



Present situation of vector-control management in Bangladesh: A wake up call

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Abstract

Objectives: Kala-azar or visceral leishmaniasis is one of the major vector-borne diseases in Bangladesh. The disease is transmitted by sandfly. The incidence of the disease, which has been increasing since the early eighties, must be reduced by taking adequate vector-control measures. The objective of the present study was to identify the favorable factors and the constraints of present vector-control management in Bangladesh.

Methods: Purposively selected senior entomologist and retired senior entomologist at central level, civil surgeons, entotechnicians, health inspectors and spray men from kala-azar-endemic districts, community leaders, and NGO representatives were key informants of the study. A household survey to learn about knowledge and perceptions of the people about kala-azar vector was carried out, using a structured questionnaire, in 202 randomly selected households.

Results: Practically, there was no vector-control activity in the nine most kala-azar-endemic districts of Bangladesh. Inadequate human resources, lack of logistics, and unavailability of funds for vector control were the major constraints. Community perception about kala-azar vector was poor. However, the use of bednets in the community was high. No private organization was involved in kala-azar vector control. Knowledge of the spray men about the insecticide-spraying technique was also unsatisfactory.

Conclusion: Kala-azar vector control in Bangladesh needs immediate attention of policy-makers and donors, otherwise, elimination of kala-azar from the country by 2015 may not be achievable.

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1. Introduction

Kala-azar is one of the major public-health problems in some districts of Bangladesh, Nepal, and India [1]. Its incidence is increasing in Bangladesh since the early

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eighties after the discontinuation of DDT spraying [2]. Results of some studies showed that the incidence rates varied from 20 to 40 per 10,000 people, and the prevalence was high (13%) [2]. The disease is endemic in 34 districts of Bangladesh. Nine of 34 districts are most endemic for kala-azar, and they are Mymensingh, Tangail, Jamalpur, Gazipur, Sirajganj, Pabna, Nator, Naogaon, and Nawabgonj. The disease is fatal if left untreated [3]. A passive surveillance for kala-azar has been continuing since 1994 by the Directorate General of Health Services (DGHSs), Bangladesh. The country has been facing problems in treating patients with kala-azar, because local pharmaceutical companies do not produce kala-azar-specific drugs [2]. Currently available sodium antimony stibogluconate (SAG) is the only drug, provided by the World Health Organization. Although the drug is given at no cost to patients, results of our previous study showed that the compliance was poor and did not exceed 70% (Unpublished data). On the other hand, miltefosine is at the trial phase and is accessible to limited people with kala-azar. Poor compliance, unavailability of drugs, eventual drug resistance, and untreated cases with post-kala-azar dermal leishmaniasis (PKDL) can further lead to the dramatic increase of kala-azar cases in the country. Hence, there is an urgent need to take adequate measures to control the disease in Bangladesh.

Many studies have shown that adequate vector control with indoor residual spraying (IRS)/insecticide-treated bednets (ITNs) are useful in controlling vector-borne diseases [4–7]. Recent studies in Afghanistan and Sudan demonstrated that ITNs could be effective to control various types of leishmaniasis [8,9]. According to the WHO, active kala-azar case detection, adequate treatment of kala-azar cases, and vector control by introducing integrated vector management (IVM) are the pillars of kala-azar control [1]. Control of kala-azar in the Indian sub-continent is possible because man is the only reservoir, diagnosis is possible at field-settings, effective oral and back-up drugs are available, and political commitments have been made by the Health Ministers of these three countries in 2005 [1].

Regular vector-control activities in endemic areas can control kala-azar as it has been shown in Nepal [10]. However, to carry out any vector-control activities, there is a need for formulating a national vector-control policy, an active vector-control management system,

sufficient human resources, and logistics. The present study aimed at exploring the current vector-control system in Bangladesh through a situation analysis with anticipation that the results of the study might contribute to identifying the gap between the present status and what is needed for kala-azar vector control in Bangladesh.

