COMPARISON OF ENERGY EXPENDITURE ON HEALTHY INDIVIDUALS BETWEEN PEG ORTHOSIS VERSUS CRUTCH AMBULATION DURING OVERGROUND WALKING
Comparison of Energy Expenditure on Healthy Individuals Between Peg Orthosis Versus Crutch Ambulation During Overground Walking

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My disclosure is in the Final AOFAS Program Book.
I have no potential conflicts with this presentation.
Cross over study design

• Experimental
• 20 participants (12 male, 8 female)
• Grouped according to age sex and BMI
• 15 - 64 years old
• Preliminary measures: Baseline heart rate, BP after 20 minute rest
• A. Control: no assistive device
• B. Treatment: using crutches
• C. Treatment: using peg walker
• Each participant will perform all three levels at random order, one level per day, for three consecutive days.
Peg Orthosis

• 4 lbs
• Aluminum- made orthosis
• Adjustable height 152-182cm
• Prototype of transfemoral prosthesis
• FWB – femur/patella
• NWB – ankle and foot
Box-and-Whisker Plots of Stride Frequencies after 1 minute and 10 minutes of walking

Comparison of Stride Frequencies

<table>
<thead>
<tr>
<th></th>
<th>without assistive equipment</th>
<th>with crutches</th>
<th>with peg orthosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stride frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at 1st minute</td>
<td>100 ± 6</td>
<td>69 ± 12</td>
<td>67 ± 12</td>
</tr>
<tr>
<td>Stride frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at 10th minute</td>
<td>102 ± 5</td>
<td>72 ± 11</td>
<td>66 ± 11</td>
</tr>
<tr>
<td>Paired Sample t-test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.044*</td>
<td>0.055</td>
<td>0.618</td>
</tr>
</tbody>
</table>

(1% level of significance)
Testing for Significant Pairwise Difference Between Use of Crutches and Use of Peg Orthosis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>t-Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate immediately after walking (BPM) with Crutches Less Than that with Peg Orthosis</td>
<td></td>
<td>0.24</td>
</tr>
<tr>
<td>VO2 max after walking (L/min) with Crutches Less Than that with Peg Orthosis</td>
<td></td>
<td>2.32E-06*</td>
</tr>
<tr>
<td>Time to Finish 1-mile Walk (minutes) with Crutches Less Than that with Peg Orthosis</td>
<td></td>
<td>1.89E-06*</td>
</tr>
</tbody>
</table>
Comparison of Average Ratings

- **Knee Discomfort (affected side)**
  - Start
  - Mid
  - End

- **Knee Discomfort (non-affected side)**
  - Start
  - Mid
  - End

- **Mobility**
  - Start
  - Mid
  - End

- **Shoulder Pain Stability**
  - Start
  - Mid
  - End

Legend:
- Red: Peg
- Blue: Crutches
Conclusion

• higher energy expenditure with the use of peg orthosis on long distance as compared to crutch ambulation.

• ease of use specially on transfers and performance of activities of daily living at short distance (start and mid range)

• best for home ambulation

• recommended for patients who were advised non-weight bearing on the affected foot and ankle.

• This may be used as an alternative for crutch ambulation
References


• Kline G et al.: Estimation of VO₂ max from a 1 mile track walk, gender, age and body weight. Med Science sports Exercises, 19, p. 253-259