IJAYUSH
International Journal of AYUSH
AYURVEDA, YOGA, UNANI, SIDDHA AND HOMEOPATHY
http://internationaljournal.org.in/journal/index.php/ijayush/

International Journal
Panacea
Research library
ISSN: 2349 7025

Original Research Article | Volume 10 Issue 6 | Nov-Dec 2021

ROLE OF NEUTROPHIL LYMPHOCYTE RATIO IN DIAGNOSIS OF *MADHUMEHAJANIT NETRA ROGA* (DIABETIC RETINOPATHY): PILOT STUDY

***Dr. Bhojraj Arun Chaudhari[1] and Dr. Jai Kiran Kini[2]**

[1]M.D. Ph.D. (Scholar) Asst. Prof. in Department of Rog-Nidan and Vikruti Vigyan, S.G.R. Ayurved Mahavidyalaya, Solapur,Maharashtra, India.

[2]M.D. Ph.D. Prof. in Department of Rog-Nidan and Vikruti Vigyan, Y. M.T. Ayurved Medical College & P.G.Institute Kharghar, Navi Mumbai, Maharashtra,India.

Corresponding Author's Email ID: kbchaudhari78@gmail.com

Abstract:

Ayurveda is holistic ancient science of health management described many philosophies related to diseases and their management. Ayurveda mentioned *Madhumeha* as a type of *Prameha* which can be correlated to the diabetes in modern medical science. Ayurveda texts encompass details about the consequences of *Madhumeha* and some manifestations were correlated with modern terminology. In this regard Ayurveda elaborated concept of *Madhumehajanit Netra Roga* which can be correlated with diabetic retinopathy. Present study endeavours to discuss the similarities and differences among the various components of *Madhumehajanit Netra Roga* i.e. diabetic retinopathy and its stages on the basis of *Dosha Dushya* in pathogenesis of *Madhumeha*. Modern science described "Neutrophil Lymphocyte Ratio" as a diagnostic indicator in diabetic retinopathy. This pilot study was planned to evaluate role of "Neutrophil Lymphocyte Ratio" in diagnosis of *Madhumehajanit Netra Roga* in patients of *Madhumeha* (Diabetes mellitus).

Key-Words: *Ayurveda,* Diabetes mellitus*, Madhumeha, Madhumehajanit Netra Roga*, Neutrophil Lymphocyte Ratio.

Introduction

Diabetes mellitus is described as metabolic disorder associated with elevated uncontrolled blood glucose level. The disease can develops some complications including heart disease, stroke, retinopathy and nephropathy, etc [1]. Diabetic retinopathy is one of the serious complications in which blood vessel of retina get affected leading to the visual symptoms like; reduced eye vision and potentially blindness. Vision Threatening DR (VTDR) i.e., Proliferative Diabetic Retinopathy (PDR) and Diabetic Macular Edema (DME) are major problematic issues related to the diabetic retinopathy [1-5].

Ayurveda *Sushrutacharya* described consequences of *Netra sharira* associated with *Patala* of *Netra*. Externally eye is covered under two *Patala* (*Urdhva* and *Adho Vartma*) while four internal *Patala*. The *Vatavaha*, *Raktavaha*, *Kaphvaha* and *Pittavaha Sira* greatly involves in functioning of *Netra* along with *Patala* [6, 7]. The pathogenesis of *Madhumehajanit Netra Roga* involves disturbances in *Sira* and *Patala* as depicted in **Figure 1**.

