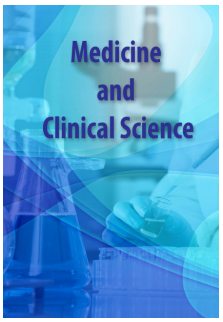
Medicine & Clinical Science

Review Article



Functional and balance assessment in older adults

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Abstract

Introduction: The aging process is characterized by several processes of change, which lead to a decrease in physiological and functional capacities. Functional fitness in the elderly is of great importance for carrying out activities of daily living, allowing the detection of limitations that result from the aging process and thus preventing and reducing the various functional declines.

Objective: To systematically review the existing scientific literature on what is the best way to assess functional fitness in the elderly. Method: Systematic review with search of all scientific articles, indexed in "PubMed", since January 2010.

Results: 323 articles were identified, of which only 8 were considered eligible for review. The studies analyzed showed some divergence in terms of the best way to assess functional capacity and balance. BESTest and the unstable board have been suggested as the best tests to measure balance.

Conclusions: The assessment of balance is more adequately assessed by tests on a board and the fragility is better assessed by tests such as Timed Up and Go. The characteristics and individuality of the populations concerned must be the primary factor in determining which assessment to apply.

Introduction

In recent years the number of elderly people in Portugal has been increasing. In 1961 the aging rate was 27.5% and in 2018 it was 157.4%. With the rise in the rate of aging, there is also a rise in concern for this population and the problems that the aging process entails. Aging is characterized by several processes of change, in the life of the human being, changes that lead to the increasing loss of physiological integrity, thus increasingly compromising functional capacities [1].

Physical and functional evaluation in the elderly is thus of great importance for the performance of daily life activities, in an autonomous and pleasurable way. In turn, the aging process is conditioned by healthy lifestyle habits, especially good nutrition, and regular physical activity. Old participants who comply with the recommendations of physical activity present better results in the battery of functional fitness tests [2].

The evaluation of physical fitness and functional capacity allows detecting limitations that result from the aging process and thus preventing and reducing the various functional declines, enabling improvements in functional fitness and quality of life of the elderly. Through these evaluations, it is possible to observe the components of physical and functional evaluation (strength, aerobic capacity, flexibility, agility, balance), involved in the various day-to-day activities [3].

There are several tests that can be used to assess balance deficits, allowing early identification of elderly people with decreased balance capacity, to allow the implementation of interventions to prevent falls [4].

Different test batteries have been used to assess physical fitness and functional capacity in the elderly, however, no recommendations or guidelines have been found as a first approach, some of which are more effective and easier to apply. Baptista & Sardinha [5] advocate the integration of physical fitness assessment tests such as Fullerton Battery [3] for the elderly, given the simplicity in its application, with fewer requirements in terms of equipment and especially for the relevant information it provides.

Therefore, the aim of this rapid systematic review is to analyze the published scientific literature on how best to perform functional assessment and balance in the elderly.

Methods

The data come from a rapid systematic review conducted at Pubmed between 2010 and 2020, using as keywords the terms "older adults", "senior", "old age", "elderly", "functional", "balance", "fitness", "evaluation", "assessment", "test", "measurement". The

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research strategy had as a guiding question: "What is the best way to assess physical and functional capacity in the elderly?".

Figure I show the process used to track and select the review articles. In the bibliographic survey, 323 potentially eligible articles were initially identified, written in English and Portuguese, which were submitted to a sequence of selection criteria, with consideration of 8 articles for study. The selection criteria were temporal stratification less than 10 years, response to the initial question and characteristics of the sample, namely, elderly subjects.

The analysis of the methodological quality of the studies, referred to in Table I, evaluated by the parameters listed in the Quality Assessment Tool For Observational and Controlled Intervention Studies of the Effective Public Health Practice Project (Tools for evaluating the quality of the study | NHLBI, NIH, no date).

The research, selection of articles, extraction of data and analysis of the quality of the studies was done by two independent researchers and that, whenever verified conflicts were resolved by a third investigator.

Results

According to Table I, the articles included in the review are relatively recent, with more than half published less than 5 years ago, with a predominance of observational and moderate-quality studies. Among the evaluation tests used, we have a predominance of tests such as the Timed Up and Go test and the unstable board test, referred to in four and three articles, respectively.

