

ORIGINAL ARTICLE

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PATIENT-RATED OUTCOME MEASURE USING DISEASE-SPECIFIC KOOS-PS SHORT FORM ARABIC QUESTIONNAIRE IN KNEE OSTEOARTHRITIS

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ABSTRACT

Background: Several studies have evaluated the effects of knee osteoarthritis on general and specific activities of the population using various health-related questionnaires in their original/native form, but very few have reported in Saudi Arabian population using Arabic versions. The target of the study is to observe the degree of knee difficulties during pivoting, kneeling and squatting in bilateral knee osteoarthritis male patients using disease-specific Arabic Version Knee injury and osteoarthritis outcome score physical function (KOOS-PS) short form questionnaire in Saudi Arabian population.

Methods: A cross-sectional study exploring 109 male primary bilateral knee osteoarthritis patients in Saudi Arabia. Subjects were assigned to three different groups based on their age after meeting the American College of Rheumatology criteria. Demographic data were obtained, and subjects were asked to rate their degree of knee difficulty during pivoting, kneeling and squatting activities using the disease-specific Arabic short-form questionnaire.

Results: The statistical description introduced in the mean, standard deviation, median, 95% confidence interval (95% CI). The statistical parameters such as mean and standard deviations were 84.08 ± 8.81 , 76.58 ± 11.49 , 28.05 ± 8.4 in the three age groups such as 50-60, 61 to 70 and above 70 years old along with 95% confidence intervals 78.2-84, 72.6-80.47, and 25.17-30.94 respectively. The statistical significance found between 50-60years and above 70years $p < 0.001$, 61-70years and above 70years $p < 0.001$ but statistical insignificance found between 50-60years and 61-70years age groups $p < 0.14$.

Conclusion: High degree of knee difficulty has been observed in male bilateral knee osteoarthritis during pivoting, kneeling and squatting activities among 61-70years and above 70years of age groups.

Keywords: Self-reported outcomes, Degree of difficulty, OA knee, Arabic version KOOS-PS, Saudi Arabia.

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INTRODUCTION

Osteoarthritis knee is growing rapidly along with aging and other comorbid conditions in Asian countries and rate of occurrence is high with aging [1,2]. The knee osteoarthritis prevalence rises with a continuous variable such as age [3]. One previous study in Saudi Arabia in 2003 had estimated the prevalence of osteoarthritis (OA) knee above 40 years of age and 66 to 75 years were 36% and 60.6% respectively which increased with the aging [4]. Knee osteoarthritis affects the high-level difficulties such as twisting/pivoting, kneeling and squatting. Functional difficulties can be better perceived by affected persons, and the subjective information is well valid as the patient comes across their quality of activities of daily life than an objective evaluation and is better possible to document their level of knee difficulties from disease to disability.

Several studies have evaluated and reported the occurrence of knee osteoarthritis [1-4] and its effects on the population using various health-related questionnaires in their original form [5], but very few have reported about knee osteoarthritis in Saudi Arabian population using Arabic versions [6].

This study used the disease-specific Knee injury and osteoarthritis outcome score physical function short form (KOOS-PS) Arabic questionnaire and hence, this study is intended to fill the gap.

A well psychometrically designed questionnaire would provide a treating clinician and a researcher a comprehensive approach towards disability prevention leading to functional independence. If a culturally validated questionnaire is used to obtain the subjective data, the information would be more imperative than a non-cultural questionnaire. The Arabic language is being used by twenty-two countries in the middle east to African countries [7]. One recent validation study in the Arabic language stated that there are many self-administered questionnaires available today to evaluate the knee functional status in western versions but very few of them are available in the Arabic language [6]. A disease-specific knee questionnaire does provide a clinician a definitive disease data to consider for further evaluation and also serve as a better prognostic tool. A long form KOOS questionnaire is to assess OA knee joint related functional and sports/recreational activities [8,9]. A precise scale of KOOS questionnaire, KOOS-PS short form has recently evolved in the Arabic language [8]. The KOOS-PS can be used to monitor/document various levels of difficulties and their recovery followed by different conservative treatment interventions, also to screen/document patients planned for knee replacement surgeries as well postoperative functional recovery to minimize the patient burden from long questionnaires [8]. This subscale domain items such as twisting/pivoting, kneeling and squatting are sensitive to osteoarthritis of the knee [10]. The target of this study is to evaluate various levels of degree of knee difficulties such as twisting/pivoting, kneeling and squatting in knee OA patients using disease-specific Arabic version KOOS-PS questionnaire in Saudi male populace.

