

# Evaluation of the relationship between physical activity level and functional capacity, depression and quality of life in patients with knee osteoarthritis

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## Abstract

**Aim:** The aim of this study was to investigate the effects of physical activity level on functional capacity, depression and quality of life in patients with knee osteoarthritis (OA).

**Materials and Methods:** Seventy nine patients who were diagnosed with knee OA according to ACR (American College of Rheumatology) criteria who applied to Inonu University, Turgut Özal Medical Center, Department of Physical Medicine and Rehabilitation, were included in the study. Radiological stage of knee osteoarthritis was evaluated according to the Kellgren Lawrence score. The patients were divided into two groups as Inadequate Activity Group (IAG) and Physically Active Group (PAG) according to their answers to the International Physical Activity Questionnaire (IPAQ-SF). Patients were evaluated using the ShortForm 36 (SF-36) questionnaire, the Beck Depression Inventory (BDI), and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

**Results:** WOMAC physical function scores were lower on PAG. The average BDI score of PAG was significantly lower than IAG. The average SF-36 scores in PAG were found to be significantly higher when compared with the IAG ( $p < 0.05$ ).

**Conclusion:** Increased physical activity in patients with knee osteoarthritis; It has positive effects on functional capacity, depression and quality of life.

**Keywords:** Depression; IPAQ-SF; knee osteoarthritis; quality of life

## INTRODUCTION

Knee Osteoarthritis (OA) is the most common chronic joint disease and one of the main causes of pain and disability worldwide. It is associated with pain and functional limitations, morphological changes in subchondral bone, articular cartilage degeneration, and soft tissue damage (1). Structural and functional limitations caused by OA affect emotional well-being and reduce the quality of life (2). Depression has been reported in 49.3% of knee OA patients, (3).

It is predicted that regular physical activity positively affects the physical functions of patients with knee OA (4). Regular physical activity in OA patients mainly causes an increase in oxidative capacity, and due to these physiological adaptations, a regular exercise program can increase their functional capacity and reduce pain (5). Studies show that OA patients are less physically active than the general population (6). These studies also showed that the amount of physical activity varies

depending on the OA location. Physical activity levels were found to be lower in patients with hip or knee OA due to physical limitations in the lower extremity (7).

Due to the main complaint in OA is pain and functional limitation, the first goal of the treatment focuses on reducing pain and improving functional capacity in the daily life of the patient. However, the studies; reveals that determining the well-being by evaluating the psychological state and quality of life of patients is a necessary step in terms of the effectiveness of treatment (8). It is important to evaluate the emotional state and quality of life as well as functional capacity in order to determine the extent to which OA harms patients and to develop a strategy for treatment method (9).

Studies on physical activity measurement are increasing in OA (10-12). However, there are not many studies on the relationship of physical activity level with depression and quality of life (13). The aim of this study was to determine the level of physical activity in knee OA patients using the

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International Physical Activity Questionnaire - Short Form (IPAQ-SF). The secondary goal is to investigate the effects of physical activity on functional capacity, depression, and quality of life and contribute to determining the long-term goals of treatment.

## MATERIALS and METHODS

Seventy nine patients, aged 55-75, who were diagnosed with knee OA according to ACR (American College of Rheumatology) criteria (14), who applied to Inonu University Turgut Özal Medical Center, Department of Physical Medicine and Rehabilitation, were included in the study.

Patients with malignancy, acute inflammation, acute pain, joint contracture, central or peripheral nervous system disorder that restricted physical activity, severe heart, lung or psychiatric disease, and systemic connective tissue disease were excluded from the study.

The Kellegren-Lawrence (KL) classification system was used for the radiological grading of the patients. Patients with 2-4 degrees of knee OA were included in the study (15).

Demographic characteristics of the patients were recorded. For all patients, the visual analog scale (VAS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) (WOMAC pain) were used to assess current pain associated with knee osteoarthritis.

The WOMAC pain score is obtained by summing up the pain intensity scores experienced by the patient during five different activities marked on the Likert scale. The WOMAC physical function subscale (WOMAC physical activity) consisting of 17 questions was used to evaluate physical functions. In this subscale, the difficulty experienced during various physical activities was graded by the patient on the Likert scale, and higher scores indicate increased disability. The WOMAC joint stiffness subscale (WOMAC stiffness) was used to assess joint stiffness. Patients rate their joint stiffness intensity using a Likert scale and a score is obtained. The total score is obtained by adding scores after the first walk in the morning and later during the day (16).

