The Correlation between Peripheral Blood Inflammatory Markers and Diabetic Macular Edema in Patients with Diabetic Retinopathy

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Abstract:

Background: The occurrence of diabetic macular edema (DME) is a significant complication arising from diabetic retinopathy (DR). Recent research has indicated a strong correlation between inflammation and the development of DME. Detecting peripheral blood inflammatory markers, such as white blood cell (WBC) count and its subtypes, has proven to be a straightforward and accessible method. In this study, we examined the connection between peripheral blood inflammatory markers and macular edema in patients diagnosed with DR.

Methods: A total of 42 patients with severe DR were included in this study and divided into two groups: DR with DME group (DME group, n=30) and a DR without DME group (non-DME group, n=20). Ophthalmologic findings and hematologic results were retrospectively retrieved from hospitalization records and databases.

Results: Neutrophils, lymphocyte, Neutrophil to lymphocyte ratio was compared between two groups. There were no significant differences between Neutrophil counts in the two groups. p >0.05. There were no significant differences in lymphocyte counts in the two groups. p>0.05

Conclusion: There were no significant differences in Neutrophil, lymphocyte and Neutrophil to lymphocyte ratio between the two groups. The peripheral inflammatory blood markers had no significant correlation in DME patients in our study. Our study has few limitations, only two inflammatory markers were studied Only 50 patients were enrolled. This study needs large sample sizes and long duration of study to evaluate the relationship.

Keywords: Diabetic Macular Edema, Diabetic Retinopathy, Peripheral Blood Inflammatory Markers.

Introduction

- Diabetic macular edema (DME) is a serious vision-threatening complication of diabetes mellitus [1]
- DME can occur at any stage of diabetic retinopathy (DR) but is more common in the severe non-proliferative and proliferative stages.
- If left untreated about 50% of DME patients will lose more than 2 lines of visual acuity (VA) within 2 years. [1,2]
- Anti- vascular endothelial growth factor (VEGF) injections are generally first-line therapy for DME a in the majority. [3]
- However, clinical trials have shown that approximately 40% of patients are non-responsive to anti-VEGFs
- More recent research suggests that inflammatory factors play key roles in the development of DME.
- Increased levels of inflammatory mediators may lead to early and sustained chronic inflammation of diabetic retina, leukocyte activation, adhesion to vascular endothelium, disruption of blood retinal barrier, increased vascular permeability, and eventually macular edema. [7]
- However, the sampling of intraocular fluid and measurement of inflammatory factors in intraocular fluid are exceedingly complicated.
- A more readily available marker source is the peripheral blood, from which white blood cell (WBC) count and its subtypes can be used as classic inflammation markers.
- Platelet to lymphocyte ratio (PLR), monocyte to lymphocyte ratio (MLR), and neutrophil to lymphocyte ratio (NLR) are potential inflammatory markers for diabetes and its complications. [8,9]
- The associations between inflammatory markers (Neutrophil to lymphocyte ratio) with DR progression have been described in the litera-

ture; however, the relationship between NLR and DR with DME remains to be clarified.

- This study therefore examined the relationship between DR with DME and peripheral blood inflammatory markers, more precisely NLR

Aims and Objectives: To evaluate correlation between peripheral blood inflammatory markers in patients with diabetic retinopathy

Materials and methods

- This is a prospective study
- Data was collected from patients attending OPD services at GREH Visakhapatnam
- Patients are divided into two groups one with DME, other non DME.

Inclusion Criteria

- Patients of all ages who are willing to participate in the study
- Patients who are diagnosed clinically with diabetic retinopathy Irrespective of the stage of diabetic retinopathy

Exclusion Criteria

- Patients who are not willing to participate in the study
- Patients with chronic diseases other than hypertension and diabetes
- With a history of prior ophthalmic surgery or intraocular inflammation or ischemia due to conditions other than DR.
- Having received laser therapy or intravitreal injections of anti-vascular growth factor drugs in both eyes due to DR and other conditions

