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Knowledge of the Dwellers Living in an Urban Slum Regarding Transmission and Prevention of Kala-Azar at Rajshahi City Area

Mst. Hasina Khatun[1]*, Md. Moshiur Rahman[2], Md. Mominul Islam[3], Mst Tahura Khatun[4], Mst Tahamina Afrin[5], Shamima Aktar[6]

[1]Nursing Instructor, Bogura Nursing College, Bogura, Bangladesh
[2]Nursing Instructor, Rajshahi Nursing College, Rajshahi, Bangladesh
[3]MBBS (Harbin Medical University), Masters of Internal Medicine (Academic ongoing), Chongqing Medical University, China
[4]Nursing Instructor, Bogura Nursing College, Bogura, Bangladesh
[5]Senior Staff Nurse, Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh
[6]Nursing Instructor, Bogura Nursing College, Bogura, Bangladesh

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***Corresponding author:** Mst. Hasina Khatun
Nursing Instructor, Bogura Nursing College, Bogura, Bangladesh

Abstract

Background: Kala-azar remains an important neglected tropical disease in Bangladesh, particularly in socially and economically vulnerable communities. Adequate knowledge of its transmission, vector, clinical manifestations, and prevention is essential for effective community-level disease control. ***Aim of the study:*** To assess the knowledge of urban slum dwellers regarding the transmission and prevention of kala-azar at Rajshahi City Area. ***Methods:*** This cross-sectional descriptive study was conducted among adult slum dwellers in Rajshahi City Corporation Area over an eight-month period from January 11, 2021 to August 11, 2021. A total of 307 participants were selected using purposive sampling. Data were collected through a partially structured, interviewer-administered questionnaire covering sociodemographic characteristics and knowledge regarding kala-azar transmission, vector, clinical features, and prevention. Data were analyzed using SPSS, with descriptive statistics and appropriate tests of association; $p<0.05$ was considered statistically significant. ***Results:*** The mean age of respondents was 37.16±8.25 years, and 65.47% were male. All respondents (100.0%) had heard of kala-azar, while 71.0% identified insect bites as a mode of transmission and 67.4% recognized the sand fly as the vector. Fever was the most commonly recognized clinical feature (80.8%), whereas only 40.7% identified sand-fly control or prevention of sand-fly bites as a preventive measure. Knowledge regarding transmission was significantly associated with age ($\chi^2=49.45$, $p<0.001$), educational status ($\chi^2=149.0$, $p<0.001$), occupation ($\chi^2=54.22$, $p<0.001$), and monthly family income ($\chi^2=23.52$, $p<0.001$), but not sex ($\chi^2=3.97$, $p>0.05$). ***Conclusion:*** Although general awareness of kala-azar was universal, substantial gaps persisted in understanding its transmission, vector, and preventive measures. Community-based, education-sensitive health promotion strategies are warranted among vulnerable urban slum populations to strengthen knowledge and support effective kala-azar prevention.

Keywords: Kala-azar; Visceral leishmaniasis; Knowledge; Urban slum; Prevention.

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INTRODUCTION

Leishmaniasis are a group of protozoal diseases caused by parasites of the genus *Leishmania* and transmitted to man by the bite of female phlebotomine sand fly [1]. They are responsible for various syndromes in humans – kala-azar or visceral leishmaniasis (VL), cutaneous leishmaniasis (CL), muco-cutaneous leishmaniasis (MCL), post-kala-azar dermal leishmaniasis etc. [2]. Visceral leishmaniasis occurs widely throughout the world, viz. South America, South Africa, the Mediterranean countries, India, Bangladesh and China. Nine out of ten cases occur in India, Bangladesh and China. Currently, the leishmaniasis is endemic in 88 countries. The overall prevalence is 13 million cases and the estimated population at risk is about 350 million. A common estimate of the incidence per year is 1.8 million newly reported clinical cases [3]. Worldwide there is an increasing number of cases and a more widespread geographical distribution, the disease

