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Original

Frailty, Physical Fitness and Quality of Life: a comparison between Physically Frail and Robust Older Women

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ABSTRACT

Objective: The aim of the study was to compare physical fitness, quality of life and domains of frailty between physically frail and robust older women, whose was classified by the physical domain from Kihon Checklist.
Method: One hundred and thirty-two community-dwelling older women participated in the study (68.5 ± 6.1 years). Data were collected through questionnaires (sociodemographic, Kihon Checklist, Short Form-8 items) and physical and functional tests.
Results: Most frail older women lived alone (P<0.01), had lower frequency of leaving home weekly (P<0.03) and reported a greater history of fall events compared to the robust ones (P<0.01). In addition, physically frail older women presented lower performance in handgrip strength, walking speed usual and maximum, and Timed Up and Go. In addition, they had worst results in other domains of frailty (i.e., instrumental activities of daily living, oral condition, socialization, cognition) as well as a lower quality of life. Older women leaving home in a lower frequency and living alone may present an increase of emotional issues and, occasionally, a decrease of the quality of life.
Conclusion: Physical frail older women leaving home less present lower muscle strength and power and, a combination of frailties besides the physical one.
Keywords: Aging; Frailty; Kihon Checklist; Physical Function; Quality of Life.

Fragilidad, Aptitud Física y Calidad de Vida: comparación entre personas de la tercera edad frágiles y robustas físicamente.

RESUMEN

Objetivo: Comparar la aptitud física, la calidad de vida y los dominios de fragilidad entre ancianos físicamente frágiles y robustos, clasificados por el dominio físico del *Kihon Checklist*.
Método: Mujeres ancianas de la comunidad participaron del estudio (n=132; 68.5 ± 6.1 años). Los datos fueron recolectados por medio de cuestionarios (sociodemográfico, *Kihon Checklist*, Short Form-8) y pruebas físicas y funcionales.
Resultados: La mayoría de las ancianas frágiles vivían solas (P <0.01), presentaron menor frecuencia para salir de casa semanalmente (P <0.03) y sufrieron mayor número de caídas en comparación a las robustas (P <0.01). Las personas de edad avanzada físicamente frágiles presentaron un menor desempeño en la fuerza de prensión manual, velocidad de caminata usual y máxima y en el test *Timed Up and Go*. Además, presentaron resultados peores en otros ámbitos de fragilidad (actividades instrumentales de la vida diaria, condición oral, socialización, cognición), así como una menor calidad de vida. Las ancianas que salen de casa con menor frecuencia y viven solas pueden presentar un aumento de problemas emocionales y, ocasionalmente, una disminución de la calidad de vida.
Conclusión: Ancianas físicamente frágiles, que salen menos de casa, presentan menor fuerza y potencia muscular junto a otros ámbitos de fragilidad.
Palabras clave: Envejecimiento; Fragilidad; Kihon Checklist; Función física; Calidad de vida.

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Fragilidade, aptidão física e qualidade de vida: uma comparação entre idosas fisicamente frágeis e robustas.

RESUMO

Objetivo: O objetivo do estudo foi comparar a aptidão física, qualidade de vida e os domínios de fragilidade entre idosas fisicamente frágeis e robustas, classificadas pelo dominio físico do *Kihon Checklist*.
Método: Cento e trinta e duas idosas da comunidade participaram do estudo (68.5 ± 6.1 anos). Os dados foram coletados por meio de questionários (sociodemográfico, *Kihon Checklist*, *Short Form*-8) e testes físicos e funcionais.
Resultados: A maioria das idosas frágeis moravam sozinhas (P <0.01), apresentaram menor frequência ao sair de casa semanalmente (P <0.03) e relataram maior histórico de quedas em comparação às robustas (P <0.01). Além disso, as idosas fisicamente frágeis apresentaram menor desempenho na força de preensão manual, velocidade de caminhada usual e máxima, *Timed Up and Go*. Em adição a isto, apresentaram resultados agravados em outros domínios da fragilidade (atividades instrumentais da vida diária, condição oral, socialização, cognição), bem como uma menor qualidade de vida. Idosas que saem de casa com menor frequência e moram sozinhas podem apresentar um acréscimo de problemas emocionais e, ocasionalmente, uma diminuição da qualidade de vida.
Conclusão: Idosas físicamente frágeis, que saem menos de casa, apresentam menor força e potência muscular, e uma combinação do domínio físico com outros domínios da fragilidade.
Palavras-chave: Envelhecimento; Fragilidade; Kihon Checklist; Função Física; Qualidade de vida.

