

# Study of Variations in Investigative Domains among Poisonous Snake Bite Cases

Yogeesha K. S.<sup>1\*</sup>, Raghavendra A. Y.<sup>2</sup>, Vishak S.<sup>3</sup>, Raghavendra Bakki Sannegowda<sup>4</sup>

{<sup>1</sup>Assistant professor, Department of Medicine} {<sup>3</sup>Assistant Professor, Department of ENT} {<sup>4</sup>Assistant Professor, Department of Neurology} Father Muller Medical College and Hospital, Father Muller Road, Kankanady, Mangalore, Karnataka, INDIA.

<sup>2</sup>Assistant professor, Department of Anatomy, K. S. Hegde Medical Academy, Nitte University, Mangalore, Karnataka, INDIA.

\*Corresponding Address:

[yogeeshaks@ymail.com](mailto:yogeeshaks@ymail.com)

## Research Article

**Abstract:** In India one of the major causes of death is due to poisonous snake bite. There are more than 3500 species of snakes, about 500 belongs to the four families of venomous snakes and only 200 species have caused morbidity and mortality in humans. Commonly encountered poisonous snakes in India are Cobras, Kraits and Vipers. This study is undertaken to document the variations in the parameters of investigation in cases following poisonous snake bite which determine the course of various cardiac and pulmonary complications, following poisonous snake bite irrespective of snake species. **Methodology:** In this prospective study 100 cases of snake bite, with local and systemic manifestation were subjected to clinical evaluation. Cases were collected for a period of one year by simple random sampling. **Observations and Results:** Commonest ECG abnormality detected was sinus tachycardia (31%). Five percent had sinus bradycardia, ST segment depression was noticed in 5%. 'T' wave inversions were seen in 2%. Tall 'T' waves were seen in 2%. 36 per cent of patients had haemoglobin less than 10 G%, 64% of patients had Hb>10 G%. In 20 patients both serum creatinine and blood urea increased in combination. Fifty-one percent of patients had normal level of both the enzymes CK-MB and SGOT.

**Keywords:** investigative parameters, poisonous, snake bite

## Introduction

In India one of the major causes of death is due to poisonous snake bite.<sup>1</sup> There are more than 3500 species of snakes, about 500 belongs to the four families of venomous snakes and only 200 species have caused morbidity and mortality in humans.<sup>2</sup> Commonly encountered poisonous snakes in India are Cobras, Kraits and Vipers.<sup>3,4</sup> Victims of snake bites are mostly healthy young persons and most of them belong to low socioeconomic status. It is difficult to ascertain the exact incidence of snake bite in India, as a large number of patients from remote areas do not report to hospital and they are treated elsewhere by non medical people by herbal remedies. Patients who have been or may have been bitten by a snake should receive prompt and careful clinical and laboratory evaluation.<sup>5</sup> World Health Organization/South East Asian Region Organization (WHO/SEARO) has published guidelines, specific for the South East Asian region, for the clinical management of

snakebites.<sup>15</sup> Among snake bitten patients, hemorrhage, shock, cardiotoxicity and respiratory arrest are the major causes of death. This study is undertaken to document the variations in the parameters of investigation in cases following poisonous snake bite which determine the course of various cardiac and pulmonary complications, following poisonous snake bite irrespective of snake species.

## Materials and methods

In this prospective study 100 cases of snake bite, with local and systemic manifestation were subjected to clinical evaluation. Cases were collected for a period of one year by simple random sampling. In the present study deliberately no attempt was made to classify snake into different species. Instead from available history and physical examination the snake bite was recognized as poisonous or nonpoisonous as per the clinical criteria by D.A. Warrell<sup>2</sup>, in the clinical management of poisonous snake bite in South East Asia region. From the clinical manifestation, if the patient had both neurological and cardiovascular manifestation, it was assigned that case belong to **Elapide bite**. If only hemorrhagic and cardiovascular manifestation were present; it was assigned as **viperidae**. Patient with previous history of respiratory disorders like, COPD, asthma tuberculosis other chronic and disabling medical illnesses like malignancies, CRF, chronic liver disease, diabetes mellitus were excluded from the present study.

Following investigations were done

## Investigation

1. ECG in all cases at the time of admission and follow-up ECG.
2. Serum CKMB and SGOT level were estimated. CKMB was estimated by immune-inhibition method. SGOT by U.V. kinetic method.

