

Comparative Study of Level of Physical Activity and Mental State for the Elderly

ORIGINAL

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Abstract

Background: The ageing process is associated to many morphological and functional alterations among them, the alteration on the mental state has a spotlight, such alterations reflecting directly on the functional autonomy one of elderly person.

Objective: The objective of this work was to compare the level of physical activities and mental on elderly who practices physical activities and who don't practice.

Method: The research is transversal kind and comparative and was done with 94 elderly divided in two groups, 48 were on the group of which practice exercise " Exercise Group " (EG) and 46 from "Control Group" (CG). To collect dates was applied the MEEM, MAC-Q and IPAQ, physical tests to evaluate the functional capacity. The informations were collected and analyzed through the SSP version 20.0.

Results: The results showed no significant differences on the mental state on elderly who practices physical activities and who don't practice. On the functional capacity evaluation the elderly from GE group obtained better results than GC group.

Conclusion: On this study haven't association between level of physical activities and elderly's mental state.

Introduction

Population aging is a current phenomenon that occurs all over the world due to improvements in health and living conditions of the population. It is estimated that in the next twenty years, the population

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of Brazilian elderly will increase exponentially, and in 2060, the population in this age group will be 58.4 million. The average life expectancy of Brazilians of expected to increase from 75 to 81 years [1-2]. The Southeast and South regions are the Brazilian regions most aged, where 8.1% of the population are formed by the elderly aged 65 or more.

The aging process is directly related to the onset of cognitive disorders such as dementia, reaction time, memory deficits, understanding and learning [3]. With the increasing number of elderly people, also there is an increase of diseases inherent to this age group, such as noncommunicable chronic, among them the WHO (World Health Organization) points out that Alzheimer's disease (AD) has been increasing in prevalence in recent years. [4]

The losses in cognitive processes such as memory, performing daily influence negatively the functional tasks and may also be related to the increased prevalence of degenerative diseases such as Alzheimer's. This can have negative consequences for the autonomy, independence and quality of life, becoming an irreversible outcome for the elderly. [5]

Physical activity, when practiced regularly, it becomes a significant form of intervention to reduce or minimize the risk of triggering frameworks dementias in the elderly. Although the decline in various cognitive functions occur naturally and gradually in this stage of life, the concern is around how these changes can interfere with daily routine activities and causing losses in cognition in the elderly. [5-6]

Given the above, it is believed that changes in mental state of elderly occur naturally and can be minimized by physical exercise. In this sense it is necessary to carry out this study with the objective to verify the existence of a relationship between the level of physical activity and mental status of elderly people who regularly practice physical exercise with others who do not practice any form of guided physical activity, making sure that the physical exercise for the elderly beyond the physical aspect,

leading to changes in cognitive aspect also related to memory.

Thus, it is premised that physical activity, when practiced regularly, it becomes a significant form of intervention to reduce or minimize the risk of triggering frames of dementias in the elderly. The physical exercises attenuates the cognitive decline associated with aging, in addition, individuals that are more physically active accumulate benefits of protection against dementia, especially Alzheimer's disease (AD). [7-8]

In order to that physical activity promotes positive changes in quality of life it needs to be practiced regularly. The WHO recommends that to prevent heart disease that is practiced at least 150 minutes of aerobic activity per week. It is believed that when physical activity is guided it results in greater benefits, since a person can not practice exercise regularly, but if it has a good level of occupational physical activity, for example, it can not be considered sedentary.

Given the above, the objective of this study was to verify the relationship between the level of physical activity and mental state of the elderly in order to identify the elderly who do not participate in any targeted program of physical activity, but performs their occupational activities daily life has negative cognitive impairment compared to elderly who exercise in a guided manner.

Methods

The research is a comparative study, transversal and descriptive, which was conducted with older people who regularly exercise at the Center for Physical Activities for Senior Citizens (CPASC) of the State University of Piauí (UESPI) and the elderly who attend a prayer group at the nearest Catholic church, which did not perform any guided exercise.

The participants were 94 elderly, and 48 practiced physical exercise oriented manner in CPASC (EG) and 46 who did not practice any form of

guided exercise, which was called the control group (CG). Physical activities practiced by EG are characterized as mixed activities involving aerobic and anaerobic activities. The training that they performed consisted of: 5 min. stretching, 20 min aerobic activity, 30 min. exercises with elastic resistance, these exercises were aimed at the working muscles of both upper and lower limbs and 5 min. ultimate stretching. These activities were carried out by the center twice a week for a total duration of 60 min/training session.

