

Comparison of levels of anxiety and depression among active and sedentary elderly

Comparação dos níveis de ansiedade e depressão entre idosos ativos e sedentários

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Abstract

Background: The anxiety and depression are a public health problem in the elderly. Currently some studies have been shown a positive association between physical activity and good mental health. **Objective:** To compare the possible relationship between levels of anxiety and depression among active and sedentary elderly. **Methods:** The sample comprised a total of 72 patients divided into one group of 38 elderly subjects (GS) and another group of 34 physically assets (GA). These answered a questionnaire with socio-demographic characteristics and the Hospital Anxiety and Depression Scale. **Results:** The variables that influenced the presence of anxiety and depression were the level of physical activity ($p < 0.001$) and the level of instruction ($p < 0.01$). The GS showed 38 more probability to develop symptoms of anxiety and depression and subjects without qualifications had 11 more probability to develop these symptoms. For the GS 35 (92.1%) patients had levels of anxiety or depression and 3 (7.9%) did not. In GA, the presence of anxiety or depression were observed only in 8 (23.5%) and the remaining 26 (76.5%) revalidates not any kind of these symptoms ($p < 0.05$). **Discussion:** Practicing physical activity may represent a very important factor to reduce levels of anxiety and depression in elderly.

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Keywords: Aging, elderly, anxiety, depression, physical exercise.

Resumo

Contexto: A ansiedade e a depressão constituem um problema de saúde pública nos idosos. Atualmente, tem-se demonstrado uma associação positiva entre a prática de atividade física e a boa saúde mental. **Objetivo:** Comparar a relação entre os níveis de ansiedade e depressão entre idosos ativos e sedentários. **Métodos:** A amostra foi constituída por 72 idosos, divididos num grupo de 38 idosos sedentários (GS) e outro grupo (GA) de 34 fisicamente ativos. Estes responderam a um questionário com características sociodemográficas e a Escala de Ansiedade e Depressão para Hospital Geral. **Resultados:** As variáveis que influenciaram a presença de ansiedade ou depressão foram o nível de atividade física ($p < 0,001$) e de escolaridade ($p < 0,01$). O GS apresentou 38 vezes mais de probabilidade de vir a desenvolver sintomas de ansiedade e depressão e os indivíduos sem habilitações apresentam 11 vezes mais de probabilidade de vir a desenvolver esses sintomas. No GS, 35 (92,1%) idosos apresentaram níveis de ansiedade ou depressão e 3 (7,9%) não apresentaram. No GA apenas 8 (23,5%) apresentaram níveis de ansiedade ou depressão e 26 (76,5%) não revelaram esses sintomas ($p < 0,05$). **Conclusão:** A prática da atividade física pode representar um fator importante para reduzir os níveis de ansiedade e depressão em idosos.

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Palavras-chave: Envelhecimento, idosos, ansiedade, depressão, exercício físico.

Introduction

Considered as the main cause of emotional suffering and decrease of quality of life, anxiety and depressive disorders are changes that occur frequently among elderly, representing a public health problem of great magnitude, due to its elevated morbidity and mortality^{1,2}. According to Instituto Nacional de Estatística³, between 2005 and 2006, 183,428 elderly presented or had already presented levels of depression.

The study of Maia *et al.*⁴, revealed a prevalence of anxiety and depression of 29.3% among 327 elderly and Xavier *et al.*⁵ found that 10,6% of the 77 evaluated elderly showed depressive disorders.

Treatments of these disorders include tricyclic antidepressants, psychopharmacological and hormonal drugs, light therapy, electroconvulsive therapy^{6,7}, and it has been suggested that the practice of physical activity could be considered as an efficient treatment for anxiety and depression⁸.

Several studies have demonstrated that adhesion to a regular program of physical exercises could improve significantly the cognitive performance of an elderly, increasing its self-esteem, humor, feeling of well-being, promoting a reduction of physiological responses to

stress and positive effects on body image, therefore reducing levels of anxiety and depression⁹⁻¹⁸. However, in their study, Bailey and McLaren¹⁹ did not find any significant positive relationship between improvement in anxiety and depression and physical activity.

