1.7 Use of insecticide treated nets (ITNs) in alternative forms for the protection against malaria transmission in the desert region

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OBJECTIVE

1. Evaluation of the effectiveness of the insecticide treated nets (ITNs) with community participation and acceptance of use of ITNs in alternate forms in the desert part of India.

PROGRESS

Insecticide Treated Nets (ITNs) are presently the most technologically advanced form and sustainable intervention for the vector control that could facilitate for malaria prevention. The efficacy and effect of the insecticide treated nets below the beds and curtains for the vector control was evaluated in Pokaran Community Health Centre of the Jaisalmer district. Among the six villages, three villages were selected for the evaluation of the insecticide nets and three villages for the control (no nets). The impregnation of nets and curtains used in the door, window and wardrobes was done with deltamethrin at a concentration of 1g/meter^2. The efficacy of the net was evaluated after immediate impregnation and after 3, 6 and 9 months of use. The impregnation and re-impregnation was done in presence of the villagers and volunteers. They were trained and educated how to re-impregnate and use insecticide treated nets. The entomological and malaria epidemiology surveys were conducted during the base line survey, intervention and post-intervention period.

The mosquito density in the houses of the insecticide treated nets distributed villages were found lower than the houses of the control villages (Table-1). The per man hour density (PMH) of female anopheline mosquito was 73% (T-1, Nathusar), 77% (T-2, That) and 58% (T-3, Billia) lower in the three insecticide treated nets distributed control villages than in the control villages in the month of March-June. Similarly in the month of June-September the PMH of female anopheline mosquito in the insecticide tretated net distributed villages was 37% (T-1, Nathusar), 45% (T-2, That) and 26% (T-3, Billia) lower than the control villages. In the month of September-December, the PMH of female anopheline mosquito in the insicide tretated net distributed villages was 41% (T-1, Nathusar), 45% (T-2, That) and 38% (T-3, Billia) lower than the control villages.

Table 1. The per man hour density (pmh) of female Anopheline mosquitoes in the deltamethrin treated nets distributed villages and control villages during the observation period

Months	T-1 (Nathusar)	C-1 (Kelawa)	T-2 (That)	C-2 (Ujjala)	T-3 (Billia)	C-3 (Devalpura)
March-June	4 ± 0.5	15± 2.5	4 ± 0.5	18 ± 1	5 ± 1	12 ± 1
June-September	10 ±1	16± 2	11 ± 1	20 ± 2	11 ± 1	15 ± 1
September-December	7 ± 1	12±1.5	6 ± 1	11 ± 1	8 ± 0.5	13 ± 1

Table 2. The slide positivity rate (SPR) in the fever cases of the deltamethrin treated nets distributed villages and control villages during the pre-intervention, intervention and post-intervention period

Months	T-1 (Nathusar)	C-1 (Kelawa)	T-2 (That)	C-2 (Ujjala)	T-3 (Billia)	C-3 (Devalpura)
March-June	6 ± 1	17 ± 3	5 ± 0.5	16 ± 1.5	0	19 ± 1.5
June-September	10 ± 2	20 ± 2	5 ± 1	10 ± 2	15 ± 2	20 ± 2
September-December	10 ± 2	15 ± 2	10 ± 1	20 ± 1	5 ± 1	15 ± 1.5

Malaria surveillance was conducted in the in the study villages during the reported period. Fever cases were diagnosed for malaria in the control and insecticide treated bed net distributed villages. Malaria parasite, *Plasmodium vivax* and *Plasmodium falciparum* were reported from the study villages. Higher malaria cases were detected in the control villages than the insecticide treated bed net distributed villages (Table-2). In the month of March-June, June-September and September-December the slide positivity rate (SPR) in Nathusar (T-1) village was 11,10 and 5% lower than the control villages Kelawa (C-1). Similarly in That (T-2) SPR was 11, 5 and 10% lower than the control village Ujjala (C-2) in the month of March-June, June-September and September-December respectively. The malaria cases were 19, 5 and 10% lower in the village Billia (T-3) than the control village Devalpura (C-3). The percentage of reduction of malaria cases in the insecticide treated net villages was higher than the control villages.

The treated bed nets were collected in different intervals from the field and their efficacy was evaluated against *Anopheles stephensi.* The mosquitoes were exposed to the field collected treated nets in and their KD_{50} was recorded. The results are shown in Table-3. The KD_{50} values were found to be increased after use and the insecticide activity was decreased slowly. The difference of the density of the mosquito was recorded between the rooms where treated nets were kept and rooms where no treated net was placed. When the per man hour density among the rooms of treated bed net village was compared, rooms where treated insecticide nets were present found to be with lower per man hour density (Table 4).

Table 3. The knockdown time in seconds (KD_{50}) of the treated nets after 1day, 3 months, 6 months and 9 months of intervention in seconds against two species of Anopheles mosquitoes

Duration	KD_{50} of different vector species (minutes)	
	An. stephensi	*An. subpictus*
1 day	5.42 ± 0.4	5.6 ± 0.3
3 months	5.5 ± 0.6	6.1 ± 0,7
6 months	6.15 ± 0.3	6.27 ± 0.4
9 months	7.06 ± 0.6	7.16 ± 0.5

Table 4. Difference of per man hour density between where treated net beds were present and no net rooms in the treated villages

Villages	Per Man Hour Density of vector species	
	Room where treated net used	Rooms where nets not used
That	5 ± 0.5	7.6 ± 0.5
Nathusar	6 ± 0.5	9 ± 1
Billia	6 ± 0.5	8 ± 0.5