Introduction

Aging is characterized by a set of alterations which result in the loss of older adults' adaptation ability to the environment stressors.[1] This phenomenon leads to alterations in the older individual' capacity to perform activities of daily living (ADL); primarily the abilities associated to the physical domain interfering with the quality of life (QoL).[2] In this aging context, the frailty syndrome may increase the vulnerability and the dependence of older adults[3] and compromise the maintenance of the homeostasis.[4]

The frailty syndrome is related to several dysfunctions including decrease of physical aspects.[5,6] Brazilian studies verified the relationship between physical fitness and frailty syndrome, and results indicated a dependency of frail older adults when performing basic and instrumental activities of daily living (IADL).[7,8] Despite the multidimensionality of frailty,[4] physical aspect constitutes an important domain to be further studied. In this way, addressing the dynamism of frailty, we analyzed the possible impact of physical frailty on other domains such as cognitive, social and emotional frailty, among others.

Furthermore, poor health characteristics can be explained when there are association between physical frailty and low QoL, which was analyzed by another study.[9] Likewise, studies found that physical fitness and QoL are also relevant to the frailty syndrome,[7,8] however, it is needed further studies regarding the physical domain of frailty in Brazilian older population. The aim of this study was to compare the domains of frailty, physical fitness and QoL between physically frail and non-frail Brazilian older women.

Methods

This study has a cross-sectional design and was approved by the Ethical Committee of the University of Campinas, under the protocol # 37100714.5.0000.5404.

Sample

One hundred and thirty-two were community-dwelling older women from Brazilian community centers with similar demographic characteristics participated to this study. The inclusion criteria were a) 60 years or older; b) be able to fill in the questionnaires; c) have ability to perform the physical tests. Were excluded the participants who had missing data. All volunteers signed an informed consent form. Only women participated in this study because they were the majority of participants at the center.

Procedures

Trained evaluators with a specific background collected the data in a single meeting with the volunteer, firstly the participants answered the questionnaires: sociodemographic, Short Form-8 items (SF-8) and Kihon Checklist (KCL); and as a second part they performed the physical/functional tests: one-leg stand, five chair stands, walking speed, Timed up and Go (TUG) and handgrip strength.

The sociodemographic questionnaire used had data concerning educational level/ living structure; working condition; satisfaction with financial condition; frequency that the older adult leaves home; fall events during the year prior to the research; injuries due to falls; number and class of medications and report morbidities.

The SF-8 and KCL questionnaires were used to evaluate QoL and frailty, respectively. The SF-8 consists in an eight-domain such as general health state, physical functioning, role-physical, bodily pain, vitality, social functioning, mental health and role-emotional. While the KCL consists of seven domains of frailty (i.e., IADL, physical condition, nutrition, oral condition, socialization, cognition and mood). The physical domain from KCL was used to categorize the groups – frail and robust, questions based on capacity of walking, standing up, climbing stairs and history of falling. Both questionnaires (SF-8 and KCL) were translated and validated for use with Brazilian older people.[10,11]

The one-leg stand test was performed with the volunteers standing in a single-leg stance, while the other leg remains elevated with the knee flexed at 90º, the upper limbs crossed in front of the torso and head straight. The test was performed once with each leg, and the higher value, which was expressed by the time in seconds. The maximum time was 30 seconds for each leg.[12]

In the five chair stands test, the volunteers sat on a 45 cm high armless chair, with the arms crossed in front of the torso. The volunteers should stand until the full extension of the knees and sit again until the contact of the gluteus on the chair. This movement was repeated five times as fast as possible. In this test, the result was expressed by the time in seconds.[13]

