RMRCT
UPDATE
Vol 1
No 1
April 2004

A BIANNUAL NEWSLETTER OF
REGIONAL MEDICAL RESEARCH CENTRE FOR TRIBALS
JABALPUR

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EDITORIAL

It gives us immense pleasure to start RMRCT Update, a biannual newsletter of our Centre. There were lot of developments in the Centre during the last six months. The Centre received extramural funds for 7 new projects, and also purchased equipments worth Rs. 64 lacs. All the modern diagnostic facilities are now available at the Centre. It hosted the WHO-ICMR workshop on IPR-WTO issues in February. This was first workshop of its kind organized at RMRCT. The centre organized another WHO workshop on rapid assessment tools for diagnosis of malaria in pregnancy for participants from South East Asian Countries in April. The Centre published 16 research papers during last 6 months and the average impact factor was 1.74. Some important papers are also in the pipeline. The campus is getting a new look after renovation. The new gate adds to the beauty of the campus.

Dr. A. P. Dash
Dr. Anup Anvikar

CHANGING PATTERNS OF MALARIA IN CENTRAL INDIA (1986 - 2003)

An increase in the number of *Plasmodium falciparum* infections in Madhya Pradesh has been noticed recently. Changing pattern of malaria provokes much interest especially because the two powerful tools dichlorodiphenyl trichloroethane (DDT) and chloroquine (CQ) on which malaria control relied are no longer effective. Long term trends in the pattern of malaria demand systematic contiguous data for several years which is almost non existent in Madhya Pradesh where both *P. falciparum* and *P. vivax* are co-endemic. Hence retrospective long term data available from a forest setting characterized by seasonal transmission of *P. falciparum* and *P. vivax* was used to demonstrate the changing epidemiology of malaria.

The ratio of *P. falciparum* versus *P. vivax*

Analysis of malaria data (1986-2000) from villages of Mandla for trend revealed that malaria occurred throughout the year and that only two *Plasmodium* species encountered were *P. vivax* and *P. falciparum*. Year wise results revealed that in 1986, only a moderate number of malaria cases mainly due to *P. vivax* were recorded. The slide positivity rate (SPR), slide *falciparum* rate (SFR), and *P. falciparum* percentage (Pf %) were respectively 9, 2 and 26%. There was a sudden spurt of malaria cases in 1987. SPR



and SFR rose to 26% and 6.5% respectively. From 1988 onwards there was a steady increase in number of *P. falciparum* cases and during 1991, the infection caused by the 2 species was detected about equally i.e. *P. vivax* 49.5% and *P. falciparum* 50.5%. During 1993, the number of *P. falciparum* cases increased exponentially (76%). Between 1994-95, the *P. falciparum* ratio remained high and showed a further sharp increase in 1999-2000 (>90%). Between 1986 and 1991, the over all mean prevalence was 23%, when malaria was mainly due to *P. vivax*, while between 1992 and 2000, overall mean prevalence was 38% when *P. falciparum* was the dominant infection. *P. vivax* percentage declined steadily from 73% in 1986 to 10% in 2000. The average yearly increase in *P. falciparum* was about 6% per year.

Further, *P. vivax* increased before *P. falciparum* in the community throughout the study years. The *P. falciparum* did not increase in either year until July-August about one month after the onset of rainy season. In September of each year, as the number of *P. falciparum* cases rose steeply, *P. vivax* began to drop. Generally, highest number of *P. falciparum* cases were recorded in October-November and its predominance persisted until January each year. *P. vivax* began to increase in February-March but gradually from 1991 onwards, *P. falciparum* remained dominating parasite till March thereby reducing the *P. vivax* season.

