

## CLINICO-EPIDEMIOLOGICAL STUDY OF SNAKE BITE IN CHITTAGONG MEDICAL COLLEGE HOSPITAL, CHATTOGRAM

Mohammad Mahmudur Rahman Chowdhury<sup>1\*</sup> Mohammed Maksudul Karim<sup>1</sup> Hiranmoy Dutta<sup>1</sup>  
Shafatujjahan<sup>2</sup> Abu Saleh Mohammed Sirajum Munir<sup>3</sup> Mohammed Jahedul Islam<sup>4</sup>  
Akramul Azam<sup>5</sup> Muhammad Rashedul Islam<sup>6</sup>

### Abstract

**Background:** Snakebite is one of the neglected tropical diseases that World Health Organization aimed to halve the numbers of deaths and cases of serious disability by 2030. This study was carried out to describe the epidemiology, clinical features, complications, and the outcome of snakebites which were seen in a tertiary care hospital of Chattogram, Bangladesh.

**Materials and methods:** This observational study was conducted at Snake Bite Clinic of Chittagong Medical College Hospital, Chattogram from October 2010 to March 2011. Three hundred consecutive admitted patients with a history of snake bite were included in the study. A structured questionnaire was used to collect data. Patients were routinely managed in the ward and were followed daily to observe any complications develop and in hospital outcomes were noted.

**Results:** Three hundred cases (n=300) from both gender were included with male to female ratio was 1.3:1. The included patients were with a Median age of 27 (1-65) years. Cases were mostly from Patiya 22.4%, Raozan 9%, Hathazari 8%, Boalkhali 7.4%, Rangunia 6.6% and 5.2% Chandanaish Upazila. Fang/teeth marks were noted in 90.6% cases and majorities were bitten below knee. About half of the victims received some sorts of management within 2 hours of bite including 16% from traditional healer (Ozahs). Most (72%) bites were non-venomous. Among the venomous bite 24% labeled as suspected viper bites having local envenomation sign and 4% bites presented with neuroparalytic symptoms. The symptoms of envenomation included local signs of inflammation (50%) blisters

and necrosis (7.4%) ptosis and ophthalmoplegia (3%) dysphagia (3.7%) dysphonia (3%) and broken neck sign (3%). Twelve (4%) snake-bite patients received antivenom and two of them developed anaphylaxis. No fatality was observed in the cohort.

**Conclusions:** Most patients admitted in this tertiary care hospital with a history of snake bite had no feature of envenomation and had favorable outcome. The ready availability and appropriate use of antivenom, close monitoring of patients and early referral to a larger hospital all help to reduce the mortality. As majority patients were admitted with no features of envenomation District or Upazila level hospitals could arrange for management of those patient and only patients who needed multidisciplinary care could be referred. Henceforth primary and secondary care level hospitals could be engaged in snake bite management.

**Key words :** Snakebite, Tertiary care hospital, Chattogram.

### Introduction

Venomous snake bites can cause acute medical emergencies involving shock, paralysis, hemorrhage, acute kidney injury and severe local tissue destruction that can prove fatal or lead to permanent disability if left untreated.<sup>1,2</sup> Most deaths and serious consequences from snakebite envenomation are avoidable by timely access to safe and effective antivenoms<sup>2</sup>. However, snake bite has been recognized by the World Health Organization as a neglected tropical disease since June 9<sup>th</sup> 2017.<sup>3</sup> Worldwide most snake envenoming and fatalities occur in South Asia, Southeast Asia, and Sub-Saharan Africa.<sup>4,5,6</sup> Incidence of snakebites in Bangladesh is very high like other tropical countries of Southeast Asia.<sup>7</sup> According to a nationwide community-based epidemiological study of snakebite and its socioeconomic consequences in Bangladesh the incidence density of snakebite in rural Bangladesh is 623.4 per 100,000 person years with an estimated 6,041 death annually.<sup>8</sup> Snakebite has a significant impact on human health and economy through treatment related expenditure and loss of productivity.<sup>9</sup> The World Health Organization is now giving snake bite high priority for large scale action and research.<sup>3</sup>

1. Assistant Professor of Medicine  
Chittagong Medical College, Chattogram.
2. Associate Professor of Medical Oncology & Radiotherapy  
Chattogram Maa-O-Shishu Hospital Medical College, Chattogram.
3. Assistant Professor of Medicine  
Chandpur Medical College, Chandpur.
4. Assistant Professor of Medicine  
Cox's Bazar Medical College, Cox's Bazar.
5. Assistant Professor of Neurology  
Chittagong Medical College, Chattogram.
6. Deputy Program Manager (ME & HMD)  
Directorate General of Medical Education, Mohakhali, Dhaka.

