ORIGINAL ARTICLE

Clinical and Demographic Profile of Neurotoxic Snake Bite Patients in a Tertiary Care Hospital in Bangladesh

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Abstract

Background: Neurotoxic Snake bite is an important health hazard that may lead to fatality in Bangladesh, particularly in rural areas. Epidemiological data point to 700000 incidences of snake bite resulting in 6000 deaths in a year. Despite the criticality of this issue, limited studies are available in the pertinent literature. Consequently, to bridge the gap and offer fresh insights into this domain, the present study was an effort to observe the clinical and demographic profile of neurotoxic snake bite in tertiary care hospital of Bangladesh.
Methods: This research was a hospital based observational study which was conducted at the inpatient department of Medicine in Dhaka Medical College Hospital (DMCH). Thirty five patients admitted in DMCH for neurotoxic snake bite were examined according to the inclusion and exclusion criteria. Ethical issues were ensured properly throughout the study. After obtaining a written informed consent, patents' history was taken and physical examination was done and data were recorded in structured case record form. In the end, the collected data was analysed by computer via SPSS 22.
Results: Neurotoxic snake bite was most frequent (34.3%) in age group 21-30 years. The mean age of the subjects was 32.31 ±14.33 SD. Total 11 Neurotoxic snake was identified and 7 were Cobras and 4 were Kraits. Difficulty in swallowing, difficulty in speech, double vision, and difficulty in breathing were found in 11.4%, 28.6%, 5.7%, and 37.1% of the cases, respectively. Moreover, all the subjects had Ptosis (100%), 14.3% had external ophthalmoplegia, 57.1% had broken neck sign. Furthermore 60% of the cases recovered completely, 17.1% recovered with complications, but unfortunately 22.9% of the patients died.
Conclusion: Ptosis and broken neck signs are the most frequent neurotoxic signs. However, a larger study is needed to validate and approve this finding.

Keywords: Symptoms and sign, Neurology, Demography, Cobra, krait

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INTRODUCTION

As substantiated by the World Health Organization (WHO), snake bite is a potentially life-threatening condition that is usually faced by physicians in their practicing life, particularly in rural hospital settings like South-East Asia including Bangladesh 1). Envenomation may not happen in all cases as very few species are venomous (2). But, irrespective of venomous and non-venomous snake, snakebite remains an underestimated cause of accidental death (3).

There are about 82 species of snakes in Bangladesh amongst which 28 species are venomous, 12 species are sea snakes (2). Bite by Green pit viper, cobra, and kraits are more commonly reported cases in Bangladesh, whereas Russell's viper appears to be localized to Rajshahi area and saw-scaled vipers are non-existent (4). Contrarily, there are venomous snakes which are of medical importance in our country including *Naja kauthia and naja naj; Doboia russelii, Trimeresurus; King cobra, Ophiophagus*, and all types of sea snakes. (1). Estimates of snakebite mortality and morbidity are mainly based on hospital data which mostly underestimate the problem as patients sometimes choose traditional healers like 'ozhas' or even use other means to treat the bite which is really harmful (5,6,7). However, there is an estimate that 5 million snake bite cases occur worldwide every year, causing about 100000 deaths (8). In Bangladesh, despite insufficient available data, an epidemiological study estimated about 700000 incidence of snake bites per year with 6000 mortality (9). Unfortunately, this rate is one of the highest ones in the world (9) Moreover, Azhar et al (10) and Faiz et al (11) reported 74 and 179 (131 non-venomous and 48 venomous bite) cases from Rajshahi and Chittagong Medical College Hospitals, respectively.

