Research Article

Death rates of snakebites in Vadodara, mid-Gujarat: a 3-year study

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Abstract

Background: Snakebite is one of the important causes of death in India. The actual incidences of snakebites are more than the number declared from official hospital records because of underreporting of cases because of many reasons. It is the only poisoning in which typical seasonal variations are present, as the incidences are typically higher in monsoon season.

Objectives: To determine the magnitude, seasonal trends, and death toll of snakebite cases.

Materials and Methods: This retrospective study was conducted in the Department of Forensic Medicine, Sir Sayajirao General Hospital and Medical College, Vadodara, Gujarat, India, which is a tertiary-health-care center of mid-Gujarat. A total of 629 cases of snakebite poisoning were studied, which were reported during the span of 3 years (2006–2008), and the data were analyzed.

Results: In the 3-year duration, all the data related to the distribution of cases, according to months and seasons, were studied with pattern of death, and we found that the incidences of snakebite were increasing every year with an average mortality of 5.7% and incidences are typically higher in monsoon seasons, which is from June to September in the mid-Gujarat region. We also analyzed the fatal events of snakebite cases in relation to the other medicolegal autopsies and revealed that the death caused by snakebites were contributing only 0.56% of the total load of medicolegal autopsies during the 3-year span of this study.

Conclusion: Till date, no study has been carried out on snakebites in Vadodara, and our study shows that though it is a life-threatening emergency, ready availability and appropriate use of antivenom, quick mobilization of patients, and close monitoring in the hospital can help us to reduce the morbidity and mortality.

KEY WORDS: Snakebite, poisoning, seasonal variation, death

Introduction

Snakebite is an important reason of emergency in India and may be fatal if specific treatment is not offered to the victim within a mean time of the incidence. Global estimate suggests that 30,000–40,000 persons die each year from a venomous snakebite, but this range is likely an underestimate because of incomplete reporting.[1] As per the Health Status Indicators, National Health Profile, 2007 and 2008, there were total of 45,900 deaths caused by snakebites in India in 2005.[2] There are opportunities of underreporting of the cases of snakebite deaths in India because in the rural areas a number of the victims are processed and may die outside the health centers.

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Vadodara city is situated in middle of Gujarat, and our institute is a tertiary-health-care center where most of the referral cases from rural health centers are likewise handled. Weather in Vadodara is dry and arid, but in the monsoon, it becomes cold and humid with severe flooding in some areas of this region, and, hence, the possibility of higher incidences of snakebite cannot be ruled out. The true incidences are unknown; but per the information from Directorate of Health Services of States/UT, a total of 1643 cases of snakebites were reported in 2006, and of them, 31 victims died because of snakebite poisoning.[3] Till date, no study has been conducted on snakebite in Vadodara, and most of the studies performed at other centers in Gujarat deal with clinical and management aspect views. This study was contracted with the objectives to determine the magnitude, seasonal movements, and death pattern of snakebite cases in Vadodara (mid-Gujarat) during the span of 3 years, from 2006 to 2008.

Material and Methods

Vadodara is a territory with a population of about 41,57,568 per 2011 census in an expanse of 7,549 km^2. This retrospective study was conducted in the Departments of Forensic Medicine, Medical College, Vadodara, which is a tertiary-health-care center, and most of the cases are referred here from the rural areas. The data of 629 cases of snakebite admitted in Sir Sayajirao General (SSG) Hospital in the period of 2006–2008 were obtained from the Medical Record Department of the hospital. The data regarding the various seasons in Gujarat were collected from the Internet to find out the seasonal variations of snakebite poisoning, and Gujarat weather is divided into four major seasons: winter from November to February, followed by summer from March to May, monsoon from June to September, and autumn during the month of October.[4] All the events in relation with their year and month-wise distribution were examined in particular. We also analyzed the deaths caused by snakebite poisoning with total admitted cases and total medicolegal autopsies performed in these 3 years and calculated the ratio of fatal outcome in these cases. Eventually, the data were analyzed manually to determine the magnitude, seasonal trends, and death pattern of snakebite cases in this particular field of mid-Gujarat.

Results

Total 629 cases of snakebite were admitted in the S.S.G. Hospital from 2006 to 2008, and of them, 28 (4.45%) patients were dead. Table 1 shows the incidences of snakebites, which were 164 during 2006 and increased up to 203 in 2007 and 262 in 2008. Mortality was higher (6.7%) in 2006 as compared to those in 2007 (3.9%) and 2008 (3.4%), and it was 5.7% on an average, in all the 3 years. The month-wise distribution of cases in Table 2 shows that the incidences of snakebite were higher in July (20.1%) during 2006, while they were higher in October during 2007 (18.3%) and 2008 (17.0%). Normally, Gujarat weather is divided into four major seasons: winter (November–February), summer (March–May), monsoon (June–September), and autumn (October).[5] Season-wise distribution of snakebite cases is shown in Table 3, which shows that the incidences are typically higher from June to September, which is the monsoon season in this region. Table 4 shows the incidences of snakebite autopsies in relation to the other autopsies, which shows that a total of 4,980 medicolegal autopsies were conducted during the period of 3 years. When we analyzed the fatal events of snakebite cases in relation to the other medicolegal autopsies, we noticed that death because of snakebites were noticed only in 0.56% cases on an average in all the 3 years.

