Relationship between the ability to walk long distances and to climb up and down stairs with the health-related quality of life of older adults with symptomatic knee osteoarthritis

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Abstract

Objective: To investigate the relationship between physical capacity and health-related quality of life (HRQoL) in older patients with symptomatic knee osteoarthritis (KOA). Method: A cross-sectional study was carried out, in which 67 older people (55 women and 12 men) diagnosed with KOA completed the physical function tests: Timed Up and Go (TUG); 30-second Chair Stand Test (30CST); Stair Climb Test (SCT); 40m Fast-Paced Walk Test (40FPWT); and Six-Minute Walk Test (6MWT). HRQoL was measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC). Univariate and multivariate linear regression analyzes were used to explore the relationship between the variables. Results: Patients were predominantly female, overweight, inactive, non-depressed, with bilateral KOA and in severe pain. In HRQoL, the domains showed low performance compared to healthy individuals. An association was observed between 30CST, SCT, 40FPWT and 6MWT with pain and physical function and an association of 30CTS, 6MWT with stiffness (R^2 = 0.064 to 0.304, $p<0.05$). In the multivariate analysis, BMI, sex and bilateral impairment were also considered as independent variables, resulting in significant associations of the 6MWT and BMI with pain (ß[6MWT]=0.121, 95%CI 0.005 to 0.237; ß[BMI]=0.022, 95CI and sex (ß=10.724, 95%CI 2.985 to 18.463) with physical function. Conclusion: The results suggests positive association between TSDE and physical function and negative associations between physical capacity on 6MWT on pain and stifness.

Keywords: Older Adults. Quality of Life. Osteoarthritis, Knee. Physical Functional Performance.

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INTRODUCTION

Knee osteoarthritis (KOA) annually affects around 86.7 million individuals[1]. KOA patients often experience pain while at rest and during movement, stiffness, apparently enlarged joints, crepitation, restricted movement, muscle weakness, and atrophy[2]. In addition, individuals with KOA spend approximately ten seconds to stair descent, 12 seconds to stair descent and nine seconds to perform TUG, in comparison to five, seven and five seconds for healthy individuals to perform the same activities, respectively[3].

During the progression of KOA, individuals with an elevated falls risk, sedentary behavior, a higher number of comorbidities, higher BMI, depressive symptoms, lower handgrip strength, and females experience increases in the deterioration of health-related quality of life (HRQOL)[4]. Regarding OA physiology, pain seems to be crucial for the physical capacity of these individuals, being capable of predicting up to 60% of the capacity to walk long distances and 48% of the HRQOL[5].

Collectively, these factors suggest the potential significance of physical capacity as an indicator of the HRQOL in older adults with KOA. The evaluation of an increase in HRQOL can also be used to measure success in intervention programs since individuals with a higher HRQOL seem to be physically more active[6]. The combination of walking short and long distances, chair standing, and stair climbing has been shown to be adequate for monitoring functionality in these individuals[7].

Considering that individuals with KOA experience lower QOL compared to paired individuals, regardless of the instrument of evaluation, the inclusion of QOL as a first step towards global management of KOA[8] and the lack of studies, within the knowledge of the authors on main databases, that have concomitantly assessed the main daily transfer activities performed by this population, understood as global physical capacity, the combination of these activities was included in the current study to investigate a possible relationship between these factors. We aimed to investigate the relationship between physical capacity and health-related quality of life (HRQOL) in older adults with KOA. We hypothesized that the global physical capacity assessed through the ability to walk short and long distances, chair stand, and stair climb would be associated with the different domains of HRQOL of older adults with symptomatic KOA. We also expect to encourage other researchers to investigate this important matter.