Our study also aimed at performing a situation analysis of the vector-control activities at the central and district levels, at assessing the involvement of NGOs in kala-azar vector control, and at studying the knowledge and practices of the people about kala-azar.

2. Study population and methods

The study population was purposively selected, except for the household survey. Civil surgeons from nine most kala-azar-endemic districts, such as Mymensingh, Tangail, Jamalpur, Gazipur, Sirajganj, Pabna, Nator, Naogaon, and Nawabgonj, were invited to participate in the study as key informants at the district level. A senior entomologist at the central level and retired chief entomologists were requested to participate as key informants at the central level. Heads of non-government organizations or their representatives who have been working with vector-borne diseases or vector control were also invited to take part in the study. Community leaders from the most endemic kala-azar district were also requested to participate in the study. An entotechnician, a health inspector, an assistant health inspector, a sanitary inspector, and a retired spray man from civil surgeon offices of the above-mentioned districts were invited to take part in the IRS knowledge test. All these participants were grouped as spray men because these are the people who are supposed to be involved in the eventual IRS programme.

Two hundred and two households were randomly selected from a kala-azar-endemic area, where no intervention study has been carried out before. The sample size for the household survey was calculated assuming that about 10% (desired precision 3%) of household heads would not have clear perception about the transmission of kala-azar and its prevention measures, and the confidence limit of this estimation would be 99%.

Key informants at the district level and a senior entomologist were interviewed using a structured questionnaire, adapted from the “WHO Guideline for Need

Assessment Analysis for Vector Control” by the investigators [11]. The investigators conducted in-depth interviews with retired entomologists, heads of NGOs or their representatives, and community leaders. Following the WHO guideline for IRS, a questionnaire was developed for knowledge test of the people, who are/were related with IRS [12]. An experienced entomologist at the central level examined and scored knowledge test results.

Trained field research assistants interviewed the heads of the randomly selected households using a structured questionnaire.

Written informed consent was taken from each participant. The Ethical Review Committee of International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) and the IRB of WHO approved the study.

3. Data analysis

All data were computerized using the Epi Info software (version 3.1.1). Descriptive statistics (mean, median, standard deviation, standard error) for quantitative data were generated from the structured questionnaire of the household survey and from knowledge test scores of spray men. Comparison between proportions was done using the Chi-square test where applicable. Quantitative data were analyzed using the SPSS software (version 11.0).

3.1. Qualitative method

Taped focus-group discussion and in-depth interviews were transcribed into English. Responses were tabulated, and Prof. Zehadul Karim, Professor of Anthropology, University of Rajshahi, Bangladesh, performed manual content analysis.

4. Results

In total, 245 individuals participated in the study. These individuals includes 3 entomologists from the central level (1 present and 2 retired entomologists); 2 entomologists at the district level; 8 civil surgeons; 22 spray men from nine most kala-azar-endemic districts; 2 NGO representatives (1 CEO of Safeway Pest Con-

trol, Dhaka and 1 MSF, Dhaka); 6 community leaders; 202 households.

4.1. Past vector-control activities in Bangladesh

Our two retired entomologists who actively participated in the malaria-eradication programme (MEP) informed us about the past malaria vector-control activities before and after the liberation of Bangladesh in 1971. According to them, the malaria vector-control activity was initiated in 1949 in Mymensingh. In 1961, regular vector-control activities were started as part of the MEP. A vector-control task force at the district level comprised an entomologist, a division malaria officer, an evaluator, a health superintendent, an assistant health superintendent, a malaria inspector, and an assistant malaria inspector. The programme was successfully run with the support from WHO, USAID, and DANIDA. After the liberation of Bangladesh, the name of the MEP was changed in 1972 to Malaria Control Programme (MCP), and the vector-control activities that were spread all over Bangladesh were reduced to only 13 malaria-endemic districts. In 1974, the MEP/MCP was merged with the Government. By 1977, the MCP was abolished as an autonomous vertical programme and was completely merged with general health services. A few personnel from the MEP/MCP joined the general health services. Vector control practically disappeared since then.

