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Mobility and dual task in healthy and neurological impaired older adults: cross-sectional study

Mobilidade e dupla tarefa em idosos saudáveis e com comprometimento neurológico: estudo transversal

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ABSTRACT

Purpose: compare the association between performance during the execution of dual tasks with cognitive function, mobility and clinical aspects and to present a proposal for a dual task evaluation on postural control in elderly participants. Materials and methods: Study cross-sectional. The participants were allocated into groups: healthy elderly group, individuals in the mild cognitive impairment group and individuals with Parkinson's disease. Motor evaluation was performed through the Foot Eight Walking and Timed Up and Go tests. Results: The Mild Cognitive Impairment Group presented a greater increase in time during the cognitive and motor tasks in Foot Eight Walking. For the cognitive Timed Up and Go, the Mild Cognitive Impairment Group presented longer times than the other groups, whereas the motor and simple Timed Up and Go required a longer time by the Parkinson's Disease Group. Conclusions: The nonrectilinear lane mobility test was useful as an evaluation method for the elderly participants and the strong correlation with already established mobility instruments is also highlighted.

Keywords: Aging, Parkinson's disease, Cognitive dysfunction.

RESUMO

Objetivo: comparar a associação entre desempenho durante a execução de duplas tarefas com a função cognitiva, mobilidade e aspectos clínicos e apresentar uma proposta de avaliação de dupla tarefa sobre controle postural em idosos participantes. Materiais e métodos: Estudo transversal. Os participantes foram alocados em grupos: grupo com idosos saudáveis, indivíduos com comprometimento cognitivo leve e indivíduos com Doença de Parkinson. A avaliação motora foi realizada pelos testes *Foot Oight Walking* e *Timed Up and Go*. Resultados: O grupo com comprometimento cognitivo leve apresentou maior aumento no tempo durante as tarefas cognitivas e motoras na *Foot Oight Walking*. Para o *Timed Up and Go* cognitivo, o mesmo grupo apresentou maior tempo que os outros grupos, enquanto o *Timed Up and Go* motor e o simples necessitaram de mais tempo pelo grupo com Doença de Parkinson. Conclusões: O teste de mobilidade de pista não retilínea foi útil como método de avaliação para os idosos participantes e a forte correlação com instrumentos de mobilidade já estabelecidos também é destacada.

Palavras-chave: Envelhecimento, Doença de Parkinson, Disfunção cognitiva.

1 INTRODUCTION

The world's aging population will increase by approximately fifteen times by 2025 and exceed the younger population by three times. In Brazil, the population over the age of sixty will be 50 million.[1,2] The process of senescence is characterized by declines in adaptive responses required for life activities, increases in susceptibility to disease, and intense physiological changes that can lead to impairment of physical and cognitive abilities, favoring cognitive decline, decreased mobility and restriction of participation in activities of daily living.[3,4]

Difficulty in the learning process and memory impairment are important characteristics of cognitive impairment.[5,6] The practice of engaging in physical exercises has a positive effect on cognition and minimizes the risk of developing mild cognitive impairment (MCI) and dementia.[4] In individuals with Parkinson's disease (PD), when cognitive tasks are added to the motor task, there is a more intense disturbance in postural control than occurs with visual deprivation, especially in individuals with a history of falls.[7]

Performing dual tasks (DT) is representative of several conditions performed during day-to-day activities and can result in adverse events such as falls.[8] Smith et al [9] concluded that the average gait velocity of healthy elderly individuals compared to those with cognitive impairment during the performance of dual motor or cognitive tasks was reduced by approximately 7.5% with an increased number of steps and a reduction in step length

Mobility tests with rectilinear, curvilinear or pivotal lanes are important for the evaluation of secondary task interference in the gait of elderly individuals; however, these variations tave been little explored in clinical practice and scientific research. In the Brazilian literature, no records of studies were found that correlated mobility activities involving dual tasks with performance in tasks involving rectilinear lanes and lanes with changes in direction and that compared healthy elderly individuals to those with MCI or PD. The purpose of this study was to describe and verify the associations between dual task performance, mobility and clinical-functional aspects in healthy elderly individuals and to describe and analyze cognitive task interference on postural control in healthy older adults and older adults with MCI or PD.

