females). Analysis revealed that 94.8 percent of population was Hindus and 5.2 percent Muslims. Nuclear families were significantly more (67.5 %) as compare to 14.7 % joint families (Tables 2). Table 3 revealed that illiteracy is significantly high in females (62.6 %) than males (32.7 %). Higher education is very low in this area i.e. 4.3 percent.

Table 1. Age and sex wise distribution of population covered

Age group	Males	%	Females	%	Total	%
0-5	300	16.6	278	16.6	578	16.6
6-9	211	11.6	175	10.5	386	11.0
10-14	237	13.1	247	14.9	484	13.9
15-17	125	6.9	99	5.9	224	6.4
18– 29	363	20.0	329	19.8	692	19.9
30-39	205	11.3	202	12.1	406	11.7
40-49	149	8.2	134	8.0	283	8.2
50-59	97	5.4	105	6.4	203	5.8
>=60	124	6.9	98	5.9	222	6.5
Total	1811	100.0	1667	100.0	3478	100.0

Table 2. Distribution of households according to type of family

Type of family	N	%
1. Nuclear	405	67.5
2. Extended Nuclear	107	17.8
3. Joint	88	14.7
Pooled	600	100.0

1Vs2 $P<0.01$, 2 Vs 3 $P>0.05$, 1 Vs 3 $P<0.01$

Table 3. Distribution of population according to educational status

Educational status	Males	%	Female	%	Total	%
Illiterate	592	32.7	1044	62.6	1636	47.0
Read & Write	51	2.8	30	1.8	81	2.3
1-4 Standard	363	20.0	264	15.9	627	18.0
5-8 Standard	392	21.7	218	13.0	610	17.6
9-12 Standard	255	14.0	41	2.5	296	8.5
College	75	4.2	4	0.2	79	2.3
N. A.	83	4.6	66	4.0	149	4.3
Pooled	1811	100.0	1667	100.0	3478	100.0

X^2=307.943, P<0.01

Main morbidities observed in population were acute respiratory infection (11.9 %) and fever (10.6 %) followed by diarrhea (0.4 %). Both the morbidities i.e. acute respiratory infection and fever were significantly higher in females than males (Table 4). Regarding nutritional deficiency signs, it is observed that discoloration and sparseness of hair, a sign of protein calorie malnutrition was observed to be high i.e.8.5 percent which was significantly higher in females than males. Marasmus was observed only in females (0.05 %). Angular stomatitis, cheliosis and glossitis were ranging from 1.8 to 3.9 percent. Vitamin A deficiency i.e. Night blindness and Bitot spot were 0.1 and 1.2 percent, higher in males than females. Dental caries (34.8 %) and dental fluorosis (26.3 %) observed high in this area. Females suffered significantly more from dental caries and dental fluorosis than males (Table 5). Koilonychia, a sign of anemia, was observed in 0.08 percent.

Table 4. Distribution of population according to Morbidity

Morbidity	Males N=1811	%	Females N= 1667	%	Total N=3478	%
N.A.D.	1484	81.9	1205	72.3	2689	77.3
Fever	149	8.2	219	13.1*	368	10.6
Diarrhoea	6	0.3	6	0.4	12	0.4
Dysentery	5	0.3	5	0.3	10	0.3
A. Res. Infection	180	9.9	233	14.0*	413	11.9
Measles	2	0.1	2	0.1	4	0.1
GIT	19	1.0	31	1.9	50	1.4

* P<0.05

Table 5. Distribution of population according to Nutritional deficiency signs

Deficiency Signs	Males N=1811	%	Females N= 1667	%	Total N=3478	%
Hair Discolour	84	4.6	211	12.7*	295	8.5
Hair Sparseness	4	0.2	10	0.6	14	0.4
Emaciation	0	0.0	0	0.0	0	0.0
Marasmus	0	0.0	1	0.05	1	0.02
Night blindness	3	0.2	2	0.1	5	0.1
Bitot spots	24	1.3	17	1.0	41	1.2
Angular Stomatitis	25	1.4	37	2.2	62	1.8
Chelosis	45	2.5	59	3.5	104	3.0
Glossitis	61	3.4	75	4.5	136	3.9
Koilonychia	1	0.06	2	0.1	3	0.08
Gums-spongy Bleeding	29	1.6	54	3.2	83	2.4
Dental Caries	465	25.7	731	43.9**	1196	34.4
Dental Fluorisis	354	19.5	561	33.6**	915	26.3
Thyroid gland palpable	4	0.2	12	0.71	16	0.46
Thyroid gland visible	0	0.0	1	0.05	1	0.02

* P<0.05, ** P<0.01

The weights of pre-school children were expressed as percent of NCHS standards and categorized into different nutritional grades, based on Gomez classification (Tables 6-7). The overall prevalence of under nutrition was very high i.e. 77.4 percent which was higher in SC community (79.6 %) in comparison to ST and communities. The overall prevalence of severe under nutrition was high i.e. 5.4 percent. Under nutrition was higher in nuclear families (79.2 %) and observed maximum in kutcha houses (80.9%) followed by pucca houses, statistically significant association. The percent prevalence of severe under nutrition was higher in low income group (6.9 %) than high income group where as reverse trend was observed in case of mild under nutrition i.e. more in high income group (38.7 %) (Fig. 1).

Table 6. Distribution of 1-5 years children according to Gomez distribution and Type of family

Type of Family	N	Nutritional Grades*			
		Normal	Mild	Moderate	Severe
1. Nuclear	260	20.8	45.7	28.5	5.0
2. Extended	89	21.3	43.8	27.0	7.9
3. Joint	80	30.0	36.3	30.0	3.7
Pooled	429	22.6	43.6	28.4	5.4

$\chi^2_4 = 3.659$ P<0.01 * NCHS Standards

Table 7. Distribution of 1-5 years children according to Gomez distribution and type of house

S. No.	Type of House	N	Nutritional Grades*			
			Normal	Mild	Moderate	Severe
1.	Kutcha	42	19.1	40.5	38.0	2.4
2.	Semi Pucca	255	18.4	45.5	29.4	6.7
3.	Pucca	132	31.8	40.9	23.5	3.8
Pooled		429	22.6	43.6	28.4	5.4

$\chi^2_6 = 126.3$ $P<0.05$, * NCHS Standards

The extent of different types of malnutrition viz. stunting (Height for age) and under nutrition (Weight for age) were computed by adopting standard deviation classification using NCHS as well as WHO standards. All the children with any of the above anthropometric measurement less than Median-2SD of NCHS values were considered as undernourished. Prevalence of under nutrition computed using Gomez classification and SD classification differ as the cut off values are different.

Stunting (Height for age) was 57.1 percent in preschoolers with the prevalence of severe stunting 36.4 %, which needs attention. It's higher than NNMB (49.3 %) and NFHS III (33.7 % - up to 3 years) where as lower than DMRC Phase I (71.6 %) and DMRC Phase II (62.1 %) as shown in Fig. 2. Stunting computed by adopting standard deviation classification using WHO standards was 59.7 percent in preschoolers with the prevalence of severe stunting 40.3%.

Underweight (Weight for age) in preschoolers observed 58.3 %, higher than NFHS III (44.0 %). The proportion of severe underweight was high (23.8 %) (Fig. 3) Both stunting and underweight were observed higher in males than females though statistically insignificant. Declining trend has been observed in stunting and underweight in comparison to Phase one and Phase II study. Underweight in preschoolers observed was 56.2 percent using WHO standards.