Examination

Fundus Examination

- Pupils are dilated with tropicamide, and examination was done, and diabetic retinopathy changes are graded according to ETDRS study.
- OCT – DME was diagnosed by a foveal thickness [also known as central subfield thickness (CST)] of ≥ 320 μm (men) or ≥ 305 μm(women) on OCT
- If macular edema was present in both eyes, data were recorded for the one with the more severe condition.
- Collection of hematological data
- Investigations are done after 12 hours of fasting before administration of insulin injections

Statistical analysis: The data was analyzed using SPSS software

Results

- Out of 50 patients 30 were grouped into DME group, 20 was grouped Into NON DME group.
- Neutrophils, lymphocyte, Neutrophil to lymphocyte ratio was compared between two groups
- There were no significant differences between Neutrophil counts in the two groups. $p > 0.05$
- There were no significant differences in lymphocyte counts in the two groups. $p > 0.05$
- There were no significant differences in Neutrophil to lymphocyte ratio between the two groups. $p > 0.05$.
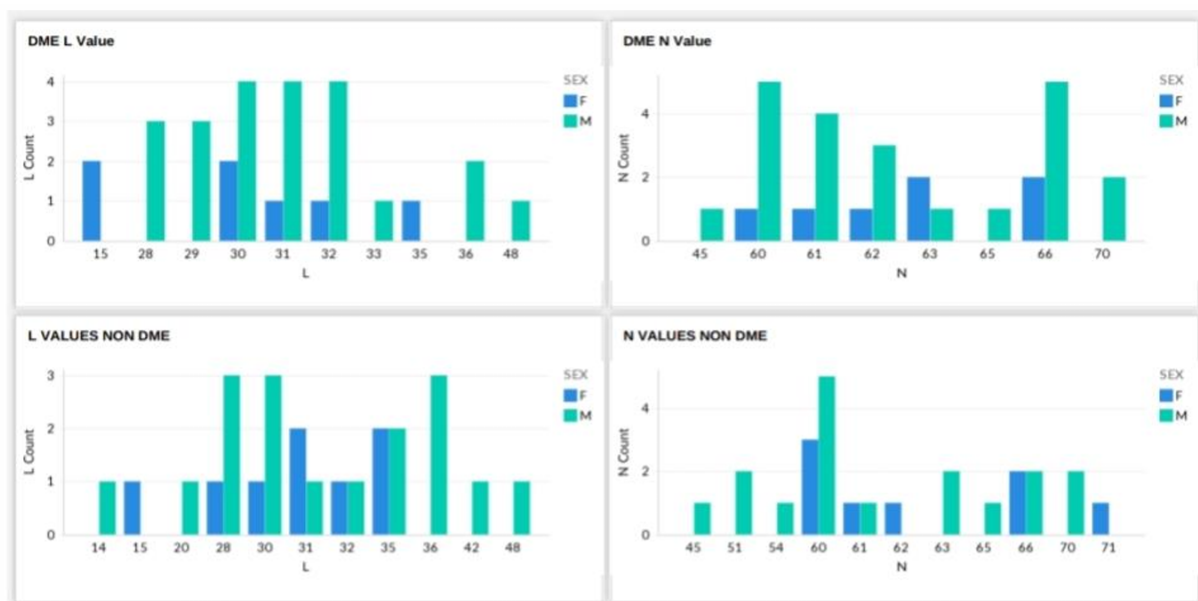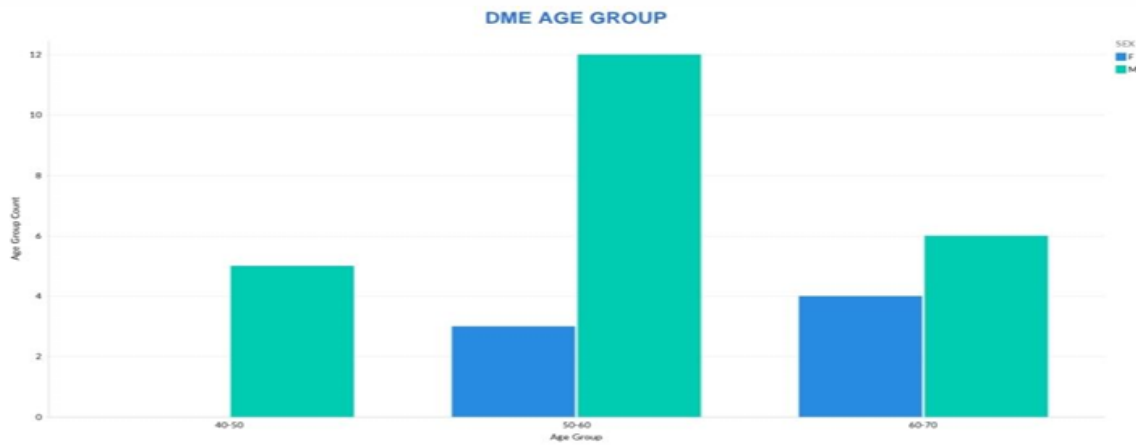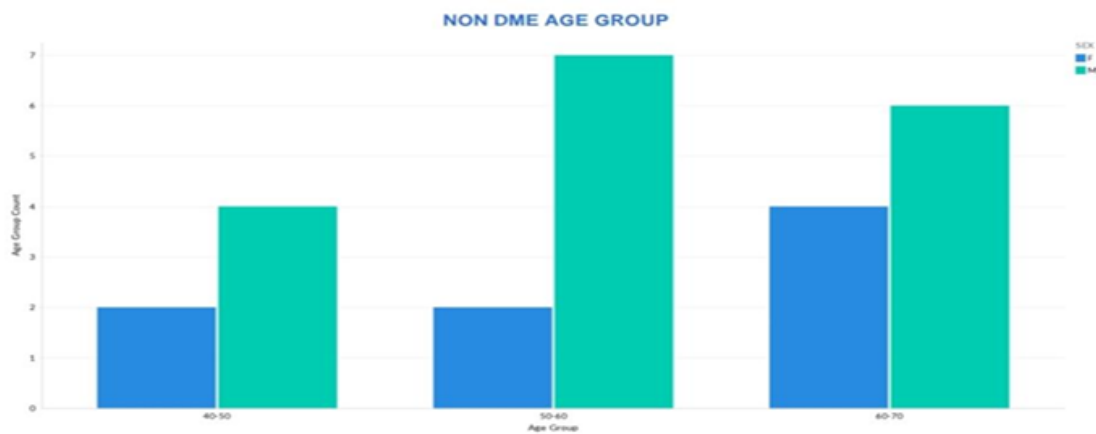

