

# Research Paper: The Relationship Between Demographic and Occupational Characteristics and Disability Severity in Patients With Knee Osteoarthritis



Maryam Abdoos<sup>1</sup>, Mahyar Salavati<sup>1,2</sup>, Zahra Mosallanezhad<sup>1,2</sup>, Hoda Fasihnia<sup>1</sup>, Somaye Azarnia<sup>1</sup>, Hamid Abolhasani<sup>1,2</sup>, Farhad Azadi<sup>1,2</sup>

1. Department of Physical Therapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

2. Elderly Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.



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## ABSTRACT

**Purpose:** Osteoarthritis is a progressive disease and the most common form of joint inflammation. Moreover, it is the most common cause of functional disability in the elderly. Among the multiple and predisposing factors influencing the disease are demographic indicators and occupational factors. The present study aimed to investigate the relationship between age, pain severity, Body Mass Index (BMI), occupation, and educational level, and the severity of functional disability in patients with Knee Osteoarthritis (KO).

**Methods:** This descriptive study was performed on 97 KO patients referring to the Novin private physiotherapy clinic of Semnan University of Medical Sciences from April to March 2017. The study participants were selected through a simple nonprobability sampling technique. Literate individuals with the educational level of guidance school and above and diagnosed with KO were included in the study. Individuals with a history of inflammatory arthritis diseases, such as rheumatoid arthritis, soft tissue rheumatoid arthritis, fibromyalgia syndrome, bursitis, tendonitis, the neurological and vascular conditions of the lower extremity, mental problems, and malignancy were excluded from this research. The data related to the variables such as age, gender, occupation, history of osteoarthritis, pain intensity, involved side, educational level, and the Knee Injury and Osteoarthritis Outcome Score (KOOS) for knee disability were collected by a self-report questionnaire. This study was approved by the Research Ethics Committee of the University of Social Welfare and Rehabilitation Sciences. Using SPSS, Spearman's correlation coefficients were calculated to examine the relationship between the study variables.

**Results:** Spearman's correlation coefficients revealed no significant correlation between the KOOS scores and age, occupation, and educational level. The obtained results suggested a poor significant association between KOOS and BMI; however, there was a strong significant correlation between KOOS and pain intensity Visual Analogue Scale (VAS) ( $P < 0.05$ ).

**Conclusion:** The severity of functional disability in patients with KO based on KOOS questionnaire scores, was well correlated with pain severity, but poorly associated with age and BMI. The obtained data indicated no significant relationship between disability and occupation and educational level.

## \* Corresponding Author:

Zahra Mosallanezhad, PhD.

Address: Department of Physical Therapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

Phone: +98 (231) 2313354180

E-mail: zmosallanezhad@yahoo.com

## Highlights

- The study shows how the related factors in patients with knee osteoarthritis are correlated with disability.
- In patients with knee osteoarthritis, pain severity showed a strongly correlation but age and Body Mass Index (BMI) showed poorly correlations with disability In patients with knee osteoarthritis, pain severity showed a strongly correlation but age and Body Mass Index (BMI) showed poorly correlations with disability.
- Occupation and educational level have no significant correlation with disability in patients with knee osteoarthritis.

## Plain Language Summary

Osteoarthritis is a form of arthritis which may be progressive and is related to old age. It damages cartilage and bone tissues in the joints and is associated with cartilage destruction and leads to muscle weakness and may other distortions. It ultimately causes serious damage to articular cartilage. Knee osteoarthritis is often associated with joint pain and increased articular tenderness. Demographic indicators and occupational factors affect the disease. Occupational knee osteoarthritis, and osteoarthritis occurrence following a previous knee injury are issues that studied recently. This study aimed to explore the relationship between age, pain severity, BMI, occupation, and educational level, and the severity of disability in patients with knee osteoarthritis.