The walking speed was evaluated using a distance of 12 meters. We used the time spent to walk the inner 10 meters, disregarding acceleration and deceleration. The participants performed this distance at usual walking speed and at maximum walking speed.[14] In the TUG test, the participants initiated the test sitting in an armless chair; they had to stand up without using the arms, walk quickly to the cone within a distance of 3 meters away from the chair, bypass it and return to the chair, without running or jogging. As the tests above, the result was based on the time registered.[5]

Finally, in the handgrip strength test (HST), Jamar® Plus Digital Hand Dynamometer was used to the evaluation. The participants should be sitting with the shoulders in a neutral position, holding the dynamometer with one hand, elbow flexed at 90º and the wrist in a neutral affirmative position. The instruction was to tighten the equipment handle with the maximum strength for 3-5 seconds.[15] The test was performed once for each hand, and the best result was considered for analysis.

Statistical Analyses

The normality was tested for all variables according the Kolmogorov-Smirnov test. The chi-square test (χ^2) was used to verify the differences between the groups, regarding the sociodemographic categorical variables. For the continuous variable of the sociodemographic questionnaire (i.e., age, body mass index (BMI), physical activity (PA) frequency and number of medications used), as well as the parametric values of the physical tests (i.e., HST and maximum walking speed), a Student's t-test of unpaired samples was used. Mann-Whitney U test was used to compare the SF-8's domains, KCL's domains and the non-parametric values of physical tests (i.e., one-leg stand test, five times sit to stand test, usual walking speed and TUG).

The value of p<0.05 was considered significant. The analyses were performed by the Statistical Package for the Social Sciences (SPSS, version 21.0; IBM, Chicago, IL, USA).

Results

A total of 132 older women were included in this study (mean age was 68.5 ± 6.1 years). The prevalence of physically frail older women was 20.5% (n=27) and of robust women was 79.5% (n=105). Comparing groups, the frail group was older (P<0.02), had higher prevalence of older women living alone (P<0.01), leaved the house less often (P<0.03) and reported more fall events in the last year (P<0.01) (Table 1).

Both groups presented high prevalence of participants engaged on PAs (frail 88.9%, robust 93.3%). There were no significant differences between groups regarding BMI, educational level, hospitalizations, quantity and class of medications, smoking habit, alcoholic beverages ingestion, prevalence of retired older adults and financial satisfaction (Table 1).

Results of the physical and functional tests indicate that the frail group had the lowest results for the HST (P<0.02), walking speed (usual: P<0.01; maximum: P<0.01) and TUG (P<0.02), when compared with the robust group. In relation to the five times chair stand test and one-leg stand test, differences were not statically significant (Table 2).

Table 1. Characteristics of physically robust and frail older women.

Variables		Frail (n=27) % Valid (n)	Robust (n=105) % Valid (n)	p
Age (y)		70.9 ± 6.7	67.9 ± 5.9	0.02
BMI (kg/m^2)		29.3 ± 5.5	28.7 ± 4.7	0.57
Educational level	Elementary school	66.7 (18)	45.2 (48)	0.27
	Junior high school	18.5 (5)	16.3 (17)	
	High school	11.1 (3)	20.2 (21)	
	Technical school or university	–	10.6 (11)	
	Illiterate	3.7 (1)	7.7 (8)	
Family structure	Alone	40.8 (11)	18.0 (19)	0.01
	Partner or child(ren)	29.6 (8)	51.4 (54)	
	Partner and children	18.5 (5)	22.9 (24)	
	Other	11.1 (3)	7.7 (8)	
Work	Retired	85.2 (23)	74.0 (78)	0.72
	Worker	14.8 (4)	26 (27)	
Financial Satisfaction	Satisfied	48.1 (13)	63.8 (67)	0.38
	Normal	26.0 (7)	24.8 (26)	
	Unsatisfied	25.9 (7)	11.4 (12)	
Frequency of Leaving home (week)	Less than once	14.8 (4)	2.9 (3)	0.03
	1-2 times	37.1 (10)	24.8 (26)	
	3-4 times	14.8 (4)	27.5 (29)	
	5 times or more	33.3 (9)	44.8 (47)	
Physical activities	Yes	88.9 (24)	93.6 (98)	0.44
Physical activities frequency (h)		3.3 ± 1.5	3.1 ± 1.	0.69
Fall events in the last year	0	3.7 (1)	–	<0.01
	Once	51.9 (14)	76.2 (80)	
	Twice	22.2 (6)	19.9 (21)	
	Three times or more	22.2 (6)	3.9 (4)	
Hospitalization	Yes	14.8 (4)	7.7 (8)	0.23
Medication		3.5 ± 1.4	2.9 ± 1.6	0.06
Smoking	No	92.6 (25)	88.2 (93)	0.90
Alcoholic Beverage	No	77.8 (21)	83.8 (88)	0.75

