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An epidemiological study of clinical outcome of snakebite in children

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Abstract

Background: Snake bite is one of the commonest medical emergencies in India and most are found in the rural areas of India.
Aim of the Study: Assessment of clinical outcome of snake bite in children.
Results: Out of 65 children studied, males (66%) outnumbered females (34%). Rural(82%) area children were more susceptible than urban children(18%). Most common presenting symptom was history of bite (55%). Lower limb (55%) bites were more common. 72% were not aware of first aid measures. 18.5% of the victims were administered Anti Snake Venom (ASV) at primary health care level and the dosages were inadequate. Syndromic approach to snake bite was very useful. 65% of the victims had no signs of systemic envenomation. Among venomous snake bites, hemotoxic (23%) snake bites were more common followed by neurotoxic (12%) bites. The allergic reactions were usually mild (40%) which were counteracted by common drugs. Most common presenting symptom was history of bite (55%). 20 minute Whole blood clotting time(WBCT) was the most reliable test for hemotoxicity. ASV was the main stay of treatment.
Conclusion: The delay in appropriate treatment leads to significant morbidity and mortality. R.I.G.H.T first aid has to be taught to the public. The syndromic approach of snake bites has to be followed. The ASV is the mainstay of treatment. There should be no panic in treating allergic reactions. Good first aid, early referral, administration of adequate and timely dose of ASV, and timely management of allergic reactions can significantly reduce mortality rate.

Keywords: Snake bite, Envenomation, Antisnake venom, Anaphylaxis, Outcome.

Introduction

India is the home for some of the most poisonous snakes in the world, most of them are found in the rural areas of India.(1) Snake bite is one of the commonest medical emergencies in India. Snake envenomation is stated as one of the most neglected medical emergencies of the century.(2) Due to strong beliefs and some associated myths, people resort to native treatment for snake bite envenomation, thus causing delay in seeking proper and adequate treatment.(3,4) Hence there is a need for the health care department to design the scientific aspects related to snakebites to the community. Recent global burden of snake bite was estimated to be around 5 million bites with around 2.5 millions envenomed, and mortality of 1.2 millions per year.(5) More than 2 lakh cases of snakebites are reported in India each year and 35,000-50,000 of them are fatal.(6) Many deaths occur before the patient reaches the treating centres. It is gratifying to note that the traditional snake catchers of Tamil Nadu, the Irulas with their sophisticated herbal medicine system have now understood the problems. They know snake injects venom which enters deep inside the body that can only be neutralised by antisnake venom and not by other oral or applied remedies, and this information needs to reach the other communities also. Snakebites seen are often among agricultural workers and those going into the forest, people working barefoot in fields, while working at night, or along dark roads.(7) Many of these susceptible people are below poverty line, living in rural areas with less access to the available health care. Majority are younger age group. Most of the bites (almost 90%) are noticed on the extremities. The hospital stay varies from 2 days to 30 days with average being 4 days. The in-hospital mortality varies from 5 to 10%, and the most commom causes are acute renal failure, respiratory failure, sepsis and bleeding. By converting forests to agricultural lands, the prey base of the snake like frogs and rats has increased very much. The rice field with millions of rats attracts snakes. The snake numbers per agricultural land is abnormally high when compared to population of snakes in the forest. Humans have to go rice fields every day and come out in the evening, just the time when snakes are very active during whole day. Thus the chance of an encounter between farmer and snake is very high. Thanjavur and its surrounding areas have river Cauvery and its tributaries, which make very rich for agricultural cultivation, and presence of bushes and canals favours snakes to exist in high numbers of population. Our study is to get the clinical profile of snake bite in children admitted to Government Raja Mirasudhar Hospital (GRMH) attached to Thanjavur Medical College, Thanjavur and to analyse various factors influencing complications and outcome.

Poisonous snakes are classified into three families(8) and they are

- Cobra group **(Elapidae)** :primarly neurotoxic
- Viper group **(Viperidae)** :primarly vasculotoxic
- Sea snake group **(Hydrophidae)** :myotoxic

Renal involvement has been associated with last two families:(9,10)

Material and Methods

This is a prospective cohort hospital based study conducted in GRMH attached to Thanjavur Medical College during the period between Sep 2014-Aug 2015. This hospital serves as a referral hospital for Thanjavur and adjacent districts mostly meeting out health needs for rural agricultural population. Thanjavur, Pudhukottai, Pattukottai, Kumbakonam, Thiruvarur and Nagapattinam are taken as urban areas. Other places are taken as rural. The study population was chosen from inpatients of GRMH.