An. culicifacies versus *An. fluviatilis*

There were 2 efficient vectors i.e. *An. culicifacies* and *An. fluviatilis* during the study period. These two species form a serious combination parallel to the *An. dirus* and *An. minimus* combination of Myanmar and Thailand. They intensify and prolong the transmission season and are responsible for creating hyperendemic malaria condition (Kondrashin et al., 1991). In Mandla, densities of *An. culicifacies* were very high in all these study year (5-200 per man hour) with a main peak in August-September (95.5±39.7) and a 2nd small peak in February-March in each year (45.5±14.5). Densities of *An. fluviatilis* were very low (0 - 7±1.23) and were collected mainly from October to February. They were completely absent during the hot dry months of May and June in each year. Though there was year-to-year variation in the prevalence of two vector species in each village but the overall trend was similar during 1986-91, when *P. vivax* was the predominant infection and 1992-2000 when *P. vivax* almost disappeared (Singh et al., 2004).



Strategy of malaria control and parasite ratio

During this period, inhabitants of these villages have over the years been subjected to different antimalarial strategies under National Anti Malaria Programme (NAMP). In 1986, the area was under regular 2 round DDT spray and chloroquine was available for treatment of malaria from multipurpose workers only during their fortnightly visit of the villages, *P. vivax* was the predominant parasite. The origin of sudden increase in malaria in 1987 is not known. This apparently seems related to hydrological changes brought about by major irrigation and hydroelectric project on river Narmada, the Bargi dam. Outbreaks of *P. falciparum* were recorded in some PHCs of Mandla/Jabalpur in 1987 (Singh et al., 1988) and foci of the disease shift spatially virtually from year to year. By 1994, the DDT was replaced by HCH (3 rounds) for one year only. The strategy of drug distribution had been modified to include drug administration through school teachers, and forest guards for easy access. The generally greater availability of chloroquine is thought to have caused the significant reduction of the *P. vivax* from 74% in 1986 to 37% in 1994. However, *P. falciparum* was on increase. With the introduction of Enhanced Malaria Control Programme (EMCP) in 1998, the strategy of insecticide spray had virtually ceased and village health link workers were established in villages for free access to chloroquine. All patients complaining of fever were given chloroquine and paracetamol as the standard course of treatment. In 2000, these villages were sprayed twice with deltamethrin as chemotherapy alone could not check the increase in *P. falciparum.* While this appears to have brought about a significant reduction in malaria prevalence, this reduction was largely at the expense of *P. vivax* as the infection rate of *P. falciparum* had not shown significant decline (90%).

The factors for shifting trends

It is well known that the parasite formula is quite a sensitive index of malaria transmission (Kondrashin et al., 1987). Three hypotheses had been offered for this progressive imbalance. One was attributed to the wide spread use of chloroquine for presumptive treatment destroying the gametocytes of *P. vivax* and not of *P.*

falciparum and thus interfering with the transmission and propagation of *P. vivax* (Ray and Beljaev, 1984). Another hypothesis suggests that it could be attributed to chloroquine resistance discovered in the area since 1987. The way in which chloroquine resistance may be contributing to this upsurge was investigated in the present study by examining the available record on prevalence of resistant *P. falciparum* from Mandla. During 1987, in some of these villages in vivo test results revealed a high level of resistance against *falciparum* (Singh et al., 1989a). Although RI resistance was common everywhere (20%), RII and RIII was also high in some pockets (15%). Since 65% of infections were still susceptible, chloroquine continues to be useful against the latter and it remains the government recommended first line drug. A repeated survey in 1994 in the same villages indicated a sharp increase (55%) in the frequency of resistance in a couple of years (Singh et al., 1995). Repeated treatment with chloroquine was prolonging the selection pressure on resistance. This interpretation is further supported by the result of a study carried out in a small group of pregnant women in 1996, which revealed a cumulative resistance of 95%(Singh et al., 2001a). Another possible explanation for the change to a predominance of *P. falciparum* is the construction of Bargi dam in 1988 with associated changes in ecology (several villages in Mandla and Jabalpur were inundated) and large scale movements of communities and the strains of parasites with which they are infected (Singh et al., 1999b). Such an influx presumably brought new strains of parasites and new reservoirs of infection into the area. This is further supported by the fact that in villages close to the reservoir of the Bargi dam, this proportion rose from 19% in 1987 to 91% in 1997 (Singh et al., 1999b).