2 METHODS

2.1 STUDY DESIGN, RESEARCH SITE AND PARTICIPANTS

This research complied with the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)[10] and was carried out in the Motricity Laboratory of the Faculty of Health Sciences of Trairi (FACISA), of the Federal University of Rio Grande do Norte (UFRN). The study represents a cross-sectional and analytical design, with a nonprobabilistic convenience sample.

Participants were recruited between April and August 2017 from the waiting list at the FACISA Physiotherapy School Clinic and assigned to three distinct groups: individuals with MCI, individuals diagnosed with PD and elderly individuals without cognitive impairment or neurological disease.

Older adults aged 60 years or older, of both sexes, were included. The elderly patients with scores less than or equal to 22 points on the LCT and with a clinical diagnosis were included in the MCI group. The individuals with PD were clinically diagnosed, continued to regularly use dopaminergic medications, and were in an on state during the assessments. All participants presented a score greater than or equal to 3 on the functional ambulation category scale. Participants included in the healthy elderly group presented a score greater than or equal to 23 points on the Leganés Cognitive Test (LCT) and could not have a diagnosis of neurological or orthopedic disease. Individuals in the PD group were excluded if there was freezing over 10 seconds during the motor tests, and elderly individuals with severe impairments in mobility and balance, as well as those with an inability to understand simple commands and those who did not complete the evaluative tests for any reason, were excluded. For convenience, one group had more women than the others, and because this population had different characteristics and performances than men. And the sample size of each group being different may have been sources of bias.

2.2 MEASURING INSTRUMENTS AND QUESTIONNAIRES

A sociodemographic evaluation was performed through a semistructured form (sex, alcoholism, education, physical activity). The motor and cognitive assessment instruments were then applied and are described below. The Leganés Cognitive Test (LCT) was developed with the purpose of evaluating cognition, without an influence of schooling. Scores less than or equal to 22 points have been used as a cutoff point to indicate cognitive impairment.[11] The Cognitive Change Questionnaire (CCQ) was used to detect changes in cognitive aspects, and the higher the score was, the greater the cognitive impairment.[12] The Functional Ambulation Category (FAC) scale was used to classify the degree of independence during walking. The higher the score was, the higher the level of independence.[13]

The Short Physical Performance Battery (SPPB) was used to evaluate functional capacity through assessments of balance, gait speed and lower limb strength. The final score was composed of the sum of the scores acquired in the three evaluated domains, ranging from 0 (fully dependent) to 12 (maximum performance).[13] The World Health Organization Quality of Life (WHOQOL) assesses domains such as physical relationships and the environment. This instrument was developed by the World Health Organization and has been widely used to assess the quality of life of individuals under different conditions.[14]

The modified Hoehn and Yahr (HY)[15] scale comprises seven stages of classification of impairment based on signs and symptoms that allow classification of the level of disability due to PD. Stages 3, 4 and 5 are indicative of moderate to severe disability. The Unified Parkinson's Disease Assessment Scale (UPDRS)[16] was developed to evaluate the progression of PD. In this study, we used the domains related to daily life activities and motor exploration, which are sections II and III, respectively. The Dynamic Parkinson Gait Scale Instrument (DYPAGS) assesses the severity of gait disorders related to PD. This instrument consisted of eight dynamic tests in which the minimum score was 0 (normal gait), and the maximum score was 40 points (severe impairment).[17]

The 10-meter walk test evaluates the kinematics of walking and speed during the course. The 30-second test specifically evaluates the strength and endurance of the lower limbs, recording the number of times the participant raised the limbs during this time.[18] The Figure-of-8 walking (F8W) test assessed dynamic balance, speed, and gait functionality. [19]

The Timed Up and Go (TUG) test quantified functional mobility, transferability, and risk of falls in the elderly. Completion times greater than 11 seconds have been indicative of a greater risk of falls and worse gait performance.[20] The F8W and TUG tests were adapted to be performed in three ways: single gait, gait with a motor task and gait with a cognitive task, as explained below:

- Simple TUG - Get up from the chair, walk 3 meters and return to sit down;
- TUG with motor DT - Get up from the chair, walk 3 meters while holding a disposable cup containing 150 mL of water with the dominant limb, return and sit down;
- TUG with cognitive DT - Get up from the chair, walk 3 meters while pronouncing animal names, return and sit down;
- Simple F8W - Walk at a usual speed on a track in a figure-8 shape with a total length of 10 meters;
- F8W with motor DT - Walk at a usual speed on an 8-meter-long 8-meter track while wearing an apron with pockets on both sides that contained various sized buttons removing them from one pocket to place them in the opposite pocket; and
- F8W with cognitive DT - Walk at a usual speed on an 8-meter-long track with a length of 10 meters in length while pronouncing animal names.

