

# A prospective study assessing cardiovascular manifestations after snake bite at a tertiary care center

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## Abstract

**Background:** Snake bite is an occupational hazard especially of agricultural workers. Through snake bite venom, a complex mixture of various enzymes, polypeptides and toxins are injected into body of the victim. **Objectives:** The present study was undertaken to evaluate the effect on cardiac profile in patients with snake envenomation and its cardiac complications. **Material and Methods:** 50 snake bite patients presenting in emergency department over a period of one year were evaluated for cardiac profile, ECG and enzyme estimation were done. **Results:** In the present study 72% of cases were in 3rd and 4th decade of life. Male patients were 62% formed majority. Cardiac manifestations were seen in 34% of cases in the form of ECG changes and elevated cardiac enzymes. Sinus tachycardia (40%) was most common cardiac manifestation. **Conclusions:** Cardiovascular system involvement following snake bite was seen in this study, it is recommended to record ECG and estimate cardiac enzymes as soon as possible for detecting cardiotoxic effects of snake bite.

**Key Words:** Cardiotoxicity, snake envenomation, Sinus Tachycardia.

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## INTRODUCTION

Snake bite is one of the major public health problems especially in tropical and subtropical countries. Snake bite is a common medical emergency encountered in the tropics and an estimated 35,000 - 50,000 people die of snake every year in India. Approximately 15% of 3000 species of snakes found worldwide are considered to be dangerous to humans. Among those species 52 poisonous species found in India, majority of bites and consequent

mortality is attributable to 5 species viz. Ophiophagusannah (king cobra), Najanaja (common cobra), Daboia russelli (Russell's viper), Bungarus caeruleus (krait) and Echiscarinatae (saw-scaled viper).<sup>1-3</sup> Few patients of snake bite die out of terrible scare, apprehension and shock, even though there are no signs of envenomation.<sup>4-5</sup> Though prevention would be ideal, in a setting of developing country like India with occupational emphasis on agriculture and hence exposure to deadly snakes, the alternative is to stress on timely and appropriate management of snake bites. Snakebite remains an important cause of accidental death in modern India, and its public health importance has never been fully appreciated. The deaths due to snakebite account for 5% of all accidental deaths and nearly 0.5% of all deaths in India.<sup>6</sup> Cardio toxicity is also seen in many cases dying of severe viper bite. This may occur in the form of sudden hypotension, cardiac arrhythmia, myocardial infarction and changes in the electrocardiogram mainly of ST segment and Twave. Many cases of myocardial infarction following snake bite have seen reported.<sup>7,8</sup> So far, not

sufficient work has been done in India on complications and cardiovascular profile following poisonous snake bite. Therefore, present study was undertaken to find out the effect on cardiac profile and complications in the victims of snake bite presenting at emergency room.

### MATERIAL AND METHODS

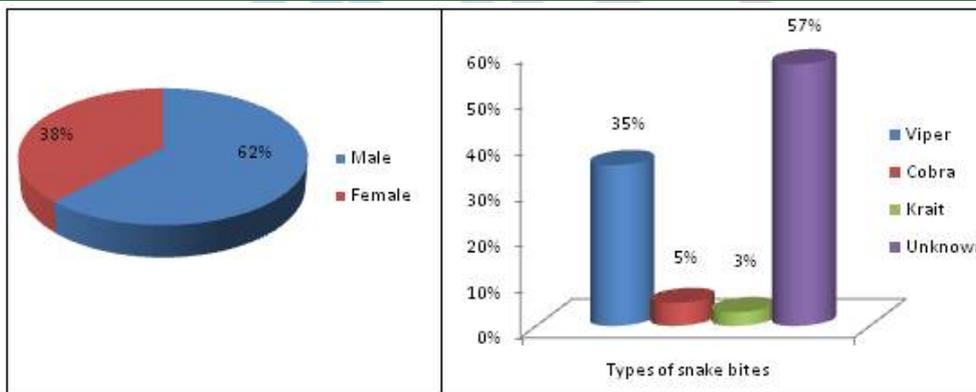
Hospital based prospective study has been conducted in emergency ward of medicine department of Department of Internal Medicine, Sathagiri Institute of Medical Sciences and Research Center, Bengaluru for a duration of 1 year. Total of 50 snake bite patients were included in the study. Those patients having history of any

cardiovascular disease, renal disease, coagulopathy, liver disease and liver muscular disease were excluded from this study. Cases that were bitten by non-poisonous snakes were also excluded. All patients underwent physical examination, routine and specific laboratory investigation pertaining to snake envenomation. Moreover, specific cardiac profile determined by 12 lead Electrocardiogram (ECG), Severity of bite was classified according to criteria suggested by Ramming with some modification by Saini *et al* <sup>9</sup>. All recruitments were conducted after obtaining informed written consent who qualifies the selection criteria. Data analysis was done by using MS Excel sheet.

