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**WHICH TESTS RECOMMENDED BY THE EWGSOP2 ALGORITHM HAVE BEST
ACCURACY TO TRACK LOW MUSCLE QUANTITY IN THE DIAGNOSIS OF
SARCOPENIA IN COMMUNITY-DWELLING OLDER WOMEN?**

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Trabalho apresentado ao curso de graduação em Fisioterapia, do Centro de Ciências da Saúde da Universidade Federal de Santa Catarina, em forma de artigo, como requisito da disciplina de Trabalho de Conclusão de Curso II.

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DEDICATÓRIA

Dedico este trabalho à minha família, e à minha orientadora, que tanto me apoiaram e me incentivaram na escrita.

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ABSTRACT

Background: Although the European Working Group on Sarcopenia in Older People 2 (EWGSOP2) recommends the use of different functional tests for the diagnosis of sarcopenia, it still remains a gap about which tests can best track for reduced appendicular lean mass (ALM) in older adults, especially women.

Objective: To determine which tests recommended by the EWGSOP2 have the best accuracy in tracking reduced ALM in the diagnosis of sarcopenia in community-dwelling older women.

Methods: A cross-sectional study with 161 community-dwelling older Brazilian women (≥ 65 years). The outcome was ALM assessed by Dual-Energy X-ray absorptiometry. The independent variables were the tests recommended by the EWGSOP2: 5-Times Sit-to-Stand Test (5XSST), Handgrip Strength (HGS), Gait Speed (GS), Short Physical Performance Battery (SPPB), and Timed Up and Go (TUG). The analysis was performed using the Receiver Operating Characteristic Curves to assess which tests have the best accuracy in tracking reduced ALM.

Results: The HGS [≤ 19.7 kgf, area under the curve (AUC): 0.81, 95% confidence interval (CI): 0.74; 0.87] and the TUG [> 12.4 s, (AUC): 0.63, 95% CI: 0.55; 0.70] showed a statistically significant ability to track reduced ALM in community-dwelling older women. There was no significant ability to track the reduction in ALM with the 5XSST, GS, and SPPB tests.

Conclusion: HGS and TUG have significant accuracy in tracking reduced ALM in community-dwelling older women. The cutoff points differed from those suggested by EWGSOP2.

Keywords: Sarcopenia; aging; diagnosis; muscle mass; EWGSOP2.

SUMÁRIO

1	BACKGROUND.....	6
2	METHODS.....	7
2.1	STUDY DESIGN.....	7
2.1.1	Eligibility criteria	7
2.2	PROCEDURES.....	7
2.3	INSTRUMENTS.....	8
2.3.1	Outcome	8
2.3.2	Independent variables.....	8
2.4	STATISTICAL ANALYSIS.....	9
3	RESULTS.....	9
4	DISCUSSION.....	11
5	CONCLUSION.....	13
	REFERENCES	14
	ANEXO A – Aprovação Comitê de Ética em Pesquisa (CEP)	17
	ANEXO B – Normas da Revista European Geriatric Medicine	23

1 BACKGROUND

Sarcopenia is a disease (ICD-10-MC) diagnosed by a reduction in the quality and/or quantity of muscle mass (MM), which occurs due to gradual and generalized muscle changes [1]. This condition is associated with an increased risk of falls [2], dependence, institutionalization [3], disability [4] and mortality [5]. It is a prevalent disease in the older adults, especially in women [6]. Recent estimates suggest that the overall prevalence can range from 10.0% [7] to 82.1% [8,9].

The divergence in the prevalence of sarcopenia may occur due to the diagnostic criteria used, since different instruments are recommended by the algorithm proposed by the European Working Group on Sarcopenia in Older People 2 (EWGSOP2) [8,10]. Previous studies have found differences in the prevalence of sarcopenia according to the test used to diagnose probable and confirmed sarcopenia, according to the algorithm proposed by the EWGSOP2 ([1,11,12].

Recently, Anand et al. (2022) identified differences in the prevalence of sarcopenia and poor agreement between diagnostic tests in Asian adults. Similar results were observed by our research group in older Brazilian women. There were variations in the prevalence and classification of sarcopenic older women depending on the instruments used, in addition to low agreement between the tests proposed by the EWGSOP2 [8].

Although the available literature shows a difference in prevalence according to the diagnostic instrument used, it is not known which test proposed would be able to track a reduction in appendicular lean mass (ALM) in the older population. Of note, once socioeconomic, cultural, and anthropometric issues can impact the results, it is crucial to evaluate and establish cutoff points for older Brazilian adults. Identifying the best screening test will help healthcare professionals choose the best instrument for diagnosing the condition faster and easier. In this context, the objective of the present study was to determine which tests recommended by the EWGSOP2 algorithm have the best accuracy in tracking reduced ALM in the diagnosis of sarcopenia in community-dwelling older women.

