GROWTH REFERENCES OF KNEE HEIGHT FOR CHILDREN WITH CEREBAL PALSY IN FLANDERS

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- Introduction
- Aims
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- Discussion
- Conclusion
INTRODUCTION

- Children with CP ↔ ‘healthy’ children:
  smaller – lower weight – lower muscle and fat mass – lower bone density

- Measurement of stature in children with CP is complicated due to:
  joint contractures
  scoliosis
  involuntary movements
  inability to stand straight
  limited cognitive capabilities

- Previous studies indicated that knee height can be used as a convenient and reliable proxy for body length.
  → appropriate reference curves are required

* VALIDATIE VAN LICHAAMSSEGMENTMETINGEN TER BEPALING VAN DE LICHAAMSLENGTE EN GRADERING VAN DE VOEDINGSTOE chops OP BASIS VAN ANTROPOMETRISCHE METINGEN BIJ KINDEREN EN JONGEREN MET EEN CEREBRALE PARESE. DR. FIEEN GEERAERT, MASTERPROEF JEUGDGEZONDHEIDSZORG, 2013.*
AIMS

Developping reference curves for knee height in Flemish children and adolescents with CP:

- Percentile curves for knee height, gender-, age- and GMFCS-level specific.
- Percentile curves for growth velocity of knee height, gender-, age- and GMFCS-level specific.

Questions:

- How does the predicted total length, based on measurements of knee height, correlate to the standard Flemish growth curves?
- How does the measurements of knee height correlate to foreign growth references, specific for children with CP?
- Is there an influence of motor function on the reference curves based on knee height measurements?
LITERATURE

1. Gross Motor Function Classification System (GMFCS)

LITERATURE

2. Foreign reference curves for children with CP

- North-American Growth in Cerebral Palsy Project (NAGCPP)
- [www.lifeexpectancy.org](http://www.lifeexpectancy.org)

METHODOLOGY

- Multi-center mixed longitudinal study

- Recruitment & characteristics of population:

Children, between the age of 2 to 20,
from 9 schools for special needs type 4 / CP centre Universital Hospital Leuven

<table>
<thead>
<tr>
<th>LEEFTIJD</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>TOTAAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>14</td>
<td>33 (9.9%)</td>
</tr>
<tr>
<td>5-10</td>
<td>9</td>
<td>19</td>
<td>19</td>
<td>14</td>
<td>19</td>
<td>80 (24.2%)</td>
</tr>
<tr>
<td>10-15</td>
<td>23</td>
<td>41</td>
<td>15</td>
<td>19</td>
<td>21</td>
<td>119 (35.8%)</td>
</tr>
<tr>
<td>15-21</td>
<td>14</td>
<td>30</td>
<td>13</td>
<td>18</td>
<td>25</td>
<td>100 (30.1%)</td>
</tr>
<tr>
<td>TOTAAL</td>
<td>50 (15.1%)</td>
<td>97 (29.2%)</td>
<td>51 (15.4%)</td>
<td>55 (16.5%)</td>
<td>79 (23.8%)</td>
<td>332</td>
</tr>
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METHODOLOGY

- **Measurement of knee height:**
  
  Knee height = distance between heel and upper side of the femur, ankle and knee in 90° flexion. Measured at the non/least affected side.
  
  At time 0, repeated after 6 - 12 months.
  
  21/01/2015 - 16/06/2016
  
  799 measurements of knee height
  
  → 21.8 cm – 59.5 cm

- **Generation of percentile curves based on LMS method.**
THE PREDICTED TOTAL LENGTH OF CHILDREN/ADOLESCENTS WITH CP VERSUS THE GENERAL POPULATION OF FLANDERS

\[ S = (KH \times 2.93) + 12.88 \text{ CM}; \text{ WITH SD OF 4.16 CM, KH=KNEE HEIGHT} \]
KNEE HEIGHT OF FLEMISH CHILDREN/ADOLESCENTS WITH CP VERSUS NAGCPP

GIRLS GMFCS I - V

GIRLS GMFCS III - V
GROWTH REFERENCES FOR KNEE HEIGHT OF FLEMISH CHILDREN/adoLESCENTS WITH CP
GROWTH REFERENCES FOR KNEE HEIGHT, GMFCS-SPECIFIC
**DISCUSSION**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tr>
<td>1\textsuperscript{st} study in Flanders concerning linear growth of children with CP</td>
<td>No Tanner-score</td>
</tr>
<tr>
<td>332 children were included</td>
<td>Influence of several parameters?</td>
</tr>
<tr>
<td>limited error of measurement</td>
<td>• low birth weight / prematurity</td>
</tr>
<tr>
<td></td>
<td>• treatment with growth hormone</td>
</tr>
<tr>
<td></td>
<td>• subtype CP</td>
</tr>
<tr>
<td></td>
<td>• etnic origin</td>
</tr>
<tr>
<td>→ collect more data of measurements of knee height</td>
<td>→ investigate impact of these variables on growth</td>
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</tbody>
</table>
CONCLUSION

- Measurements of knee height are a reliable and practical alternative for the follow-up of linear growth of children with CP.
- Calculating the total body length, based on a prediction formula, is not recommended.
- We cannot use the reference curves from the US.
- The GMFCS-specific reference curves of knee height could be a help in the assessment of growth of children with CP.
- More data can contribute to the optimisation of these curves.
Thank you for your attention!

Questions?
CURVES FOR GROWTH VELOCITY OF KNEE HEIGHT FOR FLEMISH CHILDREN/ADOLESCENTS WITH CP
Variability lowers with age:

± 0,9 SD on the age of 1-2 years
± 0,5 SD on the age of 9-10 years
± 0,2 SD for young adults