Clinical Profile of Snake Bite in Children at a Tertiary Care Center

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Abstract

Background: Snake bite is a common neglected emergency in children. The present research was undertaken to study clinical profile of snake bite in children below 12 years of age. **Method:** This was a 4 years retrospective (2011-2014) and 2 years prospective (2015-2016), observational study conducted in 43 children with history of snake bite admitted in paediatric Intensive care unit and ward of a tertiary care teaching hospital during a period of 6 years from 2011 to 2016. **Results:** Majority of cases were in the age groups of 9-12 years (46.5%) with male preponderance (65.1%). 79.10% children had snake bite during outdoor activity at day time (76.74%), lower limbs were the commonest site (65.1%) and 53.4% cases did not receive any appropriate first aid after snake-bite. 69.76% children were vasculotoxic. Common symptom/sign were local pain, swelling (95.3%) and cellulitis (70.02%). 46.51% children had moderate and 44.1% had severe grade of envenomation. ASV was administered in 95.3% of cases and most of the cases were treated with 11- 20 vials of ASV. Out of 3 died cases, 2 died due to respiratory failure and 1 died due to DIC with shock with AKI. **Conclusion:** The most vulnerable to snake bites were boys aged between 9-12 years. It must be emphasized that this study probably represent a biased population of sicker children, but we believe it should provide a good overview of children with snakebite present to tertiary hospitals.

Keywords: *Snake bite, Vasculotoxic, Envenomation, Respiratory failure, First aid, Swelling, Cellulitis*

Introduction

Snake-bite is a life-threatening medical emergency and major public health problem throughout the World, especially in tropical countries like India and also one of the commonest cause of morbidity and mortality, particularly in rural areas [1]. There are more than 2000 species of snakes in the world and about 300 species are found in India out of which 52 are venomous. The venomous snakes found in India belong to three families Elapidae, Viperidae and hydrophidae (Sea Snakes). The most common Indian elapids are Naja naja (Indian Cobra) and Bungarus caeruleus (Indian Krait), Daboia russalie (Russells' Viper) and Echis carinatus (Saw scaled viper) [2]. Clinical effects of envenoming by same species of snake are almost similar except a few regional variations. Kraits are active during night hours, often biting a person sleeping on floor bed. Maximum Viper and Cobra bites occur during the day or early darkness, while watering the planta-tion or walking bare foot in grown grass or soybean crops [3].

Every year about 2000 deaths occur due to snake-bite in Maharashtra. The majority of them remain unreported because many villagers go to traditional healers [4]. Children do not react to snake bites in the same way as adults. In children, the event is more severe since they are exposed to a larger amount of venom per meter

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square of body surface. Delay in seeking medical aid or ignorance among primary care physicians about the correct treatment of snake-bite is also responsible for the high morbidity and mortality. It is important to decide not only the proper regimens but also the modality of treatment in complication of snake bite cases. There are few studies focusing on snake bite on pediatric age group in India, and few across the world; with this background, present study was planned to study the clinical profile of snake bite in children at tertiary care center.

Materials and Methods

The present study was a 4 years retrospective (2011-2014) and 2 years prospective (2015-2016), observational study conducted in 43 children of age <12 years with history of snake bite admitted in paediatric Intensive care unit and ward of a tertiary care teaching hospital during a period of 6 years from 2011 to 2016. All children below 12 years admitted with unknown bite were excluded from the study.

Records of children below 12 years with history of snake bite admitted in Paediatric Intensive care unit or ward from 2011-2014 were analyzed retrospectively whereas records of 2015-2016 were analyzed prospectively. Demographic characteristics of the patients such as age, gender and the snake bite event like time of bite, site of bite, time of arrival to-hospital were recorded in a pre-structured proforma. Symptoms and signs such as local swelling, nausea, vomiting, ptosis, tachycardia, hypotension, impending respiratory failure, single breath count, bite to time of anti-snake venom (ASV), any treatment be-fore referral, total dose of anti-snake venom administered and duration of stay were documented. Complete blood count, liver function test, renal function tests, urine examination, coagulation profile (PT and INR) along with 20 minutes WBCT were also done. Outcome was defined in the form of discharge after completion of treatment, death or discharge against medical advice (DAMA). Severity of envenomation was correlated with the duration of hospital stay.