Indeed discrepancies still exist between results of studies related to this topic, thus, the present study aimed at comparing levels of anxiety and/or depression between physically active and sedentary elderly.

Methods

Type of study

This study is of descriptive correlational and transversal nature.

The direction of School of Health Jean Piaget Algarve made an application for authorization to the directions of the institutions involved in this study.

To participate in the study, individuals belonging to these institutions completed a consent form, where they were informed about the objectives, deciding whether or not to participate and being warned that they could withdraw from the study if they wished so.

It also guaranteed anonymity and confidentiality of data, as well as exclusive use for research purposes, thus fulfilling the ethical dimensions of research.

Sample

The sample was chosen as a convenience sample and the subjects were divided into 2 groups: one group of sedentary elderly (GS) composed of elderly from the Cultural and Social Center João de Deus of São Bartolomeu de Messines and from the Centro de Dia of São Marcos da Serra and another group of physically active elderly (GA) belonging to Sports Senior Classes of São Bartolomeu de Messines.

Inclusion criteria involved individuals aged greater than or equal to 65 years, of both sexes, who were not taking anti-depressants, who wanted to participate in the study, who completed informed consent and who had a minimum level of understanding. In addition to these factors, individuals who were regulars at the exercise program and who practiced for at least 3 months were also included in the GA; those who did not perform any physical activity were included in the GS.

Instruments of data collection

Questionnaire containing questions about socio-demographic characteristics

The questionnaire included questions about age, gender, marital status, education level, if they made use of anti-depressants and had some disease. For the GS questions were included about the scheme in the nursing home (day, night or institutionalized) and about performing physical activity and for the GA questions about family (kinship) and performing other type of physical activity in addition to Class Sport were included.

Hospital Anxiety and Depression scale (HAD)

The HAD was developed by Zigmond and Snaith in 1983, and its translation into Portuguese (Brazil) was validated by Botega *et al.*²⁰. Several studies have found that the former had good sensitivity, specificity and internal consistency to assess symptoms of anxiety and depression²⁰⁻²³.

This scale was chosen to be applied to identify and measure the intensity of depression and anxiety of individuals in non-psychiatric environment²⁴⁻²⁶.

This scale consists of 14 items divided into two scales, of which 7 items measure anxiety (HADS-A) and the other 7, depression (HADS-D). Thus, the concepts of depression and anxiety are separated^{20,22-24}.

To complete this questionnaire, the subject checked the item that were closer to what he was feeling during the last week²⁴. Each item was scored from 0 to 3, depending on the answer, reaching a total maximum of 21 points for each scale²². In both scales values between 0 and 7 indicated the absence of anxiety or depression, values between 8 and 10 indicated possible case of anxiety or depression, and values greater than or equal to 11 indicated presence of anxiety or depression^{22,26}. Thus, the individual could not have experienced any of these symptoms, anxiety and depression simultaneously, or disclose only one of the two symptoms.

Both instruments were applied in a single moment, being read by the examiner.

Protocol of physical exercise Sports Group

The activities were held 2 times per week with duration of 1 hour per day, being composed by heating, lasting 10 minutes. The main class was divided into initiation/learning content, drilling and consolidation/integration of previous contents. The skills addressed involved

physical strength, balance, breathing, flexibility, coordination, endurance of moderate intensity, notions of laterality, dance, recreational games and body expression. The final stage includes exercises back to calm, having duration of 5 minutes.

Data analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 19.

After a descriptive approach, various associations between the two groups were characterized using inferential statistics, through the chi-square test of independence. For methodological reasons, a clustering of the variables anxiety and depression was performed and only 2 groups were considered – lack of anxiety and depression and presence of anxiety and/or depression (subjects classified with possible case and probable case of anxiety and/or depression were included).

To compare the distributions centers in the two groups with respect to age and rates of anxiety and depression, the Kolmogorov-Smirnov test (to test for normality) was used and then the Mann-Whitney U test was applied to compare medians.

The influence of age, gender, marital status, level of education in the development of anxiety and depression was assessed using binary logistic regressions. Forward model and LR tests Omnibus, Hosmer and Lemeshow and Nagelkerke were used. The model results were presented as crude odds ratios (OR) and adjusted gross and respective confidence intervals.

