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INTEGRATIVE REVIEW ARTICLE

EVALUATION AND INTERVENTION OF EQUILIBRIUM IN THE ELDERLY

AVALIAÇÃO E INTERVENÇÃO DO EQUILÍBRIO EM IDOSOS

EVALUACIÓN E INTERVENCIÓN DEL EQUILIBRIO EN ANCIANOS

Jéssica Resende Del'Olmo Bennett¹, Ivania Vera², Kamylla Guedes de Sena³, Moisés Fernandes Lemos⁴,
Roselma Lucchese⁵, Graciele Cristina Silva⁶

ABSTRACT

Objective: to present which instruments and techniques are used in the elderly to improve balance and posture. **Method:** integrative review, with original research published over the last ten years. The descriptors "Aged", "Postural Balance" and "Activities of Daily Living" were used in the searches: LILACS, PubMed / MEDLINE and SciELO virtual library. The selected articles were synthesized after fulfilling the inclusion criteria and were classified through the level of evidence, totaling 36 studies. **Results:** in the face of the research, 75 assessment instruments were identified, of which the Mini Mental State Exam, Berg Balance Scale and Time Up and Go Test were the most used and with better indications of their use. **Conclusion:** a number of instruments are used to assess the balance and mobility of the elderly, revealing that only one method of evaluation is not effective in assessing all aspects of equilibrium deficits. It is necessary to associate two or more assessment instruments in order to provide a more reliable result, with a view to establishing appropriate objectives and interventions, identifying risk factors and proposing preventive and health promotion interventions. **Descriptors:** Aged; Postural Balance; Activities of Daily Living; Mobility Limitation; Risk Factors; Public Health.

RESUMO

Objetivo: apresentar quais instrumentos e técnicas são utilizados em idosos com vistas à melhoria do equilíbrio e da postura. **Método:** revisão integrativa com pesquisas originais publicadas nos últimos dez anos. Utilizaram-se, para as buscas, os descritores "Aged", "Postural Balance" e "Activities of Daily Living" nas bases de dados LILACS, PubMed/MEDLINE e na biblioteca virtual SciELO. Sintetizaram-se os artigos selecionados após preencherem os critérios de inclusão classificando-os por meio do nível de evidência em um total de 36 estudos. **Resultados:** identificaram-se 75 instrumentos de avaliação. Destes, o Mini Exame do Estado Mental, a Escala de Equilíbrio de Berg e o Teste *Time up and Go* foram os mais utilizados e com melhores indicações de seu uso. **Conclusão:** inúmeros são os instrumentos utilizados para avaliar o equilíbrio e a mobilidade de idosos revelando que apenas um meio de avaliação não é eficaz para avaliar todas as vertentes que envolvem o *deficit* de equilíbrio. Necessita-se associar dois ou mais instrumentos de avaliação, a fim de proporcionar um resultado mais fidedigno, com vistas a serem traçados objetivos e intervenções adequados na identificação dos fatores de risco e proposição de intervenções preventivas e de promoção à saúde. **Descritores:** Idoso; Equilíbrio Postural; Atividades Cotidianas; Limitação da Mobilidade; Fatores de Risco; Saúde Pública.

RESUMEN

Objetivo: presentar cuales instrumentos y técnicas se utilizan en ancianos con miras a mejora del equilibrio y de la postura. **Método:** revisión integrativa, con investigaciones originales publicadas en los últimos 10 años. Se utilizó para las búsquedas los descriptores "Aged", "Postural Balance" y "Actividades del Daily Living" en las bases de datos: LILACS, PubMed / MEDLINE y biblioteca virtual SciELO. Se sintetizaron los artículos seleccionados después de llenar los criterios de inclusión y se clasificaron a través del nivel de evidencia, totalizando 36 estudios. **Resultados:** en la investigación se identificaron 75 instrumentos de evaluación, de los cuales el Mini Examen del Estado Mental, Escala de Equilibrio de Berg y la Prueba *Time up and Go* fueron los más utilizados y con mejores indicaciones de su uso. **Conclusión:** numerosos son los instrumentos utilizados para evaluar el equilibrio y la movilidad de ancianos, revelando que sólo un medio de evaluación no es eficaz para evaluar todos los aspectos que implican el déficit de equilibrio. Se requiere asociar dos o más instrumentos de evaluación a fin de proporcionar un resultado más fidedigno, con miras a ser trazados objetivos e intervenciones adecuadas, en la identificación de los factores de riesgo y proposición de intervenciones preventivas y de promoción a la salud. **Descriptores:** Anciano; Balance Postural; Actividades Cotidianas; Limitación de la Movilidad; Factores de Riesgo; Salud Pública.