Figure 1:

Figure 2:

Figure 3:

Table 1:

	DME Group	Non DME Group
Sample	30	20
Age	57.27±7.79	55.4+7.9
Gender	23M/7F	12M/8F
Neutrophil	62.37± 4.43	62.35±7.9
Lymphocyte	31.03±4.87	29.95±9.87
Neutrophil/Lymphocyte	2.07±0.50	2.50±2.3

Discussion

- Vision loss due to DR is mainly associated with 2 late complications: DME and proliferative DR.
- DME is currently the leading cause of blindness and visual impairment in DR patients
- Even with repeated anti-VEGF therapy, some affected eyes still enter the stage of "atrophic maculopathy", and satisfactory vision cannot be recovered

- Therefore, it is particularly important to treat DME in its early stage; however, early diagnosis is often difficult to achieve.
- The focus on diabetes eye care should be between prevention, early detection of complications and then managing complications.
- NLR has become a reliable predictor of DR (10,38), while WBCs have been reported to directly cause retinal endothelial cell death and blood-retina barrier dysfunction

- In Ilhan et al.'s study, NLR was found to be higher in a DME group than in two other control groups, and it was concluded that NLR is a highly sensitive and specific diagnostic indicator of DME.
- In our current prospective study, we have compared Neutrophil, lymphocyte, Neutrophil to lymphocyte ratio between two groups, one with DME, other non DME

Conclusion

- There were no significant differences in Neutrophil, lymphocyte and Neutrophil to lymphocyte ratio between the two groups.
- The peripheral inflammatory blood markers had no significant correlation in DME patients in our study
- Our study has few limitations, only two inflammatory markers were studied Only 50 patients were enrolled
- This study needs large sample sizes and long duration of study to evaluate the relationship

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