4.2. Present vector-control management and vector-control activities in Bangladesh

All key informants at the district level from the most kala-azar-endemic districts informed us that there were no vector-control activities in their regions. The informant at the central level confirmed it. He also informed that some vector-control activities had been going on particularly in malaria-endemic districts, but it had been relying only on distribution of insecticide-treated bednets. The post of entomologist was available at the central level and in five of eight kala-azar-endemic districts, although no entomologists were appointed in five districts. All the district-level informants stated that, according to their knowledge, there was no vector-control policy, vector-control guideline, equipment, safe warehouse facilities, and training facilities for vector control. The informant at the central level, however

mentioned about the existence of some fund for vector-borne disease control, but 0% of this fund was allocated for vector control. All district-level key informants could not name any non-governmental organization which might be associated with vector-control activities in their regions.

4.3. Entomological education, training facilities, and research

The key informants at the central level and one NGO representative indicated that, at present, no university in the country has an independent entomological department, although entomological units exist in some universities. The number of students interested in specialization on entomology was reported to be decreasing due to a very limited scope; a qualified entomologist has been treated as a second-class government officer. Post-graduate education in entomology is not available in the country. The interviewees informed that some vector-related research has been going on in some organizations, such as Institute of Epidemiology, Disease Control and Research (IEDCR), University of Dhaka, National Institute of Preventive and Social Medicine, and International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B), but none of these research activities is related to vector-control activities of the country. However, the Directorate General of Health Services has been conducting a limited and sporadic entomological surveillance for malaria and kala-azar vectors.

4.4. Supervision, implementation, and evaluation of vector-control activities

The informants at the central level informed that, although some malaria vector-control activities based on distribution of insecticide-treated bednet had existed, effective supervision of vector control at the provincial and district levels were absent. They further informed that there was no regular communications and exchange of data between the central and the district level. The interviewees informed that funds for monitoring, supervision, and evaluation of vector-control activities were insufficient, and transports for supervision of malaria vector-control activities from the central level to the malaria-endemic district levels were not available.

4.5. Regulatory policies on pesticides

The informants at the central level and one NGO representative mentioned about the regulatory policies on pesticides. According to them, in Bangladesh, there are laws on insecticides governed by the act of 1971 and law of 1985. The Secretary, Agriculture, Poultry and Livestock, heads the Pesticide Advisory Board. Registration of a new pesticide is a time-consuming process and takes at least 3 years. A pesticide must go through chemical and efficacy tests. In the case of an insecticide of public-health importance, the IEDCR performs the efficacy testing. There are regulations about storage, distribution, and sales of public-health insecticides monitored by the Central Medical Supply Depot (CMSD). The Vector Control Unit of the Directorate General Health Services (DGHSs) performs quality control of insecticide-treated net (ITN) and insecticides.

4.6. Involvement of NGOs in vector-control activities in Bangladesh

In Bangladesh, Medecins Sans Frontiers (MSF) and BRAC are the only two NGOs working in the field of vector-borne diseases. There are few private vector-control service companies in the country. Of them, “Safeway Pest Control” is the pioneer. We interviewed representatives of MSF and Safeway Pest Control. The representative of MSF informed that their vector-borne disease activities were limited to management of malaria cases; they did not carry out any vector-control activities. The respondent from Safeway Pest Control informed that they were giving, on payment, service to control different types of pest (mosquitoes, flies, ticks, rats, etc.) both at home and private places. Their vector-control activities were not related to any vector-control programme of the country. Both the interviewees reported that, according their knowledge, there is no NGO or private vector-control company, involved in kala-azar vector-control activity.

