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Original Research Article

Clinical profile and outcome of snakebite in children at tertiary care centre in Hyderabad, India: a hospital based prospective observational study

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Abstract

Background: Snakebite is generally considered medical emergencies in many parts of the world, particularly in the rural population, and has been linked with the environmental and occupational conditions. Agricultural workers and pediatric groups are most affected in Southeast Asia especially India. This study was conducted to analyze the clinical profile, complications, and outcome of snakebite that will help in the prevention and treatment intervention in the pediatric population.

Methods: The present study was conducted at the pediatric tertiary center, Niloufer Hospital, Osmania Medical College, Hyderabad, India during the period of 1 year from January 2019 to December 2019. A total of 59 cases of snakebite were admitted to the pediatric department during the study period. After obtaining consent, data were analyzed for demographic data and other variables included are the site of the bite, time of the bite, time of arrival to hospital and type of snake, features of hematotoxicity and neurotoxicity, ASV requirement, complications, and outcome.

Results: Out of a total of 59 patients, 55.93% were male and most of the Snakebites were seen in the age group of 7-12 years. Clinically 48(81.35%) patients presented with signs and symptoms of envenomation and most of them were bitten during the months of June to July. Greater number of bites were unknown Snakebites and lower limb(57.62%) was the commonest site of the bite. Most of the Snakebites i.e. 23(38.98%) happened during evening time and 15 (25.42%) cases during night time. Most of the patients were primarily treated by medical personnel. Majority of patients (32.03%) developed clinical manifestations in 30 min to 1-hour duration followed by 13 cases (22.03%) within 30 min. Majority of patients (38.98%) arrived at the hospital in 3-6 hours. During hospital treatment, 79.66% of victims received anti-snake venom (ASV). Mechanical ventilation required in 12 cases (20.33%) in which the majority of cases (8.47%) were unknown Snakebites. The most common complication was cellulitis (20.33%) followed by respiratory paralysis/coma (15.25%) and coagulopathy (6.77%). Abdominal pain was observed in 11 (18.64%) cases and Abdominal pain was co-existed with neuromuscular paralysis (90.90%). Acute kidney injury was seen in 1 case (1.69%).

Conclusion: The most endangered group of children for Snakebites are boys aged more than 6 years. As most of the bites take place in lower limbs during evening hours, avoidance of outdoor activities, and protective clothing may significantly reduce the incidence of Snakebites. The presence of abdominal pain followed by neurotoxicity suggesting that pain abdomen is a potentially early feature of snakebite envenomation. Community education about prevention and first aid treatment, early transport, and admission in a hospital with good equipment will reduce the mortality from the snakebite.

Keywords: Snakebite, Snakebite envenomation, Neuroparalysis in children, Pain abdomen, Anti-snake venom.

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Introduction

Snakebite envenomations kills large number of people in every year worldwide especially in rural population in developing contries[1,2]. Most of the Snakebites and deaths are registered in Asia and Africa and it has estimated that 81000 Snakebites with 11000 deaths occur in each year in India[3] but according to India's latest national health profile (published in 2018) there were 1,42,366 Snakebites with 948 deaths occurred. This may be due to under reporting of Snakebites as many snakebite victims could not reach hospital. Most Snakebites occur in agricultural workers during rainy season in developing nations like india[4]. Snakes are most likely to bite human being when the snake is trodden on, by someone who is bare footed, when snake comes in to the home at night (usually krait) in search of its food, and when sleeping on floor. WHO has promulgated that Snakebite is a neglected tropical diseases as Snakebite envenomation is become public health hazard in tropical and subtropical region in June 2017[5]. The highest number of Snakebites were seen in india and it account for high mortality globally [3].Children and young adults are the factors associated with severe envenomation as large amount of venom relative to body surface area[7].There is about 52 snakes are known to be poisonous in india includes Elapidae family (common cobra, king cobra and krait), viperidae family (russells viper) and hydrophidae family(sea snakes) in which viperidae and elapidae families are medically significant venomous snakes. The peak age for Snakebite is school age children, adolescent and young adults and peak fatality rate is in young children and the elderly (WHO UNICEF, 2008). The risk of envenomation and clinical manifestations depends on species and type of bite such as dry bite or wet bite in children. Some time it may be strongly suspected from parents description or circumstances of the bite or known effects of venom of snake species. Snakebite is one of the common morbidity and mortality in rural set up. As a result, Snakebite is considred as important medical emergency and admission in health center. So, this prospective descriptive study was carried out to ascertain clinical profile, complications and outcome of Snakebite in pediatric population.

