



Clinical and Radiographic Symptoms Are Strongly Associated in Males with Knee Osteoarthritis, But not in Females

Abolfazl Bagherifard,¹ Azade Amini Kadijani,² Hooman Yahyazadeh,¹ Jafar Rezazadeh,¹ Masoud Mirkazemi,¹ and Alireza Mirzaei^{1,*}

¹Bone and Joint Reconstruction Research Center, Shafa Orthopedic Hospital, Iran University of Medical Sciences, Tehran, Iran

²Basic and Molecular Epidemiology of Gastrointestinal Disorders Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran

*Corresponding author Alireza Mirzaei, Bone and Joint Reconstruction Research Center, Shafa Orthopedic Hospital, Baharestan Sq., Tehran, Iran. Tel: +98-2133542000 - 8. Fax: +98-2133542020. E-mail: mirzaeialireza26@gmail.com

Received 2018 March 19; Accepted 2018 April 08.

Abstract

Background: The degree of patient's suffering in association with radiological evidence of osteoarthritis (OA) determines the time point of surgery. Thus, a more clear understanding of the association between clinical and radiological symptoms of OA is necessary.

Objectives: Here we aim to evaluate how clinical and radiographic symptoms of patients are associated with each other in an Iranian Knee OA population.

Methods: In a cross-sectional study, patients with knee OA were recruited. The diagnosis of OA was made using the criteria of American College of Rheumatology (ACR) Classification. Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) was used as an indicator of self-reported disability. The Kellgren - Lawrence index was used for OA grading.

Results: A total of 96 OA patients, including 77 females and 19 males, with a mean age of 53.27 ± 10 years, were included. The OA was graded as I, II, III, and IV in 28, 35, 19, and 14 patients, respectively. The mean WOMAC score was 55.2 ± 20.5 , ranging from 6.3 to 100. The WOMAC score was not significantly correlated with the grade of OA ($p = 0.1$, $r = -0.188$). When we stratified the patients based on their gender, a strong correlation was observed between WOMAC scores and OA grade in male patients ($p < 0.001$, $r = -0.882$), while it was still non-significant in female patients ($p = 0.9$, $r = 0.002$).

Conclusions: Self-reported disability is associated with radiographic symptoms in male patients with knee OA, but not in females. Hence, the orthopedic surgeons should consider this discrepancy in their decision-making process to decide appropriately about the choice of therapy.

Keywords: Osteoarthritis, Clinical Symptoms, Radiographic Symptoms

1. Background

Osteoarthritis (OA) is the most prevalent form of arthritis and a major public health problem throughout the world. The prevalence of symptomatic knee OA is estimated 10% in men and 13% in women at the age of 60 years or older (1).

The goal of the treatment is to reduce symptoms and prevent further functional deterioration. According to the evidence-based evaluation and treatment guidelines, the treatment of knee OA should start with a conservative approach. If the symptoms persist after the appropriate use of the nonsurgical treatment, a surgical approach should be considered (2).

The indication of surgery is based on symptoms, OA stage, and patient-related factors such as age, level of physical activity, and comorbidities. In the end, the degree

of patient's suffering in association with radiological evidence of OA determines the time point of surgery (2).

Total knee arthroplasty (TKA) is one of the most clinically successful and cost-effective OA surgery developed during the last century. However, the potential complications of TKA urge the need for a more accurate identification of patients who are appropriate candidates for this approach (3, 4).

Given the role of clinical symptoms in the appropriate selection of OA patients as TKA candidates, a more clear understanding of the association between clinical and radiological symptoms is necessary.

2. Objectives

Here we aim to evaluate how clinical and radiographic symptoms of patients are associated with each other in an Iranian Knee OA population.

3. Methods

In a cross-sectional study, patients with knee OA who were referred to the knee clinic of our center were recruited. The diagnosis of OA was made using the criteria of American College of Rheumatology (ACR) Classification (5). Patients with known disorders affecting the clinical symptoms of OA including other arthropathies, serious systemic diseases, depression, and neoplasm were excluded from the study.

