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Original Research Article

A study of snakebite cases in a tertiary care hospital in South India, Telangana

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ABSTRACT

Background: Snake bites pose a significant global health threat leading to substantial morbidity and mortality. According to WHO, approximately 11,000 deaths occur due to snake bite per annum in India. This study is done to know about common types of snakes in local areas, identify the clinical features, complications and mortality rates in snakebite victims attending RVM Charitable trust hospital.

Methods: A hospital-based cross sectional study done from 1st January 2024to 31st December 2024. Fifty patients enrolled during this period. Features during presentation and subsequent period were noted, anti-venom was given accordingly and outcome was recorded. Data was collected in a predesigned data sheet form and was analyzed accordingly.

Results: Among 50 snake bite patients, 70% were male and 56% cases were poisonous bites. The common victims were farmers (53%) and the bite was commonly encountered during rural foot walking (32%). Among 28 poisonous cases, 18 Poisonous cases developed neurological manifestations and 3 cases developed breathlessness which required mechanical ventilation support. Rest 10 Poisonous cases developed hematological manifestations and 6 cases developed Acute Kidney Injury of which 3 cases required hemodialysis support. Among the 28 venomous snake bite cases 25 (89%) recovered completely after getting polyvalent antivenom serum and 3 (11%) died after admission. Total 80% cases recovered with 10 vials of polyvalent antivenom serum. No reaction to anti-snake venom was noticed.

Conclusions: Snake bites cases are still a serious health problem for us. Treatment of poisonous snake bite with polyvalent antivenom serum is successful and safe. Awareness should be created among the rural people through mass media regarding the complications of snake bite and the need to visit a hospital as early as possible. Availability of snake venom kits should be made in rural health centres to identify the type of snake bite.

Keywords: Poisonous snakes, Acute kidney injury, Cellulitis, Polyvalent anti snake venom, Respiratory paralysis

INTRODUCTION

Snake bite is most often an occupational, domestic or environmental hazard affecting mostly males between 20-55yrs of age. Venomous snakes inflict considerable morbidity and mortality worldwide. The estimated numbers of snakebites worldwide has been put as 5.4million, resulting in 2.5 million envenomation and 81,000-138,000 deaths, annually.[1] It has been estimated that approximately 5 million snake bite cases occur every year worldwide and 11,000 deaths occur due to snake bite in India.[2,3] There are about 236 species of snakes in India, most of which are non-poisonous. However, there are 13 unknown poisonous species and of these, four namely common Cobra; Russell's viper, Saw scaled viper and common Krait are highly venomous and believed to be

responsible for most of the poisonous bites in India.[4,5] Poisonous snakes are usually classified into 3 groups.

Elapidae

Neurotoxic (e.g., Cobra, Krait and Coral Snake).

Viperidae

Haemotoxic (e.g., Viper, Saw scaled viper).

Hydrophidae

Myotoxic / Cytotoxic (e.g., Sea snake).

Poisonous snakes usually have features like large belly scales, small head scales, hollow hypodermic needle like fangs, compressed tail and are nocturnal (Figure 1).

Snake venom contains more than 20 different constituents, mainly proteins including enzymes (phospholipase A2, nucleotidase, collagenase, Lamino acid oxidase, proteinase, hyaluronidase, endopeptidase, kininogenase, prothrombin activator) and polypeptide toxins (Hematotoxin, Neurotoxin or cytotoxin). It is a varied form of saliva secreted through a modified parotid gland located on each side of the skull behind the eye produced through a pumping mechanism from sac storing the venom, proceeds through a channel, down a tubular fang to project the venom.

Proteolytic enzymes have digestive properties, phospholipase degrades the lipids and hyaluronidase facilitates venom spread throughout the body. Phospholipase A2 is present in venom of all families of poisonous snakes and it inhibits electron transfer at cytochrome C level and renders mitochondrial bound enzymes soluble. It damages, red blood cells, leucocytes, platelets, skeletal muscle, vascular endothelial, peripheral nerve endings, and Myoneural Junction. Hyaluronidase helps spread of venom through tissues and proteolytic enzymes are responsible for local edema, blistering and necrosis (Figure 2).

Alpha-neurotoxins bind to acetylcholine at the motor end plate, whereas beta-neurotoxins first cause release of acetylcholine at the nerve endings in the myoneural junction and then damage the endings , preventing further release of transmitter. All this leads to flaccid paralysis of the victim. Polypeptides being the smaller molecules are rapidly absorbed into the systemic circulation and cause systemic toxicity in vessel-reach organs (e.g., heart, lung, kidneys, etc) as well as at pre and post synaptic membranes.[6] Some venoms possess anticoagulant activity and promote excess bleeding (20% people die due to cerebral hemorrhages after a snake bite), while other toxins are procoagulant-initially causing wide spread clot formation, followed by defibrinogenation making patients more vulnerable to stroke.