MATERIALS AND METHOD

This is a cross-sectional study. Recruitment and data collection were carried out between August 2017 and March 2020. Recruitment was conveniently performed through waiting lists for physiotherapy and geriatric care, distribution of flyers, and information on social media and local websites. Data collection was performed at the Human Functional Performance Laboratory of the University of Brasília - Ceilândia Campus. This research project was approved by the Ethics and Research Committee of the Faculty of Health Sciences - CEP / FS of the University of Brasília - UnB (CAEE 62256516.2.0000.0030). All study participants provided a written informed consent form. Data were reported according to the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

We performed a secondary analysis of data obtained from an ongoing randomized clinical trial. The protocol of this study has been previously detailed[9] and registered in the Brazilian Registry of Clinical Trials - REBEC (RBR-875ZSW). The study included older men and women living in the western and southwestern regions of Brasília. The inclusion criteria were as follows: (i) age ≥ 60 years; (ii) clinical diagnosis of uni- or bilateral KOA according to the American College of Rheumatology criteria (ACR)[10]; and (iii) average pain ≥ four on a numerical rating scale. Participants were excluded if they: (i) had any medical restrictions that prevented the evaluation procedure (cardiorespiratory, neurological, and musculoskeletal changes), (ii) previous knee or hip surgery, (iii) could not walk without assistance; (iv) had undergone physical therapy treatment in the three months prior to the investigation; (v) had experienced infiltration or intramuscular procedure with corticosteroids or other medications in the knee (previous six months); (vi) scored less than 18 points in the Mini-Mental State Examination in the case of participants who were declared illiterate and less than 24 for those with school education[11].

Data collection was performed over two days by a single trained examiner, lasting approximately one and a half hours. On the first day, the participants responded to the clinical characteristics and the WOMAC questionnaire. Physical-functional tests were performed on the second day.

The following information was assessed: age in full years, sex (female or male), joint impairment (unilateral or bilateral KOA), physical exercise practice (Active: ≥150 minutes per week of moderate-intensity exercise; Inactive: <150 weekly minutes of moderate-intensity physical exercise[12], cognitive status (total score of the Mini-Mental State Examination - MMSE), body mass index ($BMI = \frac{weight\ (Kg)}{height\ (m)^2}$), depressive symptoms (total score of the Geriatric Depression Scale of 15 items - GDS)[13], pain perception (Numerical rating Scale - NRS), and number of prescribed medications. According to the BMI, the participants were categorized as underweight (below 22 kg / m²), eutrophic (between 22 and 27 kg / m²), or overweight (above 27 kg / m²)[14]. The identification of depressive symptoms allowed us to classify participants as not depressed (0 to 5 points), with mild depressive symptoms (6 to 10 points), or a suggestion of severe depression (11 to 15 points)[15]. The perception of pain in the NRS greater than or equal to 6 was characterized as severe[16].

Health- related quality of life (*Dependent variable*) was assessed using the WOMAC (Western Ontario and McMaster Universities Osteoarthritis), translated and validated for the Brazilian population. This is a self-report questionnaire that assesses three domains of HRQOL: pain, stiffness, and physical activity. The score for the items is expressed using a Likert scale, with a rating ranging from: none = 0, low = 1, moderate = 2, severe = 3, and very severe = 4. The maximum score in each section used in this study was expressed through the sum of the items of each domain, with higher scores indicating more significant pain (0-20 points), stiffness (0-8 points), and physical dysfunction (0-68 points)[17].

Physical capacity (*Independent or explanatory variables*) was evaluated using the five tests recommended by OARSI[18]: (i) Timed Up and Go (TUG); (ii) 30 Seconds Chair Stand (30CST); (iii) Stair Climb (SCT); (iv) 40m Fast-Paced Walk (40FPWT); (v) Six-Minute Walk (6MWT).

Except for the 6MWT, all evaluations were performed in a quiet, controlled, climatized environment. Individuals were instructed not to ingest coffee on the day of the physical test and to maintain their regular activities and medications.

For the TUG evaluation, each participant was initially positioned seated in a chair placed at the end of a 3m track. At the word "go", the participant walked at a comfortable speed to the 3m mark, turned around, walked back, and sat down again. The participants were not allowed to use their hands to help them get up[18]. The mean value of a previous study for obese individuals with KOA is approximately 8,9 seconds[19].