2 METHODS

2.1 STUDY DESIGN

This was a cross-sectional study carried out with community-dwelling older women which was approved by the Research Ethics Committee of the Federal University of the Valleys of Jequitinhonha e Mucuri (UFVJM), Diamantina, Minas Gerais, Brazil, n° 1.461.306.

2.1.1 Eligibility criteria

Older women (≥ 65 years) residing in the community able to walk independently were included. The exclusion criteria were: a) cognitive decline detectable by the Mini-Mental State Examination, considering the Brazilian cutoff points related to schooling [13]; b) neurological sequelae; c) hospitalization in the last three months; d) fractures in the lower limbs for less than six months; e) musculoskeletal, respiratory, cardiovascular, and thyroid diseases or other inflammatory diseases in the acute phase; f) active neoplasms in the last five years; g) individuals in palliative care; h) using anti-inflammatory drugs or drugs acting on the immune system; i) practitioners of physical activities on a regular basis; j) severe visual and/or hearing impairments.

2.2 PROCEDURES

Data were collected between June 2016 and June 2017, in the morning, at the Exercise Physiology Laboratory (LAFIEX) of the UFVJM. The older women were selected for convenience and recruited through calls, invitations, and announcements in public places and health care, such as home visits, Basic Health Units, and geriatric and gerontological offices. To characterize the sample, the older women were asked about the use of medication, history of falls in the last six months, and physical activity. After assessing eligibility, the participants signed an informed consent form, and a visit to the laboratory was scheduled to carry out the ALM assessment and diagnostic tests for sarcopenia [14].

ALM assessment was performed using Dual-energy X-ray absorptiometry (DXA) by trained professionals. There was masking between the assessors of the ALM and the functional tests. The sequence of execution of the functional tests was determined by drawing

lots. Initially, the older women performed the anthropometric assessment (weight and height) and then the ALM assessment in fasting. Subsequently, the tests proposed by the EWGSOP2 algorithm were performed: 5-Times Sit-to-Stand Test (5XSST), Handgrip Strength (HGS), Gait Speed (GS), Short Physical Performance Battery (SPPB), and Timed Up and Go test (TUG).

2.3 INSTRUMENTS

2.3.1 Outcome

The study outcome was Appendicular Lean Mass (ALM). For its evaluation, the participants were instructed to be fasting, wearing light clothes and not using metallic objects. Initially, body mass and height were measured using an analog scale (Welmy, model 110, precision of 0.1 kg) with an attached stadiometer (accuracy of 0.5 cm). Then, participants were positioned in the DXA scanning area so that the sagittal line passed through the center of anatomical points such as the skull, spine, pelvis and legs. For optimal positioning, Velcro straps joined the legs, both at the knee and at the forefoot. Data related to lean and fat muscle mass (MM) were collected to obtain the ALM. Participants were categorized as sarcopenic when ALM was less than 15 kg [1,14].

2.3.2 Independent variables

The independent variables of this study were the tests recommended by the EWGSOP2 for screening (5XSST and HGS) and establishing the severity (GS, SPPB and TUG) of sarcopenia.

- 5-Times Sit-to-stand Test (5XSST): The time spent by the participant to sit and stand up from the chair five times, as fast as possible, with the upper limbs crossed in front of the chest was timed [15].
- Hand Grip Strength (HGS): The participants performed an isometric contraction applied on the Jamar® dynamometer handle, in a seated position, with shoulders and wrists in a neutral position and elbow in 90 degrees of flexion. The measurement was obtained in kilogram-force (kgf). Three HGS assessments were performed with the dominant hand and the mean of these measurements was used in the analyses.

- Gait Speed (GS): Participants were asked to walk from a static position for four meters at a comfortable/habitual pace. Timing started with the first movement of the foot after the starting line and ended when the foot completely crossed the finish line [16]. The GS (m/s) was calculated by dividing the distance covered (4m) by the time taken to perform the test.
- Short Physical Performance Battery (SPPB): The SPPB is a battery of tests used to assess the functionality of the lower limbs in the older adults. It consists of three tests that indirectly assess muscle strength, static body balance and GS. For each of the tests, scores from 0 to 4 points, with a final maximum score of 12 points. The higher the score, the better the performance [17,18].
- Timed Up and Go (TUG): The time taken by the participant to get up from a chair, walk three meters, pivot around an obstacle, return and sit down again was recorded [19].

