

DELTAMETHRIN IMPREGNATED MOSQUITO NETS : AN EXPERIMENTAL STUDY IN AN AIR FORCE STATION IN CENTRAL INDIA (DELTAMETHRIN TRIAL)

Lt Col A BANERJEE*, Wg Cdr B NAYAK (Retd)[†]

ABSTRACT

An experimental study was carried out to determine the efficacy of deltamethrin impregnated mosquito nets in reducing malaria incidence under field conditions in an Air Force Station. Out of the total study population of 748 airmen and DSC personnel, 320 got their mosquito nets impregnated with deltamethrin, while 428 used unimpregnated mosquito nets. During the three months observation period, there was no significant difference in malaria incidence among the two groups (Yates Chi Sq=0.05, p=0.829405, Relative risk = 0.96 with 95% CI between 0.31 and 2.98). In view of study findings, it was concluded that in the station, use of deltamethrin impregnated mosquito nets will not reduce incidence of malaria appreciably, the stress has to be on outdoor personal protective measures.

MJAFI 2002; 58 : 03-04

KEY WORDS : Deltamethrin; Malaria; Synthetic pyrethroids.

Introduction

Mosquito nets have been used in services as a personal protective measure against malaria. It is advocated that to increase the effectiveness of mosquito nets, they be impregnated with synthetic pyrethroids [1]. The use of synthetic pyrethroids for vector control has also been recommended by National Malaria Eradication Programme in identified rural areas in highly malarious zones [2]. Field trials with pyrethroid impregnated bed nets have been carried out in several countries in Africa, China, Papua New Guinea, Surinam, Malaysia and India. The trials have shown consistent good results. Laboratory trials at Armed Forces Medical College, Pune have also shown that the use of deltamethrin impregnated mosquito net reduced mosquito density and number of mosquito bites.

However, malaria is a disease in which populations of human beings, anophelines and parasites, with their unique permutations and combinations in different geographical areas are the dominant themes and adaptation from studies carried out in other settings has little significance.

With this in view, we carried out the present study of deltamethrin impregnated mosquito net in an Air Force Station located in a highly malarious, tribal belt of Central India.

The purpose of the study was not to challenge the effectiveness of synthetic pyrethroids to keep mosqui-

toes away (which has been well established), but to evaluate the impact (as measured by malaria incidence) of using deltamethrin impregnated mosquito nets in a particular setting.

Material & Methods

Study Area : The Air Force Station is located in a semi hilly, forested, highly malarious, tribal belt in Central India, at an altitude of 2435 feet.

Study Population : This comprised all the Airmen and DSC personnel on the posted strength of the station.

Study Sample and Design : A total of 748 airmen and DSC personnel comprised the study sample. They were further randomly divided into two groups, the experimental group who had their mosquito nets impregnated with deltamethrin and the control group who continued using mosquito nets without impregnation. All impregnations were carried out in the months of May and June 99. Outcome measure, i.e all local cases of malaria in the months July to September 99, was compared in the two groups.

Method of deltamethrin impregnation : In a wide plastic basin, 25 ml of deltamethrin was mixed with one litre of water for one single cotton mosquito net. Net was immersed into the mixed solution till it was completely soaked and entire solution was absorbed. Repeated rubbing and squeezing was used to distribute the solution evenly. Drying was done in the shade. Once impregnated the individual was told not to get the net washed for six months.

Results

Out of the 320 personnel who got their mosquito nets impregnated, 5 suffered from malaria during the study period, whereas out of the 428 personnel who used un-impregnated mosquito nets, 7 contracted malaria, as shown in Table-1. There was no significant difference in malaria rates in the two groups (Relative risk = 0.96, 95%CI between 0.31 to 2.98, Yates Chi Square=0.05,

*Reader, Department of PSM, Armed Forces Medical College, Pune - 411 040 [†]Ex Commanding Officer, 3 Air Force Hospital, Amla Depot, Dist Betul - 460 553.

TABLE 1
Incidence of malaria in the study and control groups

	Contracted malaria	Malaria free	Total
Using delta-methrin treated mosquito nets	5	315	320
Unimpregnated mosquito nets	7	421	428
Total	12	736	748

Yates Chi sq = 0.05, $p = 0.829405$, RR = 0.96, 95%CI = 0.31, 2.98

$p=0.829405$).

Discussion

If a man holding a piece of wood releases his grip on it, what happens? The knee jerk answer is - it falls down. However, one should withhold the answer till one gets more information as there can be three different outcomes depending on whether the man is standing on the ground, is under water, or in space.

Similarly, in malaria, a given course of action can have different outcomes depending on the local situation (environmental factors, host factors, and vector bionomics). Malaria is a complex disease and its dynamics vary from place to place (even on the ground). Stratification of the problem has become an essential feature for the planning and development of a sound control strategy to maximise the utilisation of available resources. It can also provide guidelines as to which strategy could be most suited and economical under the existing conditions [3,4].

No two locales are identical epidemiologically, therefore, off the shelf solutions which have been successful at other locales may not provide ready answers. The cause for the low efficacy of deltamethrin in the present location is primarily due to local vector bionomics. It has been demonstrated that in the station the vector is exophilic [5]. Similarly, the personnel most affected were personnel comprising night patrols in thick forested areas and tribals from neighbouring villages engaged in forest related activities.

In this scenario, impregnation of mosquito nets will have minimal effect on the incidence. Though, generalisation in malaria is hazardous the present situation may mimic field and operational conditions to some extent.

War is an outdoor activity (at least for common soldiers who form the bulk of troops). In malarious areas, outdoor personal protective measures even to the extent of deltamethrin impregnated uniforms [6], should take precedence over indoor protective measures.

Malaria, like a game of chess, has many pieces (different vectors, different meteorological conditions, different host factors, etc) with their own permutations and combinations. "Grandmasters" may be required to plan the strategy and tactics of control competently; each locale is like a new game of chess - most of the time we amateur players are checkmated by the malaria parasite just when victory seems to be in sight.

(Professionals are predictable - but the world is full of amateurs! - Dunnigan)

References

1. APHA. Malaria. In: Control of communicable diseases manual. Benenson AS. 16th ed. American Public Health Association, 1015 Fifteenth Street, NW, Washington. 1995;283-92.
2. GOI. Malaria Action Plan. National Malaria Programme, Ministry of Health and Family Welfare, 22 Shamnath Marg, Delhi - 110 054, 1995.
3. Park K. Malaria. In: Text Book of Preventive and Social Medicine. 15th ed. M/s Banarsidas Bhanot, 1167, Premnagar, Jabalpur 482 001. 1997;188-202.
4. WHO. Technical Report Series No 857, 1995.
5. Banerjee A, Nayak B. Epidemiological and Entomological correlation of malaria transmission in an Air Force station. MJAFI 2001; 57 (3) : 191-3.
6. Singh Harinder. Control of Malaria amongst troops in Counter Insurgency Operations using deltamethrin impregnated uniforms. Quarterly PSM update. Armed Forces Medical College, Pune. Vol 1, No 1, April 1999.