2.3 POSTUROGRAPHIC EVALUATION

The participants were submitted to an evaluation of static postural control through computerized posturography. For the assessment of static balance with or without the cognitive task, the participants were instructed to remain standing barefoot on the posturography platform with the medial edges of the feet 5 centimeters apart. The subject was instructed to look at a point fixed on the wall 2 meters away. The therapist who assessed the posturography had no previous contact with the clinical-functional evaluation or with the participant. For all activities, the individuals were instructed to remain with their arms along the body and to not gesticulate during the task (figure 1).

The posturography frequency was adjusted to 100 Hz, and the measurements of center of pressure (CP) displacement, mean velocity of the oscillation, and standard deviation of the CP oscillation in the mid-lateral (PD-ML) and anteroposterior (PD-AP) directions in the different conditions were assessed over a duration of 60 seconds for each condition, as described in table 1. To avoid fatigue during the activities with greater complexity, the order of the conditions with the cognitive task was randomized with an application (random number generator). After the posturographic evaluation, all the elderly participants were evaluated with a questionnaire on individual preferences and perception of the activity involving dual tasks (5 questions). The posturographic evaluation was performed within 3 days after the end of the clinical and functional evaluations and lasted a maximum of 60 minutes. A flowchart of the study is shown in figure 1.

Figure 1 - Conditions that were performed on the force platform for 1 minute each.

1. Open eyes, absence of cognitive task.
2. Closed eyes, absence of cognitive task.
3. Verbal fluency: say the maximum of words with the letter 'F' in 1 '(we consider good performance above 11 appropriate responses).
4. Verbal fluency: say the maximum of words with the letter 'V' in 1 '(we consider good performance above 11 appropriate responses).
5. Speak animal names (we consider good performance above 11 hits).
6. Speak names of Brazilian cities (we consider good performance above 11 hits).
7. Count down from 100-3 for individuals with> 4 years of formal education. For illiterate individuals or <4 years of formal education the score was adapted to 100-1 (Example 110-3 and 110-1, respectively).
8. View a sequence of 4 geometric figures with different colors for 30 seconds (triangle = yellow, square = lilac, circle = green, rectangle = red) and identify the target figure among other geometric figures with different colors. The individual would answer 'YES' or 'NO' for the figures present or absent, respectively.
9. Evocation of 6 figures that were previously shown: turtle, bicycle, tree, dog, church and telephone.
10. Watch a video, count the number of red letters that appear and answer the total number at the end of 1 minute (figure II).
11. Speak the days of the week backwards until 30 seconds from the start of collection and stop.
12. Say the months of the year backwards.
13. Speak the months of the year backwards with instrumental music (Ludwig van Beethoven - Piano Sonata No. 14 In C Sharp Minor Moonlight).
14. Talk the months of the year back with Pop music (Shape of you, Ed Sheeran).
15. Listen to Carlos Drummond de Andrade's poems 'The No-Reasons of Love' and answer at the end how many times the word 'LOVE' was said.
16. Identify 5 existing differences between two figures.

2.4 PROCEDURES FOR OBTAINING DATA

Participants were recruited by phone contact and were evaluated on two separate days of the same week, in a room reserved at the Clinic School of Physical Therapy or at the Laboratory of Motor and Human Physiology at FACISA. On the first day, the semistructured sociodemographic data sheet, cognitive scales, UDPRS, HY, FAC and WHOQOL-BREF were completed. On the second day, the participants were submitted to the motor assessment with the other measurement instruments. The evaluations lasted 90 minutes per day.