The Persian version of Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) was used as an indicator of self-reported disability (5). The WOMAC scores were presented as percentage and a lower percentage indicated a more disability.

Full weight-bearing anteroposterior and lateral radiographs of both knees were used for the radiographic evaluation of the knees. The Kellgren - Lawrence index was used for grading the knee OA on a scale of 0 to IV, where 0 = normal knee and IV = severe OA (6). The radiographs were observed by a fellowship trained knee surgeon.

The study was approved by the ethics committee of Iran University of Medical Sciences under the code of IR.IUMS.REC 1396.31786 and informed consent was obtained from each patient prior to participation in the study.

3.1. Statistical Analysis

IBM SPSS for Windows, version 16, was used for statistical analysis of data. Descriptive analysis of the data was presented as the mean \pm standard deviation (SD) or number and percentage. The normality of data was assessed using the Kolmogorov - Smirnov test. T - test or ANOVA was used for the comparison of normally distributed variables between groups. Mann - Whitney U or Kruskal - Wallis test were used for the comparison of non-normally distributed variables between groups. Chi - Square test was used to determine whether a significant difference exists between the expected frequencies and the observed frequencies in one or more categories. The Pearson's or Spearman's correlation coefficient was used to evaluate the potential correlation between variables. A p value of ≤ 0.05 was considered statistically significant.

4. Results

A total of 131 patients were identified with knee OA. A concurrent disorder was observed in 35 patients who were excluded from the study. The final data analysis was performed on the remaining 96 patients, including 77 females and 19 males, with a mean age of 53.27 ± 10 years (ranging from 32 to 89 years). The mean duration of disease was 44.7 ± 52 months, ranging from 2 to 240 months. The OA was graded as I, II, III, and IV in 28, 35, 19, and 14 patients, respectively. The mean WOMAC score was 55.2 ± 20.5 , ranging from 6.3 to 100. The clinical and demographic characteristics of the patients are demonstrated in Table 1.

Table 1. The Clinical and Demographic Characteristics of the OA Patients

Variable	Mean \pm SD or Number (%)	WOMAC	P Value
Age, y	53.27 \pm 10	55.2 \pm 20.5	-
Disease duration	44.7 \pm 52	55.2 \pm 20.5	-
Gender			0.018 ^a
Female	77 (80)	52.4 \pm 19.6	
Male	19 (20)	66.3 \pm 21.2	
Grade			0.12
I	28 (29.1)	56.2 \pm 25.8	
II	35 (36.5)	61.1 \pm 17	
III	19 (19.8)	47.3 \pm 15.4	
IV	14 (14.6)	48.6 \pm 20.1	
Involved knee			0.09
One	32 (33.3)	60.9 \pm 23.7	
Both	64 (66.7)	52.4 \pm 18.4	
History			0.07
Family	64 (66.6)	52.2 \pm 17.9	
Trauma	16 (16.7)	56.1 \pm 8.8	
None	16 (16.7)	68.6 \pm 18.9	

^aSignificant Association.

The mean WOMAC score ranged from 6.3 to 100 in grade I, from 30.2 to 94.8 in grade II, from 23 to 76 in grade III, and from 21.9 to 79.6 in grade IV. The WOMAC score ranged from 6.3 to 94.8 in females and from 21.9 to 100 in males. Although the distribution of OA grades was not significantly different based on the gender of patients ($p = 0.46$), the mean WOMAC score was significantly lower (higher disability) in female patients ($p = 0.018$).

The mean WOMAC score was considerably lower in higher grades of OA, as well. However, this difference was not statistically significant ($p = 0.12$). Furthermore, the WOMAC score was not significantly correlated with the grade of OA ($p = 0.1$, $r = -0.188$). However, when we strat-

ified the patients based on their gender, a strong correlation was observed between WOMAC scores and OA grade in male patients ($p < 0.001$, $r = -0.882$), while it was still non-significant in female patients ($p = 0.9$, $r = 0.002$).

A significant association was observed between the grade of OA and the age of patients so that higher grades were seen in higher ages ($p < 0.001$). Accordingly, a significant negative correlation was observed between the age of patients and WOMAC scores ($p = 0.03$, $r = -0.247$). In this respect, a lower WOMAC score was detected in older patients.

