Using Ultrasound to Assess Skeletal Muscle Thickness of The Quadriceps in Young and Older Adults

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STUDY RATIONALE

- Ultrasound (US) imaging is a practical and non-invasive means to assess skeletal muscle architecture.
- To what extent and how best to utilize US to examine differences in skeletal muscle structure between young and older individuals has not been fully explored.

STUDY AIM

To determine the ability to use US as a tool to identify differences in quadriceps muscle thickness between young and older individuals, and to also examine the impact of imaging site/anatomical location.

SUBJECTS

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age (yr)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
<th>BMI</th>
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</thead>
<tbody>
<tr>
<td>Young</td>
<td>16</td>
<td>26 ± 4</td>
<td>171 ± 9</td>
<td>66 ± 12</td>
<td>22 ± 2</td>
</tr>
<tr>
<td>Old</td>
<td>12</td>
<td>70 ± 7</td>
<td>170 ± 11</td>
<td>75 ± 15</td>
<td>26 ± 4</td>
</tr>
</tbody>
</table>

Data are mean ± SD

ULTRASOUND IMAGE

RESULTS

- Collapsed Across All Muscles and Imaging Sites
- Collapsed Across Imaging Sites
- Imaging Site Specific (VL and RF)
- Imaging Site Specific (VI)

METHODS

- Five total 2D B-mode US images (Terason uSmart 3300) of the quadriceps (right leg) were acquired after 20 minutes of supine rest.
- Two anterior plane images to capture rectus femoris (RF) and vastus intermedius (VI) were obtained at 39% (A1) and 56% (A2) of femur length (from inferior).
- Three lateral plane images to capture vastus lateralis (VL) and VI were obtained at 22% (L1), 39% (L2), and 56% (L3) of femur length (from inferior).
- Individual muscle thickness was measured using Fiji (Image J) software by taking the average perpendicular thickness at 10% 50%, and 90% of the horizontal view.

CONCLUSIONS

- These data indicate that ultrasonography is an effective tool to assess skeletal muscle thickness, and that ultrasound techniques can be used to identify differences in quadriceps muscle thickness between younger and older individuals.
- These data also highlight that thickness is not uniform along the length of the muscles examined, and therefore consideration should be taken when assessing individual muscles and selecting imaging sites, at least for assessment of the quadriceps.

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