2.4 STATISTICAL ANALYSIS

Data were analyzed using the SPSS statistical program (IBM®, Chicago, IL, USA), version 23.0. The confidence level adopted was 5%. Descriptive analyzes were performed, presenting the proportions (%) with their respective 95% confidence intervals (95% CI). Receiver Operating Characteristic (ROC) Curves were used to assess sensitivity, specificity, and likelihood ratio for a positive test (+LR) and negative test (-LR) to track reduced ALM.

3 RESULTS

The study sample consisted of 161 older women, with a mean age of 74.4 (\pm 7.3) years. Regarding anthropometric measurements, the mean weight was 61.0 (\pm 10.9) kg and the mean height was 1.5 (\pm 0.05) m. In addition, 21.7% of the older women had a history of falls in the last 6 months and 81.4% were physically inactive (i.e, they practiced physical exercises less than three times a week).

Among the tests suggested by EWGOSP2 for screening for sarcopenia, HGS values \leq 19.7 kgf demonstrated better significant accuracy in tracking reduced ALM in older women (area under the curve (AUC): 0.81, 95% CI: 0.74; 0.87) (Table 1 and Figure 1a); sensitivity: 67.4% (95% CI: 56.8; 76.8); specificity: 83.1% (95% CI: 71.7; 91.2); +LR: 3.98 (95% CI: 2.30; 7.00); -LR: 0.39 (95% CI: 0.30; 0.50); Youden J statistic: 0.50 (95% CI: 0.36; 0.59) (Table 1). The 5XSST was not significantly accurate in tracking reduced ALM (AUC: 0.59, 95% CI: 0.50; 0.67).

Regarding the tests to establish the severity of sarcopenia, times > 12.4 s on the TUG demonstrated significant accuracy in tracking reduced ALM in older women (AUC: 0.63, 95% CI: 0.55; 0.70) (Table 1 and Figure 1b); sensitivity: 42.4% (95% CI: 32.1; 53.1); specificity: 76.9% (95% CI: 64.8; 86.5); +LR: 1.84 (95% CI: 1.10; 3.00); -LR: 0.75 (95% CI: 0.60; 0.90); Youden J statistic: 0.19 (95% CI: 0.11; 0.25) (Table 1). There was no significant ability in tracking reduced ALM with the GS (AUC: 0.59, 95% CI: 0.50; 0.67) and SPPB (AUC: 0.59, 95% CI: 0.50; 0.66) tests.

Table 1 - Analysis of the area under the ROC curve and cutoff points in tracking reduced appendicular muscle mass in community-dwelling older women.

Outcomes	Cutoff	AUC	Sensitivity (%)	Specificity (%)	+LR	-LR	Youden J statistic
HGS (kgf)	≤ 19.7	0.81	67.4	83.1	3.98	0.39	0.50
		[0.74-0.87]*	[56.8-76.8]	[71.7-91.2]	[2.30-7.00]	[0.30-0.50]	[0.36-0.59]
TUG (s)	> 12.4	0.63	42.4	76.9	1.84	0.75	0.19
		[0.55-0.70]*	[32.1-53.1]	[64.8-86.5]	[1.10-3.00]	[0.60-0.90]	[0.11-0.25]

* Significant value $p < 0.05$; ROC: Receiver Operating Characteristic Curves; AUC: area under the ROC curve; +LR: likelihood ratio for a positive test; -LR: likelihood ratio for a negative test; HGS: Handgrip Strength; TUG: Timed Up and Go.

