Determining the Relationship between Severity of Clinical Symptoms and Severity of Radiographic Findings in Patients with Knee Osteoarthritis

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Abstract

Objective: This study was conducted to determine the relationship between severity of clinical symptoms and severity of radiographic findings in patients with knee osteoarthritis.

Methods: In this cross-sectional analysis, 84 patients with knee osteoarthritis were studied. Clinical signs, including pain, joint effusion, morning stiffness, and limb deformity, were compared with the Kellgren and Lawrence radiographic classification reviewed by each patient.The relationship between K/L garde and BMI, age, duration of disease and gender was also investigated.

Results: This study conducted on 84 patients with knee osteoarthritis found a significant direct relationship betweenquantitative pain, VAS, and K/Lscore,as well asqualitative pain and K/L score(P=0.000).Moreover, there was a significant relationship between morning stiffness duration and gender (P=0.012). A direct relationship was also reported between disease duration and K/L score of patients (P=0.000) and Pearson coefficient was positive.

Conclusion: this study proved that with increasing VAS and patients' pain, patients are in a higher classification of K/L score.

Keywords*: Knee osteoarthritis, Clinical signs, Radiographic findings, Morning stiffness*

Introduction

Osteoarthritis is one of the most important and common musculoskeletal diseases with a per capita cost of $ 5,700 per person annually in the United States[1] and surgeries performed on this patients account for half of these costs.[2]Significant risk factors ofthis disease include obesity, localized trauma, and certain occupations. In addition, there is disagreement about the role of smoking and nutrition.[3]The prevalence of knee osteoarthritis in the general population is 3.8% and it is the 11th most serious disease in the world in terms of disease burden, which shows a significant increase compared to previous years.[4]The most important diagnostic methods for knee osteoarthritis include clinical and radiographic examinations, and its prevalence on radiography in people over 40 years of age is 34.2%, which in one third of cases is consistent withclinical diagnosis of the disease.[5]

On the other hand, osteoarthritis (OA), formerly known as degenerative joint disease, is the most common joint disorder in the world.In Western countries, osteoarthritis is one of the most common causes of complaints of pain, disability and loss of ability in adults.Radiographic evidence of osteoarthritis

begins in many people over the age of 65, and about 80% of people over the age of75 have this evidence.[5-6]In people over 60, the prevalence of symptomatic osteoarthritis in theknee is 10% in men and 13% in women. Inflammatory cytokines, chemokines, and other inflammatory mediators can also be measured in the joint fluid of a person with OA.[7]Although the main feature of this disease is destruction of cartilage, in addition to articular cartilage, the bone below the joint and the joint membrane are also affected.[8]

The most important method for OA diagnostic classification is Kellgren-Lawrence (K/L) method.[9]Kellgren tested the reliability of rheumatoid radiographic changes in the hand. After his studies, due to differences in the results of different studies, a criterion for classifying OA was proposed in 1957. This classification was used for 8 joints, which include: DIP, MCP.1st CMC, wrist, cervical vertebrae, lumbar vertebrae, pelvis and knee.Among them, radiographic connection in the knee joint was the most coordinated through their studies.[10]This method has been used for 4 decades and is classified from 0 to 4 OA.This classification is based on the presence of osteophytes, narrowing of the joint space, sclerosis, cysts and deformities.[9]Accordingly, this study tends to investigate the relationship between severity of clinical symptoms and severity of radiographic findings in patients with knee osteoarthritis referred to Bu Ali Hospital in 2017 and 2018.

Materials and Methods

This is a cross-sectional-analytical study. The studied population include patients with knee osteoarthritis referred to Bu Ali Hospital in 2017 and 2018.The data was collected by a questionnaire from patients with knee osteoarthritis who referred to Bu Ali Hospital during 2017 and 2018.This information was collected through direct interviews with patients, physical activityquestionnaire, as well as information related to graph by examining the latest graphs available to patients.Then the information related to the graphs was calculated according to K/L classification. Patient pain was assessed with VAS and this scale was used visually for illiterate patients.

