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An Autopsy-Based Study of Snakebite Fatalities in PGIMS, Rohtak, Haryana, India

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Abstract: Snake venom is probably the oldest known poison to the human race. Snake bite is an important and serious health problem remains an underestimated cause of accidental deaths in modern India. This postmortem conducted study, has been carried out at Pt. B. D. Sharma PGIMS, Rohtak, Haryana during the period of one year from 1 Jan 2023 to 31 Dec 2023. Out of total 1461 autopsies, 216 cases of death due to poisoning in which only 10 cases were selected for the present study as snake bite, which were referred to us for autopsy examination during the period of one year from January 2023 to December 2023. Maximum snake bite deaths seen in Monsoon (70%) particularly July and among Agricultural laborer (55%). All 10 (100.0%) cases are accidental in nature. Not a single case of suicidal or homicidal snake bite was encountered in the present study. Maximum cases found from lower socioeconomic class-7 cases (70%) while 3 cases (30%) from middle class.

Key Words: Snake bite, Epidemiological profile, snake, poisoning, mortality

Introduction: Most of the deaths due to Snakebite in rural areas are still unidentified because many villagers go to traditional practitioners first before visiting any medical Center. However, reliable data for morbidity and mortality are not available since there is no proper reporting system and snakebite is not a notified disease in medical fraternity.1 Snakebite is one of the common causes of death in rural and suburban areas of tropical countries such as India. About 52 different species of venomous snakes are encountered in India, and every year about 2 lakh cases of snakebite are reported, out of which 15,000 to 20,000 cases prove fatal.2

In India, there are 216 species of snakes found out of which, 52 species are poisonous the poisonous families are Colubridae, Atractaspididae,

Elapidae, Viperidae and Hydrophidae. In India, common poisonous snakes are: 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).3-4

The incidence of snakebite rises substantially in the monsoon season. The case being reported too occurred during this season. Conventional Indian textbooks do not discuss the common bite sites in great detail. Snakebite is not a common problem in the West, and hence discussion on snake envenomation is deficient even in foreign books on toxicology. However, Wallace does mention common sites chosen by venomous snakes, and includes trunk and face as having been affected in a few case.5

The Snakes most commonly associated with human mortality in India are Cobra (Naja naja), Krait (Bungarus Caeruleus) Russell"s viper (Vipera russelli) and saw scaled viper (Echis carinatus).

Snakebite frequency vary from area to area and depend upon:

(i). The natural habit of particular species of Snakes in the area; and

(ii). Chances of humans coming in contact with the snake.6

Snake bite is specifically considered to be a rural question & linked with environmental & occupational modalities. 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 Rohtak, Haryana region is farming with majority of population living in rural areas.

Farming practice is monsoon dependent and the farmers usually belong to lower socioeconomic status. Morbidity & mortality from snake bite depend upon the species of snake, delay between bite & treatment. Generally deaths occur due to lack of proper knowledge, treatment and treatment done by local quacks and babas, because the victims over usually of low social economic class and they still believe in these local quacks and babas for treatment of snake bite poisoning.

The aim of the present study was, to know the epidemiological profile of Snakebite cases admitted and brought dead with alleged history of snake bite at a tertiary care centre in the Pt. B. D. Sharma PGIMS, Rohtak region of Haryana in the year of 2023.

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 socioeconomic status and literacy, manner of death, time of poisoning, survival time, etc. in Rohtak, Haryana region & to compare the present study with prevalence of Snake bite in other regions of India

Material & Method

This present study was conducted in the Department of Forensic Medicine of Pt. B. D. Sharma PGIMS, Rohtak . Pt. B. D. Sharma PGIMS, Rohtak apex institute of the Haryana and snake bite cases from all over the state are referred to this apex referral institution for management. These cases are included in the present autopsy based study. The deaths occurred in PGIMS, Rohtak, Haryana due to Snake bite & then brought for medicolegal autopsy and brought dead cases of snake bites are 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 1461 autopsies were conducted in the mortuary of Pt. B. D. Sharma PGIMS, Rohtak during this period, Out of total 1461 cases of post mortem examination, Snake bite was observed in 10 cases. Relevant history was obtained from relatives of the deceased or the investigating police officer.

Observations and Results:

Findings at Autopsy: Figure 1 & 2 showing site of snake bite over the posterior aspect of the pinna of right ear and over the right eyelid. The skin over the bite mark was preserved and sent for histopathological examination.

