UMSHA Press

JECH
Journal of Education and Community Health

J Educ Community Health, 2024; 11(1):25-30. doi:10.34172/jech.2284

http://jech.umsha.ac.ir

Original Article

Designing a Knee Self-care Checklist for Menopause Women with Knee Osteoarthritis

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Article history:
Received: May 3, 2023
Revised: November 20, 2023
Accepted: February 15, 2024
ePublished: March 30, 2024

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Abstract

Background: Knee osteoarthritis (KOA) is the most common destructive disease of the knee joint. The purpose of the present study was to design to psychometrically assess a checklist for knee care behaviors in housewives living in Yasuj, Iran.

Methods: This study was conducted from 2019 to 2021. Medline, Google Scholar, and SID databases were searched using keywords such as KOA, menopause, instrument, self-care behavior, and women. The first draft of the checklist, consisting of 41 items, was prepared, and 10 experts assessed its wording, content validity index (CVI), and content validity ratio (CVR). Cronbach's alpha and test re-test were utilized to assess the reliability of the tool.

Results: Content validities confirmed the 38-item tool with 5 dimensions of standing, sitting, walking, sleeping, and exercise practicing, which were rated on a yes (score 1) or no (score 0) response. The total values for CVR and CVI for the tool were 0.97 and 0.88, respectively. Cornbrash's alpha and test re-test coefficient of 5 dimensions were above 0.7, which was in an acceptable range.

Conclusion: The study findings suggest that the 38-item tailor-made knee self-care checklist is a valid and reliable tool. Indeed, this instrument could be used by healthcare providers in health centers for evaluating knee self-care behaviors in KOA-suffered women. Furthermore, this checklist is worthy of use to further help determine the risky behaviors of women while doing daily activities and to design appropriate practical and educational interventions for improving their knee-related behaviors.

Keywords: Checklist, Knee self-care, Women, Knee osteoarthritis, Psychometrics

Please cite this article as follows: Dashtian M, Tavafian SS, Karimzade Shirazi K, Yazdanpanah P. Designing a knee self-care checklist for menopause women with knee osteoarthritis. J Educ Community Health. 2024; 11(1):25-30. doi:10.34172/jech.2284

Introduction

Knee osteoarthritis (KOA) is a prevalent chronic disease due to age-related joint degeneration (1,2). This disease is more common in women than men (2) since there are physiologic differences between these two genders, especially in postmenopausal women due to estrogen reduction during this period (3). KOA can cause disability-adjusted life years and years lived with a disability that consequently could result in reduced quality of life (4,5). Different approaches to managing this disease are applied to reduce their pain and improve their function (6). Non-steroidal anti-inflammatory drugs, acetaminophen, or opioids are yet the first-line medicines for these patients to reduce their pain (7). However, lifestyle modifications through protective behaviors are a kind of conservative approach to controlling pain and improving the function of these patients (8).

To the best of our knowledge, few tools have been developed to evaluate knee protective behaviors. In an available document, an ergonomic checklist was designed to identify just the environmental risk factors for musculoskeletal disorders in the workplace (9). Moreover, another study confirmed that the 6-item Pain Behaviors for Osteoarthritis Instrument for Cognitively Impaired Elders could assess pain behaviors in KOA patients (10). Furthermore, the Orthopedic Checklist Risk Assessment was verified as an appropriate tool to check the risky behaviors of musculoskeletal disorders in the upper parts of body (11). Benhamou et al designed an 11-item tool called the Knee Osteoarthritis Fears and Beliefs Questionnaire that was found to be a valid instrument to assess the fears and beliefs of patients suffering from osteoarthritis (12). To the best of our knowledge, no instrument has so far been designed to measure the self-care behaviors affecting KOA in Iran.

Despite developing these tools to evaluate osteoarthritis in patients (13,14), there is a lack of self-care measurement for these people. Thus, designing an appropriate instrument to measure patients' compliance with knee-protecting behaviors is strongly felt (15). However, before designing the self-care educational intervention, it is necessary to design an observational checklist to determine risky behaviors regarding KOA.

A perfect checklist, as a highly credible tool for safety management, essentially contains items that need to be considered in related behaviors. Typically, each item is checked by completing, confirming, identifying, or responding (16,17). In some medical fields, checklists are used as a useful tool for communication and improvement of care methods, and even as a practical and effective instrument for information interaction in teamwork (18).

