



## Knee Osteoarthritis Preventive Behaviors in Women over 40 Years referred to Health Centers in Shiraz, Iran: Application of Theory of Planned behavior

Ali Khani Jeihooni<sup>1\*</sup>, Seyyede Farnaz Mousavi<sup>2</sup>, Mahmood Hatami<sup>2</sup>  
Mina Bahmadoost<sup>2</sup>

1. Department of Public Health, Fasa University of Medical Science, Fasa, Iran.

2. Non-communicable Disease Research Center, Department of Public Health, Fasa University of Medical Sciences, Fasa, Iran.

**Background:** Adopted healthy lifestyle known as changing the high risk behaviors to protective behaviors regarding Knee Osteoarthritis (KO) prevention. This study aimed to evaluate the preventive behaviors of KO in women over 40 years referred to health centers in Shiraz, Iran.

**Materials and Methods:** This cross-sectional study randomized 151 women over 40 years, who referred to the health centers in Shiraz in 2016. Data were gathered using a questionnaire including demographic questions and measures based on the Theory of Planned Behavior (TPB) constructs regarding KO. Data were analyzed using SPSS software version 22.

**Results:** The mean age of the participants was  $53.17 \pm 12.41$ , and the mean of Body Mass Index (BMI) was  $26.62 \pm 4.9$ . The participants' knowledge and behavior were low. Attitude, subjective norms, and intention in people were going to be at a moderate level. Among knowledge, attitude, and perceived behavioral control, there was a significant correlation between behavior and performance ( $P < 0.05$ ). The TPB constructs explained 41% of the variance in preventive behaviors of knee osteoarthritis.

**Conclusion:** According to this study, designing and implementing theory-based training programs have a significant effect on promoting preventing behaviors of KO. Thus, adopting a healthy lifestyle is recommended for women.

**Keywords:** Knee Osteoarthritis, Theory of Planned Behavior (TPB), Women

### Introduction

Osteoarthritis known as the degenerative joint disease (joint disease degenerative) is the most common type of arthritis and joint disease in humans (Mehdinasab et al 2009). Erosion or osteoarthritis is one of the most common musculoskeletal disorders, especially in elderly, which leads to physical disability and dependency in patients (Dahaghin et al 2009; Hoogbeem et al 2010). Osteoarthritis is defined as degeneration in the joints having the progressive joint disease (Muraki et al., 2010).

The knee joint is the largest body joint, having the most penchant for vulnerabilities, tendon rupture, and inflammatory arthritis (Nadji & Akhlaghi 2012). Knee pain is common and constitutes a large percentage of patients referring to a doctor (Porth 2009). Arthritis is one of the most common diseases in developed and developing countries (Keshtcarran et al 2010), including our country Iran (Davatchi et al 2008). Based on the studies conducted in Iran, the prevalence rate of arthritis has been reported as 15.5 and 16.6% in urban and villages, respectively (Nadji & Akhlaghi 2012). The prevalence rate of KO in a population with the age ranges over 15 years was 3.15% (Davatchi et al 2008). In a study conducted in 2009 in Iran, sitting cross-legged and kneeling common in our country were reported to be among the risk factors of the disease while walking up the stairs and transportation were reported to have low effect in increasing the risk of disease progression (Dahaghin et al 2009).

Corresponding author: No. 212, Assistant Professor, Department of Public Health, Fasa University of Medical Science, Fasa, Iran, e-mail: khani\_1512@yahoo.com

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Generally, of every 10 patients with the age ranges over 40 years, referring to a doctor with the main complain of knee, back, and neck pain, 9 patients suffer from arthritis (Mehdinasab et al 2009). Nowadays, the prevalence rate of the disease is increasing, and it is expected that the process continues with increasing life expectancy and the prevalence rate of obesity (Dahaghin et al 2009). Joint building is formed of 3 bones, including tibia, the thigh (femur), and the patella (patella). Cartilage surfaces of these bones are in contact with each other (patella isn't in contact with tibia), and with slippery, movement, and opening and closing play an important role in a person's daily activities. In addition to the above-mentioned three bones, four other important tissues are involved in joint building as follow: 1. Meniscus, 2. ligament (ligament), 3. synovium (splash screens), 4. capsule (a rigid membrane covering the articular surfaces of the aforementioned bones, meniscus, ligaments, synovium). Illness or injury in any of the above-mentioned tissues involved in the construction of the knee joint leads to knee problems and pain (Bartels et al., 2007). Arthritis is divided into two types: primary and secondary. In primary osteoarthritis, there is a weak and abnormal joint. Secondary osteoarthritis is caused as a result of the previous types along with an underlying bone injury such as fractures, arthritis, infections, rheumatoid arthritis, tumors, and congenital metabolic diseases (Mehdinasab et al 2009). Except for cartilage tissue lacking blood vessels and nerves, any damage in 4 knee tissues is painful. Direct destruction of articular cartilage alone does not cause pain, but the pain is caused by abnormal new bone replacing damaged cartilage which now released in joint space as the small pieces. This process in cartilage and synovial membrane stimulates the pain and increases in synovial fluid of the knee and eventually causes inflation (fluid in the knee), and the pain becomes more detailed. Normally, on an adult's knee joint, the fluid volume is up to 2 mL, and in abnormal conditions (patients) may reach up to 150 or 200 cc. Swelling and fluid in the knee isn't a disease, but like pain is a symptom of disease (Porth 2009). The most common causes of knee pain are the strikes, pressures, chronic tensions, and in general, its treatment is consisted of care and relative inactivity of knee for 3 weeks to 3 months. The most reliable guide in this treatment journey is pain. The knee should be

