Life Skills Workshop
Friday, 17 February 2006

Optimal Child Growth and critical periods for the prevention of childhood obesity

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The WHO Multicentre Growth Study Group
Estimated number of EU obese children

European Union (EU-25) population = 450m
Of which 4- school-age children (aged 18) = 74m

Obesity levels range 3% - 14% in surveys 1995-2003, rising over period.

Best current estimate 5% - 5.5%.

EU obese children = 3.7 - 4.1milion

T. Lobstein 2005 (modified)
**Estimated number of obese EU children with complications**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Estimated Number</th>
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<tbody>
<tr>
<td>Obese children with hypertension</td>
<td>520,000+</td>
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<tr>
<td>Obese children age 10+ with impaired glucose tolerance</td>
<td>830,000+</td>
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<tr>
<td>Type 2 diabetes = 9,000+ (three in four not diagnosed)</td>
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<tr>
<td>Obese children with high triglycerides</td>
<td>830,000+</td>
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<tr>
<td>high cholesterol = 900,000+</td>
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<tr>
<td>high LDL-C = 900,000+ low HDL-C = 710,000+</td>
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<tr>
<td>Obese children age 8+ with raised ALT</td>
<td>340,000+</td>
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<tr>
<td>steatohepatitis = 225,000+</td>
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<tr>
<td>Cirrhosis (&amp; liver cancer) = 13,000+</td>
<td></td>
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<tr>
<td>?liver transplant needed = 240+</td>
<td></td>
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<tr>
<td>metabolic syndrome in obese EU adolescents = 550,000</td>
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</tbody>
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T. Lobstein 2005 (modified)
In Europe there are:

Probably

1 million children

with obesity-related co-morbidities

Very cautious estimates, taking lowest figures of range

Excluding overweight children, also at risk (11 million children)

In Europe we have around

15 million

overweight children!

Intervention to prevent obesity and its complications is urgently needed

T. Lobstein 2005 (modified)
- Choose, my dear: you can loose 25 kg., or you need to grow about 32 cm...
Critical periods at higher risk of obesity development

1. Birth

2. Early adiposity rebound

3. Adolescence

A reliable method of diagnosis at the different ages is needed.
1. Birth

Method = Weight

- HIGH BIRTH WEIGHT (>4kg.) $\rightarrow$ OBESITY
  

- LOW BIRTH WEIGHT (<2.5kg.) $\rightarrow$ OBESITY
  
  (Barker, Arch Dis Child 1997)

Preventive interventions:

improving mother’s nutritional status

(in developed countries = reducing mother’s obesity and control weight gain excess during pregnancy)
2. Early adiposity rebound

Method = BMI  Weight Kg  Height (m)²

BMI - follows the adipose tissue growth pattern
- allows an early diagnosis of childhood obesity

Adiposity rebound phenomenon

BMI = Weight Kg / Height (m)^2
Consequences of early and proper adiposity rebound

BMI = Weight Kg / Height (m)^2
Risk factors of an earlier adiposity rebound and development of childhood obesity

1. Reduced breastfeeding (rate and length)

2. Early introduction of solid foods

3. Unbalanced nutrient intake (↑ protein, ↑ fat, ↑ simple sugar, ↓ fiber, etc.)

4. Low SES

5. Low P. A. level

n. 734 children born from 01/01/96 to 30/12/97 (M 389, F 345) in province of Brindisi (Region Puglia)

Overweight 24.4%+ obesity 13.4% = 38.8%

Caroli M et al, Int J Obes 2003
Wake up, to school, back home, meals, TV, and then again wake up, to school, back home, meals, TV...