### 1. Introduction

Osteoarthritis is a progressive disease and the most common form of arthritis; it is among the most critical causes of disability in the elderly [1, 2]. Increasing age in the global population has led to an enhanced incidence of chronic destructive diseases, like osteoarthritis [3]. It damages cartilage and bone tissues in the synovial joints. Cartilage destruction is associated with osteophyte formation, sub-cartilage bone sclerosis, articular capsule thickening, increased ligamentous loosening, synovial inflammation, and muscle weakness [4, 5]. Osteoarthritis ultimately causes irreversible damage to articular cartilage [6]. Knee osteoarthritis is often associated with joint pain, dryness, swelling, movement restriction, articular noise, and increased articular tenderness [7].

Despite many epidemiological studies, there is insufficient research evidence to support the effect of daily activity on osteoarthritis; however, gender, age, obesity, and a history of previous knee injury are predisposing factors for knee osteoarthritis [8]. Among multiple factors that predispose and affect the disease, demographic indicators, and occupational factors are listed [9-14]. In recent years, there has been more attention to two factors: occupational knee osteoarthritis, and osteoarthritis occurrence following a previous knee injury.

The present study aimed to explore the relationship between age, pain severity, Body Mass Index (BMI), occupa-

tion, and educational level, and the severity of disability in patients with knee osteoarthritis.

### 2. Materials and Methods

Of patients with knee osteoarthritis, 200 individuals referring to the Novin private physiotherapy clinic of Semnan University of Medical Sciences, in 2017, in Semnan City, Iran, were selected. According to the inclusion and exclusion criteria, 97 patients were finally included in the study. They were chosen through a nonprobability sampling method.

Inclusion criteria were being literate, primary or secondary knee osteoarthritis based on the American Society of Rheumatology criteria (i.e., clinical evaluation & laboratory tests, clinical evaluation, and radiological findings, and clinical evaluation alone), and diagnosis by an orthopedic specialist and rheumatologist.

Exclusion criteria included a history of diagnosed inflammatory arthritis diseases, like rheumatoid arthritis; a history of diagnosed soft-tissue rheumatism, such as fibromyalgia syndrome, bursitis, tendonitis; a history of diagnosed neurological and vascular disorders of the lower extremities; a history of diagnosed mental health problems, and a history of malignancy. Data on the variables of age, gender, occupation (employee, housekeeper, retired, & worker), a history of osteoarthritis disease, pain severity, involved side, educational level, as well as the degree of functional disability by measuring the total Knee Injury and Osteoarthritis

tis Outcome Score (KOOS) were collected using self-report questionnaires. Height and weight variables were measured using tape and scale. Concerning the occupation variable, the level of job pressures was considered from low to high with the classes defined as a housekeeper, employee, retiree, and worker, respectively. This study was approved by the Research Ethics Committee of the University of Social Welfare and Rehabilitation Sciences. Furthermore, ethical principles, including providing sufficient explanations to the participants, the principle of confidentiality, etc., were observed, and their informed consent was obtained. Using SPSS, Spearman’s correlation coefficients were calculated to investigate the relationship between the study variables.

### 3. Results

The Mean±SD age of the study participants was 55.10±9.68 years, ranging 24-75 years. The description of the qualitative variables is presented in Table 1.

Spearman’s correlation coefficients were calculated between the KOOS and the variables of age, pain severity, BMI, occupation, and educational level (Table 2).

Spearman’s correlation coefficients suggested no significant relationship between KOOS and occupation and educational level. The KOOS items had a statistically significant

**Table 1.** The frequency distribution of qualitative variables (N=97)

Variables	Type	Absolute Frequency	Relative Frequency (%)
Gender	Female	84	86.6
	Male	13	13.4
Occupation	Housekeeper	70	72.2
	Employee	10	10.3
	Retired	11	11.3
	Worker	6	6.2
The side of involvement	Right	29	29.9
	Left	29	29.9
	Both sides	39	40.2
Educational level	Under the diploma	34	35.1
	Diploma	44	45.4
	Above diploma	19	19.6

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**Table 2.** Spearman’s correlation coefficients between KOOS and the variables (N=97)