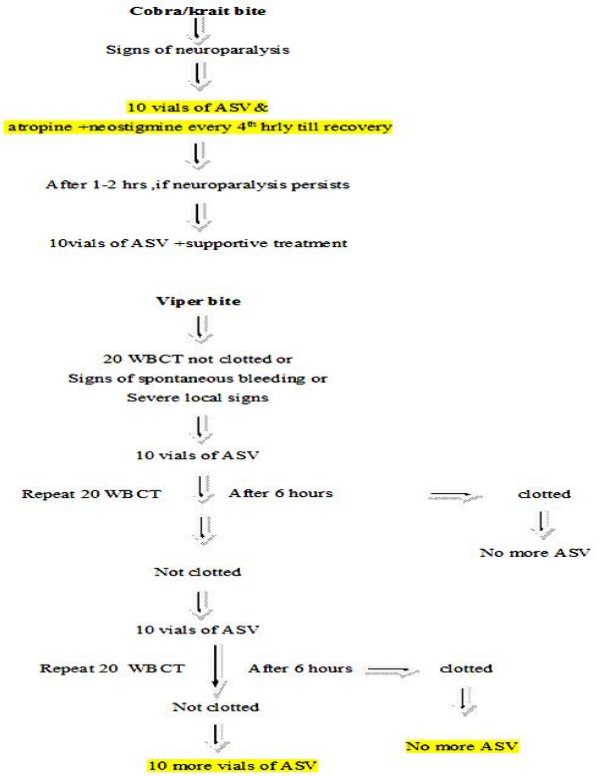
Inclusion criteria

1. All children with history of snake bite.
2. Children with history of unknown bite with features of snake envenomation.

Exclusion criteria

1. Children who had been treated outside but details not available.
2. Children with pre-existing conditions like cardiac, hepatic, renal diseases,etc**.**

Eligible children were enrolled in the study after getting informed consent from the parents or guardian after explaining details of the study procedure. This study protocol was reviewed and approved by the local ethical committee. All the victims were admitted. The attendants were enquired as per the history in the proforma. Clinical examination includes level of consciousness, local site examination for bite mark, native treatment, bitesite swelling, vascular compromise etc, vitals recording HR/ RR/ BP/ TEMPERATURE, to look for evidence of systemic envenomation like neuroparalysis, hemotoxicity, and to look for evidence of local envenomation like pain, oozing, lymph node enlargement, discoloration and swelling. Children were monitored for signs of envenomation. If 20 minutes Whole Blood Clotting Time (WBCT) was initially normal, then it was repeated every 30 mins for first 2 hours, then hourly for 4 hours, and also monitored for features of neuroparalysis. ASV was administered according to the Indian national snake bite protocol 2007. Allergic reactions were managed as per standard protocol.



Datas were entered in excel and analysed using SPSS software software version 20 for windows OS.

Results

- Male children (66%) outnumbered female children (34%).
- Rural (82%) area children were more susceptible than urban children (18%).
- More common in class 3 & 4 socioeconomic groups.
- More common in summer (33%) months.
- Slightly more common in night (55%) time than day(45%) time.
- Lower limb(55%) bites were more common.
- 72 % were not aware of first aid measures.
- 18.5% of the victims were administered ASV at primary health care level, the dosages were inadequate.
- Syndromic approach to snake bite was very useful.
- 65% of the victims had no signs of systemic envenomation.
- Hemotoxic(23%) snake bites were more common followed by neurotoxic(12%) bites among venomous snake bite.
- The allergic reactions were usually mild (40%) which were counteracted by common drugs.
- In most of the snake bite victims snake species were not known (83%).
- Most common presenting symptom was history of bite (55%).

- 20WBCT was the most reliable test for hemotoxicity.
- ASV was the main stay of treatment.

