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Clinico-Epidemiological Study of Snake Bite Presenting to the Emergency Department of a Tertiary Care Hospital

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Abstract

Snakebite is an acute, life-threatening condition which is most commonly faced by the rural population of tropical countries. About 1.2 million deaths related to snake bites are reported from the Indian subcontinent adding a major part to the global burden towards snake bite mortality. Maharashtra reported the highest number of snake bite cases in the year 2019. A retrospective study was carried out at the emergency department from April 1st, 2020 to June 30th, 2021. Data regarding demographic factors, clinical features, complications, details of treatment received and outcomes of the snake bite victims were recorded. A total of 103 patients with snake bites were admitted, 71.84% were males, and the mean age group was 31.68 years. 26% of the cases were reported during the month of June, and 68% of the bites were reported between 12:00 pm to 12:00 am. 62.14% had bites over their lower limbs, and 31.07% of them were farmers. 47.57% had local pain. 59.22% were dry bites out of which 17.47% received an incomplete dose of Antisnakevenom (ASV) from referring hospitals. 17.47% manifested with neurological symptoms. Our study suggested that farmers, children, women and labourers are the most vulnerable groups affected. There is still a lack of knowledge among healthcare workers regarding the use of ASV.

Keywords: ASV, Dry Bite, Neurotoxicity, Vasculotoxic

1. Introduction

Snakebite is one of the acute, life-threatening medical emergencies most commonly faced by the rural population. It was included in Category A of the Neglected Tropical Diseases in 2017[1]. Around 5.4 million people are bitten each year causing the death of around 81,000 to 1, 38,000 people every year[2]. About 1.2 million snake bite deaths occurred in India from 2000-2019[3]. The population suffered from snake bites varies in regard to their socio-economic status and occupation. Maharashtra reported the highest number (42,026) of snake bite cases in the year 2018-2019, followed by West Bengal, Tamil Nadu, Andhra Pradesh, Karnataka and Odisha[4]. About 300 species of snakes are found in India of which 52 are venomous and mainly include the Indian cobra, Indian Krait, Russel's viper and Saw scaled vipers[5]. Despite the low number of adequately trained medical professionals and the poor resources in primary healthcare centres across Maharashtra, India snakebite fatality rate decreased from 24% (1998-2004) to less than 5% (2013-18)[6].

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Antisnakevenom (ASV) is the only specific treatment for snake bites and is available at public hospitals in Maharashtra and given free of cost. Lack of knowledge and training of medical personnel regarding snake bite management has led to the delay in treatment and un-indicated use of ASV has led to the shortage in low antivenin supplies[7]. Majority of the people in the countries like India where 70% of the population lives in rural areas, 77% of the snake bite victims die outside the health care facilities, because they prefer to seek traditional healers rather than health care setups, because of ignorance and monetary issues, leading to the death of 97% of victims in rural areas[8]. Lack of availability of trained medical staff, inadequate supply of ASV, and delayed administration of ASV and other required medical equipment at the primary health care centres have caused increased morbidity and mortality, which has now been acknowledged by the WHO[9]. This study was done to study the epidemiological profile, clinical features, complications, management and outcomes of snakebite cases in the Emergency Department of a Tertiary Care Teaching Hospital in Pune, Maharashtra.

2. Materials and Methods

This retrospective study was carried out at the Emergency Medicine department of the tertiary care teaching hospital in western Maharashtra. The records of the snake bite patients admitted to the hospital from the 1st of April 2020 to the 30th of June 2021 were studied. Data regarding demographic factors (age, gender, place of residence), history of snake bite (season, site, time), complications that occurred (acute kidney injury, compartment syndrome), treatment received and outcomes of the snake bite victims were recorded.

All the patients with snake bites were included in the study and other bites/stings were excluded. The data were analysed using the Statistical Package for the Social Sciences, version 11.0 (SPSS Inc, Chicago, IL, USA). The results are expressed as percentages and graphs. As a part of the hospital protocol, approval was obtained from the Institutional Ethics Committee (IESC/FP/2021/07) on 1/06/2021, before the commencement of the study.

