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Brief Communication

"Chair Stand" Test as Predictor of Brazilian Elderly Men Fallers

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Abstract

AIM: The aim of this study was to investigate the association between fall and performance in the "chair stand" test; and evaluate this test as a predictor of community-dwelling Brazilian elderly men fallers.

MATERIAL AND METHODS: This was a study based on secondary data derived from a population-based epidemiological study involving 143 elderly men. The association between fall and performance in the "chair stand" test was tested with the Poisson regression technique (robust model adjusted by age). The discriminatory power of the "chair stand" test was determined by the ROC curve. In all analyses the level of significance adopted was 5% (α = 0.05). The data were analyzed in the IBM SPSS and MedCalc. The participants' age ranged from 60 to 105 years (73.4 ± 9.4 years). The time for performing the test ranged from 6 s to 31 s (13.2 ± 5.0 s) and 17.7% (n = 25) reported having suffered at least one fall in the last 12 months.

RESULTS: The Poisson multiple regression model (adjusted by age) showed that the spent time to perform the "chair stand" test was positively associated (PR = 1.08; CI95% = 1.02 - 1.14; P = 0.009) with the occurrence of fall in the last 12 months. The power of the "chair stand" test to discriminating the elderly who suffered fall may be visualized by means of the ROC curve parameters. The value of AUC indicates that the "chair stand" test was able to discriminate individuals who suffered and those who did not suffered fall. The cut-off point of 12 s was the one that best discriminated the occurrence of fall, presenting sensitivity = 68.4% and specificity = 60.0%.

CONCLUSIONS: The results indicated that the "chair stand" test was associated with fall and presented predictive potential for elderly men fallers.

Introduction

In the elderly, the history and recurrence fall may be favored by alterations in motor performance: weakness in the lower limbs, inefficient walking and/or deficient balance [1-3]. Therefore, it is believed that assessment of the muscle strength and endurance of lower limb, may be a feasible criterion for monitoring the risk of fall in the elderly. Motor performance tests may constitute powerful tools for falls monitoring, since they are easy to perform and interpret and do not require expensive devices [3]. Based on recent results that indicate the direct relationship between lower limbs weakness and fall risk and postural instability in the elderly [3, 4], the aim of this study was to investigate the association between fall and performance in the "chair stand" test; and to evaluate this test as a predictor of community-dwelling Brazilian elderly men fallers.

Material and Methods

This is a study, based on data derived from a cross-sectional, population-based household survey denominated "Nutritional status, risk behaviors and health conditions of the elderly at Lafaiete Coutinho-BA". Details about the study location, population and

data collection have previously been published [5].

Briefly, the study population consisted of all the men (n = 160) aged ≥ 60 years resident in the urban zone of the municipality. Of the 160 men who comprised the population of this study, 143 (89.4%) participated in the research: There were 7 refusals (4.4%) and 10 (6.2%) individuals were not located after 3 home visits, on alternate days, and were considered sample losses.

Of the 143 participants, were excluded from the analyzes two individuals who did not answer the question about fall and 17 who were considered unable to perform the test because it had one or more exclusion criteria described as follows: individuals who were unable to understanding the test instructions due to cognitive problems; those who couldn't walk or needed help to remain standing up, who had paralysis of a limb, who used a leg prosthesis or who could not keep their balance. Thus, the final sample consisted of 124 elderly men.

The survey complied with the Declaration of Helsinki and was approved by the Committee of Ethics in Surveys with Human Beings; participation in the study was voluntary and all subjects gave informed consent.

The occurrence of fall (dependent variable) was verified through of dichotomic response (yes or no) to the following question: "*Have you had any fall in the last 12 months?*". The "chair stand" test (independent variable) was used to assess lower-extremity function (leg strength and endurance). The detailed description of the procedures for performing the "chair stand" test have previously been published.[5] The following is a brief description: the participants were invited to cross their arms over the chest height and then stand up and sit down on the chair five times, as quickly as possible, while being timed in seconds (s). Individuals were considered apt to carry out the test when concluding it 60 s or less.

The association between fall and performance in the "chair stand" test was tested with the Poisson regression technique (robust model adjusted by age). The discriminatory power of the "chair stand" test was determined by the ROC curve. In all analyses the level of significance adopted was 5% (α = 0.05). The data were analyzed in the IBM SPSS and MedCalc.

Results

The participants' age ranged from 60 to 105 years (73.4 ± 9.4 years). The time for performing the test ranged from 6 s to 31 s (13.2 ± 5.0 s) and 17.7% (n = 25) reported having suffered at least one fall in the last 12 months.

