Özgün Çalışma / Original Article

THE EVALUATION OF DUAL-TASK ACTIVITIES AND BALANCE IN OLDER ADULTS DURING THE COVID-19 PANDEMIC: A PILOT STUDY

COVID-19 SALGINI SÜRESİNCE YAŞLI BİREYLERİN DUAL-TASK AKTİVİTE VE DENGELERİNİN DEĞERLENDİRİLMESİ: TÜRKİYE ÖRNEĞİ, PİLOT ÇALIŞMA

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ABSTRACT

AIM: The aim of this study is to evaluate the dual-task activities and balance of older adults during the COVID-19 pandemic.

MATERIAL AND METHOD: This study was conducted between August 2020 and November 2020 and included older adults who lived in a house environment in Ankara, met the study criteria, volunteered to participate in the study, and were aged between 65-80 years. The sociodemographic information of the older adults was recorded. The balance and dual-task performances of the individuals were assessed by the Tinetti Balance and Gait Test, Timed Up and Go Test (TUG), and Dual-Task Questionnaire (DTQ), and their cognitive states were evaluated by the Mini-Mental State Test. The individuals were requested to perform the tests by transferring an object from one hand to the other as an additional motor task and by counting two by two as an additional cognitive task.

RESULTS: The mean age of the individuals was 70.35±5.44 years. According to Spearman's correlation analysis, a moderate-level correlation was identified between the DTQ and the Tinetti Balance and Mobility Scale and its subgroups, and a low-level correlation was observed between the DTQ and TUGMotor (p<0.005). No correlation was detected between the DTQ and TUGCognitive. In terms of sex, TUGCognitive was found to be longer in male individuals.

CONCLUSION: It has been demonstrated that there is a correlation between the DTQ and balance and functional states.

Keywords: COVID-19, older adults, balance, dual-task

ÖZET

AMAÇ: Bu çalışmanın amacı COVID-19 salgını süresince yaşlı bireylerin dual-task aktivite ve dengelerini değerlendirmektir.

GEREÇ VE YÖNTEM: Ağustos 2020-Kasım 2020 tarihleri arasında yapılan bu çalışmaya, Ankara'da ev ortamında yaşayan, çalışma kriterlerine uyan, çalışmaya katılmaya gönüllü olan 65-80 yaş arası bireyler dahil edildi. Yaşlı bireylerin sosyodemografik bilgileri kaydedildi. Bireylerin dengeleri ve ikili görev performansları Tinetti denge ve yürüme testi, Timed up and Go Test (TUG) ve İkili Görev Anketi (DTQ) ile, kognitif durumları Mini Mental Durum testi ile değerlendirildi. Bireylerden motor ek görev olarak bir elden diğer ele obje transferi yaparak; kognitif ek görev olarak ise ikişer ikişer sayarak testleri yapmaları istendi.

BULGULAR: Bireylerin yaş ortalamaları 70,4±5,4 yıldı. Yapılan Spearman korelasyon analizine göre DTQ ve Tinetti denge ve mobilite ölçeği ve alt grupları arasında orta düzeyde, TUGMotor fonksiyon arasında düşük düzeyde ilişki saptandı (p<0,005). DTQ ile TUGKognitif arasında ilişki saptanmadı. Cinsiyet açısından TUGKognitif erkek yaşlı bireylerde daha uzun bulundu.

SONUÇ: Türkiye'deki yaşlı bireylerde COVID-19 pandemisi sürecinde denge ve dual task aktivitelerinde azalma ile birlikte DTQ ile denge ve fonksiyonel durumları arasında ilişki olduğu gösterilmiştir.

