

PREVALENCE OF VISCERAL LEISHMANIASIS ASSOCIATED WITH THE BEHAVIORS OF THE PEOPLE IN RURAL AREAS

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ABSTRACT

A cross sectional study was conducted by taking a random sample of 204 households of 5 VDCs in Sunsari district, Nepal with the objective to verify the prevalence of visceral leishmaniasis with behaviors of the people in endemic rural areas.

Interviews with structured questionnaires and k-39 tests were used to collect information. From a sample of 204 respondents, 28 (13.73%) cases of Kala-azar (KA) were identified with k-39 test positive. Of them, 43% KA cases were found among Mushar ethnic group, 32% among Muslims, 11% cases among Tharus and 4% in Uraus and 11% in others. The difference in the prevalence of Kala-azar in people who had lands and in those who did not have were significant. People not owning lands were at 4 times greater risk of developing Kala-azar in endemic areas. Seventy seven percent of the people were bed net users. From 46 nonusers, 11 (23.91%) developed Kala-azar, which was significant as compared to bed net users. From among 196 'ground-floor' sleepers, 85 (43.34%) were ground sleepers and 111 (56.63%) were 'plung' sleepers. Nineteen (22.35%) of ground sleepers had suffered from Kala-azar, while 9 (8.11%) of 'plung' sleepers had suffered from Kala-azar. From all cases of Kala-azar, 25 (89.25%) had cracks and crevices on the walls of their living rooms.

Sleeping on ground, non-use of bed-nets, landlessness, cracks and crevices on the floor and wall of living houses, poor living condition and overcrowding in houses, labors, dalit groups were identified as risks for Kala-azar.

Key Words: Behavior, prevalence, socio-economic, visceral leishmaniasis.

INTRODUCTION

Kala-azar has been recognized as a serious public health problem in Nepal.¹ Kala-azar (Visceral Leshmaniasis) is mainly confined to the southern plains of Eastern and Central region bordering Kala-azar endemic districts of Bihar state of India. In

Nepal, from 1993 onward the incidence rate of visceral leishmaniasis (VL) per 100,000 populations was always above 33 and up to 50 in the year 2002. In 2003, the rate of Kala-azar cases (KA) was 53.61/100,000 and the number of cases recorded were 2229(highest annual record so far) from 14 districts. In the same year, the case fatality rate (CFR) was 1.44%.²

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Sunsari district has shown higher incidence rate than 50/100,000 during years 2001-2003. The years 2004 and 2005 showed the incidence rates of 26.79/100000 and 32.50/100000 respectively. The VDCs affected in the same years 2003, 2004 and 2005 were 37, 31 and 29. However, the case fatality rates in the years 2003, 2004 and 2005 have shown some improvement with 1.23%, 0.8% and 0.45%.

The objectives of the study were to determine the behaviours, housing condition, socio-economic and geographical factors of the people in the endemic areas; and find the associations with the occurrence of the disease.

MATERIALS AND METHODS

The samples for studying Kala-azar were collected from 5 Village Development Committees (VDC) - Aurabani, Bhokraha, Bhutaha, E.kushaha and Madheli. The total sample size from all VDCs were 204 households from 10 wards from all VDCs. A cross sectional study design for collecting information was chosen. Interviews with structured questionnaires and k-39 tests were used. The k-39 test detects the presence of anti-leishmanial antibody against K-39 antigen of amastigote form of the parasite. This is a simple test, which requires a drop or two of a finger pricks blood. A positive blood is indicated by development of two bands on an air-dried strip. The results are obtained within 30 seconds.

RESULTS

From a total of 204 respondents, the number of Kala-azar cases in Aurabani, Bhokraha, Bhutaha, E.kushaha and Madheli were 9 (15.25%), 5 (11.36%), 6 (14.63%), 5 (17.24%), and 3 (9.68%) respectively.

Of the 204 respondents, a total of 28 (13.73%) cases of Kala-azar were positive with k 39 test. There were 18 (55.39%) male KA cases while females were 10 (44.61%). The age of Kala-azar cases ranged from 2 years to 59 years with the mean age of 30.85 years.

