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Resistance training program on functional independence of a elderly man with frontotemporal dementia: a case report

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ABSTRACT

Borba-Pinheiro CJ, de Figueiredo NMA, Walsh-Monteiro A, Júnior ORMR, Pernambuco CS, Oliveira MA, Dantas EHM. Resistance training program on functional independence of a elderly man with frontotemporal dementia: a case report. *J. Hum. Sport Exerc.* Vol. 8, No. Proc2, pp. S47-S53, 2013. To investigate the effects of a resistance training program on muscular strength, functional autonomy and body composition of an elderly man with frontotemporal dementia, was the objective of this study. A male volunteer with 80 years of age and 75.7 kg of body weight was participant of this study. The cerebral atrophy of temporal lobes was diagnosed by a Computer Tomography Scan. To evaluation of muscle strength the 10RM test (repetition maximum), for functional autonomy the protocol of the Latin American Development to Maturity Group – (GDLAM) and body composition determined by Dual Energy X-ray absorptiometry (DXA) were used. The training period of four months consisted of eight exercises with intensity of 65% to 90% of 10RM, with three sessions weekly of the 60 min/session. The student t test was used. Statistical improvement was observed for % fat (Δ% = -2.93%, p = 0.041), for exercises of leg press 45 ° (Δ% = 48%, p = 0.001), horizontal leg press (Δ% = 18%, p = 0.01) and knee extension (Δ% = 12%, p = 0.04). In addition, the put on and remove a t-shirt test (Δ% = -7.19%, p = 0.018) and the GDLAM Index (Δ% = -8.53%, p = 0.014) of functional autonomy. It is concluded that the resistance training program was effective for the case study, as improved functional autonomy, the muscle strength of the legs, and the fat percentage of the volunteer.
Key words: MUSCLE STRENGTH, BODY COMPOSITION, ACTIVITIES OF DAILY LIVING.

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INTRODUCTION

The frontotemporal dementia (FTD) represents an important group of neurodegenerative diseases. FTD is characterized by atrophy of the frontal and temporal cortices. The resulting syndrome of FTD is characterized by: progressive aphasia, Parkinsonism, memory loss and Alzheimer's disease; as well as behavioral disorders and personality changes (Lovestone, 2009).

For Marra et al. (2007) the severity of the dementia affects the performance of older people in activities of daily living (ADL). Prospective studies on the practice of vigorous physical activity are reported in the literature as indicators of protection of cognitive decline and consequently the risk of developing dementia independent of the risk factors (Speelman et al., 2011; Bowen, 2012).

Most studies involving the FTD relate aerobic activity (Eggermont et al., 2006; Trudeau, 2003; PAHO, 2003). However, Blankevoort et al. (2010) considers interventions with multi-exercises including strength training for improving physical function and ADL of elderly with dementia.

The studies using resistance training (RT) in elderly people with dementia are not referenced in the literature, however, there are recommendations for the use of RT due to the positive effect variables related to functional autonomy and quality of life of elderly (ACSM, 2009; Romo-Perez et al., 2011). However, it is primary to provide further conclusions about the RT and the FTD by deficiency of randomized studies. Thus, the objective of this study was to investigate the effects of an RT program on functional autonomy, muscle strength and body composition of an elderly man with FTD.

MATERIAL AND METHODS

Case report

The volunteer of this case is a man with 80 years of age, with ethnic characteristics afro-South American, retired of work, with 170 cm of height, 75.7 kg of body mass and BMI of 26.2 kg/m². The volunteer has a family history of Alzheimer's disease and social isolation, led to treatment with antidepressants. Between the physical symptoms include: difficulty walking and body balance; muscle dystonia and Parkinsonism; and difficulties of speech and articulation of words. In addition, a report of Alzheimer disease in case of family was related. The cerebral atrophy in the temporal lobes was diagnosed by computerized tomography in equipment Siemens® AR Star (Germany). The clinical evidence and the temporal atrophy confirm the diagnosis of moderate FTD with parkinsonism (Guimarães et al., 2006) in agreement with the doctor psychiatrist's in 2002.

Study Variable and Protocols:

a. 10RM test (repetition maximum) for the study of muscle strength with exercises for the arms and legs (ACSM, 2009) in Physicus® equipments (Brazil);
b. Functional Autonomy (GDLAM) protocol of evaluation of the activities of daily living (Dantas and Vale, 2004);
c. Body Composition by Dual Energy X-ray Absorptiometry, Lunar® (USA). The study was approved by the ethics committee in research of the Castelo Branco – RJ University PROCIMH number 01712/2008.

The classes had a frequency of 3/week in alternate days with 60 min/class. The RT was planned for 4 months, according with recommendations of Borba-Pinheiro et al. (2010) shown in the Table 1.

Table 1. *Training Periodization.*

Cycle 1		Cycle 2	Cycle 3	Cycle 4
Adaptation period	10 RM test	10 RM test	10 RM test	10 RM test
Stretches (10s) Loads lightweight	Intensity 65%	Intensity 70%	Intensity 75%	Intensity 80%
10-12 Rep.	18-20 Rep.	15-18 Rep.	10-12 Rep.	6-8 Rep.
2-3 Sessions	3 Sessions	3 Sessions	3 Sessions	3 Sessions
8-10 Exercises	8-10 Exercises	8-10 Exercises	8-10 Exercises	8-10 Exercises
	Intervals 20-30´	Intervals 30-40´	Intervals 40´	Intervals 60´
Stretches (10s)	Stretches (10s)	Stretches (10s)	Stretches (10s)	Stretches (10s)
2 Week	2 Week	4 Week	4 Week	4 Week
60 min.	60 min.	60 min.	60 min.	60 min.

10RM= 10 reptition maximum. Rep=repetition.

