Original Research Article

TO STUDY THE EFFECT OF SNAKE BITE ON CHANGES IN ELECTROCARDIOGRAM, ECHOCARDIOGRAPHY AND COLOR DOPPLER FINDINGS WITH SPECIAL REFERENCE TO CARDIOVASCULAR ABNORMALITIES.

Dr. Dinkar Dubey[1] (Senior Resident), Dr. Avnish Gaur[2] (Senior Resident), Dr. Nikita Goyal[3] (Senior Resident) & Dr. Alka Mishra[4](BDS)
GRMC, Gwalior, M.P.[1&2]
Mahatma Gandhi Memorial Medical College & M.Y. Hospital, Indore, M.P.[3]
Govt. College of Dentistry, Indore, M.P.[4]
Corresponding Author: Dr. Avnish Gaur

Abstract:
Background:
Snake bite envenomation is a common, acute life threatening medical emergency in India. The persons at greatest risk are farmers and agriculture laborers. Bush cleaners, construction workers, scientists and entertainers who handle the snake are also at increased risk. Snake bite is predominantly rural and occupational hazard of farmers and land workers. Snake bite is completely treatable if treated in time. The present study was undertaken to evaluate the effect of snake envenomation on cardiovascular profile.
Method: Total 100 patients of more than 14 years old of confirmed case of snake bite were taken in this study excluding patients having ischemic heart disease, diabetes, valvular heart disease, known history of cardiomyopathy, deep vein thrombosis. All patients underwent physical examination, electrocardiogram, echo-cardiography, arterio-venous color doppler study and cardiac enzymes.
Result: Total 100 cases had envenomation. Most common ECG manifestation showed sinus tachycardia 65% followed by 25% patients have normal ECG finding, 12% ST-T changes due to myocardial injury, 7% had bradycardia only 2% patients have noted A-V block.[8]).[7]Most of the echocardiographic findings are normal. Only 9% patients have global hypokinesia.
Increase CPK-MB level seen in 5% cases. Increased troponin-I level seen in 12% cases.
Conclusion:
Cardiac complications are not prominent features of snake bite and the clinical picture is usually dominated by neurological, hematological and vascular damage by snake bite toxin. Most common cardiac manifestation in ECG was sinus tachycardia may be due to anxiety, followed by sinus bradycardia. Some patients developed myocarditic changes which were detected by serial ECG. Increase CPK-MB level seen in 5% cases. Increased troponin-I level seen in 12% cases. Most common echocardiographic finding was global hypokinesia.
Keywords: snake bite, cardiovascular abnormalities, ECG changes
Study Designed: Observational Study.

1. INTRODUCTION

Snake bite envenomation is a common, acute life threatening medical emergency in India. An estimated 40900-50900 people die of snake bite every year in India (1). Snakes are fascinating and form an important component of fauna and are the objects of awe and curiosity since the dawn of civilization. Snakebite is one of the common medical emergencies encountered in day-to-day practice in India. In India 236 species of snakes have been identified out of which 52 are poisonous (2). The annual mortality from snake bites all over the world is 40,0003

Majority deaths are reported from Bengal, Uttar Pradesh, Tamil Nadu, Maharashtra, Bihar and Madhya Pradesh. The area of highest mortality is in Bengal in the Delta of Ganges in the districts of Dinajpur, Nadia and Midnapur[3].

Majority of victims of snake bite are found in the age group of 11-50 years by Sawai et al (1974). Males are twice more involved than females. Incidence of snake bit increases with age upto 50 years[4].

The persons at greatest risk are farmers and agriculture laborers. Bush cleaners, construction workers, scientists and entertainers who handle the snake are also at increased risk. Snake bite is predominantly rural and occupational hazard of farmers and land workers.

Currently intensive work is being done on the pharmacological, pathological, toxicological and immunological aspects of snake venoms to give a better break to the snake bite victim, which has resulted in production of polyvalent and monovalent antisnake venoms though the latter is not yet freely available in India.(5)

Snake bite is completely treatable if treated in time. Immediate steps should be taken to shift the victim to the hospital as early as possible. Educate the people to avoid traditional heals so that we can reduce the time lapse for the admission of hospital. All cases of doubtful snake bites should be admitted in hospitals to watch the toxicity for proper treatment.