Further, the pattern of increasing *P. falciparum* prevalence with increase in chloroquine resistance was also supported with increase in insecticide resistance in *An. culicifacies*. Records revealed that in 1987, 20% *An. culicifacies* were susceptible to DDT while in 2000, only 5%. Infective *An. culicifacies* were found in the months of May, August and November (Singh et al., 2004). Clearly, the presence of infective *An. culicifacies* from indoor resting collections during main transmission season inspite of insecticide spray further confirmed failure of insecticide. The causes of the change in species predominance to *P. falciparum* are unclear. Whether the change is simply indicator of the establishment of drug resistant population of *P. falciparum* in the study area or reflects a more complex , multi-factorial interaction of various factors must be demonstrated by further studies in the field.

The extended transmission of *P. falciparum*

Another significant change recorded in this area was extension of *P. falciparum* period. All earlier studies carried out in district Mandla revealed summer peak due to *P. vivax* dominated malaria and autumn peak due to *P. falciparum* (Singh et al., 1989b and Singh et al., 1996) but gradually from 1991 onwards, *P. falciparum* remained dominating parasite till March (Singh et al., 2002) thereby reducing the *P. vivax* season and thus complete disappearance of summer peak due to *P. vivax*. Furthermore, last year in urban area of Jabalpur, a focal outbreak due to *P. falciparum* was recorded in April-May 2003 when temperature was around 40°C, among migrants who spent 3 weeks in forest of Panna district for Mahua (*Madhuca indica*) collection (Singh and Saxena, 2004). These migrants slept under the Mahua trees (used for making country liquor) without any preventive measures against malaria . Three deaths were also recorded among 39 migrants (DMO Jabalpur, unpublished report). Mass surveys in neighbouring families of migrants did not show any malaria cases. Investigation on the site of occupational activities of these migrants in Panna revealed 63% *P. falciparum* in rapid fever survey. All age groups were affected including infants. Five deaths were also recorded.

The role of microclimate

During summer, rise in temperature and drop in humidity affects the anopheline population. Further, meteorologically transmission is not feasible during hot summer months as the average temperature is above 30°C (Fox & Srickland, 1989). On the contrary, an outbreak of falciparum malaria was recorded during extreme winter recently in Mandla (Singh et al., 1997). Interestingly, *An. culicifacies* was incriminated in the months of May (Singh et al., 1999a) and January from Mandla, (Subbarao et al., 1992). Perhaps microclimate is playing a role in survival of *An. culicifacies* to *support P. falciparum* sporogony during extreme climatic conditions. Moreover, human ecology and customs of the people in



the area also play a part in malaria transmission. The houses in general are overcrowded with people and they often keep domestic animals inside. During winter they maintain constant fire and sleep around fire on the floor. On account of this, inside the huts it is usually warmer than outside. *An. culicifacies* could find under such situation a micro climate warm enough to develop gland infection even when outside temperature is not favourable. Similarly, during summer the dark, damp mud houses keep temperature relatively less warm than outside. The perennial streams and their tributaries maintain high humidity in forests and thereby malaria.

The extended *P. falciparum* transmission or an indication of malaria resistance?

From an examination of the malaria morbidity records of past 18 yrs in Madhya Pradesh, it is to be inferred that transmission of *P. falciparum* has extended from post monsoon (Singh et al., 1989b, 1996) to extreme winter (Singh et al., 1997 and Singh et al., 2001b) to spring (Singh et al., 2002) to summer month (Singh and Saxena, 2004). However, the effect of such a shift in *P. falciparum* season might only become apparent if PCR is used for monitoring drug resistance in parasite.

