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IMPORTANCE OF PHYSICAL TRAINING IN LOW BACK PAIN IN CAREGIVER BURNOUT

Ana Díaz Cevallos[1]*, Viviana Paucar[2], Teresa García-Pastor[3], Diana Ruiz-Vicente[4]

[1]Universidad Nacional de Chimborazo, Ecuador. Email: anidiaz1208@hotmail.com
[2]Universidad Metropolitana, Ecuador. Email: v.paucat@umet.edu.ec
[3]Universidad Camilo José Cela, España. Email: tgarcia@ucjc.edu
[4]Universidad Camilo José Cela, España. Email: diruiz@ucjc.edu

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Corresponding Author: Ana Díaz Cevallos (anidiaz1208@hotmail.com)

ABSTRACT

***Introduction:** Family members of people with Cerebral Palsy (CP) are usually the ones who act as informal caregivers. On certain occasions their work has repercussions on their quality of life and their health and may even trigger lumbar and cervical pain. **Objective:** The study aims to determine the effects of physical exercise on low back pain in caregivers of people with CP. **Methodology:** It is quantitative quasi-experimental research, with a pretest-posttest design with a control group, with a non-probabilistic sample by accessibility considering the characteristics of the participants for the study. The study analyzed the functional effects on the cervical spine and emotional effects of the implementation of a physical exercise program in caregivers of people with CP. **Results:** The intervention with a physical exercise program for 16 weeks to an experimental group of 24 informal caregivers of CP for 19.83 ± 1.2 years improved caregiver burden, emotional health and low back pain. In contrast, the control group after the 16 weeks worsened anxiety. **Discussion and Conclusion:** The results of the study collaborate as a non-pharmaceutical treatment for anxiety and neck pain, being the practice of physical exercise for 16 weeks a good option to alleviate the symptomatology of Caregiver Overload Syndrome.*

KEYWORDS: Caregivers; Caregiver Overload Syndrome; Cerebral Palsy; Physical Exercise; Caregiver Overload Syndrome.

1. INTRODUCTION

Cerebral Palsy (CP) is the physical disability that produces alterations in mobility and development, as well as others in sensation, perception, cognition, communication and behavior (Duvignau, 2015). The family of subjects with CP tries to improve the quality of life of the people in their care, since a correlation is shown between the degree of motor impairment and the decrease in quality of life in the pediatric and adolescent population with CP.

In addition to the quality of life of people with CP, the quality of life of their caregivers is also affected (Garip, 2017). Caregivers of a family member with CP often have health problems associated with the exercise of this work. Among the main diseases are: stress, headache, sleep disturbances, anxiety and neck pain (Chamorro, 2009). There is evidence that the use of supervised aerobic exercise, performed three times a week at moderate intensity for a minimum of eight weeks, has become an alternative treatment to medication in the management of depression and spinal pain (Lamotte, 2017; Ghaderi et al., 2016; Cordeiro, 2017).

Exercise increases blood flow, vascular density, during exercise the nervous system increases the levels of neurotransmitters such as: endorphins, norepinephrine, serotonin reducing anxiety, pain and improving mood and the feeling of well-being (Connel et al., 2017; Carek et al., 2011). These benefits can also be seen reflected in caregivers of people with chronic neurological diseases, in different studies on the practice of physical exercise have shown positive effects mainly in reducing the caregiver's burden (Cuthbert et al., 2016; botha et al., 2015).

The physical and emotional health of the caregiver is important, and there is currently little scientific evidence on treatments, prevention and promotion measures that help improve the quality of life of this group of people, this was the main motivation for carrying out this research, which is why the objective of this study.

2. METHOD

The present study is a quasi-experimental quantitative research, with a pre-test-post-test design with a control group, with a non-probabilistic sampling for accessibility considering the characteristics of the participants for the study. In the research, the effects of muscle strength and functional disability of the lumbar spine after the implementation of a physical exercise program in caregivers of people with CP were analyzed.

2.1. Participants

A total of 24 women with a mean age of 48.25 ± 1.29 years, caregivers of a family member with CP, who presented Caregiver Overload Syndrome and low back pain, participated. The sample was divided into two groups: a so-called intervention group, which carried out a 16-week exercise program with a frequency of 3 times a week, and a control group whose participants followed their usual lives.