**\*Correspondence:** Dr. Mohammad Mahmudur Rahman Chowdhury  
E-mail: mahmudurarif1976@gmail.com  
Cell : 01716 44 27 34

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A resolution passed in World Health Assembly in May 2018 urged member states to step up efforts to tackle snake bite.<sup>5</sup> Government of the Peoples Republic of Bangladesh has already taken several praiseworthy steps to deal with this important health issues even long before this resolution. The Directorate General of Health Service and Ministry of Health and Family Welfare, Bangladesh have initiated a five year project in 2017 and set up a Venom Research Centre at Chittagong Medical College (CMC) to collect venoms from medically important local snakes with an aim to develop antivenom specific to venoms of local snakes. This project is expected to “revolutionize” the treatment of snake bite and a great leap forward in the field of research in toxicology. Published studies of snakebites in Bangladesh are scarce and mostly conducted long before.<sup>10-15</sup> Haris et al analyzed data of 884 individual cases of snake bite presenting in Chittagong Medical College Hospital between May 1999 and October 2002.<sup>16</sup> In the current study we aimed to report some recent evidence regarding the hospital presentation and outcome of snake bite victims attending in the same hospital and also to compare the findings with the previous reports.

### Materials and methods

This prospective study was conducted in the snake bite clinic, situated at Medicine Unit of Chittagong Medical College Hospital from October 2010 to March 2011. Three hundred patients irrespective of age with the suspicion of snake bite (Clear recall by the victim of seeing snake or brought offending snake or having circumstantial evidence of snake bite) during the period were included in the study. Patient or legal guardian of the patient who refused to provide voluntary consent and those who left the hospital before collecting information against medical advice were not included. After consenting data including basic demographic data, snake bite related information e.g time, place, site of bite, type of activity done at the time of bite and species of snake that caused the bite, clinical features, and first aid given after bite were recorded in a structured questionnaire. The offending snake was identified through patient’s history and description of the snake, showing the picture of different snakes to the victims or through observation of corpse of the snake bring

with the victim. After admission a detailed history was taken and a thorough physical examination was done. Local examination was done with attention to note the fang marks, swelling, tenderness and blisters. Patient with local or systemic features of envenomation, according to the National Guideline of Management of Snake Bite was detected as venomous snake bite case and type of snake was suspected accordingly.<sup>18</sup> Twenty minutes whole blood coagulation test were done in all patients. Other investigations were done according to same guideline. Patients were followed up daily during their hospital stay till discharge/death to observe the complications and outcomes. Statistical analyses were performed with Statistical Package for the Social Sciences version 16.0 for Windows. Categorical variables were summarized as frequencies and percentages. Continuous data were expressed as mean ( $\pm$  standard deviation) or median (Interquartile range). The study protocol was reviewed and approved by the Research and Training Monitoring Department of Bangladesh College of Physicians and Surgeons (Memo No.CPS- 712/2010/ 12/18/2010 (MM/DD/YY) PSN- 1216). Before data collection, informed written consent was taken from the respondents (Patient or their legal guardians). Objectives, procedure, risks, and benefits of participation in the study were included in the informed consent sheet. The participants were ensured that participation was voluntary and refusal might not influence their ongoing treatment in the hospital. Moreover, confidentiality of collected data was maintained using a code for each respondent.

### Results

The average age of victims of snake bites was 27 years (Range 1–65 years) and the male: female incidence ratio was 1.3:1. Regarding patient occupation, 30.3% of bite victims were school/college students, 23.3% were housewives and 18.3% were day laborers / agricultural workers. Overall, 78.9% of bites were on the hands or feet and a further 17.7% were on the arms and legs. Weather condition of the day at the time of bite was mostly dry (83.0%). Open ground and shrub were the common location of bite occurred. Around 53% of the incidences occurred during 9.00-16.00 hours followed by 1.00-8.00 hours (40.0%). Majority (89%)

of the snake bite victims was awake at the time of biting and snake was disturbed in majority of the events. The data are summarized in Table I.

