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THE ASSOCIATION BETWEEN ALBUMIN- DERIVED NEUTROPHIL TO LYMPHOCYTE SCORE AND DISEASE ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

Rheumatology

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ABSTRACT

Background and Aim: Albumin and derived neutrophil to lymphocyte ratio(dNLR) are known biomarkers that can reflect systemic inflammation and it has been hypothesized that combination of both markers in one score can be useful in monitoring rheumatoid arthritis(RA) patients. This study was aimed to investigate the albumin-dNLR score in rheumatoid arthritis patients and assess its relationship with clinical and laboratory parameters of rheumatoid arthritis. **Methods:** A hospital based observational study done in 100 RA patients who fitting in inclusion and exclusion criteria and attending the OPD/IPD of mahatma Gandhi hospital, Jaipur. The ALB-dNLR score was based on serum albumin level, neutrophil count, and white cell count. DAS score was used to measure the correlation between ALB-dNLR score and disease activity as well as laboratory indexes. **Results:** RA patient had a significantly elevated dNLR (p<0.01*) and albumin-dNLR score (p<0.01*), while serum albumin was decreased (p<0.01*) along with increased in DAS score. When ALB-dNLR score was compared according to DAS score, statistically significant (p<0.01*) difference was found. **Conclusion :** The results of this study found that ALB-dNLR score was significantly associated with DAS score. The present study demonstrated that ALB-dNLR score increased in patient with RA and positively correlated with disease activity.

KEYWORDS

albumin-dNLR score, DAS score, disease activity, rheumatoid arthritis

INTRODUCTION

Rheumatoid arthritis (RA) is an inflammatory autoimmune disease with unknown etiology and systemic involvement. Genetic predisposition and environmental factors contribute to the pathogenesis, diversity of clinical findings and activation of the disease[1-2]. Although the disease is observed more frequently in women compared to men, its frequency is 0.5–1% in the general population. RA is characterized by symmetric joint involvement, and erosion and deformity in the joints as a result of synovial inflammation[3-4]. Inflammatory markers are usually high in the active period of the disease.

The main clinical symptoms are symmetric joint involvement, synovial inflammation, and progressive articular damage, typically leading to physical disability, destruction of cartilage, and decreased quality of life[5]. Increasing evidences show that systemic inflammation and nutritional status are associated with RA patients.

The current treatment strategy for RA is focused on reducing the disease activity to the lowest possible level. Accurate measurement of disease activity (inflammation) is essential for customizing the treatment strategy[6]. The disease is usually assessed at baseline and in the treatment follow-up period by the Disease Activity Score of 28 joints (DAS-28) system, which is calculated by the number of painful joints, number of swollen joints, visual analogue scale (VAS), C-reactive protein (CRP) and/or erythrocyte sedimentation rate (ESR)[4,7]. Impaired immune system functions and control play an important role in the activation and progression of the disease[8-9].

Among the immune system elements, neutrophils, lymphocytes and platelets play a role in the control of inflammation, while also undergoing changes secondary to inflammation[8-9]. The immunocompetent cells like T and B cells, macrophages and neutrophils play a major role in RA pathogenesis. The altered balance between anti- and pro-inflammatory factors has been suggested to be responsible for progression and maintenance of the disease.

Albumin is a routine marker reflecting both nutritional status and systemic inflammation, while the synthesis of albumin can be suppressed by systematic inflammation and malnutrition. Recent studies have demonstrated that serum albumin functions as an antioxidant in the host defence mechanism[10-11].

We aimed to measure albumin-dNLR score in RA and to investigate its possible relation with several clinical and laboratory disease activity parameters.

MATERIALS AND METHODS

This hospital based observational study is conducted in all patients (outpatient & Inpatient) diagnosed as rheumatoid arthritis and evaluated under the department of medicine, mahatma Gandhi hospital, Jaipur.

Inclusion Criteria:
a. All patients attending medicine opd and admitted having rheumatoid arthritis according to ACR criteria
b. Age more than 18 year

Exclusion Criteria:
a. Patients aged less than 18 years.

b. Patients with co-morbidities – Diabetes   mellitus, Hypertension, Hypothyroidism
c. Patients with other underlying chronic liver Disorder, kidney disease, pregnancy, malnutrition, acute or chronic infection, burns, protein losing enteropathy.
d. Patients with a documented cause of hypoalbuminemia and increased derived neutrophil to lymphocyte ratio   other than rheumatoid arthritis.

RESULTS
Table 1: Investigation Profile Among The Study Subjects

Variables	Mean	SD
CRP (mg/l)	7.2	5.78
Albumin (g/l)	39.51	6.07
Leukocyte (*10^9/L)	5.73	4.01
Neutrophil (*10^9/L)	3.52	1.94
Platelet (*10^9/L)	251.08	43.89
dNLR	1.64	0.35
ESR	40.92	20.31

Table 1 shows the investigative profile among the study subjects. Mean CRP (mg/l), Albumin (g/l), Leukocyte (*10^9/L), Neutrophil (*10^9/L), Platelet (*10^9/L), dNLR and ESR among the study subjects was 7.2, 39.51, 5.73, 3.52, 251.08, 1.64 and 40.92 respectively.