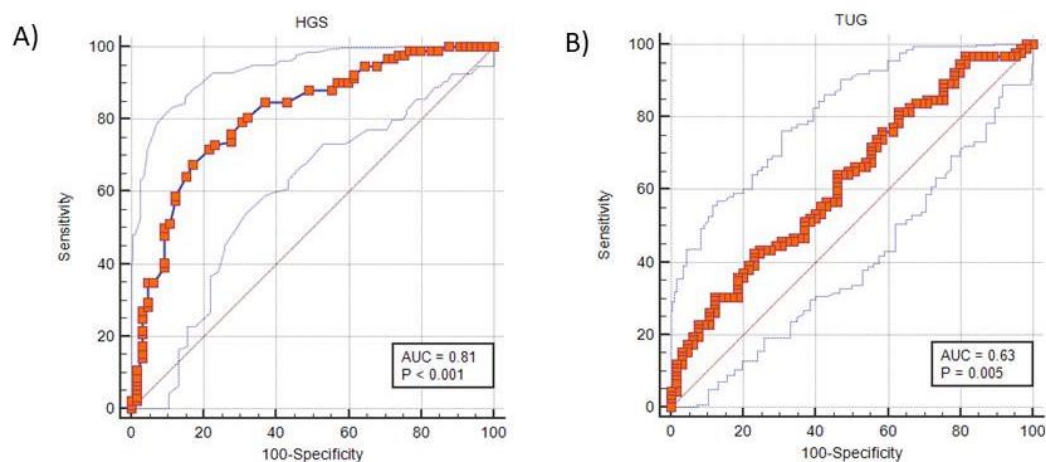


Fig. 1 - ROC curves and area under the ROC curves to track reduced appendicular muscle mass in community-dwelling older women: (a) Handgrip Strength and (b) Timed Up and Go test.

4 DISCUSSION

The objective of the present study was to identify which tests recommended by the EWGSOP2 algorithm have the best accuracy in tracking reduced ALM in community-dwelling older women. Our results evidenced that HGS and TUG have the best accuracy in tracking reduced ALM in community-dwelling older Brazilian women according to the EWGSOP2 algorithm.

Corroborating our findings, a recent study conducted with hospitalized older adults showed that HGS can be used as a diagnostic tool for sarcopenia. [20]. These authors found a cutoff point of 18 kgf for French older women, with an AUC of 0.72 (95% CI: 0.59–0.85), a sensitivity of 92.9%, and a specificity of 52.1% [20]. A study conducted by Confortin et al. (2017) also evidenced that HGS is a good indicator of total muscle strength and, consequently, a good predictor of sarcopenia. These authors found a cutoff value of 18.5 kgf for older women from Santa Catarina, which is close to that found in our study, with an AUC of 0.64 (95% CI: 0.59-0.69), a sensitivity of 60.6%, and a specificity of 60.3% [21]. Fernandes et al. (2021) found a cutoff value of 16 kgf for older women from the Brazilian Northeast, a lower value than that found in our study. According to the authors, this lower value compared to studies from other regions of the country may be related to the sociodemographic characteristics of the female population in the Northeast, which has greater exposure to violence, discrimination, and gender inequality, which may lead to a significant impact on their performance when using HGS [22].

The cutoff point identified for HGS in the present study was higher (≤ 19.7 kgf) compared to that recommended by the EWGSOP2 for women (< 16 kgf) [1]. A possible explanation for this finding could be the ethnic, anthropometric, lifestyle, and cultural differences between Brazilian and European women [23]. Corroborating this argument, Bahat et al. (2020) identified a cutoff of < 20 kgf to detect probable sarcopenia in Turkish older women. These authors also observed that the use of a cutoff point similar to that suggested for the British population could result in the underdiagnosis of probable sarcopenia in 25.3% of the sample [24].

Among the tests proposed by the EWGSOP2 to classify the severity of sarcopenia, only the TUG demonstrated the ability to track a reduction in ALM. In our study, AUC for the TUG was 0.63 (95% CI: 0.55; 0.70). In line with this result, previous studies have also demonstrated that TUG is a good predictor of sarcopenia, as it is significantly associated with

muscle mass [25,26]. Furthermore, the balance ability measured in this test is of great importance in the diagnosis of sarcopenia [26]. A study conducted by Martinez et al. (2015) with hospitalized older Brazilians of both sexes found an AUC of 0.80 (95% CI: 0.66-0.94), which indicates a good accuracy for predicting sarcopenia. A higher AUC found in their study can be due to the sample characteristics since the authors predicted sarcopenia in hospitalized older adults [27].

The cutoff point for TUG found in our analysis was much lower (> 12.4 s) when compared to that recommended by the EWGSOP2 (≥ 20 s) [1]. Again, this divergence can be attributed to the different characteristics between the Brazilian and European populations. In addition, in consonance with our findings, Filippin et al. (2017) observed that the TUG could track sarcopenia in older Brazilians. However, the cutoff point found by these authors also differed from the present study, being 7.5 s. This finding may be related to the differences in the profile of the samples between the studies in terms of physical-functional, cultural, and social characteristics. In our study, only female participants from a municipality in the Southeast region of Brazil were evaluated, while in the study by Filippin et al. (2017), the sample consisted of older adults of both sexes from a municipality in the southern region of the country [28].