Table 1: Death rates of snakebite cases

Year	No. of patients admitted	No. of patients expired	Mortality (%)
2006	164	11 (39.28%)	6.7
2007	203	8 (28.57%)	3.9
2008	262	09 (32.14%)	3.4
Total	629	28 (100%)	5.7 (Average)

Table 2: Month-wise distribution of snakebite cases

Month	Patients in 2006, *n* (%)	Patients in 2007, *n* (%)	Patients in 2008, *n* (%)	Total Cases, *n* (%)
January	1 (0.6)	0 (0)	3 (1.1)	4 (0.6)
February	5 (3.0)	4 (2.0)	8 (3.0)	17 (2.7)
March	3 (1.8)	10 (4.9)	8 (3.0)	21 (3.3)
April	7 (4.3)	10 (4.9)	8 (3.0)	25 (4.0)
May	7 (4.3)	10 (4.9)	7 (2.7)	24 (3.8)
June	22 (13.4)	19 (9.3)	29 (11.1)	70 (11.1)
July	33 (20.1)	29 (14.3)	35 (13.3)	97 (15.4)
August	23 (14.0)	30 (14.8)	44 (16.8)	97 (15.4)
September	20 (12.2)	31 (15.3)	31 (11.8)	82 (13.0)
October	15 (9.1)	44 (21.7)	48 (18.3)	107 (17.0)
November	19 (11.6)	13 (6.4)	30 (11.4)	62 (9.8)
December	9 (5.5)	3 (1.5)	11 (4.2)	23 (3.6)
Total	164	203	262	629

Table 3: Seasonal variations of snakebite cases

Season of snakebite	No. of patients (2006–2008)	Percentage of patients (2006–2008)
Winter (November–February)	106	16.86
Summer (March–May)	70	11.13
Monsoon (June–September)	346	55.00
Autumn (October)	107	17.01
Total	629	100

Table 4: Incidences of snakebite in relation to other autopsies

Year	Total autopsies	Snakebite autopsies, *n* (%)	Incidences of snakebite (%)
2006	1540	11 (39.28)	0.71
2007	1728	08 (28.57)	0.46
2008	1712	09 (32.14)	0.52
Total	4980 (100%)	28 (100)	0.56

Discussion

Snakebite is an important and dangerous medical problem in many regions of India. However, reliable data for the morbidity and mortality are not available as there is no proper eporting system. Moreover, the records of the large number of cases do not come to official statistics as people seek traditional methods of treatment.[6] In this study, we have broken down the incidences of snakebite cases, which were held in the SSG Hospital, Vadodara, during the span of

3 years (2006–2008) and found that the incidences increase every year, similar to previous studies.[1–3,6,7] Mortality was 5.7% on an average in the 3-year duration of our study, which is almost similar with observations of other studies.[8,9] Penetration of jungles during construction of new residential areas and highways and irrigation with hydroelectric schemes may be the causes of increased incidences of snakebite. In this study, total 629 cases were reported to the hospital, and of them, 95.54% cases survived after treatment, whereas only 4.46% cases died, which shows that, although it is a medical emergency, the life of the victims can be easily saved by offering them appropriate treatment within mean time and the prognosis is generally very good. No specific courses were seen during month-wise analysis of the snakebite cases. In our study, season-wise distribution of the snakebite cases shows that the incidences are typically higher from June to September, which is the monsoon season in this region of Gujarat. The higher incidences of snakebites during monsoon season were also observed by Ali *et al*.[10] It is the only poisoning that is experiencing a typical seasonal variation because the incidences are more in monsoon season, and it might be because of severe flooding in the residential areas of snakes, increased agricultural activities such as plowing, or fluctuations in the activity or population of poisonous snakes during this particular time of the year. Serious flooding, focusing the human and snake populations, has previously given rise to epidemics of snakebite in India, Pakistan, Columbia, Bangladesh, and Vietnam.[1] Specific seasonal variations with higher incidences in rainy seasons are also noted by many authors in their studies.[5–11] In this study, we have also analyzed the fatal events of snakebite cases in relation to the other medicolegal autopsies and revealed that the deaths because of snakebites were contributing an average of just 0.56% of the total medicolegal autopsies performed at our center during the 3-year span of this study.

Strength and Limitations

The strong point of our work is that we have laid stress on the parameters such as seasonal variations in cases of death caused by snakebites. We have also analyzed the fatal events of snakebites in relation to the other autopsies and showed that the deaths because of snakebites were contributing an average of just 0.56% of the total medicolegal autopsies performed at our center during the 3-year span of this study. No such kind of work has been conducted so far in Gujarat on this particular subject. Limitation of our work is that we could not examine the cases who survived after the treatment of snakebite and factors affecting their prospects of survival.

Conclusion

Snakebite poisoning is an important medical emergency in the mid-Gujarat region. Distribution of snakebite cases, their magnitude, seasonal variations, and mortality pattern of snakebite cases are more or less similar to the pattern found in most of the other studies. This similarity prevailed in virtually all the parameters used in this study. Although snakebite is a common life-threatening emergency in our health centers, our study showed that ready availability and appropriate use of antivenom, early referral when required and quick mobilization of patients to higher centers, and close monitoring of patients in the hospital can help to reduce the mortality from snakebites.

Finally, more studies and research need to be conducted at this center and in other centers to offer a fuller apprehension of the trends of snakebites in Vadodara and how deaths from it may further be reduced. However, we trust that this study has contributed in some way toward the better understanding of this problem.

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