No significant correlation was observed between the disease duration and WOMAC score ($p = 0.07$, $r = 0.211$).

5. Discussion

Although clinical and radiological symptoms both play a crucial role in the selection of therapeutic approach in knee OA, little is known regarding the association of clinical and radiographic symptoms (2). Severe pain is identified by 95% of the orthopaedic surgeons as a very important factor in making the decision to perform a TKA (7). However, ample evidence suggests a discrepancy between the presence of radiological and clinical symptoms of OA (8-11).

Several factors including educational level, life satisfaction, number of comorbidities, female sex, and physiological conditions such as depression have been associated with self-reported pain and physical function in OA (12-14). Whatever the reason is, it is important to have a clear understanding of the association between clinical and radiological symptoms as this discrepancy could affect the therapeutic decision-making and the patient's outcome.

Here we aimed to evaluate the association of clinical and radiological symptoms in Iranian patients with knee OA. According to our results, no significant association was observed between the clinical and radiographic symptoms in female patients, while they were significantly associated in the male population.

Tonelli et al. assessed differences in pain, pain sensitivity, function, psychosocial variables, and physical activity between 208 women and men with knee OA. According to their results, women with knee OA showed significantly more pain, greater pain sensitivity, poorer perceived function, and more impairment on specific functional tasks (15).

De Filippis et al. assessed factors influencing bodily pain, physical function, and social functioning in patients with osteoarthritis. Female sex was associated with more bodily pain in their study (12).

Such differences in pain perception between male and female participants could be attributed to many known and unknown factors. For example, it has been revealed

that healthy women and men differ on quantitative sensory testing measures including pressure pain threshold, heat, and cold measures (16). However, it is not clear if these differences in pain sensitivity persist in chronic knee pain, too. Women and men may also differ on psychosocial factors.

Women also have higher rates of depression (17). Thus, higher self-reported pain in women could be attributed to differences in psychosocial variables. For instance, anxiety has been reported to be associated with knee pain in women. Creamer et al. investigated the association between anxiety and depression and reporting of knee pain. Based on their results, women reporting knee pain in the absence of radiographic osteoarthritis had higher anxiety scores than those without pain (18).

Our study had some weaknesses that should be pointed out. The unequal number of males and females could be regarded as the main limitation of this study. Thus, further study with a more matched population is needed to clarify the role of sex in association with self-reported disability.

Altogether, these results suggest that the orthopedists should consider the potential discrepancy between clinical and radiographic symptoms of OA in their decision-making, especially in the female population. Moreover, they should be aware of the factors that might affect this discrepancy, including psychological determinants. This information enables them to rule out the source of pain other than OA and address this pain more adequately.

References

1. American Academy of Orthopaedic Surgeons. *The burden of musculoskeletal diseases in the United States*. Rosemont, IL, USA: Bone and Joint Decade; 2008.
2. Ronn K, Reischl N, Gautier E, Jacobi M. Current surgical treatment of knee osteoarthritis. *Arthritis*. 2011;2011.
3. Healy WL, Della Valle CJ, Iorio R, Berend KR, Cushner FD, Dalury DF, et al. Complications of total knee arthroplasty: standardized list and definitions of the Knee Society. *Clin Orthop Relat Res*. 2013;471(1):215-20. doi: [10.1007/s11999-012-2489-y](https://doi.org/10.1007/s11999-012-2489-y). [PubMed: 22810157].
4. Chang CB, Yoo JH, Koh JJ, Kang YG, Seong SC, Kim TK. Key factors in determining surgical timing of total knee arthroplasty in osteoarthritic patients: age, radiographic severity, and symptomatic severity. *J Orthop Traumatol*. 2010;11(1):21-7. doi: [10.1007/s10195-010-0086-y](https://doi.org/10.1007/s10195-010-0086-y). [PubMed: 20169392].
5. Altman RD. Criteria for classification of clinical osteoarthritis. *J Rheumatol Suppl*. 1991;27:10-2. [PubMed: 2027107].
6. Kellgren JH, Lawrence JS. Radiological assessment of osteoarthrosis. *Ann Rheum Dis*. 1957;16(4):494-502. [PubMed: 13498604].
7. Verra WC, Witteveen KQ, Maier AB, Gademan MG, van der Linden HM, Nelissen RG. The reason why orthopaedic surgeons perform total knee replacement: results of a randomised study using case vignettes. *Knee Surg Sports Traumatol Arthrosc*. 2016;24(8):2697-703. doi: [10.1007/s00167-015-3961-5](https://doi.org/10.1007/s00167-015-3961-5). [PubMed: 26759152].