MATERIALS AND METHODS

An official permission was obtained from the developer of the KOOS-PS physical function short form Arabic version of (www.koos.nu) the original developers, University of Southern Denmark, Denmark. The ethical approval was acquired from the Majmaah University (Approval No: MUREC-Apr.11/COM-2017/25) where this work had been carried out. This questionnaire is designed to assess the degree of difficulty in knee joint osteoarthritis [8]. The data have been collected between 2017 to 2018 in and around Majmaah city, Saudi Arabia. The diagnosis has been established based on American College of Rheumatology (ACR) criteria [11]. Patients have been examined based on the presence of three out of six criteria such as, patients aged above fifty years, morning stiffness less than thirty minutes, crepitus on knee motion, bony tenderness, bony enlargement and no palpable warmth. One hundred and nine bilateral knee osteoarthritis male patients met the ACR criteria and were divided into three age groups based on their age. The (KOOS-PS) short form has been developed in Arabic language and designed to measure knee difficulties [8] in native language for better perception of their knee status due to osteoarthritis and the items were scored as None ('0' represents no difficulty) to the extreme (4 represents an extreme difficulty) [8]. This short form consists of limited items which are related to functional activities of daily living, and sports/recreation activities [8,12]. Our hypothesis of this study was to observe only the high-level degree of difficulties in male bilateral knee osteoarthritis patients such as twisting/pivoting on the knee, kneeling, squatting activities of Saudi population using KOOS-PS short form Arabic questionnaire and to observe the impact of bilateral knee osteoarthritis on such activities. A cross-sectional study was designed involving 109 OA knee male bilateral knee osteoarthritis patients who were classified into three different age groups such as 50 to 60, 61 to 70 and above 70 years old patients, group-I ($n = 40$), group-II ($n = 37$), group-III ($n = 32$). Their heights and weights were measured along with their body mass index (BMI). Female patients were not considered in this study as their BMI was high compared to their male counterparts to prevent the biased results. Patients were explained about the study and concern was taken and asked to fill the only high-level difficulty items such as serial item number five twisting/pivoting on knee, item number six kneeling, item number seven squatting in the questionnaire about their degree of difficulty level due to knee Osteoarthritis. Our intention of the current study was to see the adverse effects of bilateral OA knee on routine activities involved in cultural and religious practices of Islamic population, and male data was collected separately and evaluated to determine only the sports difficulty levels in male population with bilateral OA knee and to evaluate the impact of bilateral OA knee than mixed unilateral and bilateral OA knee patients on cultural and religious activities. The data was analyzed to see the degree of difficulty with bilateral knee OA during their cultural and religious activities. Nonparametric descriptive statis-

tics were obtained using the test statistics such as Kruskal Wallis and Post hoc for multiple comparisons using SPSS software (version 25). Significance level fixed at 0.05.

Inclusion criteria: Bilateral primary male OA knee patients only considered for the study.

Exclusion criteria: I. Obese males with BMI more than 30 kg/m² and female subjects were also excluded. II. Associated knee injuries, infections, tumors, post fractures. III. Patients excluded from the study who have undergone knee, hip, ankle, neck and low back surgeries.

RESULTS

Among 109 individuals with bilateral OA knee, the minimum to maximum age was 51- 77years. And the mean and standard deviation of age in group-I was 56± 2.2, group-II was 66.3 ± 1.6 & group-III was 74.1±1.6. The BMI was measured based on their height and weight, the mean and standard deviation of their height in centimeters, weight in kilograms were 166.7 ±4.1, 76±5.4 for group-I, 166.6±3.9,79.3±4.7 for group-II & 164.3±3.3, 75.9±5.6 for group-III respectively along with their BMI mean, and standard deviations were 28.75±1.38, 29±1.2, 29±1.2 in all the respective age groups as tabulated in (Table1).