Fig.1. Gomez classification according to Per Capita Income (Rs.) in preschoolers

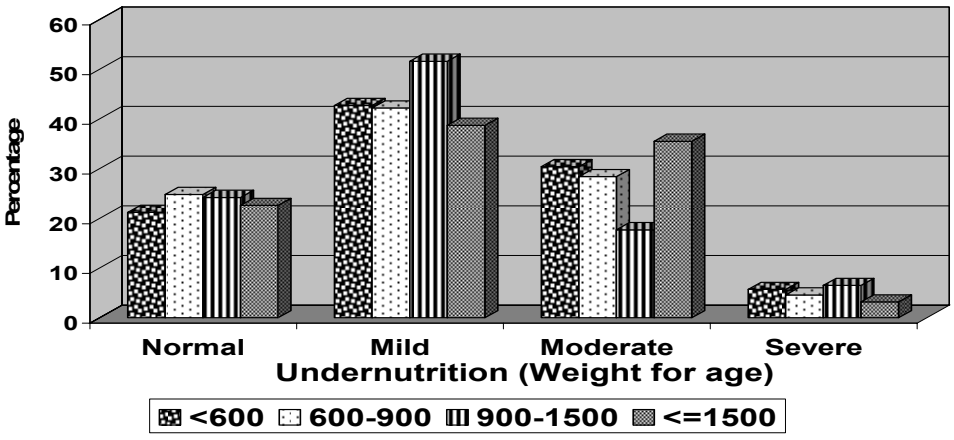


Fig.2. Standard Deviation Classification for Height foe Age in Preschoolers

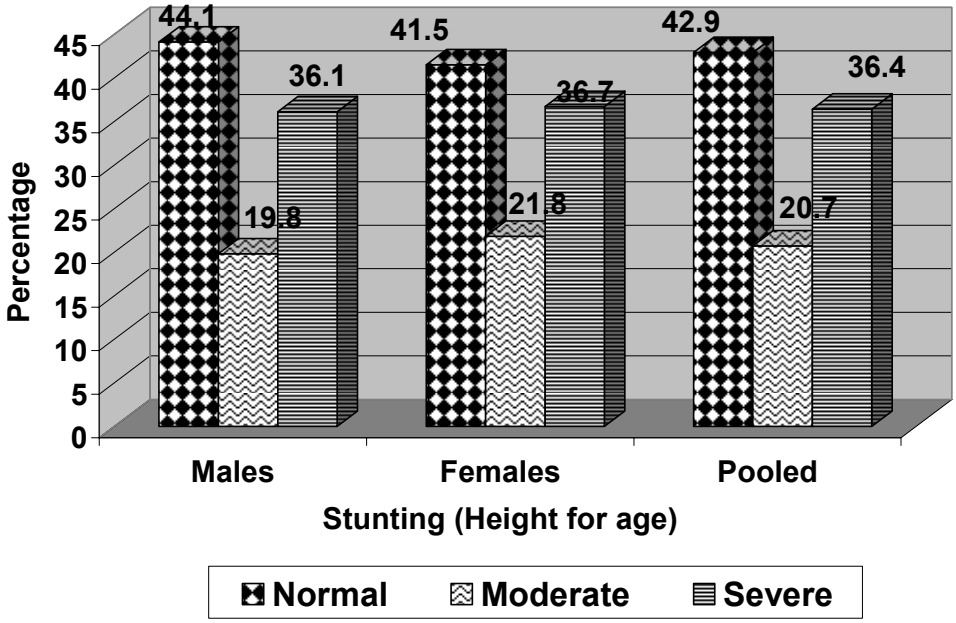
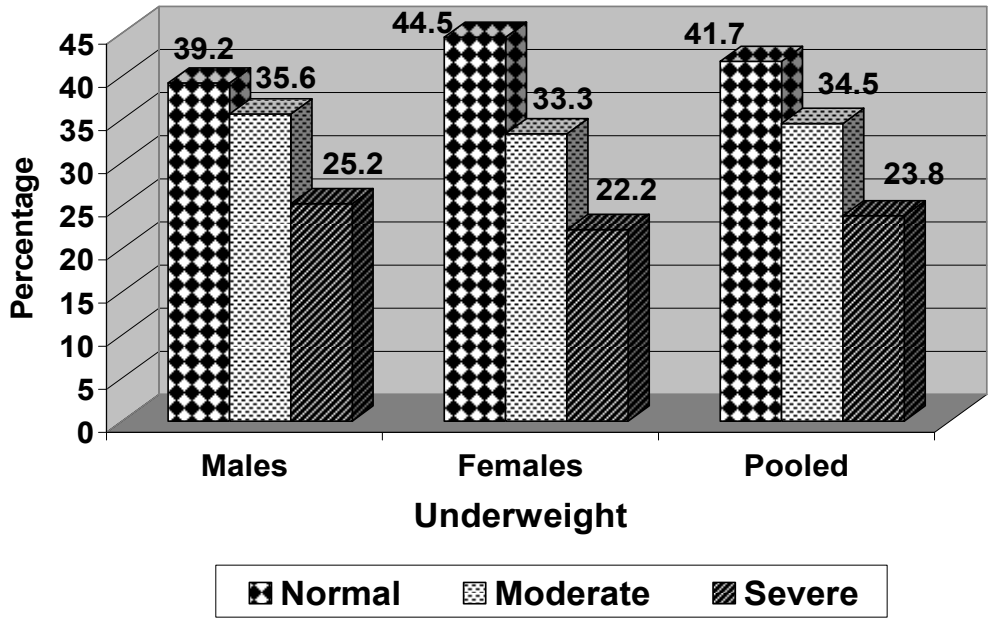


Fig.3. Standard Deviation Classification for Weight for Age in Preschoolers



The distribution of adults according to BMI grades have been shown in Tables 8 to 10. At the aggregate level, 54.3 percent had normal BMI (18.5-25.0), while 34.5 percent had chronic energy deficiency (Fig. 4). Severe chronic energy deficiency was higher in joint families (6.7 %) than extended families (4.6 %) and maximum in pucca houses (7.0 %) though statistically insignificant. Chronic Energy deficiency declined with increase of per capita income i.e. 39.8 percent in low income (<300 Rs.) and 24.3 percent in high income group (≥ 1500 Rs.).

Table 8. Distribution of adults (>=18 years) according to BMI classification

Gender	Obese II ≥ 30	Obese I 25-30	Normal 20-25	Low wt Normal 18.5-20	CED I 17-18.5	CED II 16-17	CED III <16
1. Male N=323	1.2	8.7	30.0	21.4	23.1	9.9	5.7
2. Female N=626	2.2	9.6	36.9	19.0	17.7	8.5	6.1
Pooled N=959	1.9	9.3	34.5	19.8	19.6	9.0	5.9

$\chi^2_{1,2}$ = 84.2 P<0.01

Fig.4. Body Mass Index in Adults

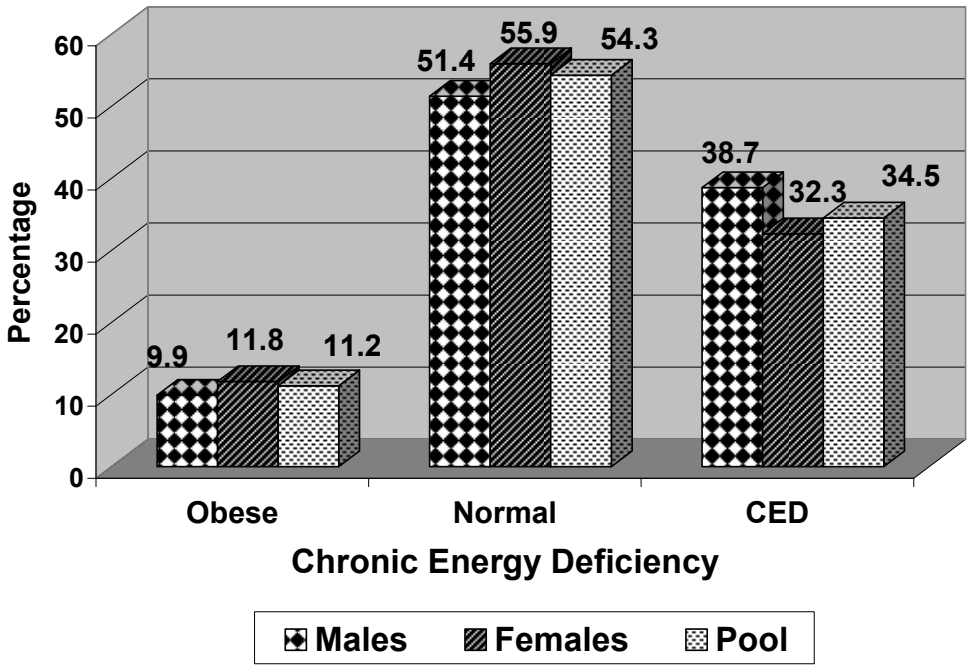


Table 9. Distribution of adults (>=18 years) according to BMI classification and type of family