Anahtar Kelimeler: COVID-19, yaşlı, denge, dual-task

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INTRODUCTION

The new coronavirus (COVID-19), an RNA virus from the coronavirus family, which emerged in December 2019, infects animals and humans and leads to respiratory, gastrointestinal, hepatic, and neurological diseases (1). On January 30, 2020, the World Health Organization declared that COVID-19 was a serious international public health emergency (2). As seen in the data of all the countries, COVID-19 clearly constitutes a higher risk factor for older adults when compared to other age groups in this period. The Imperial College London COVID-19 Response Team reports that individuals with symptoms in their seventies are twenty times more likely to be hospitalized than those with symptoms in their twenties (3). The most effective method to break the infection chain and protect individuals at risk is the effective separation of infected individuals and suspected or real carriers from unaffected populations. Therefore, the elderly population above 65 years of age, which was announced to be at high risk in terms of mortality, was the first group separated from the social environments in our country. Thus, they have been isolated at home since the first week (4,5).

Older adults who are especially isolated at home, suffer from cognitive regression and dementia, and need a high level of care are adversely affected by this situation both psychologically and physically as the period of the pandemic or isolation is prolonged (6). While dealing with problems related to the pandemic, it is important to pay attention to the difficulties caused by the physical and social distance for older adults and overcome them. During the isolation at home, it is significant to approach and maintain the state of well-being as a whole for elderly individuals. The general health state of older adults is affected by the quality of daily living activities rather than medical interventions. For example, muscle weakness resulting from inactivity may cause balance problems and falls (4,5).

Especially with the normal aging process, balance problems are observed in older adults (7). A good balance is required to carry out daily living activities successfully (8). In general, gait speed, gait patterns, and balance change with age (9). People need to do different tasks such as walking, talking to someone else, or carrying stuff while performing daily living activities. There is a need for adequate balance, coordination, attention, and thinking so that these tasks can be carried out properly. Hence, significant interaction occurs between motor and cognitive systems (10). The dual-task (DT) is the mutual communication between motor and cognitive functions (10). Motor development patterns also change, particularly at old age, when physiological changes start (11). During old age, gait disorders, balance problems, and falls occur even in older adults who have no neurological deficit, and they are observed to face many problems with fulfilling the tasks when more than one or complex tasks are given to them (12-14). In addition to this, together with an extraordinary circumstance, such as the pandemic, a negative effect on balance, cognitive and motor functions seems unavoidable in older adults. Therefore, the aim of our study is to evaluate the dual-task activities and balance of older adults during the COVID-19 pandemic.

MATERIAL AND METHOD

Study Design

This study was conducted between August 2020 and November 2020 and included older adults who lived in a house environment in Ankara, met the study criteria, volunteered to participate in the study, and were aged between 65-80 years. For power analysis and sample size, G*Power software (version 3.0.10 Universität Düsseldorf, Dusseldorf, Germany) was used. In power analysis, the power rate of the study was calculated to be 90% with an error margin of 0.005 and a confidence limit of 85%, and 76 individuals were included in this study.

Ethical Approval

The necessary permission was received from Kırıkkale University Clinical Research Ethics Committee for carrying out the study (Ethics Committee number: 2020/10, 2020.07.07). The informed consent form was signed by each individual.

Inclusion and Exclusion Criteria

Individuals who were 65-80 years old, agreed to participate in the study, had no cooperation problem, individuals with the Mini-Mental State Examination score ≥24 and older adults who were independent in mobilization and not using any gait aid were included in the study. Patients who had a cardiac disease (a history of angina pectoris, acute myocarditis, myocardial infarction in the last three months, aortic aneurysm), a history of pulmonary embolism and deep vein thrombosis, cerebral aneurysm or intracranial hemorrhage in the last three months, acute retinal hemorrhage or previous ophthalmic surgery, active infection, malignancy, multiple organ failure, terminal disease, a history of fracture in the lower and upper extremities in the last three months, severe hearing and visual loss, a diagnosis of Alzheimer's disease, Parkinson's disease, dementia, benign paroxysmal positional vertigo, and older adults who had received exercise training during the pandemic and in the last six months were not included in the study.

