EVALUATION THE TENDENCY TO FALLS IN ELDERLY SERGIPE

Avaliação da tendência a quedas em idosos de Sergipe

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ABSTRACT

Purpose: to evaluate and characterize the balance during gait using the Dynamic Gait Index and Time Up and Go Test Brazilian version and the interference of the variables gender, age and falling events. **Methods:** this is a clinical research, descriptive, qualitative and quantitative to analyze the results of applying the Dynamic Gait Index and Time Up and Go Test -Brazilian version, in 60 volunteers of both sexes and aged between 60 and 83 years (mean = 68, 57 ± 5.94). The research project was appreciated by the Ethics Committee of the institution and followed the recommendations of the opinion 196/96. For data analysis we used descriptive tests, Mann-Whitney and Chi-square (X^2), and was adopted at $p < 0.05$. **Results:** we found that 37 (61.7%) of the 60 subjects scored with indices below the normal range in Time Up and Go Test while Dynamic Gait Index in 19 (31.7%) volunteers had rates below the cutoff point. There was a statistically significant association between Dynamic Gait Index and the variables of age and falls. In this study the Time Up and Go Test showed statistically significant association with the variables gender and falls. Values statistically significant were found in the study of the all variables. **Conclusion:** it was a frequent finding functional alteration of gait and balance, and most of the sample tended to fall. Age was associated with changes in gait and balance, gender with tendency to falls, and reports of events falls stunted with both instruments applied. The results presented here underscore the need for scientific and professional training directed at primary and secondary care in the elderly population.

KEYWORDS: Aged; Gait; Postural Balance; Questionnaires; Accidental Falls

■ INTRODUCTION

It has been observed the increase of the elderly population in developing countries. In Brazil the number of subjects over 60 years of age increased from 3 million in 1960, to 7 million in 1975, and 18 million nowadays. The decrease in fertility scores and decrease of the mortality in Brazil has produced changes in the age pattern of the population. The typical triangular shape of the population with a broad base has been modified showing characteristics of a society undergoing rapid aging. In 2008, while children 0-14 years of age accounted for 26.47% of the population, the number of subjects aged over 65 years accounted for 6.53%. In 2050, the first group will represent 13.15%, while the elderly population will exceed 22.71% according to the Brazilian Institute of Geography and Statistics (IBGE) [1].

In this context, the myth that chronic diseases or conditions, and disabilities resulting from them it is regular and in aging population. Generally, the elderly group presents multiple chronic diseases that last for several years and demand specifically health care, medicine and evaluations. It is believed that senility is not a disease, just another period in life with their own characteristics and values at the individual changes that occur in the structural, such as metabolism, balance, immunity, nutrition, functional mechanism, intellectual and emotional conditions[2].

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Aging is a process that is characterized by the natural degradation or changes in several systems as musculoskeletal, cardio respiratory, neurological, vestibular, visual, proprioceptive, cognitive, motor coordination and concentration. The combination of multiple changes associated with aging increase the possibility of a fall[3].

The incidence of falls in patients aged over 65 years is 25 % but reaches almost 50 % when they present elderly aged 80 years[4]. However, 2010 data estimate that 30 % of people over age 65 relate a fall event at least once a year and it could be represent around 70 % of accidental deaths in people aged 75 years or more[5].

The instability and postural imbalances also result from muscle weakness that eventually compromise the gait, that presents slow, cautious, dragged promoting greater risks to falls[6].

It is important to assess the factors that can lead to a dysfunction of the vestibular system, such as co - morbidities and the use of medicine in elderly subjects with and without complaints of balance dysfunction. This evaluation can be performed by applying the Dynamic Gait Index (DGI) and Timed Up and Go Test (TUGT) that aim to assess the balance through gait in different contexts.

The DGI is a simple and practical instrument to check the balance in senile age, whose neuropsychomotor integrity is essential for the normal performance of tasks that requires ability and neurological motora[7].

TUGT also known as test stand and walk , it's simple and easy to apply , in which it is possible to identify the risk of falls from the record time displacement of a subject out of a seated position, walking and returning to the starting position[8].

It is noteworthy that both tests are characterized by functional assessment, which simulates the demands involved in the ability to control the body balance and gait in different contexts. It was pointed out that the choice of these protocols would be justified by the low cost, easy to apply, the short time duration and few types of equipment, as well as the diagnostic and prognostic value assigned to them, as would be strongly predictive of the risk of falls in the elderly.

Based on these, the aim of this study was to analyze the performance of the elderly group on TUG and DGI test to assess the tendency to fall and the interference of the age, gender and self-report of falls events.

METHODS

This project was appreciated and approved by the Ethics Committee of the institution by the CAAE 0197.0.107.000-09 and followed the Brazilian Resolution 196 of 10 October 1996 for research with humans being.