BMI: body mass index. Values represent % valid (n) or mean ± standard deviation. Statistical difference for p<0.05

Table 2. Comparison of physical tests, frailty domains and quality of life between Physically robust and frail older women.

Variables		Frail	Robust	p
Physical tests	One-leg stand test (s)	30 [7.7 ± 30]	25.9 [8.7 – 30]	0.53
	Five times chair stand test (s)	10 [9 – 12.4]	9.4 [7.9 – 11.2]	0.07
	Handgrip strength (kgf)	24.2 ± 4.6	26.7 ± 4.8	0.02
	Usual Walking speed (s)	8 [7 – 9.3]	7.3 [6.5 – 8.1]	0.01
	Maximum Walking speed (m/s)	1.5 ± 0.4	1.8 ± 0.2	<0.01
	Timed Up and Go Test (s)	7.4 [6.2 – 9.1]	6.6 [5.9 – 7.7]	0.02
Frailty domains	IADL	1 [0 – 2]	1 [0 – 1]	<0.01
	Nutrition	0 [0 – 1]	0 [0 – 1]	0.89
	Oral Condition	2 [1 – 2]	1 [0 – 1]	0.01
	Socialization	0 [0 – 1]	0 [0 – 0]	0.02
	Cognition	1 [1 – 2]	1 [0 – 1]	0.03
	Mood	1 [0 – 3]	1 [0 – 1.5]	0.12
	Total	9 [6 – 12]	4 [2.5 – 6]	<0.01
	Physical	3 [3 – 4]	1 [0 – 2]	<0.01
Quality of Life domains	General Health	38.4 [38.4 – 46.4]	46.4 [38.4 – 52.8]	<0.01
	Physical Functioning	40.1 [40.1 – 49.8]	54.1 [48.3 – 54.1]	<0.01
	Role-Physical	38.7 [38.7 – 54.0]	54.0 [46.9 – 54.0]	<0.01
	Bodily Pain	40.1 [31.5 – 53.4]	53.4 [40.1 – 60.8]	0.01
	Vitality	45.2 [45.2 – 55.6]	55.6 [45.2 – 61.8]	0.01
	Social Functioning	55.3 [40.4 – 55.3]	55.3 [49.5 – 55.3]	0.23
	Mental Health	49.6 [41.5 – 56.8]	49.6 [41.5 – 56.8]	0.46
	Role-Emotional	52.4 [38.1 – 52.4]	52.4 [45.7 – 52.4]	0.39

Values with parametric variables represent the mean ± standard deviation. Values with non-parametric variables represent the median [25% – 75%]. Statistical Difference for p<0.05

The KCL results and their comparison between groups showed that the physically frail group presented the worst conditions to perform the IADL (P<0.01), oral condition (P<0.01), socialization (P<0.02), cognition (P<0.03) and total frailty (when considering the total score of the KCL, P<0.01). In the domains of mood and nutrition, the groups did not present statistical difference (Table 2).

The frail group had lower QoL regarding to the general health state (P<0.01), physical functioning (P<0.01), role-physical (P<0.01), bodily pain (P<0.01), vitality (P<0.01). Questions on social functioning, mental health and role-emotional aspects of both groups presented similar results (Table2).