Measurement And Data Collection

Within the scope of the evaluation, face-to-face interviews were held with individuals in company with an experienced physiotherapist. Firstly, parameters such as individuals' age, sex, marital status, nutritional characteristics, habits, smoking status and alcohol consumption, aids used, background information, family history, education status, social insurance, previous or current job, history of falls, and medications were questioned. The balance and dual-

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task performances of the individuals were assessed by the Tinetti Balance and Gait Test, Timed Up and Go Test (TUG), and Dual-Task Questionnaire (DTQ), and their cognitive states were evaluated by the Mini-Mental State Test. The individuals were requested to perform the tests by transferring an object from one hand to the other as an additional motor task and by counting two by two as an additional cognitive task.

Tinetti Balance and Gait Test: In this test, which is used to assess the balance, the gait score is maximum 12 points, the balance score is maximum 16 points, and the total score is 28 points. Individuals receiving 26 points and below are thought to have a problem. In previous studies, it has been stated that the risk of fall increases as the score decreases. Its Turkish validity and reliability studies were conducted by Ağırcan (15).

Timed Up and Go Test (TUG): The participant is told to stand up while sitting by leaning back on a standard chair (height 43 cm), walk 3 meters, turn back, come back, and sit on the chair. The score is determined by time (16).

Dual-Task Procedure
-Motor Function: During the TUG, a globe-shaped (ball) object was added, and the individuals were asked to transfer it from one hand to the other during the test for the evaluation of their motor functions.

-Cognitive Function: During the TUG, counting two by two was added for the evaluation of individuals' cognitive functions.

Dual-Task Questionnaire (DTQ): It consists of 10 questions, and it was used to measure how often the directed questions had been encountered in the last two weeks. In response to the questions, the individuals were requested to prefer one of the five options between very frequently and never (17).

Mini-Mental State Examination (MMSE): The MMSE is a test used frequently to evaluate the cognitive functions of elderly individuals, and it can be applied easily within 5-10 minutes. The MMSE is composed of five main headings; orientation (10 points), memory (3 points), attention and calculation (5 points), recall (3 points), and language (9 points). The MMSE includes 11 items evaluated over a total of 30 points. A score between 27 and 30 points is considered to be within normal limits, a score between 24-27 points as mild cognitive disorder, and a score of <24 as severe cognitive disorder (18).

Statistical Analysis
Statistical analysis was conducted by utilizing SPSS version 24 software. The sociodemographic characteristics of the individuals were analyzed with descriptive statistics. Data distribution normality was assessed by the Kolmogorov-Smirnov test. It was determined that the variables were not distributed normally. The variables obtained from the measurements were expressed as a percentage (%) and as the median minimum-maximum. The Mann-Whitney U test was performed to compare the findings of both groups. The relationships were analyzed by Spearman's correlation analysis (less than 0.3 (weak), 0.3 to 0.5 (mild), 0.6 to 0.8 (moderately strong), and 0.8 and above (very strong). $p < 0.05$ was accepted as statistical significance (19).

RESULTS
This study included a total of 76 older adults (age 70.4±5.4 years). The sociodemographic and clinical data of the individuals are presented in **Table 1**. According to Spearman's correlation analysis, a moderate-level correlation was identified between the DTQ and the Tinetti Balance and Mobility Scale and its subgroups, and a low-level correlation was observed between the DTQ and TUG motor function and a low-level correlation was found between the MMSE and DTQ and Tinetti Balance score (p<0.005) **(Table 2).** No correlation was detected between the DTQ and TUG cognitive.

Table 1. Clinical characteristics of the older adults (n=76).

