Sedentary behavior and physical activity preferences in patients with knee osteoarthritis: insights from a cross-sectional study

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Summary

Objective. Osteoarthritis (OA) is a prevalent condition associated with significant disability, particularly affecting mobility and daily activities. Sedentary behavior is common among individuals with knee OA, influenced by factors such as pain, functional limitations, and sociocultural aspects. Despite the benefits of physical activity in managing knee OA, many patients remain sedentary. Understanding factors contributing to sedentary behavior and patients' preferences regarding physical activity is crucial for effective intervention. This cross-sectional study aimed to assess the level of physical activity among Moroccan patients with knee OA, identify factors associated with sedentary behavior, and explore patients' expectations and preferences regarding physical activity.

Methods. We conducted a survey involving 130 patients with knee OA. Information on sociodemographic characteristics, disease profile, physical activity levels using the International Physical Activity Questionnaire Short Form, barriers to physical activity, and preferences for educational interventions was collected.

Results. The mean age of the patients was 59.9±10 years, with females comprising 84.6% of the sample. Sedentary behavior was prevalent in 69.2% of patients and was associated with factors such as age (p=0.005), lack of prior physical activity (p=0.01), knee pain (p=0.02), functional disability (p=0.01), socioeconomic factors (p=0.01), and non-recommendation of physical activity by rheumatologists (p=0.0001). Patients expressed preferences for outdoor physical activity (39.2%), gym-based exercise (30.8%), audiovisual support (80%), and participation in physical activity workshops (66.7%).

Conclusions. Sedentary behavior is prevalent among knee OA patients. It is important to overcome this unhealthy lifestyle and to encourage the practice of physical activity in this population by combating barriers reported by patients.

Introduction

Adapted physical activity (APA) encompasses tailored physical exercises and activities designed to meet the specific needs and abilities of individuals with particular health conditions or limitations (1). In the context of musculoskeletal pathologies, such as knee osteoarthritis (OA), APA plays a crucial role in managing symptoms, improving function, and enhancing overall well-being (2, 3). It involves exercises that are modified to accommodate joint pain, stiffness, or other limitations commonly experienced by patients with knee OA (4).

Musculoskeletal diseases, including knee OA, pose significant challenges to affected individuals, impacting their mobility, daily activities, and quality of life. APA provides a targeted approach to address these challenges by offering exercises and activities that are safe, effective, and tailored to the specific needs of patients (2, 3).

Recommendations from health organizations such as the National Institute of Health and Medical Research, World Health Organization (WHO), Centers for Disease Control and Prevention, and various scientific societies emphasize the importance of promoting physical activity and adapting it to suit the needs of individuals with chronic conditions like knee OA. These recommendations underscore the role of APA as a cornerstone of holistic management strategies for musculoskeletal disorders (2, 4).

Despite the recognized benefits of APA, the implementation of regular physical activity among patients with knee OA remains suboptimal. Previous studies have highlighted various barriers to physical activity in this population, ranging from pain and functional limitations to socio-cultural factors. Understanding these barriers and addressing patients' perceptions and preferences regarding physical activity is essential for developing effective strategies to promote APA uptake among individuals with knee OA (5-7).

In Morocco, initiatives aimed at promoting a healthy lifestyle, including regular physical activity, are gaining momentum.

Collaborative efforts between the Moroccan Society of Rheumatology, academic institutions, such as Mohammed V University, and governmental health agencies are instrumental in raising awareness about the importance of physical activity in managing chronic diseases like knee OA.

Against this backdrop, this study aims to assess the level of physical activity among Moroccan patients with knee OA, identify factors associated with sedentary behavior in this population, and explore patients' expectations and preferences regarding physical activity participation. By gaining insights into these aspects, healthcare professionals can develop targeted interventions to promote physical activity and improve the overall management of knee OA in Morocco.

Materials and Methods

This was a cross-sectional, descriptive, and analytical study aimed at assessing the level of physical activity among patients with knee OA, exploring factors potentially associated with sedentary behavior, and elucidating patients' preferences and expectations regarding APA.