Hindus cases with positive k-39 test were 19 (67.86%) of total cases and Muslims were 9 (32.14%). KA cases occurred differently in various ethnics groups. Dalits showed high prevalence rate like Mushars (43%), Muslims (32%), Tharus (11%), Uraus (4%), others formed the rest i.e. (15%).

Most of the people were laborers, farmers and housewives. Out of 80 laborers, 18 (22.5%) suffered from Kala-azar while out of 62 (15.9%) farmers, only 6 (10.71%). Out of 28 Kala-azar cases, 18 (64.29%) were from laborers while from farmers, the number was 6 (21.43%). The cases from students were 2 (7.14%); and those from housewives were 2 (6.67%). No cases were found among businessmen and service holders.

Out of 204 respondents, 104 (50.98%) had lands and 100 (49.02%) had no land. Out of 28 KA cases, 22 cases (79%) had no land and only 6 (21%) were land owners, (Table I). The differences in the prevalence of Kala-azar in those people who had lands and those who did not were significant ($p < .001$). The people who did not own their land were at 3.82 times at greater risk of developing the disease in endemic areas than those people who had their own lands. Landlessness in the endemic area was considered to be a risk for Kala-azar disease.

Out of 204 respondents, 158 (77.45%) were bed net users. Of them, only 17 (10.76%) people developed disease while out of 46 (22.55%) non-users of bed nets, 11 (23.91%) developed disease (Table II).

Table I : Showing land ownership and Kala-azar

Land owner	K-39 test				Total	Odds
	+	Odds (positive)	-	Odds		
No	22	79	78	78	100	49.02
Yes	6	21	98	94.23	104	50.98
Total	28	100	176		204	100.00

Table II : Showing Bed net users and Kala-azar

Bed net	K-39 test		Total
	+	-	
- (non users)	11 (23.91%)	35	46 (22.55%)
+ (users)	17 (10.76%)	141	158 (77.45%)
Total	28	176	204

Table III : Showing sleeping behavior and Kala-azar

Sleeping	K-39 test		Total	Odds
	+	-		
Outdoor sleeping	9 (32.14%)	38	67	32.84%
Indoor sleeping	19 (67.86%)	118	137	67.16%
Total	28	176		

Table IV : Showing Sleeping Behavior and Kala-azar

Sleeping Behavior	K-39 test			Total	IC
	+	+	-		
Ground E ¹	19	22.35	66	85	43.37
'Plung' E ¹	9	8.11	102	111	56.63
	28		168	196	100

Table V : Showing Crevices on walls and Kala-azar

Crevices	K-39 test		Total	Qb
	+	-		
+	25 (89.29%)	115	140	68.62
-	3 (10.71%)	61	64	31.37
Total	28 (13.734%)	176	204	100.00

Table VI : Showing room numbers and Kala-azar

No. of Rooms	K-39 test				Total	Qb
	+	Qb (column)	Qb (row)	-		
1	5	17.86	41.67	7	12	5.88
2	11	39.29	15.38	61	72	35.29
3	8	28.57	10.67	67	75	36.77
4	3	10.71	9.68	28	31	15.20
5	1	3.57	9.10	10	11	5.39
7	0	0	0	2	2	0.98
8	0	0	0	1	1	0.49
Total	28	100	176	204		100

The difference in the incidence of disease between two groups, i.e. bed-nets users and non-users of bed nets, was statistically significant at 5% level of significance. Further, people not using mosquito nets in the endemic area of disease were 2.22 times more likely to affected than those using bed nets.

Indoor and out door sleepers: People in the villages during warm season sleep outside at 'brandah or aangan'. Among outdoor sleepers, 9 (13.43%) developed diseases with positive k-39 test and 19 (13.87%) developed disease among those who did not sleep outside their house (Table III). Occurrence of the disease in both the groups i.e. outdoor sleepers and indoor sleepers was not significant at 5% level of significance.

People who used to sleep on ground floor were 196 (96.08%). Of them, people used to sleep on 'plung' (khat) were 111 (56.63%) while 85 (43.37%) used to sleep on ground. 7 (3.43%) used to sleep on 1st storey, while only 1 (0.49%) on 2nd storey. 19 (22.35%) people, out of all ground sleepers, developed KA disease with positive k39 test while only 9 (8.11%) 'plung' sleepers developed the disease. The difference in incidence of disease between two groups was statistically significant ($p < 0.01$). Further, people who slept on ground received 2.7 times more risk of developing disease than people who slept on khat(plung), as shown in the Table IV.