¹Master student, Federal University of Goiás / UFG. Catalão (GO), Brazil. E-mail: srt_bennett@hotmail.com ORCID iD: <http://orcid.org/0000-0001-8980-4512>; ²PhD, Federal University of Goiás / UFG. Catalão (GO), Brazil. E-mail: ivaniavera@gmail.com ORCID iD: <http://orcid.org/0000-0002-8974-7949>; ³Master student, Federal University of Goiás / UFG. Catalão (GO), Brazil. E-mail: kamylla_g@hotmail.com ORCID iD: <http://orcid.org/0000-0001-8345-9981>; ⁴PhD, Federal University of Goiás / UFG. Catalão (GO), Brazil. E-mail: moisesflemos@yahoo.com.br ORCID iD: <http://orcid.org/0000-0002-5307-2791>; ⁵PhD, Federal University of Goiás / UFG. Catalão (GO), Brazil. E-mail: roselmalucchese@hotmail.com ORCID iD: <http://orcid.org/0000-0001-6722-2191>; ⁶ PhD, Federal University of Goiás / UFG. E-mail: gcsilvanut@gmail.com ORCID iD: <http://orcid.org/0000-0003-1108-306X>

INTRODUCTION

The presence of the elderly in the world population is considered to be increasing.¹ It is predicted that in Brazil, the number of people aged 65 or over in 2018 will reach almost 10% of the general population (8.46%), , with higher projections for 2030 (13.44%), as a result of technological advances, access to health services, reduction of birth rates and control of chronic health problems.²

It is related to aging, an inevitable mechanism, a set of biological, psychological, social, cultural, and economic changes.³ Such changes, associated with comorbidities, cannot imply fragile and dependent individuals, creating an integrated need in the care and preserve their autonomy.⁴

It is known that the achievement of more years in the life trajectory of the individual does not guarantee a better condition and quality of life (QoL), since, with aging, chronic diseases can be aggravated or new pathologies can appear, making the individual unable to have a better condition and QoL.⁵

Increasing the life expectancy of the elderly population, one of the factors that interfere in the autonomy and difficulty in the treatments is the loss of balance, which is directly related to an increased risk of falls and complications/comorbidities arising from it. It is necessary to control the reduction of falls through the screening of risk factors and evaluation of the elderly, together with interventions that focus on gaining mobility and functionality.⁶

It is believed that these interventions can provide the elderly with autonomy and independence in aging, minimizing dependence on activities of daily living (ADL)⁷ and creating the means that interfere and prioritize the prevention of this decline are of extreme importance for their health individuals.⁸ The theme is not saturated and it is necessary to emphasize that there is an inclusion of the elderly in society, geared not only to longevity but also to a better QoL.⁹

It is observed that the regularity of physical activity and an active lifestyle have great importance for the promotion of health and a healthy aging.¹⁰ It is known that the elderly practicing physical activity has shown effective results to avoid falls, since they present improvements balance, gait and independence in ADL.¹¹

Therefore, the method of movement exercises and assessment instruments is evaluated, improving the balance and development of daily activities in the elderly.

In this sense, it is questioned: Which methods, instruments and techniques are being used in order to favor the improvement of balance and posture in the elderly, in the execution of daily activities?

OBJECTIVE

- To present which instruments and techniques are used in the elderly in order to improve the balance and posture.

METHOD

The Integrative Literature Review (IR) was elaborated following the steps outlined for construction: identification of the theme and selection of the hypothesis or research question for the elaboration of IR, criteria for inclusion and exclusion of studies / sampling or search in the literature, definition of information to be extracted from selected studies / categorization of studies, evaluation of included studies in IR, interpretation of results, presentation of review / synthesis of knowledge.¹²

The following guiding question was sought in this IR: Which methods, instruments and techniques are used in order to favor the improvement of balance and posture in the elderly, in the execution of everyday activities?

The following inclusion criteria was considered: complete articles, available in full, found in databases and collections of virtual libraries that applied instruments and exercises with the purpose of improving the posture and balance in the daily activities of the elderly. The languages English, Spanish and Portuguese were chosen published between January 1, 2007 and October 11, 2017. Articles that were excluded were reviews, reports, theses, dissertations and monographs.

Two independent reviewers were interviewed between September and October 2017. In the Latin American and Caribbean Literature in Health Sciences databases (LILACS); Medical Literature Analysis and Retrieval System online (MedLine) and collections of virtual libraries Scientific Electronic Library Online (SciELO) and PubMed, a free access resource of the U.S. National Institutes of Health's National Library of Medicine (NIH / NLM).

The following controlled descriptors were distinguished for investigation: "Aged", "postural balance" and "activities of daily living", selected for representing the elderly-balance-daily activities triad. The titles and summaries of the studies presented were

read, followed by a full reading of the articles.

The information of interest was extracted using a validated instrument in the country,¹³ being: title, journal name, authorship, year of publication, country of origin, database, sample size, study design, level of evidence, instruments used in the research, results, and synthesis of conclusions (Figure 1).

The selected articles were synthesized after fulfilling the inclusion criteria and were classified through the level of evidence as follows: Level I: meta-analyzes of multiple controlled studies; Level II: classified as individual experimental study; Level III: quasi-experimental study as a single group, non-

randomized, controlled, with pre- and post-test, or control-type studies; Level IV: non-experimental study as descriptive correlational research, qualitative research or case study; Level V: report of cases or data obtained systematically, of verifiable quality, or data of evaluation programs; Level VI: opinions of respected authorities (as nationally known authors) based on their clinical experience or the opinion of a committee of experts including their non-research-based interpretations of information. This level also includes opinions from regulatory or legal bodies.¹⁴ The synthesis of the steps performed in this IR is arranged in the diagram below:

Figure 1. Synthesis of the steps performed. Catalão (GO), Brazil, 2017.

RESULTS

Thirty-six articles were selected to elaborate this IR, with the following prevalence: database and collections of virtual libraries Medline (n: 14/39%), LILACS (n: 12 / 33,3%), Pubmed : 8 / 22.2%) and

SciElo (n: 2 / 5.5%). In relation to the year of publication, there were more articles publications in the years 2011 (n: 06 / 16,7%) and 2013 (n: 08 / 22,2%), followed by the years 2009, 2012 and 2014 (n: 04 / 11.1%). Figure 2 shows the countries of origin of the studies.

