Overweight and obesity

Almost 25% of Australian children are considered overweight.[1] Obesity predisposes children to a range of serious medical conditions including insulin resistance, diabetes, cardiovascular disease and liver disease [2] Overweight children are also at risk of low self-esteem, negative self-image and social isolation [3]. Children with one obese parent have a 40% risk and with two obese parents 80% risk of developing obesity. Recent studies suggest that all children are heavier than they used to be, and that the overweight children are more overweight than earlier. This corresponds to adult studies which indicate that while more adults are obese, it is in the category of the morbidly obese that there is the greatest change [1]

Child overweight was previously been defined as weight for height above the 90th centile on the NCHS growth charts or weight above 120% of the median for weight taking into account a child's sex, age and height [4]
BMI is now commonly used as the standard measurement. BMI does not directly measure body fat but is a useful predictor of adiposity in children. It is also used as a predictor of risk for medical complications of obesity. CDC suggests that children above the 85th percentile BMI are 'at risk of overweight' and above the 95th centile are 'overweight'; recognising that weight status may improve before the child reaches adulthood. NHMRC definition classifies children above the 85th centile as 'overweight' and over the 95th centile as 'obese'.

During childhood it is possible to see the early signs of later indicators such as high blood pressure and raised lipids, with tracking into adult life. For a number of adult health problems, the morbidity and mortality is higher in those who have been overweight as adolescents, even if they are no longer overweight. This includes cardiovascular problems, some cancers and some gastrointestinal problems [5]

Despite growing concern about childhood obesity in Australia, most of the mothers surveyed in a community-based cohort of 4 year old children were not concerned about their child's weight, and many mothers did not perceive their overweight children as different from their peers [6]. The prevalence of overweight was 19%, but only 5% of mothers indicated concern about their children being currently overweight.

The proportion of all infants and toddlers plotting above the 85th centile weight for length is greater using WHO (21%) compared with CDC (16.6%) charts according to a recent comparative study. The greatest disparity between the 2 charts occurs in weight for length percentiles in children between 6 months and 2 years [7].

Question about the applicability of the BMI centiles in the WHO reference charts have also been raised for preschool children. For example the prevalence of overweight in a sample of 5 year old girls is 3.4% using the WHO and 15.3% using other internationally recognised definitions for child obesity [8]. Research is urgently needed to identify, for the WHO standard, BMI cut-offs associated with an increased risk of overweight and obesity and associated health outcomes later in life. BMI charts from the CDC reference will continue to be used in Victoria at this stage.

Role of BMI

Unlike adults where a single BMI can be applied across all ages, BMI for children depends on age and stage of growth, and use of BMI in children needs to take this

into account. In infancy and as toddlers children have a relatively higher proportion of fat. During primary school ages BMI falls as children become relatively leaner, and then increases as puberty approaches and body composition approaches that of adulthood.

In adults the accepted normal range for BMI range (the 'Healthy Weight Range' is generally accepted as between 20 - 25) and has been determined by data based on health risk. A BMI range of 20 - 25 is that associated with lowest health risk. In children health-risk data is not available; use of the 85th centile as overweight or risk of obesity and of the 95th centile as obese is somewhat based on outcome, and somewhat arbitrary.

In adults there are single point BMI's range and cut-offs to identify health risk associated with overweight and obesity. Due to the changes in body composition with growth in children, single point cut-offs are not suitable for children. BMI curves are an alternative to weight for height percentile curves. In children, BMI decreases from birth until the point of 'adiposity rebound' at around 5 – 6 years [9] and increases to adult levels by 18 – 20 years. The point at which the adiposity rebound is reached is considered relevant to development of obesity. Unlike the cut-off in adults, BMI cut-off points derived from centile charts in children do not directly correlate to risk factors.

There is no perfect weight index of over and underweight, but BMI is a reasonable index from childhood to adulthood [10] BMI screening in children over the age of 2 years is recommended with a goal to identify as early as possible children who may be at risk of overweight and obesity with a view to prevent obesity rather than reverse it. The CDC - BMI centile charts are available with the standard weight and height for age growth charts.

References

1. Commonwealth of Australia, *Children's Nutrition and Physical Activity Survey* 2008
2. Daniels, S.R., et al., *American Heart Association Childhood Obesity Research Summit.* Circulation, 2009. **119**(15): p. 2114-2123.
3. Zametkin, A.J., et al., *Psychiatric Aspects of Child and Adolescent Obesity: A Review of the Past 10 Years.* Journal of the American Academy of Child & Adolescent Psychiatry, 2004. **43**(2): p. 134-150.
4. Hangen, J.P., *Chapter 32: Obesity*, in *Manual of Pediatric Nutrition*. 2005, B.C. Decker: Hamilton, Ontario, Canada. p. 659-674.
5. Must, A., et al., *Long-Term Morbidity and Mortality of Overweight Adolescents.* New England Journal of Medicine, 1992. **327**(19): p. 1350-1355.
6. Campbell, M., et al., *Maternal concern and perceptions of overweight in Australian preschool-aged children.* MJA, 2006. **184**: p. 274-277.
7. Nash, A., et al., *Field testing of the 2006 World Health Organization growth charts from birth to 2 years: assessment of hospital undernutrition and overnutrition rates and the usefulness of BMI.* JPEN Journal of Parenteral & Enteral Nutrition, 2008. **32**(2): p. 145-153.

8. Monasta, L., et al., *Defining overweight and obesity in pre-school children: IOTF reference or WHO standard?* Obesity Reviews, 2011. **12**(4): p. 295-300.
9. Whitaker, R.C., et al., *Early Adiposity Rebound and the Risk of Adult Obesity.* Pediatrics, 1998. **101**(3): p. e5.
10. Lenders, C.M., et al., *Chapter 16: Nutritional epidemiology*, in *Nutrition in Pediatrics: Basic Science & Clinical Applications*. 2008, BC Decker Inc: Hamilton, Ontario, Canada. p. 167-177.