The effect of therapeutic horseback riding on balance in community-dwelling older adults

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Made possible by the Cheff Therapeutic Riding Center, Augusta, MI
And Michigan State University, Kalamazoo, MI
+ = ?
The Idea
The Literature Review

i.e.

“The Homework”
33% of Seniors experience at least one fall per year.¹
Fall related costs are astounding.

$20.2 \text{ Billion} \text{ in } 1994$

Projected to reach

$32.4 \text{ Billion} \text{ in } 2020^2$

Quality of life can greatly decrease
An impairment in balance triples the fall risk.
To decrease fall risk:
1. Identify Early
2. Manage Medically
3. Modify Environment
4. Exercise
Exercise Programs

Lead to faster postural reflexes, improve balance and mobility, and result in fewer falls.
Cochrane Database Review
(Howe et al. 2008)
of exercise and balance

- 34 studies of exercise interventions leading to statistically significant improvements in balance compared to usual activities
  - 2883 participants
  - Average age ranged from 60-75 years
- Exercises involved
  - Gait-Walking, heel-toe walking, tandem walking, etc.
  - Balance-Standing on one leg, repeated stand ups, step ups, etc.
  - Coordination-Ball throwing, standing and bending in different directions, etc.
  - Muscle strengthening-Resistance training, stair climbing with resistance, etc.
AAANNNNNDDDD... The results of 34 Cochrane Database studies concerning exercise interventions confirm...
“Exercise has a statistically significant positive effect on balance as opposed to usual activity in older people.”
Equine Assisted Therapy and Recreational Riding

IMPROVES
• Balance in children with developmental delay
• Dynamic postural stabilization*
• Joint stability*
• Muscle co-contraction*
• Postural responses*
• Equilibrium responses*
• Gross motor function*

*10,11

Are FUN and healthy exercise!
“The exact **physiologic basis for functional improvements** is not known but is thought to involve **three dimensional transmission of the horses motion to the patients body requiring both neural and musculoskeletal responses.**"
The Study
The effect of therapeutic horseback riding on balance in community-dwelling older adults

A single blind pilot study to evaluate the effect on balance of a ten week therapeutic riding course versus the usual activities in 20 community dwelling adults over the age of 65
Study Design

- Age and gender matched single blind (balance tester, statistician) comparative trial
- Intent to enroll 10 TR and 10 controls
- Balance testing to be done at start and end of study

Study protocol was approved by the Bronson Methodist Hospital Review Board (Kalamazoo, MI)
Inclusion Criteria

- 65 Years or Older
- Be able to understand instructions for balance testing and therapeutic riding
- Be able to complete health history and activities questionnaire
- Be able to provide physician approval
- Be able to provide informed consent
- Be able to commit to 2 balance tests (and) 10 consecutive weeks of once-a-week riding sessions
Exclusion Criteria

- Chronic condition known to affect balance
- Chronic condition that would put subject at risk from horseback riding
- History of substance abuse
- Intake of over 1.5 oz. of alcohol per day
- Fear of horses
- Current recreational horseback riding or previous therapeutic riding instruction within one year of enrollment
Each subject had a health screening and an activity level assessment prior to starting the study.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Sclerosis</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Parkinson’s Disease</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Middle ear disorder (vertigo)</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Brittle bones (osteogenesis imperfecta)</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Thin bones (osteoporosis)</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>In the last one year have you had?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizzy spells?</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Tripping or falling resulting in injury?</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Do you take any medications that cause drowsiness or sleepiness?</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>If yes, name of medication:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you drink more than the equivalent of one glass of wine or one beer each day?</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

Comments:
## Complete Physical Function Scale
(activity level screening)

Please indicate your ability to do each of the following by circling the number next to the activity (your response should indicate whether you are able to do these activities, not if you actually do the activities):