The study was conducted by the Rheumatology B team at the Ayachi Hospital in collaboration with the Moroccan Association for Research and Assistance to Rheumatic Patients. We conducted a survey of patients with knee OA who are followed up in consultation at the Ayachi Hospital. We also used the clinical and radiological data from the same patients' medical records. The diagnosis of knee OA was based on clinical and radiological criteria (according to Kellgren and Lawrence). Patients with other disabling neurological or non-neurological conditions were excluded.

The survey received approval from the Ethics Committee of the Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco (approval no. 94/24) and was conducted per the ethical standards of the 1964 Declaration of Helsinki and its later amendments or comparable standards. Each patient received an information letter and consent form detailing the purpose and process of the study, along with a clickable link to the survey. The questionnaire was sent to patients and their families (in the case of illiterate patients) *via* the Google Form platform. Completing the self-administered questionnaire implied consent to use the responses, and all data were analyzed anonymously.

Questionnaire

We designed a structured questionnaire divided into the five following sections.

Demographic characteristics

Collected information included age, gender, educational level (illiterate, primary, secondary, university), habitat (rural, urban), body mass index (BMI), professional activity, and comorbidities.

Disease characteristics

Data on knee OA severity (the radiological stage was assessed from existing medical records of the patients), knee functional score (Lequesne index), disease duration, and received treatments were gathered.

Physical activity assessment

The International Physical Activity Questionnaire Short Form (IPAQ-SF) was used to evaluate physical activity levels. It has an adequate test-retest reliability of up to 0.79 (8). This score explores physical activity levels intensity (walking=3METs), moderate (4METs), intense (8METs), and the time spent sitting reported by the patient during the previous week.

The IPAQ-SF score is calculated as a multiple of the sum of the MET activity levels, the number of physical activity (PA) minutes per day and the number of PA days per week. The formula for calculating this score is as follows:

Total MET-minutes/week = (Walking METs × minutes/day × days/week) + (Moderate METs × minutes/day × days/week) + (Vigorous METs × minutes/day × days/week)

Activity levels were classified as low, moderate, or high based on specific criteria. This score is expressed in MET-minutes per week for 30 min/day and 5 days/week. The score can be used to classify physical activity into 3 levels: i) a low level of activity: no activity is reported, or activity that does not reach levels 2 or 3; ii) a moderate level of activity corresponding to one of the following 3 criteria: 5 days or more of intense activity lasting at least 20 min per day OR 5 or more days of moderate-intensity activity and/or walking for at least 30 min a day OR 5 or more days of activity combining walking, moderate-intensity and high-intensity activities, thus achieving at least 600 MET-minutes/week; iii) a high level of activity corresponding to one of the following 2 criteria: intense activity at least 3 days a week, reaching at least 1500 MET-minutes/week OR 7 or more days of activity combining walking, moderate and high intensity activities, reaching at least 3000 MET-minutes/week. The sedentary behavior corresponds to a low IPAQ-SF activity level. The IPAQ-SF was translated into the Moroccan dialect so that patients could complete the questionnaire. We used the standard Moroccan Arabic dialect (Darija) during the telephone interviews, which is widely understood and spoken across the country. This common dialect ensured that participants from different regions were able to comprehend and respond to the questionnaire without difficulty.

Barriers to physical activity

Patients were queried about potential barriers to engaging in physical activity, including functional impairment, pain, misconceptions about physical activity, COVID-19 context, and socioeconomic factors.

Expectations for therapeutic education on physical activity

Patients' preferences for the format, location, and content of physical activity interventions were assessed, along with their desire for audiovisual support or participation in physical activity workshops.