Variable	Spearman’s Correlation Coefficient (P)	Symptom	Pain	ADL	Exercise	Quality of Life
Age (y)	P	-0.29	-0.16	-0.23	-0.32	-0.33
	r <sub>s</sub>	<0/001	0.05	0.01	<0/001	<0/001
Pain severity	P	-0.71	-0.78	-0.79	-0.73	-0.72
	r <sub>s</sub>	<0/001	<0/001	<0/001	<0/001	<0/001
BMI (kg/m <sup>2</sup> )	P	-0.28	-0.26	-0.22	-0.37	-0.34
	r <sub>s</sub>	0.001	0.001	0.01	<0/001	<0/001
Occupation	P	0.15	0.06	0.05	0.11	0.08
	r <sub>s</sub>	0.07	0.5	0.58	0.18	0.36
educational level	P	0.16	0.07	0.05	0.12	0.07
	r <sub>s</sub>	0.05	0.37	0.55	0.17	0.42

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cant relationship with pain severity and a poor relationship with age and BMI.

#### 4. Discussion

The relevant results revealed that the disability scores measured by KOOS were correlated with age, pain severity, and BMI in the studied patients. Most of the daily activities and occupations require postures and movements that trigger or aggravate the symptoms of patients with knee osteoarthritis. Gholami et al. (2015) examined the risk factors of physical activity on knee osteoarthritis as well as the association between squat, climbing, kneeling, lifting, and carrying objects in patients with knee osteoarthritis. It was a population-based case-control study, the second phase of the World Health Organization Community Oriented Program for Control of Rheumatic Disorders (WHO-COPCORD) program in which two groups (263 subjects and 263 controls) aged 30-70 years from Tehran were selected. Demographic and lifestyle data were collected from all subjects. Gender, age, obesity, and previous history of severe knee injury were significantly associated with knee osteoarthritis. However, walking and squats data were significantly different between the two groups (in two-way analysis). After correction and weighting, they found no association between the disease and squat, kneeling, standing, walking, and lifting. This study suggested no significant association between knee osteoarthritis and conducting daily professional and non-professional activities [8]. These results are, to some extent, consistent with those of the present study.

Huang et al. assessed the effects of pain and physical function limitation on the health status of patients with knee osteoarthritis. In total, 73 patients with knee osteoarthritis, pain, and physical function were assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire. Health status was also assessed using the relevant tools in terms of performance, disability, and health. They concluded that the most influencing factor on the health status of patients with knee osteoarthritis was pain and functional limitation (mild to severe) [15].

Riddle et al. (2015), in a prospective multivariate cohort study, examined the changes in patients' pain, symptoms, and future performance according to the exacerbation of symptoms of knee osteoarthritis. They measured pain and symptoms by WOMAC and KOOS scales over five years. Knee grouping was performed based on the Kellgren-Lawrence (KL) system. All 25932 knees were examined in the initial analysis. At the end of the study, patients who faced an increase in the severity of disease also experienced significant changes in their outcome measures of disease [16].

Alken et al. (2013) assessed the quality of life and patient-reported disability in 112 patients with knee osteoarthritis with a mean age of 60 years (45-76). Their quality of life, disability status, and pain severity were assessed using the 36-Item Short Form Survey (SF-36), WOMAC, LEQUESNE, and VAS. The quality of life in the control group was assessed by SF-36. Patients with knee osteoarthritis scored lower on all SF-36 subscales, compared to the controls. In the patients, physical function and pain in SF-36 were significantly associated with effusion, VAS pain, LEQUESNE scores, and the WOMAC subscales values. The SF-36 and WOMAC pain scores were higher in female patients. Patients with knee osteoarthritis had a significantly lower quality of life [17].

Oladapo et al. (2016) examined pain, walking time, physical function, and the quality of life in patients with knee osteoarthritis in Nigeria. In this study, 96 patients with knee osteoarthritis were selected. Moreover, their function, pain, walking time, and quality of life were measured using Ibadan Knee Hip Osteoarthritis Outcome Measure (IKHOAM), VAS Stop Watch, and Arthritis Impact Measurement (AIM), respectively. There was a significant correlation between the mean values of daily pain, performance, pain severity, and the quality of life in the investigated subjects. A significant correlation was found between walking pain and performance and the quality of life of the studied participants. This study revealed that pain during walking and the time of painless walking was the most crucial predictors of performance, the quality of life, and health status in patients with knee osteoarthritis [18].