Snake bite poisoning patients can have local complications like pain, swelling, visual problems due to corneal spray, compartment syndrome, necrosis, gangrene, infection, limb loss, chronic ulceration and systemic complications like cardiac problems (myocardial infarction, arrhythmias, pulmonary edema, hypotension, AV block, pericardial effusion, pericarditis), renal impairment (Acute renal failure, oliguria, haematuria, albuminuria) and neurological complications like stroke, paralysis, ptosis, respiratory failure, ophthalmoplegia, respiratory failure, convulsions, delayed sensory neuropathy, locked in syndrome), prolonged bleeding time, prolonged clotting time, ARDS.[7]

Approach to a victim with snake bite

Recommended first aid: reassurance, immobilisation of bitten limb, accelerated transport to medical care in preferably left lateral position to decrease the risk of aspiration.[8] Things to avoid - torniquet, washing bite site with soap or any solution, making cuts on or near bitten area, herbal or folk remedy, attempt to suck out the venom with mouth, attempt to capture or kill the snake. Acute hospital management-stabilise airways, breathing, circulation.[9]

Monitor vitals, cardiac rhythm, oxygen saturation. Establish two large-bore IV lines. If the patient is hypotensive, administer a normal saline bolus of 20-40 ml/kg IV. Identify the offending snake if possible.[10] The border of swelling should be marked and observed for progression every 30 mins. Perform WBCT in every venomous snake bite patient. Order laboratory studies (CBC, blood type, PT(INR), APTT, fibrinogen level, FDP, CPK, urine analysis, ABG, RFT, LFT). If abnormal repeat after 6hrs after anti venom administration.[11] ASV if indicated (haemostatic abnormalities, neurotoxic signs, cardiovascular instability, AKI, haemoglobinuria/ myoglobinuria, local swelling involving more than half of bitten limb, development of an enlarged tender lymph nodes draining the bitten limb.[9]

Cobra-Atropine 0.6 mg stat followed by neostigmine 1.5 mg IV stat and repeat the same every 30 mins for five doses, thereafter tapering the doses at 1 hour, 2 hours, 6 hours, 12 hours response is seen as ptosis recovery in 1hr. Krait- Inj calcium GLUCONATE 10 ml IV slowly over over 5-10 mins-acts as neurotransmitter pre-synaptically and helps with neuroparalysis (Figure 3).

METHODS

The study conducted was a prospective study at RVM Charitable Trust Hospital located at Siddipet, Telangana. This observational study was carried from 1st January 2024 to 31st December 2024.

Patients with history of snake bite were admitted to the hospital. The selection criteria were all the patients >14 years of age with no history of coronary artery disease and neurological deficit and those giving consent for the study

were included in the study. Exclusion criteria for the study were age <14 years, pregnant and lactating mothers and those not giving consent for the study.

Preliminary data was collected and a structured proforma including detailed case history has been used for the evaluation of patients. Fifty patients enrolled consecutively during this period with those who saw snakes during bite or in whom bite mark or scratch marks were present or those who developed features of envenomation. Features during presentation and subsequent period were noted, antivenom was given accordingly and outcomes were recorded.

Relevant laboratory investigations were performed including complete hemogram, liver function tests, renal function tests, serum electrolytes, 20 min whole blood clotting time and ECG.

Specific investigations like Serum creatine phosphokinase, PT(INR), APTT, Nerve conduction studies and Electromyography (EMG) were also done.

RESULTS

Among 50 snake bite patients 35 (70%) were male and 15 (30%) were female. Total 28 (56%) were venomous and 22 (44%) snake bite cases were non-venomous (Figure 4). The common victims were farmers (53%) and housewives (13%). The bite was commonly encountered during rural foot walking (32%) followed by sleeping (15%). Fifty five percent were bitten during outdoor and agriculture related activities. Sixty five percent had sustained bite in lower limb.

Total 98% patients applied multiple tight tourniquets in the affected limb. Among 28 poisonous cases, 18 poisonous cases developed neurological manifestations and 10 patients had hematological manifestations (Figure 5). Of the neurological manifestations, drooping of eyelid seen in 12 poisonous cases and neurological weakness and external ophthalmoplegia developed in 6 cases (Figure 6). 3 cases developed breathlessness which required mechanical ventilation support. Almost 15 poisonous cases had abdominal pain complaints initially.