During the data collection seniors were invited to participate in the survey and agreed that explained the data collection procedures and asked to sign the Informed Consent and Informed - IC. Data collection consisted of questionnaires, physical and mental tests. For the characterization of the sample was assigned a sociodemographic questionnaire that included questions relating to gender, age, education level, housing and family income.

In assessing the mental state was applied to the Mini Mental State - MMSE of Folstein, Folstein & McHugh, [9] which is an instrument used to track the presence or absence of cognitive impairment. The MMSE is an objective assessment of cognition by questions grouped into seven categories: 1) temporal orientation; 2) spatial orientation; 3) record of 3 words (immediate memory); 4) attention and calculation; 5) recall of three words (delayed recall); 6) language and 7) visual-constructional ability. Its score ranges from 0 to 30, and the total score decreases as cognitive impairment increases, that is, the lower the score, the higher the cognitive impairment. [10]

In the classification of the MMSE was adopted the criteria proposed by Brucki [10], the authors described adaptations for use of MMSE in Brazil and proposed the cutoff according to the level of education being for illiterates: 20 points, for those with 1-4 years of study: 25 points, 5-8 years of study: 26.5 points, 9-11 years of study: 28 points and 29 points for those with > 11 years of study.

Another test that was applied was the MAC-Q [11] which is used in the assessment of subjective memory. This is a short questionnaire to access memory decline in the elderly, it consists of six items that reflect comprehensive situations on the current memory usage, to be compared with the memory to 40 years old. The items are evaluated on a Likert scale of five points: much better now (1), a little better now (2) unchanged (3), slightly worse now (4) or much worse now (5). The maximum number of points obtained in the MAC-Q is 35 and reflects the negative perception of memory.

In the identification of physical activity level was used the IPAQ - International Physical Activity Questionnaire [12], version 8. In addition to the questionnaires were carried out some appraisal tests of functional capacity, according to Fluerton battery proposed by Rikli and Jones [10], and, of this battery, were only performed strength tests of lower limbs, upper, aerobic capacity and displacement.

Obeying the CNS/MS Resolution 466/12, the data were only collected after approval by the Ethics Committee of the Platform Brazil, by CAAE No. 1,220,276.

Data were presented by simple descriptive statistics using mean (m), standard deviation (SD) and percentage. To verify the association between variables was applied the chi-square test (χ^2). In the comparison between groups was applied the Mann Whitney test. Data were considered significant when $p < 0.05$. For all analyzes was used Statistical Package for Social Sciences (SPSS) for Windows (version 20.0).

Results

The participants were 94 elderly divided into 2 groups, 48 EG and 46 of GC. The sample characteristics are described in **Table 1**.

The data in **Table 1** show that the vast majority of respondents are female, has from 1 to 4 years of

Table 1. Characterization of study participants, Teresina (PI), 2016.

Variables	EG		CG	
	f	%	f	%
Sex				
Male	5	10.5	10	21.8
Female	43	89.5	36	78.2
Education				
0 years	7	14.5	14	30.5
1-4 years	26	54.2	28	60.8
5-8 years	10	20.8	1	2.2
9 years or more	3	6.5	3	6.5
State Conjugal				
Married	28	58.3	24	52.2
Widowed	12	25.0	12	26.0
Divorcee	7	14.5	4	8.7
Single	1	2.7	6	13.1
Retired				
Yes	42	87.5	37	80.4
No	6	12.5	9	19.6
Family income				
1 minimum wage	18	37.5	16	34.7
2 to 3 minimum wage	30	62.5	30	65.3
Total	48	100	46	100

Source: Direct research.

schooling, are married, retired and receive between 2 to 3 minimum wages for both groups.

Table 2 presents the data relating to the average MMSE and the standard deviation of the elderly participants of the study.

The MMSE cutoff point for people with 0 years of schooling is 20, for those who have 1-4 years of study the reference value is 25, for those with 5-8 years of study the value is 26.5 and for those with 9-11 years of education the figure is 29. Through the above data it can be seen that the means of participants were lower than the standard in almost all education levels in both groups.

Table 2. Average (m) and standard deviation (SD) of the Mini Mental State Examination - MMSE of older people in relation to education by group. Teresina (PI), 2016.