Materials and Methods

The present study was conducted at pediatric tertiary center, Niloufer hospital, Osmania Medial College, Hyderabad, India during period of 1 year from January 2019 to December 2019.

Inclusion criteria

Patients of age less than 12 years in Telangana region admitted with suspected or confirmed Snakebite.

Exclusion criteria

1. Patients brought dead with history of Snakebite.
2. Cases of unknown bites in the absence of fang marks or any other symptoms not suggestive of venomous Snakebites were also excluded.

A total of 59 cases of Snakebite were admitted in pediatric department during the study period. After obtaining consent data was collected on predesigned, pretested and structured questionnaire by interviewing the parents of the study subjects.

A detailed information regarding demographic and epidemiological parameters such as age, sex, residence, site of bite and place of bite , type of snake if identified etc. was obtained. Time interval to reach the health facility after Snakebite and first aid received if any was asked. Time interval between Snakebite and clinical manifestations suggestive of hematotoxicity, neuro toxicity and local symptoms including fang marks, condition of the wound and initiation of treatment were recorded. A detailed systemic and local examination was carried out in all patients. Routine and specific investigations were done, including complete hemogram, peripheral smear, renal function test, liver function test, BT, CT, whole blood clotting time. According to WHO protocol patients were treated with polyvalent anti-snake venom[11,8].The specific antidote for snake venom is anti-venom which is a immunoglobulin purified from plasma of horse. Antivenom can be monovalent (specific for one species of snake) or polyvalent. In India each milliliter of polyvalent anti-venom is supposed to neutralize 0.6 mg of Indian cobra venom , 0.6 mg of russel viper venom, 0.45 mg of common krait venom, 0.45 mg of saw scald viper venom[12,9].According to the severity of symptoms freeze-dried antivenom is reconstituted with 10 ml of sterile water then 50-150 ml of ASV was diluted with 200 ml of normal saline and infused at a constant rate over a period of 1 hr. During hospital stay complications and sequelae were noted. Resuscitation, requirement of ventilation and duration of ventilation was obtained.

Results

A toal of 59 cases of Snakebites, under 12 years of age were analyzed. Among them 33 (55.93%) were males and 26 (44.06%) were females. The highest incidence of Snakebite was observed in the age group of 7 12 years (64.40%), followed by 33.89% in the age group