4.7. Role of community leaders (Union Parishad Chairman) in kala-azar vector control

We conducted open interviews with six community leaders from a highly endemic sub-district (upazila) in Mymensingh. After thematic analysis of their recorded

interviews, we concluded that they recognized kala-azar as a public-health hazard in their localities. They are also concerned about the increasing number of kala-azar patients. They are aware that kala-azar is a disease of the poor people living in mud houses and transmitted by sand fly. However, they admitted that, till now, they did nothing to control kala-azar and its vector. They expressed their willingness to organize seminars and symposiums in the villages to mobilize the local people for vector control.

4.8. Knowledge test score of spray men

The average score of the participants in the knowledge test was 21 (S.D. 7.6). Only 5 of 22 participants scored 50% or more of the total score.

4.9. Knowledge and practice survey

In total, 202 household heads participated in the study. Their median age was 35 years (quartiles 25–45). Fifty-two percent were female, and 87% were married. Ninety-eight percent of the interviewees were Muslims, 51% were illiterate, and 75% were farmers. Eighty-seven percent of the household heads heard of kala-azar, and 61% were aware that kala-azar is a transmissible disease (Table 1). Less than 50% recognized the role of sand fly as a vector of kala-azar, and 66% indicated mosquitoes as kala-azar vector. About 50% answered correctly about the biting behavior of the vector. Surprisingly, the most respondents gave correct answer regarding the breeding places of the vector (Table 1), but their practice relating to cleaning of the breeding place, such as cattle shed, was unsatisfactory (Table 2). More than 90% of the houses possessed at least one bednet, which is the foremost way to protect family members from mosquito bites. Another important finding was that more than 90% believed that indoor residual spraying would help reduce the incidence of kala-azar, and a similar percentage of the household heads welcomed eventual IRS programme (Table 2).

5. Discussion

The most important findings of the present study are: (a) current vector-control management in Bangladesh

Table 1
Knowledge of household heads about kala-azar and kala-azar vector

Question	Percentage (no.)
Have you heard about kala-azar?	87 (176/202)
Anybody in your family with kala-azar in the last 2 years?	13 (26/202)
Is kala-azar transmissible?	61 (123/202)
How does kala-azar spread?	
By water?	20 (41/202)
By air?	14 (28/202)
By mosquitoes?	66 (133/202)
By sand fly?	40 (81/202)
By mosquitoes or sand fly?	68 (138/202)
Breeding place?	
Dirty water?	78 (107/138)
Crack and craves of wall?	61 (84/138)
Cattle shed?	82 (113/138)
Garbage?	91 (136/138)
Dark place?	57 (78/138)
When they bite?	
Day time	4 (5/138)
At night	40 (55/138)
Any time	51 (70/138)
Don't know	5 (8/138)

is underprivileged in terms of policy, human resources, and logistics; (b) the involvement of community leaders and NGOs in vector control is negligible; (c) community knowledge and practice is unsatisfactory.

Kala-azar is a major public-health problem in 34 districts of Bangladesh. The disease is highly endemic in nine districts, such as Mymensingh, Tangail, Jamalpur, Gazipur, Sirajganj, Pabna, Nator, Naogaon, and Nawabgonj. The Health Ministers of Bangladesh, India, and Nepal signed a Memorandum of Understanding to eliminate kala-azar from the Indian sub-continent [1]. One of the strategies of the elimination programme is to introduce integrated vector-control management (IVM) to reduce the transmission of the disease [1]. To be successful, IVM needs promotion and embedding of IVM principles in development policies of all relevant agencies, organizations, and civil society. However, the majority of the informants participated in this study failed to inform about the existence of any vector-control policy in Bangladesh. Essential physical infrastructure, financial resources, and adequate human resources at the national and local levels are of paramount importance to administer the IVM programme. Key informants of