Hales and Pronovost verified that the use of simple tools such as performance checklists can improve patient care outcomes, reduce errors, and make better use of budgets and resources (19). Moreover, performing knee-protecting behaviors to prevent the disease is less costly than treatments. On the other hand, observing the risky behaviors of these women is more objective than reporting them through self-reporting questionnaires. Therefore, the importance of the issue becomes more transparent with the knowledge that osteoarthritis is a fully behavior-based problem. The women living in small cities such as Yasuj, based on their culture and perceived social norm, perform heavy daily activities, especially in the wrong posture. In this research, it was sought to design a checklist to observe knee care behaviors in the KOA-suffered women who referred to the physical medicine and rehabilitation clinic in Yasuj, Iran.

Materials and Methods

Checklist Design

First, a literature review with valid evidence was performed to determine KOA self-care behaviors. This phase began with an extensive search of internal and external databases and consultation with orthopedic and physical medicine specialists. Therefore, the databases of Medline, Google Scholar, and SID, from 2019 to 2021, were assessed using keywords such as KOA, menopause, instrument, self-care behavior, and women. Thus, all relevant materials, including questionnaires and checklists, were assessed based on the study objectives. Furthermore, common items regarding the issue were extracted through interviews with perimenopausal women who suffered from KOA and experts who exposed these women. The interviews with the eligible women were conducted to investigate the biomechanical risk factors affecting their KOA. According to the inclusion criteria, eligible women were individuals who were around menopausal age, suffered from KOA, referred to the physical medicine clinic due to their knee pain, diagnosed with KOA by the physician, and lived in Yasuj. The interviews took place face-to-face in a mutually convenient, quiet environment of the women's houses without the presence of others. In these interviews, the aim and procedures of the study were explained to the women, and all their questions were answered, and finally, their contest for participation in the study was obtained. Then, all participants signed a consent form, and the interviews were begun accordingly. In the initial questions, the women were asked to do their own behaviors while standing/sitting/walking/sleeping and exercising, and the observer was observing all risky behaviors that were performed during these activities. These activities were performed twice for each woman. All items extracted through literature reviews and interviews were confirmed at this stage. After observing the behaviors of 13 women during the mentioned activities, there were no new data, so data saturation was achieved. The five daily activity domains in which risky behaviors have occurred were determined based on the data obtained from the participants. Finally, a first draft of knee self-care behaviors was prepared, which included 5 dimensions of sitting, standing, walking, sleeping, and exercise therapy with 41 items related to risky behaviors that were evaluated by experts. For example, one item that the observer confirmed with a "Yes or No" response was *"when she sits on a chair or couch, she relies on handles"*.

For face validity, the items were sent in the form of a checklist to 10 professors specializing in the related field, and their opinions on their relevance to the main concepts of the study and the simplicity of writing of each item underwent assessment. Furthermore, the research team evaluated the qualitative face validity of the items regarding their wording; thus, some editions were made to the items. Moreover, qualitative face validity was performed by some KOA patients so that they reviewed the items and verified the meaningfulness of the items and simple wording. The initial improved version of the checklist with 41 items was prepared after considering the opinions of the specialists and patients.

Then, a quantitative method was used to evaluate the content validity ratio (CVR) and content validity index (CVI) (20). To determine the CVR and CVI, a checklist was sent to ten experts. To estimate the CVR, the specialists were asked to respond to each of the 41 items on a three-point scale, including necessary, not necessary but useful, and not necessary at all. The answers were calculated according to the formula and adapted to the Lawshe table. To calculate the CVI, three criteria (simplicity, relevance, and resolution) were utilized based on a four-choice spectrum (1. unrelated, 2. somewhat relevant, 3. relevant, and 4. completely related). For this purpose, the CVI score was calculated by adding the total number of agreeing points for each item that scored 3rd or 4th (the highest score) to the total number of voters. The minimum acceptable value of CVR considering the number of specialists was 0.62.

All items related to five daily activities (standing, sitting, walking, sleeping, and exercise practicing) were rated on a yes (1) or no (0) response.

The total score for each dimension was achieved by summing all row scores. The higher scores indicated better conditions.

