

JAPANESE ENCEPHALITIS

Trials are in progress by using Information Technology application (Heuristic Engine, software) to develop a surveillance system for Japanese encephalitis (JE) for a reliable early warning system to forecast the outbreaks. A collaborative study was undertaken with the Indian Institute of Chemical Technology, Hyderabad in which entomological and serological parameters were collected longitudinally from the JE endemic areas of Kurnool district, Andhra Pradesh. In rural areas, JE vectors, *Culex tritaeniorhynchus* was the predominant species, which comprised 68.5% of total collection whereas *Cx. gelidus* was the dominant (50.1%) in urban area. A high abundance (females / man hour) of *Cx. tritaeniorhynchus* was recorded in rainy season (July - November) whereas lowest density was recorded in June (hottest month). However, no seasonal trend was observed in the case of *Cx. gelidus*, another vector species of JE, which may be due to the availability of breeding habitat (polluted water bodies) throughout the year. Sero-epidemiological study showed a declining trend of JE virus activity (0.3%) during this year. Data analysis using Heuristic Engine software is in progress.

In Cuddalore district of Tamil Nadu, *Cx. tritaeniorhynchus* was dominant species (77%) followed by *Cx. gelidus* (9.1%), *Cx. fuscocephala* (5%) and others. A four-fold decrease in the over all minimum infection rate values (0.714) was recorded during this year when compared to the previous year. Except *Cx. tritaeniorhynchus*, *Cx. fuscocephala* and *Cx. gelidus* no other vector mosquitoes had been found with JEV infections. An increase in JEV infection in the vector mosquitoes was observed in alternate years since 2000.

A collaborative study with referral hospitals JIPMER, Pondicherry & RMMCH, Chidambaram has revealed that JE was an important component of hospitalized children with AES symptoms from nearby rural areas in Cuddalore district. Forty percent of pediatric AES cases examined during this year were due to JE.

In laboratory JE virus antigen was prepared in Vero cells and a simple and rapid virus concentration methodology was adopted for the partial purification of the virus antigen. Preliminary trial was made to use the cell culture derived antigen (CCDA) in IgG ELISA for the screening of coded human serum samples collected from endemic areas. Results were found encouraging.

LYMPHATIC FILARIASIS

In the ongoing studies on evaluation of role of vector control (VC) and mass drug administration (MDA) in the filariasis elimination campaign, a survey was carried out during April 2004 in Villupuram district, Tamil Nadu, to determine the status of microfilaraemia and antigenaemia in the two age groups. Overall six MDAs were made (1995 – 2003) in the erstwhile Group A & B villages. In MDA alone villages (Group A) the mf prevalence was 1.1 & 2.3% in 2-5 & 15-25 age groups, respectively, whereas in the villages where vector control (VC) was also implemented (Group B), the mf prevalence was 0.0 and 1.3, respectively. Reduction in AGP was higher in the MDA + VC villages than MDA alone villages.

The VC villages continued to demonstrate negligible vector density with nil transmission in both in the resting and landing populations. In villages without VC the vector density was >25.0 (PMH) and the infection rate declined, but there was a moderate increase in infectivity rates.

In an additional study on an extramural project (WHO/TDR) in the same district, during this year, annual single dose of 4th MDA with DEC was administered in Mugaiyur block; while albendazole (ALB) was co-administered with DEC in Tirukoilur block in September 2004. The drug consumption rate was >80% in both the arms; while adverse reactions were 1.0% and 1.5%, respectively, in the DEC+ALB and DEC alone arms.

In the block administered with DEC with ALB, there was a significant reductions in the microfilaraemia and antigenaemia in 2-25 years with 3 MDAs. Higher reductions were noticed in the younger age groups of 2-5 & 6-9 years. The overall reduction in the prevalences of the three soil transmitted helminths (STHs), viz; *Ascaris*, Hookworm and *Trichuris* was 88% in DEC+ALB arm, as against 30% (3 times less) observed in DEC alone arm, 3 weeks after fourth MDA. The reduction in the egg intensity of STHs was 99% in co-administration arm, while 75% in DEC alone arm.

Entomological monitoring was continued every month in all the 18 index villages by collecting *Cx. quinquefasciatus*, resting in human dwellings and also those landing on human volunteers. Due to the postponement of MDA for 5 months, an upsurge in the infection and infectivity rates was observed, resulting in an increased transmission indices in both the treatment arms. Transmission intensity index (TII) estimated from the resting collections for the 6 months period after 4th MDA was almost similar in both the arms.