2.5 STATISTICAL ANALYSIS

Statistical Package for the Social Sciences (SPSS) for Windows version 20.0 was used, and the level of significance adopted was 5%. Nonnormal distribution of the variables was found by the Kolmogorov-Smirnov test. The nominal and ordinal quantitative and qualitative variables for the sample were expressed in frequency, percentage, median and quartiles. The Kruskal-Wallis and Friedman tests were used to compare the independent and dependent quantitative variables, respectively, and the chi-Square test was applied to compare the frequency of the qualitative variables. The Spearman correlation test was used to verify the associations between the different quantitative variables in the study, and the correlation coefficient (r) were classified as follows: 0 - 0.25, very low; 0.26 - 0.49, low; 0.50 - 0.69, moderate; 0.70 - 0.89, high; and 0.90 - 1.00, very high.[21]

2.6 ETHICAL ASPECTS

All participants authorized their participation by signing the Informed Consent Form (ICF) and the study complied with the ethical principles governing research with human beings, as specified in the Declaration of Helsinki, with the approval of the Institutional Research Ethics Committee of FACISA under number 1,933,982 and CAAE: 64438017.3.0000.5568.

3 RESULTS

Thirty-eight individuals were recruited, two of the participants failed to complete the study and one individual was excluded based on the criteria. The sample consisted of 35 individuals distributed in 3 different groups (figure 2). The demographic data and characterization of the groups are expressed in table 1. Table 2 summarizes the mobility and dual task instruments.

