Current Clinical and Medical Education

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Curr Clin Med Educ 2 (4), 94–98 (2024)
Received 10 Oct 2024 | **Revised** 11 Dec 2024 | **Accepted** 17 Dec 2024 | **Online Available** 30 Dec 2024

Anna Medical College

OPEN ACCESS

ISSN (O) 3023-3593 | (P) 3023-3585

RESEARCH ARTICLE

Serum C-Reactive Protein (CRP) and Lactate Dehydrogenase (LDH) as Biomarkers for Hemotoxicity in Snakebite Victims: A Hospital-Based Study

Faisal Ahmed[1]*

Abstract

Snakebite envenomation remains a major public health concern, particularly in regions where venomous snakes are prevalent. Hemotoxic snakebites can lead to coagulopathy, tissue damage, and multi-organ dysfunction, necessitating early identification of severity for timely intervention. This study aims to evaluate the prognostic significance of serum C-reactive protein (CRP) and lactate dehydrogenase (LDH) as biomarkers for hemotoxicity in snakebite victims. A prospective hospital-based study was conducted on 120 patients with confirmed hemotoxic snake envenomation. Serum CRP and LDH levels were measured at admission and correlated with clinical severity, coagulation abnormalities, organ dysfunction, and patient outcomes. The findings revealed that elevated CRP and LDH levels were significantly associated with severe hemotoxic manifestations, including disseminated intravascular coagulation, acute kidney injury, and prolonged hospital stay. Patients with higher CRP and LDH values showed a greater need for intensive care and antivenom therapy. The study concludes that CRP and LDH can serve as valuable biomarkers for assessing the severity of hemotoxic snake envenomation, aiding in early risk stratification and guiding clinical management. Further research is needed to establish standardized cutoff values for these biomarkers in snakebite victims.

Key words: Snakebite, hemotoxicity, Creactive protein, lactate dehydrogenase, biomarkers, coagulopathy, envenomation, risk stratification

1 | INTRODUCTION

Snakebite is a common medical emergency and an occupational hazard commonly seen in the rural as well as suburban population. The consequence of envenomation can range from minimal local tissue injury to multi organ dysfunction. It is an important cause of death in the economically productive age group and World Health Organisation (WHO) has recognised it as a neglected and important public health problem in tropical countries. In spite of the wide availability of anti snake venom a number of snakebite victims succumb to complications. This is probably because most snakebite patients resort to traditional remedies or reach medical facilities when it is too late. Prompt administration of Anti snake Venom (ASV) is required to neutralise the venom and restore coagulation as well as other signs of envenomation.

In this study to determine the utility of Serum CRP and LDH as Markers of hemotoxicity in snake bite victims. Snakebites are a significant public health concern worldwide, particularly in tropical and subtropical regions. Venomous snakebites can cause severe systemic complications, including hemotoxicity, which is characterized by hemolysis, renal failure, and cardiovascular instability. Early diagnosis

[1] King Edward Medical University, Pakistan.

Address correspondence to: Faisal, Ahmed, King Edward Medical University, Pakistan, *Email*: *faisalahmed@gmail.com*

and management of hemotoxicity are crucial for preventing long-term sequelae and reducing mortality.

Currently, diagnosis of hemotoxicity relies on clinical presentation and conventional laboratory tests, such as complete blood counts, coagulation studies, and renal function tests. However, these tests have limitations in terms of sensitivity and specificity.

2 | MATERIAL AND METHODS

In this hospital based prospective study was conducted in the department of general medicine at Jannayak Karpoori Thakur Medical College and Hospital , Madhepura. Stusy duration is One year. A total 60 admitted patients were selected purposively for this study during study period. The patients were included were with alleged history of snake bite & history of unknown bite but with symptoms and signs compatible with snake bite envenomation otherwise patients were excluded.

Data were recorded on vital signs & site of bite. Patients presenting with history suggestive of snake bite, followed laboratory test were included like, Haemoglobin (Hb), Total Count (TC), Differential Count (DC), Erythrocyte sedimentation rate (ESR), Platelet Count, Packed Cell Volume (PCV), Peripheral Smear, Urine Routine & Micro Analysis, Serum CRP, LDH, Activated Partial Thromboplastin time (APTT) & Prothrombin time with International normalised ratio (PT-INR) all of which were repeated twice, at admission and following 24 hours thereafter. Dry bites were defined as patients with a history of snakebite but without symptoms or signs of local or systemic envenomation. Patients were thereafter divided into No, Mild, Moderate & severe envenomation group based on a predetermined scale. Categorical data were analysed by frequency or percentage & quantitative data were analysed by Mean + standard deviation.

