

## UNIT NO. 2

## CHILDHOOD

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**ABSTRACT**

**Childhood obesity is increasing in prevalence world-wide, and is an important predictor of adult obesity. As a consequence, many chronic diseases are now appearing in childhood and adolescence, and will contribute to future morbidity and mortality in adulthood. Over the past 5 decades, while the heights of pre-schoolers and school age children appear to have optimised, their weights and body mass indices (BMI) are still increasing.**

**Childhood obesity is defined as a BMI  $\geq$  95th percentile for age and sex. The family doctor's approach to childhood obesity is to exclude pathological causes and detect complications of obesity for further treatment. However, the main management principles of childhood obesity encompass adopting healthy lifestyle interventions of age-appropriate diet and exercise recommendations which allow normal height growth to continue. The nutritional goal for obese children is to reduce energy-dense foods and increase nutrient density. Regular exercise encourages long term continuation. Equally important is decreasing time spent in sedentary pursuits and substituting with alternative forms of physical activity. For children, behaviour modification involving the family is essential and implementation requires a multi-disciplinary team. There is no data on long term efficacy and safety of medication for treatment of childhood obesity. There is also no role for bariatric surgery in childhood obesity.**

**Keywords: Childhood obesity; Epidemiology; Evaluation; Diet; Exercise; Behaviour therapy**

SFP2012; 38(1): 15-18

## **THE ASSESSMENT AND MANAGEMENT OF CHILDHOOD OBESITY**

### **Epidemiology**

In 1998, the World Health Organisation designated obesity as a global epidemic, affecting both children and adults (WHO, 1998)<sup>1</sup>. This arose as a consequence of societal and environmental factors which promote weight gain. The increasing prevalence of childhood and adolescent obesity is occurring even in the developing countries, and childhood

obesity is an important predictor of adult obesity (Deckelbaum et al, 2001)<sup>2</sup>. As a consequence, many chronic diseases are now appearing in childhood and adolescence, and will contribute to future morbidity and mortality in adulthood.

In a recent review of all major anthropometric studies in Singapore over the past 5 decades, although the heights of pre-schoolers and school age children appears to have optimised according to their genetic potential, the weights of children still appear to be increasing from 6-18 years for both sexes, and the body mass indices also appear to be increasing in tandem with this trend of weight increase (Loke et al, 2008)<sup>3</sup>.

The persistence of obesity into adulthood depends on the age at which the child becomes obese, the severity of obesity, and the presence of obesity in at least one parent. Overweight in a child under 3 years of age does not predict future obesity, unless at least one parent is also obese. After 3 years, the likelihood that obesity persists increases with advancing age of the child, and is higher in children with severe obesity in all age groups. The presence of obesity in at least one parent increases the risk of persistence in children at every age (Whitaker et al, 1997)<sup>4</sup>.

### **Clinical Evaluation**

#### A. Definition

Obesity is defined as excessive fat accumulation which presents a risk to health. In adults, obesity is assessed from the body mass index (BMI), which is calculated based on the person's weight (in kilograms) divided by the square of his / her height (in metres). Based on previous studies which have demonstrated an increased risk for cardiovascular events, the adult BMI cut-offs for those above 18 years who are overweight is 25.0 kg/m<sup>2</sup>, and for obesity, 30 kg/m<sup>2</sup> (Cole et al, 2000)<sup>5</sup>.

Clinical assessment of obese children and adolescents should also include determination of the BMI percentile (for age and sex). However, in normal children, the BMI increases after birth, decreases around 2 years, and increases again between the ages of 5 and 8 years. Since the BMI changes with age during childhood and adolescence, single BMI cut-offs cannot be used. In the past, surrogate measures of childhood adiposity include skinfold thickness and percentage of ideal weight for height. More recently, many countries are now adopting gender-specific BMI charts for their paediatric populations, and overweight is defined as a BMI between the 85th to 94th percentiles, while obesity is defined as a BMI at or more than the 95th percentile for age (Speiser et al, 2005)<sup>6</sup>.

