ARTIGO ORIGINAL

# FACTORS ASSOCIATED WITH THE KIHON CHECKLIST IN OLDER WOMEN: A CROSS-SECTIONAL STUDY IN A UNIVERSITY OUTPATIENT CLINIC

## Fatores associados ao Kihon Checklist em mulheres idosas: Um estudo transversal em ambulatório universitário

ISSN: 2178-7514

Vol. 17 | Nº. 1 | Ano 2025

Luiz Fernando Lima Diniz[1]; Priscila Yukari Sewo Sampaio[2]; Yasmin da Silva Ribeiro[3]; Jullyane Caldas dos Santos[1]; Thiago Silva Sales[1]; Carlos Kazuo Taguchi[1]; Ricardo Aurélio Carvalho Sampaio[1]

## ABSTRACT

Introduction: Population aging is a global phenomenon that has increased the prevalence of conditions such as frailty syndrome, which compromises the autonomy and quality of life of older adults. Frailty is characterized by a reduction in physiological reserves and raises the likelihood of adverse outcomes, such as falls and functional dependence. Objective: To analyze markers of frailty syndrome in older women attending a university hospital in Brazil. Methods: This cross-sectional and exploratory study included a convenience sample of women aged 60 years or older, attending an outpatient clinic in northeastern Brazil. Participants were evaluated through questionnaires, anthropometric measurements, and physical tests, including education level, physical activity, medication use, frailty index (KCL), sarcopenia (SARC-F), body fat percentage, appendicular mass, handgrip strength, and gait speed. Data were statistically analyzed by independent samples T test, Mann-Whitney test, chi-square, and partial correlation. Results: Frail older women performed less physical activity, had lower handgrip strength and gait speed, and higher scores on SARC-F, reflecting greater functional impairment. They also presented higher scores on KCL, except for the nutrition subcategory. Frailty showed negative correlations with muscle mass index, physical activity, handgrip strength, and gait speed, and a positive correlation with SARC-F, indicating that worse functional performances are associated with greater frailty. Conclusion: This study provides evidence of the relationship between KCL and various factors related to health and physical function in older women. Early identification of factors associated with frailty can contribute to more effective interventions aimed at maintaining independence in this population.

**Keywords**: Functional performance, body composition, aging, frailty, sarcopenia.

## RESUMO

Introdução: O envelhecimento populacional é um fenômeno global que tem aumentado a prevalência de condições como a síndrome da fragilidade, que compromete a autonomia e a qualidade de vida dos idosos. A fragilidade é caracterizada pela redução das reservas fisiológicas e aumenta a probabilidade de desfechos adversos, como quedas e dependência funcional. Objetivo: Analisar marcadores da síndrome da fragilidade em idosas atendidas em um hospital universitário no Brasil. Métodos: Este estudo transversal e exploratório incluiu uma amostra de conveniência de mulheres com 60 anos ou mais, atendidas em um ambulatório no nordeste do Brasil. As participantes foram avaliadas por meio de questionários, medidas antropométricas e testes físicos, incluindo nível de escolaridade, atividade física, uso de medicamentos, índice de fragilidade (KCL), sarcopenia (SARC-F), percentual de gordura corporal, massa apendicular, força de preensão manual e velocidade da marcha. Os dados foram analisados estatisticamente pelos testes t para amostras independentes, teste de Mann-Whitney, qui-quadrado e correlação parcial. Resultados: Idosas frágeis realizaram menos atividade física, apresentaram menor força de preensão manual e velocidade da marcha, e maiores pontuações no SARC-F, refletindo maior comprometimento funcional. Elas também apresentaram maiores pontuações no KCL, exceto na subcategoria nutrição. A fragilidade apresentou correlações negativas com índice de massa muscular, atividade física, força de preensão manual e velocidade da marcha, e correlação positiva com o SARC-F, indicando que piores desempenhos funcionais estão associados a maior fragilidade. Conclusão: Este estudo fornece evidências da relação entre KCL e vários fatores relacionados à saúde e função física em mulheres idosas. A identificação precoce de fatores associados à fragilidade pode contribuir para intervenções mais eficazes visando à manutenção da independência nessa população.