MMSE/years of study	EG		CG		Expected average
	M	Dp	M	Dp	
0	18	±4	18	±4	20
1 to 4	21	±4	23	±4	25
5 to 8	22	±5	30	-	26.5
9 to 11	26	±1	24	±4	29

Source: Direct research.

Table 3. MAC-Q for the elderly group. Teresina (PI), 2016.

MAC	EG		CG		Total		P
	n	%	n	%	n	%	
No complaints	12.08	-	-	1	1.06	±4	0.250
Memory complaints	22	45.83	16	34.78	38	40.43	
Negative perception of memory	25	52.08	30	65.22	55	58.51	
Total	48	100.00	46	100.00	94	100.00	

Source: Direct research.

Table 4. Mean and standard deviation of the subjective perception of memory test - MAC-Q.

Group	EG		CG		P
	n= 48		n= 46		
	M	Dp	M	Dp	
MAC	25.0	5.0	27.70	4.3	0.011*

Source: Direct research. *: statistical significance

Table 3 are the subjective evaluation data memory of elderly people per group.

According to the data it can be seen that CG elderly had a worse perception of memory (65.22%) compared to the EG elderly (53.08%).

Despite the difference 13.14%, presented in this evaluation, statistical test revealed no significant difference between groups. Since in both groups

obtained a large number of elderly who complain of memory with 45.83% for EG and 34.78% for CG.

Data on the mean (m) standard deviation (SD) of the values of the subjective perception of memory test can be given in **Table 4**.

The score of the perception test MAC-Q memory ranges from 7 to 35. Since 7-15 the person has no memory complaints, up 15 to 25 means complaining of memory and over 25 negative perception of memory. Comparing the overall average of the MAC-Q between the groups it was observed that the EG obtained significantly lower average in the subjective perception of memory, which means that this group showed better perception of memory than the CG.

The assessment of the level of physical activity of the elderly, held through the IPAQ is highlighted in **Table 5**. It is considered active by IPAQ who performs at least 150 minutes per week of moderate physical activity and inactive least who has lower levels.

Assessing the level of physical activity of the participants of this study, we observed higher levels of physical inactivity in CG 63.04%, but the EG values still very high this classification were found 52.08%. In the asset classification GE obtained 47.92% of the elderly and CG 36.96%.

The association between physical activity level and perception of memory (MAQ x IPAQ in EG $p = 0.882$) and (MAQ x IPAQ in CG $p = 0.108$) by χ^2 did not presented statistical significance, ie it was not possible to observe that more active seniors were with better perception of memory.

The values found in the evaluation tests of the ability functional may be verified in **Table 6**. In these tests not all CG elderly attended, as some had physical limitations that prevented them, such as tendonitis and herniated disc.

According to the data in **Table 6**, it is observed that EG achieved the best averages in almost all tests, except for the test with stand and walk. Among the tests it appears that the march stationary the

Table 5. Physical activity level of elderly per group. Teresina (PI), 2016.

IPAQ	EG		CG		Total		p	
	n	%	n	%	n	%	n	%
Inactive	25	52.08	29	63.04	38	40.43	54	57.45
Active	23	47.92	17	36.96	55	58.51	40	42.55
Total	48	100.00	46	100.00	94	100.00	94	100.00

Source: Direct research.

Table 6. Mean (m) and standard deviation (SD) of the functional capacity of elderly per group.

Evaluation tests of Functional Capacity	EG		CG			P value	
	n	%	n		%		
The test of sitting and standing of a chair	n= 48	11.7	±2.9	n=40	10.3	±2.4	*0.15
Cubit flexion test	15.8	±4.2	n=38	14.1	±3.7	*0.49	
Stationary march test	149	±39.5	n=35	118	±35.7	*0.01	
Test to stand up and move	10.9	±2.8	n=39	12.8	±6.0	0.60	

Source: Direct research. *: Significant difference

average obtained is classified as excellent in EG and CG average ranks as good.

Discussion

The results obtained through the MMSE show that most of the elderly participants of this study showed impairment in cognitive function, since in both the average MMSE presented groups were lower than the average recommended by Brucki [10] in almost all levels of education. With these findings it appears that both EG elderly as CG the present changes in cognitive function. Nevertheless, one can not say that they have some form of dementia, as the MMSE is a screening test.