The inclusion criteria were: being a caregiver of a family member with CP, for a period between 18 and 25 years, with Caregiver Overload Syndrome, assessed with a score higher than 46 in the Zarit test, who did not have health problems that prevented them from practicing physical activity and who agreed to participate freely and voluntarily in the research. The exclusion criteria were being a caregiver for a family member with another dependent disease, presenting cardiovascular risk and/or pre-existing heart disease.

2.2. Procedure

The variables of muscle strength and low back pain were investigated with the Oswestry test. The physical exercise program was applied and supervised by a physiotherapy professional for a period of 16 weeks, 3 days a week (with a day off), for 60 minutes, the exercises were performed in a group manner. In the first weeks of the physical exercise program, it was started at a low intensity and a progressive increase was made until reaching a moderate intensity by week 16.

2.2.1. Instrument

Data are shown as mean ± standard deviation. The normality of the variables was checked with the SHAPIRO-WILK test. To analyze the influence of the intervention program on the study variables, a two-factor ANOVA was performed (Group * pre-post). The significance level was established at $p < 0.05$ in all cases. All calculations were performed with the SPSS version 22 program.

2.2.2. Ethical Considerations

All families received information about the objectives and characteristics of the study and gave their verbal and written informed consent on behalf of the participant. This work was designed following the deontological standards recognized by the Declaration of Helsinki, complying with the recommendations of the Good Clinical Practice of the Ecuadorian Ministry of Public Health and the current Ecuadorian regulations that regulate research on human beings and received a positive assessment from the Ethics Committee.

2.3. Data Analysis

The results of the study and the analysis of the

processed data are presented below.

3. RESULTS

The post-intervention data in the two groups vary intergrouply, in the intervention group the variables of caregiver burden and disability due to low back pain decreased statistically significantly (P<0.05), on the contrary, in the control group these variables increased (Table 1).

Table 1: Emotional Health And Low Back Pain Before And After Surgery.

		GE (N=12)	Intragroup Difference *P*	GC (N=12)	Intragroup Difference *P*	Intergroup Difference *P*
Caregiver Burden	pre	61.6 ± 3.11	0,00*	64,58 ± 4,56	0,08	0,00*
	post	53,6 ± 3,72		65,25 ± 4,15		
	post	4,08 ± 0,79		5,16 ± 1,11		
lumbago	pre	56,25 ± 1,22	0,00*	60,13 ± 3,08	0,09	0,012*
	post	42,18 ± 1,56		60,26 ± 3,81		

Note: GE= Experimental Group; CG = Control Group; *P = Statistical Significance. *Indicates* A Statistically Significant Intragroup Difference With A Significance Level P <*0.05*

The caregivers' burden on the Zarit test was significantly reduced in the group that followed the P<0.05 exercise program. On the other hand, in the control group there was no statistically significant change (P=0.08).

The experimental group reduced low back pain after the intervention with physical exercise (P<0.05), unlike the control group, which did not present any statistically significant change (P=0.09).

Table 2: Caregivers' Muscle Strength Before And After Surgery.

		GE (N=12)	Intragroup Difference *P*	GC (N=12)	Intragroup Difference *P*	Intergroup Difference *P*
Right Hand Prehensile Strength Kg	Pre	24,17 ± 12,22	0,00*	24,17 ± 12,22	0,09	0,011*
	Post	26,58 ± 9,79		24,16 ± 12,23		
Right side hip flexion strength Kg	Pre	9,86 ± 1,22	0,00*	9,52 ± 1,37	0,29	0,000*
	Post	10,51 ± 1,79		9,51 ± 1,38		
Right Side Hip Extension Strength Kg	Pre	9,83 ± 1,63	0,08	8,57 ± 1,72	0,26	0,089
	Post	9,96 ± 1,58		8,56 ± 1,72		
Right side knee flexion strength Kg	Pre	14,85 ± 21,22	0,00*	14,54 ± 3,36	0,34	0,000*
	Post	15,91± 2,56		14,56 ± 3,41		

Note: Results Expressed As Mean ± Standard Deviation.

GE= Experimental Group; CG = Control Group; *P = statistical significance. *Indicates a statistically significant intragroup difference with a significance level of P<0.05.* As shown in Table 2, when analyzing muscle strength by dynamometry, strength in hip and knee flexion movements was improved, and in the upper extremity the prehensile strength of the hand increased, in Table 2 there are statistically significant changes (*P<0.05) in the three tests respectively.*

4. DISCUSSION

The physical exercise program applied in Caregiver Overload Syndrome produced positive effects in the reduction of caregiver burden and disability due to low back pain in the intervention group, which unlike the control group, at the end of 16 weeks increased anxiety and social dysfunction. In addition, it improved muscle strength in both the lower and upper body.