Conclusion

The available records in respect of *falciparum / vivax* species proportion changes indicate that this progressive imbalance can not be attributed to any particular factor alone. Hence further field observations are required in order to arrive at a definitive conclusion whether the changes in the parasite ratio seen are transient phenomenon or represent a more permanent transformation that would continue under these conditions. To quantify the contribution made by chloroquine resistance or by any other biological and operational factor would require intensive studies. If the upsurge in *falciparum* is mainly due to drug resistance, then replacing chloroquine with an efficient second line drug (sulfadoxine pyrimethamine) will bring a sharp decline in proportion of *P. falciparum* as reported earlier in Thailand (Kondrashin et al., 1987). If this imbalance is due to climatological conditions then the upsurge of *falciparum* malaria is by no means insurmountable. In conclusion, we would like to stress that a further deterioration of the situation in these region, which has always been the hard core of malaria in the country, will inevitably have serious repercussion in other districts leading towards the epidemic of *falciparum* malaria. The practical implication of our findings are that more effective measures may be taken to interfere with the transmission of *P. falciparum* malaria.



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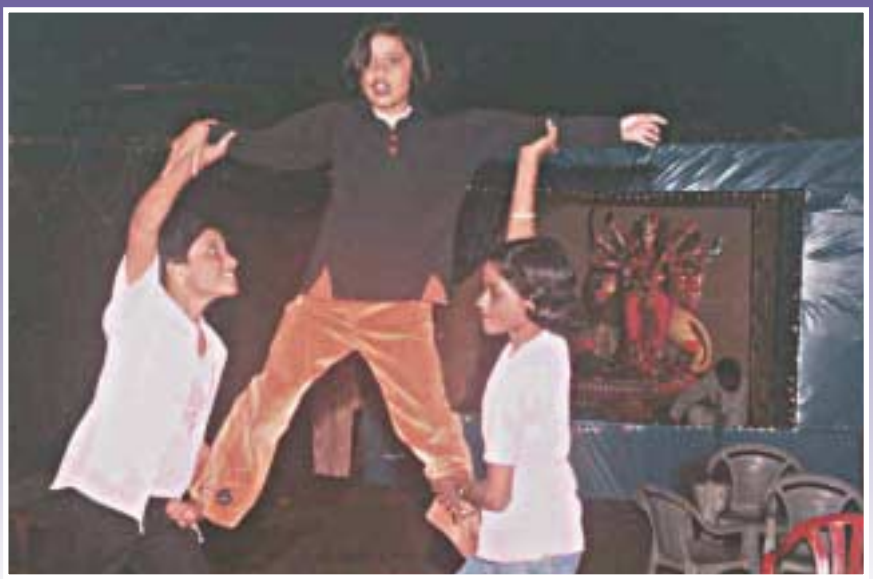
Dr. Neeru Singh
Dy. Director (SG) &
Officer-in-Charge,
MRC Field Station, Jabalpur



ANNUAL DAY

RMRCT celebrated its annual day on 4th October 2003. On this occasion, cultural programmes were organized for staff members and their families.



WORLD AIDS WEEK CELEBRATION (1st to 7th December 2003)

As a part of the World AIDS Week celebration, the RMRCT team visited nearby villages and educated the people about prevention of AIDS by showing films on AIDS, group discussions, and through poster exhibition. RMRCT organized an Essay competition for college students and extempore talk competition on AIDS for RMRCT and MRC Field Station staff.



(World AIDS Week Celebration)

WORKSHOP ON IPR & WTO ISSUES

A WHO-ICMR workshop on Intellectual Property Rights and World Trade Organization issues was organized at RMRCT on 16th & 17th February 2004. There were 42 participants from different parts of the Country.



(Hon'ble Justice Sj. Deepak Mishra inaugurating the IPR workshop)



(From left to right - Dr. A. P. Dash, Dr. K. Satyanarayana, Hon'ble Justice Sj. Deepak Mishra and Dr. Dhananjay Sharma in IPR Workshop)

Honourable Justice of the Madhya Pradesh High Court, Sj. Deepak Mishra inaugurated the workshop. He highlighted the importance of Intellectual Property Rights in his inaugural address. Dr. K. Satyanarayana, Deputy Director General (Senior Grade) and Chief IPR and P & I Division, ICMR, New Delhi explained about issues relating to Intellectual Property Rights in 21st century.

