HOW EXERCISE CAN AFFECT DEMENTIA PERSONS?

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Introduction

Alzheimer's disease (AD) is the most common form of dementia[1]. In recent years, there has been a particular interest in the role of physical exercise as a therapeutic strategy for the management of persons suffering from dementia [2].

Purpose

The purpose of this study was to investigate the effect of exercise on cognition, mood, daily living activities, physical activity and balance in persons with mild AD.

Participants

Participants were recruited with the assistance of the Amarousion Day Center of the Alzheimer Society of Athens as well as from the outpatient clinic of the Athens General Hospital “G. Gennimatas”.

Inclusion criteria: age≥65, mild AD, Mini-Mental State Examination (MMSE): 20-24/30, sufficient hearing and vision, existence of a caregiver, medical consent to participate in exercise, absence of any other exercise program, without medication change for at least 2 months, and must possess ability of consent.

Exclusion criteria: If suffering from neurological and/or other severe diseases, cancer, surgery during the previous year, alcohol and/or drug abuse.

Total of 128 participants were randomly allocated to three groups: Group A (n=43), Group B (n=43) and Group C (n=42).

Methods

The study was approved by the Ethics and Deontology Committee of the University of West Attica (96645/25-11-2020). The Group A did aerobic exercise (walking) five times/week for 30 min and resistance exercise three times/week for more than 40 min, at moderate intensity. Group B performed only resistance exercise program such as Group A for 12 weeks. Group C carried on their usual daily activities (no exercise). Cognitive function (Mini Mental State Examination-MMSE and Digit Span Test-DST), mood (Geriatric Depression Scale-GDS-15), activities of daily living (Instrumental Activities of Daily Living Scale-IADL), physical activity (International Physical Activity Questionnaire-IPAQ) and balance (Berg Balance Scale-BBS) were evaluated in all participants at baseline and after 12 weeks.

Statistical Analysis

Differences between groups at baseline, and after the intervention were investigated with one-way Analysis of Variance (Anova) tests. Pair tests for each group, within time were performed to examine the effect of exercise. In addition, Bonferroni multiple pairwise comparison tests were executed to determine between which groups this significant difference occurred. Possible dependencies for qualitative variables between groups were analyzed by the use of Pearson's chi-squared test ($\chi 2$). Statistical analyses were carried out using the software package SPSS. P-values less than 0.05 were considered statistically significant.

Results

Demographic and personal characteristics results for each group of patients are presented in table 1.

Table 1. Personal characteristics for each group at baseline. Data presented as the mean ± sd and categorical data presented as the frequency and (%) values.

		A: Aerobic & Resistance		B: Resistance		C: Control	
Age		76.63	±6.14	76.12	±5.89	78.19	±6.95
BMI		27.45	±3.49	27.14	±3.68	27.15	±3.88
Education Years		14.19	±2.00	14.53	±2.13	13.71	±2.11
Gender	man	15	(34.9)	12	(27.9)	6	(14.3)
	woman	28	(65.1)	31	(72.1)	36	(85.7)
Dementia	no	23	(53.5)	22	(51.2)	17	(40.5)
Medication	yes	20	(46.5)	21	(48.8)	25	(59.5)
Depression	no	34	(79.1)	29	(67.4)	33	(78.6)
Medication	yes	9	(20.9)	14	(32.6)	9	(21.4)
International Physical Activity Questionnaire	<600MET.min/wk	21	(48.8)	34	(79.1)	37	(88.1)
	≥600MET.min/wk	22	(51.2)	9	(20.9)	5	(11.9)
Berg Balance Scale	<45	2	(4.7)	1	(2.3)	4	(9.5)
	≥45	41	(95.3)	42	(97.7)	38	(90.50
Geriatric Depression Scale	low (0-5)	37	(86.0)	38	(88.4)	32	(76.2)
	moderate (6-10)	6	(14.0)	5	(11.6)	10	(23.8)

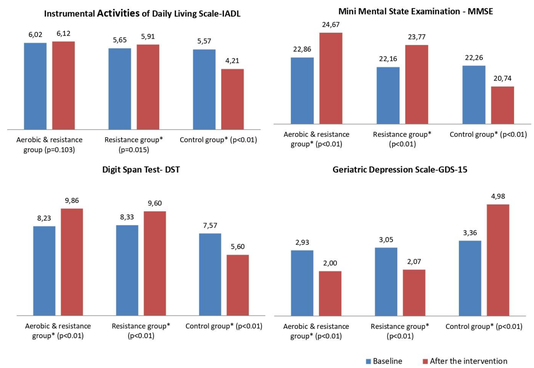

Figure 1: The effect of intervention for each group in all measurements scales. Pair tests for each group within time reveal significant differences * for all scales except from IADL in group A (p=0.103).