No way to escape from the environmental cage...
Problems using updated national growth standards

Upward skewness of reference population
Underestimation of childhood obesity
Late diagnosis
Considering a single population as “the gold standard”
Girl, 52 months, 32.3 kg, 109.4 cm, z-score = 7.36

Girl, 52 months, 32.3 kg, 109.4 cm, z-score = 2.96

Mean Z-scores of healthy breastfed infants relative to the NCHS/WHO reference

Source: An Evaluation of Infant Growth, WHO, 1994
A Growth Curve for the 21st Century

The WHO Multicentre Growth Reference Study

Department of Nutrition
World Health Organization
Geneva, Switzerland
Sample size

Total sample: 8,440 children
Target of growth curves: 400 both sexes

Eligibility criteria of individuals

- No health, environmental or economic constraints on growth
- Mother willing to follow feeding recommendations
- Term birth
- Single birth
- Lack of significant perinatal morbidity
- No smoking mothers (before and after delivery)
- Medium-high parental education level

WHO Multicentre Growth Reference Study
Growth Reference Study
Prescriptive Approach

- Optimal Nutrition
  - Breastfed infants
  - Appropriate complementary feeding
- Optimal Environment
  - No microbiological contamination
  - No smoking
- Optimal Health Care
  - Immunization
  - Paediatric routines

WHO Multicentre Growth Reference Study
WHO Child Growth Standards
Innovative aspects

- Prescriptive approach recognizing need for standards
- Breastfed infant as normative model
- International sample
- Reference data for assessing childhood obesity

WHO Multicentre Growth Reference Study
Validation of the new WHO Child Growth Charts in region of Puglia, Italy.

The principal aim of the validation was to check the concordance between the child’s nutritional assessment made by the paediatrician and the position of the anthropometrical measurements on the new WHO charts.

WHO Multicentre Growth Reference Study
Trained nurse in Brindisi Hospital measured the newborns from 0 days to 15 days.

12 standardized and trained paediatricians measured 3700 children from 15 days to 4 years and 364 days in the Puglia region.

Time data collection: 4 months.

Up to 23.99 months of age the length has been measured and thereafter the height.

To get reliable and homogenous data in the first 2 years of age a specific infantometer has been built by an engineer, according to the rules of maximum accuracy.

WHO Multicentre Growth Reference Study
The paediatricians, before measuring the child, expressed a clinical comment about the perceived nutritional status of the index child.

Comments indicated their perception about the child's nutritional status regarding stature, and weight and their combination.

Each of the paediatricians expressed his/her own nutritional comment, standardized as classification terms, but not as concept.

WHO Multicentre Growth Reference Study
New growth curves

Will be released in the web site
www.who.int/childgrowth/en

April 27 2006

The WHO Multicentre Growth Reference Study
Rationale, Planning & Implementation

Food and Nutrition Bulletin
vol 25, no.1 (supplement)
March 2004
Risk factors of childhood obesity

1. Reduced breastfeeding (rate and length)
2. Early introduction of solid foods
3. Unbalanced nutrient intake
   (↑ protein, ↑ fat, ↑ simple sugar, ↓ fiber, etc.)
4. Low SES
5. Low P. A. level

Growth Reference Study
Prescriptive Approach

1. Optimal Nutrition
   - Breastfed infants
   - Appropriate complementary feeding
2. Optimal Environment
   - No microbiological contamination
   - No smoking
3. Optimal Health Care
   - Immunization
   - Paediatric routines
   - No health, economic, environmental or constraints on growth
4. Medium-high parental education level
To effectively prevent childhood obesity

1. Primary prevention interventions
2. Long lasting, widely applied
3. Starting from pregnancy
4. Continuing through all childhood and adolescence
   (with adapted language, tools, and aims according to the age)
5. Not leaving any space for interruption.

Education to prevent obesity needs, in this environment, to be life-long
Composition
What do you like to do?
(first approach)

To me, I like eating chips, chocolate, meatballs, and brioches.
And also, to me, I like watching TV, mostly cartoons and reality shows.

Deborah 8 years of age.

After 6 months and about 4kg \( \frac{1}{2} \) of weight loss

To me, I like singing, dancing, painting, and playing with my friends.

The same Deborah 8 years \( \frac{1}{2} \).
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