Table 1: Demographic data of the three age groups of bilateral OA knee male patients (N = 109)

Parameter	Group-I (50-60 years) (n=40)		Group-II (61-70 years) (n=37)		Group-III (> 70 years) (n=32)	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Age (years)	56.5 ± 2.2	51-59	66.3 ± 1.6	61-69	74.1±1.6	71-77
Height (cm)	166.7 ± 4.1	158-176	166.6±3.9	162-175.5	164.3±3.3	158-169
Weight (kg)	76 ± 5.4	61-86	79.3±4.7	67-88	75.9±5.6	66-84
BMI Kg/m ²	28.75 ± 1.38	24-30	29±1.2	24.4-30	29±1.2	24-30.2

SD- standard deviation

Table 2 shows the descriptive analysis for KOOS-PS domain/subscale, sports/rec in OA knee male patients in group-I (n = 40) with mean and standard deviation was 84.08±8.81. According to KOOS-PS scoring, hundred represents the normal/functional independence and zero represents the highest level of difficulty[7]. In group-I, the score ranged between 67 to 92 with a median value of 83 which indicates that the functional independence is more than the disability level. The confidence interval is between 78.2 to 84. Table 2 shows the descriptive analysis for KOOS-PS domain/subscale, sports/rec in OA knee patients in group-II, (n = 36) with mean and standard deviation 76.58±11.49. In group-II the score ranged between 58 to 92 with a median value of 75 which indicates that the functional independence was less compared to group-I. The confidence interval lies between 72.6-80.47. Table 2 shows the descriptive analysis for KOOS-PS domain/sub-

scale, sports/rec in OA knee patients in group-III (n = 33) with mean and standard deviation 28.05 ± 8.4. In group-III the score ranged between 8-42 with a median value of 25 which indicates that there is more disability level noticed than the functional independence when compared to group-I & II. The confidence interval lies between 25.17-30.94.

Table 2: Descriptive analysis of KOOS-PS domain/subscale, sports/rec in bilateral OA knee patients in three age groups in male patients (N = 109).

KOOS-PS Domain	Age	Mean± SD	Median	Range	CI (95%) Lower & Upper bound
Sports/recreational	50-60	84.08±8.81	83	67 -92	78.2-84
	61-70	76.58±11.49	75	58-92	72.6-80.47
	> 70	28.05 ± 8.4	25	8-42	25.17-30.94

CI- confidence interval

Table 3: Item wise analysis of degree of difficulty in different age groups in male OA knee patients (N= 109).

KOOS-PS Sports/rec -Items- No-5,6 &7	Age	Degree of difficulty				
		Extreme	Severe	Moderate	Mild	None
Twisting/pivoting	50-60	5.1.0%	7.0%	7.9%	30.0%	50%
	61-70	11.1 0%	20.0%	38.9%	24.0%	6.0%
	> 70 years	55.0%	35.0%	10.0%	0%	0%
Squatting	50-60	1.5%	12.5%	22.0%	30.0%	34.0%
	61-70	40.0%	45.0%	5.0%	10.0%	0%
	> 70 years	68.0%	32.0%	0%	0%	0%
Kneeling	50-60	5.0%	5.2%	9.8%	30.0%	50.0%
	61-70	19.4%	48.0%	20.6%	12.0%	10.0%
	> 70 years	74.0%	11.0%	5.7%	9.3%	0%

The percentage of higher level difficulty (Extreme) was seen in all the items of Sports/rec domain more in the age group above 70 years than the other age groups (Table 3).

Table 4: Post-hoc multiple comparison analysis among three age groups in bilateral OA knee male patients.

KOOS-PS Domain	Group	Difference Multiple Comparisons	Mean Difference (MD)	Significance p value	Confidence Interval (95%) (lower & upper bound)	
Sports/rec	50 - 60 years	61-70 years	4.6	< 0.14	-1.1338	10.3355
		> 70 years	53.12	< 0.001***	48.3015	57.9527
	61 - 70 years	50-60 years	0.140	< 0.14	-10.3355	1.1338
		> 70 years	48.5	< 0.001***	42.8035	54.2489
	> 70 years	50-60 years	-53.12	< 0.001***	-57.9527	-48.3015
		61-70 years	-48.52	< 0.001***	-54.2489	-42.8035

MD- Mean Difference, *** means significance p<0 .001 Post- hoc analysis showed in table 4 that the mean difference MD was 4.6 (-1.1338-10.3355, p<0.14) for Group -I compared to group-II in KOOS-PS Sports/rec subscale. When group-I compared to group-III in KOOS-PS Sports/rec subscale, the MD was 53.12 (48.3015-57.9527, p<0.001) with a 95% confidence interval. The multiple comparison analysis shows that the statistical difference did not exist / no higher level of difficulties found between the age

