Yaşlı Bireylerde İkili Görev Anketinin Türkçe Versiyon, Geçerlik ve Güvenirliğinin Araştırılması

Investigation of the Validity and Reliability of the Turkish Version of the Dual Task Questionnaire in Older Individuals

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ÖZ

Amaç: Çalışmamızın amacı yaşlı bireylerde İkili Görev (Dual Task) Anketi'nin Türkçe versiyonunun geçerlik ve güvenirliğini araştırmaktır.

Yöntem: Bu çalışmaya toplumda yaşayan 118 yaşlı birey katıldı. Bireylerin ilk değerlendirmelerinde fiziksel özellikleri ve klinik durumları kaydedilerek Mini Mental Durum Testi (MMDT) uygulandı. İkili Görev Anketinin Türkçe versiyonu, geçerlik ve güvenirliğinin araştırılması için uzman kişiler tarafından çevirisi yapıldı. Çalışmada geçerliği test etmek için Zamanlı Kalk ve Yürü testi (ZKYT) hem motor hem de kognitif görevler ile birlikte ve Tinetti Denge ve Yürüme Değerlendirme Testi uygulandı. Test-tekrar test güvenirliği için, anket 1 hafta sonra aynı fizyoterapist tarafından tekrarlandı.

Bulgular: İkili Görev Anketinin ICC değeri 0.991 [95 %CI; 0.984– 0.995 (mükemmel)] idi. Yapılan korelasyon analizine göre İkili Görev Anketinin ilk ve ikinci değerlendirmeleri arasında yüksek ilişki (r= 0.982) bulundu. Cronbach's alfa katsayısı 0.695 hesaplandı. On maddenin ilişki değerleri 0.90'ın üzerinde idi, bu da değerlendirici içi güvenirliği için çok yüksek bir ilişki olduğunu göstermektedir. İkili Görev Anketi ile ZKYT Motor, ZKYT Kognitif ve Tinetti ölçeğinin arasında, düşük düzeyde ilişki bulundu.

Sonuç: Çalışmamızın sonunda, yaşlı bireylerde İkili Görev Anketi'nin Türkçe versiyonunun geçerli ve güvenilir olduğu gösterildi.

Anahtar Kelimeler: Yaşlı, İkili Görev Anketi, Türkçe Versiyon, Geçerlik, Güvenirlik.

ABSTRACT

Objective: The aim of the study is to indicate the Turkish version of the Dual Task Questionnaire for older adults and its suitability for Turkish society.

Methods: This study included a total of 118 older adults living in the community. The Mini Mental State Examination (MMSE) was applied by recording the physical characteristics and clinical conditions of the individuals in their initial evaluation. The Turkish version of the Dual Task Questionnaire was translated by experts for its validity and reliability. The Timed Up and Go Test (TUG) were applied together with both motor and cognitive tasks and Tinetti Balance and Gait Assessment Test to test validity in the study. For test-retest reliability, retest was performed by the same physiotherapist 1 week later.

Results: ICC values on the individual test were 0.991 [95% CI; 0.984–0.995 (excellent agreement)]. According to the correlation analysis, a very high correlation (r=0.982) was found between the first assessment and second assessment of Dual Task Questionnaire. Cronbach's alpha coefficient was calculated to be 0.695. Ten items had correlation values above 0.90,

which indicated a very high correlation for intra-rater reliability. A low level of correlation was revealed between the Dual Task Questionnaire and TUG Motor, TUG Cognitive, and Tinetti scales.

Conclusion: The study was indicate that the Turkish version of the Dual Task Questionnaire in older adults was valid and reliable.

Key words: Older Adults, Dual Task Questionnaire, Turkish Version, Validity, Reliability.

1. INTRODUCTION

When people carry out daily life activities, they need to do different things together, such as walking, talking to another person, or carrying things. Sufficient balance, coordination, attention, and thinking are required for these tasks to be done properly. Therefore, a significant interaction takes place between motor and cognitive systems (1). Dual tasking (DT) is an experimental neurophysiological procedure that requires the person to perform two tasks simultaneously. Furthermore, DT is the mutual communication between motor and cognitive functions (1). When two tasks are carried out at the same time, the attention capacity should be used effectively, and attention should be shared in accordance with the difficulty and priority of the tasks. As the level of difficulty increases or the attention capacity decreases, problems will occur in the implementation of one or both of the tasks (2).