being reported from previously non-endemic areas. Economic and demographic circumstances that contribute to increased prevalence include: new agro-industrial projects, large-scale migration of populations, unplanned urbanization and man-made environmental changes [4]. Co-infection of VL and AIDS is emerging due to spread of the AIDS pandemic particularly in Southern Europe, where 25 to 70 percent of adult VL cases are related to HIV infection, and 1.5 to 9 percent of AIDS patients suffer from newly Acquired or reactivated Visceral Leishmaniasis [3]. Before the Second World War, Kala-azar was endemic in Assam, Bengal, Bihar and further South in the eastern part of the Indian subcontinent and was prevalent as far to the north-west as Punjab [5]. In addition to the endemic cases, waves of epidemic of the disease swept over that region in every 15 to 20 years [6]. A resurgence of the disease occured in Bangladesh, Nepal and the adjoining states of Indian Union in seventies of the last century [7]. The number of reported cases is increasing in Bangladesh and Nepal. Kala-azar – Bangladesh: In the early seventies of 20th century, DDT spraying under the malaria eradication programme successfully controlled VL transmission in Bangladesh [8]. This was a major collateral benefit of the malaria eradication programme. In the late 1970s Kala-azar re-emerged in Bangladesh sporadically [9]. Since then, Kala-azar cases have gradually increased. In 1981-85 period 8 Upazillas were reporting Kala-azar which has grown to 91 Upazillas in 1997 and 102 Upazillas in 1998. During the last few years the Kala-azar situation has assumed epidemic proportion with the number of reported cases increasing from a total of 3039 in 1991 to 8828 in 1997. The current rate is estimated at least 30,000 cases. The total population considered at risk is above 20 million with 29 districts affected and 102 Upazillas reporting Kala-azar cases in 1999 [10]. The study aimed at a view to explore the knowledge of the urban slum dwellers of Rajshahi city area regarding transmission and prevention of Kala-azar.

METHODS & MATERIALS

This cross-sectional descriptive study was conducted to evaluate knowledge regarding Kala-azar transmission and prevention among dwellers in an urban slum at Rajshahi Metropolitan City Corporation Area, Bangladesh. The research was carried out over an eight-month period from January 11 to August 11. Purposive sampling technique was followed. A total of 307 participants were selected from the target slum communities based on their availability and fulfillment of the predefined eligibility criteria.

Inclusion Criteria

- Adult slum dwellers aged ≥ 18 years
- Adult slum dwellers residing within Rajshahi City Corporation Area.
- Mentally and physically capable of answering questions.
- Provided voluntary informed consent.

Exclusion Criteria

- Individuals unwilling to participate in the study.
- Short-term visitors or temporary migrants (< 6 months).
- Critically ill patients or those with severe cognitive impairments.
- Formal health personnel (to avoid professional knowledge bias).
- Individuals unwilling to participate.

Ethical Considerations

Prior to the commencement of the study, the research protocol was approved by the research committee (Local ethical committee). The aim and objectives of the study along with its procedure, risks and benefits of the study was explained to the respondents in easily understandable language and then informed consent was taken from each participant. Then it was assured that all information and records will be kept confidential and the procedure will be used only for research purpose and the findings will be helpful for developing awareness package to increase awareness and to improve health and wellbeing of the people in Bangladesh.

Data Collection Procedure and Instruments

The researcher targeted adults of slum dwellers of Rajshahi City Corporation Area for data collection. Data were collected through a partially structured questionnaire. Baseline information on socio-demographic characteristics, knowledge with respect to Kala-azar transmission and prevention was collected from study participants through interviewer administered questionnaire by face-to-face interview. All efforts were made to collect data accurately. For open questions, the respondents were asked in such a manner so that they could speak freely and explain their opinion in a normal and neutral way. No leading questions were asked.

The questionnaire included questions covering socio-demographic characteristics, knowledge of Kala-azar, its mode of transmission, vector identification, clinical manifestations, preventive practices, and sand-fly breeding or resting places. Responses were recorded systematically during the interview and checked for completeness after each interview. The collected information was kept consistent with the predefined questionnaire and study objectives.

