

PREVALENCE OF VISCERAL LEISHMANIASIS, RISK FACTORS AND ASSOCIATED DISORDERS: KNOWLEDGE OF INHABITANTS AND PROFESSIONALS IN FULBARIA, MYMENSINGH

Anindita Rani Bhowmick and Hamida Khanum*

Department of Zoology, University of Dhaka, Dhaka-1000, Bangladesh

Abstract: A total of 215 cases were recorded from the rural areas of Fulbaria upazila during June 2015 to May 2016. The prevalence of kala-azar was higher in male (51.22%) than female (36.96%). In the area, 10.1 - 20 years age group was the most prevalent group and the prevalence was found to decrease with the increase of age. Post Kala-azar Dermal Leishmaniasis (PKDL) was developed in 38.14% of kala-azar patients of Fulbaria upazila. The prevalence of kala-azar was found 63.89% in mud house dwellers and when living in tin shed house but with earthen floor, the prevalence was 58.79%. On the other hand, 10.31% had single infection with kala-azar, 21.65% had double infection and 68.04% had multiple infection. Living in proximity to prior case, climatic change, racked mud house, humid area, cattle sheds made of cracked mud walls, lack of awareness and knowledge regarding kala azar were the risk factors. Total 45 professionals were interviewed in the Upazila Health Complex and Upazila Sub-Centers of the study area through a preset questionnaire. Of them, 71.11% had the appropriate acquaintance about the agent (*Leishmania donovani*) of kala-azar and 35.29% professionals had the correct comprehension regarding the reservoir of kala-azar (man). Most of them (91.11%) recommended rK 39 dipstick test as the single most important diagnostic blood test and Miltefosine and Amphotericin B are the most recommended drugs for treatment of kala-azar.

Key words: Visceral leishmaniasis, risk factors, associated disorders.

INTRODUCTION

Visceral leishmaniasis (VL), also known as kala-azar (KA), is a major public health problem in Bangladesh, India and Nepal. The word “kala-azar” has been derived from two Indian words “kala” and “azar” meaning “Black sickness”- an illness in which the colour (pigmentation) of the body turns black. The word “kala” also means “deadly”, thereby signifying a fatal illness (Chatterjee 1995). VL is the world’s second-deadliest parasitic disease after malaria, with 400,000 cases and 40,000 deaths occurring annually (Alvar *et al.* 2006). VL is a neglected tropical disease transmitted by sandflies (Le Rutte *et al.* 2016). The disease burden is highest in India, followed by Bangladesh and Nepal. Out of 64

*Author for correspondence: <hamida_khanum@yahoo.com>

districts of Bangladesh, 45 are endemic for VL and 20 million people, around 18% of the total population, are considered to be at risk for VL. Without treatment, VL is nearly always fatal (Alvar *et al.* 2012). The disease is caused by a parasite called *Leishmania* and is transmitted by the bite of female sandfly, *Phlebotomus argentipes* (Park and Park 1987). Kala-azar is a disease of reticulo-endothelial system (RES), characterized by chronic fever, substantial weight loss, enlargement of the spleen and liver, anaemia and depletion of platelets in the blood.

The disease usually affects the poorest population living in remote rural areas. Poor housing and sanitary conditions create an ideal breeding ground for sandflies and at the same time, chronic health conditions such as malnutrition lower the ability of at-risk individuals to resist the disease. Sandfly may obtain the parasite directly from the infected skin or by ingesting the parasite from the circulating blood of the reservoir host. (Park and Park 1987). A major challenge towards VL elimination is the rising incidence of PKDL which occurs after the VL treatment and act as an infection reservoir, threatens the VL elimination initiative. PKDL is a skin disorder which usually develops in 10–20% and about 60% of patients with visceral leishmaniasis (VL) after treatment respectively in the Indian subcontinent and Sudan. These patients are difficult to diagnose and treat, as some of them may not have even past history of VL (Rahman *et al.* 2010).

The elimination campaign has been running in the Indian subcontinent (India, Nepal, Bangladesh, Bhutan and Thailand) since 2005 (WHO 2015). On the Indian subcontinent, the target is to eliminate VL as a public health problem by or before the end of 2017, where elimination is defined as an annual incidence of VL of <1 per 10,000 capita at sub-district-levels in Bangladesh and India and at district-levels in Bhutan and Nepal. In the rest of the world, the WHO target is 100% detection and treatment of all VL cases.