3. Blood examination (routine) includes Hb, Total WBC count, differential count, RBS, Blood urea, Serum creatinine.
4. Bleeding time and clotting time. Bleeding time by DUKES method. Clotting time by Lee and White method.
5. Serum potassium.
6. Urine examination, to look for evidences of
  - i. Albuminuria
  - ii. Microscopic hematuria
7. Chest x-ray PA view

## Observations and Results

### Electrocardiographic manifestations

Commonest ECG abnormality detected was sinus tachycardia (31%). Five percent had sinus bradycardia, ST segment depression was noticed in 5%. 'T' wave inversions were seen in 2%. Tall 'T' waves were seen in 2%. Ventricular ectopies were seen in 7% of patients.

### Blood examination (routine)

36 per cent of patients had haemoglobin less than 10 G%, 64% of patients had Hb>10 G%, 70% of patients had normal WBC count, 30% had leukocytosis (TC 11,000-20,000/cumm) and none of them had significant leukocytosis (TC > 20,000/cumm). 29% of patients had prolonged clotting time, 4% had prolonged bleeding time, 94% had euglycemia and 2% had hypoglycemia, 4 patients had hyperglycemia but follow-up blood sugar was normal, none of them developed diabetes. The hemoglobin level was 106, leukocyte count was 7400 with a normal differential, and platelet count was 147 000 (normal 190 000 to 400 000). Red blood cell indices were compatible with a microcytic, hypochromic anemia.<sup>8</sup>

### Renal Profile

Majority of the patients (61%) had raised blood urea, microscopic haematuria 36%, serum creatinine 22%, albuminuria 15%, serum potassium 11% and oliguria 9%. Some of the patients had combinations of albuminuria, microscopic haematuria and oliguria. Only in 20 patients both serum creatinine and blood urea increased in combination.

### Cardiac enzymes

Fifty-one percent of patients had normal level of both the enzymes CK-MB and SGOT. Elevated levels of serum CK-MB and SGOT were seen in 18% of patients, followed by elevated CKMB alone in 29% and elevated SGOT alone in 2% of patients.

### Discussion

Most common ECG abnormality in present study is sinus tachycardia (31%) which is not comparable to any other study. Ventricular ectopies was observed in 7% of patients which is not comparable to any other study<sup>5,6,10</sup>. ST segment depression observed in 5% of the

patient (2% in inferior leads, 3% in anterior leads) and only 2% of patient had associated T wave inversion. Which is also not comparable with any other study group, none of the patients had sinoatrial block, 1<sup>st</sup> degree A.V blocks, 2<sup>nd</sup> degree heart block, complete heart block, Atrial fibrillation and ST segment elevation, in the present study group. Tall T waves were observed in the setting of renal damage with hyperkalemia. Hypotension, ST segment depression and T wave inversion are all known to be transient cardiovascular changes that are known to revert to normal after treatment. Although the ectopic, atrial fibrillation, conduction block or ischemic changes are not common occurrence in snake bite, it is important to detect them early as they are treatable. More severe systemic effects include altered mental status, severe tachycardia, tachypnea, respiratory distress, and hypotension (systolic blood pressure<80 mmHg).<sup>14</sup>

### Cardiac enzymes

Cardiac enzymes can detect silent myocardial damage. Cardiac enzyme estimation in the present study cannot be compared with other studies because of the fact that Mishra et al estimated only SGOT level in their study and Mohapatral et al estimated only CKMB levels<sup>5,12</sup>. 15% of non-venomous patients in this study who had their CK level measured within 6 hours had an abnormal result.<sup>16</sup> Even though patients were asymptomatic elevated CKMB level is noticed in the present study group. So estimation of serum cardiac enzymes is more valuable than clinical assessment alone for the detection of cardiac damage in snake bite patients.

### Bleeding time and Clotting time

In the present study prolonged clotting time was observed in 29% of the patients, prolonged bleeding time in 4% of the patients which comparable to Saini et al.<sup>11</sup> (BT=5.6%) (CT=30%)

### Other investigations

Hb%<10 gm% in the present study is comparable with study conducted by Saini et al.<sup>11</sup> However significant leucocytosis (i.e>20,000/mm<sup>3</sup>) was not seen in the present study, significant leucocytosis indicates severe envenomation.<sup>18</sup> Abnormal blood biochemistry, such as raised serum concentrations of creatine kinase and other muscle-derived enzymes, is commonly found in severe envenomation because of local muscle damage. Neglected major adder bites may be complicated by rhabdomyolysis, with release of muscle contents into the plasma (myoglobinemia), manifesting with myoglobinuria, which may lead to compromised renal function. Thrombocytopenia is also a potential complication. Special investigations should therefore include urinalysis, urea, serum creatinine, electrolytes, and full blood count (including the blood clotting profile).<sup>17</sup>

## Renal parameters

Findings	Present study	Bhat et al <sup>13</sup>
Oliguria	9%	28%
Hematuria	36%	78%
Blood urea >40	61%	28%
Sr. Creatinine >1.4	22%	28%
Sr. Potassium >5.5	11%	-

ARF was observed in 9% patient in the present study that developed oliguria and elevated level of blood urea and Serum creatinine. Hyperkalemia was noted in 11% of the patient.

