Effectiveness of physical exercise in the elderly with depression

Efectividad del ejercicio físico en ancianos con depresión

Authors

Dr. Alvaro Paúl Moina Veloz. Professorof Medicine at the Universidad Regional Autónoma de los Andes (UNIANDES Ambato).
Email: ua.alvaromoina@uniandes.edu.ec
https://orcid.org/0000-0002-8050-8562

Dr. Carlos Pérez Padilla. Professorof Medicine at the Universidad Regional Autónoma de los Andes (UNIANDES).
Email: ua.carlosperez@uniandes.edu.ec
Orcid: https://orcid.org/0000-0002-2873-9291

Dr. Marcelo Fernando Viteri Villa.Professorof Medicine at the Universidad Regional Autónoma de los Andes (UNIANDES).
Email: ua.marceloviteri@uniandes.edu.ec
Orcid: https://orcid.org/0000-0001-6960-6383

Abstract

Introduction: Depression is a common and disabling disorder. Physical exercise could be beneficial for depressed patients.

Objective: to compare the effectiveness of physical exercise with that of treatment with antidepressant drugs in patients with depression.

Methods: a parallel trial was conducted with 2 randomized groups, the participants were selected from 10 family medicine outpatient clinics.

Results: the probability of improvement of depressive symptomatology was higher in the AT group (odds ratio = 2.0; 95% CI, 1.3-3.2).

Conclusions: In conclusion, both AT and PA, performed in group sessions, can decrease depressive symptomatology in persons ≥ 65 years diagnosed in primary care with mild-moderate depressive disorder.

Keywords: depression, physical activity, elderly, primary care source: DeCS

DOI Number: 10.14704/nq.2022.20.13.NQ88026 NeuroQuantology 2022; 20(13): 183-190

Resumen

Introducción:La depresión es un trastorno común e incapacitante. El ejercicio físico podría ser beneficioso para los pacientes deprimidos.

Objetivo:comparar la efectividad del ejercicio físico con la del tratamiento con fármacos antidepresivos en pacientes con depresión.

Método:Se realizó un ensayo paralelo con 2 grupos aleatorizados, los participantes fueron seleccionados en 10 consultas externas de medicina familiar.

Resultados:la probabilidad de mejoría de la sintomatología depresiva fue mayor en el grupo de TA (odds ratio = 2,0; IC 95%, 1,3-3,2)

Conclusiones:En conclusión, tanto la TA como la AF, realizadas en sesiones grupales, son capaces de disminuir la sintomatología depresiva en personas ≥ 65 años diagnosticadas en atención primaria de trastorno depresivo leve-moderado.

Palabras clave: depresión, actividad física, ancianos, atención primariafuente:DeCS

Introduction

Depression is a common and disabling disorder that affects more than 120 million people worldwide and at least 1 in 5 people in their lifetime. Although depression is usually treated with antidepressant drugs and psychological therapy, other therapeutic alternatives have received increasing attention in recent years. Physical exercise, in particular, could be beneficial for depressed patients and equivalent to antidepressant treatment[(1)].

Depressive disorders in older adults are characterized by great diagnostic complexity, a high degree of clinical polymorphism (difficulty in recognizing depressive symptoms, frequent somatic complaints, etc.), and a high associated risk of disability, with a potentially severe impact on quality of life[(1)]. Old age can be a time of great emotional fragility; in addition to neurobiological changes during brain aging, major losses affect the emotions, physical condition and social status of older adults. Depression is the most common psychiatric disorder among the elderly, with 8% to 16% of all community-dwelling older adults presenting clinically significant depressive symptoms[(2)] .

Antidepressant drugs often result in undesirable side effects, especially in the elderly population, prolonging the use of such drugs indefinitely or unnecessarily. Therefore, it seems reasonable to try new therapeutic modalities that may result in fewer adverse side effects and lower health care costs. One reason exercise might improve depression is the belief that it can act as a distraction from negative thoughts and that an important aspect of exercise might involve the acquisition of a new skill. In addition, social contact could be part of this mechanism, given that weak social support is known to be a strong predictor of depressive symptomatology among community-dwelling older adults[(3)]. In addition, physical activity may have physiological effects, such as changes in endorphin and monoamine levels or a decrease in the stress hormone cortisol, which may improve mood[(4)]. Some studies suggest that exercise stimulates the growth of new neurons, as well as the release of proteins, such as brain-derived neurotrophic factor, which improves the survival of neurons[(5)]. However, there is still considerable uncertainty about the efficacy of exercise for depression, mainly due to methodological considerations related to the studies conducted. Furthermore, older adults have been underrepresented in clinical trials evaluating pharmacological and non-pharmacological measures for depressive disorders[(6)].