This is a clinical trial, descriptive, qualitative and quantitative for analysis the results the application of the Dynamic Gait Index (DGI) and Time Up and Go Test (TUGT), Brazilian version, in 60 volunteers of both gender and age between 60 and 83 (mean = 68.57 , SD ± 5.94) years old at the Center for Health Care Family from Itabaiana city.

All volunteers were interviewed and all factors of inclusion and exclusion were listed, highlighting key complaints of loss of balance and report of falling events.

We included all the volunteers who understood all tasks of the test; that presented independent gait and were not using psychotropic drugs. We excluded subjects with musculoskeletal weakness and wear orthosis or prosthesis, since the gait analysis is performed without the aid of human or instrumental support, the same occurring with TUGT[7, 8]. The context of the DGI is performing tasks on gait. So, neurological, psychological, mental disorders and use of psychotropic medicine interfere on DGI.

The same criteria were adopted for the realization of TUGT that also involves the march of departure and arrival of a fixed point, and in which the execution time of the activity is recorded in seconds. Thus, all selected volunteers were able to perform ambulation at the time of evaluation.

For the application of the DGI, the Brazilian version, we used two rubber cones 50cm tall and a shoes box with 40X 20X15 cm to carry out the tasks during gait as recommended the autor[9] and are described below in figure 1. The TUGT need a chair with arms and back support, stopwatch, tape measure and a rubber cone. In this test, the subject was demanded to move from sitting to standing position and walk to the rubber cone, around it and sit back in the chair, making a walk of six (6) meters[9].

Tasks of the Dynamic Gait Index (DGI)	
Task 1	March on flat surface
Task 2	Change in gait speed
Task 3	Gait with horizontal movement (rotation) of the head
Task 4	Gait with vertical movements (rotation) of the head
Task 5	March and turning on its own axis body (pivot)
Task 6	Go over the obstacle
Task 7	Bypass obstacles
Task 8	Up and down stairs

Figure 1 - Distribution of tasks DGI Brazilian version

The tasks are implemented by the same evaluators and three blinded observers to evaluate the performance of each volunteer. All observers were submitted a prior training in order to perform the assessment and ensuring reliability results on the research. They were instructed to do not comments to each other and to establish verbal contact with the evaluated or evaluator.

The observers for DGI testing were classified as observer 1 (O1), observer 2 (O2), observer 3 (O3), and each observer evaluated each subject submitted to the test. For statistical analysis it was preserved the total number of responses obtained from the application of the tests.

The subject misunderstood was read again, and when necessary, it was clarified with another words or expressions, until the volunteer fully understood the instruction. Where, after explaining the topic, the volunteer remained doubtful, the task was demonstrated by the investigator and performed by the volunteer.

The DGI results were based on the concepts of normal, minimal, moderate or severe commitment of the gait, while the eight tasks were performed. According to suggestions of the author [9], the maximum score was 24 points and a score of 19 points or less predicted risk for falls. Each volunteer was evaluated by ordinal scale consisting of 4 categories, scoring according to their performance in each task: 3 = Normal gait, 2 = mild impairment, 1 = moderate impairment and 0 = severe impairment, as recommended by Brazilian version[9].

The TUG test consists of a single task, in which the volunteer begins the test seated until given the command "go". After, it should get up from the chair and walk a linear path of 3 meters with safe steps, skirting the cone and returning toward the chair and sit down again. The time of this route is timed from the command "go" and ended when the volunteer returns to the starting position.

Performance was considered regular when the volunteers done it less than 10 seconds, and above this value it was considered irregular, following the validated version[8].

For data analysis we used descriptive tests to assess correlation with gender, the results of each test, age and prediction to falling events; nonparametric Mann -Whitney test and the chi -square test. Data were analyzed by SPSS 20.0 software.

All significant data were highlighted with the use of an asterisk (*) and the parameters of significance remained within the limits of the statistical study of 0.05.

■ **RESULTS**

The population consisted of 60 healthy volunteers, 42 females (70 %) and 18 males (30 %). The ages ranged from sixty to eighty -three, with an average of 68.57 years old.

The final scores from the application TUGT showed 37 subjects (61.7%) of the sample classified as altered and 23 (38.3 %) it was regular. On the DGI, 19 (31.7 %) of the sample volunteers were abnormal and 41 (68.3 %) showed normal parameters.

On the table 1 it was presented the results for the association study for age, falls events and the total scores on the DGI for the 60 volunteers evaluated, proving the association with age and falling events with p = 0.012 * and 0.006 * respectively.