The effect of dual tasking on performance in various age groups is known (3). In older people, falls mostly occur when they try to perform a second task while standing (2). Changes are also observed in motor development patterns, especially in old age, when a physiological change process is entered (4). Gait disturbances observed without any cause in older people without any neurological deficits cause falls, and studies have indicate that the said situation is particularly associated with DT activities (5-7). Because the control of balance requires the cortex and a high level of cognitive function, and a number of activities such as DT cause postural performance to deteriorate, particularly in older people (8,9). With aging, the cognitive functions, balance, and mobility of individuals decrease (10,11). This reduces the physical activities of individuals during their daily life activities (10). It is observed that individuals' balance, cognitive, and motor functions decrease with age (12), and when multiple or complex tasks are given, they experience significant difficulties in performing tasks (13). Therefore, it is important to evaluate the balance and postural control of older adults together with the dual task.

The evaluation of DT performance is made by clinical tests and laboratory measurements. During these tests, DT conditions are created by assigning an additional motor (pressing the button, moving something ...) or cognitive (counting, answering simple questions ...) task to the person. During clinical tests, some easy-to-apply, valid and reliable tests, such as walking at certain distances and Timed up and go tests, are generally used (14,15). With the additional tasks given during these tests, changes in the test performance and gait of the person are observed. In laboratory tests, devices such as computerized gait analysis, stabilometer, and posturography are used, and changes in gait parameters, postural oscillations and balance strategies during DT are examined together with changing visual and sensory perception. Although there are many questionnaires in the literature evaluating the balance, there is no questionnaire that can be used during DT evaluation (14,15). Using a questionnaire that can be applied in a simple, easy and fast way on older people and evaluates dual tasks with the individual's statement in the clinic will make the job of clinicians easier. Therefore, this study's

goal is to question the suitability for Turkish society and the effectiveness of the clinical use of the Turkish version of the Dual Task Questionnaire in older adults and to bring it into the use of other researchers.

2. MATERIALS AND METHOD

Individuals

The type of this research is a methodological research. Ethical permission was obtained for the study from Kırıkkale University Non-Interventional Research Ethics Committee on 18.12.2019 with the decision number 2019.11.05. Written informed consent was acquired from all individuals participating in the research. This study was conducted using the instantaneous state detection method, which is a single survey model among the general survey models. The individuals were reached with the accessible (unbiased) sampling method. The sample of the study also formed the population of the study. In scale studies, taking at least 5-10 individuals for each scale item constitutes the sample size (16). Therefore, it was planned to include at least 100 older adults, which are ten times the number of items, in order to examine the validity and reliability of the Turkish version of the Dual Task Questionnaire consisting of 10 items. This study included a total of 118 older adults living in the community.

The present study included individuals aged 65 years and over, who could read and understand Turkish, who voluntarily agreed to participate in our study and signed the consent form, whose Mini-Mental State Examination (MMSE) score was 24 and higher, who did not use a walking aid, and who were independent in mobilization. Patients with cardiac diseases (angina pectoris, acute myocarditis, with a history of myocardial infarction in the last three months, aortic aneurysm), a history of pulmonary embolism and deep vein thrombosis in the last three months, cerebral aneurysm or intracranial bleeding, acute retinal hemorrhage or previous ophthalmic surgery, active infection, malignancy, multiple organ failure, terminal disease status, a history of fracture in the lower and upper extremities in the last three months, patients with severe hearing and vision loss, Alzheimer's, Parkinson's disease, dementia, patients diagnosed with benign paroxysmal positional vertigo, and older adults who had received exercise training during the pandemic period and in the last six months were excluded from the study.

Procedure

Translation

We used the guidelines for cross-cultural adaptation in the translation process (17). Necessary permissions were obtained from the authors for the Dual Task Questionnaire, of which validity and reliability features would be tested, and the questionnaire was finalized by completing its translation process into Turkish. At the translation stage of the Dual Task Questionnaire for older adults, two experts, who had a good level of English, first translated the questionnaire from English to Turkish. The translations in question were investigated by the researchers, and a single form was created. These translations were translated back into English by two native English speakers who spoke Turkish at a good level and were far from medical subjects. The Turkish form created was sent to five experts in the field, and its content was

checked, and its compatibility with Turkish was assessed. A pilot study was carried out on 10 people, and it was observed that the scale was understandable, and the scale was finalized (17).

Validity according to a reference

The validity of a measurement tool can be found by comparing that measurement tool with other known and accepted measurements. In case of a high correlation between the new scale and the criterion, it can be said that the new scale has criterion validity. The significant point here is that the criterion has proven reliability and validity. To this end, Tinetti Balance and Gait Assessment Test and TUG test was applied together with both motor and cognitive tasks to test validity in the study (18).