The literature mentions that practicing physical exercise in a group expands and improves social interaction, due to the development of social, communicative, and coexistence skills and abilities through body expression, cooperation, and inclusion (Thompson et al., 2012; Yu et al., 2015; Wegner, 2014; Del Cura & Sandin, 2020 Cuthbert et al., 2018). In addition, physical exercise improves people's self-esteem, confidence, commitment, effort, and vitality by feeling better about themselves, which favors interpersonal relationships (Ortega & Miranda, 2014; Stanton, 2014; Singh, 2001).

The results of this research are consistent with studies carried out in caregivers of people with chronic diseases, that the practice of physical exercise causes a positive anxiolytic effect and a decrease in symptoms of depression and anxiety (Morland et al., 2017; Ochentel 2018). Physical exercise improves the regulation of the cardiovascular and respiratory system by affecting the nervous system, which increases the levels of neurotransmitters such as:

endorphins, norepinephrine, serotonin, reducing anxiety, pain and improving mood and the feeling of well-being (Lowery, 2014; Madruga et al., 2020)

The results of the present study collaborate as a non-pharmaceutical treatment for anxiety and neck pain, with physical exercise for 16 weeks being a good option to alleviate the symptoms of Caregiver Overload Syndrome.

5. CONCLUSIONS

In caregivers of people with chronic diseases, such as CP, they usually present exhaustion, physical and psychological exhaustion due to intense dedication to care. This situation causes a series of physical, psychological and emotional symptoms.

All the aforementioned symptoms treated with the intervention of a physical exercise program for 16 weeks in an experimental group of 24 informal PC caregivers improved caregiver load, muscle strength and disability due to low back pain. In contrast, the control group after 16 weeks worsened emotional health in the aspects of anxiety and social dysfunction.

Physical exercise improved physical and emotional health, due to the development of social and communicative skills and abilities through body expression, also the positive effects of physical exercise were to regulate the nervous system, increasing the release of neurotransmitters improving mood and the feeling of well-being.

This study is of great contribution to the treatment of neck pain and anxiety with physical exercise for 16 weeks, good results are observed in the research sample.

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REFERENCES

Botha E, Gwin T, Purpora C. (2015). The effectiveness of mindfulness-based programs in reducing stress experienced by nurses in adult hospital settings: a systematic review of quantitative evidence protocol. JBI Database System Rev Implement Rep. 13(10):21–9. doi: 10.11124/jbisrir-2015-2380. PubMed PMID: 26571279.

Carek P. (2011). Exercise for the treatment of depression and anxiety. Int J Psychiatry Med. 41(1):15–28. doi: 10.2190/PM.41.1.

Chamorro A. (2009). characterization of the Primary Caregiver of Patients with Disabilities of Neurological Origin. Journal of the Faculty of Health Sciences of the University of Cauca [Internet]. 17(3):31–8. Available in:

Connell CJW, Thompson B, Turuwhenua J, Srzich A, Gant N. (2017). Effects of Dopamine and Norepinephrine on Exercise-induced Oculo-motor Fatigue. Medicine and science in sports and exercise [Inter-net]. 49(9):1778–88. Disponible en:

Cordeiro LMS, Rabelo PCR, Moraes MM, Teixeira-Coelho F, Coimbra CC, Wanner SP(2017). Physical exercise-induced fatigue: the role of serotonergic and dopaminergic systems. Braz J Med Biol Res. 50(12):e6432. doi: 10.1590/1414-431X20176432. PubMed PMID: 29069229.

Cuthbert CA, King-Shier K, Tapp DM, Ruether D, Jackson C, Culos-Reed SN. (2016). Renewing caregiver health and wellbeing through exercise (RECHARGE): A randomized controlled trial. Contemp Clin Trials. 50:273–83. doi: 10.1016/j.cct.2016.08.007. PubMed PMID: 27530087.

Cuthbert CA, King-Shier KM, Ruether JD, Tapp DM, Wytsma-Fisher K, Fung TS (2018). The Effects of Exercise on Physical and Psychological Outcomes in Cancer Caregivers: Results From the RECHARGE Randomized Controlled Trial. Ann Behav Med. 52(8):645–61. doi: 10.1093/abm/kax040. PubMed PMID: 30010704.