Statistical Analysis

Qualitative data was presented in the form of percentage. Correlation was studied between severity of envenomation and duration of hospital stay was estimated using Spearman's rho. Correlation of time lapse and mortality was studied using mean ± standard deviation and compared using unpaired't' test.

Observations and Results

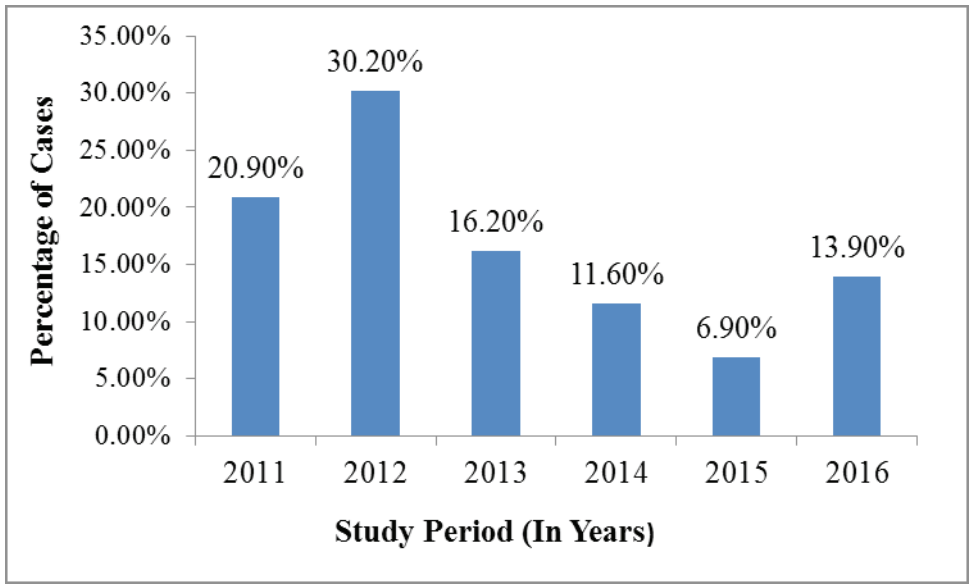
Among a total of 43 cases, 28(65.1%) were males and 15(34.8%) were females with male to female ratio of 1.8:1. The highest incidence of snake bite was observed in age group of 9 to 12 years (46.5%) with mean age of 7.1years, (Table 1). Most of the cases (20;46.5%) were from Thane district followed by Mumbai (14;32.55%) and Raigad district (9;20.93%).

Table 1: Age and sex-wise distribution of children with snake bite

Age group (in years)	Female	Male	Total
0-3	3 (20%)	3 (10.7%)	6 (14%)
4-8	6 (40%)	11 (39.3%)	17 (39.5%)
9-12	6 (40%)	14 (50%)	20 (46.5%)
Total	15 (100%)	28 (100%)	43 (100%)

During the study period maximum 13(30.2%) cases where admitted in year 2012 followed by 9(20.9%) in 2011 as depicted in figure 1.

Figure 1: Year wise distribution of snake bite cases



Most of the victim 34(79.10%) were bitten outdoors and at day-time (33;76.74%), lower limbs were the commonest site (65.1%) and 53.4% cases did not receive any appropriate first aid after snake-bite, (Table 2). 29(67.44%) cases received ASV and fourteen (32.56%) do not received any ASV before reaching tertiary care.

Table 2: Distribution of cases according to location, time, and site of snake bite, type of first aid received on spot

Parameters		No. of cases	Percentage
Location of bite	Indoor	09	20.90
	Outdoor	34	79.10
Time of bite	Day	33	76.74
	Night	10	23.25
Site of bite	Head and neck	07	16.3
	Upper limb	08	18.6
	Lower limb	28	65.1
Type of first aid received	Appropriate	14	32.55
	Inappropriate	23	53.48
	No first aid	06	13.95

26(60.4%) cases reached tertiary care within 0-12 hour, 13(30.23%) cases between 12-24 hours after snake bite. Four (9.3%) cases required more than 24 hours to reach tertiary care hospital of which one survived. Among total 43 cases, 30(69.76%) were observed to be vasculotoxic, 13(30.23%) were neurotoxic and no case of musculotoxic envenomation was observed.