Figure 2 - Research flowchart

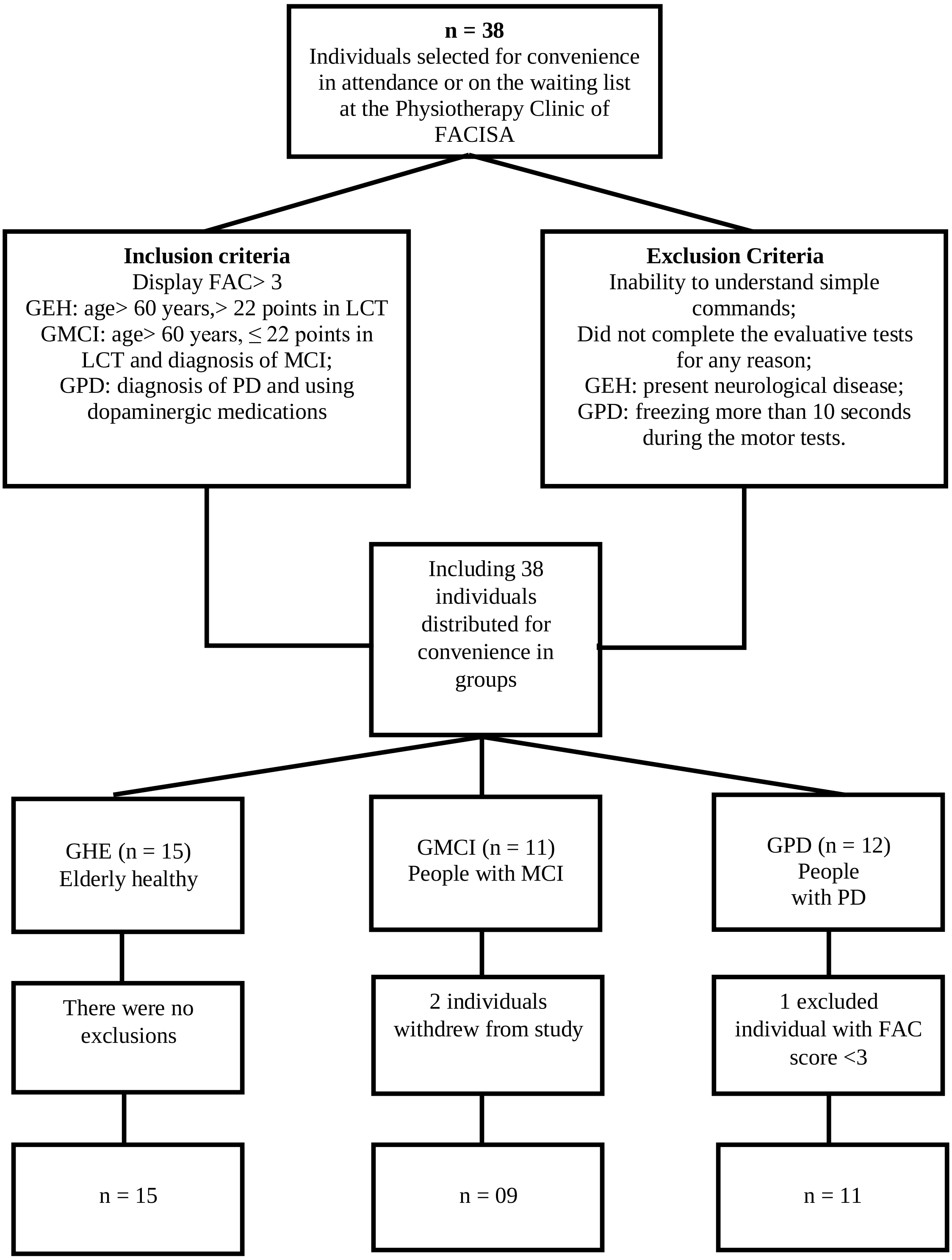

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Table 1 - Sociodemographic data for the three group.

Variables	Group HE (n=15)		Group MCI (n=9)		Group PD (n=11)		
	n (%)	**Median (1°Q;3°Q)**	**n (%)**	**Median (1°Q; 3°Q)**	**n (%)**	**Median (1°Q;3°Q)**	**p-value**
Age, years		67 (65/76)		67 (65; 75)		67(59; 75)	0,760
Sex (M/H)	13/2 (87%/13%)	—	6/3 (70%/30%)	—	4/7 (36%/64%)	—	**0,030**
Schooling							0,760
Illiterate	4 (27%)	—	4 (45%)	—	3 (27%)	—	
Teaching fund. Incomplete	5 (33%)	—	5 (55%)	—	5 (46%)	—	
Elementary School	1 (7%)	—	—	—	1 (9%)	—	
Incomplete high school	2 (13%)	—	—	—	—	—	
High school	2 (13%)	—	—	—	1 (9%)	—	
Higher education	1 (7%)	—	—	—	1(9%)	—	
Physical activity (S/N)	7/8 (47%/53%)	—	4/5 (45%/55%)	—	—	—	0,920
Alcoholism (S/N)	1/14 (7%/93%)	—	2/8 (10%/90%)	—	0/11 (0%/100%)	—	0,560
Smoking (S/N)	0/15 (0%/100%)	—	2/7(20%/80%)	—	0/11 (0%/100%)	—	0,050
FAC	—		—				0,110
3	0	0	0	—	3 (28%)	—	—
5	3 (20%)	—	1 (10%)	—	4 (36%)	—	—
6	12 (80%)	—	8 (90%)	—	4 (36%)	—	—
HY	—						
Stage 1	—	—	—	—	3 (27%)	—	—
Stage 2	—	—	—	—	2 (18%)	—	—
Stage 3	—	—	—	—	5 (46%)	—	—
Stage 4		—		—	1 (9%)		—
DYPAGS	—	—	—	—	—	9 (6;16)	—
UPDRS II	—	—	—	—	—	9 (8;16)	—
UPDRS III	—	—	—	—	—	13 (10; 19)	—

HE = healthy elderly; PD = Parkinson's disease; MCI = cognitive impairment; 1 ° Q = first quartile; 3 ° Q = third quartile; M = Woman; H = Man; S = Yes; N = No; FAC = Functional Ambulation Category; p-value for comparison of the variables of different groups (Kruskal-Wallis test). HY = Hoehn & Yahr; UPDRS = Unified Scale of Assessment for Parkinson's Disease DYPAGS = Scale Dynamic Parkinson Gait Scale; 1 ° Q = first quartile; 3 ° Q = third quartile.