Discussion

In our study, there were differences of sociodemographic characteristics between physically frail and non-frail older women. Frail group was older in agreement with other Brazilian studies that reported a higher chronological age in frail older adults,[7,8] justified by the modifications of the human body's physiological systems that occur over the years. Frail women also had higher prevalence of living alone, leaved the house less often and reported more fall events in the last year.

Living structure is still controversial in literature. On one hand, by living alone, the older adult may be considered well succeeded, with family and friends.[16] On the other hand, other study indicated that living alone affects older adults' physical, cognitive and, mainly, social matters. Living alone instead of living with partners or children indicates lower social interaction and may be associated with depressive and emotional stress issues, besides the fact that the most part of these older adults are frail.[17]

Results of the present study indicate that physically frail older women presented lower performance in specific physical tests (lower muscle strength and functional mobility). Slower walking speed and TUG indicate a decline of the older women's functional mobility. The walking speed test is often applied because it is related to different health indicators, such as fall events, hospitalizations, among others.[7,18] For instance, according to other study, TUG is also a test that indicates probability of falls.[5]

One possible cause of mobility reduction and the high fall prevalence in older adults is the sarcopenia, a physiopathological process in which there is a decrease of lean mass, what means a decline of muscle strength and functionality.[19] In the present study, was observed a relation among physical domain of frailty and low muscle strength (i.e., HST). Therefore, is possible infer that the sarcopenic condition should be analyzed when approaching physical frailty and functionality in older people.

The present study also corroborates with evidences related with the decrease in physical abilities found in frail older adults determined by KCL.[7,20] The data collected regarding the frail older women's physical fitness in comparison to the robust participants demonstrate that the KCL's physical domain is an important component to indicate physical changes in frail older women. Once the physical frailty is detected through the KCL, it is relevant to deepen the investigation with more specific assessments for each physical capacity through physical tests as it was performed in this study.

One of the main characteristics concerning frailty syndrome is it vulnerability regarding not exclusively the biological functioning, but also social, cognitive, nutritional and psychological aspects.[20] The present study confirms this phenomenon, and also, indicates that even when the frailty is assessed by a specific dimension – physical, in this case –, it is associated to the reduction of the ability to perform IADL, difficulties of oral digestion, decreased socialization and lower cognitive capacity.

Evidences in literature indicated that low physical capacity may be associated with the decline of the cognitive capacity, mainly regarding functionality.[21,22] Fukutomi et al. stated that cognitive and physical functions are domains that interfere in the decline of IADL.[21] In this perspective, the Yokoya et al.' study analyzed that when do not perform an ADL, the older adult may go out less often and be afraid of fall events, intensifying the tendency of being frail.[6]

In terms of QoL, physically frail older women presented, in this study, low levels of physical functioning, role-physical, bodily pain and vitality. The positive QoL may be represented by individuals who have physical, mental and social conditions to perform their ADL.[23] Brito et al. settled that social isolation occasionally leads to neurological disorders and loss of functional independence.[24] Considering this present study, we can identify, as well, the interference of difficulties in physical domains on quality of physical functioning and vitality.

Usually, healthcare professionals, including the ones in community centers, deal with older adults and suggest PAs as strategy to improve only physical aspects regarding the aging process. However, the older adults present, concomitantly with debilitated physical function, cognitive and social declines and poor perception of QoL. Thus, it is necessary to use combined strategies and interventions that consider aging and the multifactorial aspect of frailty.

The first procedure to address frailty is screening it; therefore, one of our study relevance was to assess frailty by KCL as it is a fast yes/no questionnaire and concomitantly a comprehensive screening. Through it, it was possible to better understand the background surrounding the physical domain as other frailty aspects, sociodemographic characteristics and QoL.

This study presented some limitations: its cross-sectional design and the composition of the sample (i. e., only active women). For future studies, longitudinal studies are suggested to involve participants of both genders and count on sedentary and active groups. In addition, it would be interesting to pursue psychosocial area of studies, in order to educate older adults and create adherence to practice physical exercise.

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