Socio-epidemiological Study of Visceral Leishmaniasis among Rural Community of East Champaran, Bihar

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***Abstract*- Visceral Leishmaniasis (VL), also known as kala-azar. From 2004–2008 there were an estimated 200,000–400,000cases and 20,000–40,000 deaths per year globally. Bihar is the most impoverished, most densely populated, and most VL-endemic state in India, with 90% of the Indian VL cases reported there. To find out the contribution of socio-epidemiological factors on VL in the East Champaran, Bihar. A case-control study design was used. In this study 139 visceral leishmaniasis cases and 139 healthy controls were taken. Visceral Leishmaniasis was strongly associated with age group. 6-15 years of age group (odds ratio [2.363], 95% CI 0.826-6.886) has higher risk of VL. Educational status, Joint family, OBC caste, SC/ST caste, Semi-pucca houses, kutcha houses had higher risk of VL in the East Champaran but they were not significant. Unmarried group (odds ratio [OR] 1.788, 95% CI 1.081-2.962) and presence of domestic animals [OR] 1.763, 95% CI 1.025-3.037) were statistically significant on univariate analysis. In this case control study we identified several factors associated with VL. Improper drainage system and poor housing condition is a stronger factor; thus housing plans lunched by the government may positive affect for controlling of VL. In villages males were sleep outdoors and they were higher risk of VL. Use of mosquito nets should be used to prevent insect bite. Information, education and communication for the awareness of the community regarding prevention of VL should be carried out.**

Keywords: Visceral Leishmaniasis, East Champaran, Case-Control, epidemiology

INTRODUCTION

Visceral Leishmaniasis (VL), also known as kala-azar, is the world's deadliest parasitic disease after malaria [1]. During 2004 to 2008 VL cases ranged between an estimated 200,000–400,000 cases and death between 20,000–40,000 per year globally [2]. The highest global rate of occurrence is on the Indian subcontinent with approximately 67% of all human instances occurring in India, Bangladesh and Nepal especially in areas of extreme poverty and high population density [3]. Bihar is the most impoverished, most densely populated, and most VL-endemic state in India, with 90% of the Indian VL cases reported there [4]. However, since 2012, there has been a significant decline in the number of VL cases identified in the Indian subcontinent, attributed usually to interventions and socio-economic improvements [5-7].

The World Health Organization (WHO) has targeted VL for elimination as a public health problem in the ISC by 2020 [6]. This is defined as <1 new VL case per 10,000 capita per year at sub-district (block) level. Transmission of L. donovani occurs via the bite of a female Phlebotomus argentipes sand fly. Out of the nearly 50 species of sand flies present in India, P. argentipes is the only one known to transmit VL in this country [8]. Once the parasite is in the human body, it rapidly invades macrophages and eventually moves in this way to the liver, spleen, and lymph nodes [9]. Symptoms include: fever lasting weeks to months, splenomegaly, hepatomegaly, and anemia [10],[11]. P. argentipes females host blood feed primarily on the cattle and humans within rural villages [12]-[14]. The blood meal is required in order to complete the oviposition process. Immature sand flies in Bihar have been found largely in areas within and surrounding cattle sheds [15]-[17], suggesting cattle faces may serve as a food source for larvae which feed on organic matter. Post Kala-azar Dermal Leishmaniasis (PKDL) patients do not experience other symptoms outside of the rash; however, they are thought to serve as a reservoir for L. donovani where feeding sand flies can acquire the parasite [18]. Visceral Leishmaniasis is a poverty-associated disease linked to poor housing and sanitary conditions and malnutrition, these factors have led to a number of difficulties regarding treatment and elimination [19]-[23]. Phlebotomus argentipes prefers hot and humid climates in all the VL abundant endemic areas of Bihar, West Bengal, Assam and Eastern Utter-Pradesh. High densities have also been recorded in Southern peninsula and Central India. Studies conducted in endemic areas revealed that the vector density starts increasing from March onwards, with some decrease in June, followed by an increase with the advent of the monsoon. In Southern and Eastern India, with very mild cold season, P. argentipes is common throughout the year.

OBJECTIVE

a) To find out the monthly variation of Visceral Leishmaniasis in the study area.
b) To find out the association of socio-epidemiological factors with Visceral Leishmaniasis.

MATERIAL AND METHODS

Study Design: This is Case-Control study. The study is based on primary data collected through pretested and structured schedule method.

Study Duration: Data has been collected from June 2016 to November 2016 from East Champaran District of Bihar.

Study subjects: The registered cases at Primary Health Centres during the calendar 2014 of the East Champaran District. Informed consent was obtained from all subjects before including them in this study.