For the 30CST evaluation, participants sat in the middle of an armless chair, with their back straight, feet shoulder-width apart, and arms crossed on their shoulders. On the word "go", the participant stood up and sat down again as fast as they could for 30 seconds[18]. A low number of repetitions (>12) implied in poor muscle power performance.

The SCT test[18] was adapted to a set of two steps. The participants began the stair climb facing forward and on the word "go", ascended two steps (height 40cm; step width 16cm), and descended the two steps facing backward, nine times while being timed. The participants were allowed to use the therapist's support if necessary. More time to complete the test implied in poor lower body strength and balance performance.

The 40FCWT test was administered in a 10m hallway with a marked beginning and end[18]. On the word "go", participants began walking fast, without running, they walked 10m, walked back, and repeated the course until they had covered 40m. More time to accomplish the test implied in poor walking speed performance.

For the 6MWT, patients walked as far as possible in 6 minutes on a 30m quiet, partially covered hallway, and the distance they covered was recorded. A one-minute warning was also provided, along with the sentence "You are doing well, keep the pace". The mean value of a previous study for obese individuals with KOA is described as approximately 299 meters[19].

The possible confounding variables (BIAS) such as age, sex, BMI, joint impairment, physical exercise, and depressive symptoms were controlled by including them as covariates in the data analysis. To ensure an accurate predictive model, the recommendation of approximately ten individuals per variable was considered in the linear regression analysis[20].

The statistical analyses were performed using descriptive statistics (mean, standard deviation, absolute frequency, and percentage) for the measurements of clinical characteristics, HRQOL, and physical capacity. No imputations were made for missing data. In the cases of participants with missing data, the data were analyzed using pairwise exclusion so that the available data could be included in the analyses and, thus, the risk of bias minimized.

Pearson's correlation was calculated considering each domain of HRQOL (WOMAC) and measures of physical capacity. Pearson or Spearman correlations were calculated between continuous covariates and HRQOL. Additionally, independent student t-tests or the Mann Whitney U test was used to compare the scores of the HRQOL domains between the groups of categorical covariates. Correlations or comparisons of measures of physical capacity and covariates with a p-value ≤ 0.05 were considered significant.

Measures of physical capacity that showed significant correlation ($p \leq 0.05$) with the domains of HRQOL were chosen for the analysis of univariate linear regression to identify a possible relationship between each of the predictors (physical capacity) and the output variable (HRQOL). Any measures of physical capacity identified as significant predictors of HRQOL in these analyses ($p \leq 0.05$) were included in the multiple regression analysis.

The remaining predictors were then placed in a multiple linear regression model to determine whether the importance of these tests in explaining possible variations in the WOMAC domains was maintained when included with the others. Four multiple linear regressions were performed between each HRQOL domain and the physical capacity measures (independent variables) that were already significant in the simple regression. The significant covariables ($p<0.05$) in the correlation or comparison analyses were included in the multiple regression analyses as adjustment variables. For each analysis, the principles of independence between residues (Durbin-Watson), normality of residues, presence of homoscedasticity, and absence of multicollinearity between variables (VIF <10 and Tolerance> 0.1) were respected and, therefore, assumptions were guaranteed to perform regression by the step-by-step method. The analyses were performed using the stepwise-forward method. The variables not identified as predictive were removed, and the model with the highest adjusted R^2 value or that explained a higher percentage of the output variable was presented. A significance level of 5% was considered.

RESULTS

Initially, 188 participants were contacted. After applying the inclusion/exclusion criteria, 67 were considered eligible to participate in the study and included in the final analyses (Figure 1). Briefly, the research participants were predominantly women, aged between 60 and 83 years, overweight, inactive, without depressive symptoms, and with bilateral knee impairment associated with severe pain. The clinical characteristics of the participants and data on HRQOL and physical capacity are summarized in Table 1. Complete data were provided by 60 participants, with partial data available for the other 7. Two individuals had no BMI information, two individuals did not have information on the level of physical activity, and seven individuals had no information on the number of medications being used.

