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Original Article

Epidemiological Profile of Snake Bite in South 24 Parganas District of West Bengal with Focus on Underreporting of Snake Bite Deaths

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Abstract

Background: Snake bite is a neglected public health problem in India. Very few community based epidemiological studies in India have been published so far on this issue. Most of the studies were carried out on hospital data. Previous community-based survey in the state revealed that only 22% snake bite victims attended hospitals. **Objectives:** The objective of the present study is to find out the epidemiological profile of snake bite in eight blocks of the South 24-Paraganas district of West Bengal and to explore the under reporting of snake bite deaths in health facilities in that area during the study period. **Materials and Methods:** A retrospective analysis of snake bite data was carried out from a community-based epidemiological survey on 1.9 million populations. This survey was done door-to-door from January 2009 to October 2010 to get epidemiological profile of snake bite of the previous 2 years. The data of direct survey was compared with the official report of the same area to evaluate the hospital-based data with focus on underreporting of snakebite deaths. **Results:** A total number of snake bite cases as found in the survey in the study area was 4871. There was a huge gap between the two data (direct survey and official data). Only 7.23% snake bite deaths were officially reported. Only 22.19% of the snake bite victims attended the hospitals. Nearly 65.7% of the snake bite deaths were due to common krait bite, most of them occurring in the months of June to September. **Conclusions:** Official reporting system is still having a huge deficiency in India. Snake bite needs to get more attention from the health authority.

Keywords: Community survey, Official reporting, Snake bite

Introduction

Snake bite was included in the list of neglected tropical diseases by World Health Organization in the year 2009.[1,2] Snake bite is a public health problem distributed mainly in the tropical and sub-tropical countries. India is one of the high prevalence countries.[3] Though no clear cut data is available due to poor reporting system and poor maintenance of hospital data in India, 35,000-50,000 people die every year in this country due to snake bite.[4] Government of India official data showed only 1331 snake bite deaths in the year 2007.[5]

Very few epidemiological surveys had been done on the snake bite problem in India. To know the problem and to get some way out to tackle the problem, knowledge regarding epidemiological profile of snake bite is essential.[6,7] West Bengal is one of the high snake bite prevalence states of India besides Andhra Pradesh, Kerala, Tamil Nadu and Maharashtra.[7-9] In literature review, it was revealed that so far very few community-based surveys on snake bite was done in India.[7] Most of the epidemiological surveys on snake bite in India were done on hospital records.

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Furthermore, not much community-based surveys on snakebite have been done in the state of West Bengal.[7] Thus in this study, we made an attempt to collect the community-based data and also to evaluate the hospital data based reporting system particularly to point out the deficits of the hospital records.

The present study was planned with the following objectives: to find out the epidemiological profile of snake bite in eight blocks of the South 24-Paraganas district of West Bengal and to explore the under reporting of snake bite deaths in health facilities in that area during the study period.

Materials and Methods

This study is a community-based descriptive study with cross sectional design done in the period of January 2009 to October 2010. The study was planned in the South 24-Parganas district as it was the district where number of snakebite cases was quite high as reported for the previous 3 years among all the districts of West Bengal.[8] Furthermore, funding was available for survey on snakebite in this district. There were 29 blocks in the South 24-Parganas district of West Bengal. Eight blocks (25% of 29 blocks) were selected by simple random sampling for the study.

To assess the snake bite problem of the district National Rural Health Mission funded this study. "Canning Juktibadi Sanaskritik Sanastha (CJSS)" is a non-governmental voluntary organization working for public awareness on snake bite since 1986. Training of CJSS volunteers on verbal autopsy was done by the experts (Faculties of Department of Community Medicine, Calcutta National Medical College, Kolkata) based on the standard training procedure of verbal autopsy as laid down by Maternal Death Division, Ministry of Health and Family Welfare, Government of India. Trained voluntary workers of CJSS started door-to-door visit with a set of specific questions. These workers of CJSS were specially trained to extract the history of mysterious common krait (CK) (*Bungarus caeruleus*) snake bite. They were directed to collect data of previous 2 years from the date of visit to the particular block. They collected data on various issues, e.g., the demographic factors regarding the victims, history of snakebite in previous 2 years, time of bite, healthcare seeking behavior after the bite, treatment history, outcome of the bite, any reporting of death. Totally 57 workers had done the survey in 1130 g sansads with a predesigned pretested proforma. Total number of houses visited by the workers in selected eight blocks were 381,853.

Data from the office of the Deputy Chief Medical Officer (MO) of Health II of the South 24-Paraganas district for the years 2008, 2009 and 2010 was collected. These data were the original broad sheet of the district containing several fields sent to the state authority. For this study, data on some specific points were noted and analyzed. These data were as follows:

1. Total population of the district and of the eight blocks concerned.
2. Name of the government health facilities (BPHC or Rural Hospitals) in the blocks.
3. Number of snake bite cases who had attended the government hospitals in the blocks under study.
4. Number of snake bite deaths reported from the study area.