Dr. Dhananjay Sharma, Professor of Surgery, N.S.C.B. Medical College, Jabalpur delivered the keynote address. Dr. N. C. Jain, Deputy Director General (Senior Grade), ICMR explained the role of the IPR unit of ICMR. Shri Hardev Karar represented the Patent Office, New Delhi. He explained the patent filing procedures in India.

FOUNDATION DAY

The Centre celebrated its Foundation Day on 1st March 2004. Dr. G. C. Mishra, Director, National Centre for Cell Science, Pune delivered the Foundation Day Lecture. Honourable Chief Justice of the M. P. High Court, Shri Kumar Rajaratnam was the Chief Guest. Mrs. Hira K. Rajaratnam inaugurated a scientific exhibition focusing the achievements of the Centre over the last two decades.

On this occasion, employees first to join the Centre were felicitated.



(Foundation Day celebration)



(Dr. G. C. Mishra delivering Foundation Day Lecture)



(Hon'ble Chief Justice Shri Kumar Rajaratnam on occasion of Foundation Day)

NATIONAL SCIENCE WEEK CELEBRATION

(28th February to 5th March 2004)

As a part of the National Science Week celebration, a scientific exhibition focusing the achievements of the Centre over last two decades was displayed. Honourable Chief Justice of India, Shri Rajendra Babu visited the Centre and addressed the scientists on occasion of the National Science Week. He appreciated the work done by the Centre particularly the intervention work of Fluorosis, Malaria and Sickle Cell Disease. He visited the exhibition alongwith Mrs. R. Babu. The exhibition was seen by students and faculty from different colleges of Jabalpur city.



(Hon'ble Chief Justice during his visit to RMRCT)

WHO WORKSHOP ON RAPID ASSESSMENT TOOLS FOR DIAGNOSIS OF MALARIA IN PREGNANCY

A workshop on rapid assessment tools for diagnosis of malaria in pregnancy was organized at RMRCT in collaboration with the World Health Organization on 26th to 29th April 2004. Dr. S. P. Gautam, Vice Chancellor of Rani Durgavati University Jabalpur inaugurated the workshop. Dr. A. P. Dash, Director of the Centre welcomed the guests. Dr. Ravi Kumar from the World Health Organization, Dr. Meghna Desai from Centre for Disease Control, Atlanta, U.S.A. and Dr. Anna Maria from KEMRI, Kenya imparted training on ill effect and treatment of malaria in pregnancy.

Fourteen participants from different Countries of South East Asia attended the workshop.



(Workshop on malaria in progress)

HEALTH MINISTER, CHHATTISGARH VISITS RMRCT



(Hon'ble Health Minister Dr. Krishnamurti Bandhi along with Director, Dr. A. P. Dash)

Dr. Krishnamurti Bandhi, Hon'ble Health Minister, Government of Chhattisgarh visited the Centre on 28th April 2004. He discussed various health problems of Chhattisgarh with the scientists. He felt a need to conduct studies in Sickle Cell Disease, which is common in various tribes of the state. He invited RMRCT scientists to carry out various studies in Chhattisgarh.

