



Original Research Article

CROSS-SECTIONAL STUDY FOR EVALUATION OF NEUTROPHIL-LYMPHOCYTE RATIO, MEAN PLATELET VOLUME, AND PLATELET-LYMPHOCYTE RATIO IN PTERYGIUM

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Name of Author:

Tatiparthi Kavya^{1*}, Usha B.R.²

Affiliation: ¹Junior Resident, Department of Ophthalmology, Sri Devaraj Urs Medical College, Tamaka, Kolar.

²Professor, Department of Ophthalmology, Sri Devaraj Urs Medical College, Tamaka, Kolar.

Corresponding Author:

Tatiparthi Kavya

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Abstract: Background: Purpose: Pterygium is a common disorder of the ocular surface characterized by collagen degeneration and overgrowth of fibrovascular tissue from the conjunctiva onto the cornea. This study was done to evaluate the neutrophil-lymphocyte ratio (NLR), mean platelet volumes (MPV), platelet-lymphocyte ratios (PLR) and complete blood count parameters (CBC) as indicators of inflammation in patients with pterygium. **Material and method:** Cross-sectional, observational study was conducted at tertiary hospital which included 43 patients diagnosed with primary pterygium. Neutrophil-to-lymphocyte ratio (NLR), Mean Platelet Volumes (MPV), Mean Corpuscular Volume (MCV), Platelet-Lymphocyte Ratios (PLR) were compared with normal values. Qualitative data was described as frequency and percentages. Quantitative data was described as mean and standard deviation. For analysis of categorical variables, chi square test was used. For analysis of continuous variables, Anova test and Z test were used. P value less than 0.05 was considered as statistically significant. **Results:** Significant difference was found in neutrophils, lymphocyte, NLR, PLR and MCV values in the pterygium patients when compared to normal values while there was no statistically significant difference in mean platelet volume. **Conclusion:** An increased NLR in patients with pterygium may be an indicator of systemic inflammation. These results underscore the importance of addressing inflammation in pterygium and promoting strategies to control inflammation and preserve ocular health.

Keywords: Pterygium, inflammation.

INTRODUCTION

Pterygium is a common disorder of the ocular surface characterized by collagen degeneration and overgrowth of fibrovascular tissue from the conjunctiva onto the cornea [1].

Pterygium is a wing-shaped conjunctival fibrovascular tissue that crosses over the limbus and invades the corneal surface [2]. It causes chronic irritation and astigmatism. The exact cause of pterygium is still unknown and ultraviolet radiation

(UV) exposure was the only proven risk factor [3].

Prevalence of pterygium varies in different geographic regions and is higher in tropical areas around the equator, which are known as the "pterygium belt" [4]. In India, prevalence of pterygium is 7% increasing to 25% with advancing age [5]. Neutrophil-Lymphocyte Ratios (NLR) and Platelet-Lymphocyte Ratios (PLR) are inflammatory markers that can easily be acquired by a simple complete blood count (CBC) test. Platelets play

important role in immune or inflammatory processes and Mean Platelet Volume (MPV) is a potentially useful marker as an indicator reflecting platelet function and activity. [4] Neutrophils are the active components of inflammation while lymphocytes are its regulatory and protective components.

Recently, neutrophil-to-lymphocyte ratio (NLR) has been frequently encountered as a simple and inexpensive marker that can be used in the evaluation of inflammatory responses of the various systemic diseases [5]. Although ocular diseases often cause local inflammation compared to a systemic inflammatory response, the NLR was investigated in various ocular disorders like age-related macular degeneration, retinal vein occlusion, keratoconus, vernal keratoconjunctivitis.[6]

Sunlight exposure, male gender and older age are the most common risk factors for pterygium. In addition to the well-known trigger effect of ultraviolet radiation, recent literature suggests the potential role of inflammatory mechanisms, immunological mechanisms, oxidative stress, genetic factors, and antiapoptotic mechanisms in the pterygium development [6]. There is paucity of literature on effect of inflammation on pterygium. In this study we aimed to evaluate role of inflammation in the development of pterygium.

MATERIALS AND METHODS

This cross-sectional observational hospital-based study was conducted on 43 patients diagnosed with primary pterygium fulfilling the inclusion criteria in the department of Ophthalmology at R.L.J. Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Kolar during a period from July 2025 to November 2025. This study was performed according to the guidelines of the Declaration of Helsinki, and all subjects gave their written informed consent to participate, which was approved by the Institutional Ethics Committee.