MATERIAL AND METHODS

Study areas and period: The present study was conducted in rural areas of Fulbaria upazila (endemic area) of Mymensingh district. Seven unions of Fulbaria upazila were selected. These were Fulbaria, Kushmail, Putijana, Radhakanai, Bakta, Balian and Kaladaha. The study was conducted from June 2015 to May 2016.

Sample scheme: Total 215 inhabitants and 45 professionals were interviewed in the study areas. The observed inhabitants were divided into two sex groups—male and female. They were divided into seven age groups for analysis. Data was collected about the education, occupation, house type, presence of cattle shed,

presence of chicken/pigeon shed, blood group etc from the study areas. Investigation on knowledge, attitude and practice of inhabitants and professionals for treatment, prevention and control of visceral leishmaniasis was carried out.

Procedure of data collection: Data was recorded through a preset questionnaire. Data collection was done from the inhabitants and households and from professionals in the Upazila Health Complex and Upazila Sub-Centres in the study areas. Demographic and socio-economic conditions of the households was also observed. The data of the treated patients were also collected from Upazila Health Complex.

RESULTS AND DISCUSSION

A total of 215 suspected inhabitants were interviewed for visceral leishmaniasis (VL) from the rural areas of 7 unions of Fulbaria upazila, Mymensingh district. In the present study, total 85 professionals were interviewed in the Upazila Health Complex and Upazila Sub-Centers of Fulbaria upazila. In Fulbaria upazila, out of 215 inhabitants, kala-azar patients were 97 in number and the overall prevalence of kala-azar patients was 45.12%. The prevalence of kala-azar in male was 51.22% and in female was 36.96% (Fig. 1). The result was consistent with the study findings of ICDDR, B (2003).

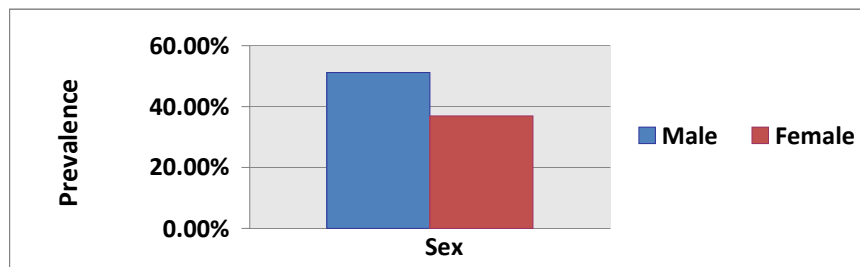


Fig. 1. Prevalence of kala-azar in male and female inhabitants in Fulbaria upazila.

The highest prevalence of kala-azar patients was found in 10.1 - 20 years age group (67.35%) and the lowest prevalence was found in 60-above age group (8.33%). The prevalence of KA showed a decreased value with the increase of age (Table 1). In Bangladesh, the maximum numbers of cases were reported in the age group of 11 - 20 years (Thakur 1984). This is probably because of low immunity and lower prevalence of protective delayed type hypersensitivity (DTH) responses in young than adult.

In the present study, the prevalence of VL was observed in different seasons. The highest prevalence (59.34%) of VL patients was found during the summer season and the next prevalence (44.29%) was found in the rainy season. The winter season had the lowest prevalence (22.22%) (Table 2).

Table 1. Prevalence of kala-azar in inhabitants of different age groups in Fulbaria upazila

Age group	Total observation	Number of kala-azar patients	Prevalence of kala-azar patients (%)
0.1-10	30	13	43.33
10.1-20	49	33	67.35
20.1-30	47	27	57.45
30.1-40	19	9	47.37
40.1-50	21	6	28.57
50.1-60	25	7	28.00
Above 60	24	2	8.33

Table 2. Prevalence of kala-azar in different seasons in the study area

Season	Total observation	Number of kala-azar patients	Prevalence of kala-azar patients (%)
Rainy (July-October)	70	31	44.29
Winter (November-February)	54	12	22.22
Summer (March-June)	91	54	59.34

In the study area, out of 97 kala-azar patients, 10 patients (10.31%) had single infection with leishmaniasis; 21 patients (21.65%) had double infection and 66 patients (68.04%) had multiple infections infecting with jaundice, ascitis, anaemia, oedema, hepatomegaly, splenomegaly etc. (Fig. 2). Post Kala-azar Dermal Leishmaniasis (PKDL) was found to occur in case of many kala-azar patients. In Fulbaria upazila, 37 PKDL cases were found out of 97 kala-azar patients and the prevalence of PKDL positive cases was 38.14% (Table 3). Bern and Chowdhury (2006) specified that ascertainment and treatment of PKDL patients would become a key issue for the control programme, especially when kala-azar incidence rates fall.

