

Assessment Of The Economic Impact Of Snake Bite In Bangladesh; An Observational Study From A Tertiary Care Hospital In The Covid Era

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Abstract

Introduction: Snakebite is one of the unrecognized calamities posing a huge economic burden on the population of Bangladesh, especially the Rural and suburban groups. So present study is aimed to see the economic impact of snake bites among Bangladeshi victims. Methods: This observational study was done in the Department of Medicine during a period of six months among 100 cases of patients with snake bites in the covid era from 2021 to 2022. Patients were selected as per inclusion criteria and all necessary data were collected as per case record form to observe the economic impact. After collection, data were compiled and analyzed by SPSS-20 Results: Regarding age group of the study patients, 23(23%) were <15 years, 40(40%) were 16-30 years, 20(20%) were 31-45 years, 15(15%) were 46-60 years and 2(2%) were >61 years and sex distribution revealed male was 76(76%) and female was 24(24%). Male to female ratio was 3.01:1.

Occupation of study patients revealed farmer was 14(14%), service holder was 12(12%), students was 35(35%), house wives were 19(19%), businessman was 11(11%), unemployed was 6(6%) and others was 3(3%). Regarding the socioeconomic status of the study patients, 79(79%) were poor, 18(18%) were from middle-class groups and the rest 3(3%) were from higher-class groups. Regarding type of bite 25(25%) were venomous and 75(75%) were nonvenomous bites. Among all 12(12%) cases took treatment from a local healer and 24(24%) cases took treatment from a local hospital. Regarding types of venomous snake bite, 52 per cent was the green pit, 36 per cent was the cobra and 12 per cent was krait. Regarding mode of bites, 54(54%) were provoked and 46(46%) were unprovoked bites. Antivenom was used in 12(12%) cases and one case needed mechanical ventilation. Cost analysis revealed total mean outside cost was 263 BDT/patient, the private cost was 3645 BDT/patient, the government cost was 752BDT/patient, the service charge was 149BDT/patient, travel costs for the patient and other than patients were 777bdt/patient and 745BDT/patient respectively. Mean monetary loss for patients and other than patients were 1101BDT and 1005BDT respectively. Daily mean expenditure for patients and other than patients was 716BDT and 593BDT respectively. The total cost in the hospital was 2428 BDT/patient. The total monetary loss was 2240 BDT/patient. In Nonvenomous snake bite total mean outside cost was 247BDT/patient, the total monetary loss was 689BDT/patient and daily expenditure was 441BDT/patient in the case of venomous snake bite it was 156BDT/patient, 2164 BDT/patient and 2375BDT/patient respectively. 72 per cent of patients expend money from business and service income, 21 per cent got loans from others, 18 per cent expend from deposited money, 4 per cent from sold live stalk, and 2 per cent from mortgage and sold properties.

Conclusion: Snake bite in Bangladesh causes significant monetary loss. It causes substantial monetary loss and resources as most of the victims are young and active population. Venomous snake bite causes more monetary loss than non-venomous snake bite. Appropriate measures should be taken to lower the incidence of snake bites and treatment in vulnerable areas and arrange special scientific training for traditional healers to prevention of undue morbidity and mortality due to treatment-related complications.

Categories: Allergy/Immunology, Infectious Disease, Epidemiology/Public Health

Keywords: financial impact, burden of illness, anti-snake venom, low socio-economic level, snakebite

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I. Introduction

Bangladesh is a land of 1,47,570 Km (55,813 Sqm), mostly flat & alluvial plane with hills in the northeast and southeast (The Economist, 2011). The climate is mostly semi-tropical and monsoon. It is a country of 156 million people with annual population growth is 1.29% (The World Bank, Bangladesh economics of adaptation to climate change study). The economy has grown 5-6% per year since 1996. (The World Fact Book, 2011). GDP per head is only 720 US dollars (The Economist, 2011). Although more than half of the GDP is generated through the service sectors, 45% of Bangladeshis are employed in the agricultural sector (World Fact Book, 2011). It is estimated that 36.3% (2008 estimate) of the population live below the poverty

line which is at the 30th position in the world (World Fact Book, 2011). Household income or consumption by percentage share is 8.8% (Lowest 10%) and is ranked 1st in the world (World Fact Book, 2011).

