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

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Background and aims: Dementia is characterized by a decrease in cognitive and physical functions. Unlike in previous years, there is more interest in the role of exercise as a treatment strategy for people with dementia. The aim of this study is 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, Scopus 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, aerobic exercise, mixed exercise (aerobic and 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].

Results: The study included fourteen trials with two (2) types of exercise (aerobic and mixed). The fourteen studies that were examined concern a population of 1874 people, 746 men and 627 women with an average age of 77,1.

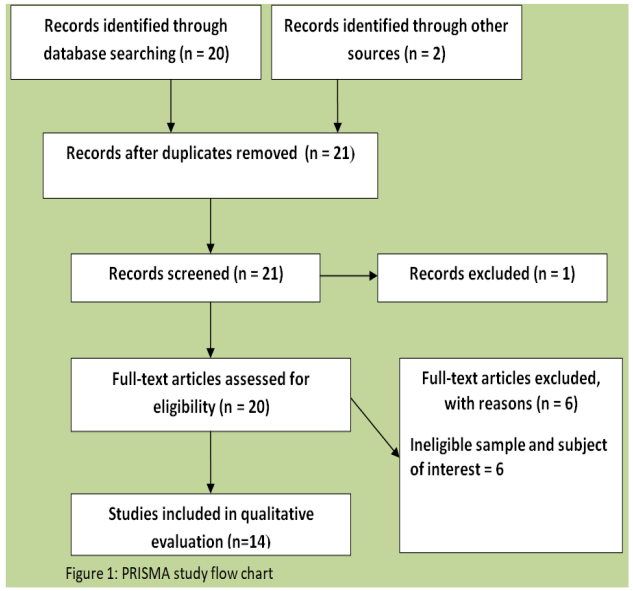

Figure 1: PRISMA study flow chart

The patients who participated had different degree of dementia (Fig.2) while the intensity of exercise in the intervention programs varies as shown in Figure 3. The moderate exercise intensity improved significantly (P<0.05) cognitive function in patients with mild Alzheimer's disease [3].

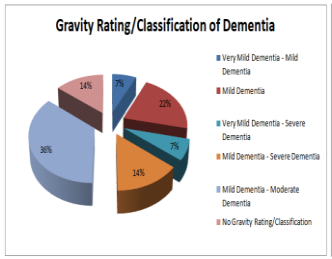

Figure 2. Gravity Rating/Classification of Dementia in the studies - quantitative ration

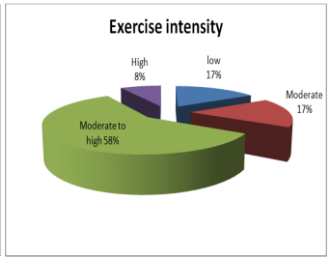

Figure 3. Exercise intensity quantitative ratio

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 (2, 5,6,7 and 10) are assigned more weight while studies with relatively poor precision (9 and 12) 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	*Mixed*	*Cognitive function*	*Physical function*	
1. Si-Yu Yang	2015	✓		✓		2,62
2. José M. Cancela	2015	✓		✓	✓	9,91
3. Willem J.R. Bossers	2015	✓	✓	✓	✓	5,72
4. Laura H.P Eggermont	2016	✓		✓		5,09
5. Nanna A. Sobol	2016	✓			✓	10,49
6. Kristine Hoffmann	2016	✓		✓		10,49
7. Hannareeta Ohman	2016		✓	✓		11,01
8. Eric D. Vidoni	2017	✓			✓	3,41
9. Jonathan B. Harris	2017	✓		✓	✓	0,84
10. Sarah E. Lamb	2018		✓	✓	✓	25.90
11. Nanna A. Sobol	2018	✓		✓	✓	2,88
12. Kristian S. Frederiksen	2018	✓		✓	✓	2,15
13. Marinda Henskens	2018		✓	✓	✓	4,56
14. I-Ting Liu	2020	✓		✓	✓	3,20

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 [4] and it seems to be related to changes in cognitive and neuropsychiatric symptoms [5-6].

There are proved to be benefits of aerobic exercise in memory and instrumental activities of daily life [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].

The mixed exercise at home-based (HE) improved the executive function while enhanced the level of physical function and independence of the participants [9].

Aerobic exercise and mixed interventions (aerobic and resistance exercise) have been studied more, both of the types of exercises 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 and physical function in patients with dementia but additional study is needed to clarify optimal intervention and established 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) 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. 4) 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. 5) 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 Alzheimer's Dis.2018; 65:137-45. 6) Hoffmann K., et al. Moderate-to-High Intensity Physical Exercise in Patients with Alzheimer's Disease: RCT. J Alzheimer's Dis.2016;50:443-53. 7) 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. 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) Ohman H., et al. Effects of Exercise on Cognition: The Finnish Alzheimer Disease Exercise Trial: RCT.J Am Geriatr .Soc.2016; 64:731-8. 10) Sobol A., et al. Effect of aerobic exercise on physical performance in patients with Alzheimer's disease. Alzheimer's Dement.2016;1-8. 11) 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. 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) 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. 14) Henskens M., et al. Effects of Physical Activity in Nursing Home Residents with Dementia: RCT. Dement. Geriatr. Cogn. Disord.2018;46:60–80. 15) Liu IT., et al. The Therapeutic Effects of Exercise Training on Elderly Patients with Dementia: RCT. Arch Phys Med Rehabil.2020;101:762-69, 16) Eggermont L., et al. Walking the line: a randomized trial on the effects of a short term walking programme on cognition in dementia. J. Neurol. Neurosurg. Psychiatry.2009;80:802–4.

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