Trop. Med., 35 (4), 331−334, December, 1993

A Rapporteur's Summary: Vector Control

Somei KOJIMA

Department of Parasitology, Institute of Medical Science, The University of Tokyo, 4-6-1 Shirokanedai, Minato-ku, Tokyo 108, Japan.

Abstract: Vector control is essential for control of the occurrence of dengue virus infections. Through discussions by participants of the session IV, it became apparent that shortage of professionals in the field of entomology and lack of simple messages that motivate community participation may be a key for overcoming difficulties in vector control. Thus, the establishment of an international or regional training course for young scientists must be proposed under the sponsorship of either international organizations or semi-governmental agencies.

Key words: Dengue infections, Vector control

I owe a great debt of gratitude to Professor Igarashi for providing me a good chance to attend this Symposium and to learn many things concerning dengue virus infection and its vector control.

Since I am neither an entomologist nor a virologist, I know my colleagues and friends among the audience are very anxious about what I am going to talk. Indeed, I have to confess that I did not know anything about *Aedes aegypti* or *Ae. albopictus* before this symposium. I have some experience on shistosomiasis and therefore I know a little bit about snail control. Probably I should talk vector control for dengue virus infection in keeping in mind some strategies in schistosomiasis control programs.

Professor Igarashi is asking us to make some proposals which I suppose should be determined after group discussions among participants of the respective session. However, we were exhausted last evening, so that I asked Dr. Gratz and the other speakers to allow me to arbitrarily deliver my personal suggestions. Before going to tell you about suggestions, however, I feel it is my duty to briefly summarize what has been discussed in the session of vector control.

Summary of discussions in the session of vector control

Dr. Gratz pointed out that implementing effective and sustained vector control programs is urgent and essential for control of dengue virus infection. He repeated to mention even through discussions from the floor that existing control programs are not functionally effective if there still occurs a transmission.

That the control of dengue and DHF is a matter of big business is also his opinion,

because 2 million children are hospitalized annually and whole family members are sitting beside their beds, the costs of which must reach to a huge amount. Furthermore, the disease threatens our life. Therefore, social awareness on the importance of control has to be increased and the cooperation of a government, local authorities and the public is entirely necessary for vector control in the carrying out of environmental management to reduce breeding sources.

Dr. Supat described firstly some biological aspects of dengue vectors, especially of *Ae. aegypti* and *Ae. albopictus*. The breeding habitats of *Ae. aegypti* are jars, ant traps, flower pots, etc., mainly inside of the house, whereas those of *Ae. albopictus* are mainly found outside of the house. The adult of the former is anthropophilic and endophagic. He also mentioned *Ae. aegypti* can bite pigs, cows, and chicks but I am not sure if he emphasized that *Ae. albopictus* is not anthropophilic. This might be very important when we consider the role of *Ae. albopictus* in transmission of dengue virus. I should like to come back to this point later.

In addition, Dr. Supat reported control measures which were carried out in Thailand, i. e. emergency control by space spraying by ULV or by fogging, application of larvicide, and environmental management. Later on, a question was raised from the audience by Dr. Yasuno as to which intervention was the best. Unfortunately, discussion was closed before Dr. Supat might answer the question.

Dr. Itoh made a beautiful presentation on his experimental works on control of *Aedes* mosquitoes with insecticides. He developed two new methods for larval control. One is a slow release strip formulation with pyriproxyfen, an inhibitor of emergence of adult mosquitoes. The strip formulation can maintain a certain concentration of pyriproxyfen in a water container by releasing the inhibitor very slowly into water.

The other one is the utilization of blood-fed females as a vehicle of pyriproxyfen to a small larval habitat. For this purpose, he used black-color adult resting traps which had been treated with pyriproxyfen. In addition to these methods, he also recommended to use permethrin-incorporated bed nets and mosquito coils containing d-allethrin, the latter of which was shown to be effective in inhibiting mosquito's landing on man. However, I felt mosquito coils might be good for personal use rather than for vector control in the community level.