Selection of Controls: Controls were selected from neighbourhood of the cases other than visceral leishmaniasis or they were apparently healthy controls. Sample size: East Champaran district of Bihar has 552 registered Visceral Leishmaniasis cases during the year 2014. A total 25% of visceral leishmaniasis population (i.e. 139) will be taken as required sample. So the sample size will be 139. In this study 139 visceral leishmaniasis cases and 139 apparently healthy controls were taken.

Sampling Methods: There are 24 primary health centers (PHCs) in the East Champaran, Bihar. VL cases were reported only from 11 PHCs.

All the 11 primary health centers were stratified into 3 strata depending upon the number of cases, less than 30 cases, 30 to 60 cases and more than 60 cases. The cases will be selected from each stratum according to proportional allocation.

STATISTICAL TECHNIQUE

The data was initially entered into MS excel and then transferred to trail version of SPSS 16.0. The socio-epideiological factors of VL were estimated by calculating the odds ratio (OR) with 95% confidence intervals (CIs).

RESULTS

This study was conducted in endemic in rural areas of East champaran, Bihar. The VL cases starts increasing from March onwards, with some decrease in June, followed by an increase with the advent of the monsoon. In this area VL was mild in cold season, but it was common throughout the year. Visceral Leishmaniasis was strongly associated with age; the odds of having VL were lowest for children 2-5 years of age group and higher for children 6-15 years of age group (odds ratio [2.363], 95% CI 0.826-6.886). Educational status also shows that the illiterate groups were at higher risk of VL (odds ratio [4.136], 95% CI 0.741-30.169).

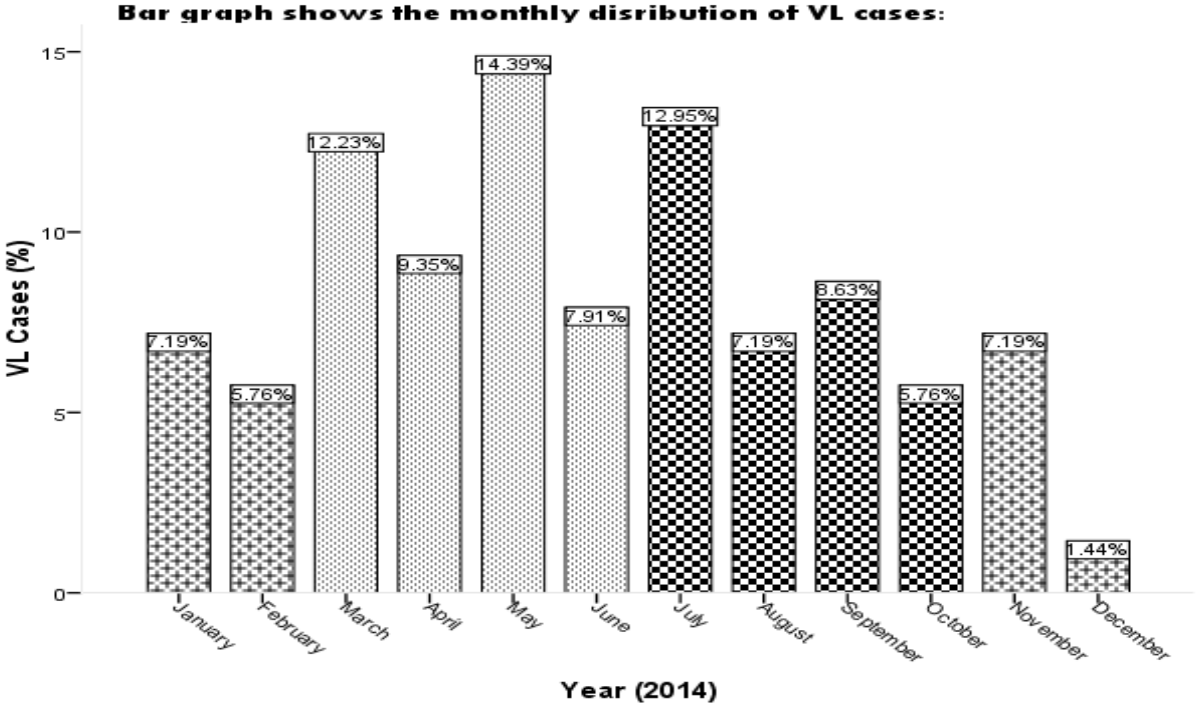

Table 1: Factors associated with visceral leishmaniasis in East Champaran, Bihar, 2014.