The aim was to compare the effectiveness of physical exercise with treatment with antidepressant drugs commonly used in clinical practice to reduce depressive symptoms in patients ≥ 65 years of age presenting clinical criteria for a depressive episode diagnosed in primary care. Supervised physical exercise of moderate intensity, combined with aerobic and resistance training, could be appropriate for reducing depressive symptoms in older adults.

Method

A parallel trial was conducted with 2 randomized groups. Participants were selected from 10 family medicine outpatient clinics belonging to 3 health centers in Puyo. The target population comprised persons aged ≥ 65 years who presented criteria for a clinically significant depressive episode. Inclusion criteria were defined as any patient affiliated with the participating health centers who had a mild to moderate depressive episode with a score of at least 10 points on the Montgomery-Åsberg Depression Rating Scale (MADRS)[(7)]. Exclusion criteria were as follows: physical or mental limitation capable of precluding participation in the study, contraindication(s) to physical exercise, major depressive disorder (significant interference with social or occupational functioning, psychotic symptoms, or suicidal ideation), or use of antidepressant medication Baseline fitness was assessed for all participants

concerning resting heart rate (measured with a heart rate monitor) and submaximal heart rate, calculated based on maximal heart rate (220 minus age) on an indoor exercise bike (70%-85% of maximum heart rate at constant load and speed for 6 minutes). This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

After verification of compliance with inclusion criteria and consent to participate, patients were randomly and equally assigned to the physical activity (PA) or antidepressant treatment (AT) group.

Of the 432 patients who were preselected, 347 gave their consent and were randomized to 1 of the 2 groups (176 to the PA group and 171 to the AT group). Subsequently, 23 were excluded because of the presence of exclusion criteria (major depressive disorder or contraindication for inclusion in a PA program), and another 11 were excluded because of withdrawal of consent, resulting in a total of 313 patients included in the study (158 in the PA group and 155 in the TA group). During the follow-up period, 46 additional patients withdrew consent and 120 dropped out for different reasons (including those who dropped out before starting treatment). 66 patients in the PA group and 93 in the TA group completed follow-up.

To test the hypothesis that physical exercise might be appropriate for decreasing depressive symptoms in older adults (null hypothesis: physical exercise is less effective than antidepressant treatment; alternative hypothesis: physical exercise is at least as effective as antidepressant treatment), a sample size of 313 patients was taken.

The supervised physical exercise consisted of a physical activity program of two 1-hour sessions per week over 6 months (a total of 48 sessions in groups of 10-12 people). The sessions included a balanced combination of aerobic, muscular strength and flexibility exercises and exercises designed to improve balance. The sessions also included educational content on how to increase physical exertion in daily life and perform regular exercise adapted to each individual's age and physical condition to maintain appropriate body weight.

The duration of follow-up was 6 months, with assessments at baseline and 1, 3 and 6 months. The main outcome variable was the decrease in depressive symptomatology, with a positive result defined as a MADRS score <10 points, indicative of the absence of depressive disorder. Other variables were body mass index, the occurrence of any adverse event, level of physical activity according to the International Physical Activity Questionnaire[8], history of depressive disorder and use of antidepressant drugs, the existence of multimorbidity and polypharmacy, smoking and alcohol consumption (grams of alcohol per week), self-perceived health status (EuroQol EQ-5D)[9], sociodemographic variables and satisfaction with participation in the study. In addition, attendance at PA sessions, type of antidepressant prescribed and therapeutic adherence was assessed according to the Medication Adherence Questionnaire[10] for the AT group. The expected reasons for study termination were the end of the observation period, patient dropout or withdrawal of informed consent.

The statistical analysis strategy consisted of an initial study of the homogeneity of participant characteristics and possible confounding variables in both groups. We then compared the incidence of the outcome variable (MADRS score <10) in both groups using the χ^2 test for comparison of proportions at a significance level of P <0.05 and estimated the relative risks along with the corresponding 95% CIs. To determine the trend in self-perceived health status in each group, the study used t-tests to compare means for related samples. The database and statistical processing of the data were performed and analyzed in SPSS 26 statistical software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

The analysis included 313 participants, 158 in the PA group and 155 in the AT group, with mean (SD) baseline MADRS scores of 15.1 (4.6) and 15.9 (3.9), respectively. The mean (SD) age was 72.2 (5.5) and 72.8 (6.1) years, respectively.