Data Analysis

After proper verification, data were coded and entered into the computer by using SPSS/PC programme. Data were analyzed according to the objectives of the study by using SPSS/PC+ software computer programme. Descriptive variables were explained with mean and standard deviation. Statistical significance was found by applying relevant statistical tests at appropriate probability level ($p = 0.05$ or $p = 0.01$). For categorical variables, findings were presented using frequencies and percentages. Associations between socio-demographic

characteristics and levels of knowledge regarding Kala-azar transmission were examined using appropriate statistical tests. Chi-square statistics were used to determine whether observed differences between groups were statistically significant, with the level of significance interpreted according to the predefined probability threshold.

RESULTS

The mean age was 37.16±8.25 years. The largest age group was 40–44 years (21.8%). Males constituted 65.47% and females 34.53%. Regarding religion, 62.2% were Hindu, 37.5% Muslim, and 0.3% Christian. Nuclear families accounted for 55.7%, while 44.3% lived in joint families. Educational attainment was up to class V in 46.6%, class VI–XII in 27.0%, illiteracy in 24.8%, and graduate or above in 1.6%. Business was the commonest occupation (25.7%). Monthly family income was highest in Taka 6001–12000 in 67.4%, with a mean income of Taka 7457.65±2223.21 (Table 1). Regarding transmission, 71.0% identified insect bite, while 17.6% reported air and 11.4% water/food. Sand fly was identified as the vector by 67.4%, compared with house fly (31.3%) and mosquito (1.3%). 40.1% reported biting, 12.1% contact, 13.7% contaminated food. Fever was recognized by 80.8%, blackening of skin by 15.6%, and splenic enlargement by 3.3%. For prevention, 40.7% identified sand-fly control/prevention of bites. Sand-fly habitat was identified as damp room corners/wall cracks by 32.6%, cow sheds by 14.7%, while 52.8% did not know (Table 2). Knowledge regarding transmission differed significantly across age groups (χ^2=49.45, p<0.001). Complete knowledge was reported by 71.4% of respondents aged up to 24 years. Partial knowledge ranged from 19.0% to 43.1%, whereas wrong answers increased from 9.6%in up to 24 years to 66.7%in aged ≥50 years (Table 3).Complete knowledge was reported by 6.6% of illiterate respondents, compared with 31.5% among those educated up to class V. Partial knowledge was highest among respondents educated up to class V (44.1%), while none/wrong answers were highest among illiterate respondents (77.6%)(χ^2=149.0, p<0.001) (Table 4).Complete knowledge was highest among respondents in the "Others" category (91.7%) and service holders (79.3%), while it was lowest among day labourers (21.7%). Partial knowledge ranged from 8.3% to 34.3%, whereas wrong answers were highest among day labourers (46.4%) and lowest in the "Others" category (χ^2=54.22, p<0.001) (Table 5). Complete knowledge was reported by 20.6% of respondents earning up to Taka 6000, compared with 47.3% among those earning Taka 6001–12000 and 33.3% among those earning Taka 12001+. None/wrong answers were reported by 48.5%, 25.1%, and 33.3%, respectively (χ^2=23.52, p<0.001) (Table 6). Knowledge regarding transmission did not differ significantly by gender (χ^2=3.97, p>0.05). Complete knowledge was reported by 42.8% of males and 31.1% of females, while partial knowledge was 26.9% and 32.1%, respectively. None/wrong answers were reported by 30.3% of males and 36.8% of females (Tabe 7).

Table 1: Socio-demographic Characteristics of the Respondents (n=307)

Variables	Frequency (n)	Percentage (%)
Age Group (years)		
Up to 24 years	21	6.8
25–29 years	47	15.3
30–34 years	51	16.6
35–39 years	52	16.9
40–44 years	67	21.8
45–49 years	60	19.5
50+ years	9	2.9
Mean ± SD	37.16 ± 8.25	
Gender		
Male	201	65.47
Female	106	34.53
Religion		
Islam	115	37.5
Hindu	191	62.2
Christian	1	0.3
Type of Family		
Nuclear	171	55.7
Joint	136	44.3
Educational Status		
Illiterate	76	24.8
Up to class V	143	46.6
Class VI to Class XII	83	27.0
Graduate+	5	1.6