Figure 2. List of papers published by countries. Catalão (GO), Brazil, 2017.

The data collected by continents is limited: America (n: 27/75%), Europe (n: 06 / 16,7%) and Asia (n: 03 / 8.33%). As for the languages of publication in the databases, English (n: 29 / 80,5%) and Portuguese languages prevailed (n:07/19,4%).

Seventy-five instruments used to assess balance and posture were identified, which

were grouped by purpose and shown in figure 3. The three most used were: Mini Mental State Examination (n: 15 / 41,67%); Berg balance (n: 10 / 27.78%) the Time up and Go test (n:09/25%).

Figure 3. Classification of the evaluation instruments by their purposes. Catalão (GO), Brazil, 2017.

A significant predominance of studies describing and discussing the risk of falls (n = 10 / 27.7%) followed by fear of falls (n = 03 / 8.3%) was found in the synthesis of the results. Other findings are related to the balance and were grouped as: poor balance (n: 05 / 13.8%), balance and functional capacity in chronic non-communicable

diseases (n = 07 / 19.4%) and balance in ADL (n: 02 / 5.5%). In addition to the results associated to balance, other factors were aggregated: spine and posture (n: 02 / 5.5%); aerobic capacity; aquatic exercises in functionality; pain associated with physical mobility (n: 01 / 2.7%) and two validations of parkinsonian instruments (n:02/5,5%).

Title of the article/ Journal	Authors/ Year	Country/ Database/ Sample	Study outline / Level of evidence/ Instruments	Results	Summary of conclusions
Psychological, physical and sensory correlates of fear of falling and consequent activity restriction in the Elderly: the InCHIANTI Study/ Am J Phys Med Rehabil	Deshpande et al., 2008 ¹⁵	Italy/ Medline/926 older adults	- Study population (NÍVEL IV) - Survey of activities and fear of falling in the Elderly; Mini Mental (MMSE); The Center for Epidemiological Studies Depression Scale (CES-D); Pearlin and Schooler Mastery Scale; Frailty and Injuries: Repeated Chair Standing; dynamometer; A Standard Pelli- Robson chart and Body Mass Index (BMI)	-In those who did not have depression, personal mastery, standing balance, lower limb strength and visual contrast sensitivity were associated with activity restriction. In those who were depressed, total fear of falling was the major factor strongly associated with activity restriction with marginal but significant association for cognition and standing balance.	-Psychological and physical factors are independently associated with fear of falling. Presence of depression possibly modulates what factors in addition to fear of falling affect fear induced activity restriction. A longitudinal study is warranted to substantiate causal relationships.
Physical performance and physical activity in older people are developmental influences important?/ Gerontology	Martin et al., 2009 ¹⁶	United Kingdom/ Medline/ 349 men and 280 women	- Cohort Study (NÍVEL III) - Hertfordshire Physical Activity Questionnaire (HPAQ)	-Poor balance was associated with lower birth weight. There were no significant positive relationships between early size and growth and the other measures of physical performance or physical activity in men or women.	-Current lifestyle factor, particularly those affecting adult weight, may be more important than developmental influences on most measures of physical performance and physical activity in older people.
Factors associated with functional balance and mobility among elderly diabetic outpatients/ Arq Bras Endocrinol Metab.	Cordeiro et al., 2009 ¹⁷	Brazil/ LILACS/ Ninety-one elderly	-Cross-sectional (NÍVEL IV) -Brazilian OARS Multidimensional Functional Assessment Questionnaire (BOMFAQ);	-Significant and independent positive relationships were obtained between TUG and age, daily activities (ADL/IADL), step	-Elderly diabetic outpatients show abnormal balance and mobility related mainly to advanced age, disability, and absence of step strategy, absence of

			Clinical Test of Sensory Interaction and Balance; Reactive Balance Strategy; Timed Up and Go (TUG); Balance Scale (BS); MMSE and BMI	strategy, and proprioceptive sensitivity. Factors negatively associated with Balance Scale were: ADL/IADL, step strategy, proprioceptive sensitivity, orthostatic hypotension and conflictive sensory conditions.	proprioceptive sensitivity and presence of orthostatic hypotension.
Validation of the Brazilian version of the berg balance scale for patients with Parkinson's Disease/ Arq Neuropsiquiatr	Scalzo et al., 2009 ¹⁸	Brazil/ LILACS/ 53 patients	- Demographic and clinical study (NÍVEL IV) - Hoehn and Yahr Staging Scale (HY); MMSE; Unified Parkinson's Disease Rating Scale (UPDRS); Schwab and England Capacity for Daily Living Scale (S&E).	-There was a statistically significant correlation between berg balance scale (BBS) and disease duration, UPDRS subscales II and III, stage of disease and the activities of daily living.	-BBS correlated with the severity of symptoms, the stage of disease and the level of independence. Studies evaluating the effect of pharmacological treatments and/ or rehabilitation techniques on Parkinson Disease (PD) should use BBS.
Reduce performance in balance, walking and turning tasks is associated with increased neck tone in Parkinson Disease/ Exp Neurol.	Franzén et al., 2009 ¹⁹	USA/ Medline/ 30 male	- Control case (NÍVEL III) - HY, TUG and UPDRS - Figure of Eight test - BBS -Functional Reach test;	-Results showed that PD subjects had increased tone throughout the axis compared to control subjects and that this increase was most prominent in the neck.	-A better understanding of the relationship between axial postural tone and motor disability is needed to develop more effective therapeutic interventions for PD.
Efeito de um programa de treinamento funcional no equilíbrio postural de idosas da comunidade/ Fisioterapia e Pesquisa	Lustosa et al., 2010 ²⁰	Brazil/ LILACS/ 16 idosas	- Estudo quase experimental (NÍVEL III) -Índice de Lawton	- Os resultados indicam melhor nível funcional após o programa e uma tendência à melhora no equilíbrio unipodálico, porém, não significante.	-Melhora no desempenho nas atividades instrumentais de vida diária, avaliada pelo índice de Lawton, e uma tendência à melhora do equilíbrio estático.