In Fulbaria upazila, the highest prevalence of kala-azar patients was found in blood group B+ (71.11%). The other prevalences of kala-azar patients were 34.21% in blood group A+, 56.00% in blood group AB+, 14.29% in blood group B-, 14.29% in blood group AB- and 52.17% in O+ (Fig. 3). A study by Evans

et al. (1984) indicated that ABO blood group type is not an important determinant in the development of clinically apparent visceral leishmaniasis.

The highest prevalence was found in case of agriculture farmers (68.42%) and a higher prevalence was also found in case of housewives (45.90) and labour (43.75). No patient was found in case of service-holders (Table 4).

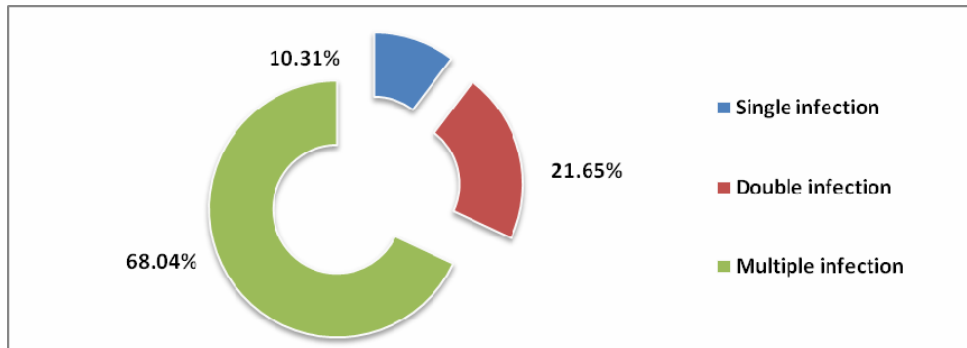


Fig. 2. Prevalence of associated disorders in kala-azar patients in Fulbaria upazila.

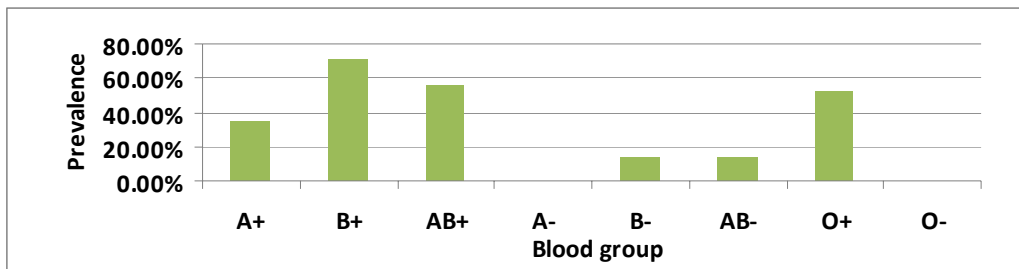


Fig. 3. Prevalence of kala-azar in inhabitants of different blood groups in Fulbaria upazila.

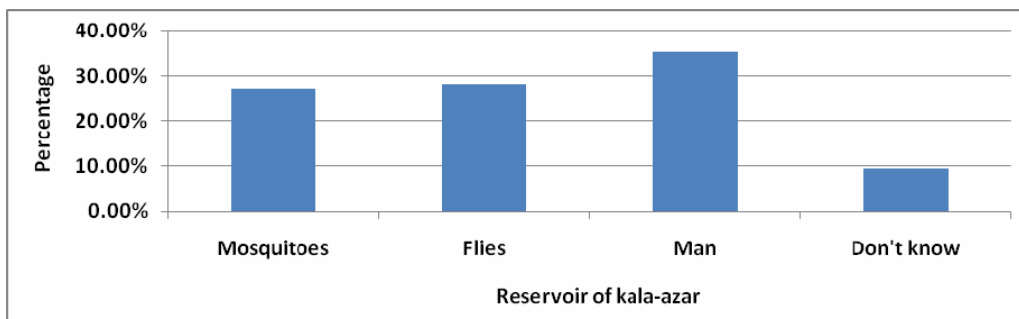


Fig. 4. Knowledge of the professionals regarding the reservoir of kala-azar.