Pair tests for each group within time reveal significant differences for all scales except from IADL in group A (p=0.103). Fig.1 shows the baseline and after the intervention scores for each group in all measurement scales.

Anova results for the three groups of patients at baseline revealed no significant differences between the groups (p-values>0.05). After the intervention (12 weeks), scores in MMSE, DST, GDS and IADL found to differ significantly between groups (p-values<0.05).

Table 2. Results of multiple comparisons tests between groups.

	mean difference	Std. Error	p - value[b]	95% CI for Difference[b] Lower B.	Upper B.
IADL					
Between A and B group	0.209	0.381	1.00	-0.717	1.135
Between A and C group	1.902*	0.384	0.00	0.971	2.833
Between B and C group	1.693*	0.384	0.00	0.761	2.624
MMSE					
Between A and B group	0.907*	0.367	0.04	0.017	1.797
Between A and C group	3.936*	0.369	0.00	3.041	4.831
Between B and C group	3.029*	0.369	0.00	2.134	3.924
DST_Total					
Between A and B group	0.256	0.393	1.00	-0.698	1.210
Between A and C group	4.265*	0.396	0.00	3.305	5.225
Between B and C group	4.009*	0.396	0.00	3.050	4.969
GDS_15					
Between A and B group	-0.07	0.459	1.00	-1.183	1.044
Between A and C group	-2.976*	0.462	0.00	-4.096	-1.856
Between B and C group	-2.906*	0.462	0.00	-4.026	-1.786

*. The mean difference is significant at the 0.05 level.
b. Adjustment for multiple comparisons: Bonferroni.

Chi-Square tests showed significant differences in frequencies between groups for categorical variables IPAQ ($X^2(2,128)=70.179$, p-value<0.01), BBS ($X^2(2,128)=24.641$, p-value<0.01). Figure 2 shows the frequencies between groups for IPAQ and BBS categories at baseline and after the intervention.

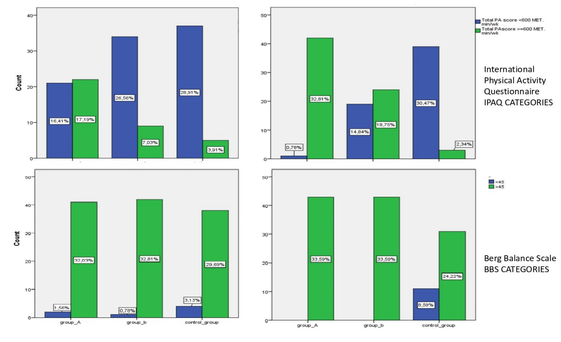

Figure 2: Frequencies between groups for IPAQ and BBS categories at baseline and after the intervention.

Discussion & Conclusions

Both exercise programs improved all parameters examined. Improvement was observed in global cognition, depression and functionality.

- Comparison of the two exercise programs did not reveal any significant differences, except from the MMSE that found to be significant higher, almost one unit, for the Group A, a fact that is also in agreement with study the Bossers et al (2015)[3].
- Liu et al (2020) indicate that both strength and aerobic training programs can bring about significant benefits for patients with dementia in both their activities of daily life (ADLs) and cognitive function[4].
- Other studies report that resistance exercise is a powerful physical intervention strategy for inducing substantial brain functional changes accompanied by improvements in executive functions[5]. Demurtas et al (2020) report in a review that mixed physical activity/exercise was effective improving global cognition in Alzheimer’s disease[6].
- Group C showed deterioration in global cognition, depression and functioning. Physical inactivity is associated with an increased incidence of dementia[7], loss of ADL independence[8] and is one of the modifiable risk factors for dementia[9].

Recommendations

Resistance exercise along with aerobic exercise should be an integral component of any exercise intervention intended to improve health in population suffer from dementia.

References

https://bit.ly/41ri9KB

The protocol was registered under the Australian and New Zealand Clinical Trials Registry: ACTRN12621001279819.

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Poster - online version
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Further information