**Palavras-chave:** Desempenho funcional, composição corporal, envelhecimento, fragilidade; sarcopenia.

1. Federal University of Sergipe, São Cristóvão, Brazil
2. Federal University of Sergipe, Lagarto, Brazil
3. Tiradentes University, Aracaju, Brazil

**Autor de correspondência**

Ricardo Aurélio Carvalho Sampaio

sampaiorac@academico.ufs.br

## INTRODUCTION

Population aging is a global phenomenon characterized by an increase in the proportion of older people. Globally, the World Health Organization[1] estimates that by 2050, older adults will correspond to 2.1 billion people. In Brazil, the Brazilian Institute of Geography and Statistics[2] projects up to 32.1% of them within the national population contingent by 2060.

The aging process can lead to various functional declines, as well as susceptibility to chronic diseases and geriatric syndromes, the most common being delirium, urinary incontinence, depression, and frailty syndrome. Frailty is characterized by a decrease in physiological reserves and increases the possibility of adverse outcomes such as functional dependence, falls, and death[3,4].

Studies emphasize the importance of early detection and assessment of frailty. Promoting quality of life, reducing and delaying conditions associated with the syndrome benefits not only the older individual but also the people around them[5]. From this perspective, instruments that measure frailty are fundamental allies in identifying possible aggravations. In 2006, the Japanese government implemented a self-reported checklist developed by the Ministry of Health, Labor and Welfare, the Kihon Checklist (KCL), to screen for frail and pre-frail older adults. The KCL has been translated and verified for languages such as Brazilian Portuguese and English and is used in various studies with different purposes[6,7].

In addition to the frailty syndrome per se, other indicators are also relevant for maintaining the health and independence of older women, such as body composition, muscle strength, gait rhythm and speed, and physical activity practice. Altered body composition refers to an inadequate relationship between fat, muscle, and other components. Reduced muscle strength, which can result in a condition of sarcopenia, impacts the performance of daily activities. Changes in gait rhythm and speed indicate difficulties in mobility and balance, predictors of falls. Irregular physical activity practice contributes to loss of muscle mass and frailty, while regular physical activity is essential for maintaining muscle strength, mobility, and quality of life[8,9].

Frailty syndrome in older people is associated with negative outcomes, including increased risk of falls, hospitalizations, functional disability, and mortality[10]. In an outpatient context, however, these conditions become even more concerning because, although the Brazilian Ministry of Health establishes guidelines for outpatient care, there are still problems that hinder adequate resources for intensive preventive interventions[11]. As a result, older participants treated in outpatient settings may face additional challenges in maintaining their autonomy and quality of life, highlighting the need for specific and continuous care.

Few studies have explored the association between frailty and different functional performance factors in the older population in the outpatient context, mainly in the northeastern region of Brazil.

Thus, the objective of this study was to analyze the markers of frailty syndrome measured by the KCL and their correlates in older women attending an outpatient clinic of a university hospital in the northeastern region of the country.

## METHODOLOGY

This is a cross-sectional, clinical, and exploratory study, consisting of a convenience sample developed in outpatient clinics of a University Hospital in a capital city in the northeast region of Brazil. The institution serves a diverse population of participants from throughout the state through the Unified Health System (SUS) in various medical clinics, providing an adequate scenario for data collection. This study was conducted and reported in accordance with CONSORT guidelines. The completed CONSORT checklist is provided as a supplementary file.

**Sample characterization and ethical aspects**

The selected participants were women, older adults with 60 years or older, who were waiting for medical consultation in the biomedical outpatient clinic. All were approached by the researchers, were informed of the research objective, and invited to participate in this study. Participants who agreed signed the informed consent form. Participants who used orthoses, had difficulty in locomotion, moderate deafness without the use of hearing aids, or difficulty in comprehension were excluded. The final sample consisted of 55 older women. Data collection lasted between August and October 2023. This research was approved by the Ethics and Research Committee of the Federal University of Sergipe (#3.317.800).