Adaptability to perturbation as a predictor of future falls: a preliminary prospective study/ J Geriatr Phys Ther.	Pai et al., 2010 ²¹	USA/ Pubmed/13 older adults	-Preliminary prospective study (NÍVEL IV) -MMSE -TUG	-Four people reported at least one fall had significantly higher slip scores than the rest. In contrast, neither failed recovery on the first slip, nor a higher TUG score predicted greater odds of future falls.	-Community-dwelling older adults' adaptability to externally imposed perturbations may reveal their future fall risk.
22.Performance measures predict the onset of basic ADL Difficulty in Community-Dwelling Older Adults/ J Am Geriatr Soc.	Huang et al., 2010 ²²	USA/Medline/ 110 older adults	- prospective cohort (NÍVEL III) -Comorbidity index; National Health Interview Survey; Short Physical Performance Battery (SPPB); BBS and Dynamometer.	- The BBS was the most consistent and best predictor for the onset of basic ADL difficulty over an 18-month period. The SPPB showed excellent predictive value for the onset of difficulty at 12 months.	-BBS, followed by SPPB, TUG, gait speed and grip strength were predictive for the onset of basic ADL difficulty over an 18-month period in community-dwelling older adults.
Correlação entre equilíbrio corporal e capacidade funcional de idosos com disfunções vestibulares crônicas /Braz J Otorhinolaryngol.	Sousa et al., 2011 ²³	Brazil/LILACS/50 senior citizens	- Estudo transversal, clínico e experimental (NÍVEL II) - Ficha de Avaliação Funcional, do Índice de Marcha Dinâmica - Medida de Independência Funcional (MIF)	-Verificou-se correlação positiva entre o escore total do Índice de Marcha Dinâmica e todas as pontuações da MIF, especialmente a MIF total, prejuízo da capacidade funcional em idosos com maior risco de queda.	-Há correlação entre equilíbrio corporal e capacidade funcional em idosos com vestibulopatias periféricas. Quanto melhor o equilíbrio, melhor a capacidade funcional. Pior capacidade funcional maior o risco de quedas.
Neurophysiological aspects and their relationship to clinical and functional impairment in patients with chronic obstructive	Rocco et al., 2011 ²⁴	Brazil/ LILACS/ 22 patients	-Cross-sectional (NÍVEL IV) -BODE Index evaluation; Electromyographic evaluation; Monosynaptic reflex test.; Evaluation of	-The individuals exhibited deficits in functional balance and gait on the Tinetti scale, compared with the Control Group. The BODE Index	These results suggest a worse prognosis; however, more studies are needed to identify the causes of these changes and the repercussions that could

Bennett JR Del'Olmo, Vera I, Sena KG de et al.

Evaluation and intervention of equilibrium...

pulmonary disease/ CLINICS			peripheral muscle strength; Evaluation of state balance and Tinetti Scale.	demonstrated correlations with balance assessment (determined by the Tinetti scale), $r = 0.59$ ($p, 0.05$) and the sit- to-stand test, $r = 0.78$ ($p, 0.05$).	result in their activities of daily living.
Reliability and validity a scale for measurement of trunk mobility in Parkinson's disease/ Arq Neuropsiquiatr	Franco et al., 2011 ²⁵	Brazil/ LILACS/Ninety eight PD	- Demographic and clinical study (NÍVEL IV) - UPDRS, S&E and HY - Trunk Mobility Scale (TMS)	- A strong correlation was found between the TMS scores and the HY staging scale, motor UPDRS and Schwab and England ADL.	- The scale showed a satisfactory reliability rate. TMS is a simple and reliable instrument to evaluate trunk mobility impairment in patients with PD.
Comparison of once and twice weekly water exercise on various bodily functions in community- dwelling frail elderly requiring nursing care/ Elsevier	Sato et al., 2011 ²⁶	Japan/ Medline/ 35 frail elderly persons	- Prospective cohort (NÍVEL III) - Dynamometer; Functional independence measure (FIM); The sit and reach test (SR); Functional reach test (FR) and TUG	- Significant differences were seen between groups only at 3-months. Significant correlations were also found between the change in flexibility and balance ability.	- Even a once weekly Water Exercise (WE) regimen for six months improved lower muscle strength as well as a twice weekly regimen in frail elderly and lacking exercise habit. Once weekly WE did not improve flexibility and balance.
Assessing Balance and Mobility to Track Illness and Recovery in Older Inpatients/ J Gen Intern Med	Hubbard et al., 2011 ²⁷	Canada/ Medline/ 409 patients, with a mean age of 81.8 years	- Prospective cohort (NÍVEL III) - Hierarchical Assessment of Balance and Mobility; Comprehensive Geriatric Assessment; Frailty Index (FI)	- Patients discharged home showed the greatest rate of improvement, whereas those discharged to institutions stabilized at a lower level of performance.	- Mobility and balance allows assessment of acute changes in the health of older people. Frailty slows recovery of mobility and balance, and reduces recovery potential.
Estudo longitudinal do equilíbrio postural e da capacidade aeróbica de idosos independentes/ Rev Bras Fisioter.	Lima et al., 2011 ²⁸	Brasil/ LILACS/ 100 indivíduos com idade entre 60 e 75 anos.	- Longitudinal (NÍVEL III) - Teste de caminhada de 6 minutos (TC6); Escala de Equilíbrio de Berg (EEB) e Questionário	- Houve diminuição da distância percorrida entre as duas avaliações; O IPAQ evidenciou aumento de indivíduos	- Necessita de manutenção da atividade física para prevenção das alterações do equilíbrio e da capacidade aeróbica e a realização de