The International Physical Activity Questionnaire - Short Form (IPAQ-SF) was used to determine the level of physical activity. The patients were divided into two groups according to their answers to the IPAQ-SF Questionnaire: Insufficient Activity Group (IAG) and Physically Active Group (PAG). IPAQ-SF has been developed to evaluate the physical activity levels of individuals in international standards. This questionnaire evaluates the physical activity levels of individuals in the last seven days in four parts such as vigorous activities, moderate activities, walking and sitting. When calculating the total score, when the metabolic equation (MET) values given to the activities (intensive activity = 8 MET, moderate activity = 4 MET, walking = 3.3 MET) are multiplied by the duration of the activities (min) and the frequency of doing (number of

days), the weekly MET- min scores are obtained. The total physical activity score is obtained by adding these three scores.

For this study, the total physical activity scores of the patients were included in the analysis, and patients with a physical activity level below 600 METs per week were included in IAG and patients above 600 METs per week were included in PAG (17).

Evaluation of patients' depression was performed with the Beck Depression Inventory (BDI). BDI is a self-report inventory that measures the severity of depression. The BDI includes 21 items scored between 0 and 3. Higher scores in the BDI indicate an increased tendency to depression. The Turkish version was verified by Hisli (18).

The quality of life of the patients was evaluated using the Short Form-36 (SF-36) questionnaire. SF-36 is a short questionnaire commonly used to examine many aspects of quality of life based on sub-scores for eight different areas (16). The validity of the Turkish version of the SF-36 was carried out by Kocyigit (19).

SPSS (Statistical Package for Social Sciences) for Windows 19.0 program was used for statistical analysis. While evaluating the study data, Student-T Test was used for intergroup comparisons of normally distributed quantitative data, and Mann-Whitney U test was used for intergroup comparisons of quantitative data that did not show normal distribution. Significance was evaluated at the  $p < 0.05$  level.

Inonu University Clinical Research Ethics Committee approval was obtained for this study (Protocol number: 2020/185).

## RESULTS

Demographic and Clinical Parameters are summarized in Table 1. There were 41 patients in PAG group according to their physical activity levels and 38 patients in IAG group. Both groups did not differ in mean age. The female / male ratio was similar between the study groups. Mean body mass index (BMI), VAS, W OMAC values were consistent between the two groups (Table 1).

**Table 1. Characteristics of study groups**

	PAG (n=41)	IAG (n=38)	p
Age, (mean $\pm$ SD), yıl	65.8 $\pm$ 4.6	68.7 $\pm$ 5.9	0.076
Sex (female), n (%)	24 (58 %)	21 (55%)	0.509
BMI, (mean $\pm$ SD), kg/m <sup>2</sup>	27.2 $\pm$ 4.1	28.8 $\pm$ 4.3	0.155
VAS (mean $\pm$ SD)	5.2 $\pm$ 3.1	4.6 $\pm$ 2.8	0.472
WOMAC pain	11.8 $\pm$ 4.5	12.3 $\pm$ 3.9	0.793
WOMAC stiffness	4.4 $\pm$ 2.1	4.9 $\pm$ 1.9	0.453
WOMAC physical function	38.1 $\pm$ 7.5	42.9 $\pm$ 8.2	<b>0.010</b>
BDI, (mean $\pm$ SD)	10.2 $\pm$ 5.0	15.6 $\pm$ 9.8	<b>0.015</b>

**BMI: Body mass index; OA; VAS Visuel analog scale; WOMAC: Western ontario and McMaster Universities osteoarthritis index; BDI: Beck depression index; Physically active group (PAG); Insufficient activity group (IAG)**

There was no difference between study groups in terms of VAS pain scores. There was no statistically significant difference between the groups in terms of WOMAC pain and WOMAC stiffness scores. However, WOMAC physical function scores in PAG group were significantly lower than IAG group. When the physical activity levels were compared, the BDI score was found to be statistically significantly lower in PAG group (Table 1).

When PAG average SF-36 scores compared to IAG scores; Physical function, physical role and physical component scores were found to be significantly higher. However, no difference was found between the study groups in terms of physical pain, vitality, general health, social functionality, emotional role and mental health scores (Table 2).