Cronbach's alpha coefficient was used to test reliability (internal consistency). To do this test, the checklist was applied to 30 premenopausal women with KOA, and all of them were completed by the observer and analyzed by SPSS, version 24. These coefficients were above 0.7 for all items, which was in an acceptable range. Furthermore, the intra-cluster correlation coefficient index (ICC) was utilized in the test-retest method. In this method, the obtained results should remain relatively constant over two different time periods. A high level of stability indicates a high level of reliability. In this study, to estimate the ICC of the tool, 40 women around menopause (40–55 years) were selected by the convenience sampling method. Even though it could be possible to check reliability through a test-retest with a smaller sample, we did this with 40 women because we could access them conveniently and obtain more credit. Then, in two stages, with an interval of two weeks, their behaviors according to the checklist were observed and scored by the researcher. Finally, the correlation between the two test clusters of ICC for different dimensions of the checklist and the whole tool was calculated, and SPSS (version 24) was employed to estimate the coefficients at a significance level of 0.05.

Results

After estimating content validity, two checklist items scored less than 0.70 on the CVI; thus, the experts suggested that they should be replaced by two more appropriate items. Two items from the walking domain and one item from the sleeping domain that were indicated as non-necessary were removed from the checklist after calculating CVR. Finally, a checklist with 38 items, a CVI of 0.97, and a CVR of 0.88 was confirmed (Table 1).

Cronbach's alpha coefficients for the various instrument dimensions and the whole checklist are provided in Table 2. Based on the results, the Cronbach's alpha coefficient for all dimensions and the whole checklist was above 0.7. Furthermore, the dimension of getting up and standing with 0.95 had the highest reliability, while the dimension of sleeping with Cronbach's alpha of 0.86 had the lowest reliability. The external reliability of the whole tool and all dimensions was significantly less than 0.001. The ICC of the dimensions was obtained between 0.76 and 0.91. The ICC values of the whole checklist and its dimensions are presented in Table 2. Accordingly, the dimensions of getting up and standing with an ICC of 0.91 and sleeping with an ICC of 0.76 had the highest and lowest rates, respectively.

Discussion

In this study, it was attempted to design and psychometrically assess a checklist for evaluating knee care behavior indoors in patients with KOA.

According to the available evidence, women with knee pain have an unhealthy lifestyle associated with knee postures. Moreover, considering that women are more prone to osteoarthritis than men (21), it is necessary to prepare a checklist to evaluate highly risky behaviors that directly affect the knee. Thus, after making a standard tool, training is needed to change unhealthy behaviors to reduce pain in women. This justification is in line with the results of the study by Wang et al, confirming pain management after intervention (22). The present study is a kind of study on knee care behaviors for women with KOA. The results of the present study demonstrated that the checklist prepared for behavioral risk factors has the potential validity to design appropriate interventions for patients with KOA. In other words, according to the experts, the developed tool has the ability to measure knee care behaviors. Based on the findings of this study, the designed tool has acceptable reliability. The women in this study showed that they did not comply with knee care behaviors such as sitting properly, using European toilets, not lifting heavy objects, not bending the knee too much, not sitting for long periods of time, strengthening quadriceps muscles, and wearing appropriate shoes, which are important predictors of knee pain and KOA. The available evidence revealed that the above-mentioned risky behaviors could lead to KOA (23,24). In addition, having a standard tool can help researchers assess risky behaviors in patients with KOA and lead to designing proper intervention programs such as training and behavior therapy for women to lead to a better prognosis of doing behavior at the individual level. Consistent with this justification, various studies have shown that checklists and questionnaires can be used to better identify factors influencing musculoskeletal disorders (19). The results of the present study confirmed that the designed checklist is a valid and reliable instrument. In this regard, a previous study proved the Direct Nurse Observation (DINO) tool to estimate the risk of musculoskeletal disorders due to patient movement and reported that the DINO assessment method is suitable for estimating the risk of musculoskeletal disorders due to patient movement in nursing staff. This tool can be utilized in evaluating patient transportation training programs and estimating the nurse's work technique as a way to measure the quality of service delivery (25).

Consistent with other studies (8-11), the checklist prepared in the present study can better evaluate the most knee protection behaviors at home. In this study, the researchers attempted to identify the most important predictors of knee pain behaviors at home, such as behaviors that directly affect the knee. With the help of the designed tool, it is possible to show the level of compliance of people with a healthy lifestyle. In this study, the content validation of the checklist was verified by experts such as physical therapists.

