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Understanding Risk Factors of Knee Pain Severity among Iranian Women suffer from Knee Osteoarthritis: A cross-sectional study from Yasuj, Iran.

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ABSTRACT

Aims: Knee osteoarthritis (KO) is one of the most common Musculoskeletal Disorders (MSDs) that causes severe pain, decreased function and range of motion, reduced income, decreased social interaction, and ultimately affects the quality of life in patients. As many studies indicated that KO is common among women, this study aimed to assess the risk factors of Knee osteoarthritis in women between 40 and 55 years.

Method and Materials: In this descriptive-analytical study, 198 were selected randomly, of whom, based on inclusion criteria, 100 participants were eligible and included in the study. To obtain the level of protection behaviors, a 38-item self-designed checklist was used. Western Ontario and McMaster Universities Arthritis Index (WOMAC) and visual analog scale (VAS) were used to measure knee pain severity and knee function. Moreover, a self-efficacy questionnaire and a muscle strength questionnaire were used. The obtained data were analyzed through the analytical tests by using SPSS version 24.

Findings: This study showed there is a significant relationship between knee osteoarthritis and various factors such as age, body mass index, educational status, other diseases (blood pressure and diabetes), muscle strength, daily housewives performance, knee-protective behaviors, self-efficacy in the field of knee-protective behaviors (P <0.05 in all instances).

Conclusion: As this study indicated, the majority of the risk factors associated with knee pain due to osteoarthritis can be controlled, so providing educational-training programs for women to reduce knee osteoarthritis is strongly recommended.

Keywords: Knee Osteoarthritis, Pain Severity, Risk Factors

Introduction

Knee osteoarthritis (KOA) is a common problem among the middle-aged and elderly population of the world. It has been argued that pain is the most predominant disabling symptom of this condition [1]. Today, knee pain related to osteoarthritis is increasing dramatically [2]. It has been argued that the majority of people over 55 years of age suffer from mild to moderate knee pain, and in some cases, they suffer from severe pain and disability due to OA [3]. Pain and disability make people participate less in physical and social activities [4] and affect their health-related quality of life [5]. It has been discussed that aging is one of the main causes of suffering from KOA and its consequences [6-7]. However, it has been discussed that KOA could be previous evidence, it was verified that various factors, including demographic and individual, physical, and psychological factors, are involved in knee osteoarthritis. Moreover, it was shown that osteoarthritis is more common in women than in men, and women generally present for treatment in advanced stages of osteoarthritis and have more debilitating pain than their male counterparts. Furthermore, differences in knee anatomy, range of motion, previous injury to the knee, and hormonal effects may play a role in this health problem. [7].

Osteoarthritis has multifactorial etiologies, which occur due to the interplay between systemic and local factors and affect all ages. [8] Old age, female gender, overweight and obesity, knee injury, repetitive use of joints, bone density, muscle weakness,

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and joint laxity all play roles in the development of KOA. Determination of risk factors, particularly in the weight-bearing joints and their modification, may reduce the risk of KOA and prevent subsequent pain and disability [9,10]. Mechanical forces exerted by overweight, which are exerted on the joints, are a significant cause of KOA and due to pain, and one of the most modifiable risk factors. Female sex, lower educational levels, obesity, and poor muscular strength are associated with symptomatic disease and subsequent knee pain and disability [11]. In a review of the literature, 14 contributing variables, including occupational (extrinsic) and personal (intrinsic), were considered as risk factors of the disease. Two factors, kneeling and squatting, are considered the primary risk factors in correlation with knee disorders [10].

Changing their lifestyle, losing weight obese people and performing protective behaviors such as exercising, wearing appropriate shoes, strengthening muscle strength, wearing knee braces, sitting correctly and doing corrective movements, and not lifting heavy loads can prevent this health problem in those who have not yet been infected and so could be effective in reducing pain in those who are in the mild and moderate stages of the problem [12]. According to the results of various studies, there are several reasons for not performing knee protective or preventive behaviors. It has been reported that the most important factor is not performing regular physical activity in the form of knee pain exercises. Factors such as time limitation, individual factors such as low self-efficacy, stress, and low awareness, family factors such as lack of support from family members, and social factors such as lack of facilities for not doing physical activity have been mentioned [13].

Yasuj is the capital city of Kohgiluyeh and Boyerahmad province in Iran. This city is located in the southwest of Iran. The residents of this city have their own culture, where the majority of women are housewives who undertake heavy duties and household tasks, including baking bread at home. Due to low educational levels, limited self-efficacy among these women, and a traditional lifestyle, risky postural behaviors during daily activities are prevalent. Despite these circumstances and the high prevalence of KOA, there is no observational data on these risky behaviors and other contributing factors. Therefore, this study aims to explore these risk factors among this neglected target group in Yasuj, Iran.

Method and Materials

This descriptive-analytical study was adopted from the Declaration of Helsinki and received ethical approval from the Human Ethics Committee at the University of Tarbiat Modares, Tehran, Iran (IR.MODARES.REC.1398.101). It was conducted in 2021 among the research community consisting of women between 40-55 years, referred to medical clinics in Yasuj, Iran. In this study, 198 individuals with knee osteoarthritis were randomly chosen from selected clinics and invited to participate in the study.