of 2 to 6 years and least i.e. 1.69% in the age group of less than 1 year.(Table I) .A majority of the cases were from the rural area (83.05%) and remaining (16.94%) were from urban patients. Among urban patients 8.47% cases were bitten in outdoor and 6.77% cases from indoor bites. Lower limbs were the most common site of bites where marks were seen in 34 patients (57.62%). This is followed by upper limbs (20.33%) which had bite marks and head & face (03.38%). Unknown site of Snakebite were seen in 11 cases (18.64%).(Table I) Most of the Snakebites i.e. 23(38.98%) occurred during evening time and 15 (25.42%) cases during night time. Nine cases (15. 25%) were reported in early morning followed by 8.47% cases in morning and 6.77% cases in day time.(Table II) Majority (44.06%) of the bites were unknown Snakebites. In known Snakebites 18.64% were admitted with viper bites, 8.47% with cobra bites and 11.86% with krait bite. Suspected Snakebites were recorded in 16.94% of cases. (Table II)Regarding the seasonal variation maximum Snakebites were observed during the period of Jun (22.03%) –July (20.33%), which coincides with the rainy season in India.(table III).Majority of patients (32.03%) developed clinical manifestations in 30 min to 1 hour duration followed by 13 cases (22.03%) within 30 min. In 6 cases (10.16%) clinical manifestations developed after 6 hours. Majority of patients (38.98%) reached hospital in 3-6 hours followed by 16 cases (27.11%) in 1-3 hrs and 15 cases (25.42%) reached after 6 hours. Among 59 Snakebite cases, maximum (40.67%) were having swelling at the site of bite followed by pain (22.04%), ptosis/ ophthalmoplegia (22.03%), pain abdomen (18.64%), altered sensorium/ drowsiness (13.55%) and bleeding from bite site (11.86%). Other manifestations include itching (1.69%), blisters (5.08%), fever (3.38%), vomiting (8.47%), limb weakness (5.08%) and seizures (1.69%). Fang marks were seen in 34 cases (57.62%). There were no signs of envenomation in 11 cases (18.64%) and 49 cases (83.05%) had history of Snakebite. Among the neuroparalytic bites, 11 patients presented with abdominal pain which was the main presenting complaint. (Table IV). In most cases (57.62%) the victims received no first aid immediately after the bite. During hospital treatment, 79.66% of victims received anti-snake venom(ASV) treatment. Among 59 cases 4.77% cases needed resuscitation. Mechanical ventilation was required in 12 cases (20.33%) in which majority cases (8.47%) were unknown Snakebites followed by suspected 4cases (6.77%), cobra 2(3.38%) and krait 1 case(1.69). (table VI). Out of 12 ventilated cases, 6 cases needed ventilation for 24 hours and one case required more than 72 hours. In our study 5-10 ASV vials were required in 12 (20.33%) cases followed by 16-20 vials in 8 (13.55%) cases. In 4 (6.77%) cases patients required more than 60 vials and maximum 80 vials were given in 1 case. No ASV was given in 12 cases (20.33%). In most cases (30.50%) ASV was given in 1 cycle and 5 cases (8.47%) required more than 6 cycles. (Table V).Most common complication was cellulitis (20.33%) followed by respiratory paralysis/coma (15.25%) and coagulopathy (6.77%). Acute kidney injury was seen in 1 case (1.69%). Reaction to ASV was seen in 4 cases(6.77%) . (table IV)After admission to this hospital 52 (88.13%) cases were completely cured, 4 (6.77%) cases died and 3 (05.08%) cases absconded.(table VII)

Discussion

The most affected age group for Snakebites in our study was children over 6 years of age because they are engaged in outdoor games and activities like grass cutting, cattle grazing in rural area. In this study, 64.40% of the total cases belonged to age group 7-12 years. Similar types of age distribution were reported by Kumaravel KS et al[10], Chandrashekar C et al[11], Krishana VM et al[12]. Incidence was more in boys (55.93%) as compared to girls (44.06%), this is similar to other studies as boys are more active in outdoor games[13,14].In the present study, most of the snakebite cases were from rural areas (83.05%) and were outdoor incidents (57.14%).Snakebites are more common on the lower extremities because children have bitten by snake whilewalking or playing in the evening and night[15]. We found that 34 (57.62%) patients had bite marks on thelower limbs similar to various studies which have shown that in 70-86% patients bite marks arepresent on the lower limbs[16,17]. 20.33% bite marks were seen on the upper limbs as children are curious about hiding places of snakes such as crevices.The majority of Snakebite envenomations which occurred during evening(17:00-19:59) and night i.e., 20:00 to 4:59 hour (Table 2). Those who have bites in evening and night were developed neurotoxicity in large number. Previous studies support this association, as Common Kraits are most injurious during the night hours [18,19].Majority of the Snakebites were happened in the month of June-July, similar finding was obtained by Bawaskar and Bawaskar[19].Majority of the bites were unknown Snakebite (44.06%) in the present study as children are not able to identify type of snake species. Among known bites viper bite was more common (18.64%) than krait (11.86%) and cobra (8.47%) bites. In