SF-36 subscale	PAG (n=41)	IAG (n=38)	p
	Mean±SD	Mean±SD	
Physical functioning	71.9±13.7	47.5±22.0	0.039
Role physical	67.6±41.5	28.4±41.9	0.009
Physical component	55.8±13.4	32.1±10.4	0.021
Bodily pain	55.6±27.4	40.9±26.0	0.120
Vitality	59.7±16.9	46.1±20.3	0.068
General health	71.1±14.8	53.0±24.5	0.180
Social functioning	72.6±35.5	75.8±22.3	0.217
Role emotional	69.5±24.1	65.4±44.4	0.262
Mental health	54.0±8.8	54.9±11.9	0.191

**Physically active group (PAG); Insufficient activity group (IAG)**

## DISCUSSION

Physical activity level of 38 (48 %) of 57 knee OA patients included in our study was found to be below 600 METs per week and was considered as IAG. The physical activity level of 41 patients (51 %) was above 600 METs per week. These patients were also included in PAG.

In a study, OA patients were evaluated according to their physical activity levels by dividing them into 3 groups as inactive (30%), insufficiently active (44%) and minimally active (24%). In this study, it was concluded that the OA population is less active than the general population (20). Roseman et al. Obtained similar results with their study using the IPAQ questionnaire and found that 52% of their patients were inactive, 38% were minimally active and 8% were insufficiently active (21). These results were quite low compared to our study.

In our study, when PAG and IAG were compared, although there was no difference between VAS and WOMAC pain scores in patients in both groups, patients in PAG had higher WOMAC function scores and lower BDI scores.

Similarly, Dunlop et al. divided patients with knee OA into groups according to their physical activity levels and showed increased functional performance as the activity level increased (4). In another study they followed patients

with different physical activity levels for 1 year and concluded that those with higher physical activity levels at the end of 1 year had better functional capacity (6).

Veenhof et al. investigated the relationship between physical activity and decreased functional capacity in patients with both hip and knee osteoarthritis and concluded that functional capacity improves as physical activity increases. In this study, unlike our study, increasing physical activity and exercise programs were found to be effective on both pain and functional capacity. In addition, it has been shown that increasing the level of physical activity is also effective in preventing disability in the long term, and patients with high physical activity levels adapt better to the given exercises (5).

White et al. reported lower depression scores in more physically active patients similar to the results in our study (22).

De Vreede et al. showed in their study that functional task exercise programs have more positive effects on functional capacity than strengthening exercises, and concluded that exercises that increase functional activity levels such as walking and stair climbing should be preferred instead of specific exercises such as muscle strength and range of motion (ROM). (23). However, it has been reported that it may be more effective when supportive sessions are added to these specific exercise programs or when patients are given exercises integrated into daily activities (24).

In our study, SF-36 scores that evaluate the quality of life in PAG; Physical function, physical role and physical component scores were found to be high. Studies have shown that there is a positive correlation between regular physical activity and quality of life (25,26).

Our study had some limitations. First one; the small sample size, which may limit the generalization of the observed results. Another limitation; it stands out as a cross-sectional design rather than a follow-up study. In addition, no data were collected on possible contradictions such as smoking, analgesic use, and comorbidities and behavioral factors that could affect physical activity were not examined.

## CONCLUSION

In our study; physical activity levels of knee OA patients were found to be lower. And the patients who were less physically active had higher rates of depression and lower quality of life. Therefore:

In patients with knee OA, adequate physical activity can improve the psychological state and quality of life as well as affect functional capacity.

Providing adequate physical activity with special education strategies should form an indispensable part of an effective treatment.

Qualitative studies with large patient participation continue to analyze the factors affecting normal physical activity habits in people with knee OA.