Type of Family	Obese II >=30	Obese I 25-30	Normal 20-25	Low wt Normal 18.5-20	CED I 17-18.5	CED II 16-17	CED III <16
1.Nuclear N=566	1.2	9.0	34.6	18.9	21.6	8.5	6.2
2.Extended N=198	3.0	11.1	34.8	22.2	16.7	7.6	4.6
3. Joint N=195	2.6	8.2	33.8	20.0	16.9	11.8	6.7
Pooled N=959	1.9	9.3	34.5	19.8	19.6	9.0	5.9

P>0.05

Table 10. Distribution of adults (>=18 years) according to BMI classification and type of house

Type of House	Obese II >=30	Obese I 25-30	Normal 20-25	Low wt Normal 18.5-20	CED I 17-18.5	CED II 16-17	CED III <16
1.Pucca N=342	3.2	12.0	35.7	19.6	17.2	7.9	4.4
2.Kutcha N=64	0.0	4.7	40.6	18.8	20.3	10.9	4.7
3. Mixed N=553	1.3	8.2	33.1	20.0	21.0	9.4	7.0
Pooled N=959	2.8	7.9	34.0	20.8	17.9	9.5	7.0

P>0.05

Dietary intake was collected on 880 adults (448 males and 432 females) and 774 children (375 males and 384 females). Dietary analysis revealed that diet of adults was marginally low in consumption of Cereals & Millets i.e. 84.6 and 75.6 percent of RDA in males and females respectively where as 80 percent in DMRC phase I and 77.2 percent in Phase II. Deficit was more in girls (21.9 %) than boys (15.4 %) in children. Maximum deficit was in 1-3 years age group. Consumption of Pulses & Legumes was very low in children i.e. deficit ranges from 43.2 to 90.6 % of RDA where as in adults it was 56.9 to 58.1 percent. In consumption of Fats & Edible Oil, deficit ranges from 73.4 to 88.8 % of RDA in children where as in adults it was 66.1 percent. Green Leafy Vegetables deficit was very high. Consumption of Roots & Tubers meets the requirement in most of age groups except adults where deficit was (30.6 and 23.6 percent in males and females respectively). Deficit in consumption of milk and its products was more in children than adults i.e. 37.2 to 55.6 percent in children where as 19.2 percent in adults.

Average energy intakes (calories) was less than RDA in all age groups i.e. 1-3, 4-5, 7-9, 10-12, 13-15, 16-17 years and adults ranging from 45.8 to 98.8 percent, lower than DMRC phase I (59.0 to 99.2 %) and DMRC phase II (53.5 to 85.9 percent). Calorie deficit was observed more in children (3.3 to 54.2 %) than adults (5.7 to 15.9 %) and observed highest in 1-3 years group (49.5 to 51.8 %) followed by 4-6 and 7-9 years groups. Deficiency in protein intakes was observed only in 1-3 (5.1 %) followed by 4-6 and 16-17 years age group. Diet of preschoolers (1-6 years) and adolescents (13-17 years age group was deficient in fats (17.5 to 55.1 % & 14.3 to 37.5 %), where as range in DMRC phase I was 19.6 to 34 percent and observed highest in 1-3 years group (41.0 to 42.3 %) followed by 4-6 and 7-9 years groups and in DMRC Phase II,

diet of preschoolers and juvenile adolescents was deficient in fats (6.6 to 42.3 %). Vitamin A intakes (β carotene) in their diet was below the RDA only in preschoolers i.e. deficit ranging from 31.0 to 42.6 percent. Preschoolers suffered from Thymine and Riboflavin deficiencies in their diet where as Niacin consumption was deficient in diet of most of age groups, more in preschoolers (25.1 to 50.1 %). Diet of all individuals in all age groups was deficient in intakes of Vitamin C (43.5 to 83.7 %), maximum in 1-3 years age group (76.0 to 83.7 %) and minimum in adults (48.0 to 52.8 %).

Fig.5.Distribution of Preschoolers according to SD classification

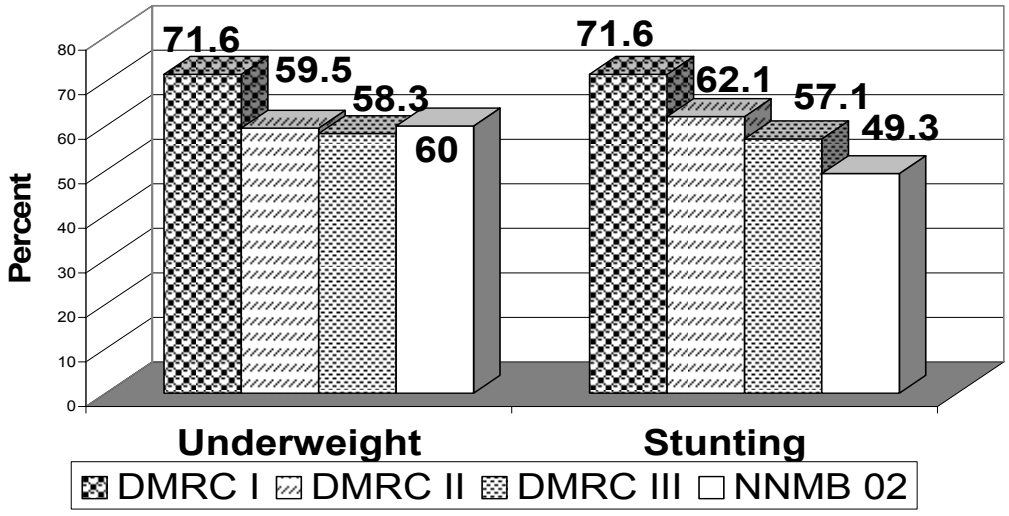
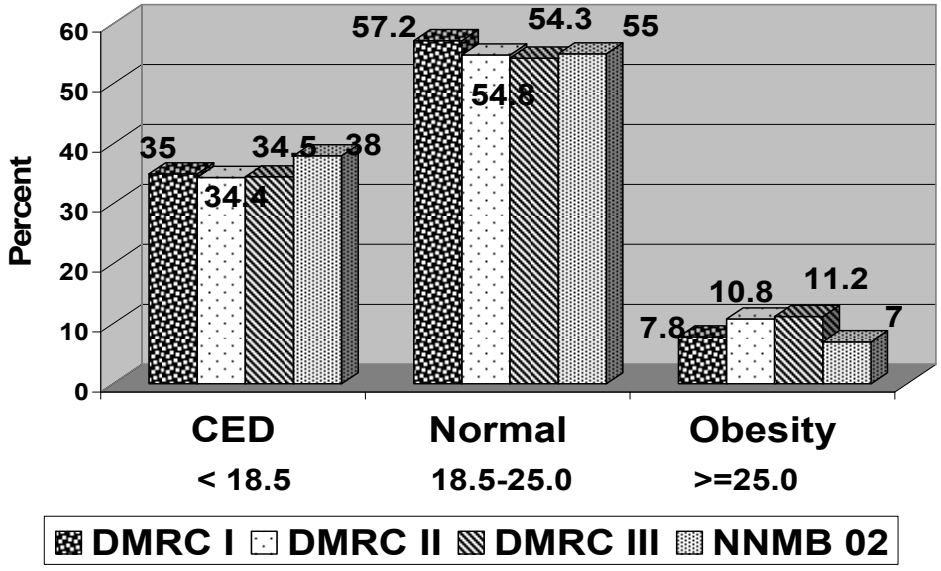