Table 1 shows the cumulative incidence of MADRS scores <10 over time. Intention-to-treat analysis showed that, although this proportion was not significantly different between the AF group and the TA group after 1 month, it was significantly different (p< 0.01) after 3 and 6 months (AF group: 45.6% and 32.9% at 3 and 6 months, respectively vs TA group: 60.6% and 49.7%. In contrast, per-protocol analysis showed no significant differences between the 2 groups for any of the 3 follow-up periods.

Table 1. The cumulative incidence of MADRS scores is <10 over time (intention-to-treat and per-protocol analyses).

	PhysicalActivity n/N (%)	Antidepressanttreatment n/N (%)	RR (95% CI)
		1 month	
Intention-to-treatanalysis	76/158 (48.1)	84/155 (54.2)	0.89 (0.71-1.1)
Analysis byprotocol	76/135 (56.3)	84/149 (56.4)	0.99 (0.81-1.23)
		3 months	
Intention-to-treatanalysis	72/158 (45.6)	94/155 (60.6)	0.75 (0.61-0.93)
Analysis byprotocol	72/96 (75.0)	94/120 (78.3)	0.96 (0.82-1.11)
		6 months	
Intention-to-treatanalysis	52/158 (32.9)	77/155 (49.7)	0.66 (0.5-0.87)
Analysis byprotocol	52/66 (78.8)	77/93 (82.8)	0.95 (0.81-1.11)

Source: statistical analysis, p ≤ 0.05, MADRS = Montgomery-Åsberg Depression Rating Scale; RR = relative risk.

Both interventions had a favorable effect on participants' self-perceived health status (range 0-100 points), with statistically significant increases (p< 0.01) in both groups' health status scores at follow-up from baseline, from 59.2 at baseline to 74.3 at last assessment in the PA group and from 57.1 to 74.3 in the TA group.

The proportion of withdrawals and dropouts was higher in the AF group than in the TA group (AF group: 39.2% and 58.2% at 3 and 6 months, respectively, vs. TA group: 22.6% and 40.0%). However, the proportion of participants with adverse effects was significantly higher (P = 0.007) in the TA group than in the AF group. In the AT group, 22.5 % of participants reported adverse effects, the most common being dizziness (6.5 %), epigastric pain (5.2 %) and daytime sleepiness (3.2 %). In the PA group, 14 participants (8.9%) reported adverse effects, generally from musculoskeletal pain, mild bruising, or exercise-related dizziness. The most serious adverse effects were radius fracture after fall and fainting with spontaneous recovery.

Satisfaction with the interventions was high in both groups, with the proportion of satisfied or very satisfied participants being 87.1%, 97.9%, and 98.5% at 1, 3, and 6 months, respectively, in the PA group and 76.8%, 85.0%, and 96.8% in the TA group.

Using intention-to-treat analysis, logistic regression showed that at the end of the follow-up period, the probability of improvement in depressive symptomatology was greater in the AT group (odds ratio = 2.0; 95% CI, 1.3-3.2), with no interaction between the type of intervention performed and the patient's

sex, age, the initial level of physical activity, or the health center where he or she was selected. When the decrease in MADRS score was used as the dependent variable, after 6 months there was a mean decrease of 4.04 points in the PA group and 5.8 points in the AT group, with a difference of 1.76 points (95% CI, 0.39-3.13) between the 2 groups being statistically significant (p = 0.012).

Discussion

The results show that AT and PA performed in group sessions decrease depressive symptomatology in persons ≥65 years diagnosed in primary care with mild-moderate depressive disorder. In addition, a comparison of the 2 groups by intention-to-treat analysis showed that while the proportion of participants who recorded an improvement in their depressive symptomatology was not significantly different after 1 month, there was a significant difference at the end of 3 and 6 months.

Although intention-to-treat analysis is the only type that retains the advantages of randomization and maintains comparability of the 2 groups, it should be noted that the intention-to-treat principle may underestimate the effects of effective therapy to which adherence is poor. Analysis of the results only for those participants who completed follow-up (per-protocol analysis) showed that the proportion of those who experienced improvement did not differ significantly between the 2 groups at any of the 3 follow-up time points. Furthermore, both interventions were successful for the participants and favorably affected their self-perceived health status.