Education level, weekly physical activity time, and the use of prescribed medications were assessed. The frailty index was evaluated using the KCL, and SARC-F assessed the possibility of sarcopenia. Body composition measurements verified body fat percentage (%BF) and appendicular muscle mass index (AMMI). Finally, physical tests included handgrip strength (HGS) and usual gait speed (GS).

The KCL is a screening tool validated and adapted for use in Brazil.[7] The KCL has 25 questions subdivided into seven domains: instrumental activities of daily living (IADL), physical function, nutritional status, oral function, socialization, cognitive state, and depression. The scale in question classifies those evaluated as frail when they score seven points or more.[7]

The SARC-F questionnaire was used to assess the self-report of components related to strength, ability to rise from a chair, walk, climb stairs, and number of falls. Each component is scored between zero and two points, with a maximum of ten points. A score of four or more is suggestive of sarcopenia.[12]

The %BF assessment was performed by electrical bioimpedance analysis, a method that estimates the amount of fat through electrical

currents. In this case, fat tends to impede the passage of electrical current more than muscle and water, allowing an estimated value for fat mass and lean mass to be found[13]. In addition, the AMMI is an important indicator for muscle health, found by the result of the sum of the skeletal muscle mass of arms and legs divided by height squared. It is one of the components for the diagnosis of sarcopenia[14].

Regarding physical function assessments, HGS was measured by a hand dynamometer (JAMAR+ Digital Hand Dynamometer, Patterson Med, USA), which indicates maximum isometric strength. One measurement was taken with each hand, and the highest value was considered for analysis[15]. Usual GS, an indicator of functional capacity and mobility, was measured from the walking time the participant took to walk four meters. Then, the speed was calculated in meters per second (m/s)[16].

### Statistical analysis

The Kolmogorov-Smirnov test was applied to verify the distribution of data. Descriptively, data are presented as mean ± standard deviation, median (25% - 75%), and frequency (%), according to the distribution and nature of the variables. Participants characteristics were compared between robust and frail older women using the independent samples T-test, Mann-Whitney test, and chi-square test, according to continuous and categorical variables, respectively.

Subsequently, a partial correlation analysis was performed to investigate the relationship between KCL and the following variables: %BF, AMMI, HGS, GS, and SARC-F score. Age was used as a control variable in the analysis. Data analysis was performed using SPSS software (IBM Statistics, version 29).

The data from this study will be available upon demand.

## RESULTS

Table 1 presents data from the total sample of 53 women, stratified according to frailty status, divided between frail (n=34) and robust (n=19). Frail older women performed significantly less weekly physical activity ($p < 0.001$), with a median of 0 minutes, compared to robust women. Furthermore, they presented lower HGS ($p = 0.005$) and lower GS ($p < 0.001$), indicating greater functional impairment. The SARC-F score, which assesses the risk of sarcopenia, was significantly higher in frail women ($p = 0.001$), reflecting greater vulnerability to muscle loss. Despite these functional differences, there was no significant variation between groups regarding education level, number of medications used, AMMI, %BF, and prevalence of diseases (Table 1).

### ATTACHED

Table 2 presents a descriptive analysis of KCL variables among the 53 participants.

The total KCL score was significantly higher among frail compared to robust women (frail KCL[10]; robust KCL[5]; p<0.001). Considering specific domains of frailty, frail women presented significantly higher scores in almost all KCL subcategories, which included: ADL (p<0.001), Physical (p<0.001), oral condition (p=0.011), Socialization (p<0.001), Memory (p<0.001), and Depression (p<0.001). There was no difference in the Nutrition subcategory (p=0.059) (Table 2).