Our study contributes to clinical practice and public health policies, by identifying the instrument with the best accuracy to track the reduction of ALM, which can help in the generation of more reliable epidemiological data and, consequently, better allocation of financial and human resources. However, our findings should be considered with caution due to some limitations. First, the sample was obtained by convenience. It is possible that the healthier older women accepted to participate in the research. Second, only women were included in this study. Therefore, sex-related differences could not be evaluated. Third, the cutoff point used to determine the reduction in the ALM was the one suggested by the EWGSOP2 algorithm (<15 kg) and not a specific cutoff point for older Brazilian women. However, there is no cutoff point for the Brazilian population. Finally, the cutoff points found in this study to classify older women as sarcopenic are specific to the Brazilian population in a low-income region and may not be nationally representative.

Based on our findings, researchers and health professionals should use the best screening method for the early identification of sarcopenia, which will consequently assist in the appropriate treatment of this disease. Additional studies on diagnostic tests for sarcopenia are needed, both to determine which test has the best accuracy in detecting reduced ALM

among older males, and to determine specific cutoffs representative of the Brazilian population.

5 CONCLUSION

HGS and TUG showed significant accuracy in tracking low muscle quantity in community-dwelling older women. If there is a need to apply a single functional test, since time is a crucial aspect in the evaluation, our results showed that HGS should be the chosen test, as it presented better accuracy evidenced by the greater area under the ROC curve. However, our cutoff points were different from those recommended by EWGSOP2.

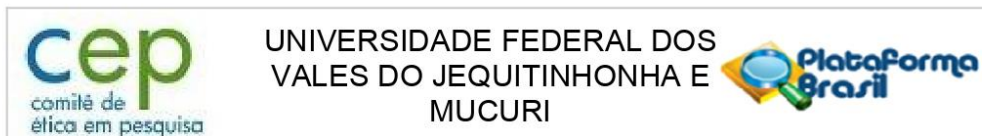
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ANEXO A – Aprovação Comitê de Ética em Pesquisa (CEP)



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: COMPARAÇÃO ENTRE OS NÍVEIS DE SARCOPENIA, FORÇA DA MUSCULATURA RESPIRATÓRIA, DENSIDADE MINERAL ÓSSEA E CITOCINAS INFLAMATÓRIAS EM IDOSAS COMUNITÁRIAS RESIDENTES EM DIAMANTINA

Pesquisador: Tamiris Campos Duarte

Área Temática:

Versão: 3

CAAE: 52982316.4.0000.5108

Instituição Proponente: Universidade Federal dos Vales do Jequitinhonha e Mucuri

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 1.461.306

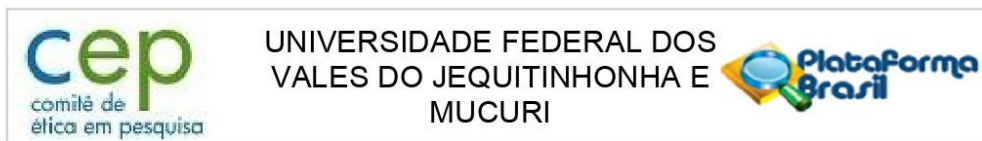
Apresentação do Projeto:

O Brasil, assim como em vários outros países, está passando por um acelerado período de envelhecimento demográfico, sendo evidenciada ainda a chamada “feminilização da velhice”. O processo de envelhecimento é complexo e é caracterizado por alterações indivíduo podendo acarretar em aumento do número de morbidades, quedas, hospitalizações e mortalidade. Uma alteração típica do envelhecimento é a chamada sarcopenia, caracterizada por perda da massa muscular, diminuição da força muscular e também da funcionalidade do indivíduo; sua avaliação pode ser realizada tanto do ponto de vista clínico, mais simples, através da realização de testes funcionais, quanto laboratorialmente, através dos exames de imagem. A sarcopenia pode estar ainda associada à diminuição da força da musculatura respiratória (FMR) o que, por sua vez,

pode acarretar em prejuízos na função pulmonar. O consenso europeu classifica idosos

em não sarcopênicos, pré-sarcopênicos, sarcopênicos e sarcopênicos graves de acordo com perdas de massa muscular, força muscular e funcionalidade. Ao envelhecimento tem sido atribuída também, uma redução da densidade mineral óssea, acarretando prejuízos à saúde do indivíduo. Sabe-se ainda, que no processo de envelhecimento pode ocorrer uma inflamação crônica de baixo grau, com aumento nas concentrações plasmáticas de algumas citocinas pró-inflamatórias, como a Interleucina 6 (IL-6) e o Fator de Necrose Tumoral alfa (TNF), mas não está claro até que ponto

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Continuação do Parecer: 1.461.306

esta inflamação poderia contribuir para o agravamento da sarcopenia e para o comprometimento da FMR. Como

não foram encontrados na literatura estudos que avaliassem e comparassem simultaneamente os níveis de sarcopenia, densidade mineral óssea, parâmetros pulmonares e inflamatórios; o objetivo do estudo será classificar e comparar os níveis de sarcopenia com a densidade mineral óssea, FMR e citocinas inflamatórias de idosas comunitárias residentes em Diamantina.