Commonest symptoms/signs seen were local pain (41;95.3%) and localized cellulitis (40;93.02%). 28(65.1%) cases showed deranged >20WBCT whereas deranged LFTs (PT INR) were seen in 23(53.5%) cases. Around 8 cases (18.6%) showed hematuria as shown in Table 3.

Table 3: Distribution of cases according to Signs/Symptoms and Laboratory parameters

Signs/Symptoms	No. of cases	Percentage
Local pain and swelling	41	95.3
Anxiety and fear	35	81.39
Nausea/vomiting	27	62.8
Numbness in face and limbs	03	7.0
Local bleeding	24	55.8
Cellulitis	40	90.02
Ptosis	13	30.2
Respiratory difficulty	07	16.3
Hematuria	08	18.6
Laboratory parameters	No. of cases	Percentage
>20 min Whole Blood Clotting time	28	65.1
Deranged LFT (PT INR)	23	53.5
Haematuria	08	18.6
Metabolic acidosis	06	14.0
Anaemia	05	11.6
Deranged renal function	04	9.3

Only 4(9.3%) cases had mild envenomation, twenty (46.51%) had moderate and 19 (44.18%) had severe envenomation, which had 3 mortality. All children admitted received intravenous fluids and antibiotics. ASV was given to 41 (95.3%) cases and maximum cases required around 11-20 vials (mean-17.44 vials) of ASV, (Table 4).

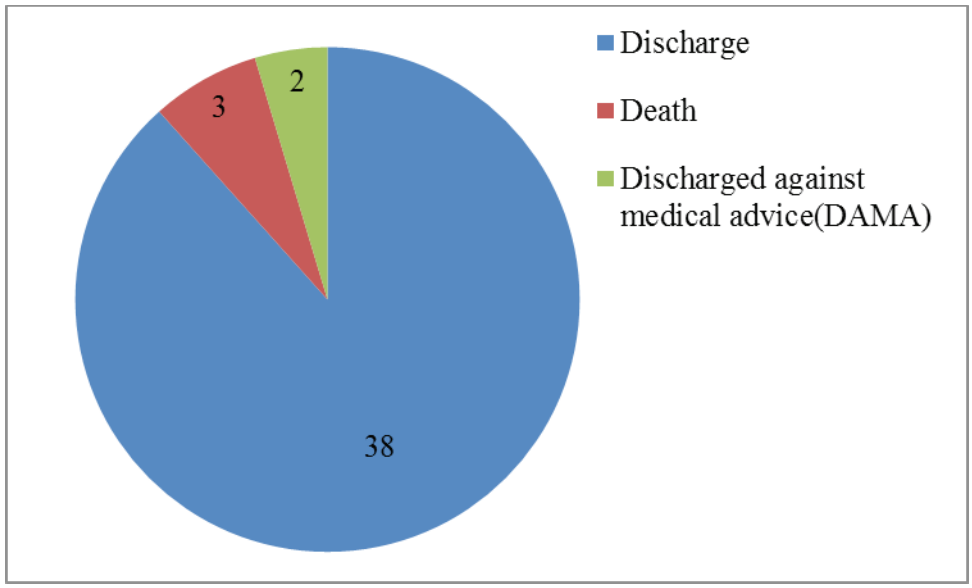
Table 4: Treatment given and no of ASV vial required

Treatment given	No. of cases	Percentage
Tetanus toxoid	39	90.7
Intravenous Fluids	43	100
Antibiotics	43	100
Anti-Snake Venom(ASV)	41	95.3
Oxygen	21	48.8
Ventilator Support	06	14
PRC/ FFP required	21	48.8
No of ASV vial required	Number of cases	Percentage
0-10 vials	09	20.9%
11-20 vials	23	53.5%
21-30 vials	11	25.6%

6(13.9%) cases developed compartment syndrome, 6(13.9%) had reaction to ASV. 4 cases were found to have respiratory failure, 1 case each with DIC and AKI. Most of the cases required around 6-10 days of stay at hospital (55.8%) followed by 0-5 days (39.5%) and 1 (2.3%) patient each required 11-15 days and 16-20 days of stay at hospital. There is no significant correlation between severity of envenomation and duration of IPCU stay (Spearman's rho = -0.032, p=0.839) or ward stay (Spearman's rho = -0.017, p=0.912) or total stay (Spearman's rho = -0.036, p=0.821).