Table 2: ALB-dNLR Score Among The Study Subjects

ALB-dNLR Score	N	%
0	19	19
1	54	54
2	27	27

An ALB-dNLR score of 2 for patients with both hypoproteinemia (≤37.6 g/L) and high dNLR (>1.37), score of 1 for those with either of the two abnormities and score of 0 for those with neither hypoproteinemia nor high dNLR was reported among 27%, 54% and 19% of the subjects respectively (table 2).

Table 3: DAS Score Among The Study Subjects

DAS Score	N	%
≤3.2	17	17
>3.2-≤5.1	61	61
>5.1	22	22

DAS Score of ≤3.2, >3.2-≤5.1 and >5.1 was revealed in 17%, 61% and 22% of the subjects respectively (table 3).

Table 4: Investigate Profile According To DAS Score

Variables	DAS Score						p value
	≤3.2		>3.2-≤5.1		>5.1		
	Mean	SD	Mean	SD	Mean	SD	
CRP (mg/l)	1.3	0.56	7.6	4.79	19.23	8.71	<0.01*
Albumin (g/l)	44.49	4.10	41.33	6.68	37.05	6.55	<0.01*
Leukocyte (*10^9/L)	5.34	3.81	5.82	4.12	5.89	4.6	0.66
Neutrophil (*10^9/L)	3.35	1.82	3.83	2.13	3.9	2.61	0.67
dNLR	1.44	0.46	1.92	0.22	1.99	0.7	0.14
ESR	17.37	5.41	52.09	13.78	68.02	17.61	<0.01*

Table 5: ALB- dNLR Sore According To DAS Score

ALB-dNLR Score	DAS Score						p value
	≤3.2		>3.2-≤5.1		>5.1		
	N=17	%	N=61	%	N=22	%	
1	10	58.82	8	13.11	1	4.76	<0.01*
2	7	41.18	42	68.85	5	23.81	
3	0	0.00	11	18.03	16	76.19	

ALB-dNLR score of 3 was reported maximum among subjects with DAS score of >5.1 while ALB-dNLR score of 1, 2 was found most in subjects with DAS score of ≤3.2 and >3.2-≤5.1 respectively. When ALB-dNLR score was compared according to DAS score, statistically significant difference was found (table 5).

DISCUSSION
In this study, a total   of 100 subjects, 24 were males and 76 were females. Hence there was female dominancy in the present study.
In this study, CRP and ESR value increases along with increase in DS score while albumin decreases along with increase in DAS score. When DAS score was compared according to investigative profile, significant difference was found w.r.t. CRP, Albumin and ESR as

p<0.05. ALB-dNLR score of 3 was reported maximum among subjects with DAS score of >5.1 while ALB-dNLR score of 1, 2 was found most in subjects with DAS score of ≤3.2 and >3.2-≤5.1 respectively. When ALB-dNLR score was compared according to DAS score, statistically significant difference was found.

Our results indicate that a combination of albumin and dNLR can improve the diagnostic effectiveness of RA. This is consistent with a previous study performed by Liu et al demonstrating that the combination of albumin and dNLR can improve the diagnostic effectiveness of pancreatic cancer (PCC) [33].

Similarly Shuaishuai Chen et al[29] in their study revealed that RA patients had higher ALB-dNLR scores than healthy controls. A higher ALB-dNLR score was positively correlated with serious RA disease activity. They also found a significant positive correlation between ALB-dNLR score and DAS28 in RA patients.

There is an increased production and activation of neutrophils in response to increased proinflammatory cytokines and mediators associated with chronic systemic inflammatory conditions, while Wood et al[95] suggested that chronic inflammation leads to suppression of lymphocyte synthesis as a result of impairment in apoptosis regulatory mechanisms. This can explain the increase of dNLR in RA patient.

CONCLUSION
Over the years, the growing need to standardize methodologies in rheumatoid arthritis, to improve the clinical management and evaluation of the effectiveness of treatments, has led to the development of different assessment tools. The therapeutic objective of RA has been shifted from relieving the disease symptoms to arresting the disease processes.

The results of this study found that ALB-dNLR score was significantly associated with DAS score. In conclusion, the present study demonstrated that ALB-dNLR score was significantly increased in patients with RA and positively correlated with disease activity. Since ALB-dNLR was determined by serum albumin and dNLR, which can be calculated easily and readily available as routine laboratory tests. Hence it can be used as an inexpensive, available, and valuable biomarker to monitor RA disease activity during the routine follow up visits without extra burden on the patient.

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