Variables	Frequency (n)	Percentage (%)
Occupation		
Service	29	9.4
Farmer	48	15.6
Day labour	69	22.5
Business	79	25.7
Housework	70	22.8
Others	12	3.9
Monthly Family Income (Taka)		
Upto Taka 6000	97	31.6
Taka 6001–12000	207	67.4
Taka 12001+	3	1.0
Mean ± SD	7457.65 ± 2223.21	

Table 2: Knowledge Regarding Transmission, Vector, Mode, Signs, and Prevention of Kala-azar (n=307)

Variables	Frequency (n)	Percentage (%)
Heard Name of Disease "Kala-azar"		
Yes	307	100.0
Knowledge on Transmission of Disease		
Through air	54	17.6
Through water/food	35	11.4
Through insect bite	218	71.0
Name of the Vector (Insect)		
House fly	96	31.3
Sand fly	207	67.4
Mosquito	4	1.3
Knowledge on Mode of Transmission		
By biting	123	40.1
Through contact	37	12.1
By contaminating food	42	13.7
Do not know	105	34.2
Knowledge on Signs/Symptoms		
Yes	307	100.0
Clinical Features Known		
Fever	248	80.8
Blackening of the skin	48	15.6
Enlargement of spleen	10	3.3
Others	1	0.3
Knowledge on Prevention		
Sand fly control / Preventing sand fly bite	125	40.7
Do not know	182	59.3
Residing Place of Sand Fly		
Damp corner of the room / hole or cracks of the wall	100	32.6
Cow shed	45	14.7
Do not know	162	52.8

Table 3: Relationship Between Age Group of the Respondents and Knowledge Regarding Transmission (n=307)

Age Group (years)	Complete		Partial		Wrong ans.	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Up to 24 years	15	71.4	4	19.0	2	9.6
25–29 years	30	63.8	9	19.2	8	17.0
30–34 years	19	37.3	22	43.1	10	19.6
35–39 years	19	36.5	17	32.7	16	30.8
40–44 years	24	35.8	15	22.4	28	41.8
45–49 years	11	18.3	19	31.7	30	50.0
50 years+	1	11.1	2	22.2	6	66.7

(Chi-square = 49.45, df = 12, $p < .001$)

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Table 4: Relationship Between Educational Status and Knowledge Regarding Transmission (n=307)

Variables	Complete		Partial		None	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Illiterate	5	6.6	12	15.8	59	77.6
Up to class V	45	31.5	63	44.1	35	24.5
Class VI to Class XII	65	78.3	13	15.7	5	6.0
Graduate+	4	80.0	0	0.0	1	20.0

(Chi-square = 149.0, df = 6, p < .001)

Table 5: Relationship Between Occupation and Knowledge Regarding Transmission (n=307)

Variables	Complete		Partial		Wrong ans.	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Service	23	79.3	4	13.8	2	6.9
Farmer	16	33.3	14	29.2	18	37.5
Day labour	15	21.7	22	31.9	32	46.4
Business	37	46.8	23	29.1	19	24.1
House work	17	24.3	24	34.3	29	41.4
Others	11	91.7	1	8.3	0	0.0

(Chi-square = 54.22, df = 10, p < .001)

Table 6: Relationship Between Monthly Family Income and Knowledge Regarding Transmission (n=307)

Variables	Complete		Partial		None	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Upto Taka 6000	20	20.6	30	30.9	47	48.5
Taka 6001–12000	98	47.3	57	27.5	52	25.1
Taka 12001+	1	33.3	1	33.3	1	33.3

(Chi-square = 23.52, df = 4, p < .001)

Table 7: Relationship Between Gender and Knowledge Regarding Transmission (n=307)

Variables	Complete		Partial		None	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Male	86	42.8	54	26.9	61	30.3
Female	33	31.1	34	32.1	39	36.8

(Chi-square = 3.97, df = 2, p > .05)