3. Results

A total of 103 cases with a history of snake bites were studied. The majority were found to be males (n = 74, 71%)

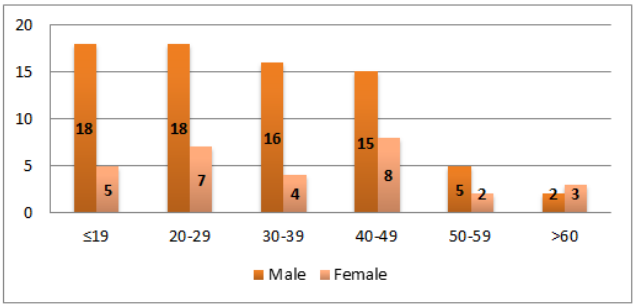


Figure 1. Age and sex distribution.

with male to female ratio of 2.5:1. The mean age of the study population was 31.68 ± SD years with the highest proportion in the age group of 20-29 (24%) years followed by 40-49 (22%) years and <19 years (22%) (Figure 1).

The maximum number of cases were reported during the month of June (26%), followed by May (20%), and July (15.56%). Seventy-one (68%) of the patients had a history of biting during the afternoon and night, whereas 32 (31.07%) of them were bitten during the early morning. The most common site of the bite was the lower limbs consisting of 64 (62.14%) cases, followed by 38 (36.89%) had bites over the upper limbs and 1 patient had a bite over the chest. Eighteen (17.48%) cases manifested with neurological symptoms and 24(23.53%) presented with vasculotoxic manifestation and 61(59.22%) of the cases were dry bites. A higher percentage (59%) of the cases had household snakebite, 29 (28.16%) at farming lands, 11 (10.68%) around the factory and 2(1.94%) cases were in the forest area. The majority of victims were farmers 32(31.07%). Students and pre-school-going children (23.3%)-21(20.39%), housewives (20.3%), labourers (19.4%), and security guards (4.8%) were also affected. One patient was a driver by occupation (Figures 2, 3, 4).

Normal GCS was reported in 84% of the cases while 16(15.53%) had low GCS. Complains recorded were, local pain in 49(47.57%), both localized pain and swelling in 35(33.98%) and 19(18.45%) had no complaints. Twenty-four (23.53%) of the cases had an increased 20-minute Whole Blood Clotting Time (WBCT), while 78(76.47%) had a normal WBCT. Three patients developed compartment syndrome (Figure 5).

Thirty-four (33.01%) cases were given a complete dose of ASV at our centre, and 18(17.48%) cases received incomplete doses of ASV from the referring centre, out of which 10(9.7%) cases had no indication for ASV. Respiratory paralysis was seen in 15(14.56%) cases which required mechanical ventilation, out of the 15 cases, 12

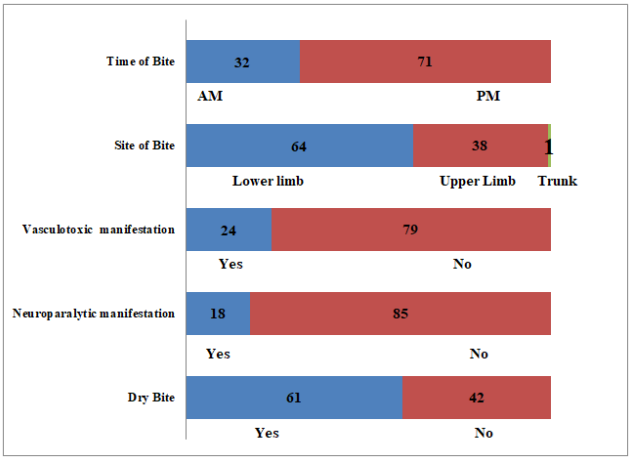


Figure 2. Time, site of bite and manifestation.