			Internacional de Atividade Física (IPAQ).	considerados ativos na segunda avaliação.	exercícios físicos pode ser benéfica para diminuir o impacto do processo de envelhecimento.
Functional decline in hospitalized older adults: can nursing make a difference?/ Geriatric Nursing	Boltz et al., 2012 ²⁹	Medline/USA/ 93 hospitalized adults	- Observational (NÍVEL IV) - Yale Depression Scale; Whisper test; Handheld Snellen; Mini - Cog; Clock Drawing Test; Dynamometer, Tinetti Gait and Balance Instrument	-Had one or more falls during the hospitalization, had demonstrated better functional performance at admission and better physical capability, measured by the Tinetti gait and balance scale.	-The Function-Focused Care(FFC) can have a positive influence on the functional trajectory of hospitalized older adults. There appears to be sufficient evidence to investigate the effectiveness of FFC in patients with diverse functional abilities and health characteristics.
Fear of falling and coexisting sensory difficulties as predictors of mobility decline in older women/ Journal of Gerontology	Viljanen et al., 2012 ³⁰	Finland/Medline/434 women	-Housing Enabler Instrument -Charlson Comorbidity Index -Restorative Care Behavior Checklist (RCBC)	-incident walking difficulty was 95% in participants with Fear of Falling (FOF) and with 2-3 sensory difficulties compared with persons without FOF and with at most one sensory difficulty at baseline.	-Older women who have several coexisting sensory difficulties combined with FOF are particularly vulnerable to mobility decline.
Correlation between balance and the level of functional Independence among elderly people/ São Paulo Med J.	Prata, M. G.; Scheicher, M. E., 2012 ³¹	Brazil/ Scielo/70 community-dwelling elderly	- Cross-sectional (NÍVEL IV) - MMSE, Berg Balance Scale (BBS) and Barthel Index (BI)	-Statistically significant relationships were found between the BBS and BI (r = 0.41; P = 0.0004); between age and BI (r = - 0.24; P = 0.04); and between age and BBS (r = -0.57; P = 0.0001).	-The results showed that among elderly people, there are correlations between age, balance and independence level.
32.Use of stance time variability for predicting	Brach et al., 2012 ³²	USA/Pubmed/ 522 older adults	-Longitudinal cohort study (NÍVEL III)	-The use of likelihood ratios demonstrated a	-Clinicians should interpret the cut-off values liberally

Bennett JR Del'Olmo, Vera I, Sena KG de et al.

Evaluation and intervention of equilibrium...

mobility disability in community - dwelling older persons: A prospective study/ J Geriatr Phys Ther.			- The GaitMat II™ and Stance Time Variability (STV)	gradient of risk across values of STV, with mobility risk increasing as values of STV increased.	and use STV in conjunction with other measures until further work is completed to validate STV as an indicator of mobility disability.
33. Analysis of the balance in diabetic patients through the F-scan System and the Berg /Physioth. Mov	Cenci et al., 2013 ³³	Braxil/LILACS/25 indidiabetic individuals	- Cross-sectional study (LEVEL IV) -Test sensitivity test -F-Scan - BSE	-Study participants were not at risk for BSE; there were no associations between BSE and later lateral oscillations measured by F-Scan and there were significant differences between BSE and anteroposterior oscillations.	- This result suggests that physiotherapeutic intervention is beneficial for the maintenance and / or improvement of body balance, thus reducing the risk of falls and increasing independence in ADL .
Elderly outpatient profile and predictors of falls/ São Paulo Med J.	Gomes et al., 2013 ³⁴	Brazil/ LILACS/ 145 elderly individuals	- Cross-sectional descriptive study (NÍVEL IV) -MMSE; Snellen optometric chart; SPPB and FIM.	- These groups were compared according to occurrences of falls over the last year, and significant differences between them were found.	-The greater occurrences of falls were associated with an elderly women, lower muscle strength and physical performance regarding balance and gait, and lower independence in motor tasks for act of daily living.
Risk of falls in the elderly in the community: evaluation with the Timed up and go test /Braz J Otorhinolaryngologist .	Bretan et al., 2013 ³⁵	Brazil/ LILACS/102 indivíduos	- Descriptive cross-sectional study (LEVEL IV) -TUG	- About 69% of the subjects performed the test in up to 19 seconds. There was a significant correlation between imbalance, time spent and fall, as well as between dizziness and fall.	- An expressive number of individuals with higher values is probably more prone to falls and to less or greater dependence in ADL.

Bennett JR Del'Olmo, Vera I, Sena KG de et al.