Maximum i.e. 38 (88%) cases were successfully discharged, (Figure 2). Out of 43 cases, 3 died (2 cases due to respiratory failure and 1 case due to DIC with shock with acute renal failure). Those who died had a significantly higher time interval in reaching hospital (25.33 ± 0.577) as compared to those who did not die (10.53 ± 6.84), (P=0.001).

Figure 2: Outcome of the study



Discussion

Over the 6-year study period, 43 children of snake bite were admitted and managed at our institute. 46.5% of the snake bite occurred in the age of 9-12 years with mean age of 7.1yrs. The age distribution and highlights of high prevalence of snake bite in older children as similar to previous studies [5-8]. The probable reasons for this may be an active group more involved in outdoor activity like play, labor and farm work. Maximum (65.1%) cases were male which are in concordance with the majority of studies [5,9,10]. The higher incidence in boys could be due to their increased involvement in outdoor activities. The maximum cases of snakebite were from the peripheral areas of Thane like Wada, Shahapur, which has largest agricultural land. There were cases of snakebite in each year (2011-2016) and the year 2012 had maximum number of cases (13). Most of the cases of snake bite occurred in rainy season like in the month of June to September (44.1%). Study conducted by Lingayat et al [5] and Koirala et al [9] reported similar trends. However, the incidence varies in India due to different pattern of rainfall and agriculture activities. Majority of (79.10%) cases occurred during outdoor activity whereas 76.7% was during the day time. 65.5% of snakebites were in the lower limbs. These findings are similar to other studies [7,8].

Only 32.55% received appropriate treatment, 53.48% received inappropriate treatment, whereas 13.9% received no first aid. This shows that people are unaware about the appropriate first aid to be given to the victim of snakebite. 67.44% cases received ASV before reaching our tertiary care center. This is seen to be beneficial for the snakebite victim when they are delayed in reaching the tertiary referral center and a comparatively improved outcome is noted. 60.4% of cases were admitted in hospital after snakebite within 0-12 hours, whereas, 9.3% cases admitted after 24 hours of snakebite. We observe that delay in seeking medical aid was largely attributed to ignorance, inappropriate first aid, transportation delay, late referral from primary care centers due to unawareness of the snake-bite and its treatment. Mortality was observed in cases which required significantly higher time interval, more than 24 hours in reaching tertiary care hospital as there was no transportation facility at odd hours and unavailability of Pediatric intensive care facility with in 50kms of area. Type of envenomation vasculotoxicity was more common than neurotoxicity. Many other researchers reported a large number of neurotoxicity in their studies[5,8].

The local pain and swelling was commonest symptom (95.3%) whereas cellulitis was the commonest sign. Previous studies[5,8,11] reported swelling and pain as the commonest symptom and depend upon the type of envenomation. Neurotoxic snakebites mainly present with ptosis and respiratory difficulties while vasculotoxic presents with prolonged bleeding. In

existing study, according to the grade of severity [12], 46.5% showed moderate grade and 44.1% showed severe grade of snakebite. It was observed that cases with severe envenomation with other factors like delay in treatment had higher mortality. 65.1% cases had more than 20min whole blood clotting time deranged 53.5% cases had Liver function test with PT INR deranged, whereas 18.6% cases showed hematuria. After analysis of the laboratory report and clinical features, maximum types of snakes seen were vasculotoxic which resemble the study of Mead et al [13].

All cases received intravenous fluids and antibiotics. 95.3% (41 cases) received ASV as 2 cases went discharge against medical advice (DAMA) before receiving any ASV, 48.5% required blood transfusion in the form of FFP/PRC. 14% cases required ventilator support. Most of the cases which received ASV had moderate/severe envenomation. All the patients who received blood products had deranged coagulation profile. All cases requiring ventilator support had severe envenomation. 53.5% cases receiving ASV between 11-20 vials (mean dose-17.44 vials). Most of the cases were hemotoxic with moderate/severe envenomation hence requiring more amount of ASV as similar to the findings of Kumaravel et al [8] and Koirala et al [9]. 13.9% cases developed compartment syndrome requiring incision and release. 9.3% had respiratory failure requiring ICU and ventilatory support. 13.9%(6 cases) developed allergic reaction to ASV but no fatality. DIC and renal failure were observed in one case each. These complications were seen in cases which did not receive early ASV, increasing the rate of morbidity and mortality. Maximum cases (55.8%) had 6-10 days of stay in hospital as similar to study by Kumaravel et al [8].