There is now overwhelming evidence attesting to the health benefits of physical exercise[11]. In addition, it is recognized that exercise can partially reverse the effects of aging on physiological functions and preserve functional reserve in older adults by acting as a protective factor and therapeutic option for anxiety, depression and insomnia. Determining the level of physical activity of older patients could also help to identify individuals at high risk of developing depressive symptoms[12]. However, despite recommendations to promote exercise to decrease the burden of chronic diseases, the frequency and intensity of physical activity among the elderly are quite discouraging.

The results of previous studies suggest that participation in physical exercise groups is beneficial for the treatment of depression and has the additional advantage of producing health benefits, such as demonstrable effects on the cardiovascular and locomotor systems and so-called active aging[13]. In general, exercise produces an improvement in depressive symptomatology in older adults. However, studies supporting this finding have been heterogeneous and of low methodological quality. A Cochrane review concluded that exercise might have a moderately beneficial effect on depressive symptoms[14], with no differences observed concerning pharmacological or psychotherapeutic treatment. However, these conclusions are based on very few studies[15], of which only 1 was explicitly conducted in persons ≥ 65 years[16]. The present study exceeds the scope of these few studies in older adults regarding the number of patients and duration of follow-up.

A meta-analysis showed that exercise, especially mixed aerobic and moderate-intensity anaerobic interventions, significantly affected depression in groups with supervised and unsupervised formats and people with no other clinical comorbidities[17]. The authors suggested that the benefits of exercise have previously been underestimated due to publication bias and that exercise should be considered a routine component in treating depression in older adults. Another meta-analysis concluded that the positive effect of exercise in depressed older adults did not differ by age or type of intervention[18] and that exercise is an effective treatment option for older adults.

Further studies are needed to incorporate motivational strategies designed to improve older adults' adherence to exercise programs by including recreational

activities such as arts and crafts.[19] The additional therapeutic resource of exercise could favor the health and well-being of older adults and decrease health care costs. Although an equivalence between physical exercise and pharmacological antidepressant treatments is not established, exercise could nevertheless support pharmacological therapy or be considered an alternative treatment in cases where pharmacological therapy is ineffective or contraindicated because of its multiple adverse effects [20].

Conclusions

In conclusion, AT and PA, performed in group sessions, can reduce depressive symptomatology in persons ≥ 65 years diagnosed in primary care with mild-moderate depressive disorder. Although the resulting improvement in depressive symptoms was initially similar for both treatment options, AT was superior in the medium term. In addition, although adverse effects were significantly more significant in the AT group, participants found both interventions satisfactory and favorably affected their self-perceived health status.

References

1. Kok RM, Reynolds CF. Management of Depression in Older Adults: A Review. JAMA [Internet]. 23 de mayo de 2017 [citado 12 de julio de 2022];317(20):2114-22. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28535241/
2. Taylor WD. Clinical practice. Depression in the elderly. N Engl J Med [Internet]. 25 de septiembre de 2014 [citado 18 de julio de 2022];371(13):1228-36. Disponible en: https://pubmed.ncbi.nlm.nih.gov/25251617/
3. Miller KJ, Mesagno C, McLaren S, Grace F, Yates M, Gomez R. Exercise, Mood, Self-Efficacy, and Social Support as Predictors of Depressive Symptoms in Older Adults: Direct and Interaction Effects. Front Psychol [Internet]. 2019 [citado 21 de julio de 2022];10:2145. Disponible en: https://pubmed.ncbi.nlm.nih.gov/31632315/
4. Abeln V, Fomina E, Popova J, Braunsmann L, Koschate J, Möller F, et al. Chronic, acute and protocol-dependent effects of exercise on psycho-physiological health during long-term isolation and confinement. BMC Neurosci [Internet]. 30 de junio de 2022 [citado 18 de julio de 2022];23(1):41. Disponible en: https://pubmed.ncbi.nlm.nih.gov/35773633/
5. Schuch FB, de Almeida Fleck MP. Is Exercise an Efficacious Treatment for Depression? A Comment upon Recent Negative Findings. Front Psychiatry [Internet]. 2013 [citado 22 de julio de 2022];4:20. Disponible en: https://pubmed.ncbi.nlm.nih.gov/23565097/
6. Yap J, McCartan C, Davidson G, White C, Bradley L, Webb P, et al. An exercise intervention for people with serious mental illness: Findings from a qualitative data analysis using participatory theme elicitation. HealthExpect [Internet]. diciembre de 2020 [citado 17 de julio de 2022];23(6):1579-93. Disponible en: https://pubmed.ncbi.nlm.nih.gov/33037731/
7. Lobo A, Chamorro L, Luque A, Dal-Ré R, Badia X, Baró E, et al. [Validation of the Spanish versions of the Montgomery-Asberg depression and Hamilton anxiety rating scales]. Med Clin (Barc). 13 de abril de 2002;118(13):493-9. Disponible en :https://pubmed.ncbi.nlm.nih.gov/11975886/
8. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc [Internet]. agosto de 2003 [citado 22 de julio de 2022];35(8):1381-95. Disponible en: https://pubmed.ncbi.nlm.nih.gov/12900694/