Del Cura Bilbao A, Sandín Vázquez M. (2020). Assets for the health and quality of life of people diagnosed with serious mental illness. Gac Sanit. DOI: 10.1016/J.Gaceta.2020.03.004. PubMed PMID: 32467001 spa.

Duvignau, E. (2015). Quality of life in patients. Rev Sanid Milit Mex. [Internet]. 69(4):535–42. Available at: https://www.medigraphic.com/pdfs/sanmil/sm-2015/sm156e.pdf.

Garip Y. (2017). Fatigue in the mothers of children with cerebral palsy. Disability and Rehabilitation. 39(8):757–62. doi: 10.3109/09638288.2016.1161837.

Ghaderi F, Mohammadi K, Amir Sasan R, Niko Kheslat S, Oskouei AE. (2016). Effects of Stabilization Exercises

Focusing on Pelvic Floor Muscles on Low Back Pain and Urinary Incontinence in Women. Urology [Internet]. 93:50–4. Disponible en:
https://pubmed.ncbi.nlm.nih.gov/27059833/.
https://pubmed.ncbi.nlm.nih.gov/28452866/.
https://revistas.unicauca.edu.co/index.php/rfcs/article/view/214.

Lamotte G. (2017) Exercise Training for Persons with Alzheimer's Disease and Caregivers: A Review of Dyadic Exercise Interventions. Journal of motor behavior. 49(4):365–77. doi: 10.1080/00222895.2016.1241739.

Lowery D. (2014). The effect of exercise on behavioral and psychological symptoms of dementia: the evidency.

Madruga M, Prieto J, Rohlfs P, Gusi N. (2020). Cost-Effectiveness and Ef-fects of a Home-Based Exercise Intervention for Female Caregivers of Relatives with Dementia: Study Protocol for a Randomized Controlled Trial. Healthcare (Basel). 8(1). doi: 10.3390/healthcare8010054. PubMed PMID: 32155761.

Morland C, Andersson KA, Haugen ØP, Hadzic A, Kleppa L, Gille A, (2017). Exercise induces cerebral VEGF and angiogenesis via the lactate receptor HCAR1. Nat Commun. 8:15557. doi: 10.1038/ncomms15557. PubMed PMID: 28534495.

Ochentel O. (2018). Efficacy of Exercise Therapy in Persons with Burn-out. A Systematic Review and Meta-Analysis. Journal of sports science & medicine [Internet]. 16(1):475–84. Disponible en: https://pubmed.ncbi.nlm.nih.gov/30116121-efficacy-of-exercise-therapy-in-persons-with-burnout-a-systematic-review-and-meta-analysis/?from_term=exercise+and+burnout+&from_pos=1.

Orgeta V, Miranda-Castillo C. (2014). Does physical activity reduce the burden in carers of people with dementia? A literature review. International journal of geriatric psychiatry [Internet]. 29(8):771–83. Disponible en: https://pubmed.ncbi.nlm.nih.gov/25191688/.

Singh N. (2001). The efficacy of exercise as a long-term antidepressant in elderly subjects: a randomized, controlled trial. The journals of ger-ontology. 56(8):497–504. doi: 10.1093/gerona/56.8.m497.

Stanton R. (2014). Exercise and the treatment of depression: a review of the exercise program variables. Journal of science and medicine in sport [Internet]. 28(3):177–82. Disponible en: https://doi.org/10.1016/j.jsams.2013.03.010.

Thompson D, Karpe F, Lafontan M, Frayn K. (2012). Physical activity and exercise in the regulation of human adipose tissue physiology. Physiol Rev. 92(1):157–91. doi: 10.1152/physrev.00012.2011. PubMed PMID: 22298655.

Wegner M. (2014). Effects of exercise on anxiety and depression disorders: review of meta- analyses and neurobiological mechanisms. CNS & neurological disorders drug targets. 18(7). doi: 10.2174/1871527313666140612102841.

Yu F, Thomas W, Nelson NW, Bronas UG, Dysken M, Wyman JF. (2015). Impact of 6-month aerobic exercise on Alzheimer's symptoms. J Appl Gerontol. 34(4):484–500. doi: 10.1177/0733464813512895. PubMed PMID: 24652914.