Fig.6. Distribution of Adults by BMI grades



Trends revealed that there is gradual decline in stunting and underweight in preschoolers on comparing between three phases i.e. DMRC Phase I, DMRC Phase II and DMRC Phase III studies, whereas, slight decline in chronic energy deficiency and incline in obesity in adults was observed (Fig. 5 & 6). Trends revealed that high illiteracy, poor economic conditions along with high deficiencies in their diet played important role for higher nutritional deficiencies, under nutrition and stunting especially more in children and chronic energy deficiency in adults of this region. After completion of fourth phase, fifth phase will be started in which 50 percent new villages and 50 percent old villages will be selected randomly in view to cover variation. Comparison of results of different Phases will be done in order to develop continuous monitoring service to study the nutritional status, dietary habits, food availability and the effect of changing social and environmental factors on the health status of the population and will continue year wise

3.4 Validity of Spot Testing Kit in the Assessment of Iodine Content of Salt - A Multicentric Study- *Madhu B. Singh*

Commencement: September, 2008 **Duration:** Six months **Status:** Ongoing

Project Coordinator: Dr. Umesh Kapil, Professor, Human Nutrition Deptt., AIIMS, New Delhi

Objective

1. To assess the validity of the Spot Testing Kit against the standard iodometric titration in the estimation of iodine content in salt

Introduction

The present multicentric research project is being conducted at four Centres in the country, namely, Baroda, Jodhpur, Dibrugarh and AIIMS, Delhi. The research project is co-ordinated by the Human Nutrition Unit, All India Institute of Medical Sciences, New Delhi. Uniform protocol have been utilized at all the four Centres.

In this study, Jodhpur district has been selected. Centralized training of research staff has been done at AIIMS, Delhi. From Jodhpur district, one rural block/tehsil i.e. Bilara was selected randomly which was 75 km away from Jodhpur. The data was collected from five High Schools of Bilara tehsil of Jodhpur district selected randomly.

Progress of the work

A total of 780 school children belonging to five high schools of Bilara tehsil were provided LDPE pouches for collection of salt consumed at their households. The students were explained about the objectives of the study, importance of iodine in salt and it's role in the prevention of ill effects of iodine deficiency. The children were demonstrated how to open and close the auto-seal pouches. Information was written on the identification slip containing his name, class and section. Each child was requested to bring four spoonful i.e. 20 g of salt which is being consumed in the family from their kitchen the next day. One LDPE carry bag was given to the class teacher so that the salt pouches could be collected from the students on the next day. A total of 769 school children brought salt samples which were collected and brought to Nutrition lab of Jodhpur center for analysis. Centralized training of research staff was done at AIIMS, Delhi.

Analysis of 769 salt samples revealed that 100.0% of salt samples were of powdered variety (Table 1). It is revealed from analysis that high percentage of women kept the salt in Plastic containers (78.7%) followed by Wooden (9.7%), Steel (7.0%), Open (2.1%), iron (0.9%) and others (1.6%) at their households.

Table 1. Total Number of Salt Samples analyzed at Jodhpur Centre

Centre	No. of Salt Samples	Type of Salt Sample			
		Powdered		Crystalline	
		n	(%)	n	(%)
Jodhpur	769	769	(100.0)	0	(0.0)

Analysis of salt samples by iodometric titration and by STK method is under process. The iodine content of each salt sample will be estimated by two different methods i.e. IT and STK method and the results will be compared. The results of IT method will be used as reference standard for comparison. Guidelines for ensuring internal quality control for the IT methods will be followed.

3.5 Nutritional Status along with morbidity and mortality of Neonates & Infants in Jodhpur District- *Ranjana Fotedar, Madhu B. Singh and J. Lakshminarayana*

Commencement: Sept 2007 **Duration**: 2 years **Status**: On Going

Objectives

1. To study profile of Health and Nutritional Status of neonates by means of anthropometry and clinical examination for nutritional deficiency signs along with feeding practices and their follow up for 1 year age
2. To study the types of morbidity, mortality and their causes among neonates and infants

Progress of Work

So far new registrations of 300 newborns have been completed from 28 villages namely Jhalamand, Sangaria, Tanawada, Salawas, Nandwan, Saraecha, Sar, Mogar Kalla, Feach, Bacharna, Dhundada, Hanwant Nagar, Piparali, Dedas, Luni, Vishnu Nagar, Shikarpura, Chainpura Bhatan, Karnayali, Modi, Golia Magra, Madopur, Dudia, Nai Basti, Krishna Kheda, Sangasni Gao, Nimbla, Guda Bishnoi belonging to Salawas Community Health Centre of Luni Panchayat Samiti, Jodhpur district (Fig. 1). One ANM or Anganwadi workers were contacted at village level for reporting the new birth.

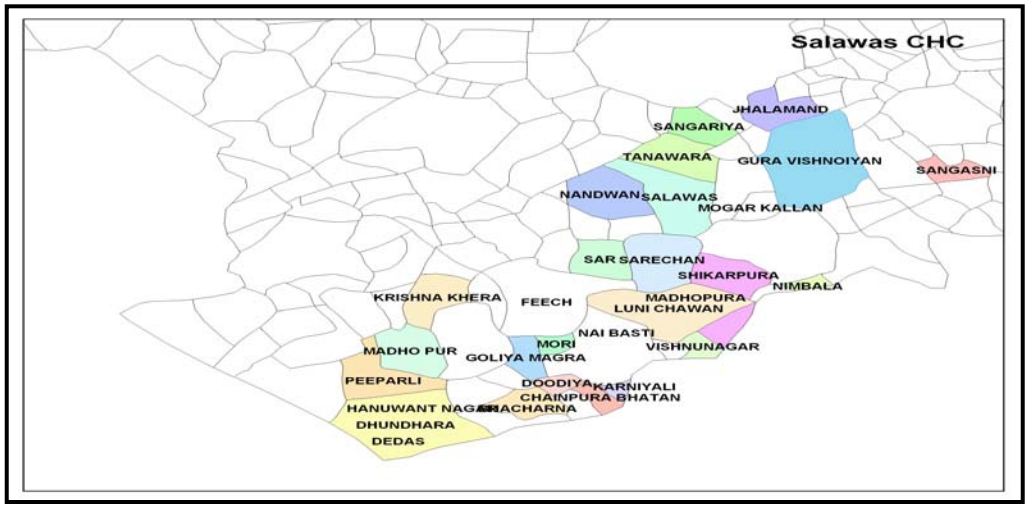


Fig. 1. Map of study villages

All the newborns were clinically examined for morbidity, mortality and nutritional deficiency signs, anthropometry (height i.e. Recumbent length, weight, arm circumference, chest circumference, head circumference and fat fold triceps following standard techniques of WHO) and feeding practices. The feeding practices of newborn were also recorded for nutritional assessment. Information on infant feeding practices comprising of both the breast-feeding as well as complementary feeding were also collected. The information on the socio-demographic, socio-cultural and economic causes responsible for mortality of neonates and infants were also recorded from mothers of each child registered in the study. Each registered child has been followed up every month for clinical examination and collection of above-mentioned information.

Table 1. Distribution of New Born according to Sex

New Borns (0-7 days)	No.	Percent
Male	144	48.00
Female	156	52.00
Total	**300**	**100.00**

Table 2. Distribution of New Born according to Morbidity Profile

Morbidity (N=300)	Newborns (0-7 days)	Percent
NAD	233	77.6
Fever	11	3.7
Vomiting	2	0.7
Diarrhea	1	0.3
Constipation	2	0.7
Stomach Ache (Colicky)	1	0.3
Respiratory (Common Cold & Cough)	2	0.7
Skin Infection (Boils) & Umbilical Infection	8	2.7
Congenital Abnormality (Bilateral Cleft lip & Hard Palate) & Urinary Problem	3	1.0
Ophthalmic Neonatorum	1	0.3

Table 3. Distribution of New Born according to Weight for Age

New Born (0-7 days) (N=300)	Nutritional Grades		
	Normal >= 2.5 Kg	Mild < 2.5 – 2.0 Kg	Severe < 2 Kg
No. Examined	251	42	7
Percent	83.7	14.0	2.3

Table 4. Distribution New Born according to Mortality

New Born (N=300)	No. of Death (13)
0-3 days	1
0-4 days	1
0-7 days	1
0-9 days	1
0-13 days	1
0-19 days	1
0-23 days	1
1 month & 14 days	1
2 month & 16 days	1
9 months & 7 days	1
10 months & 9 days	1
11 months & 23 days	1
12 months & 18 days	1

Table 5. Data on different types of Mortalities recorded during the study

Types	Age	No.	Per 1000's
Perinatal	0-7 days	3	10/1000
Neonatal	0-28 days	4	13.3/1000
Post-neonatal (Infant)	29-12 months (1 year)	6	20/1000

Preliminary analysis of 300 new borns has been done. The important observations arising from the analysis of the data collected so far have been given in tables 1-5 and summarized as follows:

- The sex-ratio of male and female new-borns was found to be 48.0 and 52.0% respectively.