DISCUSSION

Kala-azar remains closely linked to community-level knowledge of its transmission and prevention, and findings provide evidence of a substantial gap between recognition of the disease and understanding of its principal vector and preventive measures among urban slum dwellers in Rajshahi [11]. The present study has a mean age of 37.16±8.25 years, with males comprising 65.47%. Singh et al. reported a predominantly adult rural population in their large community survey, while Siddiqui et al. similarly evaluated predominantly adult populations in highly endemic communities [12,13]. In contrast, Alemu et al. included a larger proportion of females, illustrating the influence of local population structure and sampling context on sociodemographic distributions [14]. The present study also showed substantial educational and socioeconomic constraints, with 24.8% being illiterate and 67.4% reporting monthly family income of Taka 6001–12000. Similar socioeconomic vulnerability has been described in VL-endemic communities, where poverty, housing conditions and limited resources are recognized as important contextual determinants of disease risk and prevention [15,16]. 71.0% correctly identified insect bites as the mode of transmission and 67.4% identified the sand fly as the vector, 34.2% did not know the mode of transmission and 32.6% incorrectly identified the vector as a house fly. These findings are consistent with Faria et al., in which substantial gaps in vector-related knowledge were documented [17]. Similarly, Kumar et al. reported that many respondents in Bihar were unaware of the sand fly and that 61% incorrectly considered mosquitoes responsible for kala-azar [18]. Singh et al. also found that 72.8% attributed transmission

to mosquitoes despite widespread awareness of the disease [12]. Recognition of clinical manifestations in the present study was dominated by fever (80.8%), whereas only 3.3% identified splenic enlargement. This contrasts with Melkamu et al. where 88.2% recognized abdominal enlargement related to hepatosplenomegaly as a major manifestation, although only 52.1% recognized the sand fly as the vector [15]. Similarly, fever was the most commonly recognized symptom in Bihar, reported by 71.3% of participants [12]. Preventive knowledge was particularly limited: only 40.7% identified sand-fly control or prevention of sand-fly bites, while 59.3% did not know. Comparable deficiencies have been reported by Melkamu et al. and Hiruy et al [15,19]. Conversely, Srinivasan et al. demonstrates that structured behaviour-change communication can improve VL knowledge and attitudes, supporting the importance of targeted community education [20].Age was significantly associated with knowledge (χ^2=49.45, p<0.001). Complete knowledge declined from 71.4% among those aged ≤24 years to 11.1% among those aged ≥50 years, while wrong answers increased from 9.6% to 66.7%. This age gradient is compatible with Moradi-Asl et al. showing that age was associated with differing VL knowledge profiles [21]. Koirala et al. also demonstrated important variation in community understanding of kala-azar and its preventive practices, emphasizing that demographic characteristics can shape community-level knowledge [22]. Education showed the strongest observed association with knowledge (χ^2=149.0, p<0.001). Complete knowledge increased from 6.6% among illiterate respondents to 78.3% among those educated through class VI–XII and 80.0% among graduates+. This pattern closely agrees with Limongi et al., where higher education was associated with better VL knowledge [23]. Moradi-Asl et al. likewise demonstrated significantly greater odds of high VL knowledge among participants with academic education [21]. Similar associations have also been reported by Alemayehu et al, with formal education independently associated with better knowledge and preventive practices [24].Occupation was significantly associated with knowledge (χ^2=54.22, p<0.001). Complete knowledge was highest among respondents classified as "Others" (91.7%) and service holders (79.3%), but lowest among day labourers (21.7%); wrong answers reached 46.4% among day labourers. In Govil et al. study, occupation emerged as a significant predictor of knowledge, attitude and preventive-practice indices [25]. Among HIV-positive adults in Bihar, occupation was also independently associated with VL knowledge, while labourers demonstrated poorer preventive practices [26]. Income was significantly associated with knowledge (χ^2=23.52, p<0.001). Complete knowledge was 20.6% among respondents earning up to Taka 6000, compared with 47.3% among those earning Taka 6001–12000. The pattern is consistent with Limongi et al., showing that higher income was associated with better VL knowledge [23]. Govil et al. study similarly identified socioeconomic and household characteristics as relevant to VL knowledge and preventive behaviour [25]. Furthermore, VL has repeatedly been described as strongly linked to poverty and disadvantaged living conditions, providing a plausible contextual explanation for the observed socioeconomic gradient [14,15].Unlike age, education, occupation and income, gender was not significantly associated with knowledge (χ^2=3.97, p>0.05). Complete knowledge was 42.8% among males and 31.1% among females. This finding differs from Limongi et al., in which female gender was associated with better VL knowledge [23]. Conversely, Singh et al. and JS et al. have reported male predominance among participants without demonstrating a consistent gender-based knowledge advantage [12,26].

