Effect of an Exercise and Dietary Intervention on Cognitive Function in Obese Older Women

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Effect of an exercise and dietary intervention on the cognitive function in obese older women

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Introduction
• Risk of cognitive decline and disease are higher in minorities [1].
• Physical activity and healthy dietary patterns have been linked to the prevention of cognitive decline in older adults [2,3].
• Positive associations between obesity and cognitive dysfunction have been reported [4].
• Mind-body exercises positively affect cognitive and memory function [5].
• There have been similar studies on cognitive function, but there are no significant data on the effect of Tai Chi, resistance training, and a dietary intervention on cognitive function [6,7].

Purpose
The purpose of this study was to examine the effect of a combined Tai Chi, resistance training, and dietary intervention on cognitive function in older obese women.

Hypothesis
It is hypothesized that a combined Tai Chi, resistance training and dietary intervention will show positive effects on cognitive function in older obese women.

Study Design
A non-randomized experimental design with baseline testing prior to the intervention and post-testing at the conclusion of the 12-week intervention. The study took place at St. Martin de Porres Senior Center in Providence, Rhode Island. Study approved by the Institutional Review Board of the University of Rhode Island (IRB1213-08).

Participants
• Women (n=27) aged 50 – 80 years
• Obese (body mass index ≥ 30 kg/m²)
• Not engaged in a regular exercise program prior to the start of the intervention
• No significant pulmonary, cardiovascular, metabolic, musculoskeletal, or cognitive disorders
• Medication stable

Measurements
• RBANS tests were used to measure participants’ cognitive functions at baseline and post intervention.
• RBANS was always administered by a licensed Speech Language Pathologist.
• Other pre and post intervention measures were: height, weight, body mass index (kg/m²), and education.

Intervention
• The EXD group (n=16; 5 dropouts) engaged in three 45 min Tai Chi sessions and two 45min trainings sessions respectively per week.
• A registered dietician conducted the behaviorally based diet sessions for 45 min once a week.
• The CON group (n=9; 1 missing data) was asked to maintain a normal lifestyle.

Results

Table 1: Baseline Characteristics of the intervention (EXD) and Control (CON) Groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>EXD Group (n=16)</th>
<th>CON Group (n=9)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>66.0 (7.6)</td>
<td>66.2 (8.0)</td>
<td>0.945</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>0.136</td>
</tr>
<tr>
<td>High School or Less (n)</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Associates or Some College (n)</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s or Higher (n)</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>99.8 (3.3)</td>
<td>90.8 (4.4)</td>
<td>0.110</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>158.7 (1.5)</td>
<td>158.9 (2.0)</td>
<td>0.934</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>39.5 (1.1)</td>
<td>35.7 (1.4)</td>
<td>0.045</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td>0.260</td>
</tr>
<tr>
<td>Non-White (n)</td>
<td>12</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>White (n)</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Continuous data are expressed as mean (standard deviation).
Categorical data are expressed as the number of individuals.
1Data analyzed using an unpaired t-test, 2Data analyzed using Fisher’s Exact Test

Table 2: Changes in RBANS Scores between intervention (EXD) and Control (CON) Groups Post Intervention