The level of statistical significance was set to 5%.

Results

Initially the GS consisted of 40 subjects, of which 2 were excluded because they made use of anti-depressants. GA had a total of two classes of 78 students, where 44 were excluded because 11 were taking anti-depressant medication and the others did not attend on the day of data collection or did not have the age indicated by the inclusion criteria.

Thus, the sample consisted of a total of 72 patients of both sexes, 29 (40.3%) males and 43 (59.7%) females, aged between 65 and 96 years (77.1 ± 7.9 years). The GS involved 38 elderly, and 25 belonged to Cultural and Social Center João de Deus de São Bartolomeu de Messines and 13 to Centro de Dia de São Marcos da Serra and the GA included 34 seniors.

The elderly of GS were aged between 67 and 96 years (81.8 ± 7.5 years), consisting of 20 (52.6%) males and 18 (47.4%) females. The elderly belonging to GA were aged between 65 and 82 years (71.9 ± 4.3 years), and 9 were males (26.5%) and 25 (73.5%) women.

Regarding marital status of elderly belonging to GS, 6 elderly (15.8%) were single, 9 elderly (23.7%) married, 2 (5.3%) divorced and 21 (55.3%) were widowed. In GA, 25 (73.4%) were married, and 9 (26.5%) were widowed.

According to the level of education of GS, 32 elderly (84.2%) had no qualifications and 6 (15.8%) had the 1st cycle. In GA 11 (32.4%) elderly had no qualifications, 15 (44.1%) had the 1st cycle, 3 (8.8%) had an education level up to the 2nd cycle and 5 (14.7%) to the 3rd cycle.

In GS only 18 seniors (47.4%) suffered from some illness, and in GA 26 (76.5%) seniors had some type of disease.

Regarding the regime of users of nursing homes, it was found that 29 elderly (76.3%) of GS were in the daytime and only 9 (23.7%) in institutionalized regime.

In GA, 25 elderly (73.5%) lived with a partner, 5 (14.7%) alone, 2 (5.9%) with children and 2 (5.9%) with grandchildren and 11 (32.4%) elderly revealed that they performed other type of physical activity in addition to the Senior Sports.

The values obtained for each scale of anxiety and depression are presented in table 1.

The application of the Kolmogorov-Smirnov test to several variables showed that these present non-normal distribution ($p > 0.05$), so the Mann-Whitney U test was applied to compare medians.

Table 1. Descriptive statistic values obtained for HAD for levels of anxiety and depression

	Sedentary Group (GS)		Active Group (GA)	
	Values anxiety	Values depression	Values anxiety	Values depression
Mean \pm std deviation	8.79 \pm 4.2	11.13 \pm 3.9	5.38 \pm 2.8	3.41 \pm 2.08
Minimum-maximum	1-18	4-18	2-12	0-9

After applying the Mann-Whitney U test, it was found that the medians of the values of both anxiety and depression differed in a statistically significant way depending on the group (GS vs. GA) ($p < 0.001$).

Regarding the absence and presence of anxiety and/or depression at GS 35 (92.1%) subjects presented levels of anxiety and/or depression and the remaining 3 (7.9%) did not. In GA only 8 (23.5%) had levels of anxiety and/or depression and the remaining 26 (76.5%) did not have any kind of anxiety or depression. Given the small numbers obtained in this analysis to the chi-square test of independence, variables anxiety and depression were grouped as explained in the methodology and a statistically significant relationship between the GA and GS was obtained ($p < 0.05$).

By analyzing these levels separately, it was found that most of the levels of anxiety and depression was observed in elderly belonging to GS ($p < 0.05$) (Tables 2 and 3).