Limitations of the study:

The use of a single-center cross-sectional design restricts the ability to establish causal relationships or evaluate longitudinal knowledge retention. The deployment of non-probability purposive sampling within a specific geographical zone limits the broader generalizability of the findings to all endemic urban or rural slum populations across Bangladesh. Data collection relied on self-reported interviewer-administered questionnaires, which introduces potential response bias and recall inaccuracy regarding clinical symptoms and vector exposure.

CONCLUSION AND RECOMMENDATIONS

Although disease awareness was universal, critical gaps remain regarding Kala-azar vector ecology, transmission, and prevention among urban slum dwellers. Knowledge level was significantly associated with higher education, income, and occupation. To address these deficits, targeted health education focusing on sand fly control must be integrated into primary healthcare, schools, and local platforms. Active collaboration among municipal authorities, community leaders, and non-governmental organizations is essential to promote effective vector control and improve health-seeking behavior in vulnerable urban populations.

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REFERENCES

1. Aronson N, Herwaldt BL, Libman M, Pearson R, Lopez-Velez R, Weina P, Carvalho EM, Ephros M, Jeronimo S, Magill A. Diagnosis and treatment of leishmaniasis: clinical practice guidelines by the Infectious Diseases Society of America (IDSA) and the American Society of Tropical Medicine and Hygiene (ASTMH). Clinical infectious diseases. 2016 Dec 15;63(12):e202-64.
2. WHO Expert Committee on Leishmaniases, World Health Organization. The Leishmaniases: Report of a WHO Expert Committee. World Health Organization; 1984.