2. MATERIAL & METHOD

This prospective observational study was conducted in Department of Medicine, G.R. Medical College, J.A. group of Hospital & KRH, Gwalior (MP) with Sample size: 100 cases from duration : April 2019 to October 2020.

Inclusion criteria:
- Age > 14 years
- All confirmed cases of snake bite

Exclusion criteria:
- Age < 14 years
- Patients having ischemic heart disease, diabetes, valvular heart disease, known history of cardiomyopathy, deep vein thrombosis.

Methods:

In all the patients presenting with snakebites and fulfilling inclusion criteria, detailed history was taken and examination done as per enclosed proforma. It was determined whether the bites were venomous or non-venomous.

The snakebite was identified from modified criteria of Sarangiet al[5] by:

1. Fang marks: Lesions resulting from snake bites are, as a rule, two lacerated punctures, about 1.25 cms deep in the case of non-poisonous and about 2.5 cm deep in the case of poisonous snake bites. An inverted 'U' shaped or multiple teeth marks indicate non-poisonous snakebite.

2. Identification of snakes living or dead.
3. Description given by the patient /attender about the snake length, thickness, colour, head etc.
4. The development of signs and symptoms of local or systemic envenomation.

The bites were classified as venomous and non-venomous based on clinical features. In venomous bites an attempt was made to determine whether they were bitten by elapidae or viperidae based on the description or examination (when brought) of the offending snake. Also whenever the patient had or developed unequivocal neuroparalysis or haemotoxic manifestation, they were assigned to elapidae or viperidae respectively.

Statistical analysis

Statistical Analysis shall be done by using percentages and chi square-test using SPSS software, version 19.

3. RESULTS
Table 1 : Distribution of cases according to deranged level of CPK-MB

Deranged level of CPK-MB	No. of patients	Percentage
Normal	95	95
Increased	05	05
Total	100	100