Results

Demographic Variables

A total of 95 patients were included in the study, of which 11 patients were excluded due to neuromuscular disease at the same time, and finally 84 patients with knee osteoarthritis referred to Bu Ali Hospital during 2017 and 2018 were examined.The mean age of male patients with knee osteoarthritis was 70.19 and the mean age of female patients was 68.75.This difference was not significant (P = 0.623). The mean BMI of males with knee osteoarthritis is 26.9 and that of females is 27.8, and this difference is not significant (P = 0.393).The mean duration of morning stiffness in male patients is 13.5 min and in female patients is 21.1 min. This difference is significant (P = 0.012).In total, 84 patients (14.3%) did not have daily activity, 64.3% (n = 54) had low activity, 15.5% (n = 13) had moderate activity and 6% (n = 5) had severe activity.Of 84 patients, 31% (n = 26) had knee limb deformity and 69% (n = 58) did not have deformity; 61.9% of patients (n = 52) had effusion in the knee joint and 38.1% (n = 32) did not have effusion in the knee joint; 69% of the patients (n = 58) had difficulty indaily activity and 31% (n = 26) did not have difficulty indaily activity.

K/L score of19% of the patients was 0, 17.9% scored1, 28.6% scored2, 20.2% scored3 and finally 14.3% of the patients scored4.There was a significant relationship between K/Lscore and VAS score(P=0.000). No significant relationship was reported between K/L scoreand BMI of patients (P=0.876).

There was a significant relationship between K/Lscore and qualitative pain assessment (P=0.000). This difference is significant by gender (P=0.000 for male patients and P=0.003 for female patients).

The difference between K/L score and joint effusion was not significant (P=0.391). This difference was not significant by gender in male patients (P=0.438) and in female patients (P=0.53) (Table 1).

Table 1: Spearman between K/L and joint effusion and gender

			KL	effusion
Spearman's rho	KL	r	1.000	-.095
		Sig. (2-tailed)	.	.391
		N	84	84
	Effusion	r	-.095	1.000
		Sig. (2-tailed)	.391	.
		N	84	84
Gender			KL	effusion
male	KL	r	1	-.179
		Sig. (2-tailed)		.438
		N	21	21
	Effusion	r	-.179	1
		Sig. (2-tailed)	.438	
		N	21	21
female	KL	r	1	-.081
		Sig. (2-tailed)		.530
		N	63	63
	Effusion	r	-.081	1
		Sig. (2-tailed)	.530	
		N	63	63

No significant relationship was reported between K/L score and morning stiffness duration (P=0.453); based on gender, this relationship is not significant for male patients (P=0.681) and female patients (P=0.165) (Table 2).

Table 2: Spearman of K/L and morning stiffnessby gender

			KL	morning stiffness
Spearman's rho	KL	r	1.000	.083
		Sig. (2-tailed)	.	.453
		N	84	84
	morning stiffness	r	.083	1.000
		Sig. (2-tailed)	.453	.
		N	84	84
Gender			KL	morning stiffness
Male	KL	r	1.000	-.095
		Sig. (2-tailed)	.	.681
		N	21	21
	morning stiffness	r	-.095	1.000
		Sig. (2-tailed)	.681	.
		N	21	21
Female	KL	r	1.000	.177
		Sig. (2-tailed)	.	.165
		N	63	63
	morning stiffness	r	.177	1.000
		Sig. (2-tailed)	.165	.
		N	63	63

There was a significant difference between K/L score and VAS score by gender (P=0.034 for male patients and P=0.000 for female patients).

No significant relationship was found between K/L score and difficulty in daily activity (P=0.491). By gender, this relationship was not significant for male patients (P=0.433) and for female patients (P=0.791) (Table 3).

Table 3: Spearman test between K/L and difficulty in daily activity, daily activity of men and women

			KL	**difficulty to daily activity**
Spearman's rho	KL	r	1.000	.076
		Sig. (2-tailed)	.	.491
		N	84	84
	difficulty to daily activity	r	.076	1.000
		Sig. (2-tailed)	.491	.
		N	84	84
			KL	**difficulty to daily activity**
Spearman's rho (gender = Male)	KL	r	1.000	.181
		Sig. (2-tailed)	.	.433
		N	21	21
	difficulty to daily activity	r	.181	1.000
		Sig. (2-tailed)	.433	.
		N	21	21
			KL	**difficulty to daily activity**
Spearman's rho (gender = Female)	KL	r	1.000	.034
		Sig. (2-tailed)	.	.791
		N	63	63
	difficulty to daily activity	r	.034	1.000
		Sig. (2-tailed)	.791	.
		N	63	63

No significant relationship was found between K/L score and deformity in the studied patients (P=0.137); by gender, this relationship was not significant for female patients (P=0.131) and for male patients (P=0.715) (Table 4).