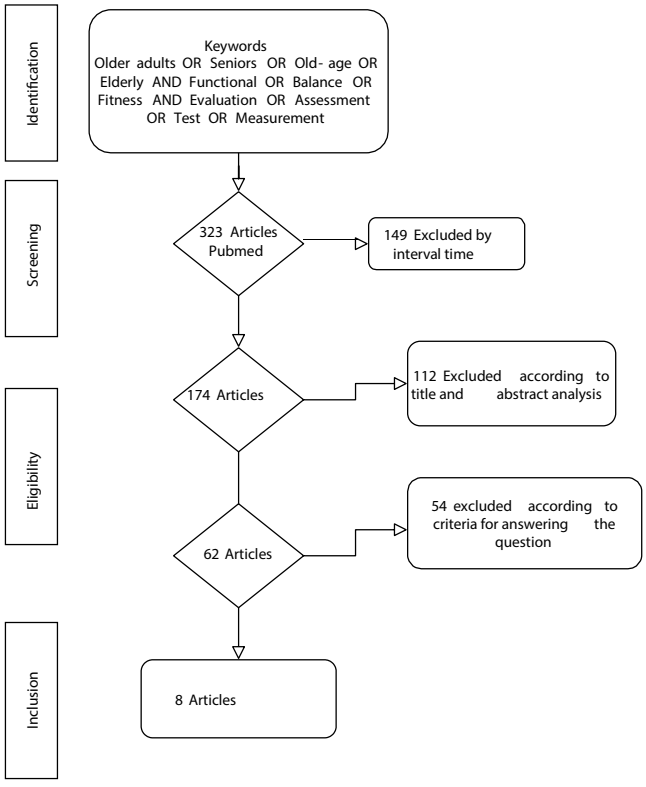

Figure 1.

Among the tests and questionnaires evaluated, we have the most used as performance tests to identify fragile individuals are the Timed Up and Go tests, gait speed and battery of short physical performance tests [6].

The tests on the platform showed moderate to good validity when compared to the Berg balance scale in the elderly [7]. But when compared to the Balance Stability System, the Berg balance scale demonstrated greater capacity and efficacy to identify the risk of fall [8].

The unstable board also proved to be the most effective in assessing the dynamic balance between healthy, independent, and community-resident elderly in an observational study to investigate the relationship between dynamic balance measurements obtained with a new unstable platform and the measures that currently exist.

When it is consistent to balance, BESTest seems to be more appropriate than a force platform to assess the impairment of postural control and discriminate balance performance in the elderly, providing different components of postural control [9]. All balance tests have similar reliability, reproducibility, and validity. However, Brief-BESTest is the fastest and easiest test to run [10].

Discussion

The loss of functional capacity and, consequently, of balance is known to affect the ability to perform day-to-day tasks and is a common factor with advancing age. Therefore, it is important to perform tests to diagnose the level of functional capacity and balance in the elderly population.

The efficacy of this type of tests has been widely studied and used in several studies to evaluate functional capacities in the elderly population.

The analyzed studies presented some divergence in terms of the best way to assess functional capacity and balance. The BESTest was mentioned by two articles, as being the best test to measure balance, also with technical and financial advantages. A negative aspect is the fact that the battery is composed of 36 items, which makes the complete realization is time consuming and this can discourage or influence the result.

Another test that was mentioned by three articles as being the best test to measure balance was the unstable plank test. As a positive aspect to the performance of this test is the fact that it is also not expensive, can be applied on a large scale and the realization is quite fast. A negative aspect may be that the board is unstable, and you always need a supervised follow-up to avoid falls.

Regarding the assessment of frailty, we have a predominance of the short physical performance battery, the gait speed and the Timed Up and Go test.

The literature provides limited number of studies that seek to compare the best way to assess functional capacity and balance, and future investigations that promote and prove the best forms of evaluation are plausible.