Only 5% patients have increases CPK-MB.
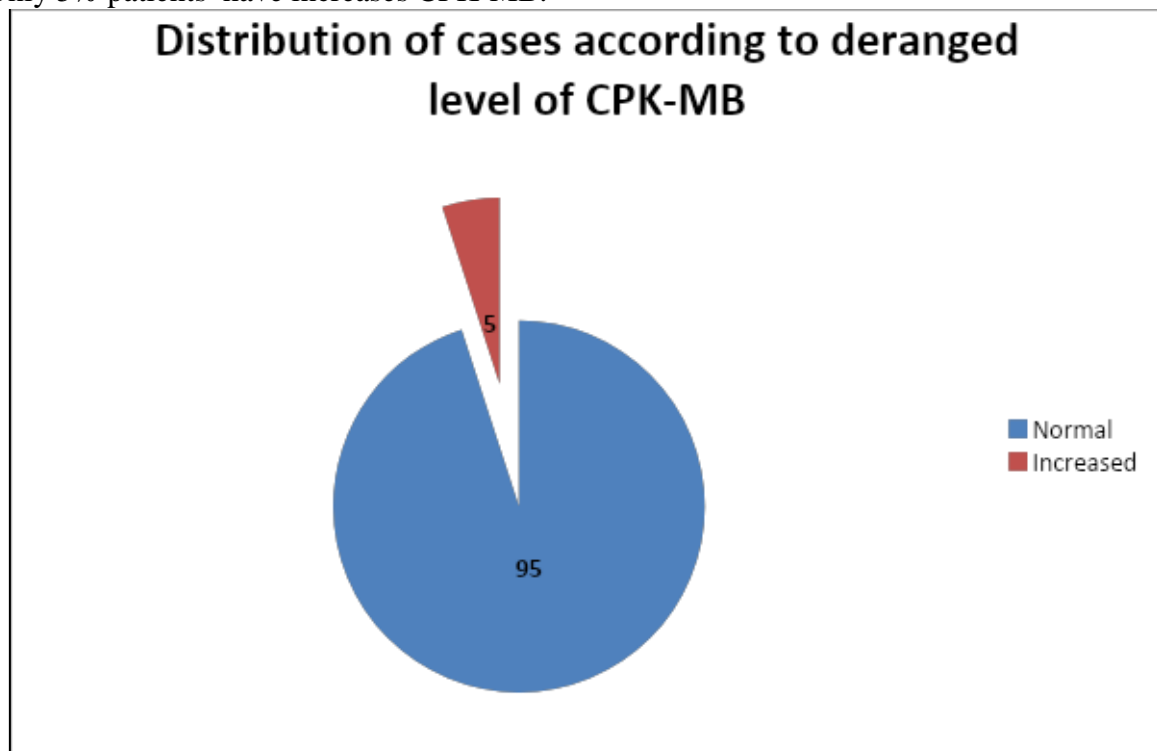

Distribution of cases according to deranged level of CPK-MB

Table 2: Distribution of cases according to increased troponin-I level

Increased troponin-I	No. of patients	Percentage
Normal	88	88
Increased	12	12
Total	100	100

Mostly patient have normal troponin-I level.
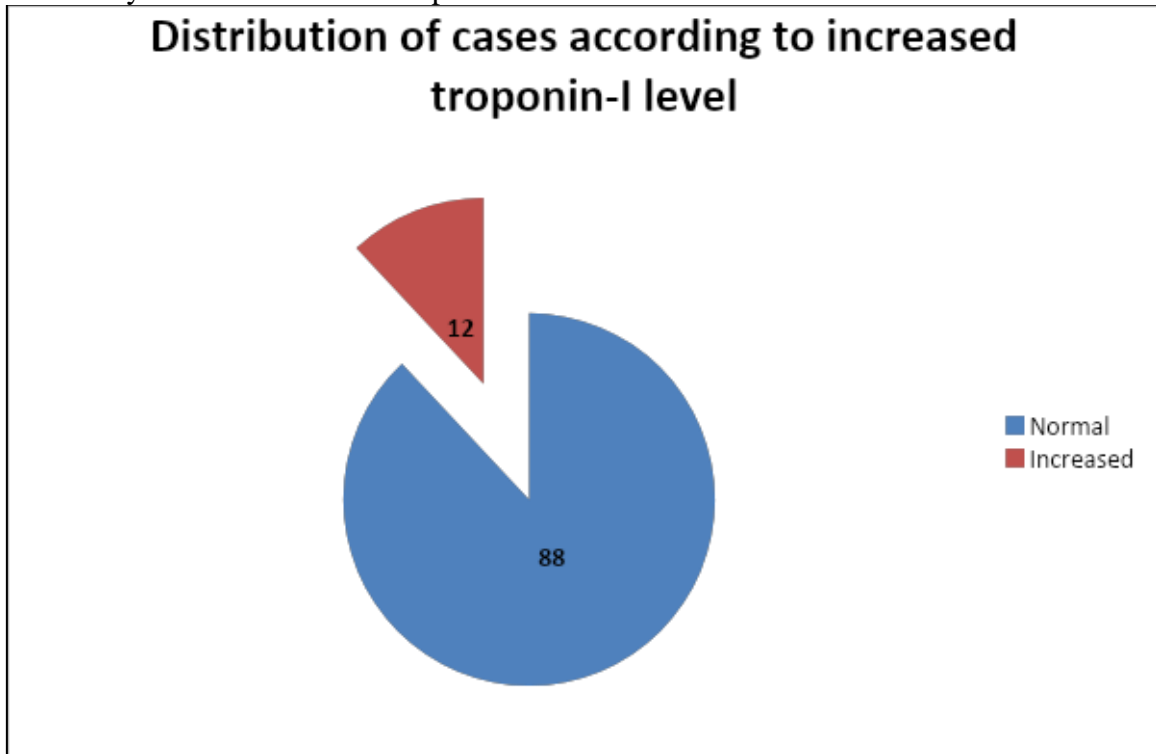Only 12% had increases troponin-I level.

Table 3: Distribution of cases according to Echocardiography

ECHO Findings	No. of patients	Percentage
Normal	91	91
Abnormal	09	09
Total	100	100