Out of total 1461 postmortems conducted in mortuary of Department of Forensic Medicine, PGIMS, Rohtak, Haryana in the period of one year from dated 01-01-2023 to 31-12-2023. The total number of cases of poisoning were 216 in which only 10 cases were snakebite. Various parameters like age, sex, residence mentioning rural or urban, season of the year, mode of death and diurnal variation were noted. First of all the gender was noted, describing the

number and percentage of males and females from the total number of cases [Refer to Table and Charts at the end].

Discussion: In the present study out of total 1461 autopsies 226 cases (15.46%) of various poisoning including snake bite were noted. Out of 226 cases of poisoning cases only 10 cases (4.42%) were snake bite

From the study of various authors in different part of India as shown in above table number 9 indicates approximately 15-20 % of total unnatural death in our country are occur due to poisoning including snake bite.

In the present study the maximum cases found from lower socioeconomic status – cases 8(80%) while 02(20%) cases from middle class and not a single case from upper class encountered in present study. From the above table it is seen that all 10 (100.0%) cases are accidental in nature. Not a single case of suicidal or homicidal snake bite was encountered in the present study. In the present study maximum numbers of cases were observed in age group 30-39, 03 cases (30%) followed by 40- 49 & 0-9 years 02 cases in each category (20%).The least incidence was found in the age group of 20-29 years. In 15-40 years age group is most active working group engaged with farms and outside the home for earning. From table observation is made that total 07 (70%) males and 03 (30%) females died due to snakebite. The male to female ratio was 2.33:1. Snake bite is more common among the male than female & ratio in present study is 2.33:1 & in most other studies also male: female ratio is around 2:112, 13, 14 except Mulay D.V et al15 and Sharma N et al16 & where M: F ratio was 3.2:1 and 4.25:1 respectively. The predominance of male victims suggests more risk due to outdoor activities.

It was reported earlier, that the majority of the snake-bites (82%) occur among the rural population16, 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 and were engaged in agricultural activities in field, Similar finding also noted by other studies. 9,13,16,& 17

Highest number of bites recorded during June to September i.e in Monsoon season in the present study is similar to that

recorded by other studies also.(9,17,18)

The possible reason for majority of the snake-bites in monsoon season may be attributed due to rain water in the habitation of snakes, thus causing their removal which increases the chances of snakes feeling vulnerable or aggravated by human beings and biting them as a defence mechanism. So, human being becomes accidental victim to the snakebite. Further, the situation is aggravated by the propinquity of rodents near the human surroundings, thus increasing the jeopardy of snake-bite.

Conclusion

In the present study most deaths have occurred in first 6 hour following the bite. Most author also reported within 24 hours pattern from bite. 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 treatment. The importance of immediate specific treatment, availabilities of specific antisnake venom serum and hence the need to strengthen our peripheral and community health centers in the villages and timely initiation of ventilator support help in reduction the mortality rate.

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Observations and Results

Findings at Autopsy: Figure 1 & 2 showing site of snake bite over the posterior aspect of the pinna of right ear and over the right eyelid. The skin over the bite mark was preserved and sent for histopathological examination.

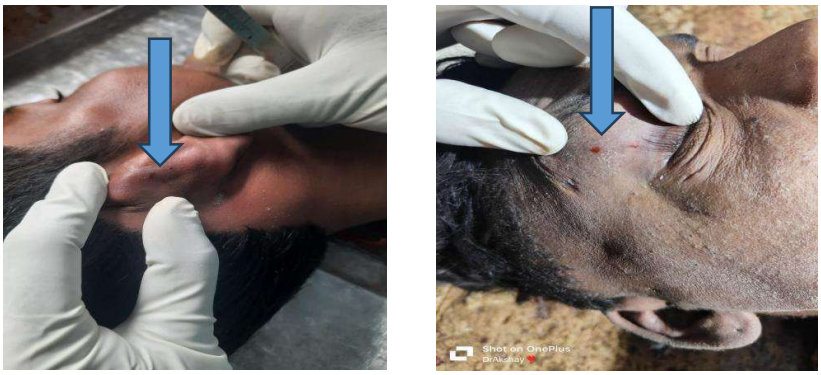

Figure 1 showing bite marks on the right ear of the helix and Figure 2 showing bite marks over the right side of the forehead.

