An Exploratory Study: The Relationship Between Birth Weight and Pediatric Grip Strength in Children Ages 4-7

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Background

Hand grip strength is used to perform and accomplish many tasks of our everyday lives. Grip strength is often used as a quick, valid measure of general health and motor function (Häger-Ross & Rösblad, 2002). Occupational therapists commonly treat children experiencing poor health, decreased motor function, and developmental delays. Children born with low birth weight often experience such problems within their pediatric years. Research has found significant, positive correlations between low birth weight and a wide variety of health and developmental outcomes including decreased height, weight, strength, and problems of the neuromuscular system (Datar & Jacknowitz, 2009, Fricke, 2010, Dodds et al., 2012). Few studies have explored the relationship between birth weight and grip strength within the pediatric population. Relevant studies have analyzed the relationship across the whole lifespan or have focused on only one age. It would be beneficial to know the relationship between birth weight and grip strength within the pediatric age range of 4 to 7 to earlier address possible developmental deficits attributed to low birth weight.

Purpose

The purpose of this study was to determine the relationship between birth weight and grip strength in children ages 4 to 7. The researchers hypothesized a strong, significant, positive correlation indicating the lower the birth weight of the child, the weaker their grip strength at the pediatric age of 4, 5, 6, or 7.

Participants

Through convenience sampling across the Midwest area, 85 male and 71 female children ages 4 to 7 volunteered to partake in the study. Researchers obtained permission to collect data from locations such as schools, churches, and YMCAs prior to data collection through a letter of cooperation. Written informed consent from a legal guardian as well as the child’s written assent was required to participate in the study.

Results

4 Year Olds: fairly strong, positive, significant relationship between birth weight and right hand grip strength
- \( r = 0.377, p = 0.044 \)
- 14% of variability in right hand grip strengths is explained by birth weight

5 Year Olds: no significant relationship

6 Year Olds: no significant relationship

7 Year Olds: no significant relationship

Correlation of Right Hand Grip Strength and Birth Weight in 4 Year Olds

<table>
<thead>
<tr>
<th>Birth Weight (ounces)</th>
<th>Average Grip Strength</th>
<th>Linear Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 lbs 1 oz- 15 lbs 0 oz</td>
<td>11.55 lbs</td>
<td>( r = 0.377 )</td>
</tr>
<tr>
<td>5 lbs 4 oz- 14 lbs 11 oz</td>
<td>11.72 lbs</td>
<td></td>
</tr>
<tr>
<td>2 lbs 12 oz- 13 lbs 1 oz</td>
<td>19.62 lbs</td>
<td></td>
</tr>
<tr>
<td>4 lbs 0 oz- 5 lbs 3 oz</td>
<td>23.69 lbs</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The results indicated the lower the birth weight of a child, the lower their grip strength at the age of 4. This finding is consistent with past studies that found birth weight to be positively correlated to height, weight, strength, and neuromuscular problems (Datar & Jacknowitz, 2009, Fricke, 2010, Dodds et al., 2012). As discussed, grip strength is known to be a valid measure of health and motor function. If low birth weight 4 year olds show decreased grip strengths, this may indicate they are experiencing poor health, decreased motor function and/or developmental delays. These results identify 4 year olds with low birth weight as a population potentially needing occupational therapy services to foster normal development. For the 5, 6, and 7 year old age groups, no significant relationship was found. This may mean low birth weight children begin to meet their developmental milestones and “catch up” with their normal birth weight peers by the age of 5 and beyond. This could be attributed to the child receiving OT services, engaging in leisure activities that foster gross and fine motor skills, or starting school in kindergarten at the age of 5.

Conclusion

As detected by grip strength, developmental delays and decreased motor function may be found in low birth weight children ages 4 and below. Low birth weight children under the age of 5 can be screened and referred for occupational therapy services to address any possible deficits related to their low birth weight.