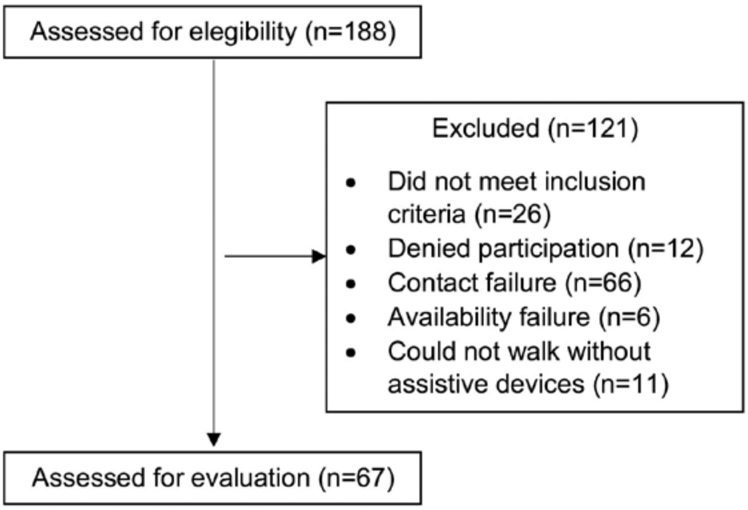

Figure 1. Study flowchart, Brasília, 2020.

Table 1. Demographic, physical, and functional performance variables of the participants (n=67), Brasília, 2020.

Variables	Total sample	Female (n=55)	Male (n=12)
Age (years)[a]	68.8 (5.8)	68.36 (5.69)	70.50 (6.028)
Sex (female)[c]	82.1 (55)	-	-
BMI (Kg/m²)[a]	30.38 (7.98)	30.60 (8.66)	29.43 (3.99)
Underweight[c]	1.5 (1)	0.0 (0)	25.0 (3)
Eutrophic[c]	16.9 (11)	15.1 (8)	25.0 (3)
Overweight[c]	81.5 (53)	84.9 (45)	66.7 (8)
Joint impairment (bilateral)[c]	73.1 (49)	78.2 (43)	50.0 (6)
Physical exercise practice (inactive)[c]	79.1 (53)	84.9 (45)	66.7 (8)
Number of medications[a]	4.07 (2.2)	4.10 (2.074)	3.91 (2.844)
MMSE (score)[a]	21.4 (5.9)	21.02 (6.317)	23.67 (3.367)
NRS (0-10)[a]	7.7 (2.2)	7.83 (2.193)	7.50 (2.431)
GDS (total score)[a]	5.04 (3.19)	5.51 (3.090)	2.92 (2.906)
Not depressed[c]	62.7 (42)	56.4 (31)	91.7 (11)
Mild depression[c]	28.4 (19)	34.5 (19)	0.0 (0)
Severe depression[c]	9 (6)	9.1 (5)	8.3 (1)
Physical capacity			
TUG (s)[b]	13.03 (11.05 – 16.07)	13.06 (11.07 – 16.04)	12.55 (10.45 – 19.54)
30CTS (repetition number)[b]	7 (5 – 9)	7 (5 – 8)	8.50 (6.50 – 11.00)
SCT (s)[b]	77 (63.05 – 95.05)	81.02 (67.56 – 100.72)	55.32 (42.03 – 76.54)
40FPWT (s)[b]	37.07 (32.09 – 43.09)	39.05 (33.55 – 44.52)	30.28 (26.54 – 35.01)
6MWT (m)[b]	371.00 (317.00 – 430.00)	365.00 (316.00 – 418.00)	445.00 (410.00 – 524.50)
WOMAC			
Pain (0-20)[b]	10.00 (7.00 – 13.00)	10.00 (8.00 – 13.50)	8.50 (5.00 – 10.50)
Stiffness (0-8)[b]	2.00 (0.00 – 4.00)	3.00 (0.00 – 4.00)	1.50 (0.00 – 2.00)
Physical function (0-68)[b]	31.00 (17.00 – 41.00)	33.00 (26.50 – 41.50)	15.00 (9.50 – 22.00)