**Table I :** Demographic and epidemiological aspects of the snake bite victims (n=300).

Characteristics	Frequency (Percentage)
Age (Years)	
Mean $\pm$ SD	29.2 $\pm$ 15.0
Median (Range)	27 (1-65)
Sex ratio (Male : Female)	1.3:1
Occupation	
Student	91 (30.3)
Housewife	70 (23.3)
Day laborers/agricultural worker	55 (18.3)
Others	84 (28.0)
Bite site	
Below ankle	159 (53.2)
Below wrist	77 (25.7)
Leg/arm	53 (17.7)
Elsewhere	11 (3.7)
Weather at the time of bite	
Dry weather	249 (83.0)
Raining	51 (17.0)
Locations where bite occurred	
Open ground	79 (26.3)
Shrub	78 (26.0)
Kancha road	63 (21.0)
Premises of house	66 (22.0)
Others	14 (4.7)
Time of bite	
1.00-8.00 hours	120 (40.0)
9.00-16.00 hours	159 (53.0)
17.00-24.00 hours	21 (7.0)
Activity of victim during bite	
Awake	267 (89.0)
Asleep	33 (11.0)

Out of 300 cases only 148 (49.3%) had received pre hospital treatment mostly from UHC (51.4%) and 16% snake bite victims contacted traditional healers initially. Ligature was applied in most of the cases (97%) but immobilization was done in 14% of the cases only. Maltreatment like incision in or around the bite site or application/ingestion of herbal medicine was observed rarely in the study (Table II).

**Table II :** Pattern of preadmission treatments received by snake bite victims (n=300).

Variables	Frequency (Percentage)* /Median (IQR)
Receive pre-hospital treatment	148 (49.3)
Pre-hospital treatment provider (n=148)	
Upazila Health Complex	76 (51.4)
Traditional healer ( Ohzas )	24 (16.0)
Nearby pharmacy	48 (32.4)
Application of ligature (1or more)	291(97.0)
Immobilization done	42 (14.0)
Incision bite site/vicinity	12 (4.0)
Applied/ingested herbal medicine	30 (10.0)
Elapsed time between bite and admission to hospital (Hour)	3 (1-7)

IQR: Interquartile Range.

*Clinical features:* Most of the reported bites in the study were putative bites without any features of systemic envenoming. In only 28% cases it was suspected that bite was by venomous snake. Among the venomous bite 66.7% were Green pit bite and 15.6% were cobra bite. In this cohort of 300 snake bite victims bleeding and pain were the most prominent symptoms and visible fang mark/scratch mark and blister at bite site were the common signs at presentation. It indicated that, most of them were admitted with a suspicion of venomous snake bite. Neuroplalytic signs like ptosis, ophthalmoplagia, dysphonia, broken neck sign, weak neck extensor were observed infrequently (3%) in this study. Whole blood clotting time was evaluated in all of the cases and it was positive in only 12 (4%) cases (Table III).

**Table III:** Symptoms and signs in the snake bite victims at presentation (n=300).

Characteristics	Frequency (Percentage)
Bleeding	150 (50.0)
Pain	178 (59.5)
Swelling	134 (44.6)
Vomiting	23 (7.7)
Weakness	28 (9.4)
Visible fang mark/scratch mark	271 (90.6)
Blister at bite site	22 (7.4)
Signs of cranial nerve palsy*	9 (3.0)
Positive WBCT	12 (4.0)

\*Included ptosis, ophthalmoplagia, dysphonia, weak neck flexor. WBCT: Whole Blood Clotting Time.

Out of 300 cases most of the patients received assurance and supportive symptomatic treatment in the form of analgesic, antibiotic and anti-tetanus injection. Anti snake venom was given in 12 (4%) cases only. Average dose of anti-venom was 10 vials. Two of the 12 patients received antivenom had antivenom reaction and managed accordingly. Most of the cases were hospitalized for 1-3 days and only 3.3% cases needed to stay in the hospital for >4 days. There was no mortality in these 300 cases and all patients were discharged after improvement (Table IV).