Families who suffered from Kala-azar during the past years had greater incidence of disease than those not suffering from disease i.e. 32.43% vs 9.58%. The difference in the incidence of the disease in both the groups was statistically significant ($p < 0.001$).

Crack and crevices on walls of houses: 140 (68.62%) respondents had cracks and crevices on the walls of their houses. Of them, 25 (89.28%) cases of Kala-azar with positive k-39 were found, as shown in the Table V.

The people whose houses had crevices on the wall had three times greater risk for exposure to develop Kala-azar than to those whose houses did not have crevices ($p < 0.05$).

Generally those houses which had crevices on the wall had crevices on the floors too. Out of 136 respondents who had houses with crevices on floors, 26 (19.12%) had developed Kala-azar and only 2 (2.94%) hadn't. The first group of people who lived in the houses with crevices and cracks bore 6 times greater risk of probability for the disease than other group who did not lived in such houses. The difference in occurrence of the disease between two groups of people was statistically significant ($p < 0.01$).

The number of the cases of Kala-azar differed with the number

of living rooms of household in the affected villages. As the number of rooms of the household increased, the number of Kala-azar cases decreased; and showed negative co-relation ($R = -0.867$).

People who had only one room, had 4 times greater risk for developing Kala-azar than to those who had 3 rooms (median number); ($RR=4$). The household with one room had 5 (17.86%) cases of KA; with 2 rooms, had 11 (39.29%) cases; with 3 rooms, had 8 (28.57%) cases; with 5 rooms, had 1 (3.57%) case, and with 7 and 8, had no cases (Table VI). The result suggested that overcrowding was the risk for disease transmission.

DISCUSSION

From five endemic VDCs - Aurabani, E.kushaha, Madheli, Bhutaha and Bhokraha, a total sample of 204 households were randomly selected for study. The range of prevalence of the disease of all VDCs varied from 9.68% to 17.14%. The overall prevalence was 13.75%. Apparently the number of the males victimized (55%) were higher than females, however the difference in prevalence between sexes was not statistically significant ($p>0.05$) resembling author's study on Kala-azar epidemic.³ The fact supported that the gender difference was not risk for Kala-azar. The mean age of diseased persons was 30.85 years, which is the most productive age group. This suggests a constraint to economic development for the family. The most affected ethnics were from Dalit group like Mushar (43%), Muslim (32%), Tharu (11%) and Urau (4%). Out of 28, positive cases 24 (85.71%) were illiterate. Most of the cases were found among laborers (64.29%), farmers (21.43%) and few among housewives (7.14%) and students (7.14%) suggesting poor education and lack of awareness on health and protective measures against the disease. No disease was found among businessman. Out of 28 positive cases, 22 cases (78.57%) were landless and had 3.82 times greater risk for developing disease than land owners ($p<0.001$). The disease was strongly associated with occupations, e.g. laborers and farmers. As kala-azar often debilitates than kills and makes people become dependents on others this disease may be cause and disease of poverty.

Out of 158 (77.45%) mosquito net users, only 17 (10.76%) had Kala-azar with positive k39 test while out of 46 nonusers of bed-net only 11 (23.91%) had developed the disease. The difference in occurrence of disease between two groups was significant ($p<0.05$). A man not using bed net in the endemic area had 2 times more probability of developing disease than those using bed net while sleeping ($RR=2$). Out of total 204 household respondents, the bed net users were 158 (77.45%). In the similar surveys conducted by others bed net users were

58%,⁴ and 66.99% respectively.^{5,6}

The difference in the occurrence of disease between ground sleepers and 'Plung' sleepers was significant; and ground sleepers were 2.76 times more risky to develop disease than 'plung' sleepers ($p<0.01$). The identical findings were in Hewitts et al's study.⁷ The difference in the occurrence of disease in the family giving past history of Kala-azar and in those not giving past history of disease occurrence was significant ($p<0.001$). The family members with positive past history of disease were 3 times more risky than those not giving past history. Similar results have been found in Schaefer KU et. al's study. These results suggested that the sources were in and around the houses and the people were unaware of their transmission behaviors.⁸