Neurotoxicity is a well-known feature of envenoming due to elapids (family Elapidae) such as kraits (Bungarus spp.),

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cobras (Naja spp.), coral snakes (Micrurus spp.), tiger snakes (Notechis spp.), and few others. Neurotoxicity has also been well-described with pit vipers such as rattlesnake although considered relatively less common with true vipers (family Viperidae, subfamily Viperinae). Neurotoxicity is well-recognized in envenoming with Russell's viper (Daboia russelii) in Sri Lanka and South India (12). Nevertheless, it presents itself in the form of acute neuromuscular paralysis (more commonly in the form of ptosis, external ophthalmoplegia, dysphagia, dysphonia and broken neck sign) (1) and predominant neuromuscular toxicity which is an important cause of morbidity and mortality due to snakebite. Neurological changes related to hypotension, shock, and other organ dysfunctions (such as renal impairment) are also common. Moreover, some non-neurotoxic neurological manifestations such as swelling and soft tissue necrosis in the bitten limb and coagulopathy can be associated with neurotoxic snake bite envenoming (12). Unfortunately, clinical manifestation of neurotoxic snake bite has not been well studied and the data of the available investigations are mostly confined to case reports (12). Even though there are some clinical studies in this area, (1) their potential pathophysiological mechanisms are yet unclear (12).

Many studies reported that, considerable geographical variations in clinical presentations have been described after a bite by some species of snakes including Cobra and Russell's viper (11, 12) Therefore, the identification of those species is a crucial management step (2). Moreover, it is essential in low resource settings particularly in Bangladesh, to recognize the neurotoxic snake bite from clinical manifestation, as mechanical ventilation, intensive care, antivenom treatment, and other ancillary care may not be available in all places. Considering this limitation, the study was planned to observe the clinical and demographic profile of neurotoxic snake bite in tertiary care hospital of Bangladesh.

METHODS

The present stud was a hospital-based observational study conducted in the inpatient department of Medicine, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh for Six months (April 2018 to September 2018). The examined patients were from both genders with history of snake bite presented with neurotoxic clinical features admitted in the Department of Medicine, Dhaka Medical College Hospital, Dhaka, Bangladesh. Additionally, the study benefited from a purposive convenient sampling technique with an adjusted sample size of 35.

The patients of all age groups (both male and female) who came to Dhaka Medical College Hospital with history of snake bite within at least 48 hour and gave their informed written consent, had at least one of the following criteria like Ptosis (partial or complete), 'broken neck' sign, external ophthalmoplegia, difficulty in swallowing, and difficulty in speech, salivation, and respiratory difficulty with or without observing snake were chosen for the study. Pre-existing neurological illness, patient receiving Antihistamine or sedative before admission and patients or attendants refusing to give informed consent was excluded in this study. Guessed

Demographics focused upon in this study were age, sex, occupation, and economic profile. The definition of socio-economic status was based on Bangladesh Bureau of Statistic 2010 where monthly family income/month (Taka) indicates following socio-economic class: Low socio-economic class: <5,500 BDT Middle socio-economic class > 5,500-11,500 BDT and High socio-economic class >11,500 BDT

It is essential to mention that the method of snake identification in this series was brought alive/killed specimen by victims, attendants, or Zoologist by showing the photographs or preserved killed specimen.

When a patient of suspected neurotoxic snake bite was presented to Dhaka Medical College Hospital indoor, attending doctor observed the patient and informed the study physician. Then the study physician immediately visited the patient for enrollment and examined him/her to see the chronologically neurotoxic sign and symptom. A 20-minute whole blood coagulation test was done by collecting and placing a few milliliters of blood in a small glass test tube and left standing for 20 minutes. After 20 minutes the tube was inverted to determine if a clot had been formed. Then the data was collected in a structured case record form accordingly. The neurological sign and symptom before and after antivenom administration was observed. The management was done according to consultant accreditation. The patient was followed up into the hospital to see the short-term outcome after administration of antivenom. All the reactions were observed and recorded as well.