**Table 2**. Descriptive data of the Kihon Checklist.

| KCL Domains | Total (n=53) | Robust (n=19) | Frail (n=34) | P |
|---|---|---|---|---|
| **IADL** | 1 (0 – 2) | 0 (0 – 1) | 1 (1 – 2) | <0.001 |
| **PHYSICAL FUNCTION** | 2 (1 – 3) | 1 (0 – 2) | 2.5 (2 – 3) | <0.001 |
| **NUTRITIONAL STATUS** | 1 (0 – 1) | 0 (0 – 1) | 1 (0 – 1) | .059 |
| **ORAL FUNCTION** | 1 (0 – 2) | 0 (0 – 1) | 1 (1 – 2) | .011 |
| **SOCIALIZATION** | 1 (0 – 1) | 0 (0 – 1) | 1 (1 – 2) | <0.001 |
| **COGNITIVE STATE** | 1 (0 – 2) | 0 (0 – 1) | 1 (1 - 2) | <0.001 |
| **DEPRESSION** | 2 (0.5 – 3) | 0 (0 – 2) | 2 (2 – 3) | <0.001 |
| **TOTAL SCORE** | 9 (5 – 10.5) | 5 (4 – 5) | 10 (9 – 12) | <0.001 |
| | 8.4 ± 3.8 | 4.3 ± 1.7 | 10 ± 2.4 | |

Values are median (25%-75%) and mean ± standard deviation. KCL: Kihon Checklist. IADL: Instrumental activities of daily living.

Table 3 presents the percentage of frailty in KCL variables among study participants. There were no cases of frailty in the Nutrition category in either group. Frailty was significantly more prevalent among frail women in the subcategories: Physical (p=0.001), Socialization (p=0.002), Memory (p<0.001), and Depression (p<0.001). In the ADL category, the difference was not significant (p=0.052), as well as in oral condition (p=0.088). Overall, 64.2% of participants presented frailty (Table 3).

**Table 3**. Frequency and percentage of frailty in each Kihon Checklist domain.

| KCL Domains | Total (n=53) | Robust (n=19) | Frail (n=34) | P |
|---|---|---|---|---|
| **IADL** | 6 (11.3) | 0 | 6 (17.6) | 0.052 |
| **PHYSICAL FUNCTION** | 18 (34) | 1 (5.3) | 17 (50) | 0.001 |
| **NUTRITIONAL STATUS** | 0 | 0 | 0 | - |
| **ORAL FUNCTION** | 16 (30.2) | 3 (15.8) | 13 (38.2) | 0.088 |
| **SOCIALIZATION** | 34 (64.2) | 7 (36.8) | 27 (79.4) | 0.002 |
| **COGNITIVE STATE** | 37 (69.8) | 6 (31.6) | 31 (91.2) | <0.001 |
| **DEPRESSION** | 32 (60.4) | 5 (26.3) | 27 (79.4) | <0.001 |

Values are frequency (%). KCL: Kihon Checklist. IADL: Instrumental activities of daily living.

Regarding the results on the association of frailty syndrome with functional performance indicators, considering the partial correlation adjusted for age and KCL correlates, negative correlations were observed with AMMI (r=-0.30), PA/Week (r=-0.42), HGS (r=-0.28), and GS (r=-0.43). In other words, the lower the result in these variables, the higher the frailty score obtained by the participant. Regarding SARC-F, the higher score in sarcopenia screening represents worse results in the frailty index (r=0.41) (Table 4).

**ATTACHED**

## DISCUSSION

The results showed that frail women presented lower levels of PA, HGS, and GS, which are indicators of physical frailty. Additionally, they had higher scores on the SARC-F questionnaire, suggesting a prevalence of sarcopenia.

The domains present in the KCL that involve physical condition, memory, socialization, and depression showed differences when comparing frail and robust women. This finding corroborates with previous studies[17,18]. These results reinforce the importance of observing frailty syndrome from a multifactorial point of view.

Among the KCL domains, the ADL domain did not show differences between groups. When considering that this domain is closer to IADL than to basic ADLs, it can be suggested that the ability to perform ADLs, which are fundamental for maintaining autonomy, is what allows individuals to remain integrated into society, avoiding institutionalization or an exacerbation of frailty that would require specific assistance, as stated by Souto et al. (2017)[19] and Leme et al. (2019)[20].

Another domain that did not show differences between groups was oral condition. This finding disagrees with another studies[21,22].