Table 1. Characteristics of selected articles

Title/Author	Objective	Type of study	Methods	Conclusions	Quality
Dynamic balance assessment using an unstable board in community-dwelling elderly people [4]	Investigate the relationship between the dynamic equilibrium measurements obtained with the new unstable platform and the dynamic equilibrium indices that currently exist	Observational study	- A total of 64 patients were recruited, with 65 years of age and independent inclusion criteria in gait, and in the end 59 participated. - The participants were evaluated by a quantitative measure of the participants' ability to maintain standing stability, using a stable plank, fixing their gaze at a focal point and keeping the picture as parallel as possible to the ground. - Also submitted to the Tests Mini-Balance Evaluation Systems (mini-Bestest), TUG, FRT and Wall test (F8W) for functional balance.	The unstable board was effective in measuring the dynamic balance between healthy, independent elderly and community residents.	Average
Reliability and validity of center of pressure measures for balance assessment in older adults [7]	Assess the reliability and validity of balance measures in the elderly	Observational study	- A total of 240 shanghai seniors were evaluated using a force platform and the Berg Balance Scale at 1-week intervals. - All over 60 years old and who could walk with or without assistance for 20 meters. - All were evaluated by bbs and force platform (Balance-A, NCC, Shanghai, China) and were reevaluated at 1-week intervals - Balance-A evaluates balance on power platforms, with an emphasis on 12 equilibrium parameters	The test on the platform has moderate to good validity when compared to bbs in the elderly.	Average
Usefulness of an unstable board balance test to accurately identify community-dwelling elderly individuals with a history of falls. [11]	Identify the usefulness of a balance test on the board to identify the risk of falls	Case-control study	- Case-control study. - We evaluated 61 elderly people over 65 years of age and ability to walk independently, without assistance. - They were divided among elderly people who fell and did not fall, based on the previous year's fall history. - 3 Performance tests: 1.Unstable plank 2.Functional scope 3.Teste Timed Up and Go	The functional range and Timed Up and Go tests were not reliable in the results, between those that fall and those that do not fall. Unlike the test on the board, it proved very useful in determining the risk of fall.	Average
Association between Functional Assessment Instruments and Frailty in Older Adults: The FRADEA Study [12]	Determining the association between functional assessment instruments and frailty in the elderly	Cohort study	993 subjects over 70 years of age were evaluated Questionnaires and tests were applied: - Barthel index (disability) - Lawton Index (disability) - Short-term function and disability instrument (SF-LLFDI) (disability) - Speed marching (ambulation) - Teste Timed up and go (deambulação) - Unipodal balance time (ambulation) - Standing test (ambulation) - Short performance battery (ambulation) - Handgrip strength (ambulation) - Elbow flexion force (ambulation) - Evaluation by Fried's criterion (frailty)	The best performance tests to identify fragile individuals (functional agitation and flexibility) are the Timed Up and Go test, gait speed, and Short Physical Performance Battery (SPPB). The best questionnaire is the SF-LLFDI (Short-term function and disability instrument)	Good
Reliability, Validity, and Ability to Identity Fall Status of the Berg Balance Scale, Balance Evaluation Systems Test (BESTest), Mini-BESTest, and Brief-BESTest in Older Adults Who Live in Nursing Homes [10]	Check and compare reliability, validity and ability to identify falls with the Berg Balance Scale (BBS), balance assessment test (Best-Test), Mini-Bestest and Brief-BESTest in elderly people who	Cross-sectional study	- 49 Elderly, between 62 and 90 years old, were evaluated by physiotherapists and maintained reliability among researchers	All balance tests have similar reliability, reproducibility and validity. However, Brief-BESTest is the fastest and easiest test to run.	Average

Title/Author	Objective	Type of study	Methods	Conclusions	Quality
De Evaluation of the reliability and validity for X16 balance testing scale for the elderly [13]	To investigate the reliability and validity of the X16 balance test for use in the evaluation of balance performance in the elderly.	Experimental study	- 1985 elderly were evaluated using an X16 balance scale, composed of 3 domains	The reliability and validity of the X16 balance scale is adequate and acceptable, and due to simple and fast features are recommended in large-scale community environments.	Average
Balance Evaluation of Prefrail and Frail Community-Dwelling Older Adults [9]	To evaluate the capacity of the balance assessment system (BESTest) and the force platform in the ability to distinguish non-frail, pre-frail and frail elderly.	Experimental study	- We evaluated 60 elderly people over 65 years of age by BESTest and platform in six positions.	BESTest seems to be the most appropriate than a force platform to assess postural control impairment and discriminate balance performance in the elderly, providing different components of postural control rather than the force platform.	Average
The functional assessment Berg Balance Scale is better capable of estimating fall risk in the elderly than the posturographic Balance Stability System [8]	The aim of this study was to verify the best instrument to identify the risk of fall in the elderly.	Observational and cross-sectional study	- They evaluated 98 participants aged between 72 and 89 years.	The results showed that the elderly classified as having the risk of a fall in the BBS had a higher chance of identifying who had a higher number of falls in the last year. Thus, BBS demonstrated greater ability to identify the risk of fall in the last year when compared to BSS.	Good

Conclusions

This review allowed us to highlight that the choice of the test to be applied, to assess functional capacity and balance, has to be previously adapted to, studied and oriented to the population concerned, based on the objectives of the current evaluation. As such, to evaluate the physical and functional capacity in the elderly, two types of tests are considered as the most appropriate, where we have the tests on board and the test timed up and go. We have the fact that the balance assessment is more adequately evaluated by board tests, but on the other hand, frailty is better evaluated by tests such as Timed Up and Go. The characteristics and individuality of the populations concerned should be the primary factor determining the assessment to be applied.

In the limitations, in addition to the use of a single database, the usefulness of this investigation is highlighted as an instrument of reflection and alert to the judicious use of the way in which the functional capacity of the elderly is evaluated.

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