Age (years), med (min-max)	70 (65-87)
BMI (kg/m^2), med (min-max)	29.6 (17.9-42.2)
MMSE, med (min-max)	25 (24-31)
Gender, female, n (%)	45 (59.2)
Chronic disease, n (%)	59 (77.6)
Hypertension, n (%)	28 (36.8)
Diabetes mellitus, n (%)	18 (23.7)
Another, n (%)	13 (17.1)
Falling history, n (%)	22 (26.3)
Use of assistive devices (stick), n (%)	10 (13.2)
Dual Tasking Questionary-T score, median (min-max)	1.2 (0.1-3.4)
TUG $_{Motor}$ (sec), median (min-max)	11.16 (6.12-27.33)
TUG $_{Cognitive}$ (sec), median (min-max)	12.44 (4.7-34.8)
Tinnetti $_{Total\ score}$, median (min-max)	23 (7-28)
Tinnetti $_{Balance\ score}$, median (min-max)	13 (4-17)
Tinnetti $_{Walking\ score}$, median (min-max)	10 (2-13)

BMI: Body Mass Index; MMSE: Mini Mental State Examination; TUG: Timed Up and Go Test; n: Number

When the DTQ, functional mobility and balance were compared in terms of sex, there was a difference only in the TUG cognitive values. The TUG cognitive times of males were observed to be longer (p<0.005) **(Table 3).**

DISCUSSION

The results of this study demonstrated that there was a correlation between the DTQ and balance and functional states. With the COVID-19 pandemic, the sudden initiation of quarantine implementation for older adults has brought about a radical change in the lifestyle of the population. These changing lifestyles and behaviors have resulted in decreased physical activities and sedentary life. During this period, it is important to reduce the side effects of sedentary life and decreased physical activities (20). In the normal aging process, the cognitive functions, balance, and mobilities of individuals decrease (21,22). Considering this situation, which particularly emerges with the normal aging process, as well as the lockdown of older adults and a decrease in their activity levels during the COVID-19 pandemic, muscle weaknesses and accompanying postural and balance problems have become inevitable.

The decrease in individuals' balance, cognitive and motor functions with age has been indicated in the studies (21-23). Matson T et al. (24) examined how balance changed during functional tasks in elderly individuals. They measured the ground reaction forces and all the body movements of 38 older (60-89 years) and 21 young (18-30 years) adults living independently during their standing, sit-stand up, sit-stand up-gait initiation and lifting functions. Age was significantly correlated with balance measurements for both participating samples; net root mean-square of center of pressure and minimum stability margin tended to increase and decrease with age, respectively. In general, the results showed that balance decreased with age, and contrary results indicated cautious behaviors and decreased physical capacity (24). As a result of our study, the average balance score of the older adults during the COVID-19 pandemic was found to be 23. This score indicates that older adults have balance problems and risk of fall. Moreover, a correlation was identified between dual-task activities and balance and mobilities. This shows that balance and mobilities decrease during dual-task activities.

In the study involving 45 individuals aged above 65, Hollman J et al. (25) examined the effect of sex on dual-task gait performance in older adults. While gait speed decreased and variability in gait speed increased in both groups during the dual-task gait, males walked with more variability than females during the dual-task gait (25). As a result of this study, similar to the study conducted by Hollman et al. (25), dual-task activities, functional mobility, and balance results were similar in both sexes, but TUG cognitive times were found to be longer in males.

Smith E et al. investigated the effects of dual-task on quantitative TUG performance in elderly adults aged above 65. They stated that the TUG performance was not correlated with the history of fall; however, cognitive dual-task affected almost all the TUG parameters (26). In the study that involved 537 older adults and investigated the correlation of the TUG test score and dual-task with the history of fall, they found that the single-TUG score and dual-TUG value were significantly correlated with the history of fall. It was thought that dual-task performance

Table 2. The correlations between Dual Tasking Questionnaire and Balance in older adults

	DTQ	TUG$_{Motor}$	TUG$_{Cognitive}$	Tinnetti	Tinnetti$_{Balance score}$	Tinnetti$_{Walking score}$	MMSE
DTQ	1						
TUG$_{Motor}$	**0.353***	1					
TUG$_{Cognitive}$	0.146	**0.547***	1				
Tinnetti	**-0.507***	**-0.299***	-0.193	1			
Tinnetti$_{Balance score}$	**-0.473***	**-0.315***	-0.061	**0.868***	1		
Tinnetti$_{Walking score}$	**-0.421***	-.0.182	-0.064	**0.797***	**0.420 ***	1	
MMSE	**-0.327***	-0.215	-0.092	0.213	**0.229***	0.213	1

*p < 0.05; DTQ: Dual Tasking Questionnaire; TUG: Timed Up and Go Test; MMSE: Mini Mental State Examination.