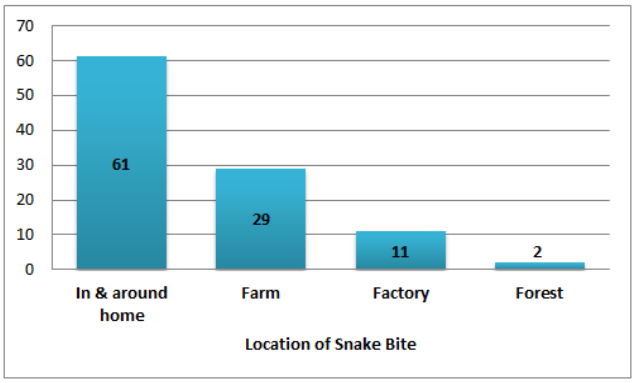


Figure 3. Location of bite.

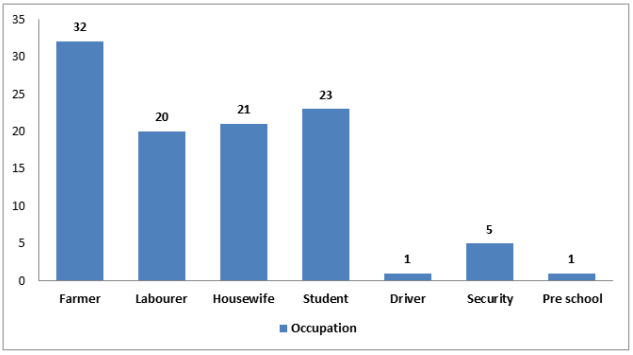
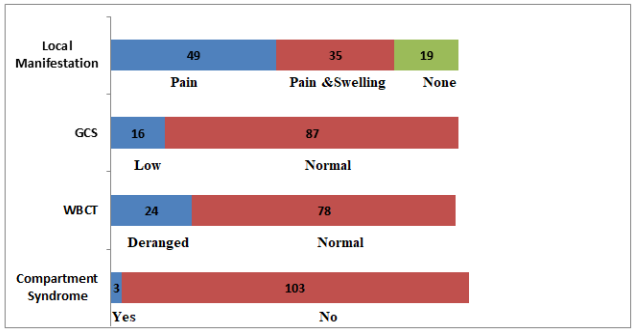


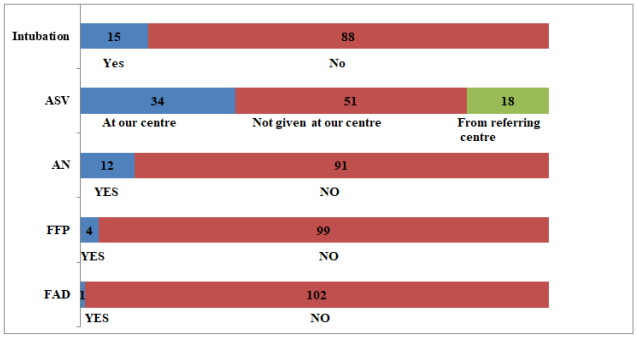
Figure 4. Occupation distribution.

cases responded to an atropine and neostigmine regimen. Four (3.8%) cases required transfusion of Fresh Frozen Plasma and 1(0.9%) case with acute kidney injury required Forced Alkaline Diuresis. A total of 41 cases with both neurological manifestations and vasculotoxic manifestations were transferred to other departments



(WBCT- Whole Blood Clotting Time, GCS- Glasgow Coma Scale)

Figure 5. Symptom manifestations.



(ASV- Antisnakevenom, AN-Atropine neostigmine, FFP-Fresh frozen plasma, FAD-Forced alkaline diuresis)

Figure 6. Intervention.

after initial management and stabilization. Cases with Dry bite (n = 61) were discharged with instructions of 24-hour observation and one (0.97%) patient with neurotoxic manifestation died (Figure 6).