groups 50 to 60 and 61 to 70 years. But significant statistical difference existed between the age groups 50 to 60 and above 70 years in male OA knee patients indicating that the high-level difficulties observed in the age group above 70 years. The mean difference MD was 0.140 (-10.3355-1.1338, $p < 0.14$) for Group -II compared to group-I in KOOS-PS Sports/rec subscale. The MD was 48.5 (42.8035-54.2489, $p < 0.001$) for Group -II compared to group-III in KOOS-PS Sports/rec subscale with 95% Confidence Interval. Significant statistical variation existed between the age groups 60 to 70 years and above 70 years in male OA knee patients, indicating that the high-level difficulties observed in both the age groups. The mean difference MD was -53.12 (-57.9527-48.3015, $p < 0.001$) for Group -III compared to group-I in KOOS-PS Sports/rec subscale. The MD was -48.52 (-54.2489 -42.8035, $p < 0.001$) for Group -III compared to group-II in KOOS-PS Sports/rec subscale with a 95% Confidence Interval. Significant statistical variation existed between the age groups above 70 years & 50 to 60 years, above 70 years and 61 to 70 years in male OA knee patients, indicating that the high-level difficulties observed in both these age groups in male patients than 50 to 60 years.

DISCUSSION

Many studies have been done on patient-reported outcomes in OA knee patients in various western languages, but very few in Middle-eastern countries. The innovation of this study is that we have used an Arabic version of disease-specific KOOS-PS short form questionnaire in the Saudi Arabian populace, that basically assesses the knee related high-level degree of difficulties such as twisting, squatting, kneeling in osteoarthritis patients [8]. KOOS-PS short form has been suggested as a tool to measure higher level difficulties such as sport/recreational activities in OA bilateral knee population [13]. Psychometric properties such as validity, reliability, and responsiveness were acceptable using KOOS-PS in OA knee population [12,14]. The scoring algorithm is represented in this study as highest score predicts no difficulty and the lowest score predicts the highest level of difficulty [8]. The mean values of the three items in this study such as twisting or pivoting, kneeling, squatting in KOOS-PS sport/rec domain were comparable and there were regular higher-level activities rather than difficulties found in the age groups 50 to 60years with a mean of 84.08 and 61 to 70years with a mean of 76.58 but there were high-level difficulties seen in the age group above seventies with a mean of 28.05 with increasing age. Felson D T, et al. (2000) have concluded that there was an impact of the Knee OA disease on disability [3]. Several cohort population-based studies have been conducted in Asian region such as Pakistan (1996), China (2005) Japan (2008), and Korea (2010) which stated that there was a direct association between the occurrence of OA knee with increasing old age [15-19]. Osteoarthritis knee related disability may tend to increase if the knee care and management is not appropriate based on the chronicity of the disease as and when indicated. Diverse cultural habits in-

fluence the consideration of OA management among Asian countries [20]. A study by Al-Arfaj A S and Al-Boukai A A in (2002) on OA knee in Saudi Arabia have analyzed the male data; with the prevalence of 79% of knee OA between 50 to 59years, 84.6% between 60 to 69years and 84 % in patients more than 70 years of age. Which also shows that OA knee occurrence in males was predominating with the bilateral OA knee [21], which would have resulted higher difficulty levels in our study. Abdurrahman S. Al-Arfaj et al. (2003) have conducted a study of prevalence of OA knee population in Al-Qassim nearer to central province, which is also nearer to our study area, Kingdom of Saudi Arabia and concluded that the prevalence percentage had been increased with increasing age and older age was most affected in this Al-Qassim area which is also nearby our study area [4]. One study has stated that the disease-specific questionnaires are better than generic ones [22]. Martijn P. M. Steultjens et al. (2002) have concluded in their study that the disability in mobility using patient-rated measures in OA knee were more valuable than other methods [23]. In our male subject study, the oldest age group have shown the worse reported outcomes than the other two age groups in Sports/rec domain as shown in the (table 4), it is possible that our results are more explanatory as the disease advances with aging. The report of our study was analogous to a study conducted in one population-based study, where males aged above 70years were affected worse in sports/rec activity than other subscales and age groups [24]. In one study, the physical function was deteriorated as measured using Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) scale in OA knee patients waiting to undergo knee surgeries and stated that the disease process would have caused the deterioration when compared to the baseline data [25]. Collins N J, et al. (2011) in their extensive work on patient-reported outcome measures had stated that the internal consistency, test-retest reliability of KOOS-PS were adequate and valid use in research with OA knee patients [13]. The Sports/rec subscale items such as twisting/pivoting, kneeling and squatting difficulties were highest in the oldest age group above 70years with the statistically significant difference observed. According to one cross-cultural knee OA disease pattern study between Saudi Arabia and American subjects, the cultural habitual pattern of squatting and kneeling in Saudi Arabia causes the anterior medial cartilage degeneration which is common and progressive in Saudi populace [26]. The possibility is that when the patients with OA knee attain the squatting and kneeling position which would have caused the degree of difficulty in the same pattern that the disease progression could have been occurred due to cultural habits such as squatting and kneeling. This scientific explanation would have caused a various degree of difficulties seen in the proposed age groups in our study in Saudi Arabia. Few studies have stated that the cultural activities such as squatting and kneeling along with a maximum knee flexion range of motion are common in the Middle East, [27,28] linked to knee OA and such cultural activities