3. World Health Organization. Technical Report Series. No. 637. Geneva: World Health Organization; 1979. p.41.
4. World Health Organization. Implementation of the global strategy for health for all by the year 2000, second evaluation: eight report on the world health situation. v. 7, Western Pacific Region. WHO Regional Office for the Western Pacific; 1993 Dec 31.
5. Alom MS, Ali ML, Shaikh AA, Kabir J. Electrocardiogram changes due to sodium stibogluconate treatment of kala-azar.
6. Davey TH, Lightbody WP. The control of disease in the tropics.
7. Rashid KM, Rahman M, Hyder S. Special Health Problems and Programmes. Text book of Community Medicine and Public Health, 4th edition, S (eds), Dhaka RHM, Banani, Dhaka. 2004:325-30.
8. Chowdhury R, Faria S, Huda MM, Chowdhury V, Maheswary NP, Mondal D, Akhter S, Akter S, Khan RK, Nabi SG, Kroeger A. Control of Phlebotomus argentipes (Diptera: Psychodidae) sand fly in Bangladesh: a cluster randomized controlled trial. PLoS neglected tropical diseases. 2017 Sep 5;11(9):e0005890.
9. Ericksen NJ, Ahmad QK, Chowdhury AR. Socio-economic implications of climate change for Bangladesh. (No Title). 1993 May.
10. Rahman MM, Rahman MA, Sajani TT, Chowdhury SA, Akhter A. Reproductive health practice of married women in the rural community of Dhamrai Upazila, Dhaka. Anwer Khan Modern Medical College Journal. 2013 Nov 10;4(2):31-6.
11. Mondal D, Singh SP, Kumar N, Joshi A, Sundar S, Das P, Siddhivinayak H, Kroeger A, Boelaert M. Visceral leishmaniasis elimination programme in India, Bangladesh, and Nepal: reshaping the case finding/case management strategy. PLoS neglected tropical diseases. 2009 Jan 13;3(1):e355.
12. Singh SP, Reddy DC, Mishra RN, Sundar S. Knowledge, attitude, and practices related to Kala-azar in a rural area of Bihar state, India. The American journal of tropical medicine and hygiene. 2006 Sep 1;75(3):505-8.
13. Siddiqui NA, Kumar N, Ranjan A, Pandey K, Das VN, Verma RB, Das P. Awareness about kala-azar disease and related preventive attitudes and practices in a highly endemic rural area of India. Southeast Asian journal of tropical medicine and public health. 2010 Jan 1;41(1):1.
14. Alemu A, Alemu A, Esmael N, Dessie Y, Hamdu K, Mathewos B, Birhan W. Knowledge, attitude and practices related to visceral leishmaniasis among residents in Addis Zemen town, South Gondar, Northwest Ethiopia. BMC Public Health. 2013 Apr 24;13(1):382.
15. Melkamu HT, Beyene AM, Zegeye DT. Knowledge, attitude and practices of the resident community about visceral leishmaniasis in West Armachiho district, Northwest Ethiopia. Heliyon. 2020 Jan 1;6(1).
16. Mondal D, Alam MS, Karim Z, Haque R, Boelaert M, Kroeger A. Present situation of vector-control management in Bangladesh: a wake up call. Health policy. 2008 Sep 1;87(3):369-76.
17. Faria S, Hossain SM, Islam MS, Chowdhury V, Chowdhury R. Assessment of knowledge, attitudes, and practices toward Kala-azar in an endemic district in Bangladesh: a cross-sectional survey. The American Journal of Tropical Medicine and Hygiene. 2023 Mar 6;108(4):783.
18. Kumar N, Siddiqui NA, Verma RB, Das P. Knowledge about sandflies in relation to public and domestic control activities of kala-azar in rural endemic areas of Bihar. The Journal of Communicable Diseases. 2009 Jun 1;41(2):121-8.
19. Hiruy EG, Sahilu WT, Yirga GK, Wondimu KS, Misganew W, Ayele H, Teshale MM, Mekonen GB, Bantie B, Gete M, Laikemariam M. Knowledge, Attitudes, and Practices of community regarding leishmaniasis in Ethiopia: A Systemic review and Meta-analysis, 2025.
20. Srinivasan R, Ahmad T, Raghavan V, Kaushik M, Pathak R. Positive influence of behavior change communication on knowledge, attitudes, and practices for visceral Leishmaniasis/Kala-azar in India. Global Health: Science and Practice. 2018 Mar 21;6(1):192-209.
21. Moradi-Asl E, Abbasi-Ghahramanloo A, Adham D, Saghafipour A, Arzamani K, Soltani A, Nejati J, Firozian S, Jalilian A, Kazempoor S, Darvishi M. Association between living in the endemic area and level of knowledge of visceral leishmaniasis. BMC Public Health. 2024 Jan 24;24(1):291.
22. Koirala S, Parija SC, Karki P, Das ML. Knowledge, attitudes, and practices about kala-azar and its sandfly vector in rural communities of Nepal. Bulletin of the World Health Organization. 1998;76(5):485.
23. Limongi JE, Costa LC, Perissato IL, Giorgiani M, Rocha MB, Faria LF, Valente HC, Oliveira SV. Knowledge, attitudes and practices concerning visceral leishmaniasis among residents of a sporadic transmission area in southeast Brazil. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2021 Jun;115(6):644-52.
24. Alemayehu B, Kelbore AG, Alemayehu M, Adugna C, Bibo T, Megaze A, Leirs H. Knowledge, attitude, and practice of the rural community about cutaneous leishmaniasis in Wolaita zone, southern Ethiopia. PLoS One. 2023 Mar 28;18(3):e0283582.
25. Govil D, Sahoo H, Pedgaonkar SP, Das KC, Lhungdim H. Assessing knowledge, attitudes, and preventive practices related to kala-azar: a study of rural Madhepura, Bihar, India. The American Journal of Tropical Medicine and Hygiene. 2017 Dec 26;98(3):857.
26. JS D, Gupta AK, Veeri RB, Garapati P, Kumar R, Dhingra S, Murti K, Ravichandiran V, Pandey K. Knowledge, attitude and practices towards visceral leishmaniasis among HIV patients: A cross-sectional study from Bihar, India. PLoS One. 2021 Aug 17;16(8):e0256239.