Before the commencement of the study, the protocol of study was approved by Ethical review committee (ERC) of DMC. The informed consent of the patients/care giver was taken by describing the objectives and purposes of the study. They were also given the freedom to withdraw from the study whenever they wanted and were ensured that the information obtained from them would be kept confidential. Moreover, they were informed that they will not get any financial benefits from this study. In case of low level of consciousness and disoriented patient history taking was done from the attendant of the patient. Researcher himself did all the physical examination. The patients who were not willing to participate in the study were excluded from the study.

Later, the gleaned data were checked and edited after the collection. An analysis plan was developed in line with the objectives of the study. Data were gathered regarding clinical manifestation of neurotoxic snake bite along with socio-demographic profiles. All these were registered, documented, and analyzed in the statistical program Statistical Package for Social Science (SPSS) version 22.0. (IBM SPSS Statistics for Windows, IBM Corp. Released 2013). Each question (termed 'variable' in SPSS) was coded with a number and all alternative responses for each question were registered to enable a statistical analysis. The data were systematically described, summarized, and presented through descriptive statistics. For frequency distribution and normal distribution of all continuous variables were calculated and expressed as Mean ± SD.

RESULTS

Total 35 cases were included in this study. A brief summary of 35 cases is illustrated in Fig1.

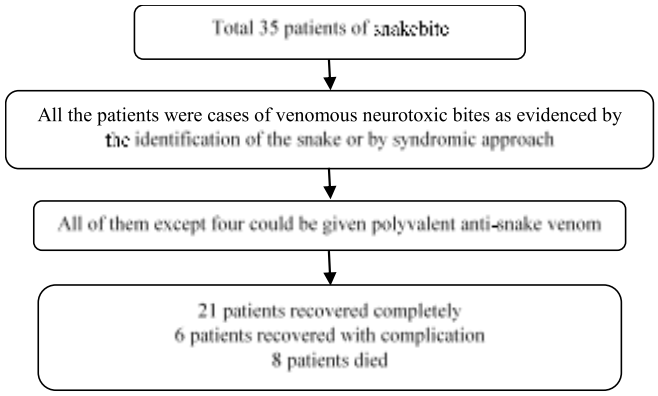

Figure 1.

Mean and Median age were 32.31 ±14.33 and 30 years. Maximum age was 60 years and minimum age was 10 years. Many of the patients (34.3%) were from age group 21 to 30 years. The number of male patients (57%) were higher than female patients (43%). Most of the patients (12, 34.3%) were farmers, followed by 10 patients (28.6%) who were housewives, 6 patients (17.1%) who were doing business, 6 patients (17.1%) who were students and one daily laborer. Many of the patients in this study came from lower socio-economic class (48.6%). 42.9% patients came from middle socio-economic class, and only 8.6% came from upper socio-economic class.

In this study, a total of 11 snakes were identified in the hospital. Out of the eleven, 7 snakes were Cobras and 4 were Kraits. Three specimen of Cobra (Three moncellate) and one krait were live. Seven specimens were dead snakes. Specimen of snakes were identified by herpetologist or wild life specialist. (Table 1) Among the remaining 24 cases, 10 cases of snake bites were observed by the victims. They identified the specimen when photos of snakes were shown to them after recovery. In fourteen cases of snakebites, the snake could not be identified. In these cases, neurotoxic bite was considered.

Most of the snake bites (82.9%) were obvious bites as identified by the presence of bite marks and 17.1% were incidence apparent bites as there were no obvious bite marks. These cases were recorded as scratches. Total 48.6% of the bite occurred in field (mainly farming areas) and 45.7% occurred at home. Most cases of bite (42.9%) occurred in between evening (6 P.M) to midnight. In 71.4% of the incidences, snake bite occurred in lower limb (Table 2).

Going further, the researcher asked the patients' attendances if they have taken the patient to 'Ozha' (a traditional healer) before coming to hospital or going to a physician. Their responses were affirmative in 77.1% of the cases.

