

The Study of Clinico-Epidemiological Profile and Outcome of Poisonous Snake Bites in Children

Shahzadi Asma Tahseen

ABSTRACT

Objective: To study the poisonous snake bite cases with particular attention to demography, epidemiology, clinical profile and outcome in children.

Study Design: Observational / Descriptive / cross sectional study

Place and Duration of Study: This study was carried out at the Pediatric Unit I, Bahawal Victoria Hospital Bahawalpur from 1st January 2012 to 31st December 2013.

Methods and Materials: The record of 41 cases of poisonous snake bite admitting in Bahawal Victoria Hospital Bahawalpur was reviewed. Detailed information was collected.

Results: Among 41 cases studied 85.37% were males. The majority of the cases (68.29%) were in the age group of 10-15 years. The majority of the cases (97.56%) were from rural area. The site of bite was on lower extremity in 82.93% cases. The timing of snake bite was evening or night in 87.8% cases. The 68.29% snake bites were in the months of monsoon season. The main type of envenomation encountered in this study was vasculotoxic. The common symptoms include local edema in 82.92%, pain in 75.61%, cellulitis in 63.41%, bleeding from bite site in 43.9% cases. The mean ($\pm$ SD) antivenom vials used was 9.39 ($\pm$ 4.77). Abnormal bleeding profile was noted in 58.54% cases. The mean ($\pm$ SD) hospital stay was 6.27 ($\pm$ 1.75) days. The case fatality rate was 4.88%.

Conclusion: Anti snake venom should be a part of primary health care in areas where snake bites are common thereby referral to higher centers can be minimized and timely treatment can be given.

Key Words: Vasculotoxic; Case fatality rate; Snake antivenom; Neurotoxic; Snake envenomation

Citation of article: Tahseen SA. The Study of Clinico-Epidemiological Profile and Outcome of Poisonous Snake Bites in Children. Med Forum 2016;27(4):28-32.

INTRODUCTION

Snake bite is one of the most neglected public health issues in the tropics. Because of serious under-reporting, the true worldwide burden of snake bite is not known. In Pakistan, 40,000 bites are reported annually, which result in up to 8,200 fatalities. There are about 216 species of snakes identifiable in Indopak, of which 52 are known to be poisonous.¹

The patterns of snake envenomation depend on the species of snake, which may cause minimal envenomation, neurotoxicity, vasculotoxicity and myotoxicity.^{2,3} The severity of envenomation is classified as mild or grade I (local effects such as swelling, pain, tenderness confined to the immediate bitten part, no systemic effects, no clinical or laboratory coagulation abnormality), moderate or grade 2 (local effects such as swelling, pain, tenderness/echymoses extending beyond the immediate bitten part, systemic effects like nausea, vomiting, fasciculation, mild

hypotension with evidence of coagulopathy but without clinical bleeding), or severe or grade 3 (local effects extending and involving the entire limb along with systemic effects like shock, severe bradycardia, tachypnoea or respiratory failure and marked coagulation abnormalities with bleeding manifestations).⁴

There is evidence that peak case fatality is in young children and the elderly. Snakes inject the same dose of venom into children and adults^{5,6} so children seem to have more serious local and systemic complications than adults.⁷

Majority of studies done in the world have been done on adult snake bite victims. Studies done solely on pediatric victims are very sparse especially performed in Pakistan.⁸ Bite circumstances, the time taken to admit patient to the hospital, clinical presentation, complications and the outcome of pediatric snake bite victims may differ significantly from adult snake bite victims. Therefore, this study was carried out in a tertiary care unit of South Punjab, Pakistan with particular attention to demography, epidemiology, clinical profile and outcome of snake bites in children.

MATERIALS AND METHODS

This observational / descriptive / cross sectional study was conducted in Pediatric unit I, Bahawal Victoria

Department of Pediatrics, The Civil Hospital, Bahawalpur

Correspondence: Dr. Shahzadi Asma Tahseen,
Postgraduate Registrar, Department of Pediatrics, The Civil
Hospital, Bahawalpur.

