Assessment of the weight status using the Body Mass Index (BMI) in 24 months old children

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Introduction

• Childhood obesity is a serious challenge for youth health care;
• Systematic monitoring of the weight status provides useful data on prevalence and trends;
• The BMI is a convenient parameter:
  o Based on height and weight only;
  o Known properties (high specificity)
  o International consensus
  o Which cut-offs?
• Need for a representative sample
Outline

• Criteria for the BMI
  - Local BMI curve
  - International Obesity Task Force (IOTF) cut-offs
  - Extended IOTF reference
  - WHO growth standards & reference

• Sample?
  - No dedicated surveys!
  - Data from well baby clinics: electronic child health records (Mirage) of Kind en Gezin
  - Validity of estimates (at 24 months)
BMI criteria: IOTF

- IOTF (Cole et al., 2000; 2007)
BMI criteria: IOTF

- IOTF (Cole et al., 2000; 2007)

Obese

Overweight

kg/m²

BMI (kg/m²)

Age (months)

2 4 6 8 10 12 14 16 18

16 17 18.5 25 30
BMI criteria: IOTF

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Mathieu Roelants – BMI in 24 months old children – EUSUHM 2017
BMI criteria: IOTF

- IOTF (Cole et al., 2000; 2007)

Mathieu Roelants – BMI in 24 months old children – EUSUHM 2017
BMI criteria: IOTF (extended)

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BMI criteria: WHO

References (5 – 19 years; NCHS)

Standards (< 5 years; MGRS)

Standards: $z < -2$: thinness;
$z > 2$: overweight ($z > 1 = \text{risk}$)
$z > 3$: obese

Reference: $z < -2$: thinness
$z > 1$: overweight
$z > 2$: obese
BMI criteria: IOTF vs. WHO

boys

girls

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Sample

• Kind en Gezin (well baby clinics): electronic registration of length, weight, head circumference (Mirage)

• But also (a.o.): size at birth, gestational age, parity, origin (nationality of mother), education (mother), socioeconomic vulnerability, breastfeeding (24h, 6d, 3m, 6m).

• °2011/12:
  o 146.522 children registered in Mirage
  o 98.947 (67,5%) measured 23 – 26 months
Results: representative sample 24mo?

- Small (1 – 3%) differences compared to whole cohort (origin, education, region, vulnerable situation, …)
- More first- and term born infants
- Statistically significant (large N → Δ0.1 – 0.3% stat. signif.)
- Mainly due to lower response in/near Brussels region
Results: prevalence

- Underweight: < -2 SD (WHO)
- Overweight/obesity: single IOTF cut-off (24mo)
Results: prevalence

- Underweight: < -2 SD (WHO)
- Overweight/obesity: single IOTF cut-off (24mo)
## Results: prevalence

<table>
<thead>
<tr>
<th>Boys + Girls</th>
<th>IOTF</th>
<th>WHO 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 98873)</td>
<td>%</td>
<td>(95% CI)</td>
</tr>
<tr>
<td>Obesity</td>
<td>1.0</td>
<td>1.0 (0.94 – 1.1)</td>
</tr>
<tr>
<td>Overweight (+ob)</td>
<td>7.3</td>
<td>(7.1 – 7.6)</td>
</tr>
<tr>
<td>“normal” weight</td>
<td>73.0</td>
<td>(72.6 – 73.4)</td>
</tr>
<tr>
<td>Thinness (I – III)</td>
<td>19.6</td>
<td>(19.3 – 20.0)</td>
</tr>
<tr>
<td>Thinness (II – III)</td>
<td>4.3</td>
<td>(4.1 – 4.5)</td>
</tr>
<tr>
<td>Thinness (III)</td>
<td>0.89</td>
<td>(0.80 – 0.97)</td>
</tr>
</tbody>
</table>
Results: Factors

- Usual suspects, e.g. origin, education, ...

<table>
<thead>
<tr>
<th>Nationaliteit van de moeder</th>
<th>Overgewicht (IOTF)</th>
<th>Obesitas (IOTF)</th>
<th>Ondergewicht (WHO SDS &lt; -2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>(95%BI)</td>
<td>OR(s)</td>
</tr>
<tr>
<td>Belgé</td>
<td>6.37</td>
<td>(6.20 - 6.55)</td>
<td>referentie</td>
</tr>
<tr>
<td>Noord-West-Europa + rijke OESO</td>
<td>8.14</td>
<td>(7.13 - 9.27)</td>
<td>1.30***</td>
</tr>
<tr>
<td>Zuid-Europa</td>
<td>10.34</td>
<td>(8.27 - 12.85)</td>
<td>1.69***</td>
</tr>
<tr>
<td>Oost-Europa en voormal. Oostblok</td>
<td>9.51</td>
<td>(8.69 - 10.39)</td>
<td>1.54***</td>
</tr>
<tr>
<td>Maghreb</td>
<td>15.58</td>
<td>(14.65 - 16.55)</td>
<td>2.71***</td>
</tr>
<tr>
<td>Andere landen van Afrika</td>
<td>13.10</td>
<td>(11.97 - 14.32)</td>
<td>2.21***</td>
</tr>
<tr>
<td>Turkije</td>
<td>12.58</td>
<td>(11.39 - 13.87)</td>
<td>2.11***</td>
</tr>
<tr>
<td>Andere landen van Azië</td>
<td>7.59</td>
<td>(6.72 - 8.56)</td>
<td>1.21**</td>
</tr>
<tr>
<td>Zuid- en Centraal Amerika</td>
<td>10.53</td>
<td>(8.28 - 13.29)</td>
<td>1.73**</td>
</tr>
<tr>
<td>Niet bekend</td>
<td>11.31</td>
<td>(9.64 - 13.23)</td>
<td>1.74**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opleiding van de moeder</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Laag</td>
<td>10.21</td>
<td>(9.73 - 10.72)</td>
<td>1.32**</td>
<td>1.02</td>
<td>1.77</td>
<td>(1.57 - 2.00)</td>
<td>1.78***</td>
<td>1.17**</td>
</tr>
<tr>
<td>Gemiddeld</td>
<td>7.93</td>
<td>(7.61 - 8.26)</td>
<td>1.00*</td>
<td>0.98</td>
<td>1.00</td>
<td>(0.89 - 1.13)</td>
<td>0.99**</td>
<td>1.00</td>
</tr>
<tr>
<td>hoog</td>
<td>6.53</td>
<td>(6.32 - 6.75)</td>
<td>0.81**</td>
<td>0.91**</td>
<td>0.62</td>
<td>(0.55 - 0.69)</td>
<td>0.62**</td>
<td>0.78**</td>
</tr>
<tr>
<td>Niet bekend/niet van toepassing</td>
<td>9.48</td>
<td>(8.79 - 10.21)</td>
<td>1.22***</td>
<td>1.01</td>
<td>1.79</td>
<td>(1.49 - 2.14)</td>
<td>1.80***</td>
<td>1.27</td>
</tr>
</tbody>
</table>

OR(s): Odds Ratio, enkelvoudige logistische regressie; OR(m): Odds Ratio, meervoudige logistische regressie, gecorrigeerd voor alle andere factoren in de tabel; * p < 0.1; ** p < 0.05; *** p < 0.01; **** p < 0.001
Conclusions

• Choice of indicator is important *(Please do tell which one you used!)*
• Data allow meaningful stats (trends, groups at risk)
• Register = possibly (very) large N
  o easy to obtain statistical significance;
  o need to define relevant differences in advance
• Relatively low prevalence
  o At 24 Months!
  o Many more at risk for overweight later in life
  o Some groups high risk
  o Time for action