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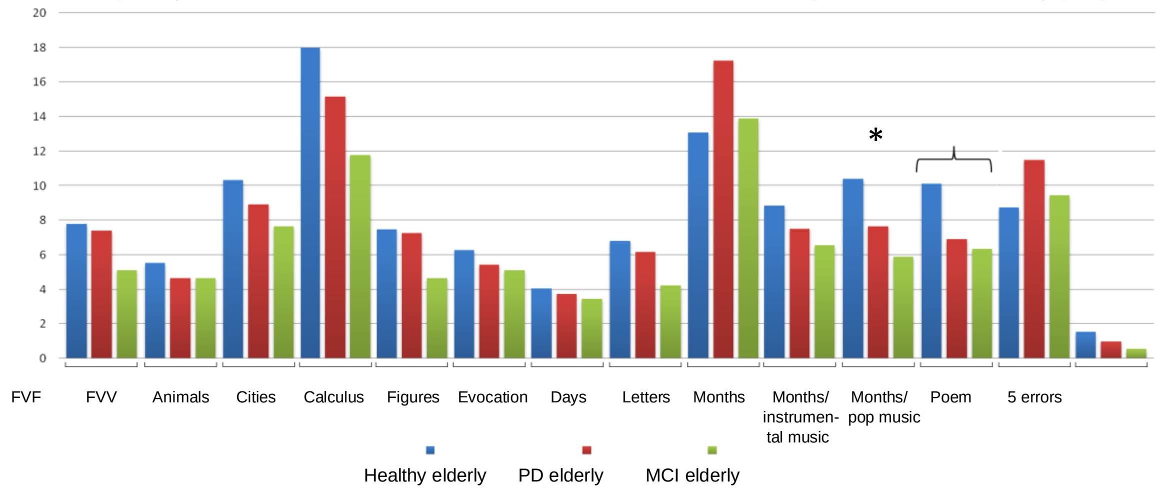
Table 2 - Variations in measurements of mobility and performance in the single and dual tasks for the 3 groups.

Variables	Group HE (n=15) Median (1°Q;3°Q)	Group MCI (n=9) Median (1°Q;3°Q)	Group PD (n=11) Median (1°Q;3°Q)	p-value
LCT	28 (25; 30)	20 (16;21)	26 (25; 29)	**<0,001**
SPPB	8 (7;9)	7 (6;8)	9 (7;14)	0,100
CCQ	13 (7;14)	12 (8;15)	8 (5;14)	0,400
WHOQOL	61 (54;76)	57 (49;65)	57 (49;64)	0,440
F8W Simple	19(16;20)	17 (17;22)	17 (16;21)	0,890
F8W Motor	22 (20;29)	24 (22;36)	21 (17;31)	0,350
F8W Cognitive	20 (16;25)*	27 (20;33)*	21 (18;25)*	0,140
TUG Simple	12 (10;12)	12 (12;14)	15 (12;20)	**0,020**
TUG Motor	13 (12;14)	14 (13;16)	19 (12;25)	0,090
TUG Cognitive	15 (13;20)*	18 (16;24)*	17 (16;18)*	0,130
Sitting / Lifting	9 (8;10)	9 (6;10)	7 (6;10)	**0,040**
10-m Test	11 (10;13)	11 (10;14)	___	**<0,001**

HE= healthy elderly; PD = Parkinson's disease; MCI = Mild cognitive impairment; SPPB = Short Physical Performance Battery; LCT = Leganés cognitive test; CCQ = Cognitive Change Questionnaire; F8W = figure-of-8 walking; TUG = Timed Up and Go; 1°Q = first quartile; 3°Q = third quartile; p-value for comparison between the groups by the Kruskal-Wallis or Mann-Whitney test); * p-value <0.01 for comparison of related variables between the simple, motor and cognitive tasks of each group (Friedman's test).

It was observed that among the posturographic variables, from the 16 conditions on the force platform for the three groups, a statistically significant difference was observed only in the group of healthy elderly participants in one condition: in the lateral position, during the tasks of verbal fluency with open eyes, when naming cities and making calculations (figure 3).

Figure 3 - Frequency of correct answers in the conditions in the dual task force platform for all elderly people (n = 35).



FV = Verbal fluency: letter 'F', letter 'V', cities, animals and calculus, good performance ≥ 11 hits; Geometrical figures and poem, maximum 10 hits; Maximum recall of 6 hits; Months maximum 12 hits; Days at most 7 hits; Letters maximum 18 hits; Errors max 5 hits. * p-value = 0.041 for comparison of groups (chi-square test).

4 DISCUSSION

In the comparison of the mobility performance of healthy elderly individuals and neurologically impaired elderly individuals during dual motor and cognitive tasks there was an increase in the time required to complete a test with the addition of the cognitive and motor tasks in relation to the simple tests in the three groups of elderly participants.

During DT-related activities, the gait parameters commonly changed, including speed reduction, pacing and step length, as well as increased support time required and variability in the measurements Gait velocity has often been considered an indicator of functional performance because when gait speed is reduced, it may be a predictor of falls and has been associated with physical and cognitive decline in the elderly. [22]

In the present study, motor DT involved coordinated function between the upper limbs and lower limbs in the F8W motor test, requiring a division of attention that resulted in longer execution times in all three groups. In addition, the lane at 8 simulates the difficulties in walking faced by elderly individuals in daily life, due to the change in speed and direction; therefore, this task may represent a good proposal for the evaluation of mobility in elderly populations with or without neurological dysfunctions.