placed in such a position, or the knee should be moved in an angle of the knee motion range that we don't have pain with no medication. If analgesia state continues for a while (according to different cases between 3 weeks to 3 months), the recovery would be achieved. Using this method, if the recovery isn't achieved, the specialized medical diagnostic procedures should be done (Hertling & Kessler 2008). Now, arthritis is the fourth cause of disability in life (about 3%) (Haq, & Davatchi 2011). This disease is one of the main causes of functional deficits and has significant effects on people's movement, independency, and daily activities, and restricts people's recreational, sports, and occupational activities. The knee joint is the most common site of disease (Mehdinasab et al 2009). Known risk factors of osteoarthritis include obesity, age, gender, weight, body mass index (BMI), age after menopause, genovarum, bad habits (repeated carrying a heavy load), sitting cross-legged, and kneeling in Iranian toilet use; the level of education is considered as a protective factor (Davatchi et al 2008). In older societies, osteoarthritis as a public health issue is of great importance (Nadji & Akhlaghi 2012). Change in lifestyle, weight loss in obese patients before the advent of osteoarthritis genuvarus deformity, and correction can be effective in preventing or reducing the severity and symptoms of the disease (Mehdinasab et al 2009; Doherty & Roddy 2006). Therefore, it is possible to reduce the prevalence rate, consequences, and the problems caused by the disease through healthy and appropriate lifestyle (Agha Amiri et al 2010). Best strategy for reducing the burden of disease is preventive interventions (primary and secondary) decreasing economic burden to society and families (Jinks, Jordan & Croft 2007). To achieve the educational goals and to implement educational programs, it is important to choose an appropriate model (Didarloo, SHojaeezade & Mohammedian 2010). Using the most appropriate theory to dramatically increase the chances of health education and health promotion is an effective way helping designers understand the environmental factors affecting health behaviors, choose suitable target groups for interventions, develop strategies and educational materials, and choose affordable interventions which are more successful in terms of time and cost (Safari & Shojaeezade 2009). According to this theory, the most important determinant of a person's behavior is to go by the person whose constructs of

attitudes, subjective norms, and perceived behaviors are controlled (Tabatabaei, Taghdisi & Nakheei 2010). Given the importance of the disease prevention in susceptible individuals, particularly in women, this study was conducted in response to this need based on a logical approach, based on the theory of planned behavior, infrastructure and basic beliefs of women to identify the most important determinants of these behaviors. Hopefully, in the future, we can use the results of behavior modification intervention for designing, implementing, and evaluating KO preventive behaviors.

### Materials and Methods

This study was a cross-sectional study. The study participants were 151 women over 40 years, referring to the health centers in Shiraz city. The sample size of 151 participants was justified by taking into account 5% Type I error and power of 95% and reaching to a mean difference of 20%. The inclusion criterion was consisted of being a woman over 40 years. People with knee arthritis were excluded. Participation in the study was voluntary, and confidentiality of data was informed to the participants. The data collection instrument was a questionnaire consisted of two parts: The first part included 4 questions related to the participants' background information in terms of age, education level, marital status, and BMI. The second part was consisted of items related to TPB constructs including attitudes, subjective norms, perceived behavioral control, intention, and behavior. Ajzen's (1991) recommendations for designing a questionnaire based on the theory of planned behavior as a research tool were used for building each construct (Saffari & Shojaeizadeh, 2009), and the other studies were used (Mazloomi et al 2015). Data were collected through a self-reported questionnaire eliciting responses from the participants. Content validity of the questionnaire items was ensured previously through a study conducted by the specialists of health education and rheumatology (Mazloomi et al 2015). Reliability of the questionnaire was confirmed by conducting a pilot study and calculating Cronbach's Alpha test. Alpha estimations for the constructs were in the ranges of 70 to 89, indicating acceptable internal consistency. There were 12 knowledge questions in a multiple choice format in which