Evaluation and intervention of equilibrium...

Spinal posture in the sagittal plane is associated with future dependence in activities of daily living: a community -based Cohort Study of Older Adults in Japan/ Journals of Gerontology:	Kamitani et al., 2013 ³⁶	Japan/ Medline/ 804 participants	-Prospective cohort (NÍVEL III) -Spinal Mouse; -Katz Index and BMI	- Only inclination was associated with outcome, although lumbar curvature also showed a marginal association. After mutual adjustment for the 4 parameters, statistical significance for inclination still remained, with no substantial changes in the association estimates.	-This study indicates that spinal inclination is associated with future dependence in ADL among older adults.
Is kyphosis reboted to mobility, balance and disability?/ Am J Phys Med Rehabil	Eum et al., 2013 ³⁷	USA/ Pubmed/ 620 older adults	- Cross - sectional (NÍVEL IV) -MMSE; SPPB; BBS; BMI; CES-D; Brief Pain Inventory; McGill Pain Map; Tinetti Falls Efficacy Scale (FES) and Kyhosis index (KI).	-After full adjustment, greater KI was associated with lower SPPB scores but not BBS or self-reported disability. In gender-specific analyses, KI was only associated with SPPB in women.	- Greater kyphosis is associated with poorer mobility performance, but not balance or self-reported disability. This association with SPPB was only observed among women.
Correlation between the risk of falls and functional autonomy in institutionalized elderly /Rev. Bras. Geriatr. Gerontol .	Silva et al., 2013 ³⁸	Brazil/ Scielo/ 47 idosos.	- Descriptive Observational (LEVEL IV) -EEB and Katz Index.	- The female gender presented worse average functional performance when compared to the male there was a positive and strong correlation between the BSE scores and the Katz index.	- There was a strong correlation between the two scales in the study. The better the result of the Berg balance scale, the better the performance in basic activities of daily living and vice versa.
Chiropractic Use and Changes in Health among Older Medicare Beneficiaries: A Comparative Effectiveness Observational Study/	Weigel et al., 2013 ³⁹	2013/ USA/ Medline/ 774 participants	-Cohort and sample selection (NÍVEL III) International classification of Diseases (ICD -9 - CM)	-Propensity score analyses among beneficiaries with back conditions indicated that chiropractic use led to comparable outcomes for ADLs, IADLs, lower body	-Chiropractic has comparable effects on functional outcomes when compared to medical treatment for all Medicare beneficiaries, but increased risk for declines in self-

J Manipulative Physiol Ther.			function, and depressive symptoms, although there was an increased risk associated with chiropractic use for declines in self-rated health.	rated health among beneficiaries with back conditions	
Minimally Supervised Multi-Modal Exercise to Reduce Falls Risk among Economically and Educationally Disadvantaged Older Adults/ J Aging Phys Act.	Almeida et al., 2013 ⁴⁰	Brazil/ Medline/ 119 individuos	-Study Sample (NÍVEL IV) -BOMFAQ, MMSE, BBS, TUG, The 400-meter walk and Balance Master	-Comparing groups on the mean change in fall-relevant mobility task performance between baseline and four months and compared to the change in Controls, both Fully Supervised and Minimally Supervised had significantly greater reduction in Timed Up and Go and increase in Tandem Walk Speed	The similar results achieved by both trained groups suggest that a reduction in supervision and the use of a home program may be similarly effective and safe, thereby, more practical and potentially more cost-effective than a fully supervised program.
Peripheral vestibular dysfunction is prevalent in older adults experiencing multiple non - syncopal/ Age and Ageing	Liston et al., 2014 ⁴¹	UK/ Medline/ 56 older adults	-Case-controlled study (NÍVEL III) -The Sensory Organization Test; Fall risk and functional gait assessment; physiological profile assessment (PPA); The Vertigo Symptom Scale; The Activities-specific Balance Confidence Scale (ABC); The Hospital Anxiety and Depression Scale.	-A clinically significant vestibular impairment was noted for 80% of Group F compared with 18.75% for Group H (p<0.01). Group F performed less well in complex gait tasks (FGA), and reported a greater number of falls than both Groups H and PV (p<0.05). Vestibular symptom scores showed no significant difference between Groups F and	-Vestibular dysfunction is significantly more prevalent in older adult fallers versus non-fallers. Individuals referred to a falls clinic are older, more impaired and report more falls than those referred to a neuro-otology department. A greater awareness of vestibular impairments may lead to more effective management and treatment for older adult fallers.

PV.