Statistical analysis

The data from all questionnaire responses were entered into Microsoft Excel (Microsoft Corp., Redmond, WA, USA) and analyzed using the statistical software SPSS Statistics version 20 (IBM Corp., Armonk, NY, USA). We conducted descriptive and analytical statistical analyses. Quantitative variables were expressed as means ± standard deviation or medians, depending on their Gaussian or non-Gaussian distribution. Qualitative variables were expressed as percentages. A comparison of qualitative variables was performed using the chi-square test. The comparison of quantitative variables was conducted using correlation analysis with Pearson's

parametric test for variables with a Gaussian distribution and Spearman's non-parametric test for those with a non-Gaussian distribution. A comparison was also made between quantitative and qualitative variables according to their distribution using the Student's *t*-test or the Mann-Whitney non-parametric test. A difference was considered statistically significant at $p \leq 0.05$.

Results

Patient and disease characteristics

This study included 130 patients with a response rate of 65%. Sociodemographic characteristics of the study population and disease description are summarized in Table 1. The mean age of patients was 59.9±10 years, with females accounting for 84.6% of the study population. The illiteracy rate was 33.8%. Among the 130 included patients, 23.8% were engaged in paid employment. The most prevalent comorbidities in our study population, in descending order, were diabetes (15.4%), hypertension (13.8%), and cardiovascular diseases (1.5%).

The mean BMI of the patients was 30.6±5.4 kg/m^2, indicating a significant level of obesity. The mean Lequesne index for knee joints was 10.77±3.3, reflecting substantial knee functional impairment. The median duration of knee OA evolution was 4 (2.7) years. Regarding the radiological stage of knee OA (according to Kellgren and Lawrence), 47.7% of the included patients were classified as stage 1-2, while 52.3% were classified as stage 3-4. Additionally, 62% of included patients were not receiving regular treatment. Table 1 presents the characteristics of the patients and their disease.

Level of physical activity in patients with knee osteoarthritis

The average IPAQ score was 260 (0.500) MET-minutes/week, indicating a low level of physical activity among the included patients with knee OA. None of the patients engaged in vigorous physical activity. Physical activity level was moderate in 30.8% of patients and low in 69.2% of them. Before the onset of knee OA, 58.5% of patients were physically active. There was a significant decrease in physical activity after the onset of knee OA, with only 23.8% of cases engaging in physical activity (p=0.01) (Table 2).

Barriers to physical activity

The univariate analysis identified several factors associated with sedentary behavior among patients: sedentary behavior was significantly correlated with patient age (p=0.005), lack of physical activity before the onset of the disease (p=0.01), pain attributed to the disease (p=0.02), functional impairment resulting from knee OA (p=0.01), socio-cultural and economic conditions of the patients (p=0.01), and absence of recommendations for physical activity by treating rheumatologists (p=0.0001). Table 2 presents the results of this analysis.

Preferences and expectations of patients with knee osteoarthritis

According to patients, rheumatologists advised them on the practice of APA in 40% of cases, and they provided satisfactory and clear explanations regarding the modalities of APA practice in 30.8% of cases. Patients preferred to engage in APA outdoors in 39.2% of cases and in a gym in 30.8% of cases. Patients also expressed the need for audiovisual support in 80% of cases, and two-thirds wished to participate in an APA workshop.

Discussion

Our study provides insights into the significant prevalence of sedentary behavior among patients with knee OA. It also identifies the main factors reported by patients as barriers preventing them from engaging in regular physical activity and explores various preferences and expectations regarding physical activity.

The Moroccan survey on common risk factors for non-communicable diseases in people aged 18 and over revealed the growing importance of the burden of non-communicable diseases and their risk factors. Indeed, 29.3% are hypertensive, 10.6% are diabetic, 53% are overweight (BMI≥25 kg/m^2), 20% are obese (BMI≥30 kg/m^2) and 21.1% have an insufficient level of physical activity [not reaching the WHO physical activity recommendations (150 minutes of moderate physical activity per week or equivalent)] with a tendency for sedentary behavior that increases with age. These data are close to the results of our study, but with a lower rate of arterial hypertension, which may be due to undiagnosed cases (9). Sedentary behavior is indeed a significant problem commonly found among patients with knee OA. It can lead to reduced mobility and physical function, potentially resulting in a sedentary lifestyle with an increased risk of cardiovascular issues (10). Several international studies have highlighted this issue of sedentary behavior among patients with knee OA. The results also demonstrate a close relationship between insufficient physical activity, disease severity, and reduced quality of life (6, 11).