8. Claessens AA, Schouten JS, van den Ouweland FA, Valkenburg HA. Do clinical findings associate with radiographic osteoarthritis of the knee? *Ann Rheum Dis*. 1990;**49**(10):771-4. [PubMed: [2241266](#)].
9. Dieppe PA, Cushnaghan J, Shepstone L. The Bristol 'OA500' study: progression of osteoarthritis (OA) over 3 years and the relationship between clinical and radiographic changes at the knee joint. *Osteoarthritis Cartilage*. 1997;**5**(2):87-97. [PubMed: [9135820](#)].
10. Cubukcu D, Sarsan A, Alkan H. Relationships between Pain, Function and Radiographic Findings in Osteoarthritis of the Knee: A Cross-Sectional Study. *Arthritis*. 2012;**2012**:984060. doi: [10.1155/2012/984060](#). [PubMed: [23209900](#)].
11. Kinds MB, Welsing PM, Vignon EP, Bijlsma JW, Viergever MA, Marinissen AC, et al. A systematic review of the association between radiographic and clinical osteoarthritis of hip and knee. *Osteoarthritis Cartilage*. 2011;**19**(7):768-78. doi: [10.1016/j.joca.2011.01.015](#). [PubMed: [21281726](#)].
12. De Filippis LG, Gulli S, Caliri A, D'Avola G, Lo Gullo R, Morgante S, et al. Factors influencing pain, physical function and social functioning in patients with osteoarthritis in southern Italy. *Int J Clin Pharmacol Res*. 2004;**24**(4):103-9. [PubMed: [15754914](#)].
13. Moghtadaei M, Moayedfar M, Dehghani M, Rahmati F, Mazaheri S. Predictors of Comorbid Depression in Iranian Patients With Knee Osteoarthritis. *Shafa Orthop J*. 2016;**3**(4).
14. Juhakoski R, Tenhonen S, Anttonen T, Kauppinen T, Arokoski JP. Factors affecting self-reported pain and physical function in patients with hip osteoarthritis. *Arch Phys Med Rehabil*. 2008;**89**(6):1066-73. doi: [10.1016/j.apmr.2007.10.036](#). [PubMed: [18503801](#)].
15. Tonelli SM, Rakei BA, Cooper NA, Angstrom WL, Sluka KA. Women with knee osteoarthritis have more pain and poorer function than men, but similar physical activity prior to total knee replacement. *Biol Sex Differ*. 2011;**2**:12. doi: [10.1186/2042-6410-2-12](#). [PubMed: [22074728](#)].
16. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley J3. Sex, gender, and pain: a review of recent clinical and experimental findings. *J Pain*. 2009;**10**(5):447-85. doi: [10.1016/j.jpain.2008.12.001](#). [PubMed: [19411059](#)].
17. Munce SE, Stewart DE. Gender differences in depression and chronic pain conditions in a national epidemiologic survey. *Psychosomatics*. 2007;**48**(5):394-9. doi: [10.1176/appi.psy.48.5.394](#). [PubMed: [17878497](#)].
18. Creamer P, Lethbridge-Cejku M, Costa P, Tobin JD, Herbst JH, Hochberg MC. The relationship of anxiety and depression with self-reported knee pain in the community: data from the Baltimore Longitudinal Study of Aging. *Arthritis Care Res*. 1999;**12**(1):3-7. [PubMed: [10513484](#)].