

ORIGINAL RESEARCH ARTICLE

Post Mortem Study of Snake Bite Cases

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Abstract:

Snake venom is probably the oldest known poison to mankind. Snake bite is an important and serious health problem remains an underestimated cause of accidental deaths in modern India. This hospital based post mortem study, has been carried out at Government Medical College and Sir T. Hospital, Bhavnagar during the period of one year. Total 878 autopsies were conducted in the mortuary of Sir T. Hospital, Bhavnagar during this period were included in present study. Out of total 878 cases of post mortem examination, 143 poisoning cases noted & out of 143 poisoning cases, Snake bite was observed in 22 (2.50%) cases. Total 15 (68.19%) males and 07 (31.81%) females died due to snakebite. Maximum cases were observed in 11 - 30 years age group and were 09 (40.91%). The male to female ratio was 2.14:1. Maximum number of deaths were belongs to rural area, comprising 17 (77.28%) out of 22, while 05 (22.72%) deaths were belongs to urban area. Most deaths were occurred in married persons – 15 (68.18%) cases, while in unmarried persons – 07 cases (31.82%). Out of 15 males 09 (60.00%) were illiterate while in females out of 07 cases, 06 (85.71%) cases were observed to be illiterate. All 22 (100.0%) cases were accidental in nature. Maximum snake bite deaths seen in Monsoon (78%) particularly July and among Agricultural labourer (55%). Maximum cases found from lower socio-economic class – 18 cases (81.81%) while 04 cases (18.19%) from middle class. Maximum deaths are occurred within less than 6 hour (45%) from bite. Snake bites are common in rural population of developing countries. There is need to educate the public about the hazards of snake bite, early hospital referral and treatment.

Key Words: Snake bite, Post mortem, Envenomation, Ophitoxaemia, Cobra, krait, Viper, Bhavnagar.

Introduction:

Poisons have always been a source of fascination and curiosity for the mankind since the prehistoric time, because they are silent weapons. Poisoning with plant and animal toxins was quite common. Historical case like death of Cleopatra due to snakebite is also on record.

Snake-bite is an important and serious medicolegal problem in many parts of the world, especially in South Asian countries. It has been estimated that 5 million snake-bite cases occur worldwide every year [1], causing about 1, 00, 000 deaths. On an average, nearly 2, 00, 000 persons fall prey to snake-bite per year in India and 35,000-50,000 of them die every year [2].

Over 2000 species of the snakes are known worldwide, of which 400 are poisonous [1]. In India, there are 216 species found out of which, 52 species are poisonous.

The poisonous families are Colubridae, Atractaspididae, Elapidae, Viperidae and Hydrophidae. In India, common poisonous snakes are: [3,4], The cobra - (nag, naja, naja naja), The king cobra - (rajnag, rajsamp, nagraj), The common krait - (maniyar), The banded krait - (ahiraj, raj sanp, koelea krait), Russell's viper - (daboia, khalchitro), The saw scaled viper - (phoorsa).

Snake bite is generally considered to be a rural problem & linked with environmental & occupational conditions. Most houses in the rural areas of India are made up of Mud and have many crevices where rodent flourish. Snakes are likely to approach residential areas when attracted by prey, such as mice & frogs. Major occupation in Bhavnagar region is farming with majority of population living in rural areas.

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Agricultural practice is monsoon dependent and the farmers usually belong to lower socioeconomic strata. Morbidity & mortality from snake bite depend upon the species of snake, delay between bite & treatment. Generally deaths occur due to lack of proper treatment and treatment done by 'Bhuvass', because the victims over usually of low social economic class and they still believe in these 'Bhuvass' for treatment of snake bite poisoning. A detailed knowledge about the nature and magnitude of the Snake bite cases in a particular area is not only important for early diagnosis and prompt treatment but also it may help to form policies. Snake bite Toxaemia in Bhavnagar region has not been studied before this study.

Therefore present study was undertaken to study epidemiological aspects, pattern, mortality and other significant features of Snake bite and to compare with the observations of various authors.

Aims & Objectives:

To study the incidence of Snake bite deaths, incidence in different age groups, according to Gender, according to area of residence, according to occupation, according to marital status, according to religion, according to socioeconomic status and literacy, manner of death, time of poisoning, survival time, etc. in Bhavnagar region & to compare the

present study with prevalence of Snake bite in other regions of India.

Material & Method:

This was a hospital based post mortem study has been carried out at Government Medical College and Sir T. Hospital, Bhavnagar during the period of one year. This institute is a referral centre for whole of Bhavnagar, Junagarh, Amreli region and acts as an apex referral institution. Proforma of questionnaire was designed after going through the literature available and consulting experts.