Contact No.: 0300-6848195

E-mail: asmatahseen13@gmail.com

Received: January 30, 2016;

Accepted: March 03, 2016

Hospital Bahawalpur, a tertiary referral hospital of South Punjab, Pakistan.

The ward admission record of patients below the age of fifteen years who were diagnosed as 'snake bite' from 1st January 2012 to 31st December 2013 was reviewed. All the children who presented with alleged history of snake bite and received polyvalent antsnake venom for treatment were included in the study. The children with incomplete data or who received antsnake venom before presenting in this hospital were excluded from the study.

The clinical data about age, sex, season pattern, biting site, first aid prior to admission, clinical manifestations, main type of envenomation (vasculotoxic, neurotoxic, myotoxic), number of anti-snake venoms vials used, complications and outcome were obtained from case records and were analyzed. Anti snake venom was giving according grading of envenomation. In Grade 1 antsnake venom dose 5 vials, in Grade 2 ten vials while in Grade 3 fifteen vials were given by intravenous infusion. Depending on the clinical response the dose was repeated till all the systemic signs and symptoms disappeared. The end point of the study was normalization of hematological or neurological parameter or death.

Vasculotoxicity (or a vasculotoxic bite) was defined as severe local symptoms along with a marked vasculotoxic effect, which included intense local pain, swelling, echymoses, blisters, severe oozing, nausea, vomiting, vasculotoxic effects such as petechial haemorrhage, epistaxis, hematemesis, melena and eventual shock. Neurotoxicity (or a neurotoxic bite) was defined as the existence of mild local symptoms, marked neurotoxic manifestations, including a slight burning pain at the bitten site with triple response, nausea, vomiting, giddiness, lethargy, muscular weakness, spreading paralysis (within 15 minutes to 2 hours), dysphasia, dysphagia, ptosis, external ophthalmoplegia, slow laboured breathing and respiratory arrest with or without convulsion. Myotoxicity (or a myotoxic bite) was defined as a sharp initial prick (painless later), generalised muscular pain, stiffness (starting in the neck and limb girdle), myoglobinuria as characterised by the brown discolouration of urine and eventual respiratory failure.⁹

Statistical Analysis: Data was entered and analyzed using SPSS 16. Descriptive analysis using inter-quartile ranges and mean $\pm$ Standard deviation (SD) were described for continuous variables. For categorical variables, proportions were depicted as percentages of cases. The appropriate statistical test was used where needed and p value less than 0.5 were taken as significant.

RESULTS

A total of 41 cases of snake bite were admitted in the hospital during the study period. The various characteristics of studied cases are shown in table I.

Table No.1: Characteristics of the cases (Total cases 41)

Characteristic	Cases	Percentage
Age groups		
Less than 5 years	3	7.32
5-10 years	10	24.39
10-15 years	28	68.29
Sex		
Male	35	85.37
Female	6	14.63
Area		
Rural	40	97.56
Urban	1	2.44
The site of bite		
Lower extremity	34	82.93
upper extremity	6	14.63
Neck	1	2.44
The timing of snake bite		
Evening / night	36	87.8
Timing of rest of day.	5	12.2
Biting season		
Monsoon season (July to September)	28	68.29
April to June	9	21.95
January to March	3	21.95
October to December	1	2.44
Snake bite evidence		
Snake bite marks seen	29	70.73
Snake seen either by the victim or the bystander	25	60.97
Two clear, distinct bite marks	18	43.9
Main type of envenomation		
Vasculotoxic	36	87.8
Neurotoxic /Myotoxic	5	12.2
Taken by the patient in reaching the hospital after bite		
Within 6 h of the bite	3	7.32
Within 6-12 hours of bite	17	41.46
Within 12-24 h	16	39.02
More than 24 h after the bite	5	12.2
Local first aid treatment from quacks or peers or health practitioners before reaching the hospital	14	34.15
The type of first aid given		
Application of tourniquet	10	24.39
Local application of lime	2	4.88
Chillies	1	2.44
Herbal medicine	1	2.44
The grading of envenomation		
Grade I	14	34.15
Grade 2	23	56
Grade 3	4	9.76
Prolonged PT/APPT time, prolonged bleeding time or thrombocytopenia alone or in combination	24	58.54
Blood products used		
Fresh frozen plasma	13	31.17
Blood transfusion	10	24.39
Case fatality rate	2	4.88
Complications.		
Compartment syndrome	3	7.31
Gangrene of toe	1	2.44