The highest prevalence (63.89%) was found in mud house dwellers. A higher prevalence (58.79%) was also found in residents of houses made of tin wall and mud floor. No patient was found in houses made of brick wall and concrete floor (Table 5). Ranjan *et al.* (2005) showed in a study that the use of mud for wall construction or for plastering walls was found to be significantly associated with kala-azar.

Table 3. Prevalence of PKDL among the kala-azar patients in the study area

Total number of kala-azar patients observed	Number of PKDL positive cases	Prevalence of PKDL positive cases (%)
97	37	38.14

Table 4. Prevalence of kala-azar in inhabitants of different occupations in the study area

Occupation	Total observation	Number of kala-azar patients	Prevalence of kala-azar patients (%)
Agriculture	57	39	68.42
Business	26	7	26.92
Housewife	61	28	45.90
Service	9	0	0
Labour	16	7	43.75
Student	27	9	33.33
Others	19	7	36.84

Table 5. Prevalence of kala-azar in inhabitants of different types of houses in the study area

Type of house	Total number of observed inhabitants	Number of kala-azar cases	Prevalence of kala-azar in particular type of house (%)
Mud wall and mud floor	72	46	63.89
Tin wall and mud floor	165	97	58.79
Tin wall and concrete floor	83	15	18.07
Brick wall and concrete floor	39	0	0

In Fulbaria, total 94 patients out of 97 kala-azar patients had cattle shed in their houses and the prevalence was 96.91%. Total 89 patients had chicken/pigeon shed in their houses out of 97 kala-azar patients and the prevalence was 93.44% (Table 6). Yared *et al.* (2014) reported in a study that

animal ownership such as presence of cattle, owning dogs, goats and owning donkeys were found to significantly increase the odds of VL.

The respondents were asked some questions about various aspects of kala-azar through a questionnaire. It was found that all of the observed 215 respondents heard about kala-azar (100%) and 171 respondents (79.53%) heard of any of kala-azar cases in or around their houses. 90.23% respondents believed that kala-azar spreads from sick person to another and 37.67% believed that kala-azar is not curable. 99.07% respondents answered that they had not heard about sand fly (Table 7).

Table 6. Prevalence of kala-azar patients having cattle shed and chicken/pigeon shed in houses in the study area

Animal shed	Number of KA patients having animal shed (total KA patients 97)	Prevalence of KA patients having animal shed (%)
Cattle shed	94	96.91
Chicken/pigeon shed	89	93.44

Table 7. Knowledge of inhabitants regarding some aspects of kala-azar in the study area

Question	Answer of inhabitants (total 215)					
	Yes	%	No	%	Don't know	%
Have you heard the name of kala-azar?	215	100	-	-	-	-
Have you heard of any of kala-azar cases in or around your house?	171	79.53	41	19.07	3	1.40
Do you think kala-azar spread from sick person to another?	194	90.23	12	5.58	9	4.19
Do you know kala-azar is curable?	114	53.02	81	37.67	20	9.30
Have you heard about sand fly?	2	0.93	213	99.07	-	-

Total 45 professionals were interviewed in the study areas. Among them, 71.11% professionals had the correct knowledge regarding the specific agent (*Leishmania donovani*) of kala-azar while 15.56% professionals believed *Entamoeba histolytica* and 8.89% professionals believed *Wuchereria bancrofti* as the specific agent of kala-azar and 4.44% professionals did not know which is the agent of the disease (Table 8).

Khanum and Akhter (2008) reported that among the professionals, about 80.4% had the correct knowledge regarding the specific agent (*Leishmania donovani*) of kala-azar, 9.8% did not have clear conception and 5.4% of the said

Plasmodium falciparum and 3.3% said *Wuchereria bancrofti* is the specific agent of the disease. It was observed that, 35.29% professionals had the correct knowledge regarding the reservoir of kala-azar (man) and 27.06% professionals believed that mosquitoes are the reservoir of kala-azar (Fig. 4).

