



The effect of exercise on the cognitive and physical function of patients with dementia

V. Papatsimpas¹, S. Vrouva², D. Bakalidou³; ¹Physiotherapy Department, General Hospital Athens "G. Gennimatas", Athens, Greece, ²Physiotherapy Department, 401 General Military Hospital of Athens, Athens, Greece, ³Department Physiotherapy, University of West Attica, Egaleo, Greece

Introduction: Dementia is characterized by a decrease in mental functions, while disorders of balance, coordination of movements and gait are gradually added. In recent years there has been a growing interest in the role of exercise as a therapeutic strategy for people with dementia.

Objectives: The aim of this study was to investigate the effect of different types of exercise and its parameters on cognitive and physical function in patients with dementia.

Methods: This is a study (hybrid narrative review), which includes almost all the steps of a systematic research but it is not included meta-analysis. The articles were selected through various sources such as PubMed / Medline and Google scholar and according to the following criteria: Date of publication from 01 January 2015 until 31 August 2020. Keywords: Dementia, cognitive function, physical function, functionality, aerobic exercise, resistance exercise. Relevance of the article to the topic. Language: English. Only Randomized Control Trial articles. Article in full text format. In addition, duplicate registrations were excluded. Figure 1 shows a flow chart describing the steps followed according to the PRISMA checklist method [1-2].

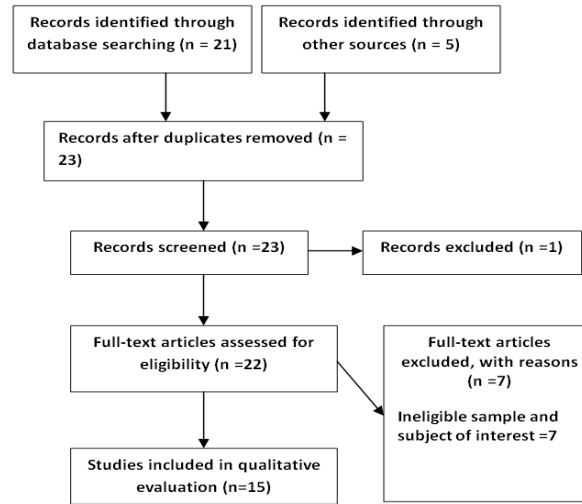


Figure 1: PRISMA study flow chart

Results: The fifteen studies that were examined concern a population of 1907 people, 746 men and 660 women with an average age of 77.5. The studies included, 3 types of exercise (Fig. 2). The intensity of exercise varied (Fig. 3), while the patients who participated showed different degrees of dementia.

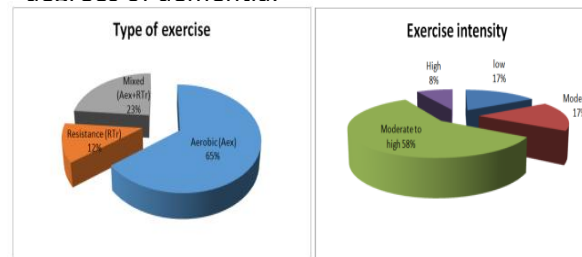


Figure 2. Quantitative ratio of exercise type in the studies.

Figure 3. Exercise intensity quantitative ratio

There is a relationship between a study's precision and that study's weight in the analysis. Since precision is driven primarily by sample size, we present the studies as being weighted by sample size. Studies with relatively good precision (4, 8, 9, 11 and 13) are assigned more weight while studies with relatively poor precision (14, 10 and 1) are assigned less weight and should be taken into account in the final conclusions respectively (Fig 4).

Author	Time Of Publication	Exercise			Effects on		Relative weight (%)
		Aerobic	Resistance	Mixed	Cognitive function.	Physical function	
1. Kristian Steen Frederiksen	2018	✓			✓	✓	2,15
2. Laura H.P Eggermont	2016	✓			✓		5,09
3. Willem J.R. Bossers	2015	✓		✓	✓	✓	5,72
4. Sarah E. Lamb	2018			✓	✓	✓	25,90
5. Eric D. Vidoni	2017	✓				✓	3,41
6. I-Ting Liu	2020	✓	✓		✓	✓	3,20
7. Nanna A. Sobol	2018	✓			✓	✓	2,88
8. Nanna A. Sobol	2016	✓				✓	10,49
9. Kristine Hoffmann	2016	✓			✓		10,49
10. Matheus U. Chupel	2017		✓		✓	✓	1,73
11. Hannareeta Ohman	2016		✓		✓	✓	11,01
12. Marinda Henskens	2018		✓		✓	✓	4,56
13. José M. Cancela	2015	✓			✓	✓	9,91
14. Jonathan B. Harris	2017	✓			✓	✓	0,84
15. Si-Yu Yang	2015	✓			✓		2,62