- The percentage of low birth weight babies was 16.3%.

- Main Morbidities observed at the time of birth were Viral fever, Stomach ache, Diarrhea, Vomiting, Respiratory Infections (Common Cold & cough), Constipation, Skin Infection, Urine Problem, Umbilical Infection and Congenital Abnormality.

- The main causes of mortality observed in 13 studied children were - Fever (viral), Premature delivery, Stop Suckling, Congenital Abnormality-by lateral cleft lip & hard palate, Stiffed body, Convulsion, Pneumonia, High fever, Asthma, Jaundice, Diarrhea, Septicemia and absence of Immunization.

- Perinatal mortality -10 per thousand, Neonatal mortality –13.3 per thousand and Post-neonatal mortality - 20 per thousand.

- Infant Mortality Rate (IMR) – 43.3 per thousand, which was 76.9% at home and 23.1% at hospital.

- Final analysis of 300 neonates (0-7 days) will be done after completion of the follow up study.

3.6 Effect and impact of tobacco use and smoking on human health, Risk factors attributable to mortality in desert districts of Rajasthan. (A Pilot Study)- *J. Lakshminarayana, K. R. Haldiya and Madhu B. Singh*

Commencement: December, 2009 **Duration:** 5 years **Status :** New

Objectives

1. To find out the impact of smoking and tobacco use in rural areas of western desert districts of Rajasthan

2. To find out the smoking attributable mortality in the rural areas

3. To correlate the associated risk factors for cause of mortality due to excessive tobacco consumption/smoking

Progress of work

For feasibility purpose Jodhpur district has been selected of which one tehsil has been surveyed and reported here. The selection of villages and study schedule has been prepared and similarly the pilot study has been carried out in jodhpur district. The data analysis has been done in FOX PRO package and reported.

The data analysis revealed that a total of 486 individuals were covered from rural areas of Jodhpur district of Rajasthan. Out of which 90 were males and 10 were females consuming tobacco in any form, and majority of individuals surveyed were in the age group of 40-49 (31.1%) and followed by 26% in the age group 50-59 as duration has been taken 10 years from the date of survey. The percentage is increasing with age among males and in females it is younger age group is consuming due to availability of tobacco in small packets. The results were compared between age and gender showed statistically significant when compared with NFHS-III data among the gender groups ($P<0.05$) with respect to consumption of tobacco in any form. The majority (77.8%) was living in joint families and the individuals were tobacco users and were almost all were Hindus. The educational status of the tobacco users were mainly illiterates 95.0% and rest of the population can only read and write. Among female population 90.0% were illiterates. This shows education plays major role in tobacco consumption in any form which is the major cause for different health problems like cancers. The Acute Respiratory infections in the surveyed population are around 9.0%. The similar case with females which is 10.0 % Though the sample is small we can say the trend is alarming and showing significant results among consumers and non consumers compared with national survey of NFHS-III study for all India figures. Chi-square test was applied for significant associations among age and gender, type of Family, literacy, Educational status , Type of consumption and morbidities, Proportion test were used for comparing with national figures(NFHS-III survey data) The prevalence estimates of India and Rajasthan were calculated and compared.

Table 1. Demographic characteristics of the subjects according to gender

Age group	Males N=304	%	Females N=182	%	Total N=486	%
15-20	5	5.5	3	30.0	8	8.0
20-29	6	6.7	0	0.0	6	6.0
30-39	20	22.2	2	20.0	22	22.0
40-49	28	31.1	1	10.0	29	29.0
50-59	24	26.7	2	20.0	26	26.0
60- 69	5	5.5	2	20.0	9	9.0
>=70	2	2.3	0	0.0	2	
Pooled	90	100.0	10	100.0	100	100.0
Distribution of tobacco users with type of family						
Nuclear	20	22.2	6	60.0	26	26.0
Joint	70	77.8*	4	40.0	74	74.0
Pooled	90	100.0	10	100.0	100	100.0

* P< 0.05 X2=6.675907

The prevalence of tobacco use is (29.6%) in >15 years of age group among males and (5.5%) among females where as in NFHS survey (32.7% in males and 1.4% in females

Table 2. Distribution of tobacco users with education of the individual

Education status	Males	%	Female	%	Total	%
Illiterate	85*	94.4	9	90.0	94	94.0
Read & Write	5	5.6	1	10.0	6	6.0
Pooled	90	100.0	10	100.0	100	100.0

*P<0.01

Table 3. Distribution of tobacco users/Chewing according to Gender

Tobacco Chewing	Males	%	Female	%	Total	%
Yes	80		6	60.0	86	86.0
No	10		4	40.0	14	14.0
Pooled	90	100.0	10	100.0	100	100.0

Table 4. Distribution of tobacco users with type of morbidity at the time of survey

Morbidity	Males	%	Females	%	Total	%
N.A.D.	71	78.8	7	70.0	78	78.0
Fever	5	5.6	0	0.0	5	5.0
A. Res. Infec.	8	8.9	2	20.0	10	10.0
Cough &Cold	6	6.7	1	10.0	7	7.0
Pooled	90	100.0	10	100.0	100	100.0

$P<0.05$

6. Papers published/accepted

1. Angel, B. and Joshi, V. Distribution of Dengue virus types in *Aedes aegypti* in dengue endemic districts of Rajasthan, India. *Indian Journal of Medical Research*. 2009,129: 665-668. (IF -1.8)

2. Bansal, S. K. and Singh, Karam V. Evaluation of the larvicidal efficacy of *Solanum xanthocarpum* storage against vector mosquitoes in northwestern Rajasthan. *J Environ. Biol.,* 2009, 30: 883-888. (IF-1.36)

3. Bansal, S. K., Singh, Karam V and Suresh Kumar. Larvicidal activity of the extracts from different parts of the plant *Solanum xanthocarpum* against important mosquito vectors in the arid region. *J. Environ. Biol.,* 2009, 30: 221-226. (IF-1.36)

4. Dam, P. K., Sharma, R. C., Joshi, V. and Singhi, Manju. Constraints in agro forestry of medicinal plants in Rajasthan: Situation analysis and suggestive remedial measures. In '*Forestry research extension: Challenges & strategies'. Ed.* C. S. Dangi & Seema Kumar, Scientific publisher, Jodhpur, 2009, 198-211.

5. Joshi, V. Guinea-worm eradication in India. *Proceedings of National Academy of Sciences,* India, Section B; 2009, 79: 161-166.

6. Mathur, M. L., Gaur, J., Sharma, R. and Solanki, A. Rapid culture of *Mycobacterium tuberculosis* on Blood Agar in resource limited setting. *Dan. Med. Bull.,* 2009,56: 208-10. (IF- 1.7)

7. Lakshminarayana, J., Misra, K. N., Singh, Madhu B. and Kalundha, R. K. Opium consumption and its indirect effect on the fertility of women in desert villages of Rajasthan. *Annals of Arid Zone*, 2009 (In Press) (IF- 0.062)

8. Singh, Madhu B., Fotedar, R. and Lakshminarayana, J. Micronutrient deficiency Status among women of desert areas of western Rajasthan, India. *Pub. Health Nutrition (UK),* 2009, 12: 624-629. (IF - 2.123)

9. Singh, Madhu B., Lakshminarayana, J. and Fotedar, R. Nutritional status of adult population of Raika community in Jodhpur, desert district, of Rajasthan. *Journal Human Ecology*, 2009, 26: 77-80.