### RESULTS

**Tables 1:** Scoring classification based on severity of sign and symptoms in patients of snake envenomation.

	Local	Systemic	Coagulation
Minimal	Swelling, erythema or ecchymoses confined to site of bite	No coagulation signs or symptoms	No coagulation abnormalities or other important laboratory abnormalities
Moderate	Progress of swelling, erythema or ecchymosis beyond the site of bite	Non life threatening signs and symptoms (Nausea, vomiting, perioral paraesthesia, myokymia and mild hypotension)	Mildly abnormal coagulation profile, clinically significant bleeding and mild abnormalities on other tests
Severe	Rapid swelling, erythema or ecchymosis involving the entire body part	Markedly severe signs and symptoms (hypotension—SBP < 90 mmHg, altered sensorium, tachycardia, tachypnoea and respiratory distress)	Markedly abnormal coagulation profile with evidence of bleeding or threat of spontaneous hemorrhage, (unmeasurable INR, a PTT and fibrinogen and severe thrombocytopenia < 20,000/cmm)



**Figure 1:** Percentagewise distribution of gender in snake bite patients Male were 62% of total snake bite cases. **Figure 2:** Distribution as per type of snake bites Most common snake bite was viper bite (57%), next common was cobra (35%).

**Table 1:** Cardiovascular manifestations in snake bite cases

Cardiac manifestations *	No. of cases	Percentage
Tachycardia	22	44
Breathlessness	12	24
Palpitations	11	22
Bradycardia	06	12
Chest pain	02	04
Multiple responses*		

Tachycardia was most common manifestation in cases 44%, while breathlessness was seen in 24% cases.

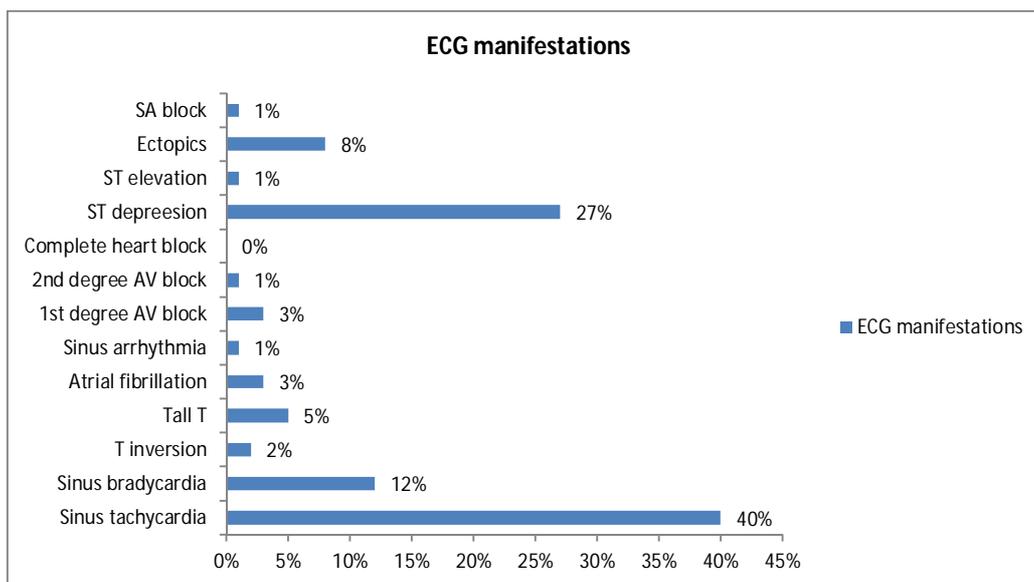


Figure 3: Bar diagram showing electrocardiographic manifestations of snake bite cases

p value = <0.01; highly Significant. sinus tachycardia was most common ECG finding (40%), next common was ST depression with (27%).

