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Epidemiological Study Of Snake-Bite Cases In Tertiary Care Teaching Institute Of Maharashtra, India.

Hemant V Godbole[1], Maroti D Dake[2]*, Sunil B Madewad[3], and Shivaji S Patil[4].

[1]Professor and Head, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.
[2]Associate Professor, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.
[3]Assistant Professor, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.
[4]Police Surgeon, PM centre, Mumbai, Maharashtra, India.

ABSTRACT

Farming being key occupation in Maharashtra and India; exposes most of rural population to various hazards of farm industry out of which snake bite is one of the major health related problems. Present study was aimed to study epidemiology of snake bite patients, to reinforce the need for understanding snake bite as important community health problem. Present study was hospital based, prospective, observational study, conducted in cases of snake bites admitted to this institute and all those cases of death due to snake bites brought for medico legal autopsy at this institute. Out of total 175 cases, male victims were 89 (50.86%) and females were 86 (49.14%). Maximum victims were from age group 21 to 30 years (33.71%) followed by age group 31 to 40 years (20 %). Majority cases were residing in rural area (87.42%) & were involved in domestic and farming related work (81.14%). Majority cases were bitten while they were in farm (70.86%), followed by at home (22.29%) The limbs of the victims were the primary sites attacked by the snakes for biting as majority had bites on lower limbs (64 %). Majority of victims were involved in farm activities (61.71%) & involved in outdoor activities (14.86 %). In the months July, August and September had highest occurrence comprising 134 (76.57%) cases. The maximum cases of snake bite occurred at time interval between 12.01 to 18.00 hours of the day (41.14%) & between 06.01 to 12.00 hours of the day (37.14%). 138 (78.85%) cases survived and in 37 (21.14%) cases the patient succumbed to death due to snake envenomation. Snake bite envenomation is one of the fairly common accidents in India especially in rural population, agriculture profession, working at farm.
Keywords: Snake bite; Snake envenomation; Farmers; Rainy season

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Corresponding author

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INTRODUCTION

Snake bite is a neglected public health issue in many tropical and subtropical countries. About 5.4 million snake bites occur each year, resulting in 1.8 to 2.7 million cases of envenoming [1]. India has long been thought to have more snake bites than any other country. The estimated total of 45,900 national snake bite deaths in 2005 constitutes about 5% of all injury deaths and nearly 0.5% of all deaths in India. Maharashtra is one of the highest prevalence states of snake bite envenomation in India having prevalence of 3.0 to 3.5 per 100000 populations [2]. India had 1.2 million snake bite deaths (average 58,000/year) from 2000 to 2019 [3]. Despite its effects on population, snake bite has not received the attention which it deserves by national and international health authorities and may therefore be appropriately categorized as a neglected tropical disease [4]. Thus, the true global incidence of snake bite envenoming, its impact and characteristics in different regions remain largely unknown [5].

Farming being key occupation in Maharashtra and India; exposes most of rural population to various hazards of farm industry out of which snake bite is one of the major health related problems. Mud houses, huts with a loose stone basement having grooves in wall and the basement give easy shelter for snakes and rats particularly in rural areas of Maharashtra [6]. Present study was aimed to study epidemiology of snake bite patients, to reinforce the need for understanding snake bite as important community health problem.

MATERIAL AND METHODS

Present study was hospital based, prospective, observational study, conducted in department of Forensic Medicine and toxicology at Dr Shankarrao Chavan Government medical college, Vishnupuri, Nanded, India. Study duration was of 18 months (February 2014 to July 2015). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of either gender, cases of snake bites admitted to this institute and all those cases of death due to snake bites brought for medico legal autopsy at this institute during study period.

Exclusion criteria

- Patients with history of bites due to other poisonous creatures like scorpions, bees, etc.
- Patients with history of unknown bites
- Patients referred to higher centre
- Patients absconded during treatment

Study was explained to patients in local language & written consent was taken for participation & study for cases taking treatment. Strict confidentiality was kept for identity & medicolegal data of autopsy cases.

In these cases, epidemiological data regarding age, sex, residence, occupation and detail history of snake bite regarding season of year, place, time, site, outcome and circumstances of snake bite, clinical features & examination findings were noted. In cases taking treatment, time interval between the snake bite and hospitalization, outcome and other parameters were noted in study proforma. In all cases brought for autopsy, detailed history and information was collected from the autopsy reports, inquest reports and post mortem findings were analyzed with the chemical analysis reports from Forensic Science Laboratory for Chemical analysis and report.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study,175 cases studied over study period. Out of total 175 cases, male victims were 89 (50.86%) and females were 86 (49.14%). Maximum victims were from age group 21 to 30 years (33.71%) followed by age group 31 to 40 years (20 %).