10. Singhi, Manju, Kumbhat, Sunita and Joshi Vinod. A Herbal Composition Patent - filed; *Official journal of the Patent Office*, 2009 pp 3907

11. Singhi, Manju, Joshi, Vinod and Dam, P. K. Development of Scientific rationale for distribution and abundance of medicinal plants of desert Rajasthan. In '*Forestry research extension: Challenges & strategies'. Ed.* C. S. Dangi & Seema Kumar, Scientific publisher, Jodhpur, 2009, 125-131.

12. Anand, P. K. and Ramakrishnan, R. Investigation of outbreak of typhoid in a remote village of Thar Desert of Rajasthan, India. *Indian Journal of Medical Research,* 2009, (In Press) (IF-1.8)

13. Kanojia, P. C., Paingankar, M. S., Patil, A. A., Gokhale, M. D. and Deobankar, D. N. Morphometric and allozyme variation in the mosquito *Culex tritaeniorhynchus* (Diptera: Culicidae) populations from India. *Journal of Insect Science;* 2010, (In Press) (IF-0.963)

14. Kumbhat, S., Sharma, K., Gehlot, R., Solanki, A. and Joshi, V. Surface plasmon resonance based immunosensor for serological diagnosis of dengue virus infection. *Journal of Pharmaceutical and Biomedical Analysis* 2010, 52: 255-259. (IF-2.6)

15. Singhi, Manju and Joshi, Ramesh. Famine foods of arid lands: Utilization, perceptions and need to integrate social practices with bio resolutions. *Studies on Ethno medicine,* 2010, 4: (In Press)

7. Workshops/Conferences/Symposia/Scientific meetings attended

Dr. K. R. Haldiya, Scientist 'F'

- Training Programme of ERMED e Journal Consortium for Northern Region on 6th July, 2009, at National Medical Library, New Delhi

Dr. Vinod Joshi, Scientist 'F'

- Presented paper (poster presentation) in International Conference 'Emerging Infectious Diseases', 8-11th December, 2009, Singapore.

- Delivered Guest lecture in a workshop 'Wetlands, Biodiversity and Climate Change' on 2-2-10 at Desert Regional Centre, Zoological Survey of India, Jodhpur.

- Workshop for training in 'Molecular Diagnosis of H1N1 viruses' at National Institute of Virology, Pune from 26-27th August, 2009.

Dr. Karam V. Singh, Scientist 'F'

- X International Symposium on Vectors and Vector Borne Diseases, organized by NIMR & Goa University at Panjim (Goa) in Nov. 2009, and presented a paper entitled 'Comparative study of larval survey and ovitrap efficacy for the surveillance of *Aedes aegypti*, the vector of dengue and Chikunguniya '.

- A meeting of High Powered Committee on Global Environment Change and Health on 4th March, 2010, at ICMR Headquarters, New Delhi and made brief presentation of the research initiatives undertaken by the Centre having bearing on climate change.

Dr. S. K. Bansal, Scientist 'F'

- 'International Conference on Nurturing Arid Zones for People and the environment: Issues and Agenda for the 21st Century' organized by Arid Zone research Association of India at CAZRI Campus, Jodhpur-342003 Rajasthan, India from 24-28 November, 2009 and presented a paper entitled, 'Evaluation of the larvicidal efficacy of *Tephrosea purpurea* and *Prosopis juliflora* against some vector mosquitoes in the arid region.'

- Workshop on 'Wetlands, Biodiversity and Climate Change' on 2nd February 2010 organized by Zoological Survey of India, Desert Regional Station, Jodhpur.

- Attended the National Seminar on 'Desert : Its Biodiversity & Conservation' sponsored by UGC and organized at Department of Zoology, Jai Narayan Vyas University, Jodhpur on February 9th, 2010.

Dr. Madhu B. Singh, Scientist 'E'

- Implementation Course on 'Laboratory Accreditation under ISO 17025:2005 Standards' held at NFI, New Delhi from 21-22 May, 2009, organized by Process Ethix, Delhi.

- International Workshop on Micronutrients and Child Health (MCHWS-2009) held from 20th to 23rd October, 2009 at All India Institute of Medical Sciences, Ansari Nagar, New Delhi and presented a paper entitled 'Iodine deficiency disorders in school age children of Jodhpur district of Rajasthan'.

- Awarded WHO Fellowship for undergoing Training in 'Food Safety' at Institute of Nutrition, Mahidol University, Bangkok, Thailand, from 13th to 31st July, 2009.

Dr. J. Laxminarayana, Scientist 'E'

- 27th Annual Conference of Indian Society for Medical statistics (I.S.M.S) during 27-29th November, 2009 at BHU Varanasi and presented a paper 'On some generalized compound inflated Poisson distribution' and Chaired Scientific Session on Non-communicable Diseases-II.

Dr. P. C. Kanojia, Scientist 'E'

- 'X International symposium on vectors and vector-borne diseases' organized by Goa University and National Institute of Malaria Research, at Panaji Goa from 4-6 November, 2009.

Dr. P. K. Anand, Scientist 'C'

- National Conference organized by National Institute of Communicable Diseases, Delhi and National Institute of Epidemiology, Chennai, held at NICD, New Delhi on 4-6 May 2009 and presented a paper in 'Epi-Days 2009'.

Dr. S. S. Mohanty, Scientist 'E'

- Workshop 'Wetlands, Biodiversity and Climate Change' on 2nd of February, 2010, at Desert Regional Centre (Zoological Survey of India), Jodhpur.

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   Phone: (R) 0291-2752821

8. Dr. C. L. Mathur — Veterinarian
Former Deputy Director
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9. Prof. R. S. Srivastava — Sociologist
Former Prof. & Head,
Department of Sociology
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10. ICMR Representative

11. Dr.K.R. Halidya — Member Secretary
Scientist F
DMRC, Jodhpur - 342005
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8. Scientists & Staff

Dr. Bela Shah, M.D.
Director-in-Charge

A. SCIENTISTS

1. Dr. K. R. Haldiya, Scientist-F
2. Dr.Vinod Joshi, Scientist-F
3. Dr. M. L. Mathur, Scientist-F
4. Dr. Karam Vir Singh, Scientist-F
5. Dr. S. K. Bansal, Scientist-F
6. Dr. Raman Sachdev, Scientist-E
7. Dr. S. P. Yadav, Scientist-E
8. Dr.(Mrs.) Madhu B.Singh, Scientist-E
9. Dr. A. K. Dixit, Scientist-E
10. Dr. J. Lakshminarayan, Scientist-E
11. Dr. P. C. Kanojia, Scientist E
12. Dr.(Mrs.) Ranjana Fotedar, Scientist-C
13. Dr.(Mrs.) Manju Singhi, Scientist-C
14. Dr. P. K. Anand, Scientist-C
15. Dr. S. S. Mohanty, Scientist-C

B.TECHNICAL STAFF

1. Dr. P. K. Dam, Technical Officer
2. Sh. Raj Kumar Kalunda, Technical Officer
3. Sh. Manjeet Singh, Technical Officer
4. Dr. Himmat Singh, Research Assistant
5. Sh. Anil Purohit, Research Assistant
6. Sh. Rajneesh Kumar, Lab. Technician
7. Sh. S. K. Dhawal, Lab. Technician
8. Sh. Ramesh Chandra, Lab. Technician
9. Sh. Pooranmal Meena, Lab. Technician
10. Sh. Rohit Prasad Joshi, Lab. Technician
11. Sh. Rajendra Chouhan, Lab. Assistant
12. Sh. Trilok Kumar, Lab. Assistant

C. MINISTERIAL STAFF

1. Sh. Anup Sarin, Accounts Officer
2. Sh. Narender Bajaj, Section Officer
3. Smt. Neelam Devi, Assistant
4. Sh. Dharampal, Assistant
5. Sh. Rajendra Singh, Assistant
6. Sh. Joginder Singh, Stenographer - Grade - II
7. Smt. Kanchan Bala, Junior Hindi Translator
8. Sh. Shamshad Ali, U.D.C.
9. Smt. Chandra Kala, U.D.C.
10. Sh. Mahesh Chand Pargi, U.D.C.
11. Sh. Yesh Pal Singh, U.D.C.
12. Sh. Ram Niwas, L.D.C.
13. Sh. Nand Kishore, L.D.C.
14. Sh. Jaideep Gaur, Hindi Typist