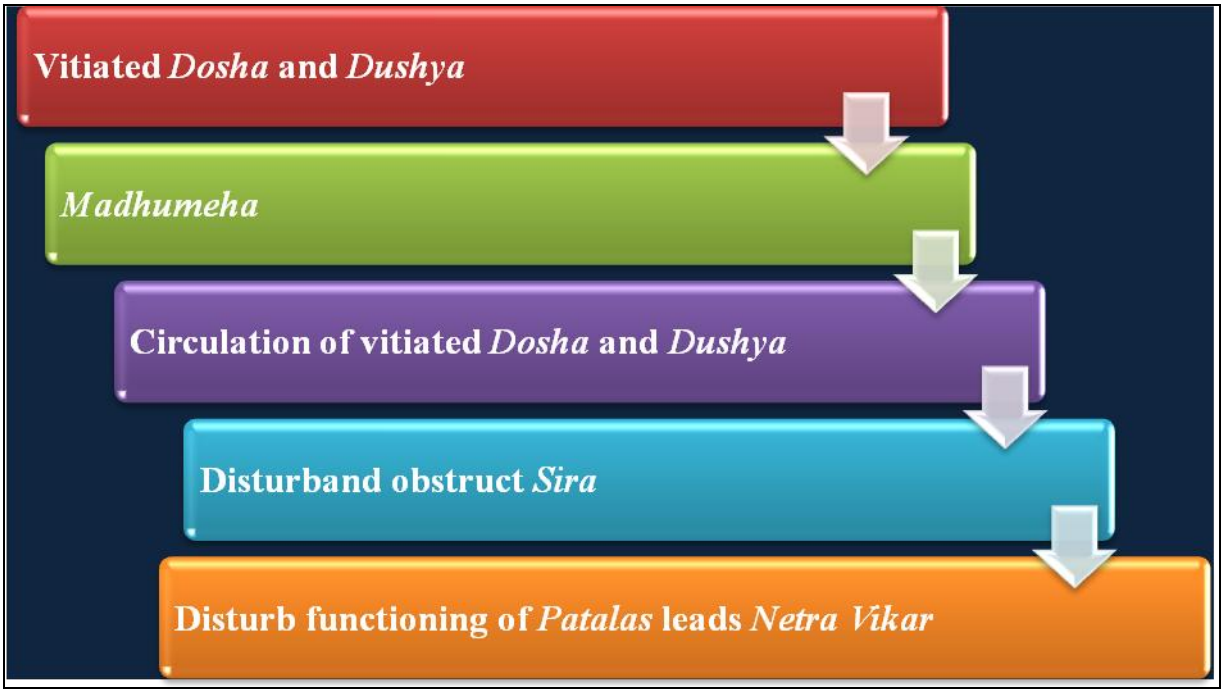


Figure 1: Major pathological events of *Madhumehajanit Netra Roga*

Diabetic retinopathy is most common form of diabetic eye disease, can become cause of vision loss. The chronic cases of diabetes mainly turned to diabetic retinopathy in

which fluctuations of blood glucose levels causes alteration in retinal blood vessels. These vessels will damage and leak fluid into the rear of the eye. This may cause haemorrhages, exudates and even swelling of the retina. Diabetic retinopathy increases stickiness of platelets, causes loss of capillary pericytes, retinal ischemia, hemorrhage and retinal edema[8].

Medical science described some parameters which can help to diagnose consequences of diabetes such as retinopathy. "Neutrophil Lymphocyte Ratio" is a useful inflammatory marker that predicts adverse outcomes in diabetes mellitus and its complications i.e.; diabetic retinopathy[9, 10]. Neutrophil lymphocyte ratio (NLR) is an efficient and stable marker of inflammation, can serve as an important predictor for the presence of microvascular diabetic complications[11]. Neutrophil Lymphocyte Ratio levels will significantly higher in diabetic patients with microvascular complications (retinopathy, nephropathy and peripheral neuropathy).

Several epidemiological studies have previously highlighted that chronic low grade inflammation is associated with diabetes mellitus[12]. It represents a combination of two markers; Neutrophils, which represent the active nonspecific mediator initiating the first line of defense and Lymphocytes, representing the regulatory or protective component of inflammation[13, 14].

Considering above all aspect present study was planned to evaluate the role of "Neutrophil Lymphocyte Ratio" (NLR) as a diagnostic marker in Diabetes Mellitus.