Table 2: Distribution of snake bite cases according to changes in cardiac enzymes

Enzyme	No. of cases	Percentage
Normal CK (MB), SGOT	25	50
Elevated CK(MB), SGOT	21	42
Elevated CK(MB)	06	12
Elevated SGOT	02	04

p value = <0.01; highly Significant

Elevated CK (MB), SGOT were seen in 42% of cases, only CK(MB) elevation seen in 12% of cases.

## DISCUSSION

The present study on 50 poisonous snake bite cases were studied for cardiovascular profile at Department of Internal Medicine, Sathagiri Institute of Medical Sciences and Research Center, Bengaluru during study period of 1 year. In the present study age of the patients ranged from 10 years to 64 years, 72% of patients belonged 3<sup>rd</sup> to 4<sup>th</sup> decade of life. This result was similar to study done by Banerjee *et al*<sup>10</sup> study where 80% of patients belonged to third and fourth decade of life, also Mishra *et al* study<sup>11</sup> concluded similar results as our study. We observed that males were victims of snakebite more often than females with 62% incidence in males while in female sit was 38%, this was in accordance with Reid *et al*<sup>12</sup> and Hati *et al*<sup>13</sup> studies. Also similar results with 58% male population for snake bite victims was seen in Ramakrishna CD *et al*<sup>14</sup> study. In this study, 85% of patients reached hospital within 24 hours of snake bite; similar was seen with Mishra *et al*<sup>11</sup> study where 76.7% of the patients reached hospital within 24 hours after bite. We observed that 42 (84%) patients had snake bite on distal part of the limbs while snake bite at other sites

ranged from 6 to 10%; this might be due to snake bites often occurs in working subjects specially in farms and forest. Bhat *et al*<sup>15</sup> and Warrel *et al*<sup>16</sup> study found pain and swelling as most common presenting symptoms similar was seen in our study. In this present study 10% of patients complained of palpitations and 8% patients complained of breathlessness which was comparable to Mishra *et al* study<sup>11</sup>, while in Ramakrishna CD *et al*<sup>14</sup> study most common manifestation noted was vomiting which was present in 26.5% patients which is in contrast with our study. Ramakrishna CD *et al*<sup>14</sup> results reflect, abnormality in ECG in 31.5% patients, this was in accordance with our study with 34%. Similar results was seen in Kumar V<sup>17</sup> study significant ECG abnormalities were found in 35%. This study observed atrial fibrillation in 3% of cases which was similar to study done by Gupta *et al*<sup>18</sup> 55% cases showed tachycardia in Gupta P *et al*<sup>19</sup> study which was in accordance with our study. Ramakrishna CD *et al*<sup>14</sup> noted bradycardia in 3% cases, while we found higher cases with bradycardia with 12% cases. The disturbance in heart rate was seen in 23% per cent. Out of the 100 patients tachycardia was present in

12% and bradycardia in 11% of cases in Kumar V *et al*<sup>17</sup> study which was lower than our study finding. Laloo *et al*<sup>20</sup> and Mishra *et al* study<sup>11</sup> noticed first degree AV block in 2.9% and 3.33% of snake bite cases respectively while in this study 3% of cases had first degree AV block. Ventricular premature ectopics were seen in 8% of cases in the present study, no case seen in Ramakrishna CD *et al*<sup>14</sup> study, while 1.4% cases were seen in Laloo *et al*<sup>20</sup> study. Cardiac enzyme estimations in the present study were similar to Anitha MS *et al*<sup>21</sup> study. Mishra *et al*<sup>11</sup> and Laloo *et al*<sup>20</sup> study estimated only SGOT levels in the serum while Mohapatra *et al*<sup>22</sup> study estimated only CKMB levels in the serum. Nayak KC *et al*<sup>23</sup> elevated AST titers were found in 10% of patients, in our study it was seen only in 4% cases. It was found that the patients were asymptomatic even with the significantly elevated CKMB.

## CONCLUSION

In the present study even in the absence of cardiac symptoms, ECG and cardiac enzymes helped to detect early myocardial damage in cases of snake bite. It is better to go for enzyme estimation for diagnosing cardiac injury than just clinical presentation. So we recommend to go for cardiac enzyme estimation and prompt ECG in all cases of snake bite presenting to emergency department of hospitals.