lead to the development of knee osteoarthritis [29]. Our sports/rec domain values with an older age group are nearly similar to the values produced in a KOOS cross-cultural study conducted recently by Ateef M et al. (2017) in India [30]. One Japanese study by Zhang Y. (2004) concluded that the squatting is linked to OA knee [31]. Though there was mild to moderate degree of difficulties seen (Table 3) but not statistically significant in 50 to 60years of age group when compared to 61-70years group. The reason for this is that the knee OA progresses with the age [4]. In addition to knee osteoarthritis, which is leading to various cultural activity difficulties [26], 95% of the male population has the inactivity status, [32] which would have enhanced the difficulty during pivoting, kneeling, squatting in the place of currently observed subjects in this study. A review study by Marlene F et al. (2011) has concluded that this disabling degenerative disease was maximum among older patients in Asian region [1]. One latest study has stated that the KOOS-PS short form was sensitive to change and a tool to measure the degree of difficulties in OA knee patients [10]. The limitation of the study was that the difficulty level was not targeted in different grades of "Kellgren-Lawrence classification of OA knee grading" and females were not considered as their BMI levels were high compared to male counterparts.

CONCLUSION

The degree of squatting and kneeling difficulties has been observed in male bilateral knee osteoarthritis patients between 61 to 70 years, and above 70 years age groups than in 50-60years age group in Saudi Arabian population and pivoting difficulty was also seen more in the oldest age group using disease-specific Arabic version KOOS-PS in Saudi Arabian population.

Clinical implications

Disease-specific Arabic version KOOS-PS is an adjunct to a clinician and researcher to monitor the responsiveness to various interventions.

Future research

The degree of difficulties in females will be evaluated along with separation of unilateral and bilateral OA knee in the near future.

ABBREVIATIONS

OA: osteoarthritis
KOOS-PS: Knee injury and osteoarthritis outcome score physical function short form
ACR: American College of Rheumatology
BMI: Body Mass Index

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Appendix 1

Knee injury and Osteoarthritis Outcome Score - Physical Function Short Form (KOOS-PS) Arabic (KSA) version
LK 1.0

استبانة الإلتهاب المفصلي العظمي وإصابات الركبة

تاريخ اليوم: ____ / ____ / ____ تاريخ الميلاد: ____ / ____ / ____

الاسم: _____

الإرشادات: تتضمن هذه الاستبانة اسئلة حول وجهة نظرك عن ركبتك. وهذه المعلومات سوف تساعدنا على تتبع مدى قدرتك على أداء الأنشطة المختلفة.

أجب على كل سؤال عن طريق وضع علامة √ في المربع المناسب، مربع واحد فقط لكل سؤال. إذا كنت غير متأكد من كيفية الإجابة على السؤال، يرجى إعطاء أفضل إجابة ممكنة حتى تتمكن من الإجابة على جميع الأسئلة.

الأسئلة التالية تتعلق بمستوى قدرتك على أداء الأنشطة اليومية المعتادة والأنشطة ذات المستوى الأعلى. لكل من الأنشطة التالية، يرجى الإشارة إلى درجة الصعوبة التي واجهتها في الأسبوع الماضي بسبب مشكلة ركبتك.

A10	النهوض من الفراش لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A9	لبس الجوارب (الشرايات) لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A3	القيام من وضع الجلوس لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A5	الإنحناء لإلتقاط شيء من الأرض لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SP4	الدوران أو اللف على ركبتك المصابة لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SP5	الارتكاز على الركبتين (الجلوس بين السجنتين) لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SP1	وضعية القرفصاء (الجلوس على المراض العربي) لا يوجد صعوبة	خفيفة	متوسطة	شديدة	شديدة جداً
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>