Table 1 - Percentage distribution of simple and absolute results of DGI minimum, maximum, standard deviation and p-value of 60 elderly volunteers

	DGI	N	Minimum	Maximum	Average	Standard Deviation	p-valor
Age	Changed	19	61	81	71,53	6,441	0,012*
	Unchanged	41	60	83	67,20	5,236	
FallS	Changed	19	0	4	1,11	1,243	0,006*
	Unchanged	41	0	4	,44	1,050	

Mann- Whitney (p< 0,05).
Legend: DGI = Dynamic Gait Index
N = Volunteers

The sheer and simple percentage distribution of the results of DGI with minimum and maximum scores, standard deviation and p - value of 60 elderly volunteers.

On the table 2 it was presented the results for the association study forage, falls events and total scores on the TUGT of the 60 volunteers evaluated, showing the association with falls events with p = 0.000 *.

Table 2 - Percentage distribution of simple and absolute TUGT results in minimum, maximum, standard deviation and p-value of 60 elderly volunteers

	TUGT	N	Minimum	Maximum	Average	Standard Deviation	p-valor
Age	Changed	37	60	81	68,97	6,265	0,583
	Unchanged	23	61	83	67,91	5,468	
FallS	Changed	37	0	4	1,03	1,323	0,000*
	Unchanged	23	0	1	,04	0,209	

Mann- Whitney (p< 0,05).
Legend: TUGT = Timed Up and Go Test

The sheer and simple percentage distribution of the results of TUGT with minimum and maximum scores, standard deviation and p - value of 60 elderly volunteers.

On the table 3 it was presented the results for the study of association of gender with the results obtained in the both tests showing that TUGT was associated with gender (p = 0.018 *).

Table 3 - Percentage distribution of simple and absolute application of chi-square analysis TUGT and DGI with respective p value of 60 elderly volunteers

	TUGT		p-valor		DGI		p-valor
	Male	Female			Male	Female	
Changed	7 (18,9%)	30 (81,1%)		Changed	7 (36,8%)	12 (63,2%)	
Unchanged	11 (47,8%)	12 (52,2%)	0,018*	Unchanged	11 (26,8%)	30 (73,2%)	0,431
Total	18	42			18	42	

Chi-Square (p<0,05*).
Legend: TUGT = Timed Up and Go Test
DGI = Dynamic Gait Index

The percentage distribution of simple and absolute application of chi -square analysis TUGT and DGI with respective p value of 60 elderly volunteers.

On the table 4 it was presented the results for the study of correlation between the two tests, showing that whoever was abnormal TUGT been changed in DGI (p = 0.000*), whereas the reverse does not apply.

Table 4 - Percentage distribution of simple and absolute application of chi-square analysis of the association TUGT and DGI with respective p value of 60 elderly volunteers

Teste		TUGT				Total	p-valor
		Changed		**Unchanged**			
		N	**%**	**N**	**%**		
DGI	Changed	18	30	1	1,7	19	
	Unchanged	19	31,7	22	36,6	41	0,000*
	Total	37		23		60	

Chi- square (p<0,05*)
Legend: TUGT = Timed Up and Go Test
DGI = Dynamic Gait Index

The percentage distribution of simple and absolute application of chi -square analysis of the association TUGT and DGI with respective p - value of 60 elderly volunteers.

■ **DISCUSSION**

The analysis and correlation study of the functional balance of elderly in association to the events of fall can be considered a hard task, especially when one takes into account the variety of risk factors associated with aging process that result in functional losses and thus increase the risk of falls [10,11].

In this study it was observed that the age and gender followed the development described by Socio-Demographic and Health Indicators in Brazil which showed that females are more numerous and present more longevity than males[1]. Despite that it was a convenience sample, the results achieved converge with studies that reveal a process of feminization of aging, subsidized by a higher mortality rate in males and increased life expectancy in females [1,12].

From the results obtained from the DGI, we can verify that 19 (31.7 %) of 60 volunteers scored below 19 points, which was considered high risk for future falls. Thus, the described findings corroborate other studies that showed a high incidence of difficulty with balance and gait among older adults that is justified by the aging process, in which the dysfunctions of the skeletal muscle and sensory system that contribute to instability and occurrence changes [13,14].

It is observed that 37 subjects (61.7 %) were into the group at high risk for falls TUGT and 23 (38.3 %) volunteers completed the path above than 10 seconds which is normal range or low risk for falls. Studies [15,16] indicate that the change on gait and balance in the elderly is very common, which corroborated the findings presented in this paper. In other hands, researches have shown that the volunteers showed no gait dysfunction, which could be explained by the fact that their survey had been evaluated patients with peripheral vestibular dysfunction[17] that presented no changes on their balance during the evaluation.

In the analysis of the DGI, it was verified significant correlation between the total scores and the age. So how more older the volunteers, more lower your total score, which corroborated some findings that showed age as a factor risk of altered test [13,18-21]. Against to the analysis presented here, other research has found that young patients apparently showed lower scores in DGI compared with older patients [22].