Table 2. Absolute and relative frequencies of levels of anxiety for GS and GA

Anxiety	Institution	Institutional group	Sports group	Total
No case of anxiety		13 (18.1%)	27 (37.5%)	40 (55.6%)
Possible case of anxiety		12 (16.7%)	4 (5.6%)	16 (22.3%)
Probable case of anxiety		13 (18%)	3 (4.2%)	16 (22.2%)
Total		38 (52.8%)	34 (47.2%)	72 (100.0%)

Table 3. Absolute and relative frequencies of levels of depression for GS and GA

Depression	Institution	Institutional group	Sports group	Total
No case of depression		7 (9.8%)	32 (44.4%)	39 (54.2%)
Possible case of depression		10 (13.8%)	2 (2.8%)	12 (16.6%)
Probable case of depression		21 (29.2%)	0 (0.0%)	21 (29.2%)
Total		38 (52.8%)	34 (47.2%)	72 (100.0%)

After applying the Mann-Whitney U test, there was no evidence of differences between medians of male and female gender for variables anxiety and/or depression ($p > 0.05$). The same was confirmed by applying the chi-square test of independence ($p > 0.05$). Levels of anxiety and/or depression were more prevalent in women (55.8%) compared to men (44.2%).

The relationship between levels of anxiety and/or depression and marital status achieved statistical significance ($p < 0.05$), where it was found that the majority of individuals who did not have levels of anxiety and depression were married (75.9%), followed by widowed (20.7%), those who had possible cases of anxiety and/or depression were only married people (52.9%) and widowed (47.1%) and those who reported probable cases of anxiety and/or depression were mostly widowed (61.5%) followed by singles (23.1%).

Regarding the level of education, it was found that the possible cases of anxiety and/or depression involved only individuals who do not possess any educational qualification (76.5%) and those who had 1st cycle (23.5%), the same being observed in probable cases of anxiety and/or depression, where 84.6% of subjects had no educational qualifications, and 15.4% had education level corresponding to the 1st cycle, a finding with statistical significance ($p < 0.05$).

GS of the elderly that revealed the presence of anxiety and/or depression, 17 (48.6%) were male and 18 (51.4%) were female and 15 (42.9%) had some type of disease. Most elderly were widowers (60%), showed no levels of educational attainment (85.7%) and attended nursing home only in the daytime (77.1%).

Levels of anxiety and/or depression were more prevalent in women (55.8%) compared to men (44.2%).

The relationship between levels of anxiety and/or depression and marital status achieved statistical significance ($p < 0.05$), where it was found that the majority of individuals who did not have levels of anxiety and depression were married (75.9%), followed by widowed (20.7%), those who had possible cases of anxiety and/or depression were only married people (52.9%) and widowed (47.1%) and those who reported probable cases of anxiety and/or depression were mostly widowed (61.5%) followed by singles (23.1%).

Regarding educational qualifications, it was found that the possible cases of anxiety and/or depression involved only individuals who had no educational qualifications (76.5%) and those who had 1st cycle (23.5%), the same being observed in probable cases of anxiety and/or depression, where 84.6% of subjects had no educational qualifications, and 15.4% had education level corresponding to the 1st cycle, findings with statistical significance ($p < 0.05$).

Among seniors belonging to GS that revealed the presence of anxiety and/or depression, 17 (48.6%) were male and 18 (51.4%) were female and 15 (42.9%) had some type of disease. Most elderly were widowers (60%) showed no levels of educational attainment (85.7%) and attended nursing home only in the daytime (77.1%).

On the other hand, among the elderly belonging to GA that showed levels of anxiety and/or depression, 6 (75%) were female, 5 (62.5%) were married, most were those seniors who did not have any educational qualification (62.5%), lived with a partner (62.5%) and suffered from some disease (75%).

From the logistic regression analysis, we found that the only variables that influence the presence of anxiety and/or depression were the level of physical activity, i.e., GA ($p < 0.001$) and education level ($p < 0.01$). Individuals from GS are 38 times more likely to go on to develop symptoms of anxiety and/or depression and those without qualifications are 11 times more likely to go on to develop symptoms of anxiety and/or depression.

Table 4 presents the results of binary logistic regression for the event presence of anxiety and/or depression (absence of anxiety and depression).

In the adjusted model, the values obtained in the tests Omnibus, Hosmer and Lemeshow and Nagelkerke applied to the characteristics of the sub-sample absence and presence of anxiety and/or depression adjusted for the GS versus GA, age, gender, marital status and level of education were respectively: $p = 0.000$, $p = 0.926$ and $R^2 = 0.613$, being considered mathematically valid models to perform the analysis.