Objetivo da Pesquisa:

Objetivo Primário:

Avaliar os níveis de sarcopenia (não sarcopenica, pré-sarcopenica, sarcopenica e sarcopenica grave) e a densidade mineral óssea, força da musculatura respiratória e concentrações de citocinas inflamatórias em idosas comunitárias residentes em Diamantina.

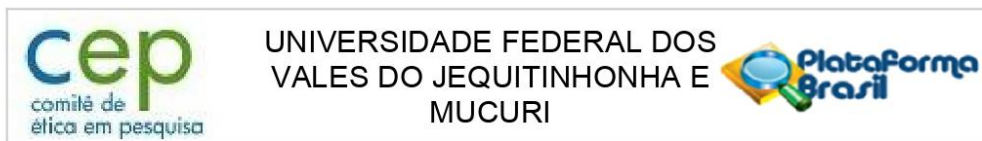
Objetivo Secundário:

Identificar e classificar a amostra quanto à sarcopenia de acordo com os critérios desenvolvidos por Cruz-Jentoft et al. (2010) em grupos de idosas, não sarcopênicas (grupo controle - NS), pré-sarcopênicas (grupo-PS), sarcopênicas (grupo - SA) e sarcopênicas graves (grupo - SG). Comparar idosas não sarcopênicas, pré-sarcopenicas, sarcopênicas e sarcopênicas graves quanto à densidade mineral óssea, força da musculatura respiratória e citocinas inflamatórias. Identificar condições clínicas específicas destas idosas, como presença de algumas comorbidades. Correlacionar às condições clínicas, funcionais com a força da musculatura respiratória e citocinas inflamatórias, em idosas comunitárias residentes em Diamantina.

Avaliação dos Riscos e Benefícios:

Riscos: Os riscos da pesquisa são mínimos, uma vez que toda a metodologia e testes utilizados são adequados para a população idosa, entretanto, haverá a supervisão direta de um profissional qualificado da área. Mesmo assim, há sempre o risco do participante sentir fadiga, dor muscular e ter equimose na região da coleta de sangue, embora tais ocorrências sejam raras. Para que não haja risco de constrangimento, o questionário será realizado de forma individual, na presença de apenas um examinador. Os testes serão realizados em ambiente adequado apenas com os pesquisadores envolvidos previamente treinados. A coleta de sangue será realizada em ambiente separado, por profissional qualificado e com o uso de material totalmente descartável. No caso de haver qualquer sintoma durante os testes, os mesmos serão interrompidos imediatamente e, se necessário, será acionado o serviço de emergência 192 (SAMU) ou 193 (Corpo de Bombeiros) e a voluntária será encaminhada para o serviço de urgência.

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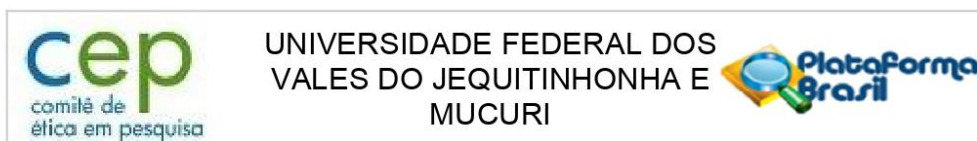
Benefícios: Os benefícios do estudo para as idosas serão o conhecimento das suas condições clínicas, funcionais, musculoesqueléticas e índices inflamatórios. Além disso, as voluntárias receberão orientações caso houver alguma alteração que

exija encaminhamento para serviço especializado. Os dados da pesquisa irão auxiliar aos profissionais da área da saúde, a diagnosticarem mais facilmente a sarcopenia, a realizarem orientação quanto às atividades e intervenções específicas e do desempenho funcional em idosas, assim como proporem políticas de saúde mais adequadas para este tipo de população.

