EFFECTS OF A MULTICOMPONENT EXERCISE PROGRAMME ON PHYSICAL AND COGNITIVE FUNCTIONS OF INSTITUTIONALISED PATIENTS WITH ALZHEIMER’S DISEASE

A. Sampaio1,* E. Marques1 J. Mota 1 J. Carvalho1
CIAFEL, University of Porto, Porto, Portugal

PEst-OE/SAU/UI0617/2011
SFRH/BD/90013/2012

San Juan, 3rd of May, 2014
Alzheimer’s Disease

It is a neurodegenerative disease associated with aging, leading to serious neurological dysfunctions and eventually to death (Alzheimer's Association, 2008).
Neurophychological Changes:
- Memory;
- Language;
- Spatial abilities (topographical disorientation);
- Behavior changes (anxiety, depression, apathy, mood swings, insomnia, aggressiveness, delusion, ...)

Physical Fitness Changes:
- Muscular stiffness (flexibility);
- Muscle mass (strength);
- Balance;
- Walking speed;
- Risk of falls.

A. Background - Dementia and Functional Fitness
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↑ Physical Inactivity
↓ Functional fitness

↓ Physical Health
↓ Brain Health

↓ Autonomy & Quality of Life
A. Background- Benefits of Exercise

**Cardiovascular Health:**
- Improves body composition;
- Improves the lipid profile;
- Aid in the prevention and control of hypertension;
- Peak and prevents hyperglycemia decreases insulin resistance;
- Decreases the levels of inflammatory markers;
- Increased capillarization;
- Decreased cerebral hypoperfusion;
- Consequent increase in brain oxygenation levels

**Brain Health:**
- Reduce disorder protein dipositaion ;
- Increases brain volume;
- Stimulates neurogenesis and synaptogenesis;
- Decreases neuronal death

**Physical Health:**
- Improves aerobic resistance;
- Increases muscular mass;
- Increases bone density;
- Decreases body fat;
- Improve coordenation and balance;
- Decrease the risk of falls;

**Neurotrophic factors:**
- Improve protective neurotrophines (such as BDNF and nerve growth factor)
- Production of endorphins and serotonin
- Increased neurogenesis;
- Facilitate synaptogenese;

Why a Multicomponent Exercise program?

- **Multicomponent Exercise (ME)** is defined as a program of endurance, strength, coordination, balance, and flexibility exercises that have the potential to impact a variety of functional performance measures.

- ME is an recommended alternative to more traditional exercise regimens, particularly due to the potential of ME to impact functional performance outcome measures when used with older adults.

B. Aim

The aim of this study was to investigate the effect of a multicomponent exercise intervention on cognitive functions, anthropometric variables and functional fitness in patients with Alzheimer´s Disease (AD).
C. Methodology- Sample

- 49 individuals screened for interview
- 37 individuals included

19 participants assigned for the Experimental Group
- 4 Excluded:
  - 2 respiratory infection;
  - 2 dead.
- 15 participants completed the study in the Experimental Group

18 participants assigned for the Control Group
- 3 Excluded:
  - 1 fall with fracture of neck of femur
  - 2 dead
- 15 participants completed the study in the Control Group

12 Excluded:
- 5 CDR= 3;
- 7 Refused to participate
### C. Methodology – Characteristics of the subjects

<table>
<thead>
<tr>
<th></th>
<th>Exercise Group (n=19)</th>
<th>Control Group (n=18)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>84,8±5,9</td>
<td>83,3±5,3</td>
<td>0,418</td>
</tr>
<tr>
<td>Men, No. (%)</td>
<td>4 (21,1%)</td>
<td>5 (27,8%)</td>
<td>0,685</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/ Widower</td>
<td>16 (84,2%)</td>
<td>14 (77,8%)</td>
<td>0,693</td>
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<tr>
<td>Married</td>
<td>3 (15,8%)</td>
<td>4 (22,2%)</td>
<td></td>
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<tr>
<td>Educational level (years)</td>
<td>2,58±2,8</td>
<td>4,00±4,0</td>
<td>0,166</td>
</tr>
<tr>
<td>Profession (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic/Agricultural</td>
<td>10 (52,6%)</td>
<td>12 (66,7%)</td>
<td>0,508</td>
</tr>
<tr>
<td>Others</td>
<td>9 (47,6%)</td>
<td>6 (33,3%)</td>
<td></td>
</tr>
<tr>
<td>Diagnosis, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(other than AD)</td>
<td>12 (63,2%)</td>
<td>13 (72,2%)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>5 (26,3%)</td>
<td>8 (44,4%)</td>
<td>0,728</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>3 (15,8%)</td>
<td>6 (33,3%)</td>
<td>0,313</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>7 (36,8%)</td>
<td>4 (22,2%)</td>
<td>0,269</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td>0,476</td>
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<tr>
<td>Medication, No.</td>
<td>7,79±1,75</td>
<td>8,3±2,11</td>
<td>0,448</td>
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<tr>
<td>Blood Pressure, mmHg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td>137,63±17,79</td>
<td>144,11±15,66</td>
<td>0,249</td>
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<tr>
<td>Diastolic</td>
<td>75,52±15,18</td>
<td>81,89±13,56</td>
<td>0,188</td>
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<tr>
<td>CDR at the Baseline</td>
<td>1,68±0,48</td>
<td>1,67±0,49</td>
<td>0,911</td>
</tr>
</tbody>
</table>

*Student’s t test for continuous variables; Chi-squared or Fisher’s exact test (two-tailed) for categorical variables
C. Methodology – Exercise Protocol

**Exercise Programme Protocol:**

- 2 exercise session per week;
- 40´ - 55´ session;
- For 6 months.
- Supervised multicomponent exercise programme:
  - aerobic exercises;
  - muscular resistance and strength training;
  - coordination/flexibility;
  - postural /breathing exercises.
  - pleasant and familiar activities;

**Monitorization:**

- Constant supervision;
- Borg Scale (perceived exertion);
- Heart Rate Monitor;
- Observing signs of fatigue;
Research design

Screening

Baseline Assessment

0 Months

2nd Assessment

3 Months

Multicomponent Exercise Programme

Final Assessment

6 Months

Assessments:
- Global cognitive function (MMSE);
- Anthropometric variables (BMI and waist circumference);
- Functional fitness (Senior Fitness Test) (Riki & Jones, 2011).
Results – Anthropometric variables

**BMI**

- No statistical significance was found

**Waist Circumference**

- Significant group and time interactions
Results – Upper Body

**Arm Curl**

**Back Scratch**

Significant group and time interactions
Results - Lower Body

30-Second Chair Stand

Chair Sit-and-Reach

Significant group and time interactions
Results

8-ft up-&-go

2-min step

Statistical differences between groups

Significant group and time interactions
Results – Cognitive Function

**MMSE**

*Significant group and time interactions on cognitive function*
F. Conclusion

- These results indicated that the ME can be an important element in the promotion and maintenance of health, allowing better results in physical and cognitive ability, on the part of GE compared with inactive elderly.

- This study suggests that ME programs can be an important non-pharmacological strategy to mitigate the decline in physical and cognitive functions in patients with institutionalized AD.
no pain no brain

Thanks for your attention!