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Natural calamities, such as floods, tropical cyclones, tornadoes and tidal bores affect the country almost every year, taking a heavy toll on nature as well as individual economic situations. Snakebite is an unexpected natural event which imposes a huge economic impact on the poor people of Bangladesh.

Nationwide, the estimated incidence density of snake bites is 623.4/1 Lac person-years (Rahman R et al, 2010). About 80 species of snakes are found in Bangladesh; among them, 27 species are poisonous including 12 species of sea snakes. Bites by different non-venomous species, green pit vipers (*Cryptelytropes erythrurus* and other species), Cobras (*Naja* species) and Kraits (*Bungarus*) are the most commonly identified ones in Bangladesh. Neurotoxic envenoming by kraits and cobras is the principle cause of snake bite mortality in Bangladesh (Global snake bite initiative, 2011). Most incidences occur from May to October in the rainy season when snakes are flushed out of their natural environment. Among the snake bite cases, younger age groups are affected in the majority of cases, and males (79%) are mostly victimized (Warrell DA, 1999).

Snakebite is an occupational hazard for farmers and fishermen. Each snake bite whether venomous or not creates a terrifying situation. The victim rushes to seek treatment and often becomes ill enough to abstain from work for the next few days. If he/she has to be admitted to the hospital one or more accompanying person also loses their daily wedges. It is, therefore, a medical problem that has important implications for the nutrition and economy of the individual, family and therefore countries where it occurs commonly (Huq F et al, 1995). The amount of wealth loss due to mortality and morbidity from snake bites can hamper the household economy as most of the victims are young. It also poses substantial economic burdens on the snake bite victims due to treatment-related expenditure and loss of productivity. Costs related to snake bite include direct costs (service provider fees, drugs, diagnostic costs and others), indirect costs (Transport, attendance cost, food cost etc) and opportunity costs (wages lost). Even a snake bite which is non-venomous can create huge monetary loss as well as loss of working hours.

II. Materials And Methods

Study Design: It was a prospective observational study. Study place: Departments of Medicine Chittagong Medical College Hospital (CMCH), Chittagong. Study period: 1 Year (January 2021 to December 2022).

Sample size: A total of 100 consecutive cases of snake bites were taken as study sample Sampling technique: Purposive/ Judgment sampling. Study population: The patients diagnosed as cases of snake bite and admitted in Snake bite Study Clinic in Chittagong Medical College Hospital. Selection criteria: Inclusion criteria : (1) Diagnosis of snake bite - Criteria in Annex. (2) Written informed consent to participate in the study. Exclusion criteria : Those who did not give consent or not willing to participate this study. Study procedure: Data was collected by interview using a structured questionnaire containing all the variables of interest. The questionnaire was finalized following field testing (appendix-1) Data Processing Analysis and Interpretation: Data was processed and analyzed using computer software SPSS (Statistical package for social science). The test statistics to be used for analysis of data are student's t-test (for comparison of data presented in quantitative scale). Chi-square test a fisher's Exact Probability Test (for comparison of data presented in categorical scale). The relationship between two continuous variables were determined by correlation test. For any analytical test, the level of significance is 0.05 and P-Value <0.05 was considered significant.