## REFERENCES

- Kasturiratne, A, Wickremasingh AR, De Silva N, Gunawardena NK, Pathmeswaran A, Premaratna, Ret al (2008) The Global Burden of Snakebite: A Literature Analysis and Modelling Based on Regional Estimates of Envenoming and Deaths. *PLoS Medicine*, 5, e218. <https://doi.org/10.1371/journal.pmed.0050218>
- Kang, S., Moon, J. and Chun, B. (2016) Does the Traditional Snakebite Severity Score Correctly Classify Envenomated Patients? *Clinical and experimental emergency medicine*, 3, 34-40.
- Mishra NP, Mishra SC. Snake bite. *Quarterly Med Review*. 1982; 33(4):5-7.
- Gordon Cook. Manson's Tropical Diseases. Animal toxins by Warrel DA, 21st edition. Saunders Publications. 2005; 581-611.
- Weatherall, Leningham, Warrel. Oxford textbook of medicine, 4th edition, Oxford 2004; 923-36.
- Mohapatra B, Warrell DA, Suraweera W, et al. Snake bite mortality in India: a nationally representative mortality survey. *PLoS Negl Trop Dis* 2011; 5(4):e1018
- Brown, R. and Dewar, H.A. (1965) Heart Damage following Adder Bite in England. *British Heart Journal*, 27, 144-147. <https://doi.org/10.1136/hrt.27.1.144>
- Blondheim, DS, Plich, M, Berman M, Khair G, Tzvig L, EzriJ et al (1996) Acute Myocardial Infarction Complicating Viper Bite. *The American Journal of Cardiology*, 78, 492-493. [https://doi.org/10.1016/S0002-9149\(96\)00347-5](https://doi.org/10.1016/S0002-9149(96)00347-5)
- Saini, R.K., Sharma, S., Singh, S. and Pathania, N.S. (1984) Snake Bite Poisoning: A Preliminary Report. *The Journal of the Association of Physicians of India*, 32, 195-197.
- Banerjee RN. Poisonous snakes of India, their venoms, symptomatology and treatment of envenomation. In: Ahuja MMS, *Progress in Clinical Medicine in India*. 2nd edition. New Delhi: Arnold- Heinemann Publishers; 1983:136-179.
- Mishra SN, Nayak KC, Jail AK, Shrada DP. Profile of cardiac complications of snake bite. *Indian Heart Journal*. 1990; 42(3):185-8.
- Reid HA. Cobra bites. *British Med Journal*. 1964; 2:540-5.
- Hati AK, Mandal M, De MK, Mukerjee H, Hati RN. Epidemiology of snake bite in the district of Burdwan, West Bengal. *JIMA*. 1992; 90:145-7.
- Ramakrishna C.D. and Kanattu, P.S. (2017) A Study of Cardiac Profile in Patients with Snake Envenomation and Its Complications. *International Journal of Clinical Medicine*, 8, 167-177.
- Bhat RN. Viperine snake bite poisoning in Jammu. *J Ind Med Asso*. 1974; 63:383-92.
- Warrel DA, Pope HM, Prentice CR. Disseminated intravascular coagulation caused by carpet viper (*Echiscarniatus*). *Br J Haematol*. 1976; 33(3):335-42.
- Kumar V. CARDIAC INVOLVEMENT IN SNAKE ENVENOMATION Cited on (sept 2018) available from <http://repository-tnmgrmu.ac.in/6771/1/200100112vinothkumar.pdf>
- Gupta OP, Mewar SH, Kalantri SP, Jain A, Jajoo UN. Reversible atrial fibrillation following snake bite. *JAPI*. 1987; 36(7):535.
- Gupta P, Mahajan N, Gupta R, Gupta P, Chowdhary I, Singh P et al. Cardiotoxicity Profile of Snake Bite. *JK SCIENCE Vol. 15 No. 4, Oct- December 2013 Pp 169\_173*
- Laloo DG. Snake bites by the papuantaipan: paralysis, hemostatic and electrocardiographic abnormalities and effect of antivenom. *Am J Trop Med Hyg*. 1995; 52(6):525-31.
- Anitha MS, Nandimath VA, Bandichhode ST. A prospective study regarding cardiovascular manifestations following snake bite. *Int J Adv Med* 2017; 4:152-5.
- Mohapatra BN. Coagulation disorder following viper bite in Orissa. *JIMA*. 1992; 90(1):12-4
- Nayak KC, Jain AK, Sharda DP, Mishra SN. Profile of cardiac complications of snake bite. *Indian Heart J* 1990; 42:185-8.

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