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The reliability and validity of the Turkish version of Fullerton Advanced Balance (FAB-T) scale

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ABSTRACT

Purpose: The aim of this study was to evaluate the reliability and validity of the Turkish version of the FAB(FAB-T) scale in the older Turkish adults.

Methods: The reliability and validity of the scale was tested on 200 community-dwelling older adults. FAB-T scale was scored by different physiotherapists on different days to evaluate inter-rater and intrarater reliability. The Berg Balance Scale (BBS) was used for the evaluation of convergent validity, and the content validity of the FAB-T scale was investigated.

Results: The FAB-T scale showed very high inter- and intra-rater reliability. For inter-rater agreement, on the individual test items and total score ICC values were 0.92 (95 %CI; 0.90–0.94) and 0.96 (95% CI; 0.95–0.97) respectively. The intra-rater agreement, on the individual test items and total score ICC values were 0.93 (95 %CI; 0.91– 0.95) and 0.96 (95% CI; 0.95– 0.97) respectively. There was a good agreement between the FAB-T and BBS scales. A high correlation was found between the BBS and FAB-T scales [rho = 0.70 (%95 CI; 0.62–0.76)] indicating good convergent validity. Considering the content validity of the FAB-T scale, no floor (floor score: 0%) or ceiling (ceiling score: 6.5%) effect was detected.

Conclusion: : The FAB-T scale was successfully translated from the original English version (FAB) and demonstrated strong psychometric features. It was found that the FAB-T scale has very high inter-rater and intra-rater reliability. Considering the convergent validity, the scale has high correlation with the BBS. The FAB-T has no floor and ceiling effect.

1. Introduction

The World Health Organization (WHO) states that; "Population ageing is a triumph of humanity but also a challenge to society" (World Health Organization, 2002a, p.6). Older adults with higher cognitive impairment are more prone to experience falls and the percentage of falling increases with age (Booth, Hood, & Kearney, 2016; Iyigün et al., 2016; Taylor, Delbaere, Lord, Mikolaizak, & Close, 2013). Balance problems may contribute to internal factors such as fear of falling and physical activity restrictions, and also affect activities of daily living (ADLs) and health-related quality of life (HRQOL) (Angın et al., 2016; Boyd & Stevens, 2009; Hoang, Jullamate, Piphatvanitcha, & Rosenberg, 2017). Falls are amongst the most important causes of morbidity and mortality, and may impose a significant burden on health and social services. Therefore they constitute a major public health concern and are regarded as a geriatric syndrome. (Masud & Morris, 2001; Noll, 2013) Between 30% and 40% of community-dwelling older adults fall at least once a year and the percentage increases with each decade after the age of 65 (Michael et al., 2010; Noll, 2013). The incidence of falls may vary among countries due to many reasons such as cultural and environmental conditions. According to WHO reports, high-income countries account for 25% of the total number of fatal falls worldwide with the mortality rate (6.6–11.3/100.000) being highest in Europe. Although not as high as Europe, fall-related mortality rates in the Eastern Mediterranean region (2.7–4.3/100.000) are relatively high (World Health Organization (WHO), D.o.I.a.V.P, 2002b). Despite the limited number of studies, the rate of falling incidence has been reported as 28.5% in Turkey (Halil et al., 2006).

Various injuries, fractures, and complications like fear of falling, functional impairment, and social isolation may occur in relation to falling (Stalenhoef, Diederiks, Knottnerus, Kester, & Crebolder, 2002). Hip fractures are common consequences of falls in older adults, and

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from those, between 25% and 75% never recover their pre-fracture level of function and mortality rate within one year is between 20%–30% (Noll, 2013; Shupert & Horak, 2016). Even if the falls do not cause any fracture, they may still lead to pain and injury, which consequently reduces future mobility (Shupert & Horak, 2016). These people may also have a fear of falling resulting in limited mobility and reduced physical activity. Reduced levels of physical activity may lead to chronic diseases such as sarcopenia, Diabetes Mellitus, metabolic syndrome, Coronary Heart Disease, hypertension, stroke, and cognitive dysfunction (Booth, Roberts, & Laye, 2012). Therefore, falls impair the quality of life of older people (Shupert & Horak, 2016). Falling related complications may constitute a major portion of health service costs. Hence, the prevention of balance problems and falls is crucial to prevent chronic disease and improve global health.