PAPERS PUBLISHED / IN PRESS / ACCEPTED

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4. Raj D.K. Das B.R. Dash A.P., Supakar P.C. (2004). Detection of a rare point mutation in the C-terminus of merozoite surface antigen 1 gene in *Plasmodium falciparum* in eastern Indian isolates. **Experimental Parasitology** 106 (1-2): 45-49.
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6. Singh N., Mishra A.K., Shukla M.M., Chand S.K. (2003). Forest malaria in Chhindwara, Madhya Pradesh (Central India) - A case study in an ethnic tribal community. **American Journal of Tropical Medicine and Hygiene** 68 (5): 602-607.
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13. Singh N., Saxena A. (2004). Usefulness of rapid on site *P. falciparum* diagnosis (Parachek®Pf) in forest migrants and among indigenous population at the site of their occupational activities in Central India**. American Journal of Tropical Medicine & Hygiene** (In press).
14. Singh N., Kataria O., Singh M.P. (2004). The changing dynamics of *Plasmodium vivax* and *P. falciparum* in Central India. Trends over a 27-year period (1975-2002). **Vector Borne Zoonotic Diseases** (In press).
15. Rajamani S., Anantharaman L., Mylavarapu V.S. Sivaram, Mirsamdi N., Chaudhary D., Lohiya N. K., Gupta R. B., Roy R. P. (2004). Remote communications in deoxyhemoglobin S fiber assembly: Inhibitory effect emanating from enhanced flexibility of the AB region of the alpha chain is annulled by a mutation at its EF corner. **Journal of Biological Chemistry** 279 (19): 20018 - 20027.
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PAPERS COMMUNICATED

1. Gupta R.B., Solanki S.S., Singh N. Splenic infarction in an Indian youth - A brief report. **American Journal of Haematology** .
2. Anvikar A. R., Chakma T. , Rao V. G. HIV Epidemic in Central India: Time Trends over 18 years (1986 - 2003). **Acta Tropica.**
3. Das D., Kumar S., Sahoo P.K., Dash A. P. Prevalence of *Wuchereria bancrofti* antigenemia in Madhya Pradesh, India. **Indian Journal of Medical Research.**
4. Das D., Kumar S., Babu B. V. , Dash A. P. A study on knowledge of lymphatic filariasis among endemic population of rural Madhya Pradesh, India. **Acta Tropica.**

CONFERENCES/WORKSHOPS/ MEETINGS ATTENDED

Dr. A. P. Dash attended Society Meeting of Institute of Life Sciences Bhubaneswar at New Delhi on 9th November 2003.

Dr. A. P. Dash attended meeting of the Tribal Task Force at ICMR, New Delhi on 17th December 2003.

Dr. A. P. Dash attended the Indo-French Meeting on Dengue at Pune on 18th & 19th December 2003.

Dr. A. P. Dash attended a meeting on Filariasis Control at CRME, Madurai on 21st & 22nd February 2004.

Dr. A. P. Dash attended meeting of Tribal Task Force at National Institute of Virology, Pune on 26th March 2004.

Dr. Neeru Singh attended a workshop on Fundamentals of International Clinical Research organized by US Embassy at Delhi, 11th & 12th November 2003.

Dr. Neeru Singh attended a meeting of the Tribal Task Force at ICMR, New Delhi on 17th December 2003.

Dr. Neeru Singh attended Indo-US workshop on Infectious Diseases Research & Development from 6th to 10th January 2004 in Banglore and delivered a lecture on Malaria Diagnostics.

Dr. Neeru Singh organized an international workshop on Rapid Assessment Tools for Malaria for South East Asia on 26th to 29th April 2004.

Dr. V. G. Rao attended the XXXV Annual Conference of the Nutrition Society of India and presented a paper on Nutritional status of Saharia, a primitive tribe of Madhya Pradesh at National Institute of Nutrition, Hyderabad on 12th & 13th December 2003.

Dr. V. G. Rao participated as a resource person in the National Seminar on Child Nutrition organized by Home Science College, Jabalpur on 9th & 10th December 2003.

Dr. T. Chakma delivered a lecture on 'Effect of micronutrients on fluorosis in tribal children of Mandla, Central India' at National Seminar on Child Nutrition organized by Home Science College, Jabalpur on 9th & 10th December 2003.

Dr. T. Chakma attended the Indo-US Workshop on Environmental and Occupational Epidemiology at National Institute of Epidemiology, Chennai on 7th to 10th January 2004.

Dr. T. Chakma attended the Indo-UK Workshop on Community Surveys in Health Research at University of Madras, Chennai on 2nd February 2004.

