Prevalence and Definition of Childhood Obesity

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Obesity is easily identified. Hence, to assess the prevalence of obesity in a given population would appear to be quite a simple task. However, despite a great deal of research and many consensus meetings, we are still without a 'gold standard' definition for childhood obesity.[1] This paper will discuss why this is so and suggest possible approaches to the problem.

SURROGATE MEASURES FOR OBESITY

An appropriate assessment of adiposity should be based on accurate determination of lean and fat body masses using either densitometry, ^{40}K counting or roentgenogram measurements.[2] However, such techniques cannot be easily applied in the clinic or in epidemiological studies. Attempts have been made to base a definition for childhood obesity on more simple measures such as weight, height and subcutaneous fat thickness.[3] The problem here is that these are only surrogate markers of fat mass. For instance, skinfold measurements may provide a good estimate of subcutaneous fat, but they do not account for internal fat.[1] In a similar way, weight for height indices such as body mass index (BMI kg/m^2) and other reference values not only measure body fat in relation to body height, but also the weight of other tissues such as muscles, skeleton and organs. In clinical practice and epidemiological study, clinicians have always relied on indirect indices of obesity based on weight for height measures.

WEIGHT RELATED TO HEIGHT

Another obstacle to defining childhood obesity based on weight and height measurements is that multiple weight for height indices have been developed.[4,5] Although BMI is widely used in the clinical assessment of obesity in adults, it is rarely used to assess body composition in children.[6] However, BMI reference values could be employed to index obesity from childhood to adult life. BMI is the key nutritional index in adult life based on actuarial analysis–high values are repeatedly linked to increased risk of cancers and cardiovascular/metabolic diseases in later life.[7-9] A BMI >25 kg/m^2 is used to define 'being overweight' in adults while a BMI >30 kg/m^2 indicates adult obesity.[6] A recent consensus report[10] recommends the use of BMI reference values to define childhood and adolescent obesity. BMI reference values have recently been published in many countries.[2,11-13]

There are several major disadvantages to using BMI-based estimates of obesity during paediatric years. Mean BMI varies with age and so a series of age-related norms is needed. Currently, there are only restricted data linking certain values of age-specific childhood-BMI to risk for short- or long-term ill health.[10] Finally, there is evidence that changes in BMI during early childhood may vary between different ethnic groups,[14] suggesting that ethnic-specific BMI reference values may be needed.

DEFINITION OF CHILDHOOD OBESITY

The objectives of defining childhood obesity are to identify children at risk for paediatric diseases, to identify children at risk for adult obesity and simply, to define the prevalence of childhood obesity in the general population. The cut-off point used in a definition of childhood obesity should be functional, ie. supported by studies on risk for ill health related to obesity. Obesity must be defined with such a cut-off point if we are to target prevention programmes to high risk groups.

Data on morbidity and mortality as a function of BMI are available for adults. In children there is limited evidence to suggest age-specific BMI is related to current health status, eg. in terms of blood pressure, serum lipids or negative psychosocial experience.[10] Neither do we know if childhood BMI is related to long-term health status eg. increased morbidity in later life after adjusting for adult obesity and other risk factors. To our knowledge only one study has produced evidence that an overweight status at 13 to 18 years of age is related to increased all cause mortality in later life after adjustment for adult overweight BMI.[15] However, it is possible to estimate risk for adult obesity during the paediatric years.[16,17] For such and other reasons there is, as yet, no established, validated and health related definition giving a functional cut-off point for childhood obesity.