Falls efficacy and self-rated health in older African American Adults/ Arch Gerontol Geriatr.	Tiernan et al., 2014 ⁴²	USA/ Pubmed/ 449 older African American adults	- Current investigated (NÍVEL IV) -FES and Social Production Function Instrument for the Level of Well-Being (SPF-IL)	-Correlation results indicated that previous falls, falls efficacy, mobility, self-rated helath(SRH) and depression and well-being were all inter-related. Regression analyses revealed that higher falls efficacy was more closely associated with better SRH than was having previously fallen.	- The improving falls efficacy in older African American adults may be beneficial to their mobility and overall health and well-being. Further, may be able to quickly identify older African American adults who have low falls efficacy and are at high risk for falling.
Pain characteristics associated with the onset of disability in older adults: the mobilize Boston/ J Am Geriatr Soc.	Eggermont et al., 2014 ⁴³	USA /Pubmed/ 634 community-dwelling older adults aged	- Longitudinal cohort (NÍVEL III) -Short Physical Performance Battery (SPPB); BMI and MMSE.	-Widespread pain contributed to decline in mobility performance. Similar associations were found for baseline pain interference predicting subsequent mobility decline and ADL disability.	- Older adults dwelling living with chronic pain musculoskeletal have a substantial increased risk for developing disability over time and for meaningful decline in mobility performance.
Performance based assessment of falls risk in older veterans with executive dysfunction/ J Rehabil Res Dev.	Fischer et al., 2014 ⁴⁴	USA /Pubmed/ 120 patients	- Comparative (NÍVEL IV) - TUG; MMSE; CDT; Montreal Cognitive Assessment (MoCA); Animal Fluency; Trail Making Tests A and B; Assessment of Neuropsychological Status and Geriatric Depression Scale.	-male patients referred to the Memory Assessment Clinic due to cognitive impairment. TUG-cognition scores were strongly associated with executive dysfunction and differed systematically between fallers grouped by number of falls.	-These findings suggest that the TUG-cognition shows promise in identifying fallers whose risk is related to, or compounded by cognitive impairment. Future research should study the predictive validity of these measures by following patients prospectively.

Decline in Fast Gait Speed as a Predictor of Disability in Older Adults/ J Am Geriatr Soc	Artaud et al., 2015 ⁴⁵	France/ Medline/ 628 participants	<ul style="list-style-type: none"> - Cohort study (NÍVEL III) - Rosow and Breslau scale - Lawton-Brody instrumental - Katz scale 	-All associations remained statistically significant in multivariable models, except for slope of change when chronic conditions were added to the model; of chronic conditions, dyspnea was the main contributor.	-The importance of measuring gait speed repeatedly in elderly adults to identify those at higher risk of disability and the need to identify determinants of decline, because they are likely to be targets for prevention and treatment to reduce disability risk.
The benefit of senior dance in relation to balance and daily life activities in the elderly / ABCS Health Sci.	Silva A.M.F.G; Berbel A., 2015 ⁴⁶	Brazil/ LILACS/ 19 idosos	<ul style="list-style-type: none"> - Prospective study (LEVEL IV) - BSE - Lawton Scale 	- The improvement of the balance and the advance in the balance and risk of falls by BSE. And significant statistical value regarding the independence in the ADL evaluated by the Lawton scale.	- Senior dance has been shown to be beneficial in relation to balance and daily life activities in the elderly.
Assessment of the balance and level of functional independence of the elderly in the community / Rev. Braz. Geriatr. Gerontol .	Ferraresi, J. R.; Prata, M. G.; Sheicher, M. E., 2015 ⁴⁷	Brazil/LILACS/ 172 idosos	<ul style="list-style-type: none"> - Cross-sectional study (LEVEL IV) - MEEM - BSE - Barthel Index 	- There was a moderate correlation between the risk of fall and functional independence. Statistically significant between age and risk of falls.	- The results indicated a correlation between the risk of fall and functional independence; In addition, it has been observed that advanced age is linked to an increased risk of falls.
Cognitive status is a determinant of health resource utilization among individuals with a history of falls: a 12-month prospective cohort study/ Osteoporos Int	Davis et al., 2016 ⁴⁸	Canada/ Medline/ 319 woman and men	<ul style="list-style-type: none"> - Prospective cohort (NÍVEL III) - Functional comorbidity index; Lawton and Brody Instrumental; Geriatric Depression Scale; SPPB, PPA, TUG, MMSE, MoCA; Stroop Test; Trail Making 	-Global cognition, comorbidities, working memory, and cognitive status (MCI(Mild Cognitive Impairment) versus no MCI ascertained using the Montreal Cognitive Assessment (MoCA)) were	-MCI was a determinant of HRU at 6 months among older adults with a history of falls. As such, efforts to minimize health care resource use related to falls, it is important to tailor future interventions

Bennett JR Del'Olmo, Vera I, Sena KG de et al.

Evaluation and intervention of equilibrium...

			Tests; Verbal Digits Forward and Backward Tests	significant determinants of total health resource utilization (HRU) at 6 months.	to be effective for people with MCI who fall.
Effects of a High-Intensity Functional Exercise Program on Dependence in Activities of Daily Living and Balance in Older Adults with Dementia/ J Am Geriatr Soc	Toots et al., 2016 ⁴⁹	Sweden/ Pubmed/ 864 residents	- Cluster-randomized controlled trial (NÍVEL III) - Katz Index; MMSE; FIM.	-Positive between-group exercise effects were found in participants with non-Alzheimer's dementia according to the FIM at 7 months and BI and BBS at 4 and 7 months.	-In older adults with mild to moderate dementia living in residential care facilities, a 4-month high-intensity functional exercise program appeared to defer loss of independence in ADLs and improve balance, albeit only in participants with non-Alzheimer's dementia.
Activities - specific balance confidence scale for predicting future falls in Indian older adult/ Clinical Interventions in Aging	Moiz et al., 2017 ⁵⁰	India/ Pubmed/ 125 community-dwelling older adults	- Prospective cohort study. (NÍVEL III) - ABC-H scale - BMI - MMSE	-The test accuracy and false-positive and false-negative rates were 86.87%, 12.2%, and 13.6%, respectively. A dichotomized total ABC-H scale score of #58.13% was significantly related with future falls.	-The ABC-H scores were significantly and independently related with future falls in the community-dwelling Indian older adults. The ability of the ABC-H scale to predict future falls was adequate with high sensitivity and specificity values.

