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Determination of Prognosis of Snake Bite Cases by Neutrophil - Lymphocyte Ratio and Platelet - Lymphocyte Ratio

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Abstract: ***Objectives: Snakebites can result in serious complications. Our country is a snakebite - endemic area. The parameters for the prognosis of snakebites are very valuable due to the inadequacy of acute inpatient services, therefore, we aimed to detect the importance of the neutrophil–lymphocyte ratio (NLR) and the platelet–lymphocyte ratio (PLR) as parameters in the prognosis for snakebites. Methods: In this study, patients who presented at the ER within 24 hours after a snakebite were retrospectively analyzed. The sex, age, exposure duration, body part affected, hospitalization period, complications, mortality rate, and blood parameters of ER patients were assessed. Conclusion: The hospitalization period, complication developments, and poor prognosis in snakebites may be predicted using the NLR is more useful than PLR values, which are easily available and inexpensive blood parameters.***

Keywords: Neutrophil–lymphocyte ratio, platelet–lymphocyte ratio, snakebites.

1. Introduction

Although the total number of snake species present throughout the world is not precisely known, it is presumed to be between 2.500 and 3.000.1The snake venom has cardiotoxic, neurotoxic, miotoxic, nephrotoxic, and hematotoxic characteristics, and local and systemic symptoms are observed in patients based on the intensity of the toxin.2' [3]In recent years, various studies have been conducted on the capability of prognosis and mortality predictions for many diseases with NLR and PLR, which are easily available and inexpensive blood parameters. [4, 5, 6]. . Neutrophil level for the acute state in inflammation, and the lymphopenia developing after acute physiological stress, NLR was used with other inflammatory markers in the studies, thus recognized to be an efficient marker for inflammatory state[7]. In this study, we aimed to analyze the role of NLR and PLR values measured during admission for determining poor prognosis in the early period for patients presenting to ER with snakebite.

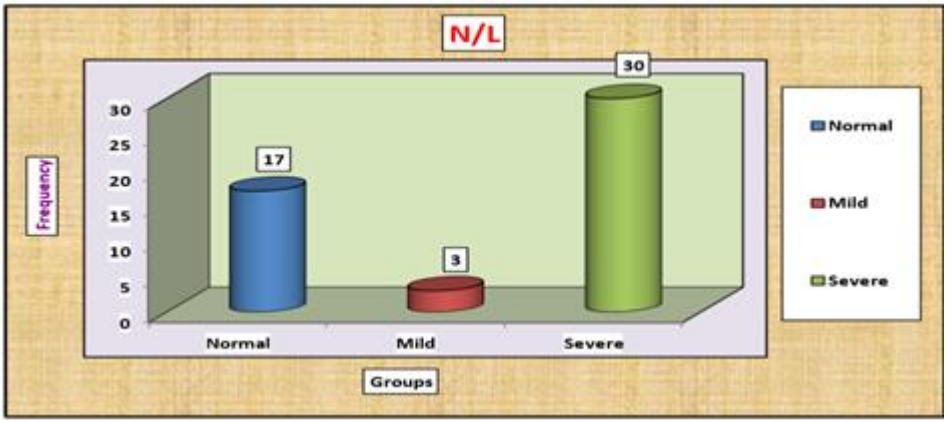
2. Materials and Methods

- In this study, medical records of patient collected from Dr Ulhas Patil Medical College in the Department of Medicine in the year 2020 - 2021 were retrospectively reviewed.
- Patients who failed to fully conform to the information from the hospital records system; who had disease that may affect neutrophil and lymphocyte count such as diabetes mellitus, hypertension, had a history of chronic use of steroid or other medications, who develop an allergic reaction; with identified systemic infection; with active cancer, acute coronary syndrome, congestive heart failure, chronic obstructive pulmonary disease exacerbation period, and any chronic inflammatory disease were excluded.

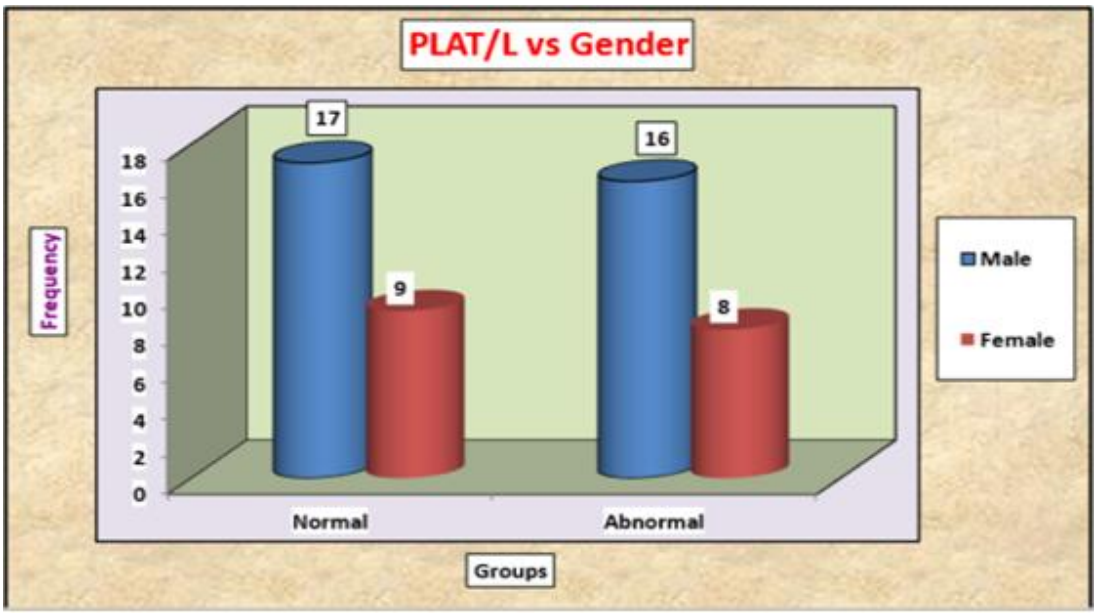
NLR and PLR ration were recorded at the day of admission within 6 hours of admission.