Factors	No. (%) participants			
Characteristic	**Cases**	**Controls**	**OR**	**95% CI**
Age group (in year)				
2-5	8 (5.8)	14 (10.1)	Referent	
6-15	54 (38.8)	40 (28.8)	2.363	0.826-6.886
16-25	21 (15.1)	17 (12.2)	2.162	0.648-7.347
26-35	12 (8.6)	13(9.4)	1.615	0.618-6.165
36-45	21 (15.2)	26 (18.6)	1.413	0.444-4.564
>45	23 (16.5)	29 (20.9)	1.388	0.445-4.396
Gender				
Male	75 (54.7)	73 (52.5)	1.060	0.643-1.745
Female	64 (45.3)	66 (47.5)	Referent	
Educational status				
Illiterate	65 (47.8)	55 (39.6)	4.136	0.741-30.169
Primary	38 (27.9)	45 (32.4)	2.956	0.514-22.011
Middle/Secondary	31 (22.8)	32 (23.0)	3.391	0.575-25.745
Above secondary	2(1.5)	7 (5.0)	Referent	
Marital status				
Unmarried	76 (54.7)	56 (40.3)	1.788	1.081-2.962
Married	63 (45.3)	83 (59.7)	Referent	
Types of family				
Joint	82 (59.0)	80 (57.6)	1.061	0.640-1.758
Nuclear	57 (41.0)	59 (42.4)	Referent	
Caste				
SC/ST	38 (27.3)	38 (27.3)	1.375	0.448-4.472
OBC	93 (66.9)	90 (64.8)	1.421	0.501-4.086
General	8 (5.8)	11 (7.9)	Referent	
Family income (per year)				
<30,000	36 (25.9)	38 (27.3)	1.083	0.482-2.432
30,000-60000	82 (59.0)	77 (55.4)	1.217	0.596-2.489
>60,000	21 (15.1)	24 (17.3)	Referent	
Types of houses				
Pucca	8 (5.8)	16 (11.5)	Referent	
Semi-pucca	44 (31.7)	35 (25.2)	2.514	0.881-7.328
Kutcha	39 (28.0)	35 (25.2)	2.229	0.775-6.541
Hut	48 (34.5)	53 (38.1)	1.811	0.654-5.120
Domestic animals				
Present	103 (74.1)	86 (61.9)	1.763	1.025-3.037
Absent	36 (25.9)	53 (38.1)	Referent	

In this study unmarried group (odds ratio [OR] 1.788, 95% CI 1.081-2.962) had more risk of VL than married group which was statistically significant. Joint family [OR] 1.061, 95% CI 0.640-1.758) OBC caste [OR] 1.421, 95% CI 0.501-4.086), SC/ST caste [OR] 1.375, 95% CI 0.448-4.472), Semi-pucca houses [OR] 2.514, 95% CI 0.881-7.328), kutcha houses [OR] 2.229, 95% CI 0.775-6.541) had higher risk of VL in the East Champaran but they were not significant. Presence of domestic animals [OR] 1.763, 95% CI 1.025-3.037) was statistically significant on univariate analysis.

DISCUSSION

This is the case-control study on visceral leishmaniasis in the East Champaran, Bihar which may contribute to understanding the epidemiology of VL in the high endemic foci. VL was strongly associated with age; the odds of having VL was lowest for children <5 years of age and higher for children 5-14 years of age (odds ratio [2.363], 95% CI 0.826-6.886). Thakur (1984) [24], observed two-thirds of cases between 10-29 years age group. The present study shows that the young adults are susceptible to VL and the incidence gradually decline with age. The current study shows preponderance among males. Naik. et al [25]. in their series of works also found that males were affected more than females. Educational status also shows that the illiterate groups were at higher risk of VL. In this study unmarried group (odds ratio [OR] 1.788, 95% CI 1.081-2.962) had more risk of VL than married group. Joint family and SC/ST caste had higher risk of VL in the East Champaran. According to the report of previous epidemic in Bihar and elsewhere in the country the disease was rare among upper class persons. Family income was also associated with VL. That family were higher risk of VL whose yearly family income was less than 60,000. Houses which were semi-pucca or kutcha had higher risk of VL because on these types of houses cracks were present in the walls of the rooms. C. P. Thakur in (2000) [20], reported 23% of VL cases lived in bricked houses, 68% in the mud houses and 8% in grass covered houses. The cracks in mud or stone wall are the breeding places for sand flies. It may be the reason for the more VL cases occurrence in the house made up with mud or stone walls. Type of housing affects occurrence of VL. Presence of domestic animals was also associated with VL (odds ratio [OR] 1.763, 95% CI 1.025-3.037). The VL cases starts increasing from February

onwards, with some decrease in June, followed by an increase with the advent of the monsoon. In this area VL was mild in cold season. As a common social practice, some family members of the vast majority of Bihari villager households sleep outdoors, particularly during the months with the hottest evening temperatures [26].

CONCLUSION

In this case control study we identified several factors associated with VL. Poor housing condition is a stronger factor; thus housing plans lunched by the government may positive affect for controlling of VL. In villages males were sleep outdoors and they were higher risk of VL. Use of mosquito nets should be used to prevent insect bite. Information, education and communication for the awareness of the community regarding prevention of VL should be carried out. Presences of domestic animals near the house are risk factors, but are not strong enough to warrant specific interventions. The exact role of domestic animals in transmission needs further study.

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