Overall, these studies highlighted a higher prevalence of knee osteoarthritis in women compared to men; as well as a higher prevalence of knee osteoarthritis compared to the other joints. The most common complication of this disease is pain and movement limitation; the affected patients have a lower quality of life than healthy individuals. Suggestions for future studies include a multi-dimensional investigation of influencing factors and the consideration of other important factors that have been emphasized by researchers.

Inappropriate lifestyle, abnormal patterns of physical activity, and decreased level of physical activity are the key factors in the development of disability in patients with knee osteoarthritis. Wallis et al. (2013), in a systematic review and meta-analysis study, examined the level of physical activity of patients with knee and thigh osteoarthritis. The explored 21 studies involving 3266 subjects; they found that the level of physical activity of these patients was often below the normal levels. They suggested incorporating activities, like walking into the daily schedules of these patients [19].

Inconsistent with the findings of the present study, in a 2009 study by Adib Haj Bagheri et al. on the elderly Iranian population, there was a significant relationship between the severity of disability in the elderly and gender, need for help, residence, substance dependence, regular physical activity, marriage, educational level, lifestyle, and past occupation. They also reported a significant and direct relationship between age and the severity of disability in the elderly. Moreover, they argued that age, gender, marital status, need for help, residence, regular physical activity, and previous occupation were the most correlated factors with the elderly's disability [20].

Studies have indicated that widespread disabilities and common illnesses could lead to disabilities in the elderly and reduce their independence in life [21-23]. Furthermore, chronic destructive disorders could affect the mental health of the elderly. This could lead to disability in these people [24].

The obtained data suggested that controlling pain and body mass could decrease the severity of disability in patients with knee osteoarthritis. Other factors that must be improved in these patients include the proprioception sense and re-positioning error. Isabel et al. (2013) examined differences in the knee proprioception sense in individuals with mild osteoarthritis, advanced osteoarthritis, and healthy controls. According to the motion analysis system and KOOS values, there was no significant difference in the proprioception sense between the patients with mild knee osteoarthritis and the control group. However, the patients with severe osteoarthritis had a higher re-position error than the mild osteoarthritis group and the healthy controls [25].

It is necessary to consider appropriate strategies to reduce disability. This is because the incidence and perception of disability could greatly affect one's healthcare, social participation, and quality of life. Medications are effective in reducing pain; however, they are associated with adverse effects. One of the appropriate and effective non-pharmacological interventions in this regard is developing a proper treatment plan for patients with knee osteoarthritis.

Bennell et al. (2011) reviewed clinical evidence for prescribing therapeutic exercise in the knee and hip osteoarthritis. They emphasized that conservative non-pharmacological strategies, especially exercise therapy, were recommended by all clinical guidelines for osteoarthritis treatment, and meta-analyses emphasized exercise therapy. Aerobics, strength, aquatic, and Tai Chi exercises are useful in improving pain and function in these patients, and their benefits are visible at all stages of the disease.

Appropriate exercise therapy should be prescribed based on a specific approach and the assessment of the severity of the disease, patient's willingness, access to facilities, and so on. To be effective, therapeutic practice sessions should include initial sessions under the supervision of the therapist, followed by home exercise. Besides, exercise therapy significantly reduces the symptoms of patients with knee and hip osteoarthritis [26].

## 5. Conclusion

The severity of functional disability in patients with knee osteoarthritis based on KOOS was strongly correlated with pain severity, but it was poorly associated with their BMI. The obtained results revealed no association between disability and age, occupation, and educational level.

## Ethical Considerations

### Compliance with ethical guidelines

This research was reviewed and was approved by the Research Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (USWR), Tehran, Iran.

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The present paper was extracted from the MSc thesis of the first author, Department of Physical Therapy, University of Social Welfare and Rehabilitation Sciences.

### Authors' contributions

All authors contributed in preparing this article.

### Conflict of interest

Authors declared no conflicts of interest.

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