Variable	Groups	Score	Frequency	Percentage
N/L	Normal	1-3	17	34.00
	Mild	3-6	3	6.00
	Severe	>6	30	60.00

The N/L ratio compared in group of 20 years to 55 years admitted in ER at DUPMCH, Jalgaon. as we can see there is value of significance is related with outcome of ration. As value increases there is increase in mortality ration.



S. No.	Variable	Groups	Male		Female	
			Frequency	Percentage	Frequency	Percentage
2	Plat/ L	Normal	17	34.00	9	18.00
		Abnormal	16	32.00	8	16.00



P/L ratio is related with relationship with bilirubin as value increases Lftderanged. But we need more extensive study for P/L ratio.

Variable	Groups	N/L			Chi Square	df	p-Value	Significance
		Normal	Mild	Severe				
Age	Below 30	7	1	9	0.60	2	0.73	Not Significant
	31 & above	10	2	21				
Outcome	**Expired**	**0**	**0**	**9**	**7.31**	**2**	**0.025**	**Significant**
	Recovered	**17**	**3**	**21**				
Creat	Up to 1	10	1	10	2.99	2	0.22	Not Significant
	More than 1	7	2	20				
Billurubin	Up to 1	9	1	23	4.24	1	0.12	Not Significant
	More than 1	**8**	**2**	**7**				

Variable	Groups	N/L		Chi Square	df	p-Value	Significance
		Normal	Abnormal				
Age	Below 30	11	6	1.66	1	0.19	Not Significant
	31 & above	15	18				
Outcome	Expired	4	5	0.25	1	0.61	Not Significant
	Recovered	22	19				
Creat	Upto 1	13	8	1.42	1	0.23	Not Significant
	More than 1	13	16				
Billurubin	**Upto 1**	**13**	**20**	**6.17**	**1**	**0.013**	**Significant**
	More than 1	**13**	**4**				

3. Discussion

Snakebite is one of the most common causes of admission to ER within our region, particularly in the summer months. The Viperidae family of snakes is frequently seen in this region due its geographical position, and snakebites are considered as a serious public health problem, since the temperature is above seasonal normal and the people mainly work in rural areas in the summer months.

- Snake venom comprises a combination of many toxic proteins and enzymes. These enzymes can facilitate an inflammatory response and create tissue and cell damage. In this study, we investigated the prognostic and predictive value of NLR at admission, complications in snake bites, and time of hospitalization. Collectively, we concluded that the increasing NLR would be effective in defining the length of stay and risk of complications in patients. Mortality may occur due to secondary infections, disseminated intravascular coagulopathy, neurotoxicity, acute renal failure, intracranial hemorrhage. Besides, progressing anemia, leukocytosis, thrombocytopenia, hyperfibrinogenemia, failure in coagulation tests, proteinuria, and azotemia have also been reported. [8]Neutrophil count is elevated beginning from the first hour due to the inflammation whereas, lymphopenia occurs in response to physiological stress (Acanfora et al., 2001).
- Snake venom contains phospholipase, acetylcholinesterase, hyaluronidase, collagenase, RNA and DNA, leukotrienes, antibactericidin, neurotoxins, procoagulant, anticoagulant, cardiotoxin, hemotoxin, and certain electrolytes. It also causes secretion of quinine, histamine, and serotonin via cytolytic enzymes in the bitten area. Apart from the aforementioned, the snake venom also contains proteolytic and hemolytic factors, amino - acid oxidants, as well as other enzymes [9, 10]. Recently, the NLR and PLR values have been used for prognosis in many diseases [11, 12, 13, 14]. The increased NLR levels in our study support the role of inflammation in snakebites
- Arachidonic acid metabolites, which trigger inflammation, lead to the release of factors activating thrombocytes.
- Accordingly, neutrophil levels improve. NLR elevation takes place as a result of increase in the number of neutrophils and the decrease in the number of lymphocytes (Sarraf et al., 2009).
- NLR has been determined to change in diseases associated with inflammation like obesity, metabolic syndrome (Bahadır et al., 2014), Behcet's disease (Rifaioglu et al., 2014), and coronary artery disease (Gillum et al., 2005, Sönmez et al., 2013, Tamhane et al., 2008)
- In our study, the NLR was found to be higher in snakebites compared to control subjects. We suggest that the snake venom may increase NLR secondary to inflammation.
- There are some limitations in our study. First, it has a relatively small sample size and it is an observational and retrospective study. In addition, other inflammatory markers such as C - reactive protein and fibrinogen were not routinely examined in the study population.
- Relationship between the NLR and PLR values, as anti - inflammatory parameters, and poor prognosis, development of complication, and hospitalization period in patients who presented to the hospital with snakebites.
- We also confirmed that PLR value comprises a predictive value concerning poor prognosis, development of complication, and hospitalization period for these patients, and to the best of our knowledge, no other study concerning the PLR value in snakebites has been conducted.
- We think that there is a need for extensive prospective studies.

4. Conclusion

1) At it is possible to make predictions on hospitalization periods and development of complications using the NLR and PLR values, which are measured in patients while applying to ER for snakebites.
2) NLR and PLR was significantly increased in patients that developed complications and needed a longer hospitalization.
3) We believe that it is possible to make predictions on hospitalization periods and development of complications using the NLR and PLR values, which are measured in patients while applying to ER for snakebites.

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