The mean ($\pm$ SD) age of the cases was 10.76 ($\pm$ 3.33) years while that of the males was 11 ($\pm$ 3.12) and that of females was 9 ($\pm$ 4.64) years (p value 0.2123). The mean ($\pm$ SD) time taken in the appearance of first symptom was 5.90 ($\pm$ 3.76) while the mean ($\pm$ SD) time taken by the patient in reaching the hospital 14.22($\pm$ 7.91) hours. The various clinical features seen in patients are shown in table 2.

The mean $\pm$ antsnake venom vials used were 9.39($\pm$ 4.77). In all cases antsnake venom was given once except in two (4.88%) cases where the doses were repeated. One case (2.44%) developed allergic reaction in the form of urticaria. The mean ($\pm$ SD) hospital stay was 6.27 ($\pm$ 1.75) days. The surgical intervention was required in 4 (9.76%) patients while one (2.44%) patient needed ventilator care due to paralysis. The two children who died had history of bite more than 10 hours and both died within 4 hours of arrival in the hospital.

Table No.2: Clinical features of the cases (Total cases 41)

Clinical feature	Cases	Percentage
Local edema	34	82.92
Pain	31	75.61
Cellulitis	26	63.41
Bleeding from bite site	18	43.9
Gum bleed	15	36.58
vomiting	15	36.58
Hematuria	12	29.27
Hemetemesis	8	19.51
Pain abdomen	11	26.83
Respiratory distress	2	4.88
Ptosis	2	4.88
Weakness of the limbs	2	4.88

DISCUSSION

The types of snakes and their envenomation vary across the world. This study was conducted in a teaching hospital of South Punjab, the agricultural belt.

There were 85.37% males in this study. There were 90% males in the study done at the same center by Khichi et al 2003.⁹ Other studies¹⁰⁻¹⁷ also showed male preponderance in the range of 54%-65% cases but, Ahmed et al 2011¹⁸, unlike other studies, showed equal male to female ratio. The male predominance in these studies was due to the fact that male children were more active outdoors. Moreover there is male preference in Indo-pak subcontinent for treatment.

The mean age of the cases in this study was 10.76 years. Other studies showed mean age 8.2-9.9 years.^{15,18,19} Our study showed that the majority of the cases (68.29%) were of 10-15 years age group. The other studies also showed the same pattern.^{8,10-14} This may be due to the fact that older children in our part of the world have to carry out outdoor activities like looking after the cattle in the fields and field-working that exposing them to snakebites. The majority of the

cases (97.56%) were from rural area. Other studies^{10,32} also confirmed our findings.

This study showed that the site of bite was on lower extremity in 82.93% cases, followed by 14.63% on upper extremity. The most of the studies^{8,10,12, 14,19} also showed that lower limbs were the most common site of bites but Shrestha 2002¹¹ and Paudel et al 2012¹³ showed that the fingers and hand were the most common biting sites. The finding of most of the studies showing the lower extremity as most common biting site might be due to the fact that the snakes had been accidentally stamped while walking or playing in the dark. Children are also very curious and have the habit to explore various holes and crevices that may be the hiding places of snakes. Similarly there are increased chances to touch the snakes while cutting the grass. This may explain the bite marks on the upper limbs.

The timing of snake bite was evening or night in 87.8% cases in this study. Other studies^{8, 13,14} also gave similar pattern of timings but Ahmed et al 2011¹⁸ showed majority of the bites occurred during day time. The reason of this disparity seems to be that levantine viper (common in that area) is usually inactive during daytime, but quite alert and apt to attack swiftly if disturbed. The majority of cases (68.29%) were noted in the months of monsoon season in this study. The other studies^{8,10-13,18} also confirmed this finding. The reason is snakes are compelled to come out of their shelter because of the increased humidity and temperature during these months.