RESULTS

The Table 2 presents the results of body composition, showing a decrease ($p<0.05$) in fat % of the volunteer studied.

Table 2. *Presents the results of body composition variables after the training program.*

Body composition variables	Pre-Test	Post-Test	Δ%	*p-value*
Mass (kg)	75.7	74.5	-1.2	0.083
Height (cm)	170	170	0.0	1.000
BMI (kg/m^2)	26.19	25.78	-0.41	0.295
% Fat	28.26	25.33	-2.93	**0.041**
Waist-Hip circunference (cm)	0.98	0.87	-0.11	0.442

BMI= Body Mass Index. The bold number indicate p<0.05 by Student-t test.

Table 3 shows the results with significant increase in one test and also the index GDLAM ($p<0.05$) of functional autonomy.

Table 3. *Presents the results of Functional Autonomy test after the training program.*

Functional Autonomy (Test fo GDLAM)	Pre-Test	Post-Test	Δ%	*p-value*
RVDP (s)	6.43	5.42	-1.01	0.131
PRTS (s)	32.94	25.75	-7.19	**0.018**
10mW (s)	7.26	5.64	-1.62	0.082
RSP (s)	10.37	8.83	-1.54	0.087
RCMH (s)	60.56	60.01	-0.55	0.237
GI (Score)	68.31	59.78	-8.53	**0.014**

RVDP= Rise fast from a ventral decubitus postion; PRTS= Put on and remove a t-shirt; 10mW= Walk 10 meters; RSP= Rise from a sitting position five times; RCMH= Rise from a chair and move around the house; GI= GDLAM Index; s= Seconds. The bold numbers indicate p<0.05 by Student-t test.

Table 4 presents the results and shows that the strength tests showed significant increase for the exercises: leg press 45 °, horizontal leg press and leg extension ($p<0.05$).

Table 4. *Presents the results of Muscular Strength Exercises after the training program.*

Exercises (kg)	Pre-Test	Post-Test	Δ%	*p-value*
Leg Press at 45º	62	110	48	**0.001**
Horizontal Leg Press	35	53	18	**0.011**
Knee Extension	21	33	12	**0.042**
Hip Adduction	40	46	6	0.121
Shoulder Adduction	16	23	7	0.123
Elbow Extension	11	14	3	0.140
Rowing Machine	11	14	3	0.140
Elbow Flexion	3	4	1	1.000

The bold numbers indicate p<0.05 by Student-t test.

DISCUSSION

The results of this case report reinforces the hypothesis that regular physical exercise contributes positively to the fitness and wellness of the elderly (Chodzko-Zajko et al., 2009) besides, exercise reduces the risk of morbidity and mortality (Hirsch et al., 2010) and potentially also contribute in maintaining independence for the autonomy of ADLs (Dantas & Vale, 2004).

In addition, studies have shown that regular exercise can be an effective non-pharmacological therapeutic resource in improving the quality of life of elderly patients with dementia (Zec & Burkett, 2008).

The exercises of regular walking, has been considered a favorable practice in physical and social-affective variables, reducing agitation and aggression, and also improvement of sleep quality and humor (Eggermont et al., 2006; Trudeau, 2003). Conversely to that described in the literature for patients with dementia, where the exercises are designed for low intensity aerobic activities, this case study was planned for the RT.

In our study, the program has resulted in gains in muscle strength in all major muscle groups and has achieved significant results for the legs (Leg Press at 45; Horizontal Leg Press; Knee Extension (Table 4) which is recommended by Blankevoort et al. (2010) and Romo-Peréz et al. (2011). It is therefore our results can contribute to the scientific community, especially for the dementia problem because the increased physiological imbalance and severe morbidity are frequent in elderly sedentary with this disease (Cruz-Jentoft et al., 2010).

The decrease in leg strength compromises locomotion, posture and body balance, which can increase the risk of falls, compromising the performance of ADLs and consequently the functional independence (Borba-Pinheiro et al., 2010). McGinn et al. (2008) shows that the decline in gait speed of individuals advanced age is directly related to the increase number of disease-related functional disability. In this study, strength gains obtained, especially in the legs contribute to an improvement in functional independence of the volunteer.

The benefits of RT in this case study for the realization of ADLs could be seen by evaluating the functional autonomy after training. It can be seen improvement in functional autonomy for the put on and remove a t-shirt test and GDLAM Index (Table 3). The improvement in functional autonomy with maintenance of ADLs can reduce dependence on assistance for home healthcare of the elderly (Stella et al., 2011) and / or occurrence of hospitalizations. In addition, this can improve the wellness perception, minimizing the occurrence of depression and maximizing self-esteem (Meisner et al., 2010).

For Blankevoort et al. (2010) multicomponent interventions involving aerobic exercise, muscle strength and balance can improve physical function and ADLs of elderly with dementia, where the best results are attributed in the interventions with major volume-training. According with Speelman et al. (2011) the benefits of exercise in individuals with dementia also promotes synaptic plasticity and neurogenic, which minimizes the occurrence of psychiatric symptoms (Speelman et al., 2011).

In addition, the increases in muscle strength and functional autonomy cited above, was also verified a reduction in fat % in voluntary after the training program (Table 2). It is noteworthy that this variable is related to the reduction of diseases associated with dyslipidemia, especially in cardiovascular diseases (Oparil, 2003), that are the major cause of morbidity and mortality in the world (PAHO, 2003). However, it is recommended that further randomized clinical studies using our methodology for effective demonstration of the results presented in this case study.

CONCLUSIONS

We conclude that the RT program was effective for the case study, as improved functional autonomy, the muscle strength of the legs, besides decrease the fat % of the volunteer who has physical limitations, which can assist in the ADLs of this voluntary.

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