The most common symptom identified in this study was difficulty in breathing (13 patients, 37.1%) and the second common symptom was difficulty in speech (10 patients, 28.6%). Among 13 patients who developed difficulty in breathing 9 cases developed severe respiratory difficulty and intubation was possible in 5 cases. (Table 3) The most common sign was ptosis (35 patients, 100%) and the second common sign was 'broken neck' sign (57.1%) (Table 4).

Out of 35 patients, 21 patients (60%) recovered completely, 6 patients (17.1%) recovered with complications, and 8 patients (22.9%) died. Table 5 presents the details of the fatal cases due to snake bites. Time from bite to admission and from admission to deaths is best approximate. Moreover, 9 patients developed severe respiratory failure. Four patients were gasping and died immediately before anti-venom could be administered or intubation could be done.

Five patients were intubated immediately along with intravenous administration of anti-venom. Three among 5 who

Table 1. distribution of the patients according to group of identified snake (n=11)

Snake group	Number	Status	
		Live	Dead
Cobra	**7**	**3**	**4**
Monocellate cobra	7	3	4
Binocellate cobra	0	0	0
Krait	**4**	**1**	**3**
Common krait	2	0	1
Greater black krait	1	0	1
Bangarus welli	1	1	0

Table 2. Information related to snake bite (n=35)

Variables	Frequency	Percent
Type of contact		
Bite	29	82.9%
Scratch	6	17.1%
Place of bite		
Home	16	45.7%
Field	17	48.6%
Others	2	5.7%
Time of day when the incidence occurred		
Midnight to 6 AM	6	17.1%
6 AM to 12 Noon	5	14.3%
12 Noon to 6 PM	9	25.7%
6 PM to Midnight	15	42.9%
Part of the body bitten by snake		
Upper limb	9	25.7%
Lower limb	25	71.4%
Head and Neck	1	2.9%
	Mean	Standard Deviation
Bite to Hospital Time (hours)	10.14	15.71

could be intubated and sent to ICU survived, 2 of them died after intubation but not referred to ICU due to the lack of bed in ICU. One patient developed severe anaphylaxis. This patient was delayed start of antivenom and patient developed respiratory failure. Intubation was done immediately but patient developed sudden sever swelling of face including eyes and neck and developed hypotension. The patients did not survive despite treatment with adrenaline. One patient died due to the deficiency of skill and assessment in managing patients' bitten by venomous snake and a belated start of treatment which lead to respiratory failure and death (Table 5).

All the patients except four who died before start of antivenom (n=31) were treated with polyvalent antivenom. Among them 23 patients (74.19%) developed pyrogenic reaction including 15 patients (48.39%) who developed allergic reaction. Most of the patients who developed pyrogenic reaction (54.83%) also complained about palpitation. The most common manifestation of allergic reaction was itching/urticarial reaction (15 patients, 48.39%). This was followed in second and third by nausea and/or vomiting (10 patients, 32.26%) and headache (8

patients, 25.81%). Among 15 cases of allergic reaction, 5 patients (16.3%) had anaphylaxis. All the 5 developed hypotension, while 3 (9.68%) of 5 developed bronchospasms as well as angioedema. Among them one patient had severe anaphylactic reaction. Three patients who developed hypotension (defined by systolic blood pressure <80 mmHg) and cyanosis due to bronchospasm were treated with high flow oxygen, rapid infusion of normal saline, and intra-muscular low dose adrenaline. In the end, two patients recovered, and one patient died (Table 6).

Table 3. Symptoms of neurotoxic snake bite (n=35)

Symptoms	Frequency	Percent
Difficulty in swallowing	4	11.4%
Difficulty in speech	10	28.6%
Double vision	2	5.7%
Difficulty in breathing	13	37.1%

Table 4. Signs of Neurotoxic snake bite (n=35)

Sign	Frequency	Percentage
Ptosis	35	100%
External opthalmoplegia	5	14.3%
Broken neck sign	20	57.1%
Drooling of saliva	2	5.7%
Local swelling (mild / moderate / extensive)	12	34.3%
Bleeding problem (subcutaneous, bite site)	3	8.6%
Local necrosis / blisters	5	14.3%

DISCUSSION

A clinical syndrome including symptoms and signs including neurological manifestation was observed in 35 neurotoxic snake bite cases in DMCH. Patients bitten by snakes with neurotoxic envenomation usually presents with clinical features of neurotoxicity which consists ptosis, external ophthalmoplegia, diplopia, dysphagia,

dysphonia, facial palsy, broken neck sign, weak grip and diminished reflexes and paralysis of respiratory muscles as well as features local features of envenomation (3).