Despite the positive effects of regular physical activity, sedentary behavior remains prevalent in our context and on a large scale internationally. Health professionals should further raise awareness among patients about the risks of sedentary behavior

Table 1. Characteristics of patients and their disease.

Characteristics of patients and their disease	n=130
Age (years)*	59.9±10
Female sex (%)	84.6
Educational level (%)	
Illiterate	33.8
Primary	16.2
Secondary	26.2
University	10
Urban area (%)	83.1
Body mass index (kg/m^2)*	30.6±5.4
Overweight (%)	64
Obesity class I (%)	35.3
Obesity class II (%)	10
Obesity class III (%)	5.3
Patients employed (%)	23.8
Radiological stage of knee osteoarthritis (%) (Kellgren and Lawrence)	
Stage 1-2	47.7
Stage 3-4	52
Duration of knee osteoarthritis (years)**	4 (2;7)
Lequesne knees*	10.7±3.3

*Expressed as average and standard deviation; **expressed as median and percentile.

(2, 12). In 2020, the WHO published guidelines on physical activity. These recommendations emphasize the importance of physical activity for everyone, stressing that any form of physical activity matters. For patients with chronic diseases, the WHO recommends at least 150 to 300 minutes of moderate-intensity aerobic activity per week, along with muscle-strengthening exercises twice a week. Elderly individuals with chronic diseases should focus on a variety of activities to improve balance. It is crucial to tailor physical activity to the needs and capacities of each individual, taking into account the overall context of the patient and their chronic disease (13). Our study also aimed to identify barriers to regular physical activity. We found that the main obstacles to physical activity among patients with knee OA in our context are related to patient age, lack of physical activity before the disease, pain, functional impairment due to knee OA, socioeconomic conditions, and the absence of physical activity recommendations from the treating rheumatologist.

Our findings are consistent with previous studies. In a 2020 article, Webber *et al*. examined barriers and facilitators to physical activity among patients with knee OA (14). This study categorized barriers into internal and external factors. Internal barriers include age, financial means, time constraints, pain, disease-related stiffness, and lack of knowledge about the disease. External barriers include social environment (including family support and encouragement from healthcare professionals and socioeconomic status) and physical environment (weather, transportation accessibility, availability of exercise classes) (10). They also suggested that external factors had more influence on sedentary behavior, while internal factors had more influence on physical activity levels (14). Facilitating factors include social support, education about the benefits of physical activity, intrinsic motivation, and adaptation of activities according to individual capacities (10), as emphasized in the 2018 European Alliance of Associations for Rheumatology (EULAR) recommendations on physical activity (2).

These findings are consistent with results of a systematic review published in 2017 on physical activity in knee OA, which identified barriers to physical activity as pain, fatigue, stiffness (15), feelings of limited physical abilities (16), misconceptions about the inefficacy and harmfulness of physical activity, lack of motivation (10, 17, 18), psychological distress related to knee OA, cost of exercise classes (16), limited accessibility (18), lack of appropriate modes, and safety issues.

A Cochrane systematic review revealed the importance of financial aspects (7, 19). A free physical activity program had an adherence rate of 53% compared to only 19% when patients had to pay. WHO-Europe defines self-care education as a discipline that "aims to train patients so that they can acquire the skills necessary to strike a balance between their lives and optimal disease control. Patient education is an ongoing process that is an integral part of medical care. Patient education includes awareness, information, learning, and psychosocial support, all related to the disease and its treatment. Training should also enable patients and their families to better collaborate with caregivers" (7).