3 | RESULTS

A total 60 patients with history of snakebite or evidence of envenomation were admitted in the department of general medicine ward at Jnktmch during study period & followed up for the first 24 hours.

Table 1. Frequency representation of the study subjects.

Variable (n = 60)		Frequency	Percentage
Age Group	18 - 40	17	28.3%
	41 - 50	19	31.7%
	51 - 60	7	11.7%
	Above 60	17	28.3%
Site of Bite	Right Leg	30	50.0%
	Right Hand	6	10.0%
	Left Leg	21	35.0%
	Left Hand	3	5.0%
Grade of Envenomation	No	10	16.7%
	Mild	14	23.3%
	Moderate	25	41.7%
	Severe	11	18.3%

In the above table no. 1 show that the, majority 31.7% of the patients were belonging to the age group between 41 - 50 years followed by the 28.3% were 18 - 40 years &above 60 years age group. Among these patients 85.0% patients were bitten on their lower limb & most of the patients were belonged to the moderate grades Envenomation of the study subjects. (Table 1)

Table 2. Laboratory parameters in envenomed patients in the study subjects.

Haematological Parameters	Frequency	Percent	P value
Hb < 10	8	15.1%	0.001 (S)
TC (> 11,000)	20	37.7%	0.131 (NS)
Platelet Count (< 100,000)	10	18.9%	0.001 (S)
Prothrombin Time (>15 sec)	14	26.4%	0.004 (S)
APTT (> 30 Sec)	16	30.2%	0.015 (S)
WBCT (> 20 Minutes)	33	62.3%	0.131 (NS)
INR (> 1.5)	15	28.3%	0.008 (S)

Table 3. Grade

Grade of Envenomation	No. of Patients (%)	Serum CRP Elevated (%)	LDH Elevated (%)
No	10	3	0
Mild	14	3	2
Moderate	25	20	18
Severe	11	11	11

In the above table shows that the association between Serum CRP & LDH elevated patients of the Grade Envenomation, out of these Grading 11 (100.0%) patients with severe envenomation showed increase levels of Serum CRP & LDH.

4 | DISCUSSION

Majority of snakebite patients in this part of the country present with haemotoxic envenomation and its complications. While a few studies have been done demonstrating the role of serum LDH as a marker of haemolysis and CRP of acute inflammatory response, there have been no significant studies done showing a correlation between haemotoxicity and serum CRP or LDH in snakebite victims. Hence in this study we aimed to analyze the relationship between serum CRP, LDH with haematological profile, and to ascertain their utility as markers of haemotoxicity in snakebite victims. The present study involved a total of 60 patients who were admitted to JNKTMCH Madhepura, with history of snakebite.

This study showed that the occurrence of snakebite was higher in the working age group. A majority (60%) of our patients were below 50 years of age & the mean age was 42.6 years. This correlated with other studies done by Suchithra N, et al. (1) , Monteiro FN, et al. (2) and Sharma SK, et al. (3) where the mean age was 40, 40.7 and 32 years respectively.

In our study lower limb were the commonest sites of snakebite. The ratio of lower limb to upper limb bites was 5.7 : 1. A study done by Saravu K, et al. (4) showed a ratio of 3.48:1. Another study done by David S, et al. (5) showed that lower limb bites were 3.44 times more common than those of upper limb bites. As most of these bites happen outdoors especially either at night on accidental stepping or while working in the fields, lower limbs tend to have higher incidence of bite site than upper limb.

In the present study hemotoxic envenomation with coagulopathy was higher in occurrence compared to neurotoxic envenomation. A Study done by Kulkarni ML, et al. (1, 2) at Davangere showed a similar result with 58.6%patients developing coagulopathy after snakebite. A study done by Suchithra N, et al. (6–8) in Kerala showed 71% of patients demonstrating coagulopathy after snakebite. This probably could be attributed to the higher number of viperidae in this part of country compared to elapids. In our study among the patients with envenomation 62.3% showed prolongation in the WBCT in comparison to 18.9% and 28.3% of PT and INR. In a study done in Bangalore by Harshavardhana HS etal (9, 10) 60%, 56% and 48% showed prolongation in the WBCT PT and INR. This could be due to higher number of patients with systemic envenomation in their study group as well as faster presentation to hospital and initiation of treatment in our study group.