Dr. T. Chakma attended the Fifth Sir Dorabji Tata Symposium on Leishmaniasis held at IISc Banglore on 10th & 11th March 2004.

Dr. Kalyan B. Saha attended meeting of ICMR Forum for Epidemiology at National Institute of Epidemiology, Chennai on 12th & 13th October 2003.

Dr. Anup Anvikar participated in AIDS awareness camp on 4th December 2003.

Dr. Anup Anvikar attended meeting of Tribal Task Force at National Institute of Virology, Pune on 26th March 2004.

Dr. D. Das delivered a lecture on Host-parasite interactions and immune responses at Academic Staff College, Rani Durgawati Viswa Vidyalaya on 30th December 2003.

Dr. K. Damyanti attended National Seminar on Childhood Nutrition and presented a paper, 'Nutritional status in late childhood in the tribal areas of Madhya Pradesh' organized by Home Science College, Jabalpur, on 9th & 10th December 2003.

Dr. K. Damyanti attended XXXV Annual conference of the Nutrition Society of India and presented a paper entitled 'Nutritional status of the adolescents in the tribal area of Madhya Pradesh' at National Institute of Nutrition, Hyderabad on 12th &13th December 2003.

Dr. Rajiv Yadav attended a workshop on Medicinal Plants- Tissue Culture and Phytochemical Investigations at Birla Institute of Scientific Research, Jaipur on 16th to 18th October 2003.

ACADEMIC ACTIVITIES

Departmental seminars have been started in various departments of the Centre. These are in addition to the regular activities like seminars, journal clubs, administrative seminars, computer classes, etc.

Master of Applied Epidemiology

Dr. T. Chakma, Assistant Director is undergoing the course 'Master of Applied Epidemiology' at National Institute of Epidemiology, Chennai.

Ph D Programme

The Centre is affiliated to Rani Durgawati University, Jabalpur for Ph D programme. Mrs. Sujata Sinha and Mr. Praveen Kumar have joined as Junior Research Fellows under ICMR and CSIR fellowships respectively.

Human Resource Development



(Ph D students with Dr. Feiko ter Kuile & Dr. Uday Kumar from CDC, Atlanta)

INTERNATIONAL COLLABORATION

The Centre is a collaborating partner with CDC, Atlanta, USA in the study 'Preparation of field site for malaria vaccine trial'. The scientists of CDC recently visited the Centre to initiate the study.

The Centre is a collaborating partner with Moore School of Medicine and CDC, Atlanta. NIH, USA grants an amount of US$ 200000 to pursue the study.



(Scientists from CDC Atlanta visiting RMRCT)



RMRCT IN NEWS

RMRCT celebrates foundation day



A view of the function organised by Regional Medical Research Centre for Tribals.

■ Staff Reporter

FOUNDATION day of the Regional Medical Research Centre for Tribals (RMRCT) (Indian Council of Medical Research) Jabalpur was celebrated at its premises on March 1.

Chief Justice Kumar Rajaratnam MP High Court, Jabalpur was the chief guest, while Mrs Heera R Rajaratnam was the guest of honour. Dr G C Mishra, Director National Centre for Cell Science, Pune was the main speaker.

Dr A P Dash, Director of RMRCT, Jabalpur briefed the audience regarding the centre. He mentioned that this is the only ICMR institute devoted to research in Tribal Health and research priorities of the centre.

He also mentioned in his speech the achievements of the centre like studies on fluorosis, haemoglobinopathies, nutrition, HIV etc.

Dr G C Mishra congratulated the Director and scientists of the centre for their achievements.

He explained the importance of cell line repository to the audience. He told that it is not fair to go to the tribal people again and again for collecting samples.

Instead, we should maintain cell line of tribals. He also talked collaboration in this connection.

He also felt a need to develop environment and HIV drugs. He told that there is also a need to develop newer tools for diagnosis of diseases.

He also gave the example of noble laureates.