III. Results

Frequency		Percent
Nonvenomous	75	75.0
Venomous	25	25.0
Total	100	100.0

Frequency		Percent	
Local swelling	2	2.0	
Local swelling and bleeding	6	6	
Local swelling and abdominal pain	1	1	
Local swelling and drowsiness	6	6	
Local pain	44	44	
Drowsiness and ptosis(bilateral)	4	4	
Drowsiness and local swelling and pain	2	2	
Local swelling and oozing	5	5	
Local discomfort	18	18	
Abdominal pain and respiratory distress	2	2	
Unconsciousness and severe respiratory distress	1	1	
Total	100	100.0	

Frequency		Percent	
Treatment with local healer	12	12.0	
Treatment with the local hospital	24	24.0	
Direct admissions to CMCH	64	64.0	

Frequency		Percent	
Cobra	9	9.0	
Krait	3	3.0	
Green pit	13	13.0	
Total	25	25.0	
Nonvenomous	75	75.0	
Total	100	100.0	

Frequency		Percent	
<1 day	44	44.0	
2-3 days	48	48.0	
4-5 days	4	4.0	
>6 days	4	4.0	
Total	100	100.0	

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Total outside cost	43	760	40	800	263.26	140.572
Private cost	99	33830	170	34000	1504.82	3645.948
Government cost	96	23940	60	24000	752.40	2557.524
Fee/Service charge	99	380	20	400	149.88	74.850
Travel cost(patient)	100	6460	40	6500	777.20	1193.422
Travel cost(Other than patient)	97	4170	30	4200	745.77	629.014

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Monitory loss(Patient)	31	6900	100	7000	1101.61	1320.384
Monitory loss(Other than patient)	66	10300	200	10500	1005.30	1415.794
Daily expenditure(Patient)	66	6920	80	7000	716.05	1170.560
Daily expenditure(Other than patient)	85	4150	50	4200	593.88	753.389
Total cost in hospital	95	57925	475	58400	2428.38	6215.732
Total travel cost	96	9420	80	9500	1469.11	1534.440
Total monitory loss	22	10650	550	11200	2240.91	2348.182

Type of bite		Total outside cost	Monitory loss(Patient)	Daily expenditure (Patient)
	Mean	247.84	689.13	441.98
Nonvenomous	N	37	23	55
	Std. Deviation	133.835	443.631	381.677
Venomous	Mean	358.33	2287.50	2086.36
	N	6	7	13
	Std. Deviation	156.258	2164.940	2375.089
	Mean	263.26	1101.61	716.05
Total	N	43	31	66
	Std. Deviation	140.572	1320.384	1170.560

Source of loss	Number of patient	Percent of patients
1. Business/salary	74	74 per cent
2. Loan	21	21 per cent
3.Mortgage/ sold land	2	2 per cent
4. Sold ornaments	0	0 per cent
5.Sold live stalks	4	4 per cent
6. Deposited money	18	18 per cent

IV. Discussion

We have evaluated the economic impact along with epidemiological and clinical aspect of snake bite in admitted patients in a tertiary care hospital of Bangladesh. In the study total of 100 patients were included in our study Regarding age group of the study patients 23(23%) were <15 years, 40(40%) were 16-30 years, 20(20%) were 31-45 years, 15(15%) were 46-60 years and 2(2%) were >61 years. So almost 60(60%) population are affected who are the main bulk of income generating population in society.

In this study, the majority of the snake bite victims are of a younger age and this reflects that an active population is at higher risk of snake bites. Similar observations were reported from Nepal, Malaysia and a previous study in Bangladesh.^{12,13} This information has important public health implications that despite of the comparatively low incidence, the youngest age group should be given priority in directing any intervention for snake bite. According to Faiz MA¹⁴ snake bite is a result of an unfortunate accidental interaction between a snake and a human victim. Most often the victim is an active poor young people who get the bite during day to day occupational activity like cultivation, fishing, plantation, wood collection, watching the 'crop' or 'garden' lying in floor or even during rural foot walk. Sometimes it happens in home surrounding like while on chicken or pet bird care.