The main type of envenomation varied in different studies. The main type of envenomation encountered in this study was vasculotoxic in 87.8% cases. Kshirsagar et al 2013¹² showed the bites were vasculotoxic in 90.74% and neurotoxic in 9.25% patients while the study done by Koirala et al 2013¹⁰ showed that in 97% cases envenomation was mainly vasculotoxic while only in 3% cases it was neurotoxic. Ahmed et al 2011¹⁸ showed about 80% were vasculotoxic and 20% were mixed. On the other hand Paudel et al 2012¹³ showed all cases were neurotoxic.

The common symptoms included local edema in 82.92%, pain in 75.61%, cellulitis in 63.41%, bleeding from bite site in 43.9%, gum bleed 36.58% and vomiting in 36.41% cases in our study. The most common presenting symptoms included pain^{8,10}, local swelling^{8,10,14} bleeding from bite site^{10,14} in other studies. Kshirsagar et al 2013¹² found local edema in 100% and cellulitis in 15.6% of cases with vasculotoxic envenomation while diplopia in 73.3%, respiratory distress in 66.7%, pain in abdomen in 60% and vomiting in 20% cases with neurotoxicity envenomation. Unlike our study Shrestha 2002¹¹ and Paudel et al 2012¹³ showed that ptosis was the commonest followed by respiratory distress. In these two studies most of the cases were neurotoxic.

The mean time taken by the patient in reaching our hospital after bite was 14.22 hours in this study. Ozay et al 2005 et al¹⁵ showed the same duration of time while other studies^{10,18} showed that the time taken by the patients in reaching the hospital was much less (3.8-8.97 hours). There were only 7.32% cases who reached the hospital within 6 h of the bite in our study while other studies¹¹⁻¹⁴ showed that majority of children reached the hospital in <6 hours of bite. The reason of this delay may be due to the fact that snake bite is more common in rural areas where non availability of transport during night hours makes the approach to the health centre difficult. Other reason may be the mentality of the villagers to seek treatment from quacks initially.

There were 34.15% cases who got local first aid treatment from quacks or religious persons (peers) or health practitioners before reaching the hospital. The first aid given was in the form of application of tourniquet in 24.39%, local application of lime in 4.88%, chillies in 2.44% and herbal medicine in 2.44%. Shrestha 2002¹¹ showed that tourniquets were used as first-aid measures in 42.5% of cases. Karunanayake et al 2014¹⁴ used tourniquet in 9% cases while immobilization was used in 75% cases as first aid types. These differences are due to differences in local practices.

The main grade of envenomation in this study was grade 2 in 56% followed by grade I in 34.15% cases. The other studies^{10,15} also showed similar pattern of grading of envenomation. The mean antsnake venom vials used in this study was 9.39 vials. The average antsnake venom vials used in other studies^{10,11,13,18} were 13.29-20.7. This difference in antsnake venom vials requirement may be due to differences in the type and grade of envenomation. Allergic reactions was uncommon (2.44%) in this study as well as in other studies^{12,19} but the study done by Koirala et al 2013¹⁰ showed that 17.6% cases developed allergic reaction.

Abnormal bleeding profile was found in 58.54% cases. The study done by Koirala et al 2013¹⁰ showed abnormal bleeding profile in 80% cases.

The mean hospital stay was 6.27 days. Ozay et al 2005 et al¹⁵ showed the mean stay time was 6.3 while Koirala et al 2013¹⁰ showed it was 4.98 days.

The case fatality rate in this study was 4.88%. The studies^{10,12,15,19} showed case fatality 0-3.9% while other studies^{11,13,14,20,21} showed higher case fatality rate in the range of 7.7-28.8%. One reason may be high number of neurotoxic type of snakes in these studies.

The complications observed were compartment syndrome in 7.31% cases and gangrene in one (2.44%) case. Kshirsagar et al 2013¹² showed acute renal failure in 0.7% cases. Ozay et al 2005 et al¹⁵ showed the most common complication occurred during the treatment were compartment syndrome in 9.1% children and gangrene in 13%.