Test-retest reliability

A way to determine reliability is to determine whether the person answering the measurement tool responds in the same way when this tool is applied again. Test-retest reliability is found by giving a measurement tool to the same group, in two separate applications under the same conditions, and then calculating the correlation of the scores obtained in these two applications. The time between applications should be long enough to prevent recalls to a significant extent and short enough not to allow changes in the feature to be measured. In the study, taking this parameter into consideration, a retest was performed one week later by the same physiotherapist (18).

Study Design

The MMSE was applied by recording the physical characteristics and clinical conditions of the individuals in their initial evaluation. Afterward, TUG and Tinetti Balance and Gait Assessment Test, which are the assessment parameters, were applied.

Instruments

The MMSE was first published by Folstein (19) et al. in 1975. It consists of 11 items grouped under 5 main headings: orientation, recording memory, attention and accountability, recall and language, and is evaluated over a total score of 30. It was determined that the ideal threshold value of the MMSE was 24. Its validity and reliability in Turkish were tested by Güngen (20) et al.

The Dual Task Questionnaire consists of 10 questions created by Evans (21) et al. and is designed to assess the frequency of difficulties associated with daily tasks involving the dual task. It is used to measure how often participants encounter problems with the content of the questionnaire. In response to the questions, the individuals were asked to choose among five options, between very often to never, or not applicable (using a 5-point, 0–4 scale). The score derived was an average rating per question (i.e., total score for questionnaire/10). This is a brief, 10-question, pencil-and-paper survey that should take less than 2 to 3 minutes (14,21).

TUG is a test that, the participant is told to stand up while sitting with his back against the standard chair (43 cm height). He walks for 3 m, turns, comes back and sits on the chair. Time recorded in sec (22).

Additional motor task: The individuals were asked to transfer a sphere (ball)-shaped object from one hand to another during the TUG.

Additional cognitive task: During the TUG, individuals were asked to count 3 by 3 (23).

Tinetti Balance and Gait Assessment Test: In the test used to evaluate balance, the gait score is maximum 12 points, the balance score is maximum 16 points, and the total is 28 points. It is thought that there is a problem in those who score 26 and below. The studies have reported that the lower the score is, the higher the risk of falling is. Its Turkish validity and reliability studies were performed by Ağırcan (24).

Statistical Analysis

Statistical analysis were conducted using IBM SPSS Statistics V23.0 (IBM Corp, Armonk, NY, USA) software. Visual (histogram and probability graphs) and analytical methods (Shapiro-Wilk's test) were used to calculate the distribution of variables. The number, %, mean and standard deviation were given in descriptive statistics.

For Reliability

Cronbach's alpha reliability coefficient was computed to evaluate the consistency and adequacy of the questions. For internal consistency, α=0-0.39 was referred to as unreliable; α=0.40-0.59 was referred to as reliable at a low level; α=0.60-0.79 was referred to as quite reliable, and α=0.80-1.00 was referred to as highly reliable (25). The Intraclass Correlation Coefficient (ICC) was calculated for test-retest reliability. The ICC coefficient was accepted as follows: 0.50–0.75 as moderate agreement, 0.75–0.90 as good agreement, >0.90 as excellent agreement.

For convergent validity, Spearman's correlation analysis was employed to determine the relationship between the Dual Tasking Questionnaire-T and TUG and Tinetti tests. Correlation coefficients were interpreted as 0-0.19 = very low, 0.20-0.39 = low, 0.40-0.69 = moderate, 0.70-0.89 = high, 0.90-1.0 = very high correlation.

The ceiling and floor effects were calculated for content validity. We hypothesized that the floor and ceiling effects would be below 15%. The probability of error was accepted to be 5%.

3. RESULTS

One hundred eighteen older adults living in the community and aged between 70.57±5.83 years participated in this study. The sociodemographic and clinical data of the individuals are presented in Table 1.

Reliability

ICC values on the individual test were 0.991 (95% CI; 0.984–0.995 (excellent agreement)). According to the correlation analysis, a very high correlation (r=0.982) was found between the first assessment and second assessment of Dual Task Questionnaire (Table 2). Cronbach's alpha coefficient was found to be 0.695. Ten items had correlation values above 0.90, which indicated a very high correlation for intra-rater reliability (Table 2).