Discussion

Age group 6-12 years (63%) outnumbered 1-5 years (37%) as 6-12 years are children likely to be involved in agricultural activities than 1-5 years group. The male children (66%) outnumbered female (34%) as boys are more exploring nature and do more outdoors games. As agricultural fields are more in rural areas, snake bites were more common in rural (82%) than urban (18%) population. Bites were more common among class 3 and 4. These people were living in areas of poor sanitation, reduced income, reduced literacy & opportunity for early transport. This classification was based on modified Kuppuswamy's scale and the parameters used were education, occupation & income of parents. Snake bites are higher in summer months as snakes come out of their shelter followed by winter season which is paddy harvesting season in Thanjavur. Snake bites usually occur in dark, dawn and dusk, as snakes go for searching its prey or returning from such activities. Also people tend to disturb them without noticing them in darks. In our study, bites were more common in lower limbs (55%) followed by upper limbs (25%), body(11%) and others(9%). It was evident that 72% of the victims were not given any first aid R.I.G.H.T(Reassure the victim, Immobilise the limbs, Get to Hospital, Tell the doctor of any systemic symptoms), 20% used tourniquets which are harmful, 6% did incision at bite site and other 2% were given herbal remedies, snake stones etc. It is evident that only 12 children (18.5%) was given ASV prior to GRMH admission from various health centres, but none of them was given adequate doses of ASV.

Table 1: ASV prior to admission

ASV Prior to Admission	Frequency	%
No	53	81.5
Yes	12	18.5

It was evident that only 10 children (15.5%) required hospitalisaion of more than 7 days. It was identified that 75% of victims reached hospital in less than 6 hours, however that 11% cases reached hospital only after 24 hours of bite after taking native treatment, herbal medications etc, which leads to bad prognosis to the victims.

Table 2: Time between bite and arrival at hospital

Time between bite and arrival at Hospital	Frequency	%
0 to 6 Hours	49	75
6 to 24 Hours	9	14
>24 Hours	7	11

In only 17% snake species were identified by attendant, whereas in 83% snake bite cases species were not identified.

Table 3: Species identified

Species		%
Not Identified	54	83
Identified as Viper	5	7.6
Identified as Krait	3	4.6
Identified as Cobra	2	3
Identified as Seasnake	1	1.5

Presenting symptoms are useful for identification of toxicity and to take appropriate measures. It is studied that 55% of cases came with presenting symptom of bite, followed by swelling 18%, neurological symptoms 11%, unknown bite 8% and others 8%. It shows that majority of cases had no features of systemic envenomation (65%). Among venomous bites, majority were hemotoxic (23%) and neurotoxic (12%). Out of 65 children studied, 33(51%) children required ASV and 32(49%) children did not require ASV. Among 33(51%) children requiring ASV administration, majority of them required only up to 10 vials of ASV (28%).

Table 4: ASV reqiurement

ASV Requirement	Frequency	%
Not Required	32	49
Up to 10 Vials	18	28
10 to 20 Vials	12	18
20 to 30 Vials	3	5
More than 30 Vials	0	0

Among 65 children admitted, 32 children (49%) required only observational care and the remaining required ASV +local care(29%), ASV+ventilation(8%), ASV alone(9%) and ASV +conservative(5%). Among 65 children admitted, 33 children(51%) required ASV, and in these 33 children, 13 developed complications like respiratory failure, acute kidney injury, DIC, compartment syndrome etc. Among 8 (12%) neurotoxic snake bites, 5 (7.6%) went for respiratory paralysis requiring mechanical ventilation. Among 15(23%) hemotoxic snake bites, 6 (9.2%) went for complications. 2 children had fasciotomy for compartment syndrome. 4 went for renal failure in which PD done for 3 patients and 1 child managed conservatively. Blood products were given for 2 children. Almost 23 children (69%) developed reactions to ASV among total children requiring ASV and only 10 children (31%) not developed reactions to ASV. Majority of ASV reactions were only minor which were counteracted by common drugs. Out of 65 children,3 children (4.6%) succumbed to death and 62 children (95.4%) recovered completely.

Conclusion

- The snake bite is rural medical emergency.
- Time between snakebite and hospital arrival is critical.
- R.I.G.H.T first aid to be taught to the public.
- The syndromic approach of snake bites has to be followed..
- The ASV is the mainstay of treatment and should be instituted at the earliest possible.
- Allergic reactions should be treated as per standard protocol and there should be no panic in treating allergic reactions.
- Good first aid, early referral, administration of adequate and timely dose of ASV, and timely management of allergic reactions can significantly reduce mortality.

Russells viper

Saw Scaled Viper

Banded krait

Hump nose pit viper

Indian spectacled cobra

King cobra

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