One of the main findings was the negative correlation between KCL and AMMI. This result aligns with previous studies that associated frailty with muscle mass loss and sarcopenia[23]. Although more detailed analysis is needed, the absence of correlation between KCL and %BF, on the other hand, suggests that frailty may be more related to muscle mass loss than to fat accumulation in this population.

The negative correlation found between KCL and the amount of weekly physical activity corroborates previous studies that highlighted the importance of physical activity in preventing frailty in older people[24,25]. This finding reinforces the relevance of physical activity promotion programs as a strategy to reduce the risk of frailty in older women.

The negative correlations observed between KCL and physical function measures, such as HGS and GS, were in line with existing literature[26,27,5]. These results suggest that KCL may be a useful tool for identifying declines in physical function, which are important components of frailty syndrome.

The positive correlation between KCL and SARC-F indicates a likely relationship between frailty and sarcopenia, as suggested by previous studies[28,29]. This finding highlights the importance of an integrated approach in assessing geriatric syndromes, considering both frailty and sarcopenia.

It is important to note that no correlation was observed between KCL and the number of medications used by the older women, which contradicted some previous studies suggesting a relationship between polypharmacy and frailty[30]. This discrepancy may be due to the specific characteristics of our sample or the multifactorial nature of frailty. It is worth noting that the outpatient context may also influence this scenario.

The study highlights the importance of frailty screening within the outpatient context, promoting early detection and intervention of functional declines, agreeing with previous studies[11]. It is suggested that outpatient care is not multifactorial, that is, it is still focused on specific diseases, but in the context of aging, care offered to older people should preferably be multidimensional.

The results presented here reinforce the usefulness of KCL as a screening tool for frailty in older women and evidence its ability to correlate with objective measures of physical function and body composition. The application of KCL in clinical settings, such as outpatient clinics, can facilitate early identification of elderly at risk of frailty, allowing for more timely and personalized interventions.

It is noteworthy that there were limitations in the development of this study, including the relatively small sample size. Additionally, the sample consisted only of women attending a university outpatient clinic, which may limit the generalization of results to other contexts or groups.

Future studies should consider larger and more diverse samples, including male participants, different age groups, and older individuals from various socioeconomic and health contexts. Longitudinal investigations would also be valuable to better understand the temporal relationship between the studied factors and the development of frailty.

## CONCLUSION

In conclusion, the objective of this study was to analyze the markers of frailty syndrome measured by the KCL and their correlates in older women attending an outpatient clinic of a university hospital in the northeastern region of the country. This study provides evidence of the relationship between the KCL and various factors related to health and physical function in older women. These findings reinforce the importance of a multidimensional assessment of frailty and highlight the potential of the KCL as a screening tool in clinical settings. Early identification of factors associated with frailty can contribute to more effective interventions aimed at maintaining independence in this population.