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## REFERENCES

1. Murphy L, Schwartz TA, Helmick CG, et al. Lifetime risk of symptomatic knee osteoarthritis. *Arthritis Rheum* 2008;59:1207-13.
2. Covinsky KE, Lindquist K, Dunlop DD, et al. Effect of arthritis in middle age on older-age functioning. *Journal of the American Geriatrics Society. J Am Geriatr Soc* 2008;56:23-8.
3. Kucuksen S, Yilmaz H, Karahan AY, et al. The prevalence of depression and its relevance to clinical and radiological characteristics among older adults with knee osteoarthritis. *Clin Med Res* 2014;2:25-30.
4. Dunlop DD, Song J, Semanik PA, et al. Physical activity levels and functional performance in the osteoarthritis initiative: a graded relationship. *Arthritis Rheum* 2011;63:127-36.
5. Veenhof C, Huisman PA, Barten JA, et al. Factors associated with physical activity in patients with osteoarthritis of the hip or knee: a systematic review. *Osteoarthritis Cartilage* 2012;20:6-12.
6. Dunlop DD, Semanik P, Song J, et al. Moving to maintain function in knee osteoarthritis: evidence from the osteoarthritis initiative. *Arch Phys Med Rehabil* 2010;91:714-21.
7. Davis AM, MacKay C. Osteoarthritis year in review: outcome of rehabilitation. *Osteoarthritis Cartilage* 2013;21:1414-24.
8. de Rezende MU, de Campos GC, Pailo AF, Current concepts in osteoarthritis. *Acta Ortopedica Brasileira. Acta Ortop Bras* 2013;21:120-2.
9. Marks R. Non-operative management of knee osteoarthritis disability. *Int J Chronic Dis Ther* 2015;1:9-16.
10. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ* 2009;339:2700.
11. Gay C, Guiguet-Auclair C, Mourgues C, et al. Physical activity level and association with behavioral factors in knee osteoarthritis. *Ann Phys Rehabil Med* 2019;62:14-20.
12. Gay C, Chabaud A, Guilley E, et al. Educating patients about the benefits of physical activity and exercise for their hip and knee osteoarthritis. *Systematic literature review. Ann Phys Rehabil Med* 2016;59:174-83.
13. Mesci E, Icgasioglu A, Mesci N, et al. Relation of physical activity level with quality of life, sleep and depression in patients with knee osteoarthritis. *North Clin Istanbul* 2015;2:215-21.
14. Altman R, Asch E, Bloch D, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. *Arthritis Rheum* 1986;29:1039-49.
15. Kellgren JH, Lawrence JS. Radiological assessment of osteoarthrosis. *Ann Rheum Dis* 1957;16:494-502.
16. Tuzun EH, Eker L, Aytar A, et al. Acceptability, reliability, validity and responsiveness of the Turkish version of WOMAC osteoarthritis index. *Osteoarthritis Cartilage* 2005;13:28-33.
17. Craig CL, Marshall AL, Sjörström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003;35:1381-95.
18. Hisli N. Beck Depresyon Envanteri'nin üniversite öğrencileri için geçerliliği ve güvenilirliği. *Psikoloji Dergisi* 1989;7:3-13.
19. Koçyigit H, Aydemir Ö, Ölmez N, ve ark. Kısa Form-36'nın Türkçe versiyonunun güvenilirliği ve geçerliliği. *İlaç ve Tedavi Dergisi* 1999;12:102-6.
20. Hootman JM, Macera CA, Ham SA, et al. Physical activity levels among the general US adult population and in adults with and without arthritis. *Arthritis Rheum* 2003;49:129-35.
21. Rosemann T, Kuehlein T, Laux G, et al. Factors associated with physical activity of patients with osteoarthritis of the lower limb. *J Eval Clin Pract* 2008;14:288-93.
22. White DK, Tudor-Locke C, Felson DT, et al. Do radiographic disease and pain account for why people with or at high risk of knee osteoarthritis do not meet physical activity guidelines? *Arthritis Rheum* 2013;65:139-47.
23. de Vreede PL, Samson MM, van Meeteren NL, et al. Functional tasks exercise versus resistance exercise to improve daily function in older women: a feasibility study. *Arch Phys Med Rehabil* 2004;85:1952-61.
24. Pisters MF, Veenhof C, van Meeteren NL, et al. Long-term effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: a systematic review. *Arthritis Rheum* 2007;57:1245-53.
25. Bize R, Johnson JA, Plotnikoff RC. Physical activity level and health-related quality of life in the general adult population: a systematic review. *Prev Med* 2007;45:401-15.
26. Klavestrand J, Vingård E. The relationship between physical activity and health-related quality of life: a systematic review of current evidence. *Scand J Med Sci Sports* 2009;19:300-12.