Table 1. Socio-Demographic and Clinical Data of the Participants (n: 118)

		X ± SD
Age, (years)		70.57±5.83
BMI, (kg/m^2)		28.81±4.69
		n (%)
Gender	Female	70 (59.3)
	Male	48 (40.7)
Education Level	Not literate	19 (19.1)
	Primary (grade 1-5)	66 (55.9)
	Middle (grade 6-8)	14 (11.9)
	High (grade 9-12)	12(10.2)
	University	7(5.9)
Fall history	Nonfaller	85 (72)
	Faller	33 (28)
		X ± SD
Clinical test scores	Dual Tasking Questionary-T score	1.30±0.59
	TUG motor (second)	14.22±12.35
	TUG cognitive (second)	15.62±7.51
	Tinnetti Total score	23.55±4.31
	Tinnetti Balance score	13.57±2.46
	Tinnetti Gait score	9.95±2.31

BMI: Body Mass Index; TUG: Timed Up and Go Test

Table 2. Intra-Rater Correlation Coefficients for Test Items and Total Score on Dual Tasking Questionnaire –T (n=50)

DualTask Questions	Correlation Coefficients (rho) 1st assessment vs 2nd assessment (intra rater)
1. Item	0.967
2. Item	0.987
3. Item	0.967
4. Item	0.957
5. Item	1.000
6. Item	0.960
7. Item	0.977
8. Item	0.994
9. Item	0.999
10. Item	0.999
Total score	0.982

Convergent validity

In the statistical analysis conducted to determine the validity of the test, statistically significant correlations were observed for test results (Table 3). The total scores of Dual Task Questionnaire was determined to have a low positive correlation with the TUG motor score (r = 0.350, p = 0.001) and low correlation with the TUG cognitive score (r = 0.272, p = 0.001), and low negative correlation with Tinnetti gait score (r=- 0.329, p=0.001), modarete negative correlation with Tinetti total score (r = –0.425, p = 0.001) and modarete negative correlation with Tinnetti Balance score (r= -0.444, p=0.001) (Table 3).

Content validity

There were no floor and ceiling effects. No one obtained the maximum and minimum score from the questionnaire.

Table 3: Correlation Coefficients Between the Dual Tasking Questionnaire –T and TUG, Tinnetti (n=118)

	TUG Motor	TUG Cognitive	Tinnetti Total score	Tinnetti Balance	Tinnetti Gait
Dual Task Questionnaire total scores	r= 0.350 p=0.001**	r=0.272 p=0.001**	r= -0.425 p=0.001*	r= -0.444 p=0.001**	r=- 0.329 p=0.001**

**p<0.05; Spearman's correlation analysis, TUG: Timed Up and Go Test

4. DISCUSSION

In this study, it was indicate that the Turkish version of the Dual Task Questionnaire in older adults was valid and reliable. In our study, it was checked whether each item of the 10-item questionnaire was valid and reliable within itself, and it was revealed that each item was valid and reliable. While minimal attention is required during a single task such as maintaining postural control, the cognitive demand for the task increases and, sources of attention are split during both tasks when a person is assigned a second task. This flexible control of attention is related to executive functions in the frontal lobe of the brain, and it is known that these functions are impaired in older adults (1). Therefore, older adults may experience increasing difficulty in maintaining balance while carrying out activities that require multiple tasks (26). Therefore, it was stated that the Dual Task Questionnaire, which was simple to apply and completed in a short time, was suitable for the use of Turkish clinicians.The results of this study have provided a new assessment scale that can be used by Turkish health staff working in the field of older adults.

Older adults cannot automatically adapt their balance and mobility to the environment. The loss of muscle strength and decreased balance are associated with aging. During the gait performance, attention is required to maintain balance and not be affected by the environment. With the disappearance of these sources, it cannot show a reaction against variable external stimuli for a long time. Accordingly, the gait speed decreases, and the risk of falling increases. Therefore, cognitive capacities should also be evaluated during functional tests performed on older adults (27).

Thus, this study's goal was to verify the suitability of the Turkish version of the Dual Task Questionnaire designed and clinically completed in a short time to reveal difficulties in dual tasks during fulfilling the daily activities that require multiple tasks in older adults who are independent in their daily living activities in the Turkish population. When the literature is reviewed, the only study in which this questionnaire was used is a study carried out on chronic neurological patients with stroke and brain injury. A 5-week training program that included cognitive and motor dual tasks during gait was given to these patients. It was evaluated using the Dual Task Questionnaire before and after the training. The mean questionnaire response in individuals with the acquired brain injury who underwent a 5-week, cognitive-motor dual-tasking training program increased from 2.09 (standard deviation 0.68) to 1.71 (standard deviation 0.56) by utilizing a 5-point, 0-to-4 scale, with a "4" referring to very often and a "0" referring to never. Furthermore, it was stated in the study that this questionnaire had test-retest reliability and its effect size was 0.162 (21). In our study, it was also observed that the test-retest reliability of the Dual Task Questionnaire in older adults was high (ICC=0.991). Moreover, all items of the Dual Task Questionnaire were examined separately for test-retest reliability and recorded as highly reliable in our study.