## REFERENCES

1. World Health Organization. Decade of Healthy Ageing: Baseline Report 2020. Geneva: WHO; 2020. Available from: https://www.who.int
2. Instituto Brasileiro de Geografia e Estatística (IBGE). Síntese de Indicadores Sociais: Uma Análise das Condições de Vida da População Brasileira 2023. Rio de Janeiro: IBGE, 2023. Disponível em: https://www.ibge.gov.br
3. Fechine BRA, Trompieri N. O processo de envelhecimento: as principais alterações que acontecem com o idoso com o passar dos anos. Interscienceplace. Edição 20, volume 1, artigo no 7, Janeiro/Março 2012. doi: http://dx.doi.org/10.6020/1679-9844/2007
4. Morley JE, Vellas B, van Kan GA, Anker SD, Bauer JM, Bernabei R, et al. Frailty consensus: a call to action. J Am Med Dir Assoc. 2013 Jun;14(6):392-7. doi: 10.1016/j.jamda.2013.03.022. PMID: 23764209; PMCID: PMC4084863.
5. Binotto MA, Lenardt MH, Rodríguez-Martínez MC. Physical frailty and gait speed in community elderly: a systematic review. Rev Esc Enferm USP. 2018;52. doi: 10.1590/S1980-220X2017028703392.
6. Fukutomi E, Okumiya K, Wada T, Sakamoto R, Ishimoto Y, Kimura Y, Kasahara Y, Fujisawa M, Chen WL, Imai H, Matsubayashi K. Relationships between each category of 25-item frailty risk assessment (Kihon Checklist) and newly certified older adults under Long-Term Care Insurance: A 24-month follow-up study in a rural community in Japan. Geriatr Gerontol Int. 2015;15(7):864-871. doi: https://doi.org/10.1111/ggi.12360
7. Sewo Sampaio PY, Sampaio RAC, Yamada M, Ogita M, Arai H. Validation and translation of the Kihon Checklist (frailty index) into Brazilian Portuguese. Geriatr Gerontol Int. 2013;14(3):561-569. doi:10.1111/ggi.12134
8. Linck CL, Crossetti MGO. Fragilidade no idoso: o que vem sendo produzido pela enfermagem. Rev Gaúcha Enferm. 2011;32(2):385-93. doi: https://doi.org/10.1590/S1983-14472011000200024
9. Coelho CF, Burini RC. Atividade física para prevenção e tratamento das doenças crônicas não transmissíveis e da incapacidade funcional. Rev. Nutr., Campinas, 22(6):937-946, nov./dez., 2009. doi: https://doi.org/10.1590/S1415-52732009000600015
10. Barbosa SR, Mansut HR, Colugnati FAB. Impactos da Fragilidade sobre desfechos negativos em saúde de idosos brasileiros. Rev. bras. geriatr. gerontol. 2017;20(06). https://doi.org/10.1590/1981-22562017020.170069
11. Barbosa GC, Caparrol AJS, Melo BRS, Medeiros TJ, Ottaviani AC, Gratão ACM. Fatores correlacionados à fragilidade de idosos em atenção ambulatorial: diferença entre grupos etários. Esc. Anna. Nery 26 • 2022. doi: https://doi.org/10.1590/2177-9465-EAN-2021-0408pt
12. Cao L, Morley JE. Sarcopenia is recognized as an independent condition by an International Classification of Disease, Tenth Revision, Clinical Modification (ICD-10-CM) code. J Am Med Dir Assoc. 2016;17(8):675-7. doi: 10.1016/j.jamda.2016.06.001.
13. Kyle UG, Bosaeus I, De Lorenzo AD, Deurenberg P, Elia M, Gómez JM, Heitmann BL, Kent-Smith L, Melchior JC, Pirlich M, Scharfetter H, Schols AM, Pichard C. Bioelectrical impedance analysis—part I: review of principles and methods. Clin Nutr. 2004;23(5):1226-43. doi: 10.1016/j.clnu.2004.06.004.
14. Cruz-Jentoft AJ, Baeyens JP, Bauer JM, Boirie Y, Cederholm T, Landi F, Martin FC, Michel JP, Rolland Y, Schneider SM, Topinková E, Vandewoude M, Zamboni M; European Working Group on Sarcopenia in Older People. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. Age Ageing. 2010 Jul;39(4):412-23. doi: 10.1093/ageing/afq034. Epub 2010 Apr 13.
15. Bohannon RW. Grip strength: an indispensable biomarker for older adults. Clin Interv Aging. 2019;14:1681-91. doi: 10.2147/CIA.S194543.
16. Middleton A, Fritz SL, Lusardi M. Walking speed: the functional vital sign. J Aging Phys Act. 2015;23(2):314-22. doi: 10.1123/japa.2013-0236.
17. Leandro LA, Teive HAG. Fatores associados ao desempenho funcional de idosos portadores da Doença de Parkinson. Kairós-Gerontologia. 2017;20(2):161-78. Disponível em: https://revistas.pucsp.br/index.php/kairos/article/view/2176-901X.2017v20i2p161-178. doi: https://doi.org/10.23925/2176-901X.2017v20i2p161-178
18. Nascimento PPP, Batistoni SST. Depressão e fragilidade na velhice: uma revisão narrativa das publicações de 2008-2018.