the correct and wrong options were scored as 1 and 0, respectively. There was also 12 items measuring attitude based on a 5-point positively-packed Likert-type rating scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the questionnaire, there were 11 items measuring the subjective norms; for example, "My friends think that I should have a healthy weight in order for KO prevention", or "My family makes little use of stair in order for KO prevention", again based on a 5-point positively-packed Likert-type rating scale with response options from 1 (strongly disagree) to 5 (strongly agree). To measure perceived behavioral control, 10 items were used with the same rating scale; for example, "Due to time constraints, exercise is not possible for me. The intention was measured by 9 items for example, "I intend to prevent KO by regular exercises. The questionnaire contained 9 behavior specific questions with a rating scale of 1 to 5. The collected data were analyzed using SPSS software version 22. To analyze the data, descriptive statistics were used with  $p < .05$ .

### Results

A total of 151 participants were selected in this study. The mean age of the participants was  $17.53 \pm 41.12$  years with an average BMI of  $3.25 \pm 22.36$ , respectively. A majority of the participants were married (73.5%) and diploma (35.8%) (Table 1). There were significant relationships between the preventive treatments of KO and variables such as marital status and BMI in patients ( $P = < 0.05$ ), but no significant relationship was observed between the preventive treatments of KO and age and education level ( $p > .05$ ). The most important barriers for not adopting preventive behaviors of osteoarthritis were announced to be lack of regular physical activity and not using the French toilet. Correlation between demographic variables and the constructs referred to in theory, showed a significant relationship between behavior and marital status ( $r = .134, p < .05$ ), education and attitudes ( $r = .154, p < .05$ ), age and subjective norms ( $r = .120, p < .05$ ), and marital status and perceived behavioral control ( $r = .166, p < .05$ ).

Multiple regression analysis showed that a total of 41% of the variance in predicting the preventive behaviors of KO was explained by the constructs of TPB.

**Table 1. Distribution of the subjects according to individual specifications Personal identification.**

Personal Information		Number	Percentage
Gender	Female	66	43.7
	Male	85	56.3
Marital status	Single	13	8.6
	Married	111	73.5
Level of education	Primary	28	18.5
	Guidance	36	23.8
	High school	54	35.8
	Excellent	33	21.9

A majority of the subjects reported to the variables of knowledge and poor behavior. Participants' mean scores on such variables as behavioral intention,

subjective norms, and attitudes were reported in (Table 2).

**Table 2. Mean and standard deviation of TPB components.**

Variables	Mean	Standard deviation
Awareness	4.62	2.18
Attitude	38.13	7.71
Subjective norms	26.13	4.29
Perceived behavioral control	24.61	4.53
Intention	25.99	6.18
Behavior	14.46	2.25

TPB: Theory of Planed Behavior.

There were significant relationships between knowledge, behavior, attitude, and perceived behavioral control ( $p < .05$ ) (Table 3).

**Table 3. Correlation between variables in patients with type 2 diabetes.**

Variables	knowledge	Attitude	Subjective norms	Perceived behavioral control	Intention	Behavior
Awareness	1	0.17	0.14	0.22	0.08	-0.21
<i>p</i> -value	-	.03	.07	.007	.30	< 0.05
Attitude	0.17	1	0.72	0.73	0.32	0.19
<i>p</i> -value	.03	-	< 0.0001	< 0.0001	< 0.0001	.< 0.05
Abstract norm	0.14	0.72	1	0.80	0.28	0.28
<i>p</i> -value	.07	.000	-	< 0.0001	.000	< 0.0001
Perceived behavioral control	0.22	0.73	0.80	1	0.42	0.24
<i>p</i> -value	.007	< 0.0001	< 0.0001	-	< 0.0001	.002
Intention	0.08	0.32	0.28	0.42	1	0.17
<i>p</i> -value	.30	< 0.0001	< 0.0001	< 0.0001	-	.02
Behavior	0.21-	0.19	0.28	0.24	0.17	1
<i>p</i> -value	< 0.05	< 0.05	< 0.0001	< 0.0001	< 0.0001	-

## Discussion

The cost of KO treatment is very high and is considered as one of the major health treatment issues (Davatchiet al., 2006). This study aimed to determine the preventive behaviors of KO in women over 40 years under the coverage of health centers in Shiraz based on the theory of planned behavior (TPB).