In this study, the first sign of neurotoxicity was ptosis (incomplete or complete) (100% of cases). Also, 14.3% patients presented with external ophthalmoplegia and 5.7% patients presented with double vision along with ptosis. This showed that the paralysis always appears first in the muscles supplied by the cranial nerves, usually in the muscles which elevate the upper eye lids and maintains eye movement. This observation is consistent with the study in Bangladesh by Amin, 2009 has found that ptosis was predominantly presented in 100% of cases (1). The results are also comparable to those of Campbell, 1991 and Mitrakul, 1984 Thailand and Papua, respectively who identified that ptosis was present in most of their cases (13,14).

'Broken neck' sign was the second most common finding in this study (57.1%). This was associated with inability to

Table 5. Details of dead snake bite cases (n=8)

	Age	Sex	Snake	Time from bite to admission (hours)	Taken to 'Ozha' before coming to hospital	Time from admission to death (mins/hrs)	Assisted Ventilation	Cause of death
1	40	Male	Couldn't be identified	5	Yes	10min	Couldn't be given	Respiratory failure
2	18	Male	Couldn't be identified	8	Yes	15 min	Couldn't be given	Respiratory failure
3	30	Male	Couldn't be identified	7	Yes	10 min	Couldn't be given	Respiratory failure
4	50	Female	Couldn't be identified	6	Yes	2 hour	Yes	Respiratory failure
5	42	Male	Cobra	3	Yes	10 min	Couldn't be given	Respiratory failure
6	14	Female	Krait	3	No	1 hour	Yes	Respiratory failure
7	40	Male	Couldn't be identified	5	Yes	4hr	Yes	Anaphylactic shock
8	60	Male	Couldn't be identified	7	Yes	8hr	Couldn't be given	Respiratory failure

Table 6. Adverse reaction following anti-venom therapy (n=31)

Adverse reactions	Frequency	Percentage
Pyrexia	23	74.19
Itching/ urticaria	15	48.39
Nausea and/or vomiting	10	32.26
Hypotension	5	16.13
Palpitation	17	54.83
Headache	8	25.81
Bronchospasm	3	9.68
Angioedema	3	9.68

Photo 1. A dead specimen of common krait (B. ceruleus)

flex neck. This amount was lower than that (80%) reported by Amin et al (1).

The next common sign observed was difficulty in breathing presented by 13 patients (37.1%), among them 4 patients were given high flow oxygen by musk, and the other 9 patients developed severe respiratory failure. Out of 9 patients, 5 patients were intubated and 4 patients came with gasping respiration and died before endotracheal intubation and anti-venom could be given. Such patients died due to respiratory difficulty, the lack of skill and knowledge of the trainees regarding the management of patients with snake bite, lack of transportation to critical care center within short time, and lack of available bed facilities in ICU.

Out of the patients who died due to envenoming, seven were brought to hospital after being taken to 'Ozha' (traditional healer) except one. Time from bite to hospital admission ranged from 3 hours to 8 hours. Studies involving cobra and kraits have shown that neuromuscular paralysis starts to develop within 2 to 5 hours (15, 16). Besides, 'ozhas' apply potentially harmful approaches such as making multiple incisions around the bite site, incorrect application of techniques in tourniquets (e.g. wrong pressure), and sucking blood orally from the multiple cuts which was practiced in an alarmingly high proportion of the cases (17,18). In one study, Faiz et al. analyzed 70 cases of Moncled Cobra bites, where 37 patients were taken to traditional healer who incised at the site of the bite and had given them herbal infusion of unknown composition in case the bitten limb was immobilized, and a pressure bandage was applied (15). These harmful and ineffective approaches lead to rapid spread of the venom throughout the body and rapid development of toxicity. All these factors alongside the variable grade of toxicity may have contributed to a high fatality rate (22.9%) in the present study.