Interface (Botucatu). 2019;23. doi: https://doi.org/10.1590/Interface.180609
19. Souto JF, Ribeiro PCC, Souza LF. Atividades avançadas de vida diária: Revisão de uma medida da capacidade funcional do idoso. Rev Kairós - Gerontologia. 2017;20(3):407-425. doi: http://dx.doi.org/10.23925/2176-901X.2017v20i3p407-425
20. Leme DEC, Thomaz RP, Borim FSA, Brenelli SL, de Oliveira DV, Fattori A. Estudo do impacto da fragilidade, multimorbidade e incapacidade funcional na sobrevida de idosos ambulatoriais. Ciênc. saúde colet. 2019;24(1). doi: https://doi.org/10.1590/1413-81232018241.04952017
21. Melo RB, Barbosa LC, Souza TM, Bastos RS. Edentulismo e fragilidade em pessoas idosas domiciliadas: um estudo transversal. Rev. Bras. Geriatr. Gerontol. 2023;26. doi: https://doi.org/10.1590/1981-22562023026.230165.pt
22. Bastos R da S, Sá LM, Velasco SRM, Teixeira DF, Paino LS, Vettore MV. Frailty and oral health-related quality of life in community-dwelling older adults: a cross-sectional study. Brazilian Oral Research. 2021. Available from: doi: https://doi.org/10.1590/1807-3107bor-2021.vol35.0139
23. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, Schneider SM, et al. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019;48(1):16-31. doi: 10.1093/ageing/afy169. PMID: 30312372; PMCID: PMC6322506.
24. Tribess S, Junior JSV, Oliveira SJ. Atividade física como preditor da ausência de fragilidade em idosos. Rev Assoc Med Bras. 2012;58(3):372-7. doi: https://doi.org/10.1590/S0104-42302012000300015
25. Virtuoso JF, Streit IA, Claudino R, Mazo GZ. Indicadores de fragilidade e nível de atividade física de idosos. ConScientiae Saúde. 2015;14(1):99-106. doi:10.5585/ConsSaude.v14n1.4934
26. Sousa RL de, Betiolli SE, Lenardt MH, Hammerschmidt KS de A, Barbiero MMA, Falcão AS. Relação entre força de preensão manual, funcionalidade e fragilidade física em pessoas idosas: Revisão integrativa. REME Rev Min Enferm. 2022;26. Disponível em: https://periodicos.ufmg.br/index.php/reme/article/view/41231 doi: https://doi.org/10.35699/reme.v26i.41231
27. Hausen L, Fuhr JC, Ramos MEK, Siqueira LO. Força de pés e mãos e a relação da independência em idosos. Rev. Fac. Ciênc. Méd. Sorocaba. 2023;24(1/4):121-34. Disponível em: https://revistas.pucsp.br/index.php/RFCMS/article/view/62016 doi: https://doi.org/10.23925/1984-4840.2022v24i1/4a2
28. Diz JBM, Queiroz BZ, Tavares LB, Pereira LSM. Prevalência de sarcopenia em idosos: resultados de estudos transversais amplos em diferentes países. Rev. BRas. GeRiatR. GeRontol. 2015;18(3):665-67. doi: https://doi.org/10.1590/1809-9823.2015.14139
29. Pillat AP, Patias RS, Berlezi EM, Schneider RH. Quais fatores estão associados à sarcopenia e à fragilidade em idosos residentes na comunidade? Rev. Bras. Geriatr. Gerontol. 2018;21(6):781-792. doi: http://dx.doi.org/10.1590/1981-22562018021.180165
30. Silva GL da S, Magalhães EQ de, Silva EC da, Ladislau RS, Silva FGC da, Oliveira ABT de, et al. Analysis of the consequences that Polypharmacy causes in patients with chronic diseases: a literature review. RSD. 2022;11(12). doi: https://doi.org/10.33448/rsd-v11i12.34065