In this study, the results showed that the participants' knowledge was low. This finding is consistent with the finding of other studies

conducted in other areas (Biranvand et al 2014; Desalu et al 2011; Chellan et al 2012; Hazavehei, Khani Jeihooni & Hasanzadeh 2010; Munoz et al 2008).

In the study of Mazloomi et al. (2015), Besharti et al. (2011) and tavoosi et al. (2009), attitude and perceived behavioral control alone was a strong predictor of behavior (Mazloomi et al 2015; Tavousi et al 2009). Also, in the study of Parrott & Tenanant (2008), attitude was satisfactory Parrott & Tenanant 2008). The results of this study are

consistent with the study of kashfi, Khani Jeihooni & Yazdankhan in 2012 (Kashfi, Khani Jeihooni & Yazdankhan 2012).

In a study, it has been noted that subjective norms is the construct of the theory of plan behavior, supporting the effect of social pressures and support in adopting or in performing the desired behaviors. As the pressure and social support is increased by family members, especially spouses of patients, physicians, and health experts, and friends for health behaviors in patients, the patients develop the same amount of behaviors (Dydarlu 2011). The results showed that the participants' subjective norms was at an intermediate level. In another study, Karimi & Heidarnia (2012) showed that oppression and anxiety were the most predictors of behavioral plans (Karimi & Heidarnia 2012; Mazloomi et al 2015). About the perceived behavioral control, the results are consistent with the results of mazloomi's study (Mazloomi et al 2015).

In a study by Pirzadehand Sharifirad, only 24% of the subjects had a favorable level of physical activity (Pirzadeh & Sharifirad 2012). Perceived behavioral control, including belief in his ability to successfully organize and carry out activities in order to achieve desirable results, was specified in certain circumstances. It refers to the degree of a person's feeling about how much doing or not doing a behavior is in his control. If there is an elimination in performing a behavior, and the person believes that there is no sufficient possibilities and time necessary to perform a behavior, it is possible that even with high attitude and subjective norms, the person does not have the strong intention to perform the behavior (Dydarlu 2011).

The first and most effective plans associated with the desired behavior for changing and promoting the constructs can be further taken from the patients' self-care behaviors. Of course, the relationship between intention and behavior is not 100%. In other words, there is a requisite intention about the desired behavior, but it is not enough for action (Dydarlu 2011). In this study, there was no patient trying to moderate KO preventive activities. In the study of mazloomi, the constructs of the theory of planned behavior (attitude, subjective norms, and perceived behavioral control) together were able to produce accurate predictions about the behavioral plans (Mazloomi et al 2015).

In the study of afshari et al. (2013), there was an increasing mean score on behavioral intention after training in the intervention group.

In this study, theoretical constructs were predicted as 41%. In the study of mazloomi et al. (2015), the theoretical constructs were predicted as 43% (Mazloomi et al 2015). In the study of Khani Jeihooni (2016), the variables under study explained 29.1% of variance in walk behavior (Khani Jeihooni et al, 2016). The study of Fishbein & Cappela (2006) showed that there was a significant relationship between the intention for exercise and attitude and perceived behavioral control (Fishbein & Cappela 2006).

The evaluation the preventive behaviors of osteoarthritis showed poor performance in women under study. Tavafyan, Jamshidi & Jamshidi (2014), showed that education can change people's behavior, making lifestyle to be effective on knee sleeping prevention (Tavafyan, Jamshidi & Jamshidi 2014). In the study of mazloomi et al. (2015), persons had better preventive behaviors of KO than before in the intervention group (Mazloomi et al 2015). The results of Beyranvand et al, (2014), Muhammad-Lutfi, Zaraiyah & Anuar-Ramdhan (2016), and kishore & Upadhyay (2015) studies are in line with this study.

Restrictions of this study can be used to collect data through questionnaires and self-assessment methods by the subjects. It is recommended that further studies be carried out through direct observation approach, intervention, and practices.

## Conclusion

According to the results of this study, which was based on poor knowledge and practice, the need for educational planning is necessary to improve knowledge and performance. In this regard, the implementation of training programs by taking advantage of this theory is suggested. So educating people based on theories and models of behavioral change effective on reducing knee osteoarthritis, can reduce the risk of it.

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## Conflict of Interest

There is no conflict of interest for this article.

## Author contribution

FM: Study implementation, data collection and analysis, writing the first draft of Paper.

Ak: Study design and data analysis, editing and confirming the final draft of the paper.

MB: Study design, confirming the final draft of the paper.

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