Other common symptoms (and signs) observed in this series was difficulty in speech by 10 patients (28.6%) and dysphagia by 4 patients (11.4%). Muscles of tongue, palate, pharynx, and jaw rather than limbs or chest muscles are involved relatively early, and this was also approved in this study (19). Drooling of saliva was also observed infrequently in this series. This study found that several muscle groups are frequently involved together contrary to the traditional belief of sequential muscle paralysis (14) in neurotoxic snake bites. Similar findings on neurologic manifestation were reported by the clinico-epidemiological study done by Faiz et al. in 2017 in Chittagong Division (15) and another analogous study carried out on neurotoxic manifestation by Amin et al. in CMCH (1).

All the patients except four (n=31) were treated with the recommended dose of polyvalent anti-snake venom according to WHO/SEARO guidelines for the clinical management of snakebites. Four patients died due to severe respiratory failure before anti-venom could be given. Out of 31 patients to whom anti-venom was given, 23 patients (74.19%) developed pyrogenic reaction including 15 patients (48.39%) who developed allergic reaction. The most common manifestation of anaphylactic reaction was itching/urticarial reaction (15 patients, 48.39%). This was followed in second and third by nausea and/or vomiting (32.26%) and headache (25.81%). Five patients (16.13%) developed hypotension, while 3 patients (9.68%) developed bronchospasm as well as angioedema. The findings are in tune with those of Amin et al. who explored the use and adverse reactions to anti-snake venom in a clinic in Bangladesh (2).

In the current study, one patient (2.85%) died due to severe angio-edema and bronchospasm. In this case treatment was started with 10 vial of anti-snake venom and the patient started to develop anaphylactic reaction as evidenced by increased temperature, hypotension, bronchospasm, cyanosis, and impaired consciousness. He was immediately given intravenous adrenaline, additional dosage of hydrocortisone and chlorpheniramine along with O_2 inhalation. But, the patient did not survive. A prospective study of hospital practice in the Gampaha district, Sri Lanka, documented only 0.43% mortality when at least ten vials (100 mL) of anti-venom were initially given to the victims (19). Therefore, the death from anaphylaxis to anti-snake venom that was found in the present study is unusual. A study by Alirol et al. (20) has shown that severe anaphylaxis to anti-snake venom may develop in up to 40% of the cases and it may occur even if the victim has no previous exposure to equine protein (20). But, these reactions usually resolve with appropriate management which was applied in this case. A study in Malaysia revealed in patients receiving Snake

anti-venom (SAV), six out of 9 cases required two to four vials of SAV. All the patients receiving SAV did not encounter any adverse effects except a child who had pyrogenic reaction (21). A hypothesis could be that the patient developed symptoms of envenoming as well as adverse reaction to anti-venom at the same time leading to severe irrecoverable respiratory failure. Another possibility is that anti-venom itself could be leading to sever hypotension and angioedema due to lack of quality product. The Batch of different anti-venom that has been used in this series has variable manufacturer by haffkin (India), Vins (India), Incepta (Bangladesh). Whether the manufacturing quality of anti-venom is responsible or not is big question here.

In this study, most of the victims were between 21-30 years of age. This indicates that, active parts of the society are bitten by the snakes. In a comparable study by Amin et al (1) similar findings were observed.