Although there may be some limitations to this study, the confirmation of physicians' views increased the content validity of this checklist. Another strength of this

Table 1. Checklist for Observing Knee Protection Behavior Indoors

	Sitting	Yes	No
1	Relying on chair or couch handles while sitting		
2	Using a footstool while sitting on chair or couch		
3	Flattening of the knees while eating food on the ground		
4	Flattening out the knees and using a cushion while sitting on the ground in free times		
5	Flattening out the knees while doing housework on the ground (i.e., cleaning vegetables, cleaning rice, and baking bread)		
6	Sitting on a short chair while washing clothes with hands		
7	Using a chair while washing dishes next to the sink		
8	Using handles while using Iranian toilets (squat toilets)		
9	Using other types of toilets		
10	Laying feet on the ground and maintaining an upright posture while using the toilet		
	Standing up		
11	Using handles while getting up from chairs or couches		
12	Equally dividing body weight on two legs and maintaining an upright posture of the spine while standing		
13	Opening the legs shoulder-width while standing		
14	Using both hands while carrying a load in a standing position		
15	Changing legs repeatedly while standing for long durations (to reduce pressure on the knees)		
16	Picking up load in several steps		
	Walking		
17	Tending to walk on smooth and flat surfaces		
18	Tending to walk at a proper speed		
19	Not taking long steps when walking		
20	Having a 3-5 minute rest for every fifteen minutes of walking		
21	Using the railing while going up and down the stairs		
22	Starts going up and down the stairs from the foot that has less or no problem		
23	Using proper shoes for walking		
24	Using carts when carrying loads		
	Sleeping		
25	Using a hot water bag before sleep		
26	Paying attention to the temperature and duration of the hot water bag on the knee while using it		
27	Flattening the knees while sleeping		
28	Leaning on the back or side while sleeping		
29	Putting a pillow between knees while sleeping on the sides		
30	Using a thin pillow under the knees while sleeping on the back		
	Exercise practicing		
31	Warming up the knees at the beginning of the exercise		
32	Doing proper stretching exercises for the knees, such as stretching the legs upwards, stretching the legs to the sides, stretching the muscles behind the thighs (hamstrings), and the like		
33	Doing proper strengthening exercises for the knees, such as strengthening the quadriceps muscles, pressing the pillow, pushup variations, planks, and the like		
34	Doing a range of motion exercises such as walking on the spot (could be seated), regular walking, bicycle kicks/leg raises, and the like		
35	Doing light-to-heavy (progressive overload) exercises		
36	Doing cool-down movements after exercise		
37	Doing exercise in regular intervals and frequencies		
38	Doing exercise therapy techniques (exercises in water, on the mattress or the ground)		

study is that the study specimens most likely represented patients with KOA due to their traditional and laborious lifestyle.

Limitations

This research was only performed on women aged 40–55 years. Thus, it is not eligible to generalize the findings to all women. Despite this limitation, this checklist seems valuable in assessing and measuring factors associated

Table 2. Cronbach's Alpha Values and Intra-cluster Correlation Coefficient for Dimensions and Total Checklist

Subscale (Score Range)	Number of Items	ICC	Cronbach's Alpha
Sitting (0-10)	10	0.89	0.94
Standing up (0-6)	6	0.91	0.95
Walking (0-8)	8	0.85	0.92
Sleeping (0-6)	6	0.76	0.86
Exercise therapy (0-7)	8	0.86	0.93
Total (0 -38)	38	0.89	0.94

with KOA among women suffering from this problem. It can be used to perform descriptive studies and examine the status of knee care behaviors. In addition, the results obtained from descriptive studies can be utilized to design proper educational interventions.

Conclusion

The findings revealed that five daily activities, including standing, sitting, walking, sleeping, and exercise practicing, are the most frequent activities in which highly risky behaviors happen; thus, it is necessary to measure them through a behavioral checklist. Accordingly, this study could design a valid and reliable 38-item knee self-care checklist. Indeed, this instrument could be used by healthcare providers in health centers for evaluating knee self-care behaviors in KOA-suffered women. Furthermore, this checklist is worthy of use since it helps determine the risky behaviors of women while doing daily activities. Hence, it is suggested that appropriate practical and educational interventions be designed to improve their knee-related behaviors.

Acknowledgements

The authors acknowledge Zahra Akbari for her scientific views. Furthermore, we gratefully thank all the participants who participated in this study. We would also like to thank the Research Deputy of Tarbiat Modares University for its financial support of the study.

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Competing Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The data used in this work is not available publicly.

Ethical Approval

This study was deprived of a PhD thesis with the ethical code IR.MODARES.REC.1398.101 on July 6, 2019. The study was confirmed by the Ethics Committee of Tarbiat Modares University with the code IR.MODARES.REC.1398.101. An informed consent form was presented before the administration of the questionnaires. The participants were assured of the confidentiality of the provided information.

Funding

None.

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