In case of death of admitted Snake bite patient, post mortem examination was done. These cases are included in the present Post mortem study. The deaths occurred in private hospital due to Snake bite & then brought for PM examination and brought dead cases of snake bites are also included in this study.

All the cases suspected of Snake bite by Physicians, Police or suspected at the time of postmortem examination are also included in the present study. Total 878 autopsies were conducted in the mortuary of Sir T. Hospital, Bhavnagar during this period, Out of total 878 cases of post mortem examination, Snake bite was observed in 22 cases. Relevant history was obtained from relatives of the deceased or the investigating police officer.

Observation & Results:

Table 01: Distribution of Snake Bite cases according to Age and Sex

Age group (in year)	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
00 - 10	02	09.10%	01	04.54%	03	13.64%
11 - 20	04	18.19%	00	00.00%	04	18.19%
21 - 30	03	13.63%	02	09.09%	05	22.72%
31 - 40	00	00.00%	02	09.09%	02	09.09%
41 - 50	03	13.63%	00	00.00%	03	13.63%
51 - 60	01	04.54%	02	09.09%	03	13.63%
61 - 70	00	00.00%	00	00.00%	00	00.00%
71 - 80	02	09.10%	00	00.00%	02	09.10%
Total	15	68.19%	07	31.81%	22	100%

From above table observation is made that total 15 (68.19%) males and 07 (31.81%) females died due to snakebite. The male to female ratio was 2.14:1.

In the present study maximum numbers of cases were observed in age group 21 - 30, 05 cases (22.72%) followed by 11 - 20 years 04 cases (18.19%). In the age group of 11-20 years 03 cases is below 15 years, while 01 case is observed above 15 years & below 20 years of age, least incidence was found in the age group of 71 - 80 years & 31 - 40 years, 02 case (09.10%) each & in 41 - 50 and 51 - 60 years, 03 cases (13.63%) each. In the age group 0 - 10 years 03 cases (13.64%) of death due to snakebite occurred. Maximum cases are observed in 11 - 30 years age group and are 09 (40.91%).

Maximum cases of male found in 11 - 20 years and maximum cases female found in 21 - 40 years.

Table 02: Distribution of Snake Bite cases according to area and marital status

Area	Male		Female		Total	
	Married	Unmarried	Married	Unmarried	Cases	%
Urban	02	02	01	00	05	22.72%
Rural	07	04	05	01	17	77.28%
Total	09	06	06	01	22	100%

The above table shows that maximum number of deaths belong to rural area, comprising 17 (77.28%) out of 22, while 05 (22.72%) deaths belongs to urban area.

In the present study, it is evident that most deaths occurred in married persons – 15 (68.18%) cases, while in unmarried persons – 07 cases (31.82%).

Out of 15 male cases, 09 males (60.00%) were married and 06 males (40.00%) were unmarried.

Out of 07 females, 06 females (85.71%) were married and 01 female (14.29%) were unmarried.

Higher incidences of snake bite deaths are seen in married males & females.

The male to female ratio of married person is 1.5:1 while in unmarried is 6:1.

Table 03: Distribution of Snake bite cases according to Educational status

Educational Status	Male	Female	Total	Percentage
Illiterate	09	06	15	68.18%
Primary	04	01	05	22.72%
SSC	01	00	01	04.55%
Not Applicable	01	00	01	04.55%
Total	15	07	22	100%

From the above table the observation is made that out of 15 males, 09 (60.00%) are illiterate while in females out of 07 cases, 06 (85.71%) cases are observed to be illiterate. Maximum cases observed in illiterate group 15 (68.18%), followed by Primary group 05 (22.72%). It is seen that snakebite is common in illiterate person than literate person.

Table 04: Distribution of Snake Bite cases according to Manner of death

Manner	Male	Female	Total	%
Suicide	00	00	00	00.00%
Accidental	15	07	22	100%
Homicidal	00	00	00	00.00%
Total	15	07	22	100%

From the above table it is seen that all 22 (100.0%) cases are accidental in nature. Not a single case of suicidal or homicidal snake bite was encountered in the present study.

Table 05: Distribution of Snake bite cases according to Social Economic class

Class	Frequency	%
Lower	18	81.81%
Middle	04	18.19%
Upper	00	00.00%
Total	22	100%

In the present study the maximum cases found from lower socio-economic class – 18 cases (81.81%) while 04 (18.19%) cases from middle class and not a single case from upper class encountered in present study.

Table 06: Distribution of Snake Bite cases according to Month of Occurrence

Month	Snakebite cases (%)
April	02 (09%)
June	03 (14%)
July	08 (37%)
August	02 (09%)
September	04 (18%)
November	02 (09%)
December	01 (04%)

From the above table it is seen that maximum deaths due to snake bite occurred in Monsoon 17 cases (78%) i.e. June to September. In monsoon maximum deaths are occurred in month of July 8 (37%). In summer 02 (09%) & in Winter 03(13%) cases seen.