**Observação:** os/(as) autores/(as) declaram não existir conflitos de interesses de qualquer natureza.

**Table 1.** Characteristics of the study participants.

| Variables | Total (n=53) | Robust (n=19) | Frail (n=34) | P |
|---|---|---|---|---|
| **Age (years)** | 68 (62.5–73) | 69 (62–72) | 67.5 (62.7–73.2) | 0.745 |
| **Education** | | | | 0.146 |
| 4 years (elementary school) | 17 (32.1) | 5 (26.3) | 12 (35.3) | |
| 5 to 8 years (junior high school) | 10 (18.9) | 6 (31.6) | 4 (11.8) | |
| 9 to 12 years (high school) | 12 (22.6) | 4 (21.1) | 8 (23.5) | |
| Technical school | 2 (3.8) | 2 (10.5) | -- | |
| University | 3 (5.7) | -- | 3 (8.8) | |
| No formal education | 9 (17.0) | 2 (10.5) | 7 (20.6) | |
| **Physical activity (min/week)** | 0 (0–180) | 240 (120–300) | 0 (0–40) | <0.001 |
| **Medications (quantity)** | 5 (2.2–6) | 3.5 (2.7–6) | 5 (2–6) | 0.482 |
| **%BF** | 42.8 ± 8.5 | 43.0 ± 10.7 | 42.7 ± 7.2 | 0.880 |
| **AMMI (kg/m$^2$)** | 7.0 (6.6–7.8) | 7.0 (6.6–8.4) | 7.1 (6.5–7.7) | 0.553 |
| **HGS (kg)** | 21.5 ± 4.5 | 23.8 ± 4.6 | 20.2 ± 3.9 | 0.005 |
| **GS(m/s)** | 0.8 ± 0.2 | 1.0 ± 0.3 | 0.7 ± 0.2 | <0.001 |
| **SARC-F** | 3 (1–5) | 1 (0–3) | 3.5 (2–5) | 0.001 |
| **Morbidities (yes)** | | | | |
| Diabetes | 18 (34) | 7 (36.8) | 11 (32.4) | 0.741 |

| | | | | |
|---|---|---|---|---|
| Stroke | 6 (11.3) | 4 (21.1) | 2 (5.9) | 0.172 |
| Heart disease | 19 (35.8) | 6 (31.6) | 13 (38.2) | 0.628 |
| Hypertension | 34 (64.2) | 14 (73.7) | 20 (58.8) | 0.279 |
| Arthritis/Arthrosis | 31 (58.5) | 11 (57.9) | 20 (58.8) | 0.948 |
| Depression | 15 (28.3) | 6 (31.6) | 9 (26.5) | 0.692 |

Values are mean ± standard deviation, median (25%-75%) and frequency (%). AMMI: Appendicular muscle mass index; HGS: Handgrip strength; GS: Gait speed; SARC-F: Questionnaire *strength, assistance with walking, rise from a chair, climb stairs, and falls*.

**Table 4.** Partial correlation matrix, controlled by age.

| Variables | KCL | Medications | %BF | AMMI | Physical activity | HGS | GS | SARC-F |
|---|---|---|---|---|---|---|---|---|
| **KCL** | 1 | - | - | - | - | - | - | - |
| **Medications** | 0.016 | 1 | - | - | - | - | - | - |
| **%BF** | -0.169 | 0.320 | 1 | - | - | - | - | - |
| **AMMI** | -0.304* | 0.081 | 0.298* | 1 | - | - | - | - |
| **Physical activity** | -0.424* | -0.062 | -0.003 | 0.164 | 1 | - | - | - |
| **HGS (kg)** | -0.286* | -0.127 | -0.114 | 0.084 | 0.268 | 1 | - | - |
| **GS (m/s)** | -0.439*** | -0.084 | -0.159 | 0.021 | 0.262 | 0.395* | 1 | - |
| **SARC-F** | 0.416* | 0.241 | 0.388* | 0.008 | -0.225 | -0.316* | -0.428* | 1 |

Values are correlation coefficients (r). *p<0.05; ***p<0.001. The analysis was controlled by “age”. KCL: Kihon Checklist; AMMI: Appendicular muscle mass index; %BF: Body fat percentage; HGS: handgrip strength; GS: Gait speed; SARC-F: Questionnaire *strength, assistance with walking, rise from a chair, climb stairs, and falls*.