Most cases (88.4%) were discharged whereas 9%(3 cases) died and 5%(2 cases) went discharge against medical advice (DAMA). DAMA was mainly due to ignorance of parents to understand the seriousness and curability of the condition. There was mortality of 3 cases, all had severe envenomation and reached hospital after 24 hours of snakebite. Two cases had neurotoxic envenomation and died due to respiratory failure whereas one case had vasculotoxic snakebite died secondary to DIC with shock and acute kidney injury. There was no significant correlation was observed between severity of envenomation and duration of hospital stay.

Conclusion

The most vulnerable to snake bites were boys aged 9-12 years because they spend considerable time outdoors. Common symptom/sign were pain, swelling and cellulitis. Delay in seeking medical aid was due to ignorance by the parents, inappropriate first aid provided, transportation delay, late referral from primary care center due to lack of awareness of snakebite and its treatment. Mortality was higher in those cases which required significantly higher time interval in reaching hospital and required Pediatric intensive care which was not available within 50 kms.

It must be emphasized that hospital based study probably represent a biased population of sicker children, but we believe it should provide a good overview of children with snakebite present to tertiary hospitals.

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Conflict of Interest: Nil

References

1. Shankhdhar AK, Joshi A, Kumar A. Clinical Profile and Management of Snake Bite Patient Attending a Tertiary Health Centre in Kumaon Region of Uttarakhand. Ann. Int. Med. Den. Res 2017;3(3):ME38- ME42.
2. Ahmed SM, Ahmed M, Nadeem A, Mahajan J, Choudhary A, Pal J. Emergency treatment of a snake bite: Pearls from literature. J Emerg Trauma Shock 2008;1(2):97–105.
3. Shende M, Gawali S, Bhongade K, Bhuskade V, Nandgaonkar A. Studies of adverse drug reaction profile of antisnake venom at district general hospital. Indo Americ J Pharm Sci 2017;4(09):3033-3039.
4. Khadse S. Snake Bite. J Pedia Crit Care 2016;3(2):33-41.
5. Lingayat AM. Study of clinical profile complications and outcome in patients of snake bite in pediatric age group. Ind Internat J Health Biomed Res 2015;3(3):203-208.
6. Bhusanpatnaik B, Varma BSK, Sujatha NV,

Satyasree TJ, Sreya A, Priyanka V. Clinical profile and outcome of snake bite in children. Pediatric Review: Internat J Pedia Res 2019;6(3):107-112.

7. Krishana VM, Sheikh NA, Soren C. Clinical profile and outcome of snake bite envenomation in children: a retrospective study in a tertiary care centre KIMS Narketpally. Int J Inform Res Rev 2014;1(11):155-158.
8. Kumaravel KS, Ganesh J. A study on the clinical profile of children with snake enven-omation in a tertiary referral centre at Dharmapuri, Tamilnadu, Ind Internat Journal of Research in Medical Sciences Kumaravel KS et al. Int J Res Med Sci. 2016;4(6):2142-2145.
9. Koirala DP, Gauchan E, Basnet S, Adhikari S, BK G. Clinical Features, Management and Outcome of Snake Bite in Children in Manipal Teaching Hospital. Nepal J Med Sci 2013;2(2):119-124.
10. Shrestha BM. Outcomes of Snakebite Envenomation in Children. J Nepal Paedia Soc 2011;31(3):192-197.
11. Hanumanna AK, Kariyappa M, Vinutha GN. Clinico-epidemiological profile of snake bite in children in a tertiary care centre: a hospital based study. Int J Contemp Pediatr 2018;5:124-128.
12. Ahmed SM, Ahmeb M, Nadeem A, Mahajan J, Choudhary A, and Pal J: Emergency treatment of a snake bite: J Emerg Trauma Shock. 2008;1(2):97–105.
13. Mead HJ, Jelinek GA. Suspected snakebite in children: A study of 156 patients over 10 years. Med J Aust 1996;164:467-470.