Notes: [a]Mean (Standard deviation). [b]Median (P25% – P75%). [c]Percentage (Absolute frequency). MMSE: Mini-Mental State Evaluation. NRS: Numerical Rating Scale. GDS: Geriatric Depression Scale. TUG: Timed Up and Go. SCT: Stair Climb Test. 30CST: 30 Seconds Chair Stand Test. 40FPWT: 40m Fast-Paced Walk Test. 6MWT: Six-Minute Walk Test. WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

Correlation coefficients between WOMAC and physical capacity are shown in Table 2. In the comparison analyses, significant differences were observed between men and women in all domains; pain (Mean difference=-2.93, [95% CI -5.54 to -0.33], *p*=0.028), stiffness (Z=-2.11, *p*=0.034), and physical activity (Mean difference=-16.71, [95% CI -24.96 to -8.47]), *p*<0.001). Differences in scores were also observed in the physical activity domain (Mean difference=9.49, F=0.009, *p*=0.015) between groups according to knee joint impairment (uni or bilateral). There was no significant difference between physically active or inactive individuals.

In the univariate linear regression analyses, an association of physical capacity was observed in the 30CST, SCT, 40FPWT, and 6MWT tests with the pain and physical activity domains, and an association of physical capacity in the SCT and 6MWT tests with the stiffness domain of the WOMAC (Table 3).

Table 2. Association between physical capacity scores and WOMAC domains:

	WOMAC					
Independent variables	Pain		Stiffness		Physical function	
	r	*p*	r	*p*	r	*p*
30CST	0.254[a]	0.038	-	-	0.259[a]	0.034
SCT	0.42[a]	<0.001	0.252[b]	0.04	0.552[a]	<0.001
40FPWT	0.329[a]	0.007	-	-	0.397[a]	0.001
6MWT	0.389[a]	0.001	0.279[a]	0.022	0.445[a]	<0.001

Key: [a]Pearson correlation; [b]Spearman correlation

Table 3. Univariate regression, including physical capacity as an independent variable and HRQOL as a dependent variable.

Dependent variable	Independent variable	Univariate regression		
		R^2 (R^2_{adj})	*Beta* (CI 95%)	*p-value*
WOMAC – Pain	TUG	0.014 (-0.015)	-0.010 (-0.197 to 0.176)	0.913
	30CST	0.064 (0.050)	-0.367 (-0.714 to -0.020	0.038
	SCT	0.180 (0.168)	0.064 (0.030 to 0.098)	<0.001
	40FPWT	0.108 (0.094)	0.111 (0.032 to 0.189)	0.007
	6MWT	0.151 (0.138)	-0.019 (-0.031 to -0.008)	0.001
WOMAC- Stiffness	TUG	0.020 (0.005)	0.064 (-0.047 to 0.174)	0.252
	30CST	0.017 (0.002)	-0.113 (-0.326 to 0.100)	0.293
	SCT	0.064 (0.049)	0.023 (0.001 to 0.044)	0.040
	40FPWT	0.035 (0.021)	0.038 (-0.011 to 0.087)	0.127
	6MWT	0.078 (0.064)	-0.008 (-0.015 to -0.001)	0.022
WOMAC- Physical function	TUG	0.001 (-0.014)	0.079 (-0.557 to 0.715)	0.806
	30CST	0.067 (0.053)	-1.279 (-2.461 to -0.097)	0.034
	SCT	0.304 (0.293)	0.284 (0.178 to 0.391)	<0.001
	40FPWT	0.158 (0.145)	0.455 (0.195 to 0.716)	0.001
	6MWT	0.198 (0.186)	-0.076 (-0.114 to -0.038)	<0.001

However, in the adjusted multivariate analysis, it was observed that physical capacity in the 6MWT (β =-0.022; t = -3.88; p<0.001) influenced by BMI (β =0.121; t = 2.08; p=0.041) explained 24.7% of the pain domain [F(2.62) = 10.19; p<0.001; R^2=0.247]. A total of 14.1% [F(2.62)=5.09; p=0.009; R^2=0.141] of the stiffness domain was explained by the 6MWT (β=-0.009; t=-2.37; p=0.021) influenced by BMI (β=0.076;t=2.00; p=0.049). The measure of physical capacity in the SCT (β=0.229; t=4.25; p<0.001) influenced by sex (β=10.724; t=2.77; p=0.007) was also observed and explained 39.5% of the physical activity domain [F(2.62)=20.26; p<0.001; R^2=0.395] (Table 4).