9. Rabin R, de Charro F. EQ-5D: a measure of health status from the EuroQol Group. Ann Med [Internet]. julio de 2001 [citado 17 de julio de 2022];33(5):337-43. Disponible en: https://pubmed.ncbi.nlm.nih.gov/11491192/
10. Lam WY, Fresco P. Medication Adherence Measures: An Overview. BioMedResearch International [Internet]. 2015 [citado 19 de julio de 2022];2015. Disponible en: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4619779/
11. Catalan-Matamoros D, Gomez-Conesa A, Stubbs B, Vancampfort D. Exercise improves depressive symptoms in older adults: An umbrella review of systematic reviews and meta-analyses. Psychiatry Res [Internet]. 30 de octubre de 2016;244:202-9. Disponible en:https://pubmed.ncbi.nlm.nih.gov/27494042/
12. Holmquist S, Mattsson S, Schele I, Nordström P, Nordström A. Low physical activity as a key differentiating factor in the potential high-risk profile for depressive symptoms in older adults. DepressAnxiety [Internet]. septiembre de 2017 [citado 18 de julio de 2022];34(9):817-25. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28489319/
13. Patiño Villada FA, Arango Vélez EF, Baena LZ. [Physical Exercise and Depression in the Elderly : A Systematic Review]. Rev ColombPsiquiatr [Internet]. junio de 2013 [citado 18 de julio de 2022];42(2):198-211. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26572815/
14. Cooney GM, Dwan K, Greig CA, Lawlor DA, Rimer J, Waugh FR, et al. Exercise for depression. Cochrane Database Syst Rev [Internet]. 12 de septiembre de 2013 [citado 19 de julio de 2022];(9):CD004366. Disponible en: https://pubmed.ncbi.nlm.nih.gov/24026850/
15. Blumenthal JA, Sherwood A, Babyak MA, Watkins LL, Smith PJ, Hoffman BM, et al. Exercise and pharmacological treatment of depressive symptoms in patients with coronary heart disease: results from the UPBEAT (Understanding the Prognostic Benefits of Exercise and Antidepressant Therapy) study. J Am Coll Cardiol [Internet]. 18 de septiembre de 2012 [citado 21 de julio de 2022];60(12):1053-63. Disponible en: https://pubmed.ncbi.nlm.nih.gov/22858387/
16. Wassink-Vossen S, Oude Voshaar RC, Naarding P, Collard RM. Effectiveness of late-life depression interventions on functional limitations: A systematic review. Int J MentHealth Nurs [Internet]. agosto de 2022 [citado 21 de julio de 2022];31(4):823-42. Disponible en: https://pubmed.ncbi.nlm.nih.gov/35142015/
17. Schuch FB, Vancampfort D, Rosenbaum S, Richards J, Ward PB, Veronese N, et al. exercise for depression in older adults: a meta-analysis of randomized controlled trials adjusting for publication bias. Braz J Psychiatry[Internet]. septiembre de 2016 [citado 18 de julio de 2022];38(3):247-54. Disponible en: https://pubmed.ncbi.nlm.nih.gov/27611903/
18. Bailey AP, Hetrick SE, Rosenbaum S, Purcell R, Parker AG. Treating depression with physical activity in adolescents and young adults: a systematic review and meta-analysis of randomised controlled trials. PsycholMed [Internet]. mayo de 2018 [citado 18 de julio de 2022];48(7):1068-83. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28994355/
19. Rhyner KT, Watts A. Exercise and Depressive Symptoms in Older Adults: A Systematic Meta-Analytic Review. J AgingPhysAct [Internet]. abril de 2016 [citado 17 de julio de 2022];24(2):234-

46. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26372020/

20. Kim D. The effects of a combined physical activity, recreation, and art and craft program on ADL, cognition, and depression in the elderly. J PhysTherSci [Internet]. abril de 2017 [citado 17 de julio de 2022];29(4):744-7. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28533622/