Data from the direct survey and official reporting were compiled and analyzed by SPSS 18.0 version. These data were annualized (by simple averaging). Dividing the number of snakebite cases of the block by the block population we calculated the number of snakebite cases per thousand per year for the block. Similarly, the case fatality of snakebite and the case fatality rate of the hospitalized snakebite cases were also calculated. Then the case fatality rates as found from the hospital records and that found from the survey were compared.

Results

This study was carried out on a total population of 1,952,546 in eight blocks. Total population of the district was 6,752,294; so, 28.91% of the population of the district was covered.

From the survey, it was found that the total number of snake bite cases was 4871 and snake bite deaths were 184 in 2 years. Out of the total snake bite cases 3056 persons were male (62.73%) and 1815 (37.26%) were female. Out of 184 snake bite deaths 105 (57%) were male and 79 (42.9%) were female. 135 (73.36%) deaths occurred in the months of June to September, the rainy season in this part of India. 88 deaths (47.8%) were of the age group below 20 years of age. Deaths in above 60 years age group were only 6 (3.26%).

121 (65.76%) deaths were due to CK (*B. caeruleus)* bite. All these CK bites had the same common history of bite

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in the open floor bed. 62 (33.69%) deaths were due to Cobra (*Naja kaouthia*) bite. Only one case of death was due to sea snake bite. No history of death due to Russell's viper bite was found [Table 1].

Only 22.19% of snake bite patients attended the local government hospitals. Out of the rest 77.8%, a small percentage tried to go to the sub-divisional hospitals, but majority depended on the local traditional faith healers.

Table 2 shows the distribution of the total 184 snake bite death victims in the study period according to place of death. It was seen that only 26 (14%) out of 184 died in the government hospitals, 114 (62%) persons died due to interventions by the traditional faith healers. 23 (13%) died at home without any intervention. Nearly 4% of the deaths occurred due at venom stone which is a superstition followed in some parts of South 24-Parganas where a piece of stone is cut and bound to the snake bite site and the patient is made to walk with the belief that the stone would take away the poison.

Block wise distribution of the population is shown in Table 3 which reveals that Basanti block was having the largest population among the selected blocks followed by Patharpratima.

In the direct door-to-door survey the total number of snakebite cases in 2 years in the selected eight blocks came to be 4871. Furthermore from the survey, the overall case fatality rate of snakebite from the selected eight blocks came to be 3.78% [Table 3].

From the 3 year records from the government hospitals in the eight blocks under study the total number of deaths reported in 2008, 2009, 2010 were only 20. Total 1622 patients of snakebite attended the hospitals in these 3 years. Case fatality rate due to snake bite from the hospital records came to be 1.23% [Table 4] which is much less than the case fatality rate found in the survey [Tables 3 and 4].

All the cases of poisonous snakebite are fatal if not treated. In our study the case fatality rate in hospitals are lower than the community. Thus keeping the two case fatality rates together we are getting a clue that hospital cases are better treated. Hence case fatality rate here is indirectly reflecting the efficacy of the hospital treatment.

Discussion

This study categorically proves that snake bite needs to get more attention. If compared with another highly attended public health problem, malaria, we see officially reported numbers of snake bite deaths are much higher than malaria death in West Bengal (340 and 96 in 2007 respectively).[5] This epidemiological survey shows that yet more than 75% of snake bite victims do not go to the government health facilities. They have strong belief on traditional faith healers. Grossly unscientific methods like venom stone application are still prevailing amongst the people of the district. The scenario had not changed in last 20 years; as we see in the previous study by Hati *et al*. also where it was found that only 22.14% victims went to hospitals.[7] Epidemiological studies on hospital data cannot assess the actual problem. A community-based epidemiological study on snake bite by Hati *et al*. was done 20 years back.[7] Research works on snake bite are concentrated mainly on clinical aspect; epidemiological aspect is still neglected.

In this study, we see case fatality rate in the local government health facilities (1.23%) are much lower than overall case fatality (3.78%) rates while Government of India data of 2007 shows case fatality rate as 1.73%. This is probably due to the time factor in treatment of snake bite. Early initiation of treatment by anti-snake venom (ASV) serum is the key of low case fatality rate.[10] Case fatality rate of a tertiary referral hospital of Pondicherry, JIPMER was 13.5%.[11] Hospital records of the Burdwan Medical College (BMC) of West Bengal for the year 2009 shows, out of 1424 venomous snake bite cases treated there, 74 died (case fatality rate 5.19%). This rate is also higher than case fatality rate of the rural hospitals of South 24-Paraganas district. It was found at BMC also patients came from distant areas either directly or referred from local health centers without

Table 1: Species of snake involved to cause snakebite deaths as found in the survey (*n* = 184)

Species	Gosaba (%)	Basanti (%)	Kultali (%)	Jay Nagar-2 (%)	Mathura pur-2 (%)	Patharpratima (%)	Sagar (%)	Nam-khana (%)	Total deaths (%)
Cobra	8 (4.4)	10 (5.4)	14 (7.6)	6 (3.2)	10 (5.4)	7 (3.8)	2 (1)	5 (2.7)	62 (33.7)
Common krait	16 (8.7)	13 (7.1)	24 (13.1)	16 (8.7)	17 (9)	21 (11.4)	8 (4.4)	6 (3.2)	121 (65.7)
Sea snake	0	0	0	0	1 (0.6)	0	0	0	1 (0.6)
Total	24 (13.1)	23 (13)	38 (20.9)	22 (11.9)	28 (14.4)	28 (15.2)	10 (5.4)	11 (5.9)	184