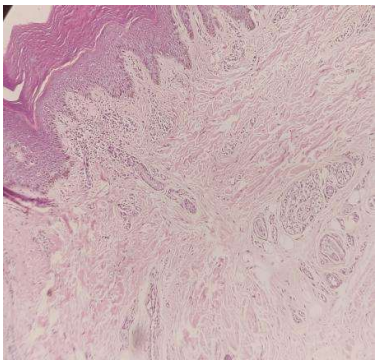

Figure 3-Histopathiological examination showing H&E-stained section from skin of bite site showing dermal congestion and chronic inflammation(200X).

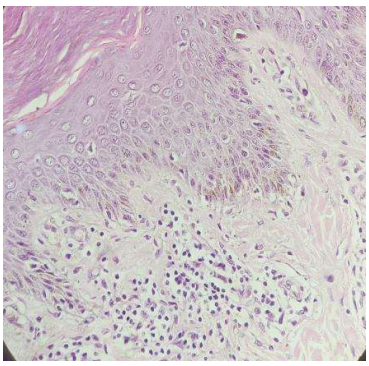

Figure 4-Histopathiological examination showing H&E-stained section from skin of bite site showing chronic mononuclear inflammatory infiltrate in the dermis(400X).

1. Sex wise distribution of cases

Table No 1: From table 1 observation is made that total 07 (70%) males and 03 (30%) females died due to snakebite. The male to female ratio was 2.33:1.

Sex	Number	%
Male	7	70%
Female	3	30%
Total	10	100%

Table no.1 depicting distribution of Snake Bite cases according to Sex.

2. Table no.2: Distribution of Snake Bite cases according to Age

Age	Number	Percentage
0-9	2	20
10--19	1	10
20-29	0	0
30-39	3	30
40-49	2	20
>50	2	20
Total	10	100%

In the present study maximum numbers of cases were observed in age group 30 – 39, 03 cases (30%) followed by 40 – 49 & 0-9 years 02 cases in each category (20%. The least incidence was found in the age group of 20-29 years.

Table 03: Distribution of Snake Bite cases according to area of Residence

Residence	Number	%

Rural	9	90%
Urban	1	10%
Total	10	100%

The above table shows that maximum number of deaths belong to rural area, comprising 9 (90%) out of 10, while 01 (10%) deaths belong to urban area.

Higher incidences of snake bite deaths are seen in rural area. The male to female ratio in area is 9:1.

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

Manner of death	Male	Female	Total	Total
Suicide	0	0	0	0
Accidental	7	3	10	100%
Homicide	0	0	0	0
Total	7	3	10	100%

From the above table it is seen that all 10 (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 Socioeconomic status

Social Economic class	Number	%
Lower	8	80%
Middle	2	20%
Upper	0	0%
Total	10	100%

The table number 5 depicting the present study the maximum cases found from lower socioeconomic status-cases 8(80%) while 02 (20%) 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 Season of Occurrence

Seasons	Months	Number	%	Male	%	Female	%
Summer	Mar-May	1	10%	0	0	1	33.33 %
Monsoon	Jun-Sept	7	70%	6	85.71 %	1	33.33 %
Winter	Dec-Feb	0	0	0	0	0	0
Autumn	Oct-Nov	2	20%	1	14.29 %	1	33.33 %
Total		10	100%	7	100%	3	100%

Table 6 that the maximum cases occurred in the monsoon season and they were 7 cases in number and 85.71% males and 33.33% females. It was followed by autumn season i.e. 2(20%) and no case was occurred in winter season i.e. 0(0.00%).

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

Survival Time	Number	%
Less than 6 hours	5	50%
6 hours – 12 hours	3	30%
12 hours-24 hours	2	20%
>36 Hours	0	0
Total	10	100%

Maximum deaths occurred in less than 6 hours after time of bite i.e. 5 (50%) cases, out of those 3 deaths occurred between 6 hours-12 hours from time of bite and 2 cases death occurred between 12 hours-24 hours from time of bite.

Table 08: Presence of Snake Bite marks

Bite Marks	Number	%
Present	8	80%
Absent	2	20%
Total	10	100%

The present study in 8(80%) cases we found two pin point bite marks of the snake and in 2 (20%) cases absence of bite marks but history given by the next to kin as they saw snake in his or her room.

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

Study/Author	Total PM cases	Poisoning Cases
Dhattarwal S.K. et al[7]	**1238**	**290 (23.42%)**
Ashok Kumar et al[8]	**1751**	**238 (13.59%)**
Navinkumar M. Varma.et al[9]	**878**	**143 (16.28%)**
Dalal J. S. et al[10]	**1059**	**163 (15.39%)**
A. K. Batra et al[11]	**4042**	**1211 (29.96%)**
Present Study	**1461**	**226 (15.46%)**