contrast, study conducted by Shyna et al[20] showed that majority of the bites were viper (46%) followed by unknown bites (36%). Another study conducted by Amitabha et al[21] showed that greater number of the bites were by Elapids (46%) followed by viper (38 %).It was observed that only a few of the patients attended hospital within the 1st hr of bite and the greater attended between 1st and 6 hrs. 16 patients arrived at this hospital after 12 hrs of bite. This delay was associated with poor prognosis. The delay from bite to treatment dissimilar in studies from different health care centers in India[22,23]. We observed that 38.98% cases arrived to the hospital within 3 to 6 hour of bite, 27.11% cases within 1 to 3 hours and remaining after 6 hours of bite. In a similar study conducted by Shyna et al[21], 86% of the subjects reached hospital within 6 hours. Most of the patients had developed clinical manifestations within 1hour of Snakebite. Among neurotoxic bites pain abdomen, pain at local site (22.03%) altered consciousness (13.55%) and ptosis/ophthalmoplegia (22.03%) were noted. Similar features were reported by Gautam P et al[24], Adhisivam B et al[25].In our study the presenting symptoms were swelling (40.67%) and bleeding (11.86%) from the site of bite. On local examination we observed bite marks in 57.62% cases and blister formation in 5.08% cases. Abdominal pain was observed in 11 (18.64%) cases and Abdominal pain co-existed with neuromuscular paralysis (90.90%). Similar to kularatne at al[26].Most of the snakebite victims received ASV vials upto 20, in few cases more than 60 vials were given in this study. Some studies described lower doses of antivenom (average vials = 16, range 2–140 vials [27,28].Some other studies showed that no differences between higher and lower dosage of ASV infusion in terms of mortality[29].Mechanical ventilation was required in 12 cases (20.33%) in which majority cases (8.47%) were unknown Snakebites followed by suspected 4cases(6.77%), cobra 2(3.38%) and krait 1 case(1.69). These unknown and suspected Snakebites were could be neurotoxic bites as children are not able to identify type of snake .In most cases (57.62%) the victims received no first aid (tourniquet, herbal, blood sucking, TT injections and ASV in PHCS) immediately after the bite. During Snakebite management, 79.66% of victims received anti-snake venom (ASV). The most effective treatment for Snakebite envenomation is IV infusion[30]. Now anti snake venom is available in all public hospitals with free of cost, particularly in the remote rural areas also as awareness of ASV is increased. Cellulitis is the most common finding as observed in Meshram RM et al[31]. Acute renal failure developed in 1 (0.68%) patient who had presented 8 hours after the bite reported by kshirsagar VY,et al[32].The overall mortality rate in the present study was 6.77%. The mortality rate was 10.3 % reported by Jayakrishnan et al[33].Immediate death after Snakebite is rare but it can happen after many hours in case of elapid bites and it may takes days in viper bites. Mortality rate after Snakebite depends upon various factors like amount of venom injected, site of bite (serious if bitten on the trunk or head, neck and face), species and size of the snakes, and time to arrival to the hospital. It also depends on age the victim(as envenomation in a child is serious and fatal) and availability of ICU care.

Conclusion

The most endangered group of children for Snakebites are boys aged more than 6 years. As most of the bites take place in lower limbs during evening hours , avoidance of outdoor activities and protective clothing may significantly reduce the incidence of Snakebites. Presence of abdominal pain followed by neurotoxicity suggesting that pain abdomen is a potentially early feature of Snakebite envenomation. Community education, early arrival and admission in a hospital with well equipment will reduce the mortality from Snakebite.

