

## **An Epidemiological Profile of Fatal Snake Bite at SRG Hospital in Jhalawar Region**

<sup>1</sup>Dr. Rajkumar Saini, P. G Student, Jhalawar Medical College, Jhalawar.

**Corresponding Author:** Dr. Rajkumar Saini, P. G Student, Jhalawar Medical College, Jhalawar.

**How to citation this article:** Dr. Rajkumar Saini, “An Epidemiological Profile of Fatal Snake Bite at SRG Hospital in Jhalawar Region”, IJMACR- November – December - 2022, Vol – 5, Issue - 6, P. No. 129 – 134.

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

### **Abstract**

**Background:** Snakebite envenoming are an important but neglected public health problem. Our objectives were to describe the epidemiological profile of snakebite cases in Jhalawar region.

**Aims and Objectives:** To study the epidemiology of snake bite poisoning in & around district Jhalawar region including incidence among various age, sex, occupation, part of body bitten, time of bite, the place of incidence and seasonal variation. The socio-economic impact of snakebite cases in the region.

**Material & Methods:** This Autopsy based 4year retrospective study was conducted in the Department of Forensic Medicine at Jhalawar Medical College, Jhalawar (Rajasthan) from January 2018 to December 2021.

**Conclusion:** Snake bite is an important occupational hazard that causes preventable death and disability. Delay in hospitalization, superstition, use of traditional medicine and infection are factors contributing to significant mortality and morbidity. Awareness regarding outdoor safety and early hospitalization can significantly reduce the incidence of snake bite.

**Keywords:** Snake bite; Epidemiology; Age, Sex, Occupation

### **Introduction**

Snake bite has been described as one of the Neglected Tropical Diseases (NTD) by World Health Organization. It is mainly a problem of tropical and subtropical countries. Globally about 5.4 million snake bites occur each year, resulting 1.8 to 2.7 million cases of envenoming. There are between 81400 to 138000 death and around three times as many amputations and other permanent disabilities each year, caused by snake bite. India has been an estimated 1.2 million snakebite death from 2000 to 2019, an average of 58000 per year. India is one of the worst affected countries.<sup>1,2</sup>

In India, 236 species of snakes have been reported. These include the front-fanged venomous snakes of the families Elapidae and Viperadae.

Viperadae are represented by true vipers and pit vipers. Green Pit Vipers are commonly found in the hilly regions of India. The family Elapidae has 17 species, which includes Cobras, King Cobras, Kraits and Coral Snakes. The spectacled Cobra (*Naja Naja*) is one of the commonest snakes in India. Mon ocellate Cobra (*Naja*

kaouthia) is seen in the Northern and North-Eastern Parts of India. Kraits are nocturnal snakes, which enter human dwelling at night in search of prey and many victims are bitten in their sleep. The prevalence of different snakes varies in different geographical parts of the country. As a result, the clinical manifestations and management practices vary.<sup>3,4</sup>

In India, four venomous snakes are most often encountered. Known as “the big four”, they are the Indian Cobra or Common Cobra (*Naja-Naja*), Russell's viper (*Daboiarusselli*), Saw scaled viper (*Echiscarinatus*) and common krait (*Bungaruscaeruleus*).

Polyvalent Anti-Snake Venom (ASV) is available for these four snakes. The lack of trained medical professionals and scarcity of health care facilities, delay in hospitalization and preference for traditional healers are some factors that contribute significantly to the disability and death associated with snake bite. Traditional methods of treatment and popular first aid methods have been found to be ineffective and even dangerous. Besides causing death, Snake bite also results in severe disability and sequelae such as infection, tetanus, scarring and contracture.<sup>5,6</sup>

Snake bite, as stated by the WHO, is one of the most neglected 6 diseases that affects mainly the rural poor. In spite of the fact that it is preventable and treatable, it continues to have a very high burden owing to lack of timely intervention and management. Rural India, most of 6 all, bears a high burden of snake bite. People belonging to the lower socio-economic strata are most impacted, especially those who are engaged in agriculture and forestry.<sup>7</sup>

### **Aims and Objectives**

1. To study the epidemiology of snake bite poisoning in & around district Jhalawar region including incidence

among various age, sex, occupation, part of body bitten, time of bite, the place of incidence and seasonal variation.