Likewise, Brustio et al,[23] whose objective was to use different cognitive tasks, in combination with the TUG, 10-m test and the Four Square Step (FSS) test, observed a decrease in mobility in all groups, leading to the inference that activities involving DT interfered with gait, especially in elderly individuals, as they presented worse performance during DT when compared to single task; this effect was interpreted as a result of the senescence process.

The same finding was identified by Doi et al, who evaluated the gait of 389 elderly people with MCI following the addition of a dual cognitive task, showing that cognitive function was directly related to walking speed and that the speed can be changed during the dual task.[24] In the present study, when the cognitive task of verbal fluency was added to the task in the elderly group and the PD group, there was an increase in walking time; in the MCI group, there was an increase in walking time that occurred with the addition of the motor DT.

Christofoletti et al[25] emphasized that the most important predictor of mobility was balance and that insufficiency in balance is present in the initial phase of PD. In the present study, there was a significant increase in TUG time with the addition of the dual motor and cognitive tasks, and the simple TUG was performed with a longer completion time by the PD group; this was probably due to reduced mobility, the clinical aspects and dysfunction associated with the disease, and the motor and nonmotor symptoms that affect mobility, balance and impairments in the performance of the dual motor or cognitive tasks.

Considering that most of the individuals in the present study had low levels of education, the cognitive task during the TUG and F8W tests could not involve computational abilities, and thus the cognitive task of verbal fluency was chosen. The individuals with higher levels of education performed the dual tasks more easily; here, we were alerted to the need to adapt the level of complexity of the task according to an individual's education.

Regarding the gait capacity measured by the FAC, the distribution frequency showed that the groups without impairment and those with MCI presented gait independence, and the group of PD patients presented with performance in lower categories, indicating reduced mobility. With the addition of a motor or cognitive task, there were increases in the duration of time to completion in the mobility tests (F8W and TUG). For the three groups, this increase may have been associated with the negative attentional interference of one activity over the other; that is, although gait has been considered an automated process, this feature may be diminished ith the aging process.[26]

A significant correlation (r=0,65, p=0,009) was found between the TUG scores and cognitive function (CCQ), as well as the simple F8W scores with the simple TUG and TUG with DT scores, in the group of healthy individuals. This led us to suppose that these associations favors the viability of the F8W test relative to a test that has already been established in the literature, such as the TUG test. In the PD group, a correlation was observed between the cognitive F8W scores and the SPPB (r=0,67, p=0,026). Individuals with PD may have cognitive decline that may impair performance in dual tasks and mobility tests.

In this sense, for both healthy elderly individuals and those with neuromotor dysfunction, the F8W test was an instrument with an ideal applicability for the evaluation of mobility in dual task situations, especially for the capacity to force cognitive and motor planning during its execution. It should be emphasized that performance in this task significantly correlated with scores with other instruments that have been already established in rehabilitation and evaluate the mobility of healthy adults or those with neurological conditions, and these tests include the sit-up test and TUG test.

Interference from cognitive verbal fluency tasks and calculation while standing. Based on the results, there was an increase in the mean position in the anteroposterior (AP) and mid-lateral (ML) directions and total displacement in practically all the activities involving FV, which surpassed the conditions with closed eyes, and was more pronounced in the MCI and PD groups. The DT with PV that most disturbed postural control in the AP direction was the activity involving numerical subtraction. For the elderly individuals with more than 4 years of formal education, the calculation was the subtraction of 3 from 100; for those with less than 4 years of schooling, the calculation was the subtraction of 1 from 100.[27]

In the LM position, the calculation condition caused a greater change in the MCI group, while the PD and IS groups presented similar behavior after the addition of verbal fluency task that used the letters 'F' and 'V'. Regarding the total displacement measure, there was greater change for the three groups with activities involving the abovementioned letters. Due to the low formal schooling of the present study sample, activities that involved verbal fluency with the letters 'F' and 'V', as well as the countdown, required a great cognitive effort due to the need for an extensive vocabulary repertoire and the ability to perform calculations. We considered 11 or more appropriate responses the minimal acceptable amount; however, the majority of individuals in the PD and MCI groups did not generate the stipulated minimum number of responses.