The MMSE is used for cognitive screening of older people and consists of questions covering temporal and spatial orientation, immediate recall and me-

mory, praxis, calculation and language skills, vision and space. Your score ranges from 0 to 30 points, which are associated, respectively, the greatest cognitive decline and most presumed cognitive ability. [13-14] Despite this, there is no consensus in the literature about the cutoff for cognitive impairment detection because this is influenced by many factors, among them, education.

Among the cognitive screening test, the Mini Mental State Examination (MMSE) is the most widely used to assess the mental and cognitive function, aiming to track early changes, helping the extensions of limitations for therapeutic planning. Negative results in this test indicates that care must be taken, but are not conclusive for the diagnosis of dementia. [15] In this sense, it is understood that the elderly of this study need care, so that can prevent against future dementia.

Similar results were highlighted by Araújo [16] in their study that aimed to investigate the cognitive aspects and the level of physical activity of the elderly, where it found that more than half of the participants had some impairment of mental state (53.6%).

When comparing the MMSE between the groups was not observed differences between the averages presented by older people who exercise with those who do not exercise a guided way. The results of this study differ from the study by Dias et al [17], it was compared the cognitive performance of elderly practitioners and non-practitioners of physical exercise. The authors noted that overall cognitive ability (MMSE) was higher in the group with exercise $m = 26.4 \pm 1.6$, than in the non-exercise group $m = 25.4 \pm 1.4$.

In study Banhato et al [18] in order to compare the cognitive performance of active and sedentary elderly residents in the community, it was observed that the most active higher scores in the evaluation. Other studies [19-20] point out that physical exercise has a positive influence on cognitive function of elderly people, however, this aspect was not observed

in this study. It is believed that this fact is associated with low levels of education presented in both groups, where the 54.8% EG and 60.2% CG had 1-4 years of study, which has probably influenced in the performance of the same test.

Education is a factor that appears to directly affect the performance in cognitive functions. In this regard, Diniz [21] comments that the acquisition of knowledge about the phonological and grammatical structures of the language, achieved with the learning of reading and writing, brings architectural and functional changes in the human brain, and influences not only linguistic skill an individual, but also how to process and represent information, such as the ability to process spatial information, to name objects in two dimensions, working memory, logical and abstract thinking.

Mota [22] reported that the MMSE is a very sensitive test to determine criteria for moderate to severe cognitive decline, while this sensitivity considerably decreases relate it with mild cognitive deterioration and early dementia. This test is widely used in research on cognitive screening and your score depends directly on the investigated subject's education level.

In this sense, Brucki [10] have suggested that the cutoff point used in MMSE takes into account the level of education. These same authors indicate a specific cutoff point for the population, which was used in this research, but analyzing another cutoff point as proposed by Bertolluci [23], there is big difference in the pattern established for the proposed by Brucki [10]. The lack of consensus regarding the default value for the Brazilian population in this test, may have influenced the results presented in this research.

In relation to the subjective memory appraisal through the MAC-Q, one can see that the GC had higher negative perception of frequency (65%), as the EG (52%) of the elderly negatively perceive their memory. In another study [24] that was used this same test in order to verify the subjective perception

of memory association with manual dexterity in elderly participants of a workshop of digital inclusion, the total average was 23.2 ± 5.4 . In the present study was 25.0 ± 5.0 to 27.7 ± 4.3 EG group for the CG. Through the data it is apparent that with respect to memory perception the group who practice exercise had better results.

Researchs [25, 26] shows that people who are physically active seem less susceptible to cognitive decline and dementia in later periods of life than insufficiently active people. This study reported the elderly performance in neuropsychological tests before and after an aerobic physical training program lasting six months, where the results showed that the experimental group improved significantly in attention, memory, motor speed and humor about the group control (sedentary).

In Silva et al [27] study in order to investigate the effect of a physical exercise program (SP), the memory has been identified that the EP had a positive effect on the memory of the elderly regardless of the variables sex and age.