<table>
<thead>
<tr>
<th>RBANS Categories</th>
<th>EXD Group (n=16)</th>
<th>CON Group (n=9)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBANS Overall Score</td>
<td>3.1 (2.0)</td>
<td>2.1 (2.7)</td>
<td>0.995</td>
</tr>
<tr>
<td>Immediate Memory</td>
<td>4.1 (2.8)</td>
<td>12.7 (3.7)</td>
<td>0.078</td>
</tr>
<tr>
<td>List Learning</td>
<td>2.0 (0.8)</td>
<td>3.0 (1.1)</td>
<td>0.475</td>
</tr>
<tr>
<td>Story Memory</td>
<td>1.8 (0.7)</td>
<td>3.3 (0.9)</td>
<td>0.204</td>
</tr>
<tr>
<td>Visuospatial/Construction</td>
<td>8.9 (3.5)</td>
<td>-6.4 (4.0)</td>
<td>0.038</td>
</tr>
<tr>
<td>Figure Copy</td>
<td>2.0 (0.5)</td>
<td>-6.1 (1.1)</td>
<td>0.147</td>
</tr>
<tr>
<td>Line Orientation</td>
<td>-0.7 (3.3)</td>
<td>-6.2 (4.4)</td>
<td>0.918</td>
</tr>
<tr>
<td>Semantic Fluency</td>
<td>0.9 (1.4)</td>
<td>-1.2 (1.9)</td>
<td>0.394</td>
</tr>
<tr>
<td>Attention</td>
<td>-4.0 (2.1)</td>
<td>3.5 (2.9)</td>
<td>0.047</td>
</tr>
<tr>
<td>Digit Span</td>
<td>-0.9 (0.6)</td>
<td>-0.9 (0.9)</td>
<td>0.934</td>
</tr>
<tr>
<td>Coding</td>
<td>0.6 (1.5)</td>
<td>-0.2 (2.0)</td>
<td>0.754</td>
</tr>
<tr>
<td>Delayed Memory</td>
<td>4.6 (2.7)</td>
<td>4.2 (3.6)</td>
<td>0.944</td>
</tr>
<tr>
<td>List Recall</td>
<td>0.5 (0.4)</td>
<td>-6.2 (0.5)</td>
<td>0.270</td>
</tr>
<tr>
<td>List Recognition</td>
<td>0.5 (0.2)</td>
<td>0.5 (0.3)</td>
<td>0.968</td>
</tr>
<tr>
<td>Story Recall</td>
<td>2.0 (0.5)</td>
<td>0.8 (0.6)</td>
<td>0.117</td>
</tr>
<tr>
<td>Figure Recall</td>
<td>2.0 (0.8)</td>
<td>-6.4 (1.0)</td>
<td>0.074</td>
</tr>
</tbody>
</table>

Between EXD and CON Groups

Figure 1: Total RBANS Average Score Change Between EXD and CON Groups

Figure 2: RBANS Subcategory Changes (Semantic Fluency and Story Recall) Between EXD and CON Groups

Discussion and Conclusion
• There were no significant RBANS score changes between the EXD and CON Groups. Results show positive and negative results in different RBANS categories and subcategories.
• Strengths of the study were the target population, which include a strong minority population, the combined interventions effects and the presence of a CON group.
• This is the first study to report the combined cognitive effects of a 12-week Tai Chi resistance training, and a dietary intervention in older obese women.
• Limitations of this study were the non-randomized design, small sample size, and the study’s main focus was on the anthropometric and blood pressure changes.
• The RBANS Subcategory “Story Recall” and “Semantic Fluency” are highlighted because scores from both have been shown to be lower in individuals with Parkinson’s disease [8].

Acknowledgements
This material is based upon work supported by the Cooperative State Research Service, U.S. Department of Agriculture, under Project No. RIK045-1039-INT

Personal Purpose for the Honors Project
I was involved fully involved with the intervention from the beginning to end and I wanted to use part of the data to learn how to create a formal poster presentation. My goal was to achieve a full understanding of the research process, I will be presenting a poster of the same topic at the American College of Sports Medicine Annual Meeting in May 2015.

References

Statistical Analysis
• Statistical analysis was performed using SAS statistical software. Significance was set at p < 0.05.
• Normality was assessed using Shapiro-Wilk test.
• No outliers were identified using the 3 standard deviations above or below the mean.
• Fisher’s Exact tests were used to analyzed education level and race/ethnicity.
• Unpaired t-tests were used for between-group baseline values.
• Paired t-test for within group values.
• To compare between group data, analysis of covariance using the change score adjusted for baseline values.

Data analyzed using analysis of covariance using the change score adjusted for baseline values. Error bars set to 3 standard deviations above and below the mean.
Note: this data is not statistically significant (p > 0.05)

Conclusions
No significant RBANS score changes between the EXD and CON Groups.