Terra and colleagues[28] evaluated the balance of individuals with PD using the posturography platform in the tandem position with three distinct forms: with open eyes, with closed eyes and with a dual task performing simple mathematical operations. There was a significant increase in the area of displacement for the pressure center in the tandem position when performed with eyes closed and in association with the DT when compared to the tandem position with open eyes. The variable displacement of the center of pressure observed in the Terra study did not present a significant difference and revealed a similar difficulty between the tests with closed eyes and the DT; that is, there was a similar difficulty in maintaining postural control in both the DT condition and with closed eyes. Our results are not consistent with the study by Terra et al since all the DT conditions with FV modified the AP, LM and displacement variables when compared to simple conditions with or without visual deprivation.

It is worth noting that in the present study, and in agreement with the data in the literature, the elderly participants with PD had the longest completion time for the simple mobility test (TUG) and had the lowest ambulation scores, suggesting that they had the worst mobility and dynamic balance. In the present study, verbal fluency with animal names caused important modifications in the anteroposterior (PA) direction when compared to other VF activities for all groups studied, even though it was performed more easily than the calculation task and the task with names using the letters described above.

4.1 EVOCATIVE MEMORY IN ORTHOSTATISM

This study showed that the visuospatial and memory tasks used caused important modifications in postural control in the AP and LM directions and displacement in the three groups, with the greatest variations in the 'evocation' and '5 errors' activities, especially in the MCI group. The above tasks were pointed out by the majority of the participants as being the most difficult to perform.

Chastelaine and colleagues[29] have pointed out that there is a gradual loss of episodic memory with age. In the present study, most of the elderly individuals in all three groups were unable to satisfactorily perform the tasks involving late and immediate recall, and this is probably the typical pattern memory impairment that occurs both with age and with cognitive deficits caused by MCI and PD.

4.2 INTERFERENCE OF MUSIC IN ORTHOSTATISM

During the cognitive task involving naming the months in reverse, there was change in the parameters of static postural control in the three groups when comparing the open and closed eyes without DT conditions. Furthermore, the addition of pop and instrumental music increased the significant variation in the posturographic aspects towards the AP, LM and total displacement values evaluated in the three groups compared to the simple task.

It was found that both pop and instrumental music amplified the posturographic parameters in the AP direction, even when the elderly reported that the music did not cause inattention during the execution of the activity. For the 3 groups studied, there was an increase in posturographic pairs in the AP direction, especially for the MCI and IS groups. In the absence of LM and total displacement changes, there was much variation, and in the 3 groups, there was a decrease in the parameters with the use of pop and instrumental music when compared to the activity without the use of the music.

Our findings, although statistically insignificant, showed that the MCI group diminished its total detachment with instrumental music, which was increased with pop music, and we can infer that more agitating music caused more disturbances in postural control and should be used when the intention is to cause balance oscillations. The tasks of fluency and recall of the names of animals and cities were not considered the easiest by the elderly participants in comparison to the other tasks.

4.3 STUDY LIMITATIONS

The convenience sample represents a limitation and restriction for generalizing the results. Another aspect that can be considered refers to the larger number of women in a group, considering that this population has peculiar characteristics and performance, this may have influenced the performance between the groups.

5 CONCLUSION

There was an increase in completion time for the mobility tests during the performance of the dual motor and cognitive tasks in the three groups when compared to the simple tests, with an emphasis on the elderly group with MCI, which presented a greater increase in time during the cognitive and motor tasks on figure-8 track that involved changes in direction. For the cognitive TUG test, the MCI group required a longer time than the other groups, whereas the motor TUG and simple TUG tests required a longer time in the elderly PD group, considering the more severe gait impairment in these individuals.

A strong correlation was found for the healthy elderly group in the execution of the figure-of-8 task and in the simple TUG, motor TUG and cognitive TUG tests with cognitive function (r=0,58, p=0,023). In the MCI group, a significant correlation was verified between the F8W motor and the 10-meter tests (r=0,087, p=0,002). In the group of individuals with PD, a correlation was observed between the cognitive F8W test and SPPB scores (r=067, p=0,026) and between the cognitive TUG and motor F8W tests (r=0,75, p=0,008).

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