Table 07: Distribution of Snake Bite cases according to time of bite

Time	Snakebite cases (%)
6AM – 6PM	13(59%)
6PM – 6AM	09(41%)

The above table shows that 13 (59%) cases of snake bite occurred between 6AM to 6 PM i.e. Day time & 09(41%) cases of snake bite occurred between 6PM to 6 AM i.e. Night time.

Table 08: Distribution of Snake Bite cases according to survival time

Survival Time	Snakebite cases (%)
Less than 6 hour	10 (45.50%)
6 hour - 24 hour	05 (22.75%)
1-3 days	04 (18.25%)
3-7 days	03 (13.50%)

Maximum deaths occurred in less than 24 hours after time of bite i.e. 15 (68%) cases, out of that 10 deaths occurred in less than 6 hours from time of bite. In 4 cases death occurred in 1-3 days & in 03 cases death occurred in 3-7 days.

Discussion:

Snake venom is probably the oldest known poison to mankind. Snake bite is an important and serious health problem remains an underestimated cause of accidental deaths in modern India [5,6]. Snake bite is one of the important causes of occupational hazard in our country [7]. Despite tremendous progress, snakebite continues to be one of the major causes of morbidity and mortality in India. High incidences of snake bite seen in the state of Tamil Nadu, West Bengal, Maharashtra, Uttar Pradesh and Kerala.

In India, Swaroop reported about 200,000 bites and 15,000 deaths in India due to snake bite poisoning as far back as 1954 [8,9]. Based on an epidemiological survey of 26 villages with a total population of nearly 19,000 individuals in Burdwan district of West Bengal state in India, Hati et al worked out an annual incidence of 0.16% and mortality rate of 0.016% per year [10]. Mortality rate in present study is 2.50 %. Mortality rate in study conducted by V Yogiraj et al was 2.62 % [5].

In the present study out of total 878 autopsies 143 cases (16.28%) of various poisoning including snake bite were noted. Comparison between different studies on cases of poisoning including snake bite brought for post-mortem is difficult because of pattern of poisoning in different in various regions of India.

Table : 09 : Comparison of distribution of cases of poisoning including snake bite

Study/Author	Total PM cases	Poisoning Cases
Vaghela P.C. [11]	826	132 (15.98%)
A. K. Kapoor [12]	1752	205 (11.70%)
Dalal J. S. et al [13]	1059	163 (15.39%)
Dhattarwal S.K. et al [14]	1238	290 (23.42%)
Kapila et al [15]	958	130 (13.56%)
Singh V.P. et al [16]	2898	593 (20.46%)
Sanjay Gupta et al [17]	4160	413 (9.92%)
Ashok Kumar et al [18]	1751	238 (13.59%)
Aggarwal N.K et al [19]	2534	268 (10.57%)
Dogra T. D. et al [20]	117	16 (14.03%)
A. K. Batra et al [21]	4042	1211 (29.96%)
R. K. Sanatomba et al [22]	1726	86 (4.98%)
Present study	878	143 (16.28%)

From the study of various authors in different part of India as shown in above table indicates approximately 15 % of total unnatural death in our country are occur due to poisoning including snake bite. It is observed that there is a variation in the incidence of fatal poisoning from region to region and time to time. The incidence also depends upon availability of poison. Maximum incidence seen in area which is agriculture based with low literacy rate, large family size, believe in false beliefs, and low income group people. Poisoning and hanging is the common way of committing suicide in males, while drowning and burn is the common way suicide in females

From the study of various authors in different part of India as shown in table indicates maximum snake bite victims mostly seen in 15-40 years of age group [2,5,6,23,24,25,26,27,28,29 & 30]. In present study also, maximum victims seen in age group of 11-30 years in males and 21 - 40 in females. 15-40 years age group is most active working group engaged with field & all type of work related to farm & outside the home for earning.

Table 10 : Comparisons of snake bite poisoning cases.

Study/Author	Age Group	M:F	Area	Months	Time
Manigandan G et al [1]	---	1.5:1	---	Sept- Dec	6 PM – 12 AM
Ganneru Brunda et al [2]	21-50	3.:1	---	June-Sept	---
V Yogiraj et al [5]	13-40	1.5:1	Rural	---	Night & early morning
Joshi Subhash et al [6]	21-30	1.62:1	---	---	Day time
Gopal Shankar sahani [7]	---	2:1	Rural	June–Oct.	---
Buranasin P. [22] (Thailand)	---	1.9:1	---	---	---
Buranasin P. [23] (Nepal)	10-40	---	---	---	---
Rano M. A [24 (Pakistan)	15-44	1.3:1	---	June-Sept	---
Jasjitsingh et al [25]	18-38	---	---	June-Oct	---
Sandip Bhelkar et al [26]	Mean age 37.78 yrs.	---	Urban	July- Sept.	---
I. F. Inamdar et al [27]	16-45	2:1	Rural	July-Sept.	---
R.C.Kirte et al. [28]	21-40	2.2:1	Rural	June-Sept.	---
VP Poudyal et al. [29]	15-45	---	---	June-Aug.	---
M. Rajeshkumar et al. [30]	Mean age 38.14 yrs		Rural	Monsoon	---
Sharma N et al [31]	---	4.25:1	Rural	---	Sleep
Kiran Nagaraju et al [33]	30-39		Rural	Rainy	---
Present study	11-30	2.14:1	Rural	June-Sept	Day 59% Night 41%