Rest 10 poisonous cases developed hematological manifestations; of which bleeding and hemorrhage was seen in 45% cases. Thrombocytopenia was seen in 22.2% and coagulopathy in 16.7% cases. Hematuria was seen in 11.1% cases and hematemesis was seen in 5.5% cases (Figure 7). Acute kidney injury was seen in 6 cases of which 3 cases required hemodialysis support and cellulitis was seen in 22.2% cases. Among the 28 venomous snake bite cases 25(89%) recovered completely after getting polyvalent antivenom serum and 3 (11%) died after admission. Of Which 2 cases died due to sepsis with AKI and cellulitis.[1] Case died due to respiratory paralysis.

Total 80% cases recovered with 10 vials of polyvalent antivenom serum but others required up to 30 vials depending on severity of symptoms and its duration. No reaction to anti-snake venom was noticed.

Figure 1: Features of poisonous snakes. (a) Indian Cobra, (b) Russell viper, (c) Common krait, (d) Saw scaled viper.

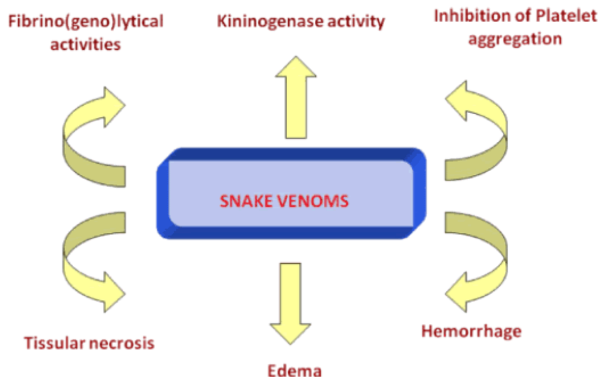

Figure 2: Mechanism of action of snake venom.

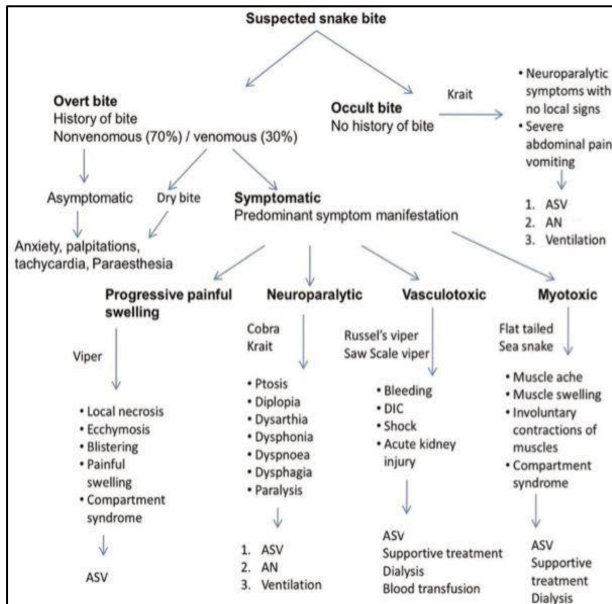

Figure 3: Approach to snake bite.

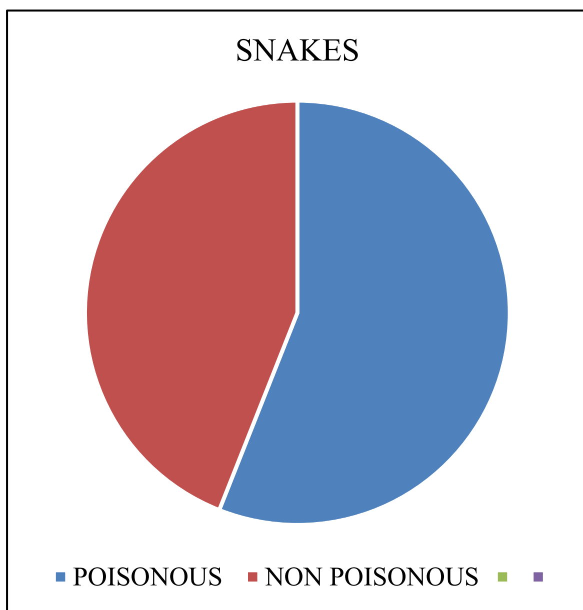

Figure 4: Snake bites.

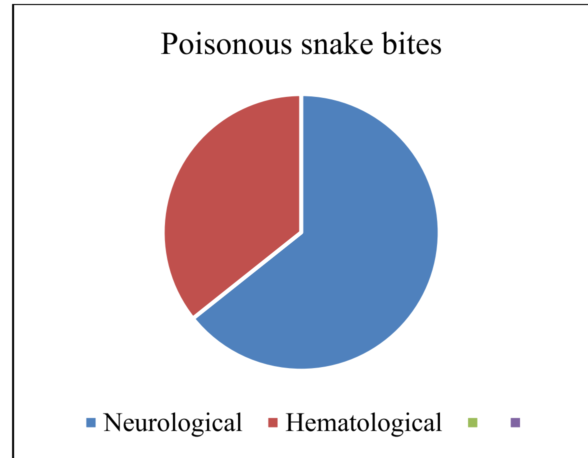

Figure 5: Manifestations in poisonous snake bites.