Table 3. Comparison of Dual Tasking Questionnaire and balance scores of older women and men

	Women (n=45) Median (min-max)	Men (n=31) Median (min-max)	P
DTQ	1.30 (0.50-3.40)	1.10 (0.10-2.60)	0.436
TUG$_{Motor}$	11.3 (6.1-18.2)	10.5 (7.1-27.3)	0.840
TUG$_{Cognitive}$	10.8 (4.7-27.4)	14.9 (8.3-34.8)	**0.041***
Tinnetti	22 (7-27)	24 (9-28)	0.134
Tinnetti$_{Balance score}$	13 (5-16)	14 (4-17)	0.133
Tinnetti$_{Walking score}$	10 (2-12)	10 (2-13)	0.562

*p <0.05; DTQ: Dual Tasking Questionnaire; TUG: Timed Up and Go Test

would provide an additional value to the evaluation of the fall when compared to the single TUG test (27). In a study carried out on elderly adults by Tand et al. (28), the cut-off point of the TUGmanual and TUGcognitive test was determined to be 8.2 sec (sensitivity 83%) and 14.3 sec (sensitivity 29%), respectively. In our study, the TUG motor and cognitive values of older adults were found to be 11.16 sec and 12.44 sec, respectively. This result was found to be similar to the literature.

Sixty-seven individuals, who could walk, were included in the study, which investigated the correlation between balance and dual-task in older adults above 80 years of age. The balance was evaluated by the standing on one foot and Tandem tests, and dual-task was assessed with the TUG test together with cognitive and motor tasks. A significant correlation was found between balance and dual-task parameters. It was concluded that noticing the effect of dual-task on balance and risk of fall could help healthcare professionals to optimize the precautions taken to protect older adults from falls and the evaluation and planning of interventions (29).

Furthermore, in a review investigating the effect of social isolation caused by COVID-19 in the elderly on health, social participation was associated with a better life quality, more muscle mass, balance, cognitive and lower comorbidities and disability in the elderly (30).

As a result of this study, a correlation was identified between dual-task activities and TUGMotor in older adults during the COVID-19 pandemic. It was concluded that there was a decrease in functional mobilities during the dual-tasks. Public institutions have been shut down as a preventive precaution during the COVID-19 pandemic. Family visits and social participation have been forbidden for older adults (31). In such a situation, a decrease in social interaction produced by social distance may create an adverse effect on both the mental and physical health of the elderly since social participation is limited in public institutions and family activities (32). Therefore, it is necessary to provide older adults with various exercise training at home. During the quarantine period, exercise training does not only improve the physiological function and reserves of most of the organ systems in older adults but also has importance in struggling against the physical and mental outcomes of COVID-19 (33).

The study was carried out in only one province in Turkey, which is the limitation of our study. Future studies should be planned to reach older adults across Turkey. The low number of older adults is another limitation of the study. There is a need for studies to compare with larger sample sizes before and after the COVID-19 pandemic period.

CONCLUSION
During the COVID-19 pandemic, there has been a limitation in the functional mobility of older adults

due to lockdown and the restriction of their existing activities. Moreover, adverse effects have been observed in dual-tasks in balance and daily living activities of both female and male elderly individuals. We believe that appropriate intervention and physical activity programs should be recommended to older adults who have to stay at home during this period. Therefore, it is highly important not to completely disrupt the lifestyle of particularly older adults who are in the risk group and to maintain an active lifestyle at home by preventing a sedentary life during the quarantine period. Furthermore, special attention is required for the exercise training provided to elderly individuals. Therefore, it can be emphasized that exercises will be done by the telerehabilitation method with older adults who are at home and in company with an expert.

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