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Study of social determinants of malaria in desert part of Rajasthan, India

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Background & objectives: A longitudinal study on social determinants of malaria has been undertaken in different villages of Ramgarh PHC of Jaisalmer district, Rajasthan. The study aims to determine social determinants of malaria as applicable to existing cast groups of desert part of Rajasthan.

Methods: Out of 940 households in five villages, 150 households of Rajput community (forward community) and Meghwal community (backward community) were selected at random to study whether due to different behaviour of existing caste groups, transmission of malaria and its intensity also vary or not.

Results: It was found that magnitude of malaria was three times more in the Meghwal community as compared to Rajput community. In-migration of natives importing malaria was found to be prominent cause of more malaria incidence in the backward community.

Interpretation & conclusion: An intervention policy aiming to study existing status of knowledge among different caste groups of desert areas could lead to a substantial control over in-migration as well as further transmission of disease in the desert part of Rajasthan.

Key words Annual blood examination rate – annual parasite incidence – blood smear examination – community

Malaria remains to be the most important cause of morbidity and mortality in India and in many other tropical countries with approx. 2 to 3 million new cases arising every year[1]. In spite of arid conditions prevailing in desert part of Rajasthan, malaria is a major health problem in this region. The ongoing control programmes being coordinated by the National Vector Borne Disease Control Programme (NVBDCP) are concentrating hard on disease containment through chemothreapy and vector control through insecticide spray. It has been observed that magnitude of malaria was three times more among backward communities as compared to forward communities. No infants were found harbouring and it is being observed that in-migrants returning homes introduce malaria in desert. Present paper is an attempt to study significant social determinants of malaria to offer social solutions to ongoing malaria control efforts in desert part of Rajasthan.

Material & Methods

Description of study area: On the request of the Joint Director, Jodhpur Zone, Ministry of Health (Rajasthan) a malarial PHC Ramgarh was selected to find out different causes responsible for malaria in the area. The PHC area falls in Jaisalmer district and lies between 26'55^{o} N latitude and 70'57^{o} E latitude and forms the part of northwestern border of India. Ramgarh PHC includes 60 villages, out of these five villages have been selected randomly for the present study.

Survey network: A longitudinal study on malaria dynamics attmepting entomological, parasitological and sociological components of malaria in desert is being undertaken in 59 villages of Ramgarh PHC, Jaisalmer district. As one of the parts of the ongoing study, a total 150 households of Rajput community (forward community) and same number of households of Meghwal community (backward community) were selected randomly in five villages— Sanu, Serawa, Tejpala, Bada and Naga. Thirty households of each community in a village were selected following systematic random sampling technique. A mass fever survey was undertaken among selected households. In addition data pertaining to malaria cases during five years (1999–2003) were collected with respect to each house from the records of the Primary Health Centre (PHC). The details regarding sociodemographic, socioeconomic, sociocultural and health practices, migration and human behaviour of each study household were recorded in pre-tested schedules through door-to-door survey. Schedules were prepared in English and communicated in Hindi or in local dilects.

Results

Table 1 shows malaria incidence data of five consecutive years from 1999 through 2003 for all the study villages. The number of positive cases for malaria were markedly different among subjects of Meghwal and Rajput communities. In the year 1999, 7(0.8%) cases of malaria were observed in the forward community (FC), while in the backward community (BC) 24 (2.5%) cases were reported. In the year 2000, 11 (1.2%) among FC and 30 (3%) among BC; in 2001, 14 (1.4%) among FC and 40 (3.8%) among BC; in 2002, 12 (1.2%) among FC and 29 (2.6%) among BC and in the year 2003, 8 (0.7%) cases in FC and 25 (2.2%) cases were reported among BC.

Table 2 shows distribution pattern of malaria cases among different age groups of inhabitants of forward and backward communities. Data indicate clearly that among infants (less than one year) in none of the two communities any malaria case was present. In the age group of 1–5 yr, 41% of total cases were present