STUDY DESIGN: Cross-sectional observational study.

INCLUSION CRITERIA: Patients diagnosed with primary pterygium.

EXCLUSION CRITERIA:

1. Patients with recurrent pterygium
2. Pseudopterygium
3. Corneal trauma/ scarring
4. Glaucoma
5. Uveitis
6. Severe dry eye

7. Patients with diabetes, hypertension, cardiovascular disease
8. Systemic inflammation
9. Pregnancy
10. History of atopy
11. Using any local or systemic anti-inflammatory or antioxidant drugs.

Patients selected as per the inclusion criteria, their demographic details & history was noted and subjected to a detailed clinical examination of both the eyes as follows-

1. Visual acuity by Snellen's chart for distant vision.
2. Near vision by Jaeger chart.
3. Slit lamp biomicroscope for evaluation of anterior segment.
4. Fundus examination by + 90D lens assisted slit lamp biomicroscope and direct ophthalmoscopy.
5. Intraocular Pressure (IOP) by Goldmann applanation tonometry.

Blood samples of pterygium patients were taken from the antecubital vein. Blood parameters like Lymphocyte counts (LYM), Neutrophil counts (NEU), Mean Corpuscular Volume (MCV) were obtained from CBC. Neutrophil-lymphocyte ratio (NLR), Mean platelet volumes (MPV), Platelet-lymphocyte ratios (PLR) were calculated over these values.

ANALYSIS & STATISTICAL METHODS:

SAMPLE SIZE ESTIMATION FORMULA: $N = \frac{4PQ}{L^2}$

L^2

- P: Prevalence of pterygium as per the article is 12%
- Q: $100 - P = 88\%$
- L: Allowable error = 10%

Entering these values in the formula, total sample size obtained is: $N=43$

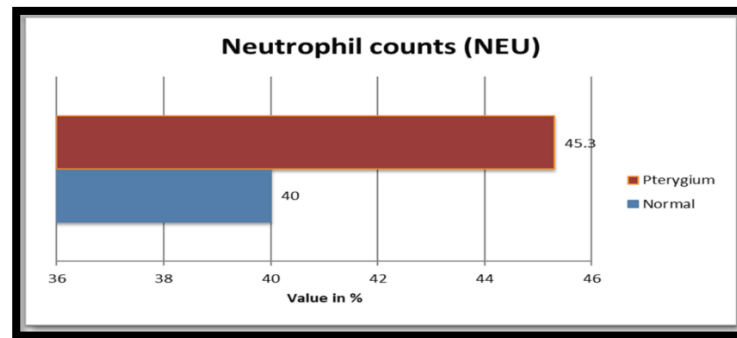
STATISTICAL METHODS USED FOR THIS STUDY:

Data was entered into microsoft excel sheet and was analyzed using SPSS 26 software. Qualitative data was described as frequency and percentages. Quantitative data was described as Mean and SD. For analysis of categorical variables, chi square test was used and for analysis of continuous variables, Anova test and Z test were used. P value less than 0.05 was considered as statistically significant.

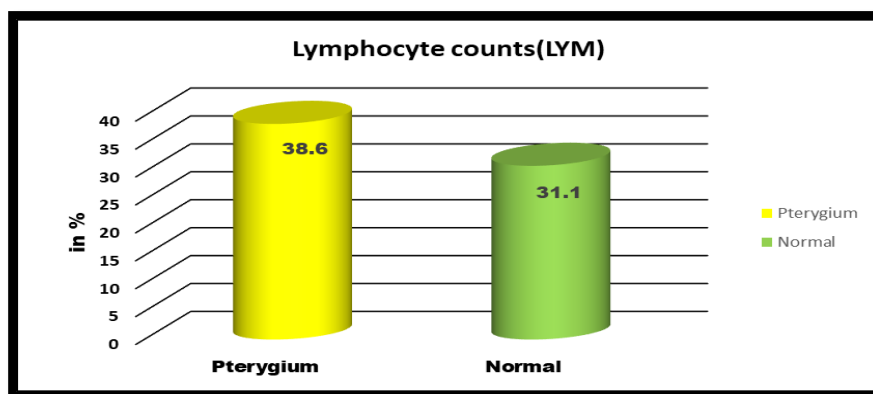
RESULTS

43 patients diagnosed with primary pterygium were evaluated for neutrophil-lymphocyte ratio, mean platelet