When it comes to treating hip and knee OA, regular physical activity is an essential treatment. However, long-term adherence to physical activity and exercise programs is highly problematic (20). To increase patients' activity levels, it is important to understand and measure factors that affect the exercise behavior of patients with OA, to assist healthcare professionals in developing targeted interventions. For example, based on our study, awareness of physical activity should be extended to all patients with knee OA, proposing APA to patients in case of significant pain or functional impairment, addressing socioeconomic factors, including misconceptions, and encouraging healthcare professionals to recommend physical activity to patients with knee OA while considering patients' preferences and expectations.

In line with the 2023 EULAR recommendations on self-management, patients with knee OA should receive training and advice on self-management (12). Methods of practicing physical activity [individual or group sessions, supervised or unsupervised, on land or in water (7), live or *via* digital technology (10)] should be selected based on local availability and patient preferences. It is preferable to integrate exercises into a personalized physical

Table 2. Analysis of factors associated with sedentary behavior in patients with knee osteoarthritis.

	All patients (n=130)	Level of physical activity		
		Low (n=90)	Moderate (n=40)	p
Age (years)*	59.9±10	61.2±8.65	55.4±9.7	0.005
Female gender**	110 (84.6)	78 (86.6)	32 (80)	0.3
Body mass index (kg/m^2)*	30.6±5.4	30.1±5.6	31.1±5.1	0.1
Lack of physical activity prior to the onset of the disease**	76 (58.4)	46 (51.1)	30 (75)	0.01
Radiological severity**	68 (52.2)	48 (53.3)	20 (50)	0.7
Pain attributed to the disease**	55 (42.3)	44 (48.8)	11 (27)	0.02
Functional impairment resulting from knee osteoarthritis**	31 (23.8)	27 (30)	4 (10)	0.01
Socio-cultural and economic:** Economic difficulties Perception of family and society Context of insecurity	84(64.6)	50 (55.5)	34 (85)	0.01
Preconceived ideas about the need to avoid PA in knee osteoarthritis**	53 (40.7)	37 (41.1)	16 (40)	0.9
Context of the pandemic COVID-19**	4 (3)	2 (2.2)	2 (5)	0.5
Absence of recommendations for physical activity by treating rheumatologists**	66 (50.7)	50 (55.5)	34 (85)	0.0001

*Expressed as mean and standard deviation; **expressed as headcount (%); p-value significant inferior of 0.05. PA, physical activity.

activity plan. The involvement of the rheumatologist in this therapeutic education of the patient is essential to share with the patient the knowledge and skills related to physical activity (21).

Our study has several limitations that should be noted. The first is the small sample size, the heterogeneity of patient characteristics, and their socioeconomic conditions. The second point is related to the administration of the questionnaire *via* Google Forms, which is a simple method but may limit the inclusion of patients with certain levels of education. This mode of administration was adopted for logistical reasons and to address the difficulties patients face in traveling to administer a questionnaire. The third and final element is the lack of open-ended responses. These would have the advantage of collecting more personalized, real-life information reported by patients.

Despite these limitations, we believe that our study has provided relevant answers on the extent of sedentary behavior among patients with knee OA in our context and has also shed light on the factors limiting the practice of APA.

Conclusions

This study underscores the importance of promoting physical activity adapted to individuals with knee OA, highlighting its role as a fundamental component of holistic management strategies for musculoskeletal disorders. By assessing the level of physical activity, identifying barriers to participation, and exploring patient preferences, this research provides valuable insights that can inform the development of tailored interventions to promote physical activity among Moroccan patients with knee OA.

Moving forward, healthcare professionals and policymakers should prioritize initiatives aimed at promoting physical activity and addressing the barriers identified in this study. Collaborative efforts involving healthcare providers, researchers, government agencies, and community organizations are essential for implementing effective strategies to increase physical activity participation among individuals with knee OA.

Furthermore, future research should focus on evaluating the effectiveness of interventions designed to promote physical activity in this population, considering factors such as cultural context, socioeconomic status, and access to resources. By advancing our understanding of the determinants of physical activity behavior and implementing evidence-based interventions, we can enhance the quality of care and improve outcomes for individuals living with knee OA in Morocco and beyond.

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