Males are higher in number (57%) as they are in special risk because of out-side activity. Especially affected working group was mostly farmers (34.3%) who work in the field. Housewives (28.6%) were also affected by snake bite in this study due to the indoor activities which are mostly seen in rural areas which was also observed in a national community based epidemiological survey (9). On the other hand, male preponderance in the incidence of snake bite was noted in the South Asian region (22). Here, the indoors included both inside and surrounding areas of house. Thus, this is an occupational hazard of young and active males especially those who are engaged in cultivation. Most of the victims were from the poor socioeconomic conditions (48%) living in rural areas. Studies conducted in neighboring countries in India, Nepal, Sri Lanka, and Pakistan suggested similar results (23, 24). These findings are also observed and described in national guideline of snake bite in Bangladesh (25).

Most of the victims (71.4%) received snake bites in lower extremities. Similar results were found in some other studies in neighboring countries including India, Nepal, and Pakistan. In India (26) a study reported 53% bites in lower extremities while in Nepal (24) 65% and in Thar Desert of Pakistan (17) it was 85%. The main reason may be that people when working on the field barefooted can tumble upon the unnoticed snake and threaten it unwillingly.

The identification of an offending snake is not easy, because the incident is very sudden and mostly accidental and, in most cases, happens in dark bushy areas or at night. Despite above facts, in this study offending snake was identified in the hospital in 11 cases, among them 7 were cobra and 4 were krait. The attendance of two of the patients brought live specimen and the rest brought killed specimen. Help were taken from Expert Zoologist when there was doubt identifying the specimen. Out of the rest (n=24), 10 specimens were identified by the patients after recovery. They identified the snake when relevant photos of snakes were shown to them.

Rest of the neurotoxic snakes (n=14) were identified by the clinical syndromic approach. If the patient had swelling with signs and symptoms of neurotoxicity and without any sign of bleeding, then he or she was considered bitten by Cobra. On the other hand, if the patient gave history of bite on land while sleeping with signs and symptoms of neurotoxicity and without signs of local envenoming (i.e., swelling, bleeding) then he or she was thought to be bitten by krait (3). Patients who presented with predominantly bleeding problem and/or renal failure without signs of neurotoxicity were considered as being bitten by viper or sea snakes and therefore, excluded from this study.

In Bangladesh, snakebite treatment is dominated by traditional healers and herbal medicine practitioners. In this study 77% of the patients sought help from traditional healer which echoes the findings of other studies (26). The proportion of people seeking care directly from medical doctor or hospital after the snake bite was higher than the findings of the epidemiologic study by Rahman et al. (9). This difference can be explained by the facts that survey was done by interviewing the victims at their households, while this study included only cases of neurotoxic snake bite where the symptoms usually become obvious within hours and are moderate to severe (15, 25). This may have led the attendants of the victim to seek care directly from the hospital. In snakebite, some clinical manifestations in the first hours of admission and prior to anti-venom administration are associated with weak therapeutic response. Identifying these prognostic factors, can assist health care providers to better estimate (27). Besides, increasing number of snake bite victims seek treatments in different public hospitals of the country through increasing numbers and methods of awareness campaign in the community (10).

LIMITATION

The present research was a single center study. The sample size was small and long term follow up was missing. Most of the snakes were identified by the patients by seeing the pictorial books. There was an absence of facilities considering venom antigen identification from swab of wound site, serum or urine by ELISA technique and PCR amplification, and the sequencing of snake DNA obtained from bite-site swabs was not available.

CONCLUSION

Patients who were active in the field were mostly bitten by neurotoxic snakes. The most common sign was ptosis followed in decreasing order by broken neck sign, breathing difficulty, dysphonia, and dysphagia. The most frequent adverse reactions to anti-venom were pyrexia and anaphylaxis in the form of urticarial. It can be concluded that snake bite is one of the commonest occupational hazards in Bangladesh with younger male victims being at the highest risk rate. Bites mostly occurred from 6 pm to midnight and at lower limb. Many cases were initially visited by traditional healers. In low resource settings, it is important for a clinician to identify the venomous snakebite by subtracting clinical symptoms and signs.

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