<table>
<thead>
<tr>
<th>Activity</th>
<th>Can do</th>
<th>Can do with difficulty or help</th>
<th>Cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Take care of own personal needs like dressing yourself?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>b. Bathe yourself using tub or Shower?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>c. Climb up and down a flight of stairs.</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>d. Walk outside one or two blocks?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>e. Do light household chores-like cooking or dusting, washing dishes, sweeping a walkway?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>f. Shop for groceries or clothes?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>g. Walk ½ mile (6-7 blocks)?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>h. Walk 1 mile (12-14 blocks)?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>i. Lift and carry 10 lbs. like a full bag of groceries?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>j. Lift and carry 25 lbs. like a medium to large suitcase?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>k. Do heavy household activities like scrubbing floors, vacuuming, raking leaves?</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>l. Do strenuous activities like hiking, digging in garden, moving heavy objects, bicycling, aerobic dance activities, strenuous calisthenics, etc.</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Each participant took both the Fullerton Advanced Balance Scale test as well as the Berg Balance Scale test before and after the ten week study.
• Standing with feet together, eyes closed
• Reaching forward to retrieve an object held at shoulder height
• Turn 360 degrees in a right and left direction
• Step up and over a 6 inch bench
• Tandem walk
Standing with feet together, eyes closed.
Reaching forward to retrieve an object held at shoulder height.
Turn 360 degrees in a right and left direction.
Step up and over a 6 inch bench.
Tandem walk.
Standing on one leg.
Standing on foam with eyes closed.
Two footed jump for distance.
Walk with head turns.
Reactive postural control.

Max. score = 40
Berg Balance Scale

- Sitting to standing
- Standing unsupported
- Sitting with back unsupported but feet supported on floor or on a stool
- Standing to sitting
- Transfers
- Standing unsupported with eyes closed
- Standing unsupported with feet together
• Reaching forward with outstretched arm while standing
• Pick an object from the floor from a standing position
• Turning to look behind over left and right shoulders while standing
• Turn 360 degrees
• Place alternate foot on step or stool while standing unsupported
• Standing unsupported on one foot
• Standing on one leg

Max. score = 56
Results
9 subjects completed the Therapeutic Riding course and 6 controls completed balance testing

*2 additional controls were discontinued due to health reasons
<table>
<thead>
<tr>
<th></th>
<th>TR</th>
<th>P value*</th>
<th>Controls</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>7 f, 2 m</td>
<td></td>
<td>3 f, 3 m</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>70.1</td>
<td></td>
<td>69.3</td>
<td></td>
</tr>
<tr>
<td>FABS</td>
<td>34.11 v. 36.0</td>
<td>0.153*</td>
<td>30.8 v. 34.0</td>
<td>0.148</td>
</tr>
<tr>
<td>BBS</td>
<td>55.3 v. 55.9</td>
<td>0.115</td>
<td>54.5 v. 54.7</td>
<td>0.931</td>
</tr>
<tr>
<td>Power Analysis (FABS)</td>
<td>44</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Power Analysis (BSS)</td>
<td>29</td>
<td></td>
<td>841</td>
<td></td>
</tr>
</tbody>
</table>

*Mann Whitney
Both groups improved in balance but this did not reach statistical significance.
Control Group Activities

“I Started going to the gym three times a week!”

“I Started walking my dog an hour a day!”

“I practiced the test!”

“I am much more active in the summer!”

“I started attending salsa dancing class!”
Other Problems Encountered

- Study started in season of normally increased activity in a healthy control group.
- The study and control group were too healthy.
- Administration of reproducible balance tests takes practice.
- No indication of any type as to a participants’ performance on an individual balance test should be transmitted to the subject.
- Ten weeks may have been too long for optimal retention of subjects.
Study Design Issues

- Larger study needed (power analysis)
  - Community controls needed?
- Balance testing uniformity and practice is needed for optimal measurements
- Should all stable neurologic conditions be excluded?
- Should subjects refrain from additional exercise activity during the study for “purity” of the intervention?
- Is ten weeks too long a TR course for study?
Conclusions
The **FABS** appeared to be **more sensitive** than the BBS for assessing balance in this study group.
Therapeutic Riding appears to be a **SAFE** and **enjoyable** activity for older individuals.
Therapeutic Riding appeared to provide **similar benefits** regarding balance to older individuals as to adults with active lifestyles.
A larger study group would help define the role of Therapeutic Riding in improving balance in this and other groups.
Future Directions

- Multicenter study of approximately 50-100 seniors
- Include patients with stable neurologic conditions
- Train all balance evaluators the same at the “source”
- Consider similar studies in patients with balance problems due to other conditions (e.g. stroke)
Questions?
References