Table 1. Incidence of malaria in two different communities from 1999 to 2003

Study parameters	1999		2000		2001		2002		2003	
	FC	BC	FC	BC	FC	BC	FC	BC	FC	BC
Population	871	955	905	997	941	1037	978	1079	1017	1122
Family size	5.8	6.4	6	6.6	6.3	6.9	6.5	7.2	6.8	7.5
BSC	61	63	66	70	76	84	70	77	71	69
BSE	54	53	60	61	69	72	62	64	59	60
(+) ve cases	7	24	11	30	14	40	12	29	8	25
Pf cases	1	13	3	18	4	26	2	14	1	12
%*Pf*	14.3	54.2	27.3	60	28.6	65	16.7	48.3	12.5	48
ABER	6.2	5.5	6.6	6.1	7.3	6.9	6.3	5.9	5.8	5.3
API	0.8	2.5	1.2	3	1.5	3.9	1.2	2.7	0.8	2.2
SPR	13	45.3	18.3	49.2	20.3	55.6	19.4	45.3	13.6	41.7
SFR	1.9	24.5	5	29.5	5.8	36.1	3.2	21.9	1.7	20
Death	0	0	0	0	0	1	0	0	0	0

FC — Forward community; BC — Backward community.

Table 2. Distribution of malaria cases according to age in two different communities

Age group (yr)	FC No. (%)	BC No. (%)	Total
0–1	0	0	0
1–5	28 (14)	82 (41)	110 (55)
5–15	18 (9)	48 (24)	66 (33)
>15	6 (3)	18 (9)	24 (12)
Total	52 (26)	148 (74)	200 (100)

among BC, while only 14% of cases were observed in FC. In the age group of 5–15 yr, 24% of cases were reported among BC, while only 9% of cases were present among FC. In the age group of > 15 yr least difference of malaria cases between FC (3%) and BC (9%) was observed (Table 2).

Table 3 depicts status of knowledge between the two communities. The knowledge status about malaria parasite was 4% among patients of BC as against 38.1% among FC. However, other parameters of knowledge about disease causation were not as much different as about parasite between the two communities. Table 3 also shows status of knowledge about signs and symptoms of malaria between the two communities. It is obvious that important signs and symptoms such as high fever, chills vomiting, etc., were substantially less known to patients of BC as compared to FC (Table 3).

Table 4 enumerates details of different preventive measures being adopted by the malaria patients of the two different communities in desert. An interesting observation was that adoption of modern preventive measures such as use of mosquito nets, good night vapouriser, odomos cream, etc. were more common among patients of FC, while use of traditional or ad hoc preventive measures such as use of oils, smoke of cow-dung, etc. were more common measures among patients of BC (Table 4).

Table 3. Knowledge about causation, and signs and symptoms of malaria in two different communities

Causation	FC No. (%)	BC No. (%)
Malaria parasite	143 (38.1)	15 (4)
Personal hygiene	16 (4.3)	24 (6.4)
Impure water and eatable items	65 (17.3)	86 (22.9)
Changing environment	76 (20.3)	102 (27.2)
Multiple causes	54 (14.4)	122 (32.5)
Don't know	21 (5.6)	26 (6.9)
Total	375 (100)	375 (100)
Signs and symptoms		
High fever with chills or sweating on alternate day	174 (46.4)	112 (29.9)
Fever with giddiness, vomitting and rashes on the face	130 (34.7)	58 (15.5)
Multiple signs and symptoms	64 (17.1)	125 (33.3)
Others	7 (1.8)	80 (21.3)
Total	375 (100)	375 (100)

Table 4. Preventive measures used by the two different communities

Preventive measures	FC No. (%)	BC No. (%)
Mosquito net	151 (40.3)	31 (8.3)
Odomos cream	52 (13.9)	10 (2.7)
Oils	40 (10.7)	69 (18.4)
Tortoise coils	32 (8.5)	15 (4)
Good Night vapouriser	23 (6.1)	5 (1.3)
Smoke of cow-dung	35 (9.3)	55 (14.7)
Smoke of foliage	30 (8)	65 (17.3)
Nothing	12 (3.2)	125 (33.3)
Total	375 (100)	375 (100)

Table 5. Knowledge, attitude about biology of malaria vectors and preventive measures of malaria in two different communities