CONCLUSION

The key to minimizing mortality and severe morbidity is aggressive management and timely and judicious administration of adequate dose of anti-venom. The antsnake venom should be a part of primary health care in areas where snake bites are common thereby referral to higher centers can be minimized and timely treatment can be given.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Alirol E, Sharma SK, Bawaskar HS, Kuch U, Chappuis F. Snake bite in South Asia: a review. *PLoS Negl Trop Dis* 2010;4(1):e603.
2. Jones AL. Poisoning. In: Haslett C, Chilvers ER, Boon NA, Colledge NR, Hunter JAA, editors. *Davidson's Principles and Practice of Medicine*. Edinburgh: Churchill Livingstone; 2002.p.166-84.
3. Kohli HS, Sakhuja V. Snake bites and acute renal failure. *Saudi J Kidney Dis Transpl* 2003;14: 165-76
4. Monzavi SM, Dadpour B, Afshari R. Snakebite management in Iran: Devising a protocol. *J Res Med Sci* 2014;19(2):153-63.
5. Warrell DA. Guidelines for the management of snake-bites. New Delhi: World Health Organization Regional Office for South-East Asia; 2010.
6. Hifumi T, Sakai A, Kondo Y, Yamamoto A, Morine N, Ato M, et al. Venomous snake bites: clinical diagnosis and treatment. *J Intensive Care* 2015;3(1):16.
7. Al Harbi N. Epidemiological and clinical differences of snake bites among children and adults in south western Saudi Arabia. *J Accid Emerg Med* 1999;16(6):428-30.
8. Khichi GQ, Mannan MA, Channar MS. Snake Bite: study of 50 cases at Bahawalpur. *Pak Pediatr J* 2003;27(2):78-80.
9. Parikh CK. Animal Poisons. In: Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology: For Classrooms & Courtrooms. New Delhi: CBS Publishers & Distributors; 1999.p. 9.45-9.46.
10. Koirala DP, Gauchan E, Basnet S, Adhikari S, BK G. Clinical Features, Management and Outcome of Snake Bite in Children in Manipal Teaching Hospital. *NJMS* 2013;2(2):119-24.
11. Shrestha BM. Snake Poisoning in children. *JNMA* 2002;41:463-467.
12. Kshirsagar VY, Ahmed M, Colaco SM. Clinical Profile of Snake Bite in Children in Rural India. *Iran J Pediatr* 2013;23:632-636
13. Paudel KM, Sharma S. Study of Clinico-Epidemiological Profile and Outcome of Poisonous

- Snake Bites in Children. J Nepal Paediatr Soc 2012; 32(1):47-52.
14. Karunanayake RK, Dissanayake DM, Karunanayake AL. A study of snake bite among children presenting to a paediatric ward in the main Teaching Hospital of North Central province of Sri Lanka. BMC Res Notes 2014;7:482.
 15. Ozay G, Bosnak M, Ece A, Davutoglu M, Dikici B, Gurkan F, et al. Clinical characteristics of children with snakebite poisoning and management of complications in the pediatric intensive care unit. Pediatr Int 2005;47(6):669-75.
 16. Enwere GC, Obu HA, Jobarteh A. Snake bites in children in The Gambia. Ann Trop Paediatr 2000; 20(2):121-4.
 17. Campbell BT, Corsi JM, Boneti C, Jackson RJ, Smith SD, Kokoska ER. Pediatric snakebites: lessons learned from 114 cases. J Pediatr Surg 2008;43(7):1338-41.
 18. Ahmed SM, Qureshi UA, Rasool A, Charoo BA, Iqbal Q. Snake bite envenomation in children in Kashmir. Indian Pediatr 2011;48(1):66-7.
 19. Correa JA, Fallon SC, Cruz AT, Grawe GH, Vu PV, Rubalcava DM, et al. Management of pediatric snake bites: are we doing too much? J Pediatr Surg 2014;49(6):1009-15.
 20. Brian MJ, Vince JD. Treatment and outcome of venomous snake bite in children Port Moresby General Hospital, Papua New Guinea. Trans R Soc Trop Med Hyg 1987;81(5):850-2.
 21. Tibballs J. Diagnosis and treatment of confirmed and suspected snake bite. Implications from an analysis of 46 paediatric cases. Med J Aust 1992;156(4):270-4.