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Dual-task and risk of falls in elderly people a cross-sectional study

Abstract

Older adult population has been increasing in the last decades. The Time Up and Go (TUG) is used in the exploration of elders and can discriminate the risk of falls. The aim of the study is to understand if aging people have more risk of falls while performing a dual-task in their daily life activities.

A cross-sectional study with older people of the general community between 60-85 years was done. Participants were instructed to perform the TUG without Dual Task (DT), and with a cognitive and a motor secondary task.

TUG with and without DT (motor and cognitive) presented shows statistical significance. There is an increase in time to perform TUG associated with a second task in elderly people. TUG tests can help in the multifactorial assessment of risk of falling.

Keywords: motor and cognitive, elderly people, cross-sectional study, dual-task

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Abreactions: WHO, world health organization; TUG, timed up and go, DT, dual-task

Introduction

The amount of population reaching the age of 60 has been increasing in numerous countries over the last decades. Moreover, around the year 2050, there is a prediction of two billion older adults around the world.[1] During senescence, the body experiences several modifications in both organs and tissues, with a decrease of the activity level, pointing to geriatric syndromes, increased risk of falls, and associated frailty.[2] The World Health Organization (WHO) definition of fall is "an involuntary event occurring loss-of-balance bringing the body to the ground or other surfaces". Regarding this subject, the highest mortality rates associated with falling are for persons over 60 years.[3]

On the other hand, The Timed Up and Go (TUG) test is commonly used in the exploration of elders[4] and has been shown to have validity[5] and correlation with the Berg Balance Scale[6] and gait speed.[7] TUG also can discriminate the risk of falls.[8,9]

Regarding activities of daily living, people typically need to accomplish concurrent tasks, such as walking and interacting with another person -talking or using the cell phone- and transporting items.[10] the dual-task (DT) paradigm was constructed to review the relationship existing between two significant structures: motor and cognitive systems. The DT paradigm defines a primary task, as -for instance- gait, associated with a secondary task that could be cognitive or motor.[11] Furthermost falls occur once elderly individuals accomplish cognitive or motor tasks related to gait throughout everyday activities.[12]

The aim of the study is to understand if aging people have more risk of falls while performing a dual-task in their daily life activities.

Methods

Design

For this descriptive study, participants signed consent based on the research ethical review panel of Alcalá University, Madrid, Spain.

Subjects

Elderly people enlisted from the general community, following these criteria: age between 60 and 85 years, able to walk 10 meters, and absence of diagnosis of cognitive deficits. Subjects were excluded if they had medical treatment that could influence with motor or memory performances or had degenerative neurological diseases.

Variables

Age, gender, and medication were collected by interviews. For the TUG valuation, an analog watch, and a 43-cm high wooden chair were used. There was a 3-meter long path delimitated by a cone on the ground. Participants were instructed to turn around when the cone was reached. To analyze the results, the mean of three attempts of the task was obtained. The tasks were performed 1) Without DT; 2) Cognitive DT and 3) motor DT. This measure was taken at both the usual and maximum speed. Concerning the cognitive DT, subjects of the study were asked to subtract backward from a random number, subtracting 3, successively, while for the motor DT, they carried a glass of water, maintaining their elbows at 90 degrees, and were instructed not to drop the glass.

Statistical analysis

Three variables were analyzed: age, gender, and TUG performance. Tests for uniformity were done using the SPSS software for Windows. Descriptive statistic was carried out using non-parametrical tests to assess differences between the groups according to their TUG execution with and without DT. The significance standard was set at 5%.

Results

Descriptive data of the 10 participants are presented in Table 1. Most of the subjects were women (n=8,80%).

Table 1 Descriptive data

	N	Mean (SD)	Range
Age	10	73,2 (8,55)	62-86
Tug	10	8,24 (2,38)	5,47-12,62
Motor tug	10	8,91 (2,61)	5,71-13,94
Cognitive tug	10	10,24 (3,51)	5,87-17,01

TUG with and without DT (motor and cognitive) presented in Table 2 shows statistical significance.

Table 2 Comparisons between TUG with and without DT

	Tug- motor tug	Tug-cognitive tug
Z	2,8	2,8
Sig	0,005	0,005

Discussion

The results of the current study indicated that there are important differences while performing TUG with and without DT.

Hofheinz & Schusterschitz[13] evaluated in their study a sample of community-dwelling elderly aged from 60 to 87 years. Their results showed an average time of 8.39 seconds for the TUG at usual speeds.[13] According to the current study, the time spent in performing the TUG was similar and also better than other studies with the same age population.[14]

In a study conducted by Shumway-Cook et al.[9] scores acquired for the TUG-DT denote that when executing a simultaneous motor or cognitive task during gait, their participants of community elderly people took additional time to perform the tasks.[15] In our study, the time used to execute the TUG was more influenced by the cognitive, than by the motor DT.

Hofheinz & Schusterschitz[13] reported in their study an average time of 11.5 seconds to complete the manual DT, which consisted of carrying a glass filled with water up to 1 cm from the edge, taking it from a 70-centimeter high table, walking, turning back, replacing the glass back on the table, and then sitting back.[16] In other studies exploring DT paradigm, the authors include different possibilities of motor tasks such as carrying a tray with three glasses of water, transferring coins between pockets,[15,16] transporting a glass of water,[17] or calling a phone number.[18] In our study the motor task was easier and that could be the explanation for the better scores. The evaluation of different tasks would be interesting for future studies to describe differences between the Motor TUG while doing diverse motor task.

Average time of 9.8 seconds, similar to the findings of our study, was obtained for one cognitive DT test that consisted of successively subtracting 3 from the numbers 100, 90, 80, or 70.[16] The cognitive reserve should be considered as a theoretical background considering education as a surrogate for this concept. Moreover, education is also associated with better health and physical conditions and, consequently, better performance in TUG-DT.[19,20] It would be engaging for future studies to describe differences between educational levels.

Other researches also describe a reduction in mobility ability in the elderly when executing different motor tasks concurrently with gait. These results could be cleared up by the intrusion of mental functions, which need to split attention between the two tasks.[15,20] A possible limitation of the present study was the limited sample.

Regarding to the aim of the study, cut-off points for detecting patients with an increased risk of falls in independent-living, varied between 8.1-16 seconds for performing TUG at a comfortable speed.[21] Older adults in this study have scores between these marks, but TUG cannot be the only test to assess risk of falling because it has been shown to be multifactorial.[1,21]

Conclusion

There is an increase in time to perform TUG associated with a second task in elderly people. This study tries to provide values that could be used to identify elderly people with risk of falls under DT.

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None.

Conflicts of interest

The authors declare no conflicts of interest.

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