The inclusion criteria for entering this study were menopausal age (40-55), people with moderate knee pain, having knee pain for three months or more (chronic pain), dry knee when sitting and standing, and having a minimum of primary education. The exclusion criteria were Joint trauma or surgery, joint replacement, intra-articular injection in the past 6 months, age over 55, knee joint infections, oral administration of corticosteroids for 6 weeks (present or past), any other disease affecting lower limb function, women with musculoskeletal disabilities (due to limitations in performing therapeutic exercise movements). According to these criteria, finally, 100 patients were eligible to be included in the study. To do the research, firstly, the purpose and procedure of the study were fully explained to the participants. All participants signed the informed consent form. They could be excluded from the study whenever they refused to continue the study.

The demographic questionnaire included some demographic variables, which are shown in Table 1, that were collected and recorded through a distributed questionnaire. To obtain the level of protection behaviors, a self-designed checklist was used. A checklist

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of knee protection behaviors, confirmed with 38 items, included 5 behavioral dimensions (sitting, standing, walking, sleeping, and exercise therapy) that were validated in a previous study [14]. Furthermore, the Western Ontario and McMaster Universities Arthritis Index (WOMAC) which is a widely used self-administered health status measure used in assessing pain, stiffness, and function in patients with OA of the hip or knee, and visual analog scale (VAS) to measure pain severity and self-efficacy questionnaire of knee osteoarthritis and muscle strength questionnaire were used in this study. A muscle test of the quadriceps (quadriceps then) was applied to measure muscle strength, and a self-efficacy questionnaire was used to measure how they believed that they could do protective behaviors.

The WOMAC questionnaire consists of 33 questions, of which 5 questions are related to clinical symptoms, 2 questions are related to knee joint stiffness, 9 questions are related to knee pain, and 17 questions are related to knee function and daily activities of patients with osteoarthritis. Each question with a severity of 0 to 4 is given a higher score with increasing severity of symptoms and the patient's problem, with no problem with zero scores, mild problem with a score of 1, moderate problem with a score of 2, severe problem with score 3 and very severe problem with score 4. The raw score of each part is the sum of the scores, then the raw score is converted from 0 to 100 by the formula, so the higher the score, the less the problem for the patient. The WOMAC questionnaires' questions were designed by Bellamy et al in 1988. In 2013, the English version was translated and equated by Ebrahimzadeh et al [15]. This study [15] reported the validity and reliability of the Persian version of the WOMAC questionnaire. A visual analog scale was used to determine pain intensity in the patients. The visual analog scale for measuring pain intensity uses a graduated ten-centimeter line, with a score of ten for the most severe pain and a score of zero for no pain, which is determined by the patient on the line. The visual pain analog instrument is the most widely used in the world, and it is applied easily. In this instrument, a score of 1-3 indicates mild pain, 4-7 moderate pain, and 8- 10 indicates severe pain. In Iran, the validity and scientific reliability of this tool have been confirmed in previous documents [16]. All the questionnaires were completed by the participants. The checklist of knee protection behaviors was completed by observing the patients at home.

The collected data were entered into the SPSS 24 software. To evaluate the normality of the variables, the Kolmogorov–Smirnov test was conducted. The chi-square ($\chi 2$) test or Fisher's exact test and t-test were used for qualitative and quantitative variables, respectively. P-values less than 0.05 were statistically considered significant.

Findings

In this study, 100 patients with a mean age and body mass index of 46 ± 4.8 years and 28.68±3.54 kg were examined, respectively. All participants were female with mild to moderate knee pain due to KOA. Table 1 shows the rest demographic characteristics of the studied participants.

Findings from this study showed that among risk factors, age, body mass index, education status, number of children, high blood pressure and diabetes as well as nervous diseases and anxiety, knee protection behaviors while sitting- walking- sleeping, and exercising, muscle strength, self-efficacy and clinical symptoms and daily function based on WOMAC questionnaire were most associated with knee pain (Table 1,2). Based on the results, it was found that there was a significant relationship between the level of education and the number of children with knee pain. Moreover, the housewives had more knee pain compared to others. Older women were more likely to suffer from knee pain than younger women. Results demonstrated that there was a significant association between body mass index and the prevalence of knee pain. Analysis of data did not show a significant relationship between levels of income, marital status, or history of family disease with knee pain.