Comentários e Considerações sobre a Pesquisa:

Metodologia Proposta: 152 idosas comunitárias serão recrutadas por meio de telefonemas, convites verbais e anúncios em locais públicos e de assistência (5 principais Unidades Básicas de Saúde de Diamantina). Será desenvolvido um questionário, constando de perguntas sobre a condição social e clínica das voluntárias. Além disso, será realizada a avaliação do estado cognitivo através do Mine Exame do Estado Mental como critério de exclusão. Este instrumento apresenta questões que avaliam cinco dimensões: concentração, linguagem/práxis, orientação, memória e atenção; tendo um escore máximo de 30 pontos. As voluntárias terão o peso e a estatura mensurados através de uma balança analógica com estadiômetro acoplado. O IMC será calculado onde será adotado a classificação da OMS (1998). Em seguida, a avaliação da composição corporal será realizada através do DXA (Lunar Radiation Corporation, Madison, Wisconsin, USA, modelo DPX). Para esta análise, as voluntárias serão posicionadas na área de escaneamento do equipamento, de modo que a linha sagital demarcada nessa área passe sob o centro de alguns pontos anatômicos (crânio, coluna vertebral, pélvis e pernas). Os sujeitos deverão usar roupas leves, sem o uso de qualquer objeto de metal que possa interferir nas medidas. Serão analisados os dados de massas muscular magra, gorda e a densidade mineral óssea. Para avaliar o risco de sarcopenia três testes serão realizados, velocidade da marcha (VM) de 4 metros, Teste de Força palmar (TFP) e o SPPB (Short Physical Performance Battery). No teste de VM, um percurso de 8 metros será demarcado por cones e as voluntárias deverão percorrer o trajeto em velocidade habitual, o registro do tempo será realizado desprezando os 2 metros iniciais e finais. O TFP será avaliado através do dinamômetro Jamar® que mensura a força de preensão palmar. Serão realizadas três medidas da mão dominante utilizando a média dessas medidas para análise. O SPPB é um teste de desempenho funcional que avalia a função de membros inferiores considerando o equilíbrio, a marcha, a força e a resistência, sendo utilizado para rastreamento de idosos em risco de desenvolver incapacidades futuras; composto pelos testes de: equilíbrio estático em pé; velocidade de marcha habitual; força muscular dos membros inferiores estimada

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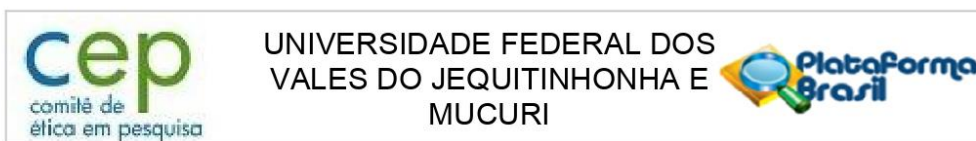
pelo teste de sentar e levantar de uma cadeira sem braços. A mobilidade do indivíduo idoso é comumente avaliada através da realização do Timed Up & Go (TUG), que consiste em pedir ao idoso para se levantar de uma cadeira com braços, andar um percurso demarcado no chão de três metros, retornar e assentar-se novamente. A força da musculatura respiratória será avaliada medindo-se a $PI_{máx}$ e a $PE_{máx}$ através do manovacuômetro. As voluntárias serão posicionadas sentadas, com os pés apoiados no chão, coluna ereta, sem apoio para os membros superiores e usando um clipe nasal. As manobras serão repetidas no máximo cinco vezes, com a coleta de três manobras aceitáveis e os esforços respiratórios máximos sustentados por, no mínimo, dois segundos. A ordem das medidas de $PI_{máx}$ e $PE_{máx}$ será aleatória e a maior medida será a selecionada para análise. As voluntárias serão submetidas à coleta sanguínea de 10ml na fossa antecubital do membro superior com material descartável em frascos vacutainers com heparina. A coleta dos dados ocorrerá no Laboratório de Fisiologia do exercício. Imediatamente após este procedimento, as amostras serão processadas no Laboratório de Inflamação e Metabolismo. Inicialmente, serão centrifugados a 3000rpm, por 10min. Amostras de plasma serão armazenadas e estocadas em freezer $-80^{\circ}C$ até a análise. O perfil inflamatório será avaliado pela mensuração das concentrações plasmáticas das citocinas pró-inflamatórias IL-6 e TNF-, e dos receptores solúveis sTNFR1 e sTNFR2 e da citocina anti-inflamatória IL-10, por meio da técnica imunoenzimática (ELISA). Metodologia de Análise de Dados: Para a caracterização da amostra será utilizada a análise descritiva com medidas de tendência central e dispersão, além das análises percentuais. Para verificação da normalidade

dos dados será utilizado o teste de Kolmogorov-Smirnov. As comparações entre os quatro grupos de idosas (NS, PS, SA, SG) em relação aos índices de citocinas pró-inflamatórias, velocidade de marcha, densidade mineral óssea e função respiratória serão realizadas por meio de ANOVA two way e post hoc no caso de encontrar diferenças. As associações serão avaliadas pelos testes de correlação de Pearson ou Spearman e uma análise multivariada será realizada para verificar o grau de associação e de dependência entre as variáveis estudadas. O nível de significância considerado será de 5%. Será utilizado o pacote estatístico SPSS v 19.0 para Windows.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados o Projeto de Pesquisa, a Folha de Rosto, o Cronograma (anexado à Plataforma Brasil), o TCLE e o termo de concordância dos setores com assinatura do responsável.