D. SUPPORTING STAFF

1. Sh. Babu Lal, Driver
2. Sh. Raghunath Singh, Driver
3. Sh. Mohammed Gaffar, Driver
4. Sh. Ishwar Khetani, Driver
5. Sh. Manoher Singh, Driver
6. Sh. Rana Ram, Driver
7. Sh. Naveen Kumar, Driver
8. Sh. Banwari Lal, Lab. Attendant
9. Sh. Shridhar Bohra, Lab, Attendant
10. Sh. Lal Chand Bandra. Lab. Attendant
11. Sh. Raghunath Bisht, Animal Attendant
12. Sh. Babu Lal Bunker, Animal Attendant
13. Sh. Mahaveer Prasad, Animal Attendant
14. Sh. Satya Prakash, Animal Attendant
15. Sh. Mahesh Chand Sharma, Attendant
16. Sh. Jodha Ram, Attendant
17. Smt. Laxmikanta, Attendant
18. Sh. Khushal Singh, Attendant
19. Sh. Ram Lal, Peon
20. Sh. Ladu Ram, Peon
21. Smt. Sua Devi, Sweeper

E. PROJECT STAFF

- **Epidemiology of Musculoskeletal conditions in India**

1. Dr. Kiran Nain, Research Scientist
2. Dr. Madhu Shekhar, Research Scientist
3. Dr. Naveen Bhora, Research Scientist
4. Dr. Sweta Bhora, Research Scientist
5. Dr. Gyan Prakash, Research Scientist
6. Ms. Hemlata Chouhan, Senior Research Fellow
7. Ms. Shewta B. Mathur, Senior Research Fellow
8. Sh. Mohd. Kasim, Data Entry Operator
9. Sh. Piyush Raj Joshi, Field Investigator
10. Ms. Kavita Joshi, Field Investigator
11. Sh. Dinesh Kumar, Senior Research Fellow
12. Ms. Vandana Purohit, Field Investigator
13. Mr. Ankit Mishra, Field Investigator
14. Mr. Priyanka Malviya, Field Investigator

- **Development of molecular and genetic markers of dengue vectors species in Rajasthan, India**

1. Ms. Bennet Angel, Senior Research Fellow
2. Ms. Annette Angel Joy, Junior Research Fellow
3. Ms. Rashmi Chauhan, Junior Research Fellow

- **Molecular Diagnosis of H1N1 Virus**

1. Ms. Bennet Angel, Senior Research Fellow

- **Jai Vigyan Mission Mode Project on Control of Rheumatic Fever and Rheumatic Heart Diseases in Jodhpur District**

1. Dr. J. K. Arora, Medical officer
2. Sh. Chander Prakash Joshi, Field Investigator
3. Miss Jyoti Gaur, Field Investigator
4. Miss. Ruchika Sharma, Data Entry Operator

- **Impact Assessment of consumption of the two electrolyte products on the mineral profile and general health and nutrition profile of adult population in desert area of Rajasthan**

  1. Sh. Sunil Beniwal, Technician
  2. Ms. Neetu Parihar, Field Investigator

- **Prevalence of Diabetes mellitus and impaired Glucose tolerance in the Raika & other communities with similar life style in Rajasthan.**

  1. Sh. Suresh Kumar, Driver

- **Utility / Validation of Spot Testing Kit in the Assessment of Iodine Content of Salt –A Multicentric Study**

  1. Sh. Robin Marwal, Research Assistant

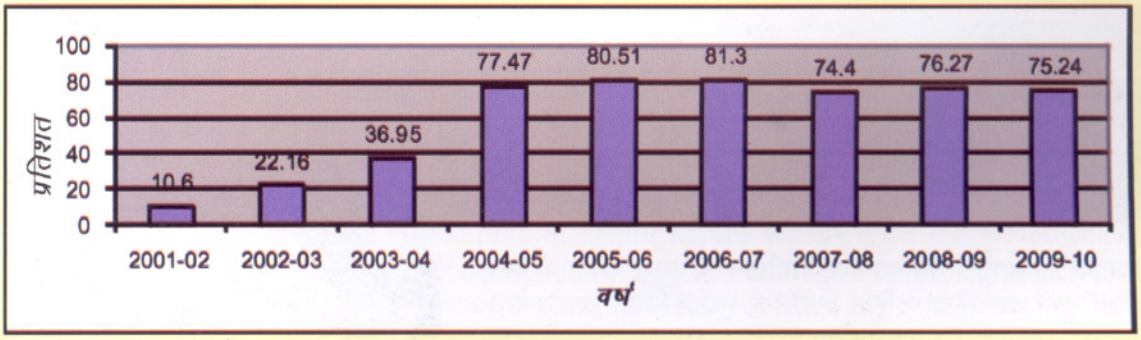
9. केन्द्र में राजभाषा को प्रोत्साहन

1. त्रैमासिक पत्रिका

त्रैमासिक द्विभाषी पत्रिका "चेतना" केन्द्र द्वारा किए जा रहे अनुसंधान एवं अन्य कार्यों की एक झलक दर्शाती है। इसमें केन्द्र के कार्यकलापों के साथ जन–स्वास्थ्य से संबंधित लेख पाठकों को अत्यंत उपयोगी जानकारी प्रदान करते हैं। अब तक (वर्ष 2002 से) इस पत्रिका के 32 अंक प्रकाशित हो चुके हैं। वर्ष 2009–10 में प्रकाशित प्रत्रिकाओं की एक झलक :

2. हिन्दी में पत्राचार

गृह मंत्रालय, राजभाषा विभाग द्वारा प्रतिवर्ष जारी वार्षिक कार्यक्रम में निर्धारित लक्ष्यों की प्राप्ति की ओर विशेष ध्यान देते हुए केन्द्र में हिन्दी में पत्राचार के लक्ष्यों की प्राप्ति की ओंर विशेष प्रयत्न किए जा रहे हैं। तदनुरूप, हिन्दी में पत्राचार के सभी लक्ष्यों, यथा 'क' क्षेत्र से 'क' क्षेत्र को पत्राचार, 'क' क्षेत्र से 'ख' क्षेत्र को पत्राचार, 'क' क्षेत्र से 'ग' क्षेत्र को पत्राचार के निर्दिष्ट प्रतिशत को प्राप्त करने के लिए सघन प्रयास किए जा रहे हैं। इस वार्षिकी में हिन्दी पत्राचार का समेकित प्रतिशत लगभग 75 : रहा है, जिसे और बढ़ाने के प्रयास किए जा रहे हैं। पिछले कुछ वर्षों में प्राप्त प्रतिशतता की झलक:



3. राजभाषा शील्ड

नगर राजभाषा कार्यान्वयन समिति, जोधपुर की चल–वैजयंती शील्ड

हिन्दी में उत्कृष्ट कार्य करने हेतु नगर राजभाषा कार्यान्वयन समिति, जोधपुर ने इस केन्द्र को लगातार पाँच बार (वर्ष 2003–04, वर्ष 2004–05, वर्ष 2005–06, वर्ष 2006–07 व वर्ष 2007–08) चल–वैजयंती शील्ड व प्रशस्ति पत्र से पुरस्कृत किया है। तदनुरूप, वर्ष 2009–10 में यह शील्ड़ इस केन्द्र को सदा के लिए प्रदान की गई है।