The Poisson multiple regression model (adjusted by age) showed that the spent time to perform the "chair stand" test was positively associated (PR = 1.08; CI95% = 1.02 - 1.14; P = 0.009) with the occurrence of fall in the last 12 months.

The power of the "chair stand" test to discriminating the elderly who suffered fall may be visualized by means of the ROC curve parameters (Figure 1). The value of AUC indicates that the "chair stand" test was able to discriminate individuals who suffered and those who did not suffered fall. The cut-off point of 12 s was the one that best discriminated the occurrence of fall, presenting sensitivity = 68.4% and specificity = 60.0%.

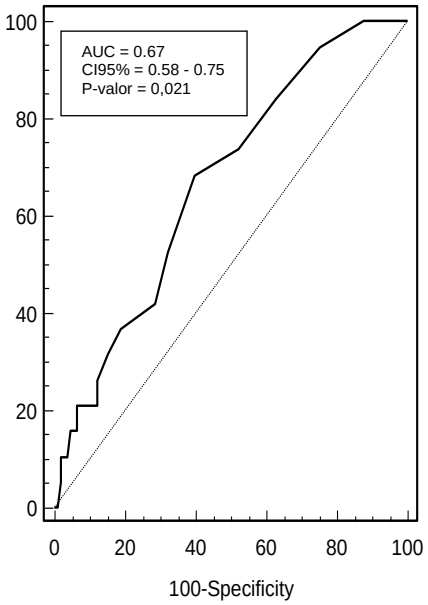

Figure 1: ROC Curve for the "chair stand" test as a predictor of elderly men fallers. Lafaiete Coutinho-BA, Brazil, 2011. AUC, area under the ROC curve; CI95%, confidence interval 95%.

Discussion

According to the results, the "chair stand" test presented predictive and discriminatory potential for fall in community-dwelling elderly men. These results are similar to those of a prospective study conducted with 362 community-dwelling Australian elderly. The authors[3] identified the cut-off point of 12 s (sensitivity = 66% and specificity = 55%) for the "chair stand" test as the best criterion for discriminating individuals who suffered multiple falls (2 or more) in a period of 12 months.

The attempt to identify a motor test with excellent diagnostic power has been proposed in other studies, and would be desirable for tracing and/or surveillance of fall in the elderly [1, 3]. As shown by these studies, it appears to be improbable that this objective will be achieved, since the outcome fall is an event with multifactorial origin [6].

The main objective of fall screening is to seek

some sign or symptom that may be indicative of the individual's propensity to suffering fall and/or suffer a fall in the near future [7]. Therefore, we argue that although it does not present excellent sensitivity and specificity, the "chair stand" test is a feasible alternative for fall screening in community-dwelling elderly. In addition to the discriminatory power observed in the present study (reasonable to good), the tests meets other postulated criteria for a good screening instrument: easy to apply, low cost and non-invasive [8].

In sum, the results of this study suggest that the "chair stand" test may be used by health professionals for fall screening in the elderly, in situations in which it is unfeasible to perform a broad clinical evaluation (e.g.: assessment in the home or in the community, or in large population groups).

References

1. Thomas JI, Lane JV. A pilot study to explore the predictive validity of 4 measures of falls risk in frail elderly patients. Arch Phys Med Rehabil. 2005;86:1636-1640.

2. Haber N, Erbas B, Hill KD, Wark JD. Relationship between age and measures of balance, strength and gait: linear and non-linear analyses. Clin Sci. 2008;114:719-727.

3. Tiedemann A, Shimada H, Sherrington C, Murray S, Lord S. The comparative ability of eight functional mobility tests for predicting falls in community-dwelling older people. Age Ageing. 2008;37:430-435.

4. Kang HG, Dingwell JB. Effects of walking speed, strength and range of motion on gait stability in healthy older adults. J Biomech. 2008;41:2899-2905.

5. Pinheiro PA, Passos TD'E-RO, Coqueiro RS, Fernandes MH, Barbosa AR. Motor performance of the elderly in northeast Brazil: differences with age and sex. Rev Esc Enferm USP. 2013;47:125-33.

6. Ambrose AF, Paul G, Hausdorff JM. Risk factors for falls among older adults: a review of the literature. Maturitas. 2013;75:51-61.

7. Lee J, Geller AI, Strasser DC. Analytical review: focus on fall screening assessments. PM R. 2013;5:609-621.

8. Rothman KJ, Greenland S, Lash TL. Modern Epidemiology. 6rd ed. Philadelphia: Lippincott Williams & Wilkins; 2008.