A Detailed Statistical Analysis of Anterior Chest Wall Muscle Recruitment

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Introduction

› The Pectoralis Major Muscle is the largest muscle on the anterior chest wall

› Previous EMG research has been conducted on activation during different types of exercise but not on ADLs & IADLs

› Purpose to conduct a detailed statistical analysis on EMG results to evaluate the extent to which the Move in the Tube (MINT) movement strategy must be put in place to reduce asymmetrical pull across the chest wall
Move in the Tube

› Movement strategy that advocates for keeping the upper arm close to the body

› Creates a shorter lever arm during lifting which could allow more activity without increasing stress across the sternum

From Bayl Univ Med. Center
Methods

› Retrospective data on previously collected data on Pectoralis Major recruitment on the anterior chest wall

› Independent variables
  – Age = Young (18-40 years) or Old (60-85 years)
  – Movement Strategy = Self-selected or Move in the Tube
  – ADL / IADL Task (10)
    › Bag – Lifting a bag with 10 lb weight from shopping cart to a table
    › Basket – Lifting a laundry basket with 10 lb from the floor to a table
    › Sit Edge of Bed (EOB) – Standing up from the edge of a bed
    › Pour – Pouring a gallon of water into a cup for 3 seconds
    › Pull Chair – Pulling a chair out from underneath a table
    › Pull Door – Standing in front of a closed door, pulling it open, and walking through
    › Push Chair – Pushing a pulled-out chair into a table
    › Push Door – Standing in front of a closed door, pushing it open, and walking through
    › Scoot Chair – Sitting in a chair and scooting it under a table
    › Vacuum – Vacuuming a floor until instructed to stop

› Dependent variable = Pectoralis Major EMG
Statistical Analyses

› 2-way Analysis of Variance (ANOVA)
  – Differences and interactions between Age x Movement Strategy
  – Alpha level set at 0.05

› 1-way ANOVA
  – Differences among 10 ADL / IADL Tasks
  – Alpha level set at 0.05

› Tukey’s Honestly Significant Difference
  – Post-hoc Test
  – Alpha level set at 0.05

› Pearson Product Moment Correlations
  – Alpha level set at 0.05
Results – 2-way ANOVA

Old subjects had higher EMG activity and asymmetrical pull for both Self-selected and MINT

For sum of bilateral EMG, 7/10 ADL’s had higher MINT activity than Self-selected

For difference of bilateral EMG, 4/10 ADL’s had higher asymmetrical pull using MINT than Self-selected
Results – 1-way ANOVA with Tukey’s

› Significant difference amongst all 10 ADL’s for Sum and Difference of Pec EMG for both self-selected and MINT strategies
## Results – Pearson Correlations

### Self-selected Movement SUM Correlations

<table>
<thead>
<tr>
<th></th>
<th>Bag</th>
<th>Basket</th>
<th>Sit EOB</th>
<th>Pour</th>
<th>Pull Chair</th>
<th>Pull Door</th>
<th>Push Chair</th>
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<th>Scoot Chair</th>
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<tbody>
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### MINT Movement SUM Correlations

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- Values greater than 0.25 are significant at P value 0.05
- Correlation between ADL’s during self-selected and MINT are all significantly different
Conclusions

› Older subjects had greater EMG due to more Motor Units needed to generate the same force

› Some activities had greater asymmetry possibly due to movement efficiency

› Subjects with the greatest EMG activity during 1 task have the greatest EMG activity during another task

› The results imply that using the MINT movement strategy does not reduce asymmetrical pull for all 10 ADL’s
References