Causation	FC (n = 375)		BC (n = 375)	
	No.	%	No.	%
(A) Knowledge about malaria vector				
Does *Anopheles* mosquito carry malaria parasite?	147	39.2	41	10.9
Can you identify male/female mosquitoes?	51	13.6	12	3.3
Is feeding time of malaria mosquitoes before dawn or after dusk period?	97	25.9	22	5.9
Do you know if *Anopheles* mosquito rest in cool and dark place?	104	27.7	20	5.3
Do you know if *Anopheles* mosquitoes lay eggs in the water?	64	17.1	13	3.5
(B) Personal prophylaxis				
Do you know *Anopheles* takes 5-6 days to complete life-cycle?	80	21.3	26	6.9
Do you know mosquito-meshes on windows and doors can prevent the entry of mosquitoes in the house?	186	49.6	35	9.3
Do you know that the bednet can prevent the mosquito bite in the open field?	219	58.4	42	11.2
Do you know `tanka', earthen pots, cess pits and stagnant water are the main sources of mosquito breeding?	232	61.9	49	13.1
Do you know by covering `tanks', etc. and by proper drainage, the mosquito breeding can be prevented in the house?	207	55.2	67	17.9
Do you apply any oil on skin during night or use smoke from cow-dung cakes around bed?	75	20	16	4.3
Do you use any kind of repellent to keep away malaria mosquitoes—Good Night, Odomos, etc.	83	22.1	13	3.5
Treatment and other aspects				
Can malaria take human life?	160	42.7	34	9.1
Can present drug cure the patients?	243	64.8	69	18.4
Whether the malaria control programme will improve the disease condition?	127	33.7	35	9.3
Is Health Department not taking good care of malaria patients in your village?	191	50.9	250	66.7
Would you like to contribute in running Sub-centre, PHC, etc. in your village?	197	52.5	45	12
Are present malaria control activities not of much help to malaria patients?	265	70.7	286	76.3
Would you go and get chloroquine tablets from PHC/RH/Sub-centre, etc. if no body comes and deliver them regularly at your place?	56	14.9	13	3.5
Would you like to be treated discreetly at the nearest PHC/RH/Sub-centre?	294	78.4	102	27.2
Whether health workers are cordial in their dealing with malaria patients?	128	34.1	97	25.9

Table 5 states the level of knowledge, attitude about malaria vectors and personal proplylaxis among study subjects. Data resolved across different parameters under "Knowledge about malaria vectors" show substantial difference in knowledge about vector mosquitoes within the two communities. The attitude regarding expectation of patients from system (questions such as "Is Health Department not taking good care of malaria patients in your village?) was more pronounced among the backward community (66.7%) as comapred to the forward community (50.9%).

Discussion

Malaria is a major public health problem in all the districts in desert part of Rajasthan. Many authors have attempted in the past[1,2] to explain causes of malaria in desert implicating different risk factors from time-to-time. However, desert dynamics of malaria do not seem to have been understood yet to the extent that a sociocultural solution to the problem can be offered. In the present paper, a distinct objective whether sociobehavioural aspects of patients of malaria influence its transmission severity or not, has been attempted. Data present in Table 1 clearly indicate that given the similar conditions of vector, parasite, surveillance and ecology in villages, malaria magnitude was markedly more among people of the backward community than the forward community. The foremost reason for such a differential malaria magnitude in the two communities was the trend of migration out of their native places. In an enquiry made by us it was pointed out that almost 90% of inhabitants of the backward community went out for their livelihood as compared to only 10% people of the forward community who migrated out. The risk of importing malaria through the out-migrating natives returning homes increases as compared to the situation where none goes out and local conditions do not support transmission. Other workers had reported an increasing proprtion of malaria cases in Italy in immigrants revisiting their place of origin[3]. Table 2 substantiates our observations of more malaria in backward communities due to their importing the infection as none of the infants studied had shown the active infection. Tables 3–5 show the observations pertaining to knowledge, attitude, behaviour and practice aspects of malaria among two different communities. The data indicate that level of knowledge about disease causation, treatment, cure, transmission, etc. is less among the backward community as compared to the people of forward community.

Misconceptions about malaria are reported in research publications from all over the world. Links between malaria and supernatural forces are found almost similar. For example, in Gambia and Kenya, malaria, especially in children, is often perceived as a result of child being possessed by an evil spirit or devil[4,5]. In a study of desert part of Rajasthan, we had also found healthy subjects considering changing environment (26.4%), impure water and eatable items (17.4%) as well as personal hygiene (4.9%) as being responsible for causing malaria[6]. As a result, the Meghwal community was taking double time to avail health facility between the occurrence of the malaria and diagnosis and treatment as compared to the Rajput community.

An intervention policy aiming to study existing status of knowledge among different caste groups of desert could lead to a substantial control over in-migration as well as further transmission of disease in the desert parts of Rajasthan. In addition, the policy of early diagnosis and prompt treatment may be emphasised in desert parts of Rajasthan as malaria is associated with in-migration of native population returning their homes.

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