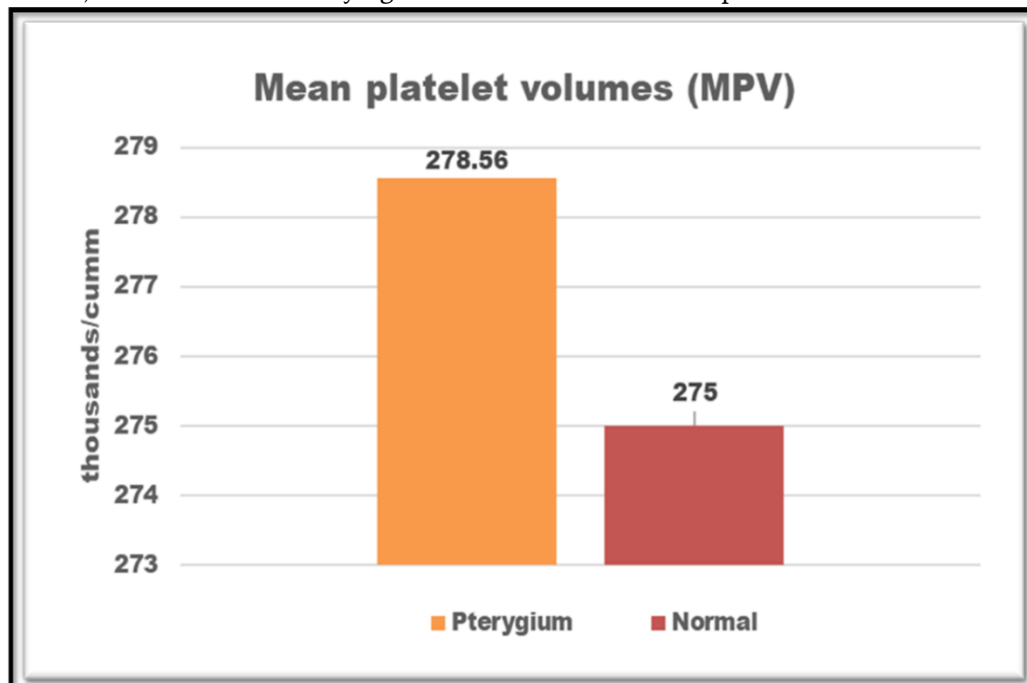
volume, and platelet-lymphocyte ratio and were compared to normal values



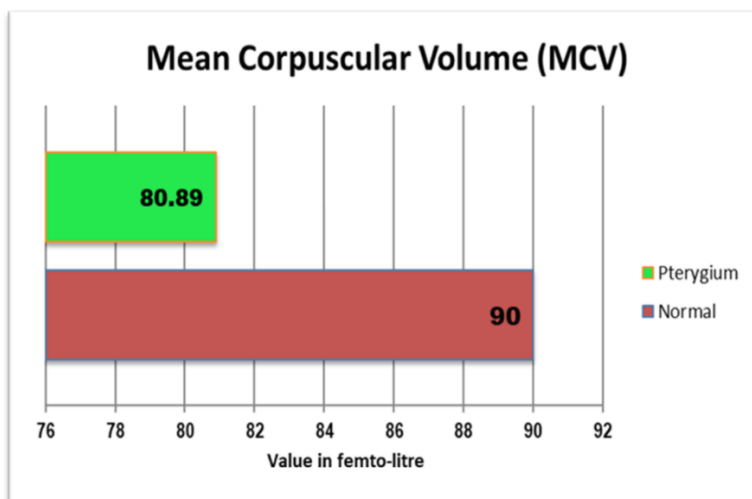
P Value <0.0001, there was statistically significant difference when compared to normal values



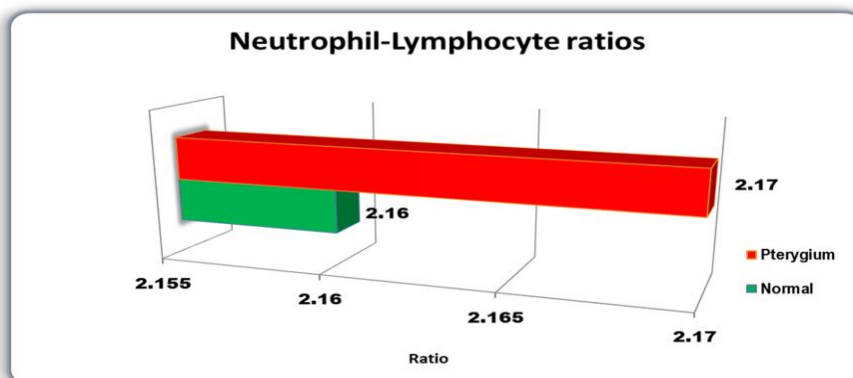
P Value 0.0001, there was a statistically significant difference when compared to normal values