The assessment of balance and risk of falling in older adults is important in order to detect possible threats and to reduce risk factors. Using these kinds of sophisticated assessment tools is very important for preventing falls and reducing healthcare requirements for older adults. There are several functional assessment tools that are being used as fall risk tools for older adults; including the Berg Balance Scale (BBS), Timed Up and Go (TUG) test, Performance-Oriented Mobility Assessment (POMA), and Dynamic Gait Index (DGI). The studies investigating these assessment tools have demonstrated the usefulness of these tests in fall risk prediction; however, they may interact differently according to different functional levels and age of older adults. The results of these studies emphasize that the identified clinical tests are more successful in predicting fall risk in more frail older adults than they are in higher functioning older adults. From the aforementioned scales, the BBS appears to be the most commonly used assessment tool in community-dwelling older adults (Boulgarides, McGinty, Willett, & Barnes, 2003). It was stated by Berg et al. when first developing the scale that there was a lack of items measuring reactive postural control (e.g. response to an external stimulus) or standing on an uneven support surface, which might limit the effectiveness of the scale when identifying more subtle balance deficits in more functionally independent older adults. It was indicated that the BBS has relatively easy items for measuring sitting balance (sitting unsupported- item 3), quiet stance (standing unsupported- item 2), and Romberg stance (standing with feet together- item 7), despite having a more difficult item measuring single-leg stance for a short duration (10 s). The omission of more challenging balance tasks has resulted in ceiling effects when the scale is administered to older adults at higher functional levels (Berg, Wood-Dauphine, Williams, & Gayton, 1989; Newton, 1997).

It has been suggested that there is a need for development and testing of tools targeting the aging population at higher functional levels (Hernandez & Rose, 2008; Klein, Fiedler, & Rose, 2011). The Fullerton Advanced Balance (FAB) scale was developed in order to identify more subtle changes in the multiple dimensions of balance (e.g., motor, sensory, musculoskeletal) among higher-functioning active older adults. The FAB scale includes more challenging balance tasks (static and dynamic), that are less prone to ceiling effects when administered to more functionally active older adults It has been suggested that the FAB scale may provide clinicians with a better understanding of the problems underlying balance deficits and result in better treatment plans (Rose, Lucchese, & Wiersma, 2006). Although the FAB scale is a very useful assessment tool, heretofore, it has not been translated into the Turkish language. Therefore, the aim of this study was to evaluate the reliability and validity of the Turkish version of the FAB (FAB-T) scale in older Turkish adults.

2. Methods

2.1. Participants

A total of 200 community-dwelling older adults aged between 65 to 85 years were included in the study. Individuals who were able to walk (assessed with 10 m Walking Test- 10 MWT) independently with or without assistive device and who scored above 21 on the Standardized Mini Mental Test (SMMT) were included in the study (Lopez, Charter, Mostafavi, Nibut, & Smith, 2005). Individuals who had orthopedic impairments, neurological problems, moderate to severe cognitive problems, severe vision and hearing problems that caused disability in balance and mobility were excluded from the study.

The ethics committee approval of the study was granted by the Board of Scientific Research and Publications of Eastern Mediterranean University dated 12.06.2017 and numbered 2017/45-02. After written and verbal information was provided to individuals about the study, written informed consents were obtained from the volunteers.

2.2. Procedure

2.2.1. Translation

In the first phase of the study, permission for preparation of the Turkish version of the FAB scale was obtained from Debra Rose, lead developer of the scale. Then, the original FAB scale was translated from English to Turkish (forward translation) by two Physiotherapists (PT-1, PT-2) who are native Turkish language speakers and fluent in English. Any inconsistencies in the first translation (Turkish-English) were analyzed by a third independent interpreter, and a common text was formed. This text was then retranslated from Turkish to English (backward translation) by a bilingual translator whose native language was English but who was also fluent in Turkish, and the backward translation was cross-verified with the original version.

In the second phase, following the translation procedure, a pilot study was conducted on older adults (n = 58) over the age of 65. Following the results of the pilot study, eight items (1, 3, 5–10) of the FAB scale were translated into Turkish directly without cultural adaptations. One item (item 2) led to confusion when translated directly into Turkish (outstretched arm) and required adaptation relating to semantic equivalence. One item (item 4) required conversion of measurement units to European measurements (inch to cm) for feasibility. There was no detailed explanation in the form of information boxes on the original (California State University); therefore we added information boxes containing testing administration instructions and small information notes related to each item (Appendix 1). After the adaptation process, the current version was sent back to the lead developer of the FAB scale for review and the suggested changes were made on the Turkish translation. The detailed test administration instructions developed for the FAB scale that included the purpose of each test item, equipment needed, safety procedures, testing procedures, and verbal instructions were also translated from English to Turkish. (Beaton, Bombardier, Guillemin, & Ferraz, 2000; Cull et al., 2002; Guillemin, Bombardier, & Beaton, 1993.)

2.2.2. Study design

After translation and cultural adaptation of the scale, study participants were assessed by two different PTs (PT-1 and PT-2), on three different days (day 1, day 2 and day 14) to establish the validity and reliability of the Turkish version of the scale. After demographic information was recorded, the Berg Balance Scale and FAB scale were administered by PT-1 on the first assessment (day 1) (1^{st} assessment) for the evaluation of convergent validity. On the following day (day 2), blinded PT-2 assessed the same participants using only the FAB scale (2^{nd} *assessment*) for the evaluation of inter-rater reliability. For the evaluation of intra-rater reliability, PT-1 repeated the FAB scale assessment on all participants 2 weeks (day 14) after the second assessment as the third assessment (3^{rd} *assessment*) (Fig. 1). All assessments were completed while the raters observed the participants performing each test item in a live situation.

2.2.3. Instruments

Participant demographic information recorded included age,