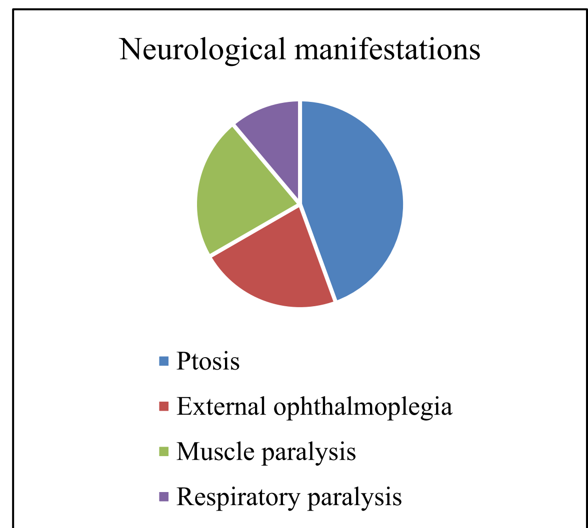

Figure 6: Neurological manifestations in poisonous snake bites.

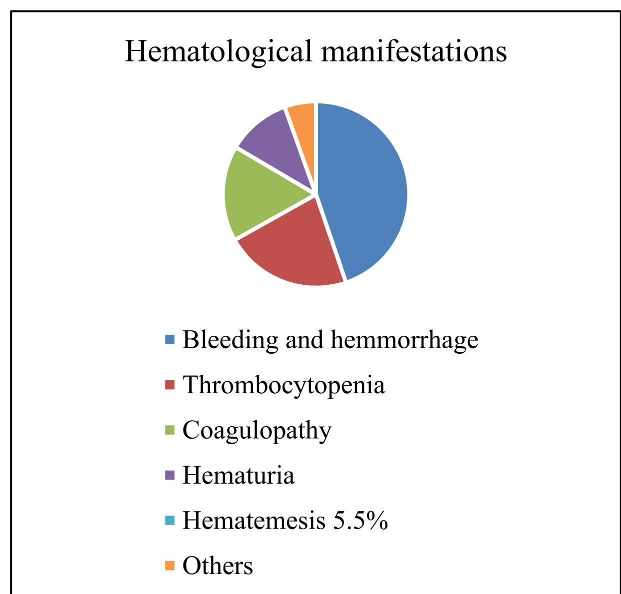

Figure 7: Hematological manifestations.

DISCUSSION

The current study gives an insight into various reasons which could be attributed to the high mortality and morbidity due to venomous snakes, to know about common types of snakes in local areas, identify the clinical features of snake envenomation, complications and mortality rates in snakebite victims attending RVM Charitable trust hospital. Majority cases were males in our study and the most common site was lower limb similar to the studies conducted by Bhagyalakshmi et al and Stephen et al.[12,13] Neurotoxic bites were more compared to hematotoxin bites. The bite was more common during outdoor and agricultural related activities similar to Pusparaj study.[14] Neurological manifestations due to snake bite observed in our study was 64.3% with ptosis being the most common (44.4%) similar to Silva et al study.[15] A study conducted by Phillips et al showed that the ptosis was most frequently observed (73.5%).[16] Ophthalmoplegia in our study was 22.2% which was less compared to studies of Silva et al, Johnson et al and Kularatne et al.[15,17,18]

Hematological manifestations in our study were 35.7%. Hematuria and hematemesis in our study were 11% and 5.5% respectively which was similar to other studies.[19] Bleeding and hemorrhage was seen in 45% cases which is higher compared to other studies and thrombocytopenia was seen in 22.2% cases.[19] Three patients died in our study similar to other studies.[12,13] AKI and sepsis were the causes for mortality in 2 patients and 1 died due to respiratory paralysis. No reactions were noted to the ASV in our study in contrast to reactions noted in a Northern Indian study.[20]

CONCLUSION

Snake bite cases are still a serious health problem for us especially in agriculture people. Many patients are not aware of what to do instantly and not getting initial first aid management. They are spending valuable times before seeking treatment in hospitals and causing fatality. Treatment of poisonous snake bite with polyvalent antivenom serum is successful and safe. Early administration of the polyvalent antivenom has reduced morbidity and mortality. Anxiety and fear and should be avoided by creating awareness among the rural people through mass media like radio, television, boards and newspaper about poisonous/non-poisonous snakes so that they go to near hospitals after snake bite rather than to traditional treatment after getting first aid by themselves. Availability of snake venom kits should be made in rural health centres to differentiate poisonous from non poisonous snakes. The future research should be done to identify the type of snake venom by kit method.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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