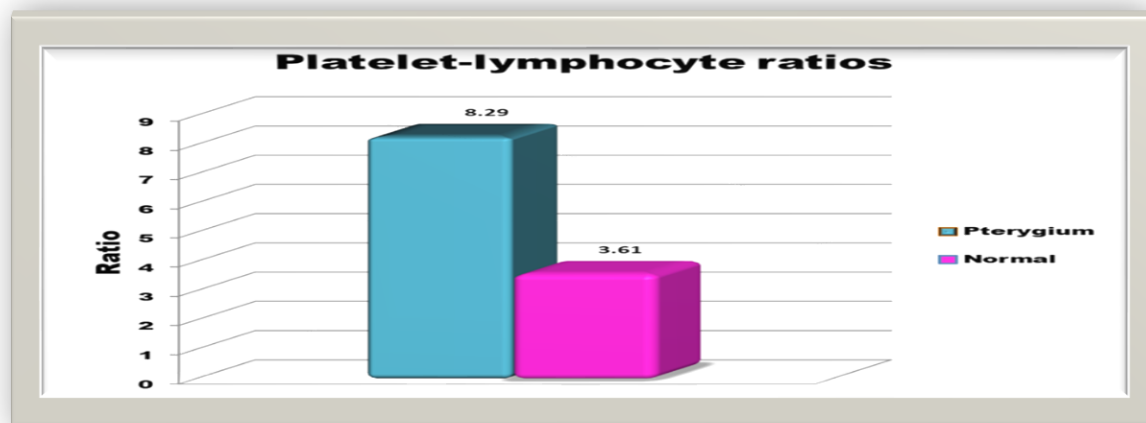
P Value 0.62, there was no statistically significant difference when compared to normal values



P Value <0.0001, there was statistically significant difference when compared to normal values



P Value <0.0001, i.e statistically significant difference when compared to normal values



P

Value <0.0001, i.e statistically significant difference when compared to normal values

DISCUSSION

Pterygium is a common ocular surface disease which is benign fibrovascular degeneration of subconjunctival tissue of the bulbar conjunctiva. Although the pathogenesis of pterygium remains unclear, epidemiological evidence suggests that environmental stress contributes to its development.

Chronic ultraviolet exposure is widely accepted etiological factor in its pathogenesis (7). Hence pterygium is more prevalent in tropical regions. Mostly asymptomatic, but can cause symptoms such as burning sensation, irritation, watering and photophobia, visual disturbance due to induced astigmatism. Cross-sectional observational hospital-based study was conducted on 43 patients diagnosed

with primary pterygium fulfilling the inclusion criteria in the department of Ophthalmology at R.L.J. Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Kolar for a period of 5 months.

Lymphocytes (LYM), Neutrophils (NEU), Platelet-lymphocyte ratio (PLR) and Neutrophil-lymphocyte ratio (NLR) in pterygium patients are higher than normal values which is similar to Kurt A et al study [1]. Mean platelet volume (MPV) is slightly elevated compared to normal value, whereas it is reduced in Kurt A et al study. Mean corpuscular volume (MCV) is lower in pterygium patients. Kurtul et al study showed that there is elevated NLR in pterygium patients which is similar to this study.

Gokmen O et al study found higher NLR values in pterygium patients ($p < 0.05$) which is similar to this study. (3)

Nötrofil PH et al did not find significantly high NLR values in pterygium group whereas there is increased NLR in pterygium patients in this study (6). The neutrophil to lymphocyte ratio (NLR) reflects a dynamic relationship between the innate (neutrophils) and adaptive (lymphocytes) cellular immune response.

CONCLUSION

In conclusion, this study showed there is role of inflammatory mechanisms in development of pterygium. Hence, more research studies should be done on understanding specific inflammatory pathways involved in pathogenesis, progression and recurrence of pterygium. This helps for the development of more effective medical therapies to prevent or treat this common ocular condition.

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Conflicts of interest: There are no conflicts of interest.

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