Table 4: Spearman test between KL and limb deformity,men and women

Correlations				
			KL	**limb deformity**
Spearman's rho	KL	r	1.000	-.164
		Sig. (2-tailed)	.	.137
		N	84	84
	limb deformity	r	-.164	1.000
		Sig. (2-tailed)	.137	.
		N	84	84
			KL	limb deformity
Spearman's rho (gender = Female)	KL	r	1	-.193
		Sig. (2-tailed)		.131
		N	63	63
	limb deformity	r	-.193	1
		Sig. (2-tailed)	.131	
		N	63	63
			KL	limb deformity
Spearman's rho (gender = Male)	KL	r	1	-.085
		Sig. (2-tailed)		.715
		N	21	21
	limb deformity	r	-.085	1
		Sig. (2-tailed)	.715	
		N	21	21

The mean of duration of knee osteoarthritis in patients was 6.49 (male 6.38 and female 6.52) years. According to ANOVA (P = 0.926), this difference is not significant.This meanby each K/L score is 1.44 years for 0, 4.07 years for 1, 6.92 years for 2, 10.06 years for 3, and 10.33 years for 4.According to ANOVA, a significant direct relationship was reported between K/L score and duration of the disease (P=0.000) and Pearson coefficient was positive.

According to Table 5, no significant relationship was found between age of participants and K/L score (P=0.077).

Table 5: Spearman test between age and K/L score

Correlations				
			Age	**K/L**
Spearman's rho	Age	r	1.000	.194
		Sig. (2-tailed)	.	.077
		N	84	84
	K/L	r	.194	1.000
		Sig. (2-tailed)	.077	.
		N	84	84

Discussion

Currently, studies estimate that there are approximately 14 million patients with osteoarthritis in the United States.[11]One of the treatments for this disease in the last stage is complete replacement of the knee joint, which does not have a strong incidence due to its high cost.The main diagnosis of osteoarthritis is made by graph.That is why Kellgren and Lawrence developed a standard in 1957 to classify osteoarthritis for joints.Through this classification, radiographic findings in osteoarthritis were classified into 5 groups. This classification in the knee joint is more reliable than all other joints and in fact K/L classification is the most common diagnostic method of OA in the whole world.[10]The importance of rapid and cost-effective diagnosis of osteoarthritis, as well as the importance of its classification to prevent its progression, prompted us to conduct the present study to find a relationship between clinical signs and radiographic evidence.In this study, which was performed on 84 patients with knee osteoarthritis, there was a significant direct relationship between quantitative pain, i.e. VAS, and K/L score, as well as qualitative pain and K/L score(P=0.000). Moreover, there was a significant relationship between morning stiffness duration and gender (P=0.0120). A significant direct relationship was reported between duration of disease and K/L score of patients (P=0.000) and Pearson coefficient was positive.

A study by Thomas Link et al. on the difference between MRI findings and clinical signs of osteoarthritis showed that 13 out of 16 knees examined with KL score 4 showed bone marrow edema and thickened cartilaginous lesions, while MRI findings and clinical signs of patients were not significant (P>0.05).[19]The present study proved the relationship between pain and K/L score. A study by Cubukcu et al. showed that there was a significant positive relationship between KL classification and duration of disease.[14] This study proved the relationship between disease duration and K/L grading. A study by Bagherifardet al. showed a significant relationship between dysfunction and radiographic findings in males, but this relationship was not significant in female patients.[12]In the present study, this relationship was found in both genders. An analytical study by Guermazi et al. found that higher severity of clinical symptoms was associated with higher severity of radiographic findings (based on K-L).[13]This is consistent with our study. A comparative study by Sowers et al. showed that severity of clinical symptoms isassociated with radiographic findings based on K-L between 30 to 40 percent.[15]Our study proved this relationship. A cross-sectional study by Muraki et al. found that high severity of K-L-based radiographic findings was present in 47% of cases, and that this relationship, especially in men, was associated with higher severity of clinical symptoms.[16]Our study reported this relationship. Felson et al observed that severity of clinical symptoms was associated with

severity of radiographic findings based on K-L score between 63 to 68 percent.[18]This is consistent with our study. Through a review, Bedson et al. found that higher severity of clinical symptoms, particularly pain, in patients with knee osteoarthritis was associated with higher severity of radiographic findings.[17]This is consistent with the present study.

Conclusion

Generally, this study found a significant relationship between pain and K/L score, so that the higher the pain, the higher the K/L score. In the studied women, morning stiffness duration was significantly higher in men; moreover, the longer the duration of disease, the higher the K/L score.

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