Furthermore, I should like to point out that careful studies are necessary to confirm non-toxicity or non-teratogenicity in humans of drinking water containing pyriproxyfen when it is used for a long period of time.

Dr. Lien reported vector surveillance and control that had been carried out in Taiwan since 1987. Health education of the public by propaganda through mass media, public lecture, etc. resulted in gradual reduction of larval density from 3,010 per 100 houses in 1987 to 570 in 1992. However, the reduction was not enough to avoid outbreaks of dengue infections in 1991 and 1992. Therefore, residual spray of alpha-cypermethrin was applied to interior walls of houses in the area with Breteau index of over 35 for *Ae. aegypti*. Results of field studies will be very interesting because according to Dr. Supat adult

mosquitoes do not rest on walls but on hanging objects. Dr. Lien also told me that *Ae. albopictus* prefers to bite animals or pets rather than humans. This might give a suggestion in considering the role of *Ae. albopictus* for dengue virus transmission.

Finally, Dr. Akiyama made a review of a multi-centre project to control DHF vectors with community participation. The project was carried out in Indonesia, Myanmar and Thailand under the sponsorship of WHO/SEARO, and control activities were focused on the source reduction of the vector in the context of the local situation. What was impressive from his talk is that people know but they don't do. Although the reason why it is so should be well analyzed with help of anthropologists or sociologists, I feel motivation must be important for changing people's attitude. Then we have to consider what will be the simple and specific message that motivates people to take an action to reduce breeding sources.

Proposals and recommendations

Through these presentations in the session of vector control as well as presentations by other participants during 2 days' meeting, I believe that everybody present here comes to the conclusion that control of dengue virus infection can not be achieved without control of vector mosquitoes which is most difficult if we do not have community participation. If it is so, our target is not mosquitoes but people in the community.

For this purpose, mothers' groups or associations must be included among such targets, because they are most anxious about the health and life of their children. The second target may be teachers at primary schools. The life cycle of mosquitoes may be an interesting material for teaching science or biology if larvae collected from schools or children's houses are used for elaborating adult mosquitoes. Children also can be considered as potential messengers who bring to their own homes necessary information on dengue or DHF/DSS and vector control. Children may be regarded as health volunteers who collect and count larvae from water jars in their houses. In relation to this point, however, I should like to remind you of what Dr. Gratz told us yesterday. He said, "Cooperation of community is essential, but this must be supervised by professionals." I completely agree with him but I feel our problem is how to get professionals.

Now I should like to suggest to Professor Igarashi to make a proposal that a regional training course should be established in one of Southeast Asian countries under the sponsorship either of international organizations like WHO/UNICEF or of semi-governmental agencies such as JICA in order to give a training for not longer than 3 months to selected young people from Asian countries who have a scientific background, whatever it is in biology or sociology. We have a good example in the Bangkok training course for integration projects of family planning and parasite control. This kind of training course may be different from that initiated by the Rockefeller Foundation.

However, these professionals are not enough by themselves alone for entering deeply into the community to motivate people. It might be nesessary to establish a local organization for vector control which is composed of political leaders, representatives of local

authorities, mother's associations, teachers' associations and health workers. Organization of volunteers may also be necessary.

I should like to add a few words in connection with shortage of professionals in the field of dengue studies. In Japan, as famous professors of entomology retire from their universities, the department of entomology has been disappearing one by one. I really worry about the present situation and if we have an epidemic of dengue, or any of vector -borne diseases, we might have to offer many precious lives as sacrifices. Therefore, I should like to suggest to Professor Igarashi on this opportunity to issue a warning to medical schools in Japan against the danger of shortage of entomologists which may bring a miserable situation in near future in our country. This is not only for Japan but also for the necessity of international cooperation with other countries.

Another thing I should like to point out is the necessity of establishment of a surveillance system in which virus detection from mosquitoes (either adults or larvae) may be performed by ELISA with monoclonal antibodies against each type of dengue viruses, because surveillance by using, for example, school children is difficult due to ethical reasons. Such a new surveillance system may be useful to predict endemicity of a certain type of virus infection.

I hope my suggestions are not misdirected ones.