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Table 1: Age and Sex Wise Distribution of Cases (n = 175)

Age group in years	Male (%)	Female (%)	Total no. of cases (%)
Less than 20	10 (05.71)	17 (09.71)	27 (15.43)
21 to 30	31 (17.71)	28 (16.00)	59 (33.17)
31 to 40	18 (10.29)	17 (09.71)	35 (20.00)
41 to 50	20 (11.43)	12 (06.86)	32 (18.29)
51 to 60	09 (05.14)	07 (04.00)	16 (09.14)
> 60	01 (00.57)	05 (02.86)	06 (03.43)
Total	89 (50.85)	86 (49.14)	175 (100.00)

Majority cases were residing in rural area (87.42%) & were involved in domestic and farming related work (81.14%). Majority cases were bitten while they were in farm (70.86%), followed by at home (22.29%) The limbs of the victims were the primary sites attacked by the snakes for biting as majority had bites on lower limbs (64 %) followed by bites on upper limb (34.86%) and only 01 (00.57%) case each had the bite on abdomen and face.

Table 2: General characteristics

Characteristics	No. of patients	Percentage
Place of residence		
Rural	153	87.42
Urban	22	12.57
Occupation		
Housewife and farmer	80	45.71
Farmer and labourer	62	35.43
Student	19	10.86
Service	10	5.71
Scrap collector	2	1.14
Shepherd	2	1.14
Place of bite		
Farm	124	70.86
Home	39	22.29
Road	07	04.00
Godown	02	01.14
Shop	01	00.57
Floor mill	01	00.57
School	01	00.57
Site of bite		
Lower limb	112	64.00
Upper limb	61	34.86
Face	01	00.57
Abdomen	01	00.57

In present study, largest groups of victims were involved in farm activities such as collection of fodder or crop during harvesting or removing weeds from the crop, collecting woods, rearing, feeding or tying cattle in cattle shed (61.71%) followed by victims involved in outdoor activities such as walking on road or walking nearby home (14.86 %), involved in indoor work such as bathing, collecting cloths, studying in school, watching television (14.28%) and were sleeping (09.14%).

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Table 3: Distribution of Cases According to Circumstances of Bite (n = 175)

Circumstances	Type of activities	No. of Cases	Percentage
Farming 108 (61.71%)	Collecting fodder, crop or removing weed	75	42.86
	Fertilizing & irrigating crop	14	08.00
	Cattle activities	10	05.71
	Collecting woods	09	05.14
Outdoor work 26 (14.86%)	Walking	21	12.00
	Work nearby home	05	02.86
Indoor work 25 (14.28%)	Work in home	16	09.14
	Sitting idle at home	05	02.86
	Bathing	01	00.57
	Studying in school	01	00.57
	Collecting cloths	02	01.14
Sleeping 16 (09.14%)	Sleeping at home and farm	16	09.14

In present study, majority cases occurred during rainy season (80.57%), followed by winter (11.43%) & least (8 %) cases occurred in summer season. In the months July, August and September had highest occurrence comprising 134 (76.57%) cases.

Table 4: Month and Season wise Distribution of Cases (n = 175)

Season of year	Month	Number of Cases	Percentage
Summer	Feb	00	00.00
	Mar	03	01.71
	Apr	04	02.29
	May	07	04.00
Rainy	June	07	04.00
	July	24	13.71
	Aug	55	31.43
	Sep	55	31.43
Winter	Oct	11	06.29
	Nov	06	03.43
	Dec	02	01.14
	Jan	01	00.57

The maximum cases of snake bite occurred at time interval between 12.01 to 18.00 hours of the day (41.14%) followed by between 06.01 to 12.00 hours of the day (37.14%), between 18.01 to 24.00 hours of the day (12.57%) & between 00.01 to 06.00 hours of the day (09.14%).

Table 5: Distribution of Cases According to Time of Bite (n = 175)

Time interval	Number of Cases	Percentage
00.01 to 06.00 Hours	16	09.14
06.01 to 12.00Hours	65	37.14
12.01 to 18.00Hours	72	41.14
18.01 to 24.00Hours	22	12.57

Of the 175 cases studied, 138 (78.85%) cases survived and unfortunately in 37 (21.14%) cases the patient succumbed to death due to snake envenomation.

Table 6: Distribution of Cases According to Outcome of Snake Bite (n = 175)

Outcome of bite	Number of Cases	Percentage
Non-fatal	138	78.85
Fatal	37	21.14

DISCUSSION

Venomous snakes found throughout the warm continents. Snake bite is a neglected problem of rural tropics; its incidence is usually underestimated because of lack of epidemiological data. Fatal snake bites in the developing countries like India are far too common to feature in local newspaper headlines [7]. The human-snake encounters are very common in rural India due to routine farm activities. The population density of India and increasing encroachment of human being into natural habitat of snakes due to construction of new buildings further increases the human-snake interactions.

In the present study, among total 175 cases of the snake bite majority of the victims were of age ranging from 21 to 50 years (72 %). This is obvious because 21 to 50 years of population is most actively involved in day-to-day work for earnings and farm activities. Similar findings were observed by Bawaskar H S et al [7], Hati A K et al [8], Halesha B R et al [9]. In a similar study conducted by Lal P et al [10], majority of the victims were in the age group of 15 - 60 years whereas the study by Wanje S et al [11] showed majority of the victims were in the age group of 10-39 years.