Out of 140(68.62%) households with cracks and crevices on the walls, 25(89.29%) had suffered from Kala-azar while out of 64 households without cracks and crevices on the walls, only 3 had developed Kala-azar. People living in houses with cracks and crevices on the ground had 6 times greater risk for developing disease than those without cracks and crevices. The difference in occurrence of Kala-azar was significant ($p<0.01$). This results suggested that the disease was highly prevalent in the houses with cracks and crevices on its walls ($p<0.05$). This environment was favourable for sandflies breeding. The results resembled with another study in which the occurrence of leishmaniasis among dwellers of houses with wood and/or cane exterior house walls.^{9,10} These results suggest modifications of the risks for developing leishmaniosis by making changes in housing environments, which may help reduce the amount of human vector contact.

The average family members per household was 7.14 (median = 6). Most of the cases of Kala-azar were found in the household having fewer numbers of rooms. Out of 28 cases, a household of one room had 5 (17.86%) KA cases, two rooms had 11 (39.29%) cases and three rooms had 8 (28.57%) while four and five rooms had remaining only 4 cases. People having 7 and 8 rooms did not suffer from Kala-azar. The result showed negative correlation ($R = -0.867$). The results suggested that overcrowding had facilitated the disease transmission. People who lived in such condition had a great risk for being bitten by sandflies.

CONCLUSION

Sleeping on ground, non-use of bed-nets, landlessness (poverty), cracks and crevices on the floor and wall of living houses, labours, farmers, dalit social groups and overcrowding were identified as risks for the occurrence of Kala-azar.

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REFERENCES

1. Devkota UN, Steinmann JP: A field study to determine the use of glutaraldehyde for screening Kala-azar cases in Siraha District, Nepal. *J. Nep Med Assoc* 1998; 37: 572-580.
2. Kala-azar control Activities, Epidemiology and Disease Control Division Department of Health services, Nepal, EDCCD-Annual Report 2002-2003: 16-21.
3. Kumar R; Kumar P; Chaudhary RK; Poi K; Mishra VP; Sundar S; Kalaazar epidemic in Varansi district, India, *Bull-World-Health-Organ*, 1999; 77: 371-374.
4. Koirala S; Parija SC; Karki P; Das ML: Knowledge, attitudes, and practices about Kala-azar and its sandfly vector in rural communities of Nepal: *Bull world Health Organ*; 1998; 76; 485- 90.
5. Ojha GP and Pokharel RK, Socio-behavioural study on acceptance and use of bed nets in Dhanusha, *Epidemiology and disease Control division, Department of Health services, Nepal*, 2002: 13-14.
6. Das M.L: Sand fly the vector of Kala-azar: BPKIHS; noted in *Infectious Diseases in Nepal*. A collection of publication by M. B. Bista, 2001; 47-51.
7. Hewitt S, Reyburn H, Ashford R, Rowland; Anthroponotic cutaneous leishmaniasis in Kabul, Afghanistan: vertical distribution of cases in apartment blocks: *Trans R Soc Trop Med Hyg* , 1998 May-Jun; 92: 273- 4.
8. Schaefer KU, Kurtzhals JA, Gachihi GS, Mullar AS, Kager PA: A Prospective sero epidemiological study of visceral leishmaniasis in Baringo District, Rift Valley Province, Kenya; *Trans R soc Trop Med Hyg*, 1995; 89: 471-475.
9. Bern, C; Joshi, A.B.; Jha, SN; Das ML; Hightower, A; Thakur, GD; Bista, MB: Factors Associated with Visceral leishmaniasis in Nepal: bed net use is strongly protective, *Am-J-Trop-Med-hyg*. 2000; 63:184-188.
10. Armijos RX, Weigel MM, Izurieta R, Racines J, Zurita C, Herrera W, Vega M; The Epidemiology of cutaneous leishmaniasis in sub tropical Ecuador: *Trop Med int Health*; 1997;2: 140- 152.