Echocardiography was done after snake bite, and mostly findings are normal (91%).Only 9% shown abnormal study i.e. regional wall motion abnormality.
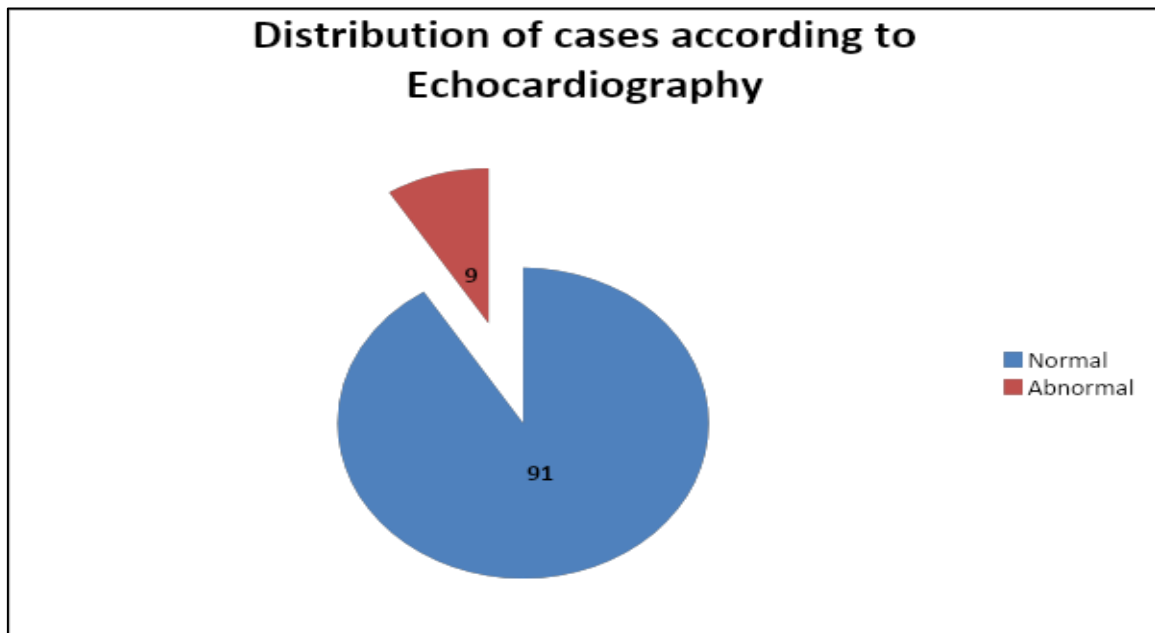
Table 4: Distribution of cases according to serial ECG changes

Serial ECG changes	No. of patients	Percentage
Tachycardia	65	65
Bradycardia	07	07
Normal	25	25
ST-T changes	12	12
A-V block	02	02

Tachycardia (65%) was found most common ECG finding after snake bite. This may be due to anxiety.
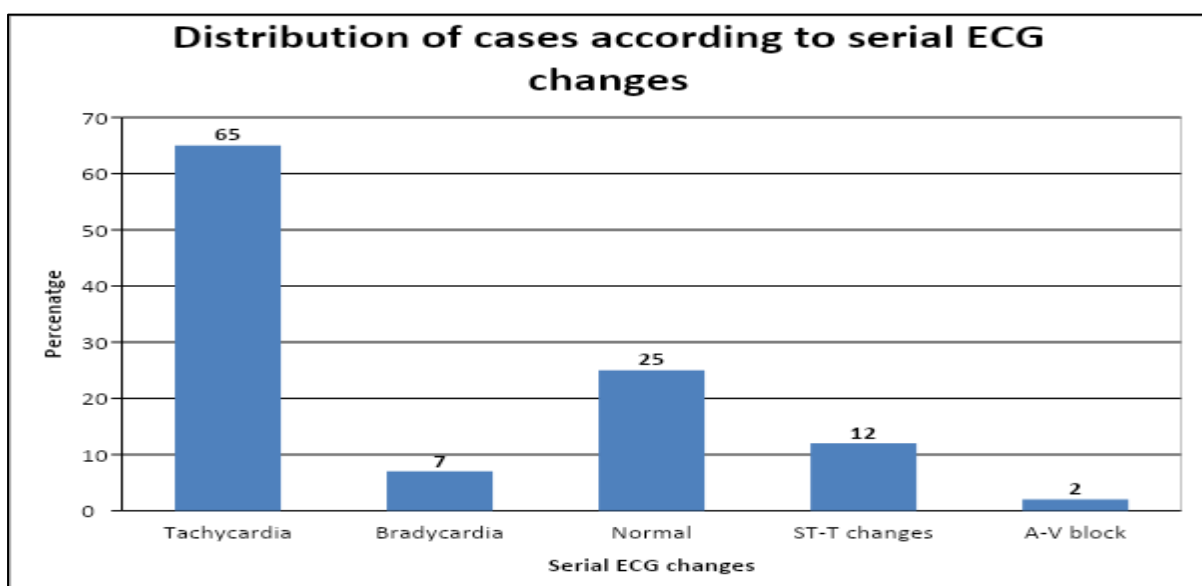
ST-T changes were 12% and A-V block were (2%).