Figure 4. Results of the effect of exercise along with the weight of each study depending on the sample

- Patients with dementia participating in aerobic exercise improved their aerobic ability [3] and it seems to be related to changes in cognitive and neuropsychiatric symptoms [4-5].
- There are proved to be benefits of aerobic exercise in memory and instrumental activities of daily life [6].
- With the strength training an increase in the cognitive profile and an improvement in fitness are observed (p = 0.001)[7].
- Mixed exercise improved global cognition, visual memory, verbal memory, executive function, gait endurance, leg muscle strength and balance (more effective than aerobic exercise alone)[8].
 - Aerobic exercise and mixed interventions have been studied ore, while resistance interventions have been less studied.
 - All three types of exercise have shown positive effects.
 - The methodological differences of the studies make it difficult to draw definitive conclusions about the optimal intervention in the cognitive and physical function.

Conclusions: Exercise may help maintain or improve cognitive function and functionality in patients with dementia but additional study is needed to clarify optimal intervention and establish guidelines.

Conflict of interest: No

References: 1) Higgins JPT, Green S. Cochrane handbook for systematic reviews of interventions version 5.0.0 [updated February 2008]. The Cochrane Collaboration, 2008. Available: <http://www.cochrane-handbook.org/>. Accessed 26 May 2009. 2) Moher M, Liberati A, Tetzlaff J, Altman D. G. & The PRISMA Group. Preferred reporting items for systematic reviews and meta-analysis: The PRISMA statement. Journal of Clinical Epidemiology. 2009; 62:1006-12. 3) Frederiksen K, et al. A 16-Week Aerobic Exercise Intervention Does Not Affect Hippocampal Volume and Cortical Thickness in Mild to Moderate Alzheimer's Disease. Front. Aging Neurosci. 2018;10: 293-4) Sobol N, et al. Change in Fitness and the Relation to Change in Cognition and Neuropsychiatric Symptoms After Aerobic Exercise in Patients with Mild Alzheimer's Disease. J Alzheimers Dis. 2018; 31: 145-5) Hoffmann K, et al. Moderate-to-High Intensity Physical Exercise in Patients with Alzheimer's Disease: RCT. J Alzheimers Dis. 2016;50:443-51. 6) Vidoni E, et al. Aerobic Exercise Sustains Performance of Instrumental Activities of Daily Living in Early-Stage Alzheimer Disease. J Geriatr Phys Ther. 2017;1-6. 7) Chupel M, et al. Strength Training Decreases Inflammation and Increases Cognition and Physical Fitness in Older Women with Cognitive Impairment. Front. Physiol. 2017; 8:377. 8) Bossers W, et al. A Nine-Week-Long Aerobic and Strength Training Program Improves Cognitive and Motor Function in Patients with Dementia: RCT. Am J Geriatr Psychiatry. 2015;23:1106-16. 9) Sobol A, et al. Effect of aerobic exercise on physical performance in patients with Alzheimer's disease. Alzheimers Dement. 2016;1-8. 10) Cancela J, et al. Effects of a Long-Term Aerobic Exercise Intervention on Institutionalized Patients with Dementia. J Sci Med Sport. 2015;19:293-8. 11) Yang S-Y, et al. The Effects of Aerobic Exercise on Cognitive Function of Alzheimer's Disease Patients. CNS Neurol Disord Drug Targets. 2015; 14:1292-97. 12) Harris J, et al. The Impact of Physical Versus Social Activity on the Physical and Cognitive Functioning of Seniors with Dementia. Activities Adaptation & Aging. 2017; 41: 161-74. 13) Eggermont L, et al. Walking the line: a randomised trial on the effects of a short term walking programme on cognition in dementia. J Neurol Neurosurg Psychiatry. 2009;80:92-4. 14) Ohman H, et al. Effects of Exercise on Cognition: The Finnish Alzheimer Disease Exercise Trial. RCT. Am Geriatr Soc. 2016; 64:731-8. 15) Lamb S, et al. Dementia and Physical Activity (DAPA) trial of moderate to high intensity exercise training for people with dementia. RCT. BMJ. 2018;361:k1675. 16) Henskens M, et al. Effects of Physical Activity in Nursing Home Residents with Dementia: RCT. Dement. Geriatr. Cogn. Disord. 2018;46:60-80. 17) Liu I, et al. The Therapeutic Effects of Exercise Training on Elderly Patients with Dementia. RCT. Arch Phys Med Rehabil. 2020;101:762-69.