#### B. Exclusion of pathological causes for obesity

While common exogenous obesity is very common, it is important to first exclude any pathological cause for obesity.

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Exogenous obesity is usually associated with increased linear growth, and these individuals are generally taller than their age-matched peers, with an advanced bone age. Conversely, most children with pathological obesity are short with a suboptimal height velocity (< 4 cm/year) and include genetic syndromes (Prader Willi syndrome) and endocrine disorders such as hypothyroidism, growth hormone deficiency, hypopituitarism and Cushing syndrome.

### C. Complications of obesity

There are two groups of obesity-related complications: psychosocial and medical problems.

#### Psychosocial problems

Childhood obesity has a significant impact on the emotional development of the child and adolescent, who may suffer from discrimination and stigmatisation. It has been observed that by 6 years of age, children have picked up societal messages that overweight is undesirable, and overweight children may encounter rejection and become socially isolated, or they may develop a distorted body image (Edmunds et al, 2001)<sup>7</sup>. The social burden of obesity may affect educational attainment and interpersonal relationships (Gortmaker et al, 1993)<sup>8</sup>. Obese children are more likely to have a poor body image, a low self-esteem and confidence (Stunkart et al, 1967)<sup>9</sup>. In general, obese children and adolescents have an increased risk of psychosocial and psychological problems that can persist into adulthood.

#### Medical problems

Obese children are also at risk of developing obstructive sleep apnoea syndrome and orthopaedic disorders (genu varus, genu valgus deformity of the knees, slipped capitata femoral epiphysis), in addition to components of the metabolic syndrome which include hypertension, dyslipidemias, insulin resistance and glucose intolerance (Barlow et al, 1998)<sup>10</sup>. The increased prevalence of obesity partly accounts for the increased incidence of type 2 diabetes mellitus in children and adolescents. Odds ratios in obese children are 2.4 (raised diastolic blood pressure), 4.5 (raised systolic blood pressure), and 3.0 (raised low density lipoprotein fraction of cholesterol). Two or more risk factors were present in 58% of obese children (Freedman et al, 1999)<sup>11</sup>.

Obese children are at higher risk of developing non-alcoholic fatty liver disease, which can present as a spectrum ranging from steatohepatitis to cirrhosis. This is characterised by elevated liver transaminases and a hyperechoic liver on ultrasonography, and is a diagnosis of exclusion.

### **Management**

The primary goal of childhood and adolescent obesity interventions is to adopt and maintain healthy lifestyle

behaviours, so as to decrease morbidity. However, these interventions should allow height growth to continue, so that height eventually becomes appropriate for weight, or the BMI percentile becomes reduced. The management of childhood and adolescent obesity incorporates the following components:

#### **a. Dietary changes**

The nutritional goal for obese children is to reduce energy density and increase nutrient density. However, all diets should be nutritionally balanced and designed to meet growth requirements. Calories should not be restricted in infants; rather, prevention of overfeeding should be emphasised. Diets consisting of drastically altered portions of various nutrients may be dangerous and should be avoided (American Academy of Pediatrics, 1998)<sup>12</sup>.

Very low calorie diets and protein-sparing regimens do not clearly offer significant improvements in long-term outcome compared to less restrictive diets (Yanovsky, 2001)<sup>13</sup>.

These are some practical healthy eating suggestions for obese children (provided by the Singapore Health Promotion Board):

1. Encourage fruits and vegetables, whole-grain foods and calcium-rich foods.
2. Reduce ingestion of foods rich in saturated and trans fat, food and drinks with added sugar and alcohol.
3. Reduce portion sizes.
4. Read food labels to understand nutrient content - even food and drinks labelled as 'no added sugar' or 'reduced sugar' should be consumed in moderation.
5. Encourage regular meals (reduced portions) and avoid skipping meals.

#### **b. Physical activity**

Regular exercise encourages long-term continuation, and is an essential component of the weight management program (American Academy of Pediatrics, 1998)<sup>12</sup>. Initial recommendations should be small, and exercise levels should be increased slowly to avoid discouragement.