Aim & Objectives:

To diagnose the *Madhumehajanit Netra Roga* (Type II Diabetes Mellitus induced Retinopathy) with the help of "Neutrophil Lymphocyte Ratio" (NLR).

Materials and Methods:

The case group will be consisting of all those patients at the hospital who developed Diabetes Mellitus with Diabetic Retinopathy. Patients of *Madhumeha* and *Madhumehajanit*

Netra Roga (type II Diabetes Mellitus induced diabetic retinopathy) will be enrolled at S.G.R. Ayurveda College; attached with S.S.N.J. Ayurved Hospital, Solapur, Maharashtra.

All the participants will be surveyed on the criteria of age, sex, smoking habits, family history, dietary compliance and other associated risk factors. Total **14** patients were selected for the study and divided into two groups; **07** patients in each group i.e. Test (Case) and Control Group.

Test (Case) Group:

Diagnosed patients of *Madhumeha* and *Madhumehajanit Netra Roga* (type II Diabetes Mellitus induced diabetic retinopathy) fulfilling inclusions and exclusion criteria who consented to participate in the study will be enrolled. A sample of age and sex matched controls will be concurrently selected from the study population in the same period.

Control Group:

The controls group not persisted condition and disease under investigation but possessing similarities with those who have the same age, sex, mix; healthy subjects they live in the same area, etc. Patients of *Madhumeha* (type II Diabetes Mellitus) whom doesn't having hereditary history retinopathy or without Diabetes Mellitus retinopathy.

Inclusion Criteria: [15]

- Patients of either sex possessing specific criteria as per their group division.
- Individuals were selected irrespective of their demographic and socio-economic status.
- Test sample will be selected as per their diagnostic criteria having the signs and symptoms of diabetes and diabetic retinopathy such as; reduce eye vision and potentially blindness.
- Patients those were ready to give their valid consent for collection of data and clinical examination, available at ophthalmology OPD for diabetic retinopathy screening.
- Patients belong from age group 31 to 61 years.

- Individual possessing blood sugar level more than 110 mg/dl in fasting condition while post prandial blood sugar more than 140 mg/dl with HbA1c more than 6.5%.
- Patients were selected irrespective of their religion.
- Patients in test group selected those were taking oral hypoglycaemic drug or insulin regularly.

Exclusion criteria:

- Individuals without *Madhumehajanit Netra Roga (DR)*
- Patient taking treatment for other diabetic microvascular complication like nephropathy or neuropathy.
- Patients suffering from with or without co-morbid conditions like chronic infection, rheumatism, hypertension, dyslipidemia and other major diseases like cancer, liver disorder, cardiovascular diseases, endocrine diseases and systemic lupus erythematosus, etc.
- Immune-compromised patients, on haemodialysis and as well as pregnant and lactating women.
- *Madhumeha* (type II DM) patients failed to give their valid consent for examination of collection of data, or patients who will not willing to participate will be excluded from the study.

Diagnostic Criteria:

Investigations like Complete Blood Count (CBC), Fasting Blood Sugar level (FBSL) and 2hr Post Prandial Blood Sugar level (PPBSL) and Haemoglobin A1c (HbA1c) were performed. All the patients underwent for valuation of blood glucose level by the venous blood with the help of biochemical test.

A. Neutrophil to Lymphocyte Ratio (NLR):

Complete blood count and differentials will be studied with EDTA venous blood *via* Mindray BC-3000 Plus three part Cell Counter machines. Measurement of Neutrophil Lymphocyte Ratio was done as simple ratio between the absolute Neutrophil and Lymphocyte count obtained from the automated blood sample. NLR was computed for each

patient. The range of Normal Neutrophil Lymphocyte Ratio (NLR) values in healthy individuals ranges from 0.78 to 3.53. [16]

B. Ophthalmic Examination:

The status of Diabetic Retinopathy was assessed in each participant through ophthalmological examination. Intraocular pressure and corrected visual acuity (BCVA) was done. Funds examination was done by indirect ophthalmoscopy.