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any ASV treatment. In this study, we have seen much higher percentage of patients died due to CK snake bite (65.76%). As the volunteers of CJSS were well-trained about the mysterious CK bite, they could extract the actual cause of death by verbal autopsy. This mysterious presentation of CK snake is yet unknown too many MOs (personal experience of the first author in several training programs). Almost 100% bite in open floor bed by CK as reported in this study is similar with the observation in Sri Lanka and Nepal.[6,12] There is every possibility of death of a CK bite patient to be undiagnosed. Victims of CK bite hardly give any history of any bite; may present with pain abdomen, convulsion or sore throat only.[6,12]

Table 2: Distribution of snakebite deaths according to the places of death as found in the survey (*n* = 184)

Place of death	Total	Percentage
At government hospital	26	14
At nursing home	4	2
At hospital following Ojha's treatment	57	31
Way to hospital/nursing home	4	2
At home without any intervention	23	13
At home after Ojha's treatment	57	31
At venom stone	7	4
At home in the hands of village quack	5	3
Total	184	100

If the Junior MO posted in a rural hospital is not well-trained in the matter there is every possibility of another diagnosis than snake bite in these cases. In contrast, lack of training and confidence of the MO may lead to over diagnosis.[13] Almost all CK bite cases happened in the open floor beds. This data is similar with data from Sri Lanka and Nepal.[6,12] Use of a bed net while sleeping reduces this accident sharply and this issue should get proper emphasis during any public awareness campaign. Seasonal variation of snake bite deaths corroborates with other previous studies. Snake bite and death rate is always high in the rainy season.[14] This is probably due to flooding of the natural habitats of the snakes and rodents and their increased penetration in the human residences. Bites during agricultural activity which increases in the rainy season is probably another reason for high death rate in June to September Almost no bite and death in the winter months of December and January is most probably due to hibernation of the snakes. Death of 47.8% snake bite patients below the age of 20 years is a new finding in this survey. Other previous reports show maximum number in the age group of 15-45 years.[7] Sharp decline of death number after the age of 60 years is most probably due to less agricultural works by older people. Another cause may be less outdoor movement by the older persons after

Table 3: Block wise distribution of the snakebite cases and snakebite deaths (with individual block population) as found in the survey

Block	Population	Snake bite cases (2 years)*	Number of snake bite cases/1000/year	Snake bite deaths (2 years)*	Survey case fatality rate (%)
Gosaba	241573	885	1.83	24	2.71
Basanti	320868	975	1.52	23	2.36
Jaynagar-2	257271	515	1.01	22	4.27
Kultali	220720	741	1.68	38	5.13
Mathurapur-2	224630	474	1.06	28	5.91
Patharpratima	319221	590	0.92	28	4.75
Sagar	185630	280	0.75	10	3.57
Namkhana	182633	411	1.13	11	2.68
Total	1952546	4871	1.25	184	3.78

In the survey history of snakebite and snakebite deaths for the previous 2 years was taken

Table 4: Comparison of case fatality rates derived from the hospital records and that found in the survey

Block	Reported hospital attendance (3 years)*	Reported hospital deaths (3 years)*	Reported case fatality rate (%)	Survey case fatality rate (%)
Gosaba	39	2	5.13	2.71
Basanti	115	2	1.74	2.36
Jaynagar-2	22	2	9.09	4.27
Kultali	59	2	3.39	5.13
Mathurapur-2	58	4	6.9	5.91
Patharpratima	742	4	0.54	4.75
Sagar	102	2	1.96	3.57
Namkhana	485	2	0.41	2.68
Total	1622	20	1.23	3.78

Hospital records for previous 3 years from the eight government hospitals situated in the eight blocks under study were taken into consideration

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the evening. Though a reported death due to snake bite is higher both in the state level and national level, snake bite is still a neglected public health problem in the district.

Conclusion

Thus based on the above study, it can be stated that snakebite deaths were much more according to the survey than stated in hospital records. Case fatality rate (3.78%) as found in the survey was much higher than the hospital records (1.23%). Bites were mostly in the rainy season (73.36%) and by CK (66%) and only 22.19% of the snake bite cases had attended local PHC and BPHC. From the history of health care seeking of the snakebite deaths it can be said that lot of superstitions were prevalent regarding snakebite management among the rural people under study. In the present study, there is possibility of recall bias which is a limitation of the study. However, snakebite being a significant event in anyone's life chance of recall bias is less than any other day-to-day event.

CK was the most common snake to bite a human in the study which causes painless bite. That a painless bite from a snakebite can be fatal: This message should be given to both doctors and common people. Training of the rural MOs regarding snakebite management is required because snakebite can be managed at Primary Health Centre level only. Adequate preparedness of the rural health centers regarding snakebite management specially during rainy season is very crucial in this regard. Emphasis on early reporting of any snakebite to the local hospitals is recommended.

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