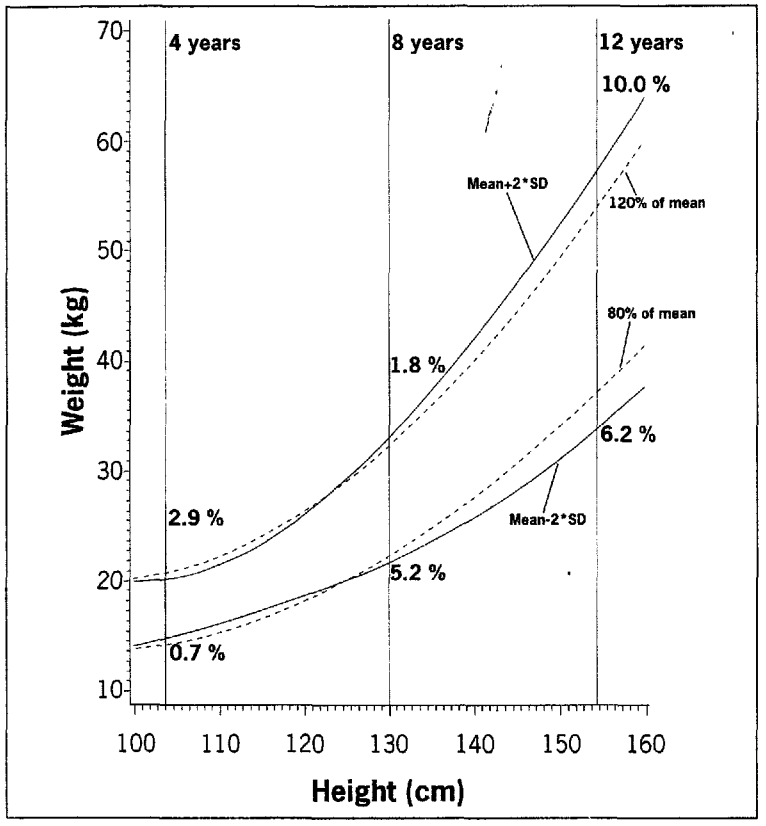

Figure 1. Weight-for-height curves for normal Swedish girls[24] ± 2SD* around the mean weight for a certain height and the weight corresponding 120%/80% of the mean weight for a certain height. The vertical lines indicate the mean height of the girls at 4, 8 and 12 years (103.7 cm, 129.8 cm and 154.3 cm, respectively). The percentages given at these three ages represent the proportion of children with weight above (obese) or below (under-nourished) the 120% or the 80% dotted reference values.

In a recent editorial in *The Journal of Pediatrics*[10] it was suggested that BMIs of 25 kg/m² and 30 kg/m² should constitute the cut-off points for overweight and obesity, respectively, in late adolescence. A US Expert Committee[18] also recommends that children with a BMI ≥85th percentile with a complication of obesity or with a BMI ≥95th percentile, with or without a complication, undergo evaluation and possible treatment. These statistically derived cut-off points using US percentiles cannot be applied globally, since average

BMI values in the US are higher than in most other countries.

A recently constructed probability chart predicts the likelihood paediatric patients will become overweight adults and provides an alternative means of defining childhood obesity.[19] This chart was based on the height and weight measurements taken from a larger longitudinal growth study of 3650 full-term and healthy Swedish babies, followed from birth to 18 years of age. BMI was used to estimate, during the paediatric years, the risk of obesity at 18 years of age. For example, in girls a BMI of 16 kg/m^2 at age 4 years is associated with a 20% risk of attaining a BMI value >25 kg/m^2 at 18 years. In boys, a BMI of 19 kg/m^2 at 4 years is associated with a 60% risk of BMI >25 mg/k^2 at 18 years. This is the first chart of its kind and provides an easy and novel means of identifying children at high risk of becoming obese in adulthood so that clinical intervention can be commenced at a young age.

AN ILLUSTRATION OF THE DILEMMA

An internationally recognised definition of childhood obesity that may be used in calculating its prevalence in different populations is not presently available. The need for an acceptable definition is widely recognised and various statistical methods have been suggested to find one. One such method is illustrated in figure 1.

This commonly used method of assessing nutritional status, ie. under-nutrition or obesity, is based on the percentage an individual's weight deviates from the mean weight for a certain height. Undernourished children are then defined as having a weight <80% of the mean weight for their height[20,21] and obese individuals are defined as having a weight 120% of the mean weight for their height.[22,23] Figure 1 shows these two cut-off points as well as the mean curve and the curves representing 2 SD points above and below the mean. The data in our illustration are taken from a large (n=3650) Swedish population based longitudinal study of full-term healthy children.[24] On the graph we have also indicated the percentage of girls in the Swedish population defined, by this method, as being under-nourished or obese at three selected ages (4, 8 and 12 years of age). The figures for both of these extreme groups increase with age, so by 12 years we have 10.0% obese and 6.2% under-nourished. These kinds of statistical definitions are not related to any short- or long-term health outcome, and for this reason they cannot serve as a realistic definition of childhood nutritional status.

CONCLUSION

BMI values should form the basis of a definition for nutritional status in childhood as well as in adulthood. There is, as yet, no precise definition of childhood obesity which can be linked to health outcome in childhood or later in life. Any current estimates of the prevalence of childhood obesity cannot be associated with ill health and are therefore useless.

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considered, they should only be decided upon if there is no active bleeding and the general condition of the patient permits.[2] Patients' age should not influence treatment choice. Proper assessment of the general condition of the patient, amount of blood loss and the degree of hypovolaemia should be done quickly. This can be performed more effectively by a senior staff member.

The decision to leave the placenta to autolyse was inappropriate in this case. The senior attendant should have assessed the patient personally before deciding on this option.

The assessment of the patient was not adequate as there was failure to recognise the intraperitoneal bleeding which was massive (>2 litres). This mortality could have been avoided.

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