Grading of Diabetic Retinopathy:

1. Non Proliferative Diabetic Retinopathy (NPDR): Mild NPDR, Moderate NPDR, Severe NPDR and Very severe NPDR.
2. Proliferative Diabetic Retinopathy (PDR).
3. Diabetic Maculopathy.
4. Advanced Diabetic eye diseases.

Study Protocol:

Total **14** patients were investigated for assessing diagnostic role of Neutrophil to Lymphocyte Ratio (NLR) in diabetic retinopathy for period of 6 months after the approval of study. Same data collected for both groups. Data was collected through essential examinations (Blood Investigation and Eye funds angiography or Ophthalmoscope.) for assessing diabetes mellitus and associated complication of retinopathy.

Observations:

The information was collected and observation was made on the basis of diabetic complications and history of retinal laser photocoagulation as well as other symptoms of diabetes.

Result:

The selected individuals were belongs from age ranging from 40 to 59 years. Study involves 35 % female and 65 % male population and most of them having history of diabetes mellitus last from 8-10 years.

The findings of biochemical studies for both groups (control and test (case) were reported in **Table 1**. The patients of test groups reported with abnormal or high level of Neutrophil to Lymphocyte Ratio while patients of control group reported with normal or low level of Neutrophil Lymphocyte Ratio.

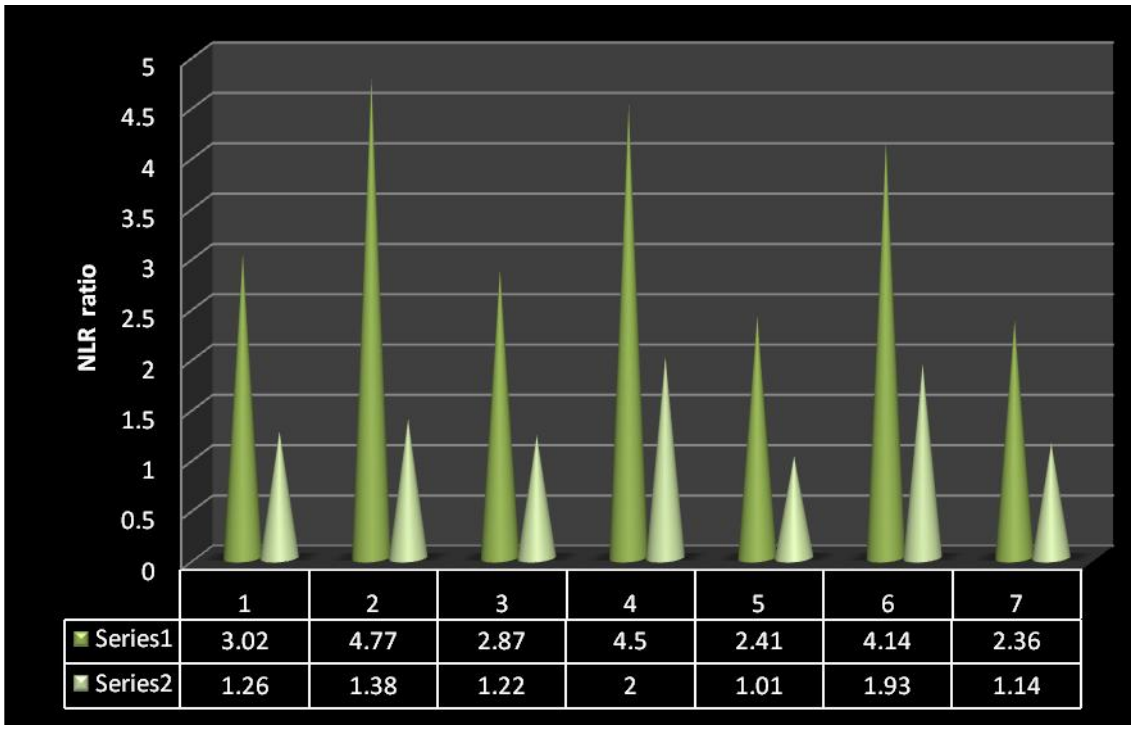
Table 1: Biochemical parameters for test (Case) and control group:

Sr. No.	Test (Case) Group				Control Group				
	BSL-F mg/dl	BSL-PP mg/dl	HbA1C %	Neutrophil Lymphocyte Ratio *	Sr. No.	BSL-F mg/dl	BSL-PP mg/dl	HbA1C %	Neutrophil Lymphocyte Ratio**
1	138	198	6.8	3.02*	1	129	210	5.4	1.26
2	162	237	7.8	4.77*	2	127	201	6	1.38
3	127	150	6.9	2.87*	3	154	210	6.9	1.22
4	196	265	7.5	4.5*	4	133	215	8.7	2.0
5	129	174	6.3	2.41*	5	152	234	7.2	1.01
6	168	223	7.9	4.14*	6	129	213	6.9	1.93
7	176	297	7.6	2.36	7	180	233	7.1	1.14

***NLR Ratio reported in higher range than normal value**

****NLR Ratio reported in normal range**

The comparative range of NLR for both groups ware presented in **Figure 2**.



- Series1- Test (Case) Group
- Series2- Control Group

Figure 2: Comparative range of "NLR Ratio" in test and control group.

The patients of control groups were observed with NLR Ratio ≤ 2; this range considered normal value of NLR ratio. However most of the patients reported NLR Ratio less than 1.5. Contrary to that patient of test group reported higher NLR Ratio and most of the patients exhibited NLR Ratio ≥ 2. Around 43 % patients of test group showed NLR Ratio more than 4, similarly around 43 % patients of test group showed NLR Ratio more than 2 and only 14 % patient of test group showed NLR Ratio less than 2. Thus probability of diabetic retinopathy was higher in test group as compared to standard.

Discussion:

The present study evaluated role of NLR ratio as diagnostic marker in case of diabetic retinopathy. The patients of both groups possess symptoms of diabetes and elevated blood glucose level as found in patients of diabetes mellitus. The patients of control group exhibited normal value of NLR ratio (≤ 2) therefore not showed any symptoms of diabetic

retinopathy. The patients of control group not observed with any changes of diabetic retinopathy including visual problem. However patients of test group showed higher value of NLR ratio (≥ 2) thus expected to have some symptoms of diabetic retinopathy. Furthermore investigations confirmed mild to severe diabetic retinopathy in test group. The 57 % patients showed "Moderate NPDR", 29 % patients showed "Mild NPDR" and 14 % patients of test group showed "Severe NPDR". The presence of diabetic retinopathy changes attributed to the vascular complications and chronic circulatory events of diabetes mellitus. The higher NLR ratio in test group confirmed diagnostic association of NLR ratio in diabetic retinopathy. The higher level of NLR ratio is resultant of microvascular diabetic complications which further leads symptoms of diabetic retinopathy. The alteration in retinal blood vessels, damage and leaking of fluid into the rear of the eye, haemorrhages, swelling of the retina, retinal ischemia and retinal oedema, etc. are major inflammatory consequences of chronic diabetes mellitus involves in pathogenesis of diabetic retinopathy. These all events increases "Neutrophil to Lymphocyte Ratio" therefore it is very much possible to have higher NLR ration in probable case of diabetic retinopathy.