DENGUE

Studies in an ongoing three-year extramural project (funded by WHO/TDR) on dengue at Chennai (Community based dengue vector control under health system in one district [south India] and transfer of technology) is in progress. The “Preparatory & Baseline” data collection phases of the project were completed earlier and during this year “Intervention phase” was implemented in which different kinds of dengue IEC programmes were organized in index areas, IEC materials were distributed and vector control monitoring cards (VCM) to the community to increase their knowledge on dengue fever, its cause, mode of transmission, dengue vector mosquito breeding sites and its control methods. After initially sensitizing the community on dengue fever, the reinforcement activity was started to disseminating the information with emphasis on potential breeding habitats of dengue vector, *Ae. aegypti* and methods of control. The reinforcement of dengue awareness programmes was made by actively involving three components of community, viz., (i) women (SHG) (ii) volunteer youths (iii) students. The positive behavioural changes were expected in water storage practices and increase in frequency of regular cleaning (at 5 day intervals) the potential breeding habitats. The reinforcement was done by house-to-house visits and following the VCM cards. Positive indicators observed including destruction of breeding habitats in 10-30% of respondents.

Following successful isolation of dengue viruses from *Ae. albopictus* (Skuse) from Kerala Western Ghat area, the study has been shifted to Thiruvananthapuram, a coastal district, where too *Ae. albopictus* has been incriminated. the mosquito species is predominant in Kerala. CRME has succeeded in detecting dengue virus even in 20-25 days old desiccated mosquitoes, making easy the mechanism of Centre’s service to several organizations regularly consigning mosquitoes for detecting virus.

In the laboratory, a diagnostic facility to screen the human sera samples for dengue is well established. Attempts are underway to study the receptors of flaviviruses in vector mosquitoes.

VECTOR CONTROL

An emulsifiable concentrate (EC) formulation developed from the metabolites of *Pseudomonas fluorescens* was screened against *Ae. aegypti* and *Cx. quinquefasciatus* for its larvicidal and pupicidal activity. Lethal concentrations for 50 and 90 percent mortality levels confirmed the larvicidal and pupicidal action of this microbial formulation against the two vector species. The dosage requirement for pupal mortality of *Ae. aegypti* was ten times less than required for larval mortality. Whereas in *Cx. quinquefasciatus*, the dosage requirement for pupal mortality was three times more than required for larval mortality.

A mosquito repellent, MosTyag, has been discovered / developed, and submitted to the ICMR for patentship. The usefulness of the repellent has been found against all the major vector mosquito species.

DISASTER MANAGEMENT STUDIES

Tsunami affected areas in southern parts of Tamil Nadu & Kerala

Following the calamities caused by the sudden tsunami tidal waves in the coastal areas of southern India on 26th December, 2004, different teams were sent from our Institute to study whether tsunami had any direct impact either on increasing or causing outbreak of vector-borne diseases. The teams commenced surveys in these areas within three days from the occurrence of tsunami and were intensively followed up by re-surveys in all the tsunami affected coastal areas of southern parts of Tamil Nadu and Kerala, where many human deaths had been reported, for a total period of 7-8 weeks. The initial survey itself revealed that the density of vectors (dengue, malaria and JE) were very low as most of the breeding habitats were distorted by marine water. The survey was initially intended for studying epidemic and outbreak of vector-borne diseases with a special focus on intrusion of an efficient malaria vector, *Anopheles sundaicus* which could be presumed to be carried all the way from Andaman and Nicobar Islands to the main land of India by tsunami waves. However, no specimen of *An. sundaicus* was found in and around the coastal villages of the five districts where the surveys were conducted and where marine water had entered. The density of the vectors of dengue, malaria and JE remained very low during ensuing surveys also, the samples of vector specimen were screened for infections and the results ascertained that there were no epidemic of vector-borne diseases in these areas. Vector control strategies adopted by local health authorities along with the affected community in these areas were found quite satisfactory. It is observed that there is no favorable change in the eco-system for breeding of vectors and was only inferred that tsunami cannot be attributed to have had any direct impact either on increasing or causing outbreak of vector-borne diseases, in this part of country.