Table 5: Correlation of AV block In ECG with patient's outcome

	Expired	Recovered	Fischer Exact Test (p-value)
Yes	2(66.7%)	0	
No	1(33.3%)	97(100%)	0.001
Total	3(100%)	97(100%)	

The above table shows the relationship between AV block in ECG with patient's outcome. Out of total expired patients, 66.7% patients had AV block in their ECG and out of total recovered patients, 100% patients did not have AV block in their ECG. Fischer exact test is applied **(p-value=0.001 i.e. statistically significant),** hence there is a significant difference between AV block and patient's severity.

Table 6: Distribution of cases according to basis of Color Doppler study

Color Doppler	No. of patients	Percentage
Normal	25	100
Abnormal	0	0
Total	25	100

In this study all patients have normal color doppler study.

4. DISCUSSION

Snake bite is one of the major medical emergencies in India especially in rural area.

In this study snake bite was observed in age group (>16 years of age). The maximum number of patients were in age group 20-50 years, and they constituted (68%) patients, which is comparable of Swai et al[4] (70.28%) and Nigam et al (5) (83.3%). Maximum number of cases were seen in 20-50 years age group due to increased risk of exposure to the snake bite occupationally. Increase CPK-MB level seen in 5% cases. The echo findings are consistent with findings of Sunil Kumar et al (4.2%).[6] Increased troponin-I level seen in 12% cases, and results are similar to Sunil Kumar et al (21%) and OH Hyum Kin et al (10%).[7]Most of the echocardiographic findings are normal. Only 9% patients have global hypokinesia. Fischer exact test is applied (p-value=0.001 i.e. statistically significant), hence there is a significant difference between echo findings and patient's severity. In all the patients, the most common ECG finding is sinus tachycardia (65%) may be due to anxiety. 25% patients have normal ECG finding, 12% ST-T changes due to myocardial injury, 7% had bradycardia only 2% patients have noted A-V block.[8] Dia and Fischer exact test is applied (p-value=0.001 i.e. statistically significant), hence there is a significant difference between AV block and patient's severity.

5. CONCLUSION

Cardiac complications are not prominent features of snake bite and the clinical picture is usually dominated by neurological, hematological and vascular damage by snake bite toxin. Most common cardiac manifestation was sinus tachycardia; most common cardiac abnormality in ECG may be due to anxiety, followed by sinus bradycardia. Some patients developed myocarditic changes which were detected by serial ECG. Increase CPK-MB level seen in 5% cases. Increased troponin I level seen in 12% cases. Most common echocardiographic finding was global hypokinesia.

6. REFERENCES

1. K.S. Narayan Reddy's Textbook of The Essentials of ForensicMedicine and Toxicology. Section II, Organic Irritant Poisons, 34[th]Edition, Page 519.

2. Smith MA. The fauna of British India, Ceylon: ReptillaandAmphibia,Vol III Serpents, Taylor and Francis, London 1943.

3. Swaroop.S. and Grah B: Snake bite mortality in the world. Bull worldshealth org. 1954; 10:35.

4. Sawai Y, Honma M. Snake bites in India. Snake 1975, 7: 1-16.

5. Nigam P, Tandon VK, Rajendra Kumar, Thacore VR, LalNarrottam.Snake bite. A clinical study. The Indian Journal of Medical Sciences.1973; 27: 697-704.

6. Minton SA. Snake venom and envenomation (Eds). Marcel DekkerInc., New York, 19071

7. Sunil KK, Joseph JK, Joseph S, Varghese AM, Jose MP. CardiacInvolvement in Vasculotoxic and Neurotoxic Snakebite - A not soUncommon Complication. J Assoc Physicians India. 2020Nov;68(11):39-41.

8. Nayak KC, Jain AK, Sahrda DP et al. Profile of cardiac complicationsof snake bite. Indian Heart J 1990;42:185-88.