4. हिन्दी कार्यशाला

केन्द्र के प्रशासन व लेखा अनुभाग में कार्यरत कर्मचारियों के दैनिक कार्यों में राजभाषा अनुपालन संबंधित कठिनाइयों का प्रायोगिक रूप से निवारण करने के उद्देश्य से केन्द्र में हिन्दी कार्यशालाओं का आयोजन किया जाता रहा है। इस वर्ष दिनांक 29 जून व 16 सितम्बर, 2009 तथा 23 फरवरी, 2010 को इन कार्यशालाओं का आयोजन किया गया जिनमें क्रमशः डॉ. कर्मवीर सिंह, वैज्ञानिक 'एफ', डीएमआरसी; डॉ. के. आर. परिहार, कार्यक्रम अधिकारी, आकाशवाणी, जोधपुर तथा श्री कैलाश चन्द्र गुप्ता, हिन्दी अधिकारी, शुष्क वन अनुसंधान संस्थान (आफरी), जोधपुर को आमंत्रित किया गया था। इन कार्यशालाओं में कम्प्यूटर सॉफ्टवेयर युनिकोड का हिन्दी टंकण में प्रयोग; गृह मंत्रालय की राजभाषा वैबसाइट में 'मंत्र' द्वारा अंग्रेजी शब्दों व वाक्यों के हिन्दी अनुवाद; मीडिया, आम आदमी व भाषा के त्रिकोणीय संबंध तथा सरकारी कामकाज में हिन्दी भाषा का सरल रूप में व्यवहारिक प्रयोग जैसे उपयोगी विषयों पर जानकारी दी गई।

5. राजभाषा व्याख्यानमाला

वैज्ञानिक क्षेत्र में हिन्दी के प्रयोग को बढावा देने हेतु केन्द्र में दिनांक 14 सितम्बर, 2009 तथा 25 मार्च, 2010 को 'डीएमआरसी राजभाषा व्याख्यानमाला' का आयोजन किया गया।

14 सितम्बर, 2009 को आयोजित व्याख्यानमाला में डॉ. त्रिलोक सिंह, निदेशक शुष्क वन अनुसंधान संस्थान (आफरी), जोधपुर ने वानिकी शिक्षा व शोध कार्यों में हुई प्रगति का जिक्र किया। उन्होंने आफरी में चल रहे विभिन्न कार्यक्रमों की जानकारी देते हुए मरुस्थलीय औषधीय पौधों पर डीएमआरसी के साथ कार्य करने की इच्छा व्यक्त की।

दिनांक 25 मार्च, 2010 को इस आयोजन में, प्रमुख वक्ता के रूप में डॉ. दुर्गा दत्त ओझा, वरिष्ठ वैज्ञानिक, भूजल विभाग, राजस्थान सरकार, जोधपुर ने अपने वक्तव्य में सरल भाषा में जल की महत्ता पर प्रकाश डाला।

6. हिन्दी सप्ताह

केन्द्र में गत वर्षों की भांति इस वर्ष भी दिनांक 14 से 22 सितम्बर, 2009 तक हिन्दी सप्ताह का आयोजन किया गया। समारोह का शुभारंभ 'डी.एम.आर.सी. राजभाषा व्याख्यानमाला' के आयोजन से हुआ। सप्ताह के दौरान विभिन्न प्रतियोगिताओं के साथ–साथ एक हिन्दी कार्यशाला का भी आयोजन किया गया। दिनांक 26 अक्टूबर, 2009 को भारतीय आयुर्विज्ञान अनुसंधान परिषद् के वित्तीय सलाहकार श्री संजीव दत्ता के कर–कमलों द्वारा हिन्दी सप्ताह के दौरान आयोजित विभिन्न प्रतियोगिताओं के विजेताओं व वर्ष 2008–09 के दौरान हिन्दी में सर्वाधिक कार्य करने वाले कर्मचारियों को विभिन्न पुरस्कारों से सम्मानित किया गया। इस अवसर पर केन्द्र के पूर्व प्रभारी अधिकारी डॉ. रमेश चन्द्र शर्मा तथा नेशनल प्रोजेक्ट कंस्ट्रक्शन कॉरपोरेशन के आंचलिक प्रबंधक श्री सतीश शर्मा भी उपस्थित थे।

विशेष :

अखिल भारतीय राजभाषा सम्मेलन में प्रतिभागिता

दिनांक 9–11 दिसम्बर, 2009 तक पुरी, ओड़िशा में 'भारतीय राजभाषा परिषद्' द्वारा आयोजित "अखिल भारतीय राजभाषा सम्मेलन" में केन्द्र के वैज्ञानिक 'इ' डॉ. शेषपाल यादव, अनुभाग अधिकारी श्री नरेन्द्र बजाज एवं कनिष्ठ हिन्दी अनुवादक श्रीमती कंचन बाला ने भाग लिया। सम्मेलन के दौरान परिचर्चा के मुख्य विषय थे – हिन्दी के प्रचार–प्रसार में गैर–हिन्दी भाषी क्षेत्रों का योगदान, गैर–हिन्दी भाषी राज्यों में हिन्दी प्रशिक्षण, सुविधाएं, समस्याएं और समाधान और हिन्दी सॉफ्टवेयर के माध्यम से कार्यालय के कामकाज में हिन्दी का प्रयोग। सभी प्रतिभागियों के मध्य एक सामूहिक चर्चा भी रखी गई जिसका विषय था भारतीय संविधान के संदर्भ में देश में हिन्दी की दशा और दिशा। इस चर्चा के दौरान प्रतिभागियों ने सरकारी कामकाज में दिन–प्रतिदिन आनेवाली समस्याओं व उनके समाधान पर अपने विचार व्यक्त किए। सम्मेलन के दौरान हुई विभिन्न चर्चाओं में पाया गया कि गैर हिन्दी भाषी क्षेत्रों में स्थित कार्यालय व उनमें कार्य करने वाले गैर–हिन्दी भाषी लोग हिन्दी का व्यवहारिक रूप में प्रयोग करने पर कड़ी मेहनत कर रहे हैं, जो निश्चय ही प्रशंसनीय है।

10. DMRC Activities 2009-10: A Pictorial View

Visit of Sh. Sanjeev Dutta, Financial Advisor, ICMR, New Delhi to the Centre – 26 -27th April, 2009

Ethics Committee meeting of the Centre -15th May 2009.

Meeting of Review Group on 'Infectious & Vector Borne Diseases' under the chairmanship of Prof. R. C. Mahajan, Emeritus Professor, P.G.I., Chandigarh - 30-31st May, 2009

Dr. Madhu B. Singh, Scientist E was awarded WHO Fellowship for Training in 'Food Safety and Micronutrient Deficiency Disorders' at Institute of Nutrition, Mahidol University, Bangkok, Thailand from 10th July to 3rd August, 2009

Progress Monitoring Committee (PMC) meetings - 10 – 11th, and 26- 27th July, 16 – 17th August & 11- 12th September, 2009

Independence Day celebration in the Centre - 15th August 2009. Professor Ram Gopal, Ex- Director, Defence Laboratory and Chairman, Building Advisory Committee of the Centre was Chief Guest on the occasion

Vigilance Awareness Week 3rd to 7th November, 2009

Establishment of H1N1 Diagnosis laboratory in the Centre - 11th November, 2009

Health Informatics Management System training for the Laboratory Technicians and Male Nurses of Block PHC Pokaran – 19th November, 2009

Second meeting of Scientific Review Group on 'Medical Sociology and Biostatistics' on 16th and 17th of December, 2009, under the Chairmanship of Professor A. K. Kalla, Emeritus Fellow (UGC), Department of Anthropology, Delhi University, Delhi

Visit of Senior Journalists from Press Information Bureau, Varanasi for coverage of various research and development activities of the Centre - 8th January, 2010

Second meeting of Scientific Review Group on 'Nutrition, Biochemistry and NCDs' on 18th -19th February, 2010 under the chairmanship of Dr. Prati Pal Singh, Professor, Pharmaceutical & Toxicology Department, NIPER, Mohali.

Republic Day Celebration in the Centre – 26th January, 2010. Professor R. C. Mahajan, SN Bose INSA Research Professor and Emeritus Professor, Department of Parasitology, PGI, Chandigarh was Chief Guest on the occasion

Training programme for Group 'D' employees of the Centre as per recommendations of Sixth Pay Commission - 24-26th February, 2010

Second meeting of Review Group on 'Infectious and Vector Borne Diseases' was held on 26-27th February, 2010 under the chairmanship of Professor R. C. Mahajan, Emeritus Professor, PGI, Chandigarh.

Training to participants of UGC Refresher Course in Home Science of J. N. V. University, Jodhpur by Dr. Madhu B. Singh, Scientist 'E' - 5th March, 2010