4. Discussion

In our study, the majority of the victims were males with male to female ratio of 2.5:1. Agriculture being the predominant occupation and requires outdoor activities, mainly males are more involved in agricultural activities than females, hence increasing the predominance of male victims. Similar findings have been reported in studies conducted in different parts of the country[10-18]. Majority of the snake bite cases were in the age group of 20-29 years, it could be because young people are involved in much of outdoor activities. The observations are similar to a study conducted in South India[13]. Maximum number of snake bite cases were reported during the monsoon which further support of findings of other studies[15,16,19]. It is the time period from the beginning of the monsoon and the end where there are increased agricultural

activities and floods causing the destruction of the natural habitat of snakes. Most cases were reported between 12:00 pm to 12:00 am, this is because snakes come out of their habitat in the evening and night times, and even due to decreased visibility of the victim. This was similar to a study conducted in West Bengal[14]. The most common site of the bite was the lower extremities followed by the upper extremities and only one case over the chest while sleeping on the floor. Similar findings were present in many other studies[11,13,15-17,19-21]. Most of the cases were reported in and around the house, followed by fields and at the workplace. Similar observations were found in several other studies[17-19,22,23], this is because the majority of the rural population still lives in kutcha houses and practises walking barefoot on the farms. The common symptom in our study was localized pain, followed by localized swelling and no complaints were present in 18% of the patients. Similar findings were reported in the studies conducted in other parts of the country[13,22]. The majority of the cases were dry bites, followed by vasculotoxic manifestations and neurotoxic manifestations. Similar observations were found in studies conducted in North India and Maharashtra[24,25]. Studies from North Kerala showed vasclotoxic manifestations were the most common presentations[26]. While two ambispective studies conducted in North India showed neurological symptoms as the most common symptom[27,28]. This variation of symptom complex between north and south India is likely because neurotoxic snakes (krait/cobra) are more prevalent in the north while hemotoxic snakes are more common in the southern part of India[29]. Twenty-four patients with vasclotoxic bites had increased whole blood clotting time >20 minutes. Out of 18 cases of neurotoxin manifestations, 15 had respiratory paralysis and required mechanical ventilation, and 12 cases responded to ASV, atropine and neostigmine regimens. The observations are similar to the study conducted in North India[27].

ASV is the only specific treatment available for snake bite envenomation, As per WHO, the most effective treatment is the administration of monovalent ASV; however, it is not available most of the time because of its high cost and shortage of ASV, and the difficulty in correctly identifying the species of snake. As snakes inject the same amount of venom, children and adults receive the same dose of ASV[30]. In the current study 34 patients were given a complete dose of ASV in the emergency department, and 8 patients who received an incomplete dose of ASV were given complete dose in the emergency department and 10 patients were given incomplete doses of ASV from the referring hospitals although not indicated. Out of 24 cases of vasculotoxic bites, 3 patients developed compartment syndrome, 4 patients required FFP transfusion and 1 patient required forced alkaline dieresis. A study conducted outside India showed majority of the patients with vasculotoxic snake bites presented with compartment syndrome and required fasciotomy[31]. Sixty-one patients with dry bites were discharged from the emergency department after observation for 24 hours, and 41 patients were transferred to other departments for further management. Even patients with a history of scratch marks manifested with symptoms of envenomation, this signifies the admission of the patients for a period of 24 hours and observations for signs and symptoms of envenomation is required[32].

5. Conclusion

Early administration of ASV remained the mainstay of treatment in our study with almost 97% recovery. Our study suggested that snake bite is still the most common occupational hazard faced by the rural population. Farmers, children, women and labourers were the most vulnerable groups affected. 59% of the cases were dry bites who were discharged directly from the emergency department. 7% of the patients were given incomplete doses of ASV from the referring centres and 9% were given ASV without proper indications, which showed that there is still a lacuna in knowledge among the healthcare workers.

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