As far as sex is considered; the male and female cases were not having much difference in numbers. Observation in present study was not consistent with the findings recorded in the study conducted by Halesha B R et al [9], Lal P et al [10], Wanje S et al [11], Shetty A K et al [12] and Whitekar R et al [13]. The observation in the present study is consistent with the fact that females in rural Indian population are involved in daily domestic as well as the farm work along with the males hence the male and females are at same risk of being bitten by snakes.

In present study, majority of the victims of snake bite (87.42%) were from rural areas. This findings in the present study correlate with that studies of Mohapatro B et al [2], Halesha B R et al [9], Lal P et al [10], Shetty A K et al [12], Kulkarni M L et al [14], Singh A et al [15] which indicates that snake bite poisoning remains a major public health problem in rural population all over India.

In the studies conducted by Halesha B R et al [9], Lal P et al [10], Shetty A K et al [12], Kirte R C et al [16] and Gosavi P A et al [17] where they found snake bite poisoning to be more in people employed in agriculture industry. Similar findings were observed in present study. The obvious reason is that, farm workers are continuously exposed to the natural habitat of snakes hence most cases observed in our study were dependent on agriculture for their earnings.

The majority of the victims were bitten while they were in farm (70.86%) followed by at home (22.29%), The incidence ratio of bites occurring outdoor in open space and indoor space of human dwellings was 3:1. A similar pattern of snake bite cases was observed in the studies of Lal P et al [10], Bhardwaj A et al [18], Suchitra N et al [19], Monterio F N P et al [20]. It is obvious that more the people are going for outdoor activities like farm work there are more chances of interactions with reptiles. The improperly constructed mud houses nearby cattle sheds and fodder, poor pest control, improper waste disposal, poor quality food and grain storage facilities etc attract the rats and mice which are primary feed of snakes therefore snakes are attracted to human dwelling for feeding as well as shelter. Hence there are instances of snake bite cases inside the homes of victims also.

In the present study we observed that limbs of the victims were the preferred site of bite by the snake involving lower limb (64 %) and upper limb (34.86%). The site of snake bite was predominantly determined by accidental or inadvertent contact of the reptile during human activities. As the lower limbs are contentiously in approximation of ground where serpents crawl and upper limbs which are necessarily outstretched to reach the object for performing the activities hence bites were observed predominantly on these parts of body. These findings are similar to the studies carried out by Bawaskar H S et al [7], Hati A K et al [8], Wanje S et al [11], Shetty A K et al [12], Kulkarni M L et al [14], Babu P R et al [21].

It was observed that largest number of victims were involved in some or other form of activities in the farm when they were attacked by snake (61.71 %) followed by victims either walking or doing some outdoor activities that also were somehow related to farming (14.86%). Similar finding iwere noted in the studies conducted by Lal P et al [10], Bhardwaj A et al [18], Suchitra N et al [19], Monterio F N P et al [20].

The seasonal variations in snake bite incidences showed that maximum cases had occurred during rainy season (80.57%) & indicated that there was a definite seasonal pattern of occurrence in cases of snake bite poisoning. A similar trend was observed by Bawaskar H S [6], Hati A K et al [8], Shetty A K et al [12], Gosavi P A et al [17], Bhardwaj A et al [18], and Paudel K M et al [22]. The interaction between human being and snakes increases in the monsoon season as rainfall and water logging force snakes to venture out of their water-filled pits and there is increased human activity in the fields as it is the cultivation season.

In respect of time of snake bite maximum cases of bite occurred at time interval between 12.01 to 18.00 hours of the day (41.14%) and in time interval between 06.01 to 12.00 hours (37.14%). Similar findings were observed in the studies conducted by Bawaskar H S et al [7], Halesha B R et al [9], Wanje S et al [11], Bhardwaj A et al [18], Monterio F N P et al [20]. The number of cases has direct impact of interaction between humans and snakes. During early morning and day time hour majority of outdoor human activities are carried out which directly exposes the victims to snakes. We observed a greater number of snake bite cases during day time because we conducted study in Marathwada region of Maharashtra where most of the farming activities are carried out during early morning and day time.

Of the 175 cases studied in majority i.e., 138 (78.29%) cases the doctors could safely treat the patients and saved their lives while in 37 (21.14%) unfortunate patients could not be saved even after treatment. Similar findings were noted by Bawaskar H S [6], Hati A K et al [8], Paudel K M et al [22] and Gautam P et al [23] in their studies. Even today's era of 21st century there is requirement for immense development of health infrastructure in rural India so that priceless lives of innocent and needy peoples can be saved. Timely medical interventions by fast and easy access to the medical facilities may save considerable number of peoples met with snake bite envenomation especially those who are backbone of their family.

CONCLUSION

Snake bite envenomation is one of the fairly common accidents in India especially in rural population. Agriculture being key profession of rural people in India they are at higher risk of snake bites. Homes and dwellings are not as safe as they are considered against snake bites. The protective measures should be strictly used to prevent snake bites especially over limbs while working at farm and rainy season should be cautiously observed as potentially dangerous period for snake bite envenomation.

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