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Continuação do Parecer: 1.461.306

Recomendações:

- Segundo a Carta Circular nº. 003/2011/CONEP/CNS, de 21/03/11, há obrigatoriedade de rubrica em todas as páginas do TCLE pelo sujeito de pesquisa ou seu responsável e pelo pesquisador, que deverá também por sua assinatura na última página do referido termo.
- Relatório final deve ser apresentado ao CEP ao término do estudo em 01/06/2017. Considera-se como antiética a pesquisa descontinuada sem justificativa aceita pelo CEP que a aprovou.

Conclusões ou Pendências e Lista de Inadequações:

O projeto atende aos preceitos éticos para pesquisas envolvendo seres humanos preconizados na Resolução 466/12 CNS.

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_646652.pdf	15/03/2016 13:33:39		Aceito
Projeto Detalhado / Brochura Investigador	PROJETO_MESTRADO_FINAL_MODIFICADO_14_03_16.pdf	14/03/2016 13:18:51	Tamiris Campos Duarte	Aceito
Cronograma	Cronograma.pdf	14/03/2016 13:13:29	Tamiris Campos Duarte	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_rubricado.PDF	01/03/2016 12:53:44	Tamiris Campos Duarte	Aceito
Declaração de Instituição e Infraestrutura	carta_concordancia.PDF	29/02/2016 14:18:01	Tamiris Campos Duarte	Aceito
Outros	questionarios_testes_utilizados.pdf	26/02/2016 09:50:13	Tamiris Campos Duarte	Aceito
Folha de Rosto	Folhaderosto_Tamiris.PDF	03/02/2016 20:47:04	Tamiris Campos Duarte	Aceito

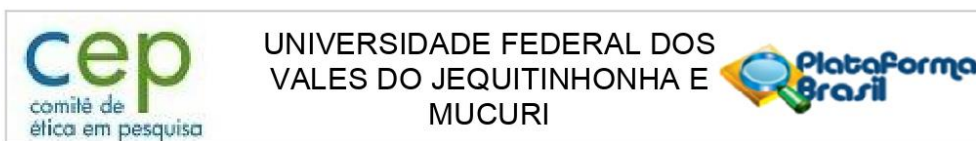
Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

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DIAMANTINA, 22 de Março de 2016

Assinado por:
Disney Oliver Sivieri Junior
(Coordenador)

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ANEXO B – Normas da Revista European Geriatric Medicine

Text

Text Formatting

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.
- Use the equation editor or MathType for equations.
- Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX. We recommend using [Springer Nature's LaTeX template](#).

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

References

Citation

Reference citations in the text should be identified by numbers in square brackets. Some examples:

1. Negotiation research spans many disciplines [3].
2. This result was later contradicted by Becker and Seligman [5].
3. This effect has been widely studied [1-3, 7].

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text.

The entries in the list should be numbered consecutively.

If available, please always include DOIs as full DOI links in your reference list (e.g. "<https://doi.org/abc>").

- Journal article
Smith JJ. The world of science. *Am J Sci.* 1999;36:234–5.
- Article by DOI
Slifka MK, Whitton JL. Clinical implications of dysregulated cytokine production. *J Mol Med.* 2000; <https://doi.org/10.1007/s001090000086>
- Book
Blenkinsopp A, Paxton P. *Symptoms in the pharmacy: a guide to the management of common illness.* 3rd ed. Oxford: Blackwell Science; 1998.
- Book chapter
Wyllie AH, Kerr JFR, Currie AR. Cell death: the significance of apoptosis. In: Bourne GH, Danielli JF, Jeon KW, editors. *International review of cytology.* London: Academic; 1980. pp. 251–306.
- Online document
Doe J. Title of subordinate document. In: *The dictionary of substances and their effects.* Royal Society of Chemistry. 1999. <http://www.rsc.org/dose/title of subordinate document>. Accessed 15 Jan 1999.

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations, see