Other dual task studies in the literature have mostly been conducted with clinical and laboratory measurements. In their study, Coelho (28) et al. significantly associated the quality of standing balance (it was examined by measuring the center of pressure (COP) sway parameters) of the older adults living in the community with age under both single and dual task conditions. In general, it was found that older adults had worse standing balance than young individuals, and the impact of carrying out a secondary task on standing balance in older adults increased the selected COP sway parameters. Considering that older adults need more attention resources in comparison with younger individuals to maintain postural stability, it was also observed in the study that the performance of a complex postural task was affected more by simultaneous stimuli in older ages.

In another study examining the TUG test conducted with the dual task in older adults, it was stated that the performance of the TUG test conducted with the additional cognitive task was affected, and slowdown occurred, especially during returning and sitting on the chair at the end of the test. The performance of the TUG test conducted with the additional cognitive task was recorded to be worse (29).

In their study, Carus (30) et al. noted that the TUG test conducted with the additional cognitive task was more sensitive to determine differences between older adults with and without a fall history. Cognitive slowdowns and cognitive errors that occur during the test and recording the time required to complete the TUG test with the dual task (cognitive) reveal the ability to accurately classify older adults with and without a fall history.

Brustio (31) et al. investigated the decrease in the dual task performance that occurs with age in young, middle-aged, and older adults using different motor and cognitive tasks. In the study, they used the 10-meter walking test, TUG, and four-square step test as single mobility tests. The operation of subtracting backward from the numbers 80-99 by 3 and 7 was given as the additional cognitive task. Although the duration of dual-task mobility tasks increased in all groups compared to a single task, the researchers found that the increase was higher in older age groups.

In the study conducted by Tang (32) et al., the TUG test was used to evaluate the dual task performance in prefrail individuals. They applied carrying a glass of water during the test as a motor task, and a backward subtraction by 3 between the numbers 80-99 as a cognitive task. As a result, they recorded that the TUG test conducted with a motor task in prefrail older adults was a valid and more sensitive test for the evaluation of balance and mobility.

In the study in which Sertel (23) et al. examined the effect of additional cognitive and motor tasks on balance in older adults, they noted that the performance times of the standing on one leg test, TUG and sit-and-stand test conducted with additional tasks increased, and, thus, adding tasks reduced balance performance in older adults.

The TUG test was utilized under single-task versus dual-task conditions to identify older adults prone to falling. Whereas the TUG test was revealed to be a sensitive and specific measure to identify community-dwelling adults who were at risk for falls, the ability to predict falls was not improved as a result of adding a secondary task to the TUG test (15).

In this study, the TUG motor, TUG cognitive, and Tinetti Balance and Gait Assessment Test were used to investigate the validity of the Dual Task Questionnaire. When the standard criterion of the Dual Task Questionnaire was examined in terms of consistency between the TUG motor, TUG cognitive, Tinetti Balance and Gait Assessment Test, there was a correlation

between both TUG motor (r: 0.350), TUG cognitive (r: -0.272), and Tinetti Balance (r: -0.444) and Gait (r: -0.329) test, and Tinetti total score (r: -0.425). These results obtained from the Turkish version of the Dual Task Questionnaire indicate that the questionnaire is related to the TUG motor, TUG cognitive, and Tinetti Balance and Gait Assessment Test . Since the Dual Task Questionnaire is a practical questionnaire in terms of clinical practice which can be used in dual tasks that we have to do during daily life activities and using which we can reach conclusions in a short time, we think that it will be a questionnaire that can be used in the evaluation of the dual tasks abilities of older adults.

5. CONCLUSION

The Dual Task Questionnaire can identify to a significant extent those who report the difficulty of the dual task and give information about the average difficulty of the daily tasks requiring dual task. Furthermore, using this questionnaire, older adults who experience dual task difficulties can be identified quickly, possible balance and posture problems can be revealed, and the risk of falling can be eliminated. Therefore, we think that the adaptation of the questionnaire to Turkish in older adults is a practical and important achievement for clinicians and will provide a new perspective and guide physiotherapists working in the clinic.

Ethical Consideration of the Study

Ethical permission was obtained for the study from Kırıkkale University Non-Interventional Research Ethics Committee on 18.12.2019 with the decision number 2019.11.05.

Conflict of interest statement

The authors do not have any interest-based relationships.

Limitations

The limitations of our study are as follows: the Dual Task Questionnaire could also be compared with computerized balance measurements. Cut-off value could not be investigated because the study evaluated only one group. In the following studies, we think that the cut-off value to be determined in older adults will contribute a different perspective on the interpretation of the results.

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