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Knee osteoarthritis severity concerning neutrophil-lymphocyte ratio

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Abstract

Osteoarthritis (OA) is a disease with a significant inflammatory component. Neutrophil-lymphocyte ratio (NLR) level is a marker to determine inflammation. The study aimed to evaluate the association between the severity of knee OA and NLR. A case-control study was conducted in Al-Zahrawi from June 2017 to June 2018. A total of 100 knees OA were recruited and 50 healthy subjects as a control group. NLR was significantly higher in knee OA than controls, the mean value was (2.19 ± 0.72) and (1.97 ± 0.88) , respectively. Older age, chronic pain, prolong the onset of diagnosis and high NLR were significantly associated with severe OA. Knee OA had higher NLR compared to healthy people. Higher NLR is associated with the severity of knee OA and it is a poor indicator.

Keywords: Neutrophil-lymphocyte ratio; Osteoarthritis; Bone sclerosis; Osteophytes

1. Introduction

Osteoarthritis (OA) is the most common form of arthritis, and it is a leading musculoskeletal cause of disability in elderly persons [1]. OA is a chronic multifactorial disease with progressive joint degeneration accompanied by sub-chondral bone sclerosis, bone cysts formation, marginal osteophytes, knee flexibility decrease, arthralgia, joint effusion, crepitus, and deformities [2]. It is likely to increase due to aging and obesity [3]. The diagnosis confirms by history, physical examination, imaging studies, and laboratory testing [4]. X-rays reveal marginal osteophytes, narrowing of the space, increased density of the subchondral bone, subchondral cyst formation, bony remodeling, and joint effusions [5]. NLR is the ratio between the absolute neutrophil and lymphocyte counts [6-8].

2. Methods

2.1. Study design and Setting

This was a case-control study conducted in Al-Zahrawi from June 2017 to June 2018. A total of 100 knees OA were recruited and 50 healthy subjects as a control group.

2.2. Participants

A total of 100 patients with OA according to the American College of Rheumatology clinical criteria [9], attended the outpatient clinic. A total of 50 healthy subjects agreed to participate in the study.

2.3. Exclusion criteria

- History of knee trauma.

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- Post-infection arthropathy.
- Tumor.
- Rheumatoid arthritis.
- Systemic lupus erythematosus (SLE).

2.4. Data collection

Data were collected including age, gender, BMI, smoking, drug history, and medical history. The clinical and laboratory data including the radiological findings and NLR. The OA grade was assessed according to the Kellgren-Lawrence (KL) grading system [10].

2.5. Statistical analysis

Data entered and analyzed using the statistical package for social sciences (SPSS) version 24. Descriptive statistics presented as frequencies, percentage (%), mean and standard deviation. Analytic statistics performed using Chi-square to compare frequencies for student's t-test and ANOVA test was used to compare means. The level of significance was set at < 0.05 .

3. Results

There were no statistically significant differences had been found between the groups in demographic variables, (Table 1). The value of NLR; patients with OA had significantly higher NLR than controls, the mean NLR was (3.02 ± 0.87) and (1.86 ± 0.9) , respectively, ($P = 0.001$), (Table 2). Regarding the distribution of the knee OA patients according to their KL grading scale, (18%) grade I, (32%) grade II, (21%) grade III, and (29%) grade IV, (Table 3). Regarding the severity, among these variables, age, and NLR were significantly different, (Table 4).

Table 1 Demographic of the studied groups

		OA (No.= 100)		Control (No. = 50)		P-value
		No.	%	No.	%	
Age (year)	Mean \pm SD	60.4 \pm 8.9	-	62.3 \pm 8.1	-	0.09
Gender	Male	35	35	25	50	0.077
	Female	65	65	25	50	
Smoking	Yes	77	77	30	30	0.069
	No	23	23	20	20	
BMI	Mean \pm SD	29.1 \pm 4.3	-	28.8 \pm 3.7	-	0.49

Table 2 NLR of the studied groups

	OA (No.= 100)	Control (No.= 50)	P-value
NLR	3.02 \pm 0.87	1.86 \pm 0.9	0.001

Table 3 Osteoarthritis patients according to the Kellgren-Lawrence grading system

Grade	No.	%
I	18	18
II	32	32
III	21	21
IV	29	29
Total	100	

Table 4 Association of age and NLR with the severity of OA

Variable	Mild (No.= 18)	Moderate (No.= 53)	Severe (No.= 29)	P-value
Age (year)	60.1 ± 8.2	62.4 ± 7.7	64.1 ± 9.1	0.001
NLR	2.76 ± 0.55	3.11 ± 0.6	3.81 ± 1.21	0.01

4. Discussion

The demographic data are similar to the clinical picture of OA documented previously, where the majority of the patients were old age and female was the dominant gender [11, 12]. There are no statistically significant differences in all hematological parameters except NLR. Despite that, there were very few studies available about the association between NLR and OA. The findings were consistent with Tasoglu, et al. [13].

Recently, Hira and Tamam [14], reported the mean NLR was significantly higher in the OA group than in controls. There was inconsistency about the predictive role of NLR in diagnosis, prognosis, or as a marker for disease activity for other diseases [15-17].

The correlation between the severity of OA and the variables that showed significant association on univariate analysis, older age, and higher NLR was still significantly associated with severe OA. Previous studies mentioned that old age is a significant risk factor of OA and associated with severe OA [11-13, 18]. The explanation beyond could be attributed to the general incidence and prevalence of OA has been reported to increase by ten times in older age than younger, particularly > 65 years who are commonly affected by OA. Also, there is a change in behavior, lifestyle, diet, and other factors. In addition, the cells and extracellular matrix of joint tissues increase the susceptibility of older adults to OA [18, 19].

5. Conclusion

Osteoarthritis had higher NLR compared to healthy subjects. NLR is a poor predictor of OS severity. Age was a stronger risk factor of severity.

Compliance with ethical standards

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Disclosure of conflict of interest

There was no conflict of interest to be declared.

Statement of ethical approval

Taken from Orthopedic Department, Al-Zahrawi Hospital committee.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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