Figure 4. Extraction of information of interest taken from selected articles. Catalão (GO), Brazil, 2017.

DISCUSSION

It is estimated that the world's elderly population in 2030 reaches 16.5% of the total population, with projections for 2050, a 22% increase in the elderly, and the probability of 400 million elderly or octagenaria.⁵¹ In Brazil, this rate will double in 25 years and will reach 20% of the population. Compared with France, a much larger number of elderly people are observed in the general population, and the country took 150 years to reach this milestone.⁵²

It is shown that the collaborations when classified in relation to year and country of origin in this study, Brazil was the country that most collaborated with publications, prevailing the years of 2010 and 2013. These data are justified by the fact that the increase of 2.4 % of the elderly population between 2000 and 2010.⁵³ Such facts corroborate the probability of aging with functional limitations, which can saturate the public and private health care system if effective health promotion actions are not implemented.⁵⁴

It was observed in the selected studies that the use of instruments in the evaluation of the elderly has brought satisfactory results, especially when accompanied by physical exercise programs, with improved muscle strength and reduced risk of falls in the target population.⁵⁵ It is emphasized that the elderly should maintain autonomy in ADLs, it is essential to keep the focus on the investigations of functional losses, paying attention to an overall assessment⁵⁶ in order to prevent addiction, since it can cause an emotional discontent stemming from a feeling of impotence and uselessness.⁵⁷

Greater identification of the Mini-State Mental State Examination (MMSE) instrument was obtained in the articles selected in this IR, in the perspective of screening of the cognitive evaluation, in the selection of the subjects of the research. The MMSE is a neuropsychological test to evaluate cognitive function, which can be applied in intra- and extra-hospital settings, especially in population studies,⁵⁸ however, other associated instruments should be used to diagnose cognitive function deficit.⁵⁹ Their greater use in the studies may be due to the decline in attention and memory associated with the loss of motor agility and with decreasing postural control during aging. This correlation shows the need to evaluate factors that detect balance deficits and risk of falls in the elderly.⁶⁰

Other instruments with greater evidence for this IR were observed, such as the Berg

Balance Scale (BSE), used to assess the functional capacity of balance in the elderly⁶¹ and the Time to Go Test (TUG) effective to reveal individuals at greater risk of falls,⁶² the TUG emerges as an essential instrument to delimit the appropriate treatment for the improvement of the balance.⁶³ As well as the efficacy of BSE in relation to the evaluation of the balance in situations of the individual's daily life using few resources for his application.⁶⁴ The joint use of these two tools corroborates the relationship between changes in balance and decline in functionality, and underscores the importance of interventions focused on mobility.⁶⁵

It is reported that the results obtained by these indices favor early identification with the possibility of avoiding future falls, which directly interferes with risk factors, indicating the need for regular interventions aimed at improving strength and balance, promoting the health of the elderly and thus provide fundamental tools for the professionals who work in the health of these individuals.⁶⁶

There are also two validations of instruments to evaluate people with Parkinson's. Interest may be justified because of the accelerated increase in the elderly population and Parkinson's disease (PD) in the elderly, with an estimated 14.2 million parkinsonians worldwide in 2040.⁶⁷ Pattern-oriented studies that examine the relationship between functional mobility and balance help in the understanding and execution of physical activity in people with Parkinson's disease.⁶⁸

To this end, it is important to note that the public policy framework for the elderly emphasizes Active Aging,⁶⁹ which associates aging in a healthy way in physical, mental and social aspects, emphasized by the National Policy on the Health of the Elderly (NPHE), which aims at means that promote the recovery, autonomy and independence of the elderly.⁷⁰ In the same sense, Basic Care Booklet n°19 provides subsidies for professionals who work in Primary Health Care, that is, with the elderly in the community.⁷¹

There is an improvement in ADL in order to promote health through the reduction of sedentarism and the fight against chronic diseases.⁷² In this sense, it is essential that in public health, the elderly have access to measures to improve physical functioning and mobility.⁷³ That is, the practice of physical exercises and social interaction allow the elderly to have an improvement in balance, functional mobility and QoL.⁷⁴

Another strategy is to work on active aging and to promote the health of people, whether

elderly or not: the creation of health awareness and promotion groups with a view to the independence of ADLs, which is in line with policies that converge to improve capacity functional disability or reduction of physical disability favoring the autonomy of the elderly.⁷⁵⁻⁷⁶

It is considered that loss of stability is also a risk factor for future falls, which can be avoided with resistance training and balance training.⁷⁷ Some interventions, such as aerobic exercises, allow for speed and balance increase. However, programs aimed at motor coordination along with balance are more effective for the improvement of QoL.⁷⁸

CONCLUSION

Numerous instruments have been used to assess balance in the elderly, however only one means of evaluation is not effective in assessing all aspects involving balance deficit. The need for an association between two or more evaluation tools is therefore necessary in order to provide a more reliable result in order to design appropriate objectives and interventions. It is directly related to the balance, future falls creating a need to focus on these two factors to generate greater autonomy in the daily activities of the elderly.

It is hoped that other studies with a more robust methodology will be carried out, looking for instruments that evaluate the risk factors for future preventive and health promotion interventions.

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Corresponding Address

Ivania Vera
Av. Lamartine P. de Avelar, 1120
Bairro Vila Chaud
CEP: 75704-020 – Catalão (GO), Brazil