Since younger children are generally incapable of focused activity for long periods of time, they need creative activities appropriate for their age, with generous periods of free play (Bailey et al, 1995)<sup>14</sup>.

In the older obese pre-adolescent and adolescent, a moderate-intensity progressive exercise programme with increasing levels of obesity has been recommended (Sothorn, 1999)<sup>15,16</sup>. For overweight children, weight-bearing activities can be recommended. For obese children, the exercises should be primarily non-weight bearing, and can include swimming, cycling, or interval walking (walking with frequent rests, gradually working up to longer walking periods with fewer rest stops).

Based on the guidelines from the Singapore Health Promotion Board:

1. Infants should be encouraged to be physically active through floor-based play in safe environments.
2. Pre-schoolers (<7 years) should be physically active for at least 180 minutes spread throughout each day.
3. 7-18 year old children and adolescents should accumulate at least 60 minutes of moderate-intensity physical activity every day, emphasising aerobic physical activities.
4. All age groups should break up sedentary periods (except time spent sleeping) lasting longer than 90 minutes with 5 to 10 minutes of moving around, active play, standing or doing some physical activity.

Decreasing time spent in sedentary pursuits (watching television, video games, computer uses) and substituting with an alternative form of physical activity is a useful strategy in weight loss (Epstein et al, 1995)<sup>17</sup>. Encouraging decreased sedentary time will help the children to identify their own areas of interest regarding physical activity, and will improve compliance.

### c. Behaviour modification

Behaviour-treatment programs have shown consistent success in weight loss (Epstein et al, 2001)<sup>18</sup>. However, the implementation requires a multi-disciplinary team which not only provides knowledge about diet and physical activity, but more importantly, has a consistent focus on principles of behaviour change.

The components of behaviour modification include (Epstein et al, 1990; Moran 1999)<sup>19,20</sup>:

- i) Educating the parents and children on the need for lifestyle changes.
- ii) Setting achievable weight maintenance and weight loss goals.
- iii) Teaching skills for weight loss.
- iv) Self-monitoring using food and activity logs, which increase awareness of eating and exercise patterns.
- v) Stimulus control, which includes limiting the amount of unhealthy food stocked at home.
- vi) Reinforcement through contracts, praise for behaviours, and rewards (but do not use food as a reward).

### d. Family involvement

Familial aggregation of risk factors for obesity is common. The long term effects of a weight control program (diet, physical activity, behaviour modification) are significantly improved when the intervention is directed at both the parents and the child, rather than the child alone (Epstein et al, 1996)<sup>21</sup>. This also avoids stigmatisation of the obese child, and provides social support and encouragement.

With regards to other strategies in the management of obesity:

### e. Pharmacotherapy

There is no data on the long term efficacy and safety of medication in childhood and adolescent obesity.

### f. Bariatric surgery

There is no role for bariatric surgery in childhood obesity. In limited case series, bariatric surgery has been performed in severely obese older adolescents who achieved significant post-operative weight reduction and improvement in co-morbid conditions (Strauss et al, 2001; Sugerma et al 2003)<sup>22,23</sup>, but were at increased risk of developing post-operative nutritional deficiencies (Strauss et al, 2001; Brodin et al, 1989)<sup>22,24</sup>. This cannot be recommended for most, but only for those at the highest risk of mortality from obesity, and with both patient and parental understanding of the consequences of surgery (Sugerma et al, 2003)<sup>23</sup>.

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### LEARNING POINTS

- **Childhood obesity is defined as a BMI  $\geq$  95th percentile for age and sex.**
  - **The family doctor's approach to childhood obesity is to exclude pathological causes and detect complications of obesity for further treatment.**
  - **The nutritional goal for obese children is to reduce energy-dense foods and increase nutrient density.**
  - **Equally important is decreasing time spent in sedentary pursuits and substituting with alternative forms of physical activity.**
  - **There is no data on long term efficacy and safety of medication for treatment of childhood obesity.**
  - **There is also no role for bariatric surgery in childhood obesity.**
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