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Table 1) Quantitative and qualitative demographic variables and their association with knee pain severity due to osteoarthritis

Quantitative Variable	Mean ± Std. deviation	P value
Age	46±4.8	<0.05
Weight	77.6±9.6	<0.05
Height	163±4.4	> 0.05

Qualitative Variable N (%)		N=100 N (%)	P value
Body Mass Index	Thin	1 (1)	<0.05
	Normal	16 (16)	
	Overweight	49 (49)	
	Fat	34 (34)	
Education	Primary school	55 (55)	<0.05
	Middle school	27 (27)	
	Associate Degree	18 (18)	
Job	Housewife	83 (83)	<0.05
	Employee	17 (17)	
Number of children	<2	9 (9)	<0.05
	>=2	91 (91)	
Income status	Poor	19 (19)	>0.05
	Average	45 (45)	
	Good	36 (36)	
Marital status	Single	3 (3)	> 0.05
	Married	97 (97)	
History of family disease	Yes	77 (77)	> 0.05
	No	23 (23)	
Existence of other diseases	Blood pressure	29 (29)	<0.05
	Nervous system (stress and anxiety)	24 (24)	
	Diabetes	21 (21)	

Table 2) Comparison of studied variables with pain severity due to KOA in the studied participants

	Dimension	Mean	SD	P value
WOMAC	Clinical symptoms	9.8	3.6	<0.001
	Knee joint stiffness	5.1	1.4	
	Knee functions	39	4.9	
	Knee pain			
Protection behaviors	While sitting	3.1	1.41	<0.05
	While standing	2.4	1.19	
	While walking	3.4	1.6	
	While sleeping	2.2	0.98	
	While exercising	0.11	0.373	
Strength of the muscle		2.7	0.514	<0.05
Self-efficacy		64.42	2.785	<0.001

SD: Standard Deviation; WOMAC: Western Ontario and McMaster Universities Arthritis Index; VAS: Visual Analog Scale; KOA: Knee osteoarthritis

Discussion

The present study investigated the rate and risk factors for KOA in a sample of women in Iran.

In a previous Iranian study, the prevalence rate of knee stiffness, which is measured by WOMAC, after sitting, lying down, or resting among women and men was 40.7% and 20.5%, respectively [17]. In Iran, the most important and largest study of the Community Oriented Program for Control of Rheumatic Disease (COPCORD) on complaints of musculoskeletal pain in the population over fifteen years, reported that 21.5% of the studied people suffered from osteoarthritis was the most common rheumatologic diagnosis [18].

In our study, it was revealed that various factors of demographic, medical, and behavioral factors are involved in knee pain

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due to osteoarthritis. Existing evidence confirms that knee osteoarthritis is a multifactorial disease, so various physical, psychological, social, and individual risk factors are involved in the disease. In line with these findings, the previous evidence in Iran reported the risk factors of knee osteoarthritis among Iranian people [19].

The present study examines the status of women with osteoarthritis of the knee in terms of demographic variables as well as knee protection behaviors, self-efficacy, and quadriceps muscle strength. The present study showed that older women experienced knee pain more than younger women. Osteoarthritis is a disease that progresses over time through increased destruction of articular cartilage, so knee pain is positively associated with increased age. This positive relationship between age and knee pain in our study is supported by other documents (17-19). Based on this reality, a study pointed to the issue that by increasing the elderly population, the treatment of knee osteoarthritis would become a major healthcare problem in developed and developing countries [7]. Another study reported that knee osteoarthritis is one of the most common diseases in old age, but it can start in young and middle age and cause many disabilities in these age groups [12].

The results of the present study showed that most women with knee osteoarthritis had a higher body mass index than individuals with normal BMI. This result is consistent with previous evidence that documented overweight and obesity play a significant role in knee pain and knee osteoarthritis (20, 21). Furthermore, most of the studied participants in the current study had low education and were housewives. Perhaps the high rate of knee pain in our study is related to these factors because other studies verified that doing heavy duties by housewives and being low educated could result in musculoskeletal pain, including knee pain (21-22). According to the results of the current study, the behavior of middle-aged women in Yasuj. Regarding osteoarthritis prevention is undesirable, so they did not have knee protection behaviors such as proper posture while sitting, standing, walking, sleeping, and knee exercises. Moreover, it was shown that doing risky behaviors due to a lack of self-efficacy is the main reason for knee osteoarthritis. Existing research that was conducted in Iran reported that patients with knee osteoarthritis who administer self-care and take the responsibility to get the right posture during daily activities and do knee exercises could control the side effects of the disease and successfully reduce their pain (21). Therefore, many studies recommend designing educational intervention programs to practice proper behavioral skills to improve healthy behaviors among people suffering from getting the right posture of the knee as well as doing knee exercises regularly (21-23). One of the innovations of the present study was observing the participants' behavior while doing their daily activities. However, as this study assessed the women around menopause, the representativeness of these results may be challenging. Despite gender differences regarding knee pain, this study was just done among women because these women living in this city are exposed to more risk factors. However, the risky factors determined in this study have been reported by previous studies mentioned above. In this study, different standard tools were applied, which are the strength points of the study. According to the risk factors of knee osteoarthritis among women, training these people regarding preventive behaviors of knee osteoarthritis is strongly recommended.

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Authors' contribution

MD conducted all stages of the study. SST supervised the different phases of the study and guided the stages. KKSh advised the first author to collect data based on the instruments. PY examined the patients and selected them based on inclusion/exclusion criteria. RM read and verified the design and the inclusion/ exclusion criteria of the manuscript. SSh edited the manuscript and verified the last version of the study. All authors read the final version and confirmed

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the manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

Ethics Approval

This study has received the Code of Ethics in Research from the Research Council of Tarbiat Modares University under the number (IR.MODARES.REC.1398.101). Allstudy participants completed an informed consent form.

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