Scientific evidence point out that physical exercise has a positive effect on memory. In the present study this was observed where EG got significantly better average than the CG in the subjective perception of memory. This finding may be explained by the targeted physical exercise, since in CPASC, the elderly are constantly accompanied by physical education teachers. Note that this guided exercise influence among other things in the best sense of self, as the exercise training is associated with improved self-esteem. In this regard, studies found that regular physical activity improves self-esteem, because it rescues the elderly lost self-image. [28-29]

Regarding the level of physical activity of elderly people, higher frequency of asset classification was found in EG (47.9%) whereas the CG presented (36.9%). However, there was a very high value of elderly considered inactive in accordance with the criteria of the IPAQ, where to be considered active

the individual must perform at least 150 minutes of moderate activity at least during the week. At EG, the frequency of physical inactivity was (52%) and CG 63%. These results show that in this study the level of physical activity of most of the elderly was considered insufficient in both groups, values were higher in CG.

Despite investigations inform about the importance of physical exercise for health, there is a high inactivity rate in the elderly [30-31]. Study [32] compared the levels of physical activity and quality of life among older people who do regular exercise and sedentary elderly, highlighted that the percentage of active AG (active group) was lower, which can be explained by the fact that the elderly seek physical exercise as a way of organizing a routine, and also for not performing other tasks besides the domestic order. In the SG (sedentary group), the authors reported that although of elderly people do not practice any regular exercise, they are considered assets by IPAQ, this was probably due to occupation of the elderly with the routine of home, work and family care.

The research findings cited above differ from that found in this study, since the asset classification was more frequently in the group which exercises. Nevertheless, in general, a higher frequency in elderly inactive classification for both EG (52.08%), and for the CG (63.04). One possible explanation for frequency of inactive elderly physically in EG is related to non-compliance of elderly people to the guidance received in the exercise program, because in CPASC practice is held twice a week for an hour, which gives a total of 120 minutes per week of moderate activity. At the core seniors are encouraged to carry out other activities such as walking, water aerobics on other days of the week, but not all participants follow this recommendation. [32, 33]

Statistical analysis did not show the existence of an association between the level of physical activity and the perception of older memory. That's

because both EG and in CG showed most negative perception of memory. Through these findings still can not say that exercise training would not be able to improve this aspect, even because this study many seniors had lower levels of physical activity than recommended by the WHO (World Health Organization) that is at least 150 minutes of at least moderate activity a week. These results reinforce that for additional gains for health in every physical, mental and functional the elderly should increase their aerobic activity to 300 minutes per week, or engage in 150 minutes of aerobic physical activity vigorous intensity per week, or equivalent combination of moderate activity and vigorous intensity. [33]

In the assessment of functional capacity, the good results presented in EG is due to the fact that these activities are carried out constantly during class core, which directly reflects the functional autonomy of the same.

Before the data, it appears that the SG elderly had better functional capacity than GC in most of the evaluated parameters. Noteworthy the values presented to the stationary gear that assesses aerobic capacity, the average presented by EG (149) and is classified as excellent. In this respect, it can be said that CPASC the elderly have an excellent aerobic capacity.

Therefore, there is once again the importance of guided exercise training may have positive effects on aerobic capacity of the participants, reflecting thus on their health and quality of life.

In the study [34], It evaluated the effect of aerobic exercise on cognition and functional ability in elderly with AD. The results show a statistically significant difference between the two groups where EG showed improvement in cognition as the CG decreased. In this same study, the functional appraisal there was also a statistically significant difference, with better results for EG. Kwak [35] explain the cognitive improvement of the elderly is due to increased cerebral blood flow, antioxidant for repair

enzyme and pro-inflammatory action of cytokines, amyloid beta degradation and increased metabolism of neurotransmitters.

There are many changes that occur both physical and mental due to the aging process, but the physical exercise, keeping active individual in their daily activities will cause the elderly exercise their body and hence your mind and it can contribute positively to the functional autonomy of these people, but so that one can enjoy the benefits of physical exercise to improve aerobic capacity, strength, flexibility and also in cognitive functions, this practice should be performed regularly, at least three times a week with an intensity ranging from moderate to vigorous.

Conclusion

Through the data presented can be concluded that in this study there was no association between physical activity and mental state of the elderly, that is, the most active seniors had no better cognitive function than less physically active. However, in relation to the subjective memory assessment the group that exercise showed better perception of memory than the group who do not exercise. These results indicate that the exercise-oriented practical influence positively the better perception of memory. Besides the functional aspect of the EG elderly performed better, emphasizing the importance of physical exercise oriented prevention and improvement of functional disability.

In this sense it is suggested that further studies be conducted on this subject, so that it can also compare these effects of exercise training on cognitive function in individuals who perform some type of intervention, with well-defined variables such as type of exercise, intensity, frequency weekly.

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