Table 4. Multivariate linear regression (Stepwise forward method) including physical capacity as independent variable and HRQOL as dependent variable:

Dependent variable	Independent variables	Multivariate Regression			
		R^2 (R^2_{adj})	'Cohen's f^2 (Effect Size) (power)	*Beta* (CI 95%)	Individual Significance (p-value)
WOMAC– Pain	30CST	0.247 (0.223)	0.32 (99%)	-	-
	SCT			-	-
	40FPWT			-	-
	6MWT			-0.022 (-0.033 to -0.010)	<0.001
	Female Sex			-	-
	BMI			0.121 (0.005 to 0.237)	0.041
	GDS			-	-
WOMAC-Stiffness	SCT	0.141 (0.113)	0.16 (83%)	-	-
	6MWT			-0.009 (-0.016 to -0.001)	0.021
	Female Sex			-	-
	BMI			0.076 (0.000 to 0.151)	0.049
WOMAC-Physical function	30CST	0.395 (0.376)	0.65 (99%)	-	-
	SCT			0.229 (0.121 to 0.336)	<0.001
	40FPWT			-	-
	6MWT			-	-
	Female Sex			10.724 (2.985 to 18.463)	0.007
	BMI			-	-
	Bilateral KOA			-	-
	GDS			-	-

After analysis, it was possible to establish three equations for all domains of HRQOL from the WOMAC:

(i) Pain domain= 14.436 + (-0.022* 6MWT) + (0.121* BMI)

(ii) Stiffness domain= 3.729 + (-0.009* 6MWT) + (0.076* BMI)

(iii) Physical function domain= -8.674 + (0.229 * SCT) + (10.724 * *sex*)

6MWT = performance in the six-minute walk test in meters (m); BMI = Body Mass Index in Kg / m^2; SCT = performance on the stair climb test in seconds (s); Sex = 1 for men and 2 for women.

DISCUSSION

The study examined the association between physical capacity and health-related quality of life in older adults with symptomatic KOA. The results showed that the HRQOL declined together with the worsening ability to walk long distances and to climb stairs, even when BMI and sex influences were considered. These data will help in the establishment of rehabilitation strategies to assist in improving function in KOA patients.

Although some studies[21,22] have investigated the individual relationship between these abilities and perceived HRQOL, the authors are not aware of any studies on the main databases that concomitantly assessed the main daily transfer activities performed by this population, understood as global physical capacity. We found the ability to walk long distances adjusted for BMI explained 22.3% of HRQOL in the pain domain of the older adults with symptomatic KOA. Our findings revealed that participants with a lower BMI walked longer distances and reported a higher HRQOL regarding the pain domain. Juhakoski and colleagues (2008)[23] also identified this association between the pain domain of the HRQOL and a greater walking distance, regardless of BMI in participants with unilateral or bilateral hip OA.

The ability to walk long distances is reduced in older adults (> 65 years) with a diagnosis of KOA[21], and several factors can impact this activity, mainly overweight and knee pain[5]. Concerning overweight, the increase in body weight may overload and decrease joint movements, favoring a decrease in the activity level of these individuals[19], an increase in local pain[24], and a reduction in physical capacity, not only to walk long distances but also to chair stand and stair climb[22]. In patients with knee OA, the walking distance, BMI, duration of knee pain (years), life satisfaction, walking speed, standing and walking performance (TUG), reported instability[25], and range of knee flexion and extension movements[24] showed a linear relationship with the pain domain of the HRQOL[23].