2. To suggest measures to prevent deaths from snakebite poisoning.

### **Materials and methods**

#### **Study design**

This Autopsy based 4year retrospective study was conducted in the Department of Forensic Medicine at Jhalawar Medical College from January 2018 to December 2021.

#### **Inclusion criteria**

All the autopsy done in mortuary of Jhalawar Medical College irrespective of age and sex, who reported with history of snake bite were included in the study.

#### **Exclusion criteria**

All cases other than snake bite like history of scorpion bites, bee sting and other insect bites were carefully excluded.

#### **Ethics statement**

The study was approved by “Institutional Ethics Committee” of Jhalawar Medical College, Jhalawar.

#### **Data collection**

During 4-year period total 1525 autopsies were conducted and out of these 87 were alleged snakebite death. These 4 years (January 2018 –December 2022) retrospective study was conducted at S. R. G. hospital in Jhalawar. All the autopsies of snake bite cases done during the study period were analysed.

The data was collected from Medical Records Section of the Hospital.

A detailed information regarding demographic and epidemiological parameters such as age, sex, residence, occupation, site of bite and place of bite, time and month of bite etc., were obtained from the medical records. The

details of PM examination were collected from the PM reports, Police Inquest and Police requisition letters. The data collected was tabulated in Microsoft Excel and analysed using descriptive statistics.

**Observation:**

Table 1: Total number of snake bite cases

Year	Total case	Total snakebite	% Incidence	male	female
2018	380	29	7.6%	14	15
2019	384	20	7.8%	09	11
2020	394	18	4.6%	10	08
2021	367	20	5.4%	15	05
Total	1525	87	5.7%	48	39

Table 2: Age wise distribution of snake bite cases

Age	Male	Female	Total	%
0-9	1	0	1	1.1
10-19	4	3	7	8.0
20-29	7	6	13	15.0
30-39	15	12	27	31.0
40-49	12	10	22	25.3
50-59	6	5	11	12.6
60 plus	3	3	6	7.0
Total	48	39	87	100

Table 3: Occupations wise distribution of snake bite cases.

Occupation	Male	Female	total	%
Agriculture	35	10	45	51.7
Student	3	5	8	9.2
Unemployed	10	0	10	11.5
Housewife	0	15	15	17.2
Others	0	9	9	10.4
Total	48	39	87	100

Table 4: Marital status wise distribution of snake bite cases

Marital status	Male	Female	Total	%
Married	46	31	77	88.5
Unmarried	2	8	10	11.5
Total	48	39	87	100

Table 5: Domicile wise distribution of snake bite cases

Domicile	Male	Female	Total	%
Rural	40	32	72	82.8
Urban	8	7	15	17.2
Total	48	39	87	100

Table 6: Locations wise distribution of snake bite cases

Location	Male	Female	Total	%
Outdoor	42	18	60	69.0
Indoor	6	21	27	31.0
Total	48	39	87	100

Table 7: Seasons wise distribution of snake bite cases

Season	Male	Female	Total	%
Jan-March	4	5	9	10.3
April-June	8	4	12	13.8
July-Sep	30	28	58	66.7
Oct-dec	6	2	8	9.2
Total	48	39	87	100

Table 8: Site of bite wise distribution of snake bite cases

Site of bite	Male	Female	Total	%
Lower limb	34	26	60	69.0
Upper limb	12	10	22	25.3
Head & neck	2	2	4	4.6
Other	0	1	1	1.1
Total	48	39	87	100

Table 9: Time of bite wise distribution of snake bite cases

Time of bite	Male	Female	Total	%
6PM to 6AM (night)	32	17	49	56.32%
6AM to 6PM (day)	16	22	38	43.68%
	48	39	87	100

Table 10: Education wise distribution of snake bite cases

Education	Male	Female	Total	%
Illiterate	15	25	40	46.0
Primary school	13	9	22	25.3
High school	15	4	19	21.8
Graduate	5	1	6	6.9
Total	48	39	87	100

Table 11: hospitalization base distribution of snakebite cases

Total deceased	Brought dead	hospitalization
87	65(64.37%)	31(35.63%)

**Discussion**

The present study has thrown interesting statistical facts which can be discussed under the following headings:

Agricultural activity; 51.7% of snakebites occurred in agriculture industry and farming activities, attributed to unshod (not wearing shoes) farmers which makes them prone to the risk.<sup>8,9</sup>

Rural area; Rural inhabitants form the biggest chunk of casualties (82.8%) attributed to the lab our they are generally engaged in.<sup>8,9</sup>

Gender and education; The study shows that most of the snakebite victims were male (55.2%) as compared to females (44.8%). The predominance of male victims suggests a special risk of outdoor activity. In the present study, about (46 %) of study population was illiterate, as majority of people living in rural areas do not have access to education. Females as compared to males were

more educationally backward and further access to higher education was limited to either sex.<sup>10,11,12</sup>

Outdoor activity; 69% of the study group victims were bitten while being outdoors forming the ratio of 2.2:1 of outdoor to indoor bites.<sup>10,11,12</sup>

Period of the year Highest numbers of bites (66.7%) were recorded in the months of July to September, which corresponds to the monsoon season in India and such incidences could be directly related to flooding of human dwellings in rural areas.<sup>11,12,13</sup>

Body region; Lower extremities were the most observed bitten part of body (69.0%) commonly the feet, upper limb (25.3%), head and neck (4.6%) and other part of body (1.1%). Bites on the head and trunk mostly occur when nocturnal species bite people while sleeping.<sup>14,15,16</sup>

Diurnal variation; In the present study, the maximum incidence of snakebite occurred between 6:00 PM to 6:00 AM (56.32%). This is mostly because of poor visibility and accidental stepping on the snake. The location of hospital and the means of transportation serve as the main limiting factor apart from the usual treatment from quacks for delay in arrival at hospital.<sup>15,16,17</sup>

people should make aware to avoid delay hospitalization and treatment from known medical person about snake bite cases because most of the deceased (64.37%) were brought dead as show in table no 11.

**Results**

A total n=87 snake bite post mortem, consisting of 48 (55.2%) male and 39 (44.8%) female were done in the mortuary of the S.R.G. hospital during the period of study. Maximum number of cases 27 (31.0%) belonged to 30-39 years of age, and the least i.e., 1(1.1%) belong to less than 10 years of age. The incidence of snakebite and age wise distribution are described in Table 1&2. As

shown in Table no. 3, 51.7% of the victims were engaged in agriculture, 11.5% were unemployed followed by students (9.2%), housewife (17.2%) and others accounting to 10.4% were salaried or people engaged in business or children. In 69% of the cases, the site of snake bite was found to be the lower limb. The site was the upper limbs in 25.3% of the cases. The site of snake bite was over the head and face in 4.6% and other body part in 1.1% of the cases. Table no. 7 shows the cases based on months of occurrence of the bite. 66.7% (n=58) of the bites occurred during the months of July to September followed by April to June (13.8%) n=12 and January to March (10.3%) n=9. Distribution of cases based on time of incident is shown in Table no. 9. The total of 56.32% of the bites occurred between 6pm to 6am (night), 43.68% of the bites occurred between 6am to 6pm (day). 69% (n=60) of the incidents occurred outdoors. 31% (n=27) of the bites occurred indoors.

### **Conclusion**

People should be made aware to avoid delay hospitalization and superstition like belief in a snake god, ability of local medicine or magnets to reduce the venom effect.

Snakebite still remains an important cause of accidental death in modern India, and its public health importance has been systematically underestimated. It is an important occupational injury affecting plantation workers, construction laborers, and farmers working in fields.

The above study clearly showed that snake bites were more common in rural areas and among people who were engaged in agricultural works. Most common occurrences were during the monsoons. The lower limbs were affected the most and majority victims were males, mostly bitten by poisonous snakes.

Avoiding snake bites specially during the peak season when agricultural works are in its full swing, by taking precautions like wearing protective foot-wears, use torch/mobile flashlight at night, carrying a stick, approaching debris cautiously, paying attention to ground etc. are perhaps the most effective tools that may significantly bring down the incidence of snake bite and also primary health centers should be fully equipped with facilities to give first aid measures and administer anti-snake venom if required.

Dissemination of information regarding quick transport, correct first aid measures and training of primary level health workers can drastically bring down the mortality of this neglected tropical disease.

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