Table 4. Results of binary logistic regression for the event presence of anxiety and/or depression

Variables	Odds ratio ^{crude} (IC 95%)	Odds ratio ^{adjusted} (IC 95%)
GS versus GA	37.92 (9.16-156.96) $p < 0.001$	22.89 (5.21-100.45) $p < 0.01$
Age ¹	12.4 (3.84-40.01) $p < 0.01$	**
Gender	0.66 (0.25-1.76) $p > 0.05$	**
Marital status ²	8.12 (2.76-23.91) $p < 0.01$	**
Educational qualification ³	11.48 (3.75-37.18) $p < 0.01$	4.60 (1.15-18.43) $p < 0.01$

* Adjusted to GS and GA and to educational qualifications; ** Variables without OR^{adjusted}, indeed they were eliminated from adjusting the model ($p > 0.20$).

¹ Variable group was grouped in ages between 65 and 75 years (median value) and 76 and 98 years. ² This variable was grouped in being alone that included single, divorced and widowed and be accompanied involving the married and concubinage. ³ This variable was grouped in without educational qualifications and with educational qualifications (1st cycle or more).

Discussion

The data obtained in this study showed higher levels of anxiety and/or depression in the elderly belonging to GS compared to elderly belonging to GA, i.e. the levels of anxiety and/or depression and physical activity showed an inverse relationship. These data are in agreement with several studies which reported that exercise promotes a reduction of symptoms of anxiety and depression^{3,9-18,27-33}.

The reduction in symptoms of anxiety and depression through physical exercise can be explained by increased release of hormones such as catecholamines, ACTH, vasopressin, β -endorphin, dopamine, serotonin and the activation of specific receptors and decrease of blood viscosity, providing tranquilizer and analgesic effect, getting a relaxing post-exercise result^{8,33,34}. The process of biosynthesis of serotonin may occur by increasing its precursor tryptophan in the brain, influenced by physical activity³⁵. Kiive *et al.*³⁶ found elevated prolactin blood levels during the performance of aerobic exercise, reflecting an increase of central serotonin. Serotonin may attenuate the formation of memories related to fear and diminish responses to threatening events through serotonergic projections that leave from the raphe nucleus to hippocampus³⁷.

Levels of anxiety and/or depression were more prevalent in females in both groups, although the gender difference in GS have been small. The same was observed in other studies³⁸⁻⁴⁰. Depressive illness is diagnosed twice more in women due to a higher frequency of medical appointments and greater adherence to health care, which in turn leads to greater detection of these cases^{8,40,42,43}.

Women are also responding to activities that expand social relations, possibly for cultural reasons associated with gender, they are more sociable⁴¹. One factor that may contribute to the further development of depressive symptoms is the older age^{7,33,40,42-44}, fact observed most frequently in the elderly from GS, since mean and maximum value of this older age in the GS higher compared to GA.

Another factor that may affect these levels is the marital status, the absence of a spouse can increase the prevalence of these symptoms^{3,7,33,40,44-46}, a fact confirmed in this study by logistic regression analysis that found that being alone increases up to eight times the chance of developing signs of anxiety and/or depression. Most seniors with the presence of GS levels of anxiety and/or depression were widowed, and in the 2 groups, most individuals with probable cases of anxiety and/or depression were single or widowed.

In addition to age and marital status, other exogenous factors may contribute to a higher rate of anxiety and depression in the elderly, particularly the lowest educational level, a low socioeconomic status, chronic and debilitating illnesses, abandonment and social isolation, besides the lack of physical activity, as previously referred^{3,7,38,46}.

The lower level of educational qualifications was observed more frequently in individuals with the presence of anxiety and/or depression, this factor being more common in the elderly from GS. In fact, the variable "education level" was shown to have an influence on the existence of anxiety and/or depression getting to be 11 times higher in individuals with no qualifications. The same was observed in the study where Gazalle *et al.*⁴⁰ found that a higher level of education was found to be a protective factor for the occurrence of depressive symptoms in the elderly.