Regarding sex distribution male was 76(76%) and female was 24(24%). Male to female ratio was 3.01:1. So in the present study male were found more affected than female but in the study of Rahaman et al¹³ and Faiz at al¹² found a similar ratio of male and female snake bite victims. Male preponderance was observed from a few studies, largely due to bites in paddy fields although male to female ratio varied in these studies. Our study finding on the male female ratio is as like the other studies. Males may have higher hospitalization rates than females in developing countries. Moreover, women receive more bites at home and during night time. This may be due to the presence of krait at the home premises. Krait is usually nocturnal. It lives close to the human dwellings and hides in holes, woods or homestead gardens. At night, especially at the height of the monsoon

season, kraits enter into human dwellings, presumably in hunt of their natural prey that includes small snakes, amphibians, rodents, and geckos, which are abundant in rural homes.¹³ In many areas of Bangladesh, women are also involved in agricultural activities at the field with the males.

Distribution of occupation of study patients where farmer was 14(14%), service holder was 12(12%), students was 35(35%), house wives were 19(19%), businessman was 11(11%), unemployed was 6(6%) and others was 3(3%). Surprisingly 35(35%) victims were students which could be explained by their active participation in farming and household activities. Socioeconomic status of the study patients revealed 79(79%) were poor, 18(18%) were from middle class group and rest 3(3%) were higher class group. These are the common scenario of Bangladesh as expected.

Regarding type of bite 25(25%) were venomous and 75(75%) were nonvenomous bite. Among the venomous snake bite 9(9%) were Cobra, 13(13%) were Green pit, 3(3%) was krait among all bites. Most of the bites in Bangladesh are nonvenomous but among the venomous bites green pits are locally venomous and Cobras are common sources of daytime bites in Bangladesh. Similar findings were reported from Nepal, Bangladesh, Malaysia and Hong Kong.^{12,13,14} Use of antivenom were in 12(12%) cases and one case needed mechanical ventilations. All those cases were venomous snake bite.

Among all 12(12%) cases took treatment from local healer and 24(24%) cases took treatment from local hospital. It is worth mentioning that fewer victims seek help from local healer and this could be explained by increase social awareness among common people. Majority of victims accessed directly to Chittagong Medical College Hospital because of change in treatment seeking behavior and better prognosis in hospital management. Regarding mode of bites where 54(54%) were provoked and 46(46%) were unprovoked bite. Our study observed that snake charmers practice many unhygienic measures such as multiple incisions, tight tourniquet around the bite mark, sucking of blood from the bite wound to manage the snake bite. Therefore, these snake charmers should be trained on as a priority, so that they can stop their risky practices, perhaps be trained to apply tourniquets correctly and immediately refer the patients to the nearest health facilities. Snake antivenin should be made available in the public hospitals free of cost, particularly in the remote rural areas.

In our study showing total mean outside cost was 263 BDT/patient, private cost was 3645 BDT/patient government cost was 752BDT/patient, service charge was 149BDT/patient travel cost for patient and other than patients were 777bdt/patient and 745BDT/patient respectively. Mean monetary loss for patient and other than patient were 1101BDT/patient and 1005BDT/patient respectively. Daily mean expenditure for patient and other than patient was 716BDT/patient and 593BDT/patient respectively. Total cost in hospital was 2428BDT/patient. Total monetary loss was 2240BDT/patient. In nonvenomous snake bite total

mean outside cost was 247BDT/patient, total monetary loss was 689BDT/patient and daily expenditure was 441BDT/patient in case of venomous snake bite is was 156BDT/patient, 2164 BDT/patient and 2375BDT/patient respectively. This are the common monetary expenditure among the snake bite patients in our country. Among them 74 percent patients expend money from business and salary, 21 percent got loan from others, 2 percent mortgage/sold their land, 4 percent sold their live stalk, and 18 percent expend from deposited money. These expenditure scenario indicates how snake bite poses damage to household economy of poor income group people in Bangladesh.

V. Conclusions

Snake bite in Bangladesh causes significant monetary loss. It causes loss of personal aspect as well as government sector. Venomous snake bite causes more monetary loss than the nonvenomous bite. Undue morbidity and mortality followed by economic loss happen due to treatment related complications by untrained ozhass and other healers.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

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