Table-1:Demographic data

Age and Sex wise distribution			
Age group	Male (%)	Female (%)	Total (%)
0-1yr	1(1.69)	0	1(1.69)
2-6yr	12(20.33)	8(13.55)	20(33.89)
7-12yr	20(33.89)	18(30.50)	38(64.40)
total	33(55.93)	26(44.06)	59
Site distribution of Snakebite			
Site		No. of patients (%)	

Lower extremity	34(57.62)
Upper extremity	12(20.33)
Head, Neck and Face	2(3.38)
Trunk	0
Unknown	11(18.64)
Total	59

Table-2: Timing of Snakebite and type of snake

Timing of Snakebite	No. of patients (%)
Early morning(03:00-04:59)	9(15.25)
Morning(05:00-09:59)	5(8.47)
Day (10:00-16:59)	4(6.77)
Evening (17:00_19:59)	23(38.98)
Night (20:00-02:59)	15(25.42)
Unknown	3(5.08)
total	59
Type of snake	No. of patients (%)
Cobra	05 (8.47%)
Viper	11(18.64%)
Krait	07(11.86%)
Unknown snake	26(44.06%)
Suspected snake	10(16.94%)

Table-3:Month wise distribution of Snakebite

Month	No. of patients (%)
January	2 (3.38)
February	5 (8.47)
March	4 (6.77)
April	2 (3.38)
May	4 (6.77)
June	13 (22.03)
July	12 (20.33)
August	8 (13.55)
September	2 (3.38)
October	3 (5.08)
Novemer	4 (6.77)
December	0
Total	59

Table-4:Clinical manifestations and Complications

Clinical manifestations	No. of patients (%)
History of Snakebite	49(83.05)
No envenomation	11(18.64)
Local symptoms/signs	
Fang marks	34(57.62)
Pain/tenderness	13(22.03)
Itching	1(1.69)
Swelling	24(40.67)
Blister	3(5.08)
Bleeding from bite site	7(11.86)
Systemic symptom/signs	
Fever	2(3.38)
Vomiting	5(8.47)
Pain abdomen	11(18.64)
Ptosis/ophthalmoplegia	13(22.03)
Limb paresis	3(5.08)
Altered sensorium/drowsiness	8(13.55)
Seizures	1(1.69)
Complications	
Cellulitis	12(20.33)
Respiratory paralysis/coma	9(15.25)
Acute kidney injury	1(1.69)
Coagulopathy	4(6.77)
Reaction to ASV	4(6.77)
death	4(6.77)

Table-5:Treatment -Average ASV vials & cycles

No. of ASV vials	No. of patients (%)
No vials	12(20.33)
Less than 5	6(10.16)
5-10	12(20.33)
11-15	6(10.16)
16-20	8(13.55)
21-25	2(3.38)
26-30	6(10.16)
31-40	1(1.69)
41-50	1(1.69)
51-60	1(1.69)
More than 60	4(6.77)
No. of cycles	No. of patients (%)
1cycle	18(30.50)
2	12(20.33)
3	10(16.94)
4	1(1.69)
5	1(1.69)
>6	5(8.47)

Table- 6: Requirement of ASV, Resuscitation and Mechanical ventilation

Type of snake	No. of patients (%) required		
	ASV	Resuscitation	Mechanical ventilation
Cobra	5(8.47)	1(1.69)	2(3.38)
Viper	11(18.64)	0	0
Krait	5(8.47)	0	1(1.69)
Unknown Snakebite	18(30.50)	3(5.08)	5(8.47)
Suspected Snakebite	8(13.55)	0	4(6.77)
total	47(79.66)	4(6.77)	12(20.33)

Table-7: Outcome of Snakebite

Type of Snakebite	Death (%)	Recovered (%)	Absconded/LAMA
Cobra	1(1.69)	4(6.77)	0
Viper	0	11(18.64)	0
Krait	0	7(11.86)	0
Unknown Snakebite	2(3.38)	21(35.59)	2(3.38)
Suspected Snakebite	1(1.69)	8(13.55)	1(1.69)
total	4(6.77%)	52(88.13%)	3(5.08%)

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