**Table IV :** Treatment parameters of the snake bite cases (n=300).

Mode of treatment	Frequency (Percentage)
Anti snake venom	12 (4.0)
Reaction to antivenin (n=12)	2 (16.7)
Duration of hospital stay	
	1 -5 days 290 (96.7)
	>5 days 10 (3.3)
Improved and discharged from hospital	300 (100.0)

### Discussion

This prospective study of snake bites in Bangladesh involved the analysis of data from 300 individual cases of snake bite admitted in a snake bite clinic of a tertiary care hospital of Bangladesh. Only 28% of cases exhibited signs of local and/or systemic envenoming. It indicates that, most of the snake bites were nonvenomous, this is consistent with previous hospital studies conducted in Bangladesh.<sup>13,17</sup> People of younger age group were affected in majority of cases. This is reflected in other studies also.<sup>15-18</sup> It may be due to involvement in more outdoor activities of these groups or which simply reflects the general age structure of the population of Bangladesh.<sup>19</sup> Males are mostly victimized reported by the previous studies.<sup>1,5,9-13</sup> However, in the current study we noticed almost equal male and female representation. This difference may partly be explained as hospitalization rate of females are improving in developing countries. Moreover, women received more bites at home and during night time. In many areas of our country women are also involved in agricultural activities at the field with the males. Bites to the feet and hands were particularly common, reflecting experience elsewhere and consistent with practice in the rural tropics to

work barefooted. High proportion of the bites happened during night times (Around 47%) and majority in dry weather condition. These findings are supported by other similar studies.<sup>4,8, 12-15</sup> In the present study and other studies conducted in different hospitals, it was not possible to identify the snakes.<sup>15,18</sup> This observation was also reported from developed country too.<sup>19</sup> Usually rural people have little knowledge about the type of snakes and victims and the bystanders remain in a panic state at the time of biting events, which might limit their ability to recognize the snake. Due to the practice of rural people ensuring that patients of snake bite receive appropriate first aid is a difficult aspect in the tropics. In this study, ligatures were applied to 97% of patients and bite sites were incised in 4% of patients. However, applied tight ligature were not done in appropriate method and may lead to serious complications to patients although fortunately none in this study population developed so. Incisions can cause severe bleeding and infection. Another bad practice following snake bite was to consult with traditional healer (Ozhas). Overall, 24 (8%) of the snake bite victims reported such practice following snake bite. The incidence of taking useless and harmful treatment from traditional healers are not very much high in this study in comparison to other studies which is a good sign and reflects the awareness of people about it. Like other studies in the current study most of the cases was non venomous and suspicion of bite without any local and/or systemic features of envenoming and likewise majority need supportive and symptomatic treatment only.<sup>15,18</sup> Antivenom was administered in 4% of cases only and anaphylaxis was developed in two of them, both presented with urticarial rash, shortness of breath, palpitation and on examination, features of bronchospasm, tachycardia were found. They were managed by withholding antivenom drips till the patient settle down, intravenous hydrocortisone and chlorpheniramine. Fortunately no patient died throughout the study period due to snake bite. In the contrary previous studies from Bangladesh reported mortality rate ranging from 15% to 22% among hospitalized snake bite victims and in the community.<sup>10,11,18</sup> This low mortality in the present study might be explained by the our study period. The study was conducted in dry season from October to March and incidence of venomous bite was extremely low.

### Limitations

The study has some limitations including small sample size collected conveniently from a single government level tertiary care hospital in a definite period of year. Patients with history of snake bite without having any bite mark and / having any sign, symptoms of toxicities were included in the study.

### Conclusions

In conclusion, admission due to snake bite is common in this hospital but features of extensive local or systemic envenomations are rarely observed. It indicates a rising awareness among the mass people to seek appropriate medical advice following a snake bite. Though incidence of seeking treatment from traditional healers is declining, to adopt proper first aid management including correct application of tourniquet and immobilizing the affected limb are still a problem.

### Recommendations

Awareness program about the appropriate first aid treatment following snake bite should be strengthened in our country. Antivenom should be made available in upazila health complex. Scarcity of supply of antivenom needs to be addressed by local production. Furthermore, future studies should focus on different aspects of venomous snake bite and cases getting antivenom are required so that it will be helpful to enrich treatment guideline to reduce morbidity and mortality of snake bites.

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### Contribution of authors

MMRC: Conception, design, acquisition of data, drafting and final approval.

MMK: Acquisition of data, drafting and final approval.

HD: Interpretation of data, critical revision and final approval.

SJ: Data analysis, drafting and final approval

ASMSM: Acquisition of data, critical revision and final approval.

MJI: Acquisition of data, drafting and final approval.

AA: Data analysis, drafting and final approval.

MRI: Design, critical revision and final approval.

### Disclosure

All the authors declared no competing interest.

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