Table 2
Current practice and believe about protection from kala-azar

Question	Percentage (no.)
Does any body of your family sleep outside during summer?	
Yes	15.3 (31/202)
Seldom	16 (32/202)
No	69 (139/202)
Do you use bed-net?	
Yes	93 (187/202)
No	7 (15/202)
Unable to buy	6 (12/202)
Feel uncomfortable	1 (3/202)
Have you heard of insecticide-treated bed-nets (ITN)s?	0.5 (1/202)
Do you use ITN?	0 (0/202)
How often do you clean your cattle shed in a month?	15.3 (31/202)
Does indoor residual spraying of insecticide (IRS) help to reduce kala-azar?	
Yes	92 (187/202)
No	2 (4/202)
Partially	1 (2/202)
Do not know	5 (9/202)
Will you permit IRS in your house?	99.5 (201/202)
How do you protect your family members from mosquitoes/sand fly bite?	
Bed-net	91 (184/202)
ITNs	0.5 (1/202)
Coil	10 (20/202)
Repellent	0.5 (1/202)

the present study reported that, no entomologists were appointed in the kala-azar-endemic areas. They further informed that there were no vector-control equipment, safe warehouse facilities and funds for vector-control activities in most kala-azar-endemic districts. The interviewees at the central level also informed that, although some vector-control activities were there for malaria, no efforts had been made to control kala-azar vector, and funds for supervision, implementation, and evaluation of malaria vector-control activities were insufficient. In other words, vector-control activities in Bangladesh have been facing challenges in terms of advocacy, human resources, logistics, and funds. If these challenges could not be overcome as soon as possible, there is a little chance for IVM to be a success.

For the success of prevention and control programme of any disease, the important prerequisite is community participation and involvement of the private sector in the programme. Cooperation of the affected population is essential in the implementation and use of programme activities. Programme

implementers need to understand the disease-related knowledge, attitude, and practices of the community, because these are the important determinants of community participation.

Most (87%) respondents had heard of kala-azar. Ahluwalia et al. also reported similar results [13]. The percentage of the people having knowledge about the transmissibility of kala-azar was less (61%), which is a matter of concern. Steps should, thus, be taken to make more people aware of transmissibility of kala-azar.

Compared to other studies where knowledge of the community people about kala-azar vector was very poor [14], in our study, we found that 40% of the household heads were aware of the vector of kala-azar. Interestingly, knowledge of the community people about the sand fly breeding place was high. However, the practice of the community for removal of the sand fly breeding places was poor. Cleaning practice of the cattle shed once a month was found only in 15% of the households. The fact that the sand fly bites mostly at night needs to be known to the community.

Only 51% were aware that kala-azar vector bites at night. Necessary steps are, therefore, needed to be taken to increase the knowledge of the community people about kala-azar vector, which may stimulate the involvement of the community in kala-azar vector control.

The only encouraging fact found in the present study was that the use of bednets was high in the community. More than 90% of the houses had at least one bednet. The use of bednets was found to be protective against kala-azar [2]. Therefore, the health policy planners should think of promoting bednets for the remaining 10% of the households without bednets. Insecticide-treated bednets were known to only 0.5% of the community people. Results of studies showed that the use of insecticide-treated bednets could reduce the risk of kala-azar and cutaneous leishmaniasis [8,15]. Consequently, the community needs to be aware of usefulness of insecticide-treated bednets, which may encourage the public sector to promote insecticide-treated materials in society.

Overall, our findings suggest that the community lacks adequate information and education to prevent kala-azar in their areas. The perception of the community people about kala-azar vector needs to be improved to derive maximum community support to reduce the transmission of kala-azar.

In conclusion, the major issue in Bangladesh for the control of kala-azar is the total lack of vector-control activities in the kala-azar-endemic areas of the country. The health policy planners need to take necessary measures to introduce kala-azar vector-control activities, particularly in the kala-azar-endemic areas of Bangladesh, otherwise, elimination of kala-azar from Bangladesh by 2015 may not be achievable.

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