Mrs. Heera Rajaratnam inaugurated a scientific exhibition focusing the achievements of the centre over last 2 decades. Chief Justice appreciated the exhibition.

Dr NeeruSingh proposed vote of thanks and Dr V G Rao compered function.

RMRCT celebrates...

Dr Mishra appreciated the fluorosis work done by the centre. He also asked the scientists to generate funds for research, make new inventions and file patents.

Mrs Heera Rajaratnam also expressed her remarks. Chief Justice Kumar Rajaratnam advised the scientists to look out for newer diseases and

Justice Rajendra Babu, others visit expo



जनजातियों में व्याप्त रोगों की खोज करें



अगले वर्ष महंगी हो जाएंगी औषधियां



MESSAGES

Prof. N.K. GANGULY
Director General

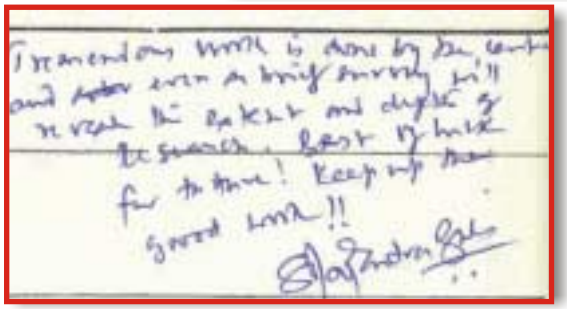
Indian Council of Medical Research

MESSAGE

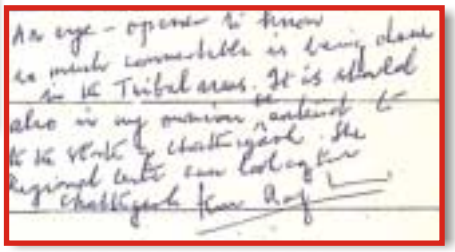


I am extremely happy to keep on record our appreciation for satisfactory progress of Regional Medical Research Centre for Tribals (RMRCT), Jabalpur.

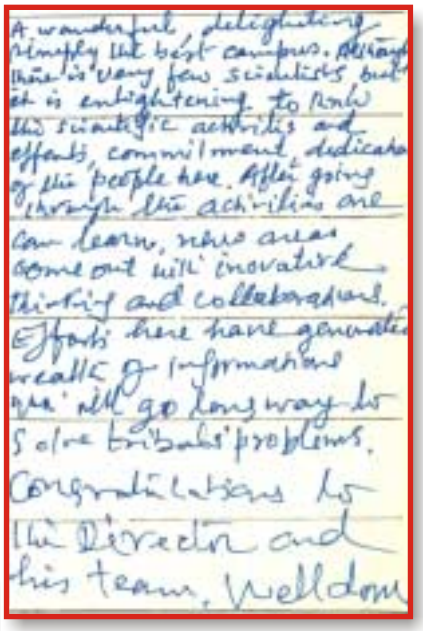
Set up, in 1984, the RMRCT addresses itself mainly to the study of the health and nutritional problems of the tribal populations, including nutritional disorders, common communicable diseases, environmental health problems, etc. In fact, it not only provides assistance in planning, monitoring and evaluation of tribal health & other developmental programmes in tribal areas of India (including Madhya Pradesh) as well as in training health functionaries, but simultaneously it is also attempting to estimate the magnitude of health problems posed by other common diseases such as tuberculosis, leprosy, diarrhea, malaria, filariasis, venereal diseases, poliomyelitis, measles, etc.....



Hon'ble Chief Justice of India, Justice Rajendra Babu



Hon'ble Chief Justice of the M. P. High Court, Shri Kumar Rajaratnam



Dr. G. C. Mishra, Director, NCCS, Pune

Printed at **AQUA PROCESS**, Nagpur Tel: (0712) 2523513

Published by **The Director, Regional Medical Research Centre for Tribals,**
Nagpur Road, P.O. Garha, Jabalpur - 482003 (M.P.)
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