Table 8. Knowledge of the professionals regarding the agent of kala-azar

Agent of kala-azar	Designation/job details						Total %	
	RMO	MO	Nurse	SACMO	MA-UHC	MA-USC/UHFWC		
<i>Leishmania donovani</i>	1	21	5	-	2	3	32	71.11
<i>Entamoeba histolytica</i>	-	-	2	1	2	2	7	15.56
<i>Wuchereria bancrofti</i>	-	-	2	-	-	2	4	8.89
Do not know	-	-	-	1	1	-	2	4.44
Total	1	21	9	2	5	7	45	100

RMO = Resident Medical Officer, MO = Medical Officer, SACMO = Sub-Assistant Community Medical Officer, MA-UHC = Medical Assistant-Upazila Health Complex, MA-USC/UHFWC = Medical Assistant-Union Sub-Center / Union Health and Family Welfare Center.

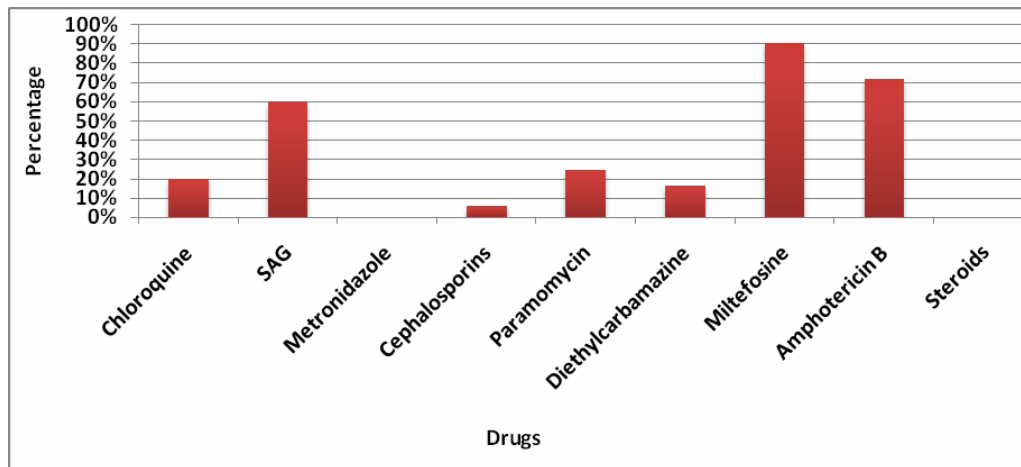


Fig. 5. Knowledge of the professionals about the drugs used for treatment of kala-azar.

Most of the professionals reported pyrexia, spleen enlargement, skin discoloration, anaemia, liver enlargement etc as the most prominent clinical features of kala-azar while the most reported (86.67%) clinical feature was

anaemia and the lowest reported (4.44%) clinical feature was bloody diarrhoea (Table 9). The present investigation revealed that, about 91.11% professionals recommended rK 39 dipstick test, 06.67% had concept about splenic puncture and another 02.22% professionals believed serological tests as the single most important diagnostic test for visceral leishmaniasis (Table 10). About 90.59% and 71.76% of the professionals reported that Miltefosine and Amphotericin B are the drugs that are used for treatment of kala-azar while 60% of the professionals reported sodium antimony gluconate (SAG) as a drug for treatment of kala-azar patients (Fig. 5).

Table 9. Knowledge of the professionals regarding the clinical features of VL

Clinical features	Number (total 45)	Percentage
Pyrexia	33	73.33
Abdominal swelling	11	24.44
Weight loss	19	42.22
Anaemia	39	86.67
Spleen enlargement	32	71.11
Liver enlargement	28	62.22
Skin discoloration	33	73.33
Bloody diarrhoea	5	4.44
Lymph node swelling	18	40.00

Table 10. Knowledge of the professionals about the single most important blood test for diagnosis of kala-azar

Tests	Number	Percentage
Bone marrow examination	-	-
rK 39 dipstick test	41	91.11
Direct agglutination test	-	-
Splenic puncture	3	06.67
Lymph node biopsy	-	-
Serological tests	1	02.22
Total	45	100

So, it is clear that kala-azar is a poverty-related disease. The poor people have not sufficient knowledge about kala-azar agent and its vector and do not take treatment timely and treatment remain incomplete many times. People affected by VL mostly present to primary health care centers (PHCs), often late in their therapeutic itinerary. PHC physicians face a major challenge. They deal

with patients presenting with complaints pointing to several diagnostic possibilities. Risk exists when some patients having less clinical manifestations are misdiagnosed. Therefore, field based accurate, sensitive and cost effective rapid diagnostic tools that can detect disease in its mildest form are essential for effective control and reaching the goal of VL elimination.

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