Regarding the presence of diseases, the literature reveals that many diseases are associated with depression, especially cardiovascular diseases, endocrinological, neurological, renal, oncological and other chronic pain syndromes⁴⁷. However, despite the presence of diseases have been most frequently observed in the elderly from GA with anxiety and/or depression, they were not classified as to its chronicity and disability, thereby contributing to greater depressive symptoms.

Although most elderly from GS who revealed that the presence of anxiety and/or depression attended the nursing home only in the daytime, the fact of belonging to an institution could lead to some degree of social isolation contributing to higher prevalence of these symptoms. Thus, the degree of anxiety and depression observed in institutionalized elderly is related not only with the lack of activities, but also with the fact that they feel isolated in an environment that

sometimes is not pleasant or familiar⁴⁴. In the GA, lower levels of anxiety and/or depression observed compared to GS, may have been attributed not only to the physiological benefits of exercise, but also to the practice which was performed in groups, contributing to the implementation of social relations. Effectively the logistic regression analysis confirmed that people who have no partner are 8 times more likely to go on to develop symptoms of anxiety and/or depression.

Despite having observed the influence of various factors on the development of anxiety and depression, when taken together, by using logistic regression, the variables age, gender, marital status, education level and GS/GA, it was found that the all these parameters, the ones who actually shown to influence the development of anxiety and/or depression were the variable physical activity and educational level.

Although the results of several studies have shown the benefits of exercise in improving levels of anxiety and depression, there has been differences in exercise protocols used in these studies^{10,42,48-50}. In the present study, the main component used was aerobic workout and frequency of exercise of only 2 times per week. The study Hassmen *et al.*⁴² found that older people who exercise at least twice a week had higher levels of sense of coherence and a strong sense of social integration than others who exercise less often.

Werneck *et al.*⁴⁸ suggest that physical exercise to improve mood should be aerobic in nature, uncompetitive, moderate and lasting between 20 to 40 minutes.

According to the study of Godoy⁵¹, it is necessary to practice between 4 to 20 weeks of exercise with moderate intensity to obtain substantial effects in the emotional domain. In this study the elderly already performed the exercise for 12 weeks. Hall *et al.*⁵² and Araújo *et al.*⁵³ do not recommend the practice of high-intensity exercise, as this is linked to the experience of negative emotional states, as well as the production of excess lactic acid that might allow the occurrence of panic attacks in individuals with anxiety disorder.

Rybarczyk *et al.*⁵⁴ compared supervised and unsupervised exercise in elderly depressed, and found a significant reduction in depressive symptoms in the group that only practiced supervised exercise, as was the case with the protocol applied in the present study for GA.

This study found a relationship between physical exercise and the presence of symptoms of anxiety and/or depression, however this relationship can be reversed once the depressed patient self-care decreases, refuses to feed themselves and follow the recommendations of clinical, staying for longer bedridden or low physical mobility^{3,12}. Therefore depression could be the cause of the decline in general health and physical fitness.

The present study had some limitations, including the small sample size and non-random selection of the same, which may contribute to the increased sampling error. Another limitation is the choice of the measuring instrument, because despite HAD to be an appropriate scale to be applied to individuals in non-psychiatric environment, this is not yet validated for the Portuguese population, despite being comprehensively used in scientific investigations.

Finally, this study only compared a group that performed physical activity with another group that did not perform any physical activity, and, although other variables were analyzed that could influence the results, we could have done a follow-up of GA, as a Experimental component.

Therefore, we suggest new studies analyzing the effectiveness of exercise in improving this symptomatology through a longitudinal study, and studies comparing different exercise protocols in order to understand what are the ideal type of exercise, frequency, and intensity duration to obtain the benefits towards improving these disorders.

Conclusion

This study confirmed a possible inverse relationship between physical activity and the prevalence of mental disorders, i.e., when there was the presence of physical exercise, levels of presence of anxiety and/or depression were lower in elderly sample analyzed in the study.

Thus, for this sample it was demonstrated that physical activity may be an adjunct in the prevention and treatment of anxiety and depression in elderly.

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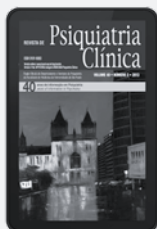
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