Snake bite is more common among the male than female & ratio in present study is 2.14:1 & in most other studies also male: female ratio is around 2:1 [1, 5, 6, 23, 24, 27, 28] except Ganneru Brunda et al [2], Sharma N et al [31] & Mulay D.V et al [32] where M: F ratio was 3:1, 4.25:1 & 3.2:1 respectively. The predominance of male victims suggests a special risk of outdoor activities.

Snake bite was observed more common among married than unmarried because married people have responsibility of home & are earning people of family. They are engaged in outdoor activity & prone for accidental events including snake bite. As mentioned above snake bite common among 15-45 years of age which age group of responsible person of family & group of married. Victim of snake bite at home & helper in farm are mostly unmarried people. It was also observed that snake bite is common among illiterate people than literate people because of ignorance of use of protective measures, treatment done by 'Bhuvass', because of popular misconceptions still prevails in society, the victims over usually of low social economic class & they can't afford expensive treatment and they still believe in these 'Bhuvass' for treatment of snake bite poisoning. Because of illiteracy, poor economical condition & family responsibility, they are mostly engaged in labour work in field & place of snake bite was mostly farm. Snake bite mostly occurred outside home & particularly in monsoon.

Envenomation to human may occur more commonly through unintentional interactions. It was reported earlier, that the majority of the snake-bites (82%) occur among the rural population [31], who are bitten in agricultural fields while working and also during sleeping outdoors. In the present study also

most victims were belongs to rural area & were engaged in agricultural work in field, Similar finding also noted by other studies [5,7,27,28,30 & 31]. The most cases found in rural area due to agriculture based economy, bare foot working place is farm, ground level and old houses, dwelling conditions are more favourable for the habitation of snakes and non availability of medical care in rural area.

Most patients are unable to identify the snake species either because of ignorance or poor visibility during darkness [1,5,31]. Highest number of bites recorded during June to September in the present study is similar to that recorded by other studies [2, 7,24,25,26,27,28,29 & 30]. The possible reason for majority of the snake-bites in rainy season may be attributed to the flooding of rain water in the dwelling places of snakes, thus causing their dislodgment which increases the chances of snakes feeling threatened or provoked by human beings, and biting them in defence. Consequently, human population becomes accidental victim to the snake-bite. Further, the situation is aggravated by the propinquity of rodents near the human habitat, thus increasing the risk of snake-bite.

In the present study day time (6AM - 6PM) bite occurred in 13 (59%) cases while night time (6PM – 6AM) bite occurred in 9(41%) cases. Few studies show night time predominance [1,5,31]. Day time bite was noted by Joshi Subhash et al [6]. Poisonous snakes are nocturnal in habit but fatal bite cases seen in day time too. The time of bite corresponds to the outdoor activities, like going to field for water harvesting, sleeping outside house on the floor, due to more number of person staying in a small house or to combat heat, passing urine & stool in open space, commuting to near place with barefoot

without light, which makes more prone for snake bite.

Conclusion:

In the present study most deaths are occurred within 24 hours, particularly in first 6 hour from bite. Most author also reported same pattern. Majority of patient could not reach the hospital in time because of lack of transport facilities and inability to afford transportation. Death was common among the patients who did not receive first aid measure.

The importance of immediate specific treatment, and hence the need to strengthen our peripheral health centres is paramount to reduce mortality due to snake bite. Ready availability and appropriate use of anti snake venom, close monitoring of patient, and timely institution of ventilator support help in reducing the mortality.

Recommendation:

1. Use lamp at night time
2. Do not walk bare foot in the field, use above ankle boot.
3. Early transportation of the cases to the nearest hospital
4. Timely diagnosis
5. Availability of ASV & Trained Non Medical Staff.
6. Early administration of ASV
7. Educate about common poisonous snakes, their sign & symptoms & first aid - to farmers & Field workers. Strengthen peripheral health centres.
8. Advice not to catch snake without proper equipment.
9. Snake Museum for easy identification of type of snake.
10. Strengthen peripheral health centres.

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