We observed that the ability to walk long distances together with BMI also explained 11.3% of the stiffness HRQOL domain. This finding demonstrated that older adults with a lower BMI who could walk longer distances had a higher HRQOL in the stiffness domain. In KOA patients, joint stiffness is present during the morning, after long periods in the same position, and persists during walking, leading to gait cycle alteration[25,26]. In patients with unilateral knee OA, the joint stiffness can be 13% greater in the symptomatic limb compared to the asymptomatic limb[26]. In these patients, asymptomatic knee load can also increase up to 41%, leading to a higher knee flexion angle at the weight-acceptance phase and contributing to approximately 70% of the variation in stiffness along with knee contact forces[25]. Few studies have investigated these relations; however, worsening in the stiffness component also seems to be related to other factors such as age ≥ 65 years, BMI ≥ 25 kg/m², the female sex[27], and reported knee instability[25].

We also found that the ability to stair climb and sex explained approximately 38% of the physical activity domain of the older adults in the study. This finding demonstrated that older men with symptomatic KOA with a greater ability to stair climb also had a higher HRQOL in the physical activity domain. These findings are in accordance with the study conducted by Topp et al. (2000)[28], who also found an association between the ability to stair climb and the HRQOL, explaining approximately 50% of the HRQOL physical activity domain in older adults with a clinical diagnosis of KOA. This ability is often limited regardless of the degree of impairment (mild or moderate)[29] and has been reported to be influenced by sex since women present worse physical capacity compared to men with equivalent impairment[30]. In addition to these two determinants evaluated in our study, the presence of pain, even at a mild intensity, also demonstrated a relationship with the domain of physical activity, even in individuals without a KOA diagnosis. After adjusting for BMI, muscle strength, and anxiety, pain explained between 36 and 60% of physical capacity[31,32].

Impairments in physical capacity can compromise the ability to perform dynamic tasks, favoring a sedentary lifestyle and negatively affecting HRQOL[19]. Our findings demonstrated that the assessment of the ability to walk long distances and stair climb using quick, simple, and affordable measures provides an estimation of the pain, stiffness, and physical activity domains of HRQOL. Most of the determinants of HRQOL identified in the present study characterize modifiable factors[33]. Consequently, rehabilitation programs aimed at improving the HRQOL of these patients should consider promoting interventions to increase the ability to walk long distances and stair climb, associated with weight reduction. Among several interventions available, a standardized exercise program is considered adequate for reducing pain and stiffness, thus contributing to increased functionality and HRQOL[34]. Another important factor to consider is the number of medications in use, polypharmacy, since the number of medications seems to negatively affect the level of physical activity[35] of individuals with KOA. Finally, the assessment of other factors related to physical capacities, such as lower extremity muscle function, can elucidate mechanisms associated with reduced physical performance and HRQOL in individuals with KOA.

Our study has some limitations. First, the inclusion of only symptomatic older adults with severe pain (NRS>7) prevents the generalization of our findings to the asymptomatic and symptomatic older population with mild pain OA. Second, other factors that can also alter pain perception and HRQOL are poor sleep quality, psychological status, and pain catastrophizing, which were not taken into consideration in our study. A further study of KOA patients to assess these components (sleep quality, psychological status, and pain catastrophizing), is warranted. Third, although the average pain perception of our participants was severe, they were not categorized into groups according to their pain intensity (mild, moderate, or severe). Considering that pain alone can explain up to 30% of the physical function domain of HRQOL this could have influenced our results. Further studies should consider cut points for pain. Fourth, even though we verified two main determinants of HRQOL in older adults with symptomatic KOA, a longitudinal assessment would better define causality. Fifth, muscle mass calf circumference was not used. Finally, the low number of subjects.

CONCLUSION

We observed a positive association between the ability to walk long distances and climb stairs and health-related quality of life. Some aspects, such as body mass index and sex may also perform a negative influence on this association. This study should be understood as an initial step towards describing the relationship between HRQOL and functional capacity, also helping health care professionals broaden their understanding regarding modifiable and non-modifiable conditions affecting patients with knee osteoarthritis. Interventions towards improving walking capacity and stair climbing such as gait training, outdoor aerobic activities, and step and stair training may enhance not only balance, strength, and body perception but also the quality of life of older adults suffering from symptomatic knee osteoarthritis, as obese and female individuals may struggle a little.

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