## Chest x-ray

Development of the pulmonary oedema in the present study group is 3 % which is similar to Mishra et al<sup>5</sup>(3.33%). Broncho-pneumonia was observed in 2% of patient in the present study group who were on the mechanical ventilator. More severe systemic effects include hypotension, tachypnea, respiratory distress, severe tachycardia, and altered sensorium.<sup>7</sup>

## Conclusion

All patients were subjected to a detailed a history taking, routine examination, routine laboratory investigations, chest x-ray PA view and specific cardiac evaluation including ECG and cardiac enzymes. Hypotension was seen in 15% of the patients and hypertension was seen in 6% of the patients. The commonest ECG changes were seen were sinus tachycardia 31% ventricular ectopies 7%, sinus bradycardia 5% ST depression seen in 5%. Tall 'T' waves were due to hyperkalemia. Elevated cardiac enzymes were seen in 50% of patients. Both CKMB and SGOT were elevated in 18% of the patients. ARF was observed in 9% patient in the present study that developed oliguria and elevated level of blood urea and Serum creatinine. Hyperkalemia was noted in 11% of the patient.

## References

1. Nayak KC, Jain AK, sharada DP, Mishra SN. Profile of cardiac complication of snake bite. Indian heart J 1990; 42(3):185-188.
2. Gordon Cook. Mansons tropical diseases. Animal toxins by warrel DA, 21<sup>st</sup> edition. Saunders publications 2005;pp 581-611.
3. Weatherall, Leningham, Warrel, Oxford textbook of medicine, 4<sup>th</sup> Edition, Oxford 2004;pp.923-936.
4. Mishra NP, Mishra SC. Snake bite. Quarterly medical review. October 1982; 33(4).
5. Mishra SN, Nayak KC, Jail AK, Sharada DP. Profile of cardiac complications of snake bite. Indian Heart Journal 1990;42(3):185-188.
6. David G Laloo et al. Snake bites by the Papuan Taipan; Paralysis, hemostatic and electrocardiographic abnormalities and effects of antivenom. Am J Trop Med Hyg;1995 52(6):525-531.
7. Barry S. Gold, M.D., Richard C. Dart et al. Bites of Venomous Snakes. The New England Journal of Medicine;2002; Vol.347:347-356
8. Wingert WA, Wainschel J. Diagnosis and management of envenomation by poisonous snakes. South Med J 1975;68: 1015-26.
9. Johnson CA, Management of snakebite;Am Fam Physician. 1991 Jul;44(1):174-80.
10. McCollough NC, Gennaro JF Jr. Evaluation of venomous snake bite in the southern United States from parallel clinical and laboratory investigations: development of treatment. J Fla Med Assoc 1963;49:959-967.
11. Saini RK. Haematological alterations in snake bite poisoning. Indian J Med Res;1985 82:77-82.
12. Mohapatra BN, Sahu SK, Das BN, Nayak J, Dhal N, Neurotoxic snake bite and factors affecting mortality. (Abstract) JAPI;December 2002
13. Bhat RN. Viperine snake bite poisoning in Jammu. J Ind Med Asso; December 1974 63:383-392.
14. McCollough NC, Gennaro JF Jr. Evaluation of venomous snake bite in the southern United States from parallel clinical and laboratory investigations: development of treatment. J Fla Med Assoc 1963;49:959-967.
15. Syed Moied Ahmed, Mohib Ahmed, Abu Nadeem, Jyotsna Mahajan et al; Emergency treatment of snake bite; J Emerg Trauma Shock. 2008 Jul-Dec; 1(2): 97-105.
16. Graham Ireland, Simon G A Brown, Nicholas A Buckley et al; Changes in serial laboratory test results in snakebite patients: when can we safely exclude envenoming?; Med J Aust 2010; 193 (5): 285-290.
17. GJ Müller et al, Snake bite in southern Africa: diagnosis and management; Continuing Medical Education ; Online ISSN: 2078-5143.
18. Jayarajah R. Russell's viper bite in Sri Lanka – A study of 22 cases. Am J Trop Med Hyg;1984 33(3):506-510.