ZOOPROPHYLAXIS WITH SPECIAL REFERENCE TO MALARIA IN HUMAN POPULATION

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ABSTRACT

To examine the possibility that domestic cattle kept in house courtyards might protect residents against malaria through zooprophylaxis. Prevalence of malaria was conducted from December 1995 to November 1996 in human population of distract Karak (NWFP). The analysis showed that the overall incidence was higher (11.81%) among the population which reared cattle than among those which did not (6.53%). The overall incidence of the disease, was higher in Autumn in cattle keeping population. However, comparison of prevalence of both species of *Plasmodium* (*P. vivax & P. falciparum)* revealed a positive correlation between parasite rates and the proportion of families owing cattle. This finding supports the prediction of the Sota-Mogi theoretical model that domestic animals can enhance rather than reduce malaria transmission when vectors are zoophilic. It can be concluded that alongwith other factors, cattle also play some role in spreading of the disease.

Key words: Human population, Malaria, Zooprophylaxis

INTRODUCTION

Zooprophylaxis has been defined by WHO (Anonymous, 1982), as the use of wild or domestic animals which are not the reservoir host of a given disease, to divert the blood seeking mosquito vectors from the human hosts of that disease. It may be active or passive. Active zooprophylaxis is a reduction in malaria as a human biting resulting from the deliberate deployment of domestic animals, as a barrier between mosquito breeding sites and human settlements (Anonymous, 1991). Passive zooprophylaxis is the serendipitous reduction in malaria purported to occur when cattle density increases within a community (Giglioli, 1963).

Domestic animals, which are preferred and are easily accessible by the mosquito, not only favour mosquito reproduction but also serve as reservoirs and spreader of disease pathogens. Thus proper management of livestock play significant role in the control of malaria (Bradly and Narayan, 1987; Service, 1987). In villages of Pakistan and Afghan refugees, parasite prevalence was significantly greater among children of families keeping cattle than those which did not (Bouma and Rowland, 1995). This study reports results of zooprophylaxis of malaria in human population in a district Karak, NWFP, Pakistan.

MATERIALS AND METHODS

The study areas included 10 villages and two schools of district Karak (NWFP). A total of 2649 blood smears were collected from human population. At the time of collection of blood smears, a printed proforma was filled of each individual to have a full information regarding the name, age, sex, occupation, previous history of ailment, drugs taken and presence or absence of cattle in the vicinity, etc. Blood smears were made by cleaning the finger tip of the concerned individual with methylated spirit followed by pricking with disposable lancet. Thick and thin blood smears were prepared on the same slide. Fixation was done with methyl alcohol and stained with Giemsa's stain. Each slide was examined under X 100 oil immersion objective.

RESULTS

During the course of research work, a total of 2649 blood smears from the human population were collected. Of which 1532 (Group A) persons were keeping cattle whereas 1117 (Group B) persons were not bearing any cattle. From Group A, 181 (11.81%) blood smears were found positive. Amongst the positive case of this group, 134 out of 1532 (8.74%) were infected with *vivax* and 47(3.07%) were infected with *P. falciparun.* From Group B, 73 (6.54%) were

positive for plasmodium infection. Amongst these, 53 (4.74%) were infected with *P.vivax* whereas 20 (1.79%) were infected with *P. falciparum*. However, overall incidence was 9.59 percent (254/2649). Amongst positive cases 187 (7.06%) were infected with *P. vivax* and 67 (2.53 %) were infected with *P. falciparum* (Table 1).

Table 1: Prevalence (%) of malaria in human population

Positive No	Mixed infection	*P.vivax*	*P. falciparum*
Group A (n=1532)			
181	11.81	8.74	3.07
Group B (n=1117)			
73	6.63	4.74	2.94
Overall (n=2649)			
254	9.59	7.5	2.53

Seasonal incidence witnessed that the highest incidence occurred during Autumn in the population (Fig. 1). The details of seasonal prevalence are given in Table 2. In Group A, *P. vivax* showed the highest prevalence percentage in spring and the lowest in Winter whereas *P. Falciparum* showed the highest prevalence in Winter and the lowest in Spring (Table 2). From these results it can be inferred that plasmodium species are also seasonal, some are more prevalent ion one season and other in the other season.

In Group B, *P. vivax* shoed the highest prevalence in Summer and *P. falciparum* in Winter (Table 2). It is clear from the results that *P. falciparum* is more prevalent in Winter, effect of keeping cattle or not, is non-significant for these plasmodium species.

DISCUSSION

Cattle ownership and parasite prevalence were associated in two ways. Families which kept cattle in their house courtyards had higher prevalence than families which did not (the compound effect). Villages

Table 2. Season wise of malaria in human population

Group/ Season	Prevalence %			
	Positive	Mixed %	1	2
Group A (Cattle keeping)				
Spring	18(242)	7.44	17 (94.44)	1(5.26)
Summer	64(570)	11.22	55(85.94)	9 (14.06)
Autumn	96(630)	15.23	61(63.54)	35(36.46)
Winter	3(90)	3.33	1(33.33)	2(66.67)
Group B (Non Cattle keeping)				
Spring	4(198)	2.02	3(75.00)	1(25.00)
Summer	19(254)	7.48	15(78.94)	4(21.05)
Autumn	49(478)	9.62	37(75.51)	12(24.49)
Winter	4(187)	2.13	1(25.00)	3(75.00)

Figures in parenthesis indicate number examined.
1 = *P.vivax*
2 = *P.falciparum*

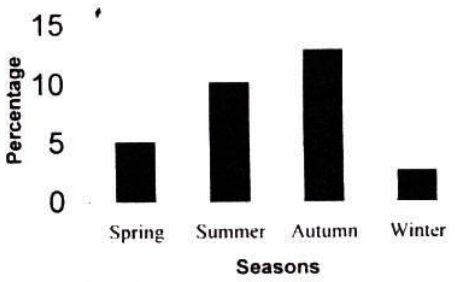

Fig 1: Relationship of prevalence of malaria in human population with season

with a greater proportion of cattle owing families depicted a higher prevalence than villages with fewer cattle owners (the villages effect). The compound effect was the opposite to that predicted by classical zooprophylaxis theory. Recent experiments by Hewitt *et al.* (1994) in a refugee village might provide the explanation: that biting rates on sleeping people increased if cattle were kept in the vicinity. It seems that mosquitoes are indeed attracted by cattle, but instead of being attacked to cattle, they victamized human population. It follows that if the biting rate in cattle owning families is greater, malaria prevalence will also be higher in that group.

So from the findings summerized in Table 1, it can be said that along with dilapidated drainage system, stagnant water, less information about the disease and poor hygienic condition etc., cattle also play a minor role in the spreading of the disease.

On reviewing the whole matter it must be concluded that theory of animal barriers may be in its potentialities, zooprophylaxis has not, yet been shown too be an effective direct against malaria. The present data indicates that in study area (district Karak) zooprophylaxis is not only of doubtful value but may even increase the danger of persons beyond the barriers being bitten by Anopheline mosquito.

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