Conclusion:

This pilot study was planned to evaluate role of "Neutrophil Lymphocyte Ratio" in diagnosis of *Madhumehajanit Netra Roga* (Diabetic Retinopathy) in patients of *Madhumeha* (Diabetes mellitus). The patients of control group exhibited normal value of NLR ratio and not showed any symptoms of diabetic retinopathy (visual problem). However patients of test (case) group showed higher value of NLR ratio and observed with some symptoms of diabetic retinopathy. Investigations confirmed mild to severe diabetic retinopathy in test group where NLR ratio was found to be higher side. The presence of diabetic retinopathy changes in patients of test group can be attributed to the vascular complications of chronic diabetes mellitus. The variable ranges of NLR ratio in control and test group suggested that this ratio may get increases in case of diabetic retinopathy. Therefore NLR ratio can be used as diagnostic marker for confirming chances of diabetic retinopathy. This study concluded diagnostic applicability of NLR ratio in diabetic retinopathy; however study on large scale population suggested to assess involvement of other parameters.

References:

1. Reyden L, Standhl E, Bartnik M, BergheG, Vd, BetteridgeJ.Guidelines on diabetes, pre-diabetes, and cardiovascular disease. Eur Heart J. 2007: 1-72.
2. Joussen AM, Poulaki V, Le ML, Koizumi K, Esser C, Janicki H, et al. A central role for inflammation in the pathogenesis of diabetic retinopathy.Faseb J 2004; 18(12): 1450-2.
3. P.K. Sahoo, S. Fiaz, Review Article, Conceptual analysis of diabetic retinopathy in Ayurveda, / Journal of Ayurveda and Integrative Medicine, 8 (2017) 122-131.
4. Prasanta Kumar Sahoo, Shamsa Fiaz, Conceptual analysis of diabetic retinopathy in Ayurveda, Journal of Ayurveda and Integrative Medicine, 8 (2); 2017: 122-131.
5. P.K. Santhakumari, A text book of ophthalmology in Ayurveda, 2nd ed., 2009, pp. 219-221.
6. https://www.idf.org/our-network/regions-members/south-east-asia/.../94 india.html, cited on 22/11/2021.
7. Agnivesha, Charaka, Dridhabala, *Charakasamhita, NidanSthana, Pramehanidan Adhyaya*, 4/44, edited by Dr. Brahamanand Tripathi, reprint edition, Chaukhamba Surbharti Prakashan, Varanasi, 2006; 616.
8. Sharma R, Prajapati PK. Rising risk of type 2 diabetes among inhabitants of Jamnagar, Gujarat: A cross-sectional survey. Ayu 2015; 36:10-7.
9. AK Khurana, Comprehensive Ophthalmology, 5th Edition, Delhi: New age international; 2012, Figure 11.13. p. 274.
10. Tamhane UU, Aneja S, Montgomery D, Rogers EK, Eagle KA,Gurm HS. Association between admission neutrophil to lymphocyte ratio and outcomes in patients with acute coronary syndrome.Am J Cardiol. 2008; 102(6): 653–657.
11. Zahorec R. Ratio of neutrophil to lymphocyte counts–rapid and simple parameter of systemic inflammation and stress in critically ill. BratislLekListy. 2001; 102(1): 5–14.

12. Relationship Between Neutrophil-Lymphocyte Ratio and Microvascular Complications in Egyptian patients with Type 2 Diabetes, American Journal of Internal Medicine, 2015; 3(6): 250-255.
13. Pitsavos C, Tampourlou M, Panagiotakos DB, SkoumasY,Chrysohoou C, Nomikos T, et al. Association Between Low-Grade Systemic Inflammation and Type 2 Diabetes Mellitus Among Men and Women from the ATTICA Study. Rev Diabet Stud 2007; 4(2): 98-104.
14. Eman Moursy, Relationship between Neutrophil-Lymphocyte Ratio and Microvascular Complications in Egyptian Patients with Type 2 Diabetes. American Journal of Internal Medicine 2015; 3(6): 250.
15. http://mdiabetes.nhp.gov.in/display.php/Diagnosis cited on 22/11/2021.
16. A K Khurana, Comprehensive Ophthalmology. 5th edition. New Age International (P) Ltd. Reprint: 2014. p. 275.