In this study we verified no association between TUGT and age pointing that not always the older volunteer presented worst score in the test. It was verified that TUGT did not reveal future risks for fall, which was discordant with other studies that showed interference from age [14-17,20].

The complaints of difficulty in balance and gait, as well as the previous history of falls have been identified as risk factors for the elderly. Studies have investigated the risk of future falls significantly increases as the same proportion to increasing the

age, what could be a problem for public health due to the spread of the number of elderly people [23,24].

There was a significant association between the total scores on the DGI and falling events, proving that volunteers with reported falls in the previous 12 months had a poorer performance in the test, which was reverse to the findings in other studies [25,26].

It was found a significant association between TUGT and falls which was agree consistent with studies[15,16,27,28] that proved that TUGT is a good test to assess mobility and predict the risk of future falls.

Other researchers reported that elderly [15,16,27,28] no reports of falls were significantly faster in execution TUGT compared to the elderly who had episodes of recurrent falls. Other[13] show that elderly that no reports falls perform the TUGT in a shorter time compared with those who had episodes of falls in the last year, which corroborated with the findings described and disagreed of the other research[15].

It was found in the study where gender did not affect the performance of the sample. It was observed that on the demand of the tasks of the DGI, volunteers females obtained similar results to the male, which agreed with the findings published previously[13]. On the other hand, studies have found that female volunteers performed better when compared with male[20]. However, other studies reported that elderly females are more leaning to changes on gait and balance due to lower lean mass and muscle strength, greater predisposition to chronic diseases and exposure to domestic activities [29,30].

It was verified a significant association between the gender and TUGT. In the analysis of the tasks during the test, the females volunteers had worse results, which agreed with the previously findings[30].

It was notice association between these tests that the volunteers highlighted as abnormal TUGT results have been the same pattern at the DGI. However the reverse cannot be verified, which allows us to infer that the DGI was a good choice to predict future falls. No references were found to do comment.

Nevertheless, this study converged with research that showed that both the DGI as TUGT instruments are applicable in elderly populations, because it has strong correlation [9,28].

Other studies showed the balance changes as a source of morbidity and mortality in people aged over 75 years, which fall could be the mainly complication, caused by intrinsic and extrinsic factors as the loss of autonomy and quality of life, what should become the object, not only for future research but priority care in the processes of primary and secondary intervention population[5].

■ CONCLUSION

It was a frequent the functional alteration of balance and gait, and most of the sample presented tendency to fall. The age was associated with changes in gait and balance, the gender with risks to fall and the reports of events falls stunted with both tests. The results showed the need for scientific and professional improvements regarding at primary and secondary care in the elderly population.

RESUMO

Objetivos: analisar o desempenho de idosos no teste *Dynamic Gait Index* e *Timed Up and Go Test* para avaliar a tendência para quedas e verificar a interferência das variáveis idade, gênero e relato de eventos de quedas pregressas. **Métodos:** trata-se de uma pesquisa clínica, descritiva, de caráter qualitativo e quantitativo para analisar os resultados obtidos da aplicação do *Dynamic Gait Index* e *Timed Up and Go Test* - versão brasileira, em 60 voluntários, de ambos os gêneros e idade entre 60 e 83 anos (média= 68,57 ± 5,94). O projeto de pesquisa foi apreciado pelo Comitê de Ética da instituição e seguiu as recomendações do parecer 196/96 da Legislação Brasileira para pesquisa com seres humanos. Para a análise dos dados utilizou-se testes descritivos, teste de Mann-Whitney e Qui-Quadrado (X²), sendo que foi adotado o p<0,05. **Resultados:** verificou-se que 37 (61,7%) dos 60 voluntários pontuaram com índices inferiores ao padrão de normalidade no *Timed Up and Go Test*, enquanto, no *Dynamic Gait Index* 19 (31,7%) voluntários apresentaram índices inferiores ao ponto de corte. Ocorreu associação estatisticamente significante entre *Dynamic Gait Index* e as variáveis idade e quedas. Neste estudo o *Timed Up and Go Test* apresentou associação estatisticamente significante com as variáveis quedas e gênero. Encontraram-se valores estatisticamente significantes na comparação entre as variáveis. **Conclusão:** foi frequente a constatação de alteração funcional de equilíbrio e de marcha, e a maioria da amostra apresentou tendência para quedas. A idade associou-se com alterações de marcha e equilíbrio, o gênero com tendência para quedas, e os relatos de eventos de quedas pregressas com os dois instrumentos aplicados. Os resultados aqui apresentados reforçam a necessidade da formação científica e profissional voltada para a atenção primária e secundária da população idosa.

DESCRITORES: Idoso; Marcha; Equilíbrio Postural; Questionários; Acidentes por Quedas

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