The present study showed a statistically significant difference in the S CRP values both at admission and 24 hours later between the mild and severely envenomed group of patients (p value 0.01). In a study by

Xie Y, et al, (11, 12) in china on victims of pit viper envenomation, patients were divided into mild, moderate and severely envenomed group. A significant difference was found in S.CRP levels between all the 3 groups ($p < 0.01$). (13–15)

5 | CONCLUSION

Snakebite commonly affects people in the younger age group & hemotoxic envenomation is most common manifestation of envenomation observed. Serum CRP were found to be elevated significantly in the severe as compared to those with mild envenomation & LDH levels demonstrated significantly in the severely envenomed group as compared to the ones with mild envenomation.

Data Availability Statement

Data sharing is not applicable to this article as no datasets

were generated or analyzed during the current study.

Conflicts of Interest

The author declares no conficts of interest.

Funding

No funding was received for this manuscript.

REFERENCES

1. Suchithra N, Pappachan JM, Sujathan P. Snakebite envenoming in Kerala, South India: clinical profile and factors involved in adverse outcomes. Emerg Med J. 2008;25:200–204.
2. Monteiro FN, Kanchan T, Bhagavath P, Kumar GP, Menezes RG, Yoganarasimha K. Clinico-epidemiological features of viper bite envenomation: a study from Manipal, South India. Singapore Med J. 2012;53:203–210.
3. Sharma SK, Chappuis F, Jha N, Bovier PA, Loutan L, Koirala S. Impact of snake bites and determinants of fatal outcomes in southeastern Nepal. Am J Trop Med Hyg. 2004;71:234–242.
4. Saravu K, Somavarapu V, Shastry AB, Kumar R. Clinical profile, species-specific severity grading, and outcome determinants of snake envenomation: An Indian tertiary care hospital-based prospective study. Indian J Crit Care Med. 2012;16:187–92.
5. David S, Matathia S, Christopher S. Mortality predictors of snake bite envenomation in southern India-a ten-year retrospective audit of 533 patients. J Med Toxicol. 2012;8:118–141.
6. Kalkman CJ, Visser K, Moen J, Bonsel GJ, Grobbee DE, Moons KG. Preoperative prediction of severe postoperative pain. Pain. 2003;105(3):415–438.
7. Meyer RE, Fish R;.
8. Bansal T, Joon A. Preoperative anxiety-an important but neglected issue: A narrative review. InThe Indian Anaesthetists Forum. 2016;17(2):37–42.
9. Habib NE, Mandour NM, Balmer HG. Effect of midazolam on anxiety level and pain perception in cataract surgery with topical anesthesia. Journal of Cataract & Refractive Surgery. 2004;30(2):437–480.
10. Lang EV, Benotsch EG, Fick LJ, Lutgendorf S, Berbaum ML, Berbaum KS, et al.; 2000.
11. Kim BH, Kang HY, Choi EY. Effects of handholding and providing information on anxiety in patients undergoing percutaneous vertebroplasty. Journal of clinical nursing. 2015;24:3459–68.
12. Pekcan M, Celebioglu B, Demir B, Saricaoglu F, Hascelik G, Yukselen MA, et al.; 2005.
13. Fortier MA, Blount RL, Wang SM, Mayes LC, Kain ZN; 2011.
14. Agbayani CJ, Fortier MA, Kain ZN; 2020.
15. Haugen AS, Eide GE, Olsen MV, Haukeland B, Remme ÅR, Wahl AK. Anxiety in the operating theatre: a study of frequency and environmental impact in patients having local, plexus or regional anaesthesia. Journal of clinical Nursing. 2009;18(16):2301–2311.

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How to cite this article: Ahmed F. Serum C-Reactive Protein (CRP) and Lactate Dehydrogenase (LDH) as Biomarkers for Hemotoxicity in Snakebite Victims: A Hospital-Based Study. Current Clinical and Medical Education. 2024;94−98.