

Childhood obesity – A public health crisis across the European Union

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Abstract: In the past, a fat child meant a healthy child, but in the last decade, excessive fatness or obesity has become the primary paediatric health issue in the EU. It is known that some 10% of children are either overweight or obese, and that obesity worldwide, apart from in sub-Saharan Africa, has reached epidemic proportions, with a threefold or more rise in most European countries since the 1980s (1,2,14,18). The main causes of the obesity epidemic are clear - overeating, especially of foods rich in fats, extracted sugars or refined starches, and a progressive decline in physical activity. The management of this epidemic depends on the successful motivation of people to eat less, to eat healthier foods and to exercise more, all of which are difficult to achieve in societies where fruit and vegetables are less available than high-fat processed foods, and where exercise no longer plays a regular part in most people's lives. Management of childhood obesity is time-consuming, frustrating, difficult and expensive (18). Adult obesity is the strongest predictor of childhood obesity; if both parents are obese, the chance of their child being obese increases tenfold. Breast feeding exerts a small protective effect against obesity. Television viewing is important, as it is known that for each additional hour of television watched at 5 years of age, the risk of adult obesity rises by 8% (7,8,18). Long-term increase or decrease in activity levels will influence whether a child becomes obese. Studies have implicated inactivity, with over 4 hours TV or computer use, and consumption of takeaway foods more than twice weekly and fizzy drinks in the rising rates of obesity. Prevention of obesity will occur only if there are fundamental changes in society, involving the production and availability of cheap healthy foods, urban planning to ensure that people exercise more, education about eating, beginning in schools, and a global code to promote only healthy food and drink to children and adolescents. The vast majority of obese children have primary obesity due to a disturbed energy balance. A very small percentage (5%) have a genetic cause for their obesity, and only very rarely are hormonal causes found.

Key words: *Childhood obesity, epidemiology, management, prevention.*

The definition of childhood obesity

The Body Mass Index (BMI) is the most practical measure of obesity and it is used in growth monitoring to assess fatness. The BMI charts for boys and girls (Tables 1 and 2) show the recommended International Obesity Task Force cut-off points for obesity and overweight in children. These correspond to the adult definitions of overweight (BMI >25) and obesity (BMI >30) at age 18 years. Rapid changes in BMI can occur during normal growth. The BMI is recommended as a practical estimate of overweight in children and adolescents, but it needs to be interpreted with caution as it is not a direct measure of adiposity.

For epidemiological purposes overweight should be defined as BMI greater than or equal to the 85th centile of the 1990 reference data, and obesity as BMI greater than or equal to the 95th centile of the 1990 reference data.

The international epidemic of childhood obesity

The definitions of overweight and obesity in children differ between epidemiological studies,

making comparisons of cross-sectional data difficult. The rates have increased threefold over 25 years in the USA and fourfold over 18 years in Egypt (see the international childhood obesity map) (1,2).

Consequences of childhood obesity

Childhood obesity is a multisystem disease with potentially devastating consequences. It causes hypertension, dyslipidaemia, increased blood clotting tendency, endothelial dysfunction and hyperinsulinism. Type 2 diabetes mellitus, once virtually unknown in adolescence, is largely attributable to childhood obesity (4). A prediabetic state of glucose intolerance and insulin resistance appears to be highly prevalent among severely obese children irrespective of ethnic group. Type 2 diabetes is almost entirely attributable to the childhood obesity epidemic, although hereditary and life-style factors affect individual risk.

Pulmonary complications include sleep-disordered breathing (sleep apnoea), asthma and exercise intolerance. The development of exercise intolerance in an obese child can limit physical activity and thus lead to further weight gain.

Table 1. *Complications of obesity*

Short-term	Long-term
Poor self-esteem/depression	Persistence of obesity
Asthma	Social stigmatisation
Sleep apnoea	Sleep apnoea
Type 2 diabetes mellitus	Type 2 diabetes mellitus
Orthopaedic problems (e.g. slipped epiphysis)	Osteoarthritis
Hypertension/ high cholesterol	Hypertension/ high cholesterol
Early puberty/ polycystic ovaries	Menstrual irregularities/ hirsutism
Gallstones	Gallstones

Childhood obesity, of course, has substantial psychosocial consequences, and overweight children can develop a negative self-image at as early as 5 years of age, while obese adolescents show diminishing degrees of self-esteem associated with sadness, loneliness and risk-taking behaviour (3,15).

Causes of childhood obesity

Genetic causes

In 1997, two massively obese Pakistani children of consanguineous parents were found to have a mutation in the gene encoding leptin and since then five genetic mutations causing obesity have been identified, all presenting in childhood (5,6).

Prader-Willi syndrome (PWS) is a rare cause of obesity, with a deletion of chromosome 15 and features of a voracious appetite, poor linear growth, small hands and genitalia and dysmorphic features. Progress has been made in mapping the genetic loci of PWS but the molecular cause of this obesity syndrome has not yet been identified.

Thus, single gene defects account for a very small fraction of human obesity and predisposition to obesity appears to be related to a complex interaction between at least 250 obesity-associated genes.

Physical activity

A lifestyle characterized by a lack of physical activity and excessive television viewing has been shown to be associated with childhood obesity. Among children from Mexico City, the risk of obesity decreased by 10% for each hour of moderate to vigorous physical activity and increased by 12% for each hour per day of television viewing.

Television viewing

Television viewing is thought to promote weight gain not only by displacing physical activity but also by increasing energy intake (7,8). Children tend to passively consume excessive amounts of energy-dense

Table 2. *Tests to be considered in obesity*

Secondary causes of obesity are exceedingly rare; most obesity is what is termed simple obesity, and no investigations are required.
- Short stature/hypertension/striae - morning and evening cortisol levels (to exclude Cushing's disease)
- Short stature/goitre/hip pain - thyroid function tests, hip X-ray to exclude slipped capital femoral epiphysis
- Small hands and feet/voracious appetite - karyotype, FISH (Prader-Willi syndrome)
- Excessive thirst/increased urine output - fasting + 2 hour blood sugar levels, glucose tolerance test (Diabetes)
- Hirsutism/obesity/absence of periods - blood testosterone level, ultrasound scan of ovaries showing numerous cysts (polycystic ovary syndrome)

foods while watching television. Furthermore, television advertising could adversely influence dietary patterns at other times throughout the day. Screen time for children of over 2 years should be limited to no more than 1 to 2 hours per day (18).

Diet

Children who were bottle fed appear to be at greater risk of obesity later in childhood than those who were breast fed (9).

Sugar-sweetened soft drinks have been the subject of several studies, which have shown that the total energy intake was 10% greater among children who consumed soft drinks than in those who did not (18). Increasing portion sizes are also a factor. Fast food typically incorporates potentially adverse dietary factors including saturated fat, a high glycaemic index, high energy density and, increasingly, large portion size. A large fast food meal could contain 2,200 kcal, which, at 85 kcal per mile, would require a full Marathon to burn off.

Breakfast skipping, snacking and eating out (in particular at fast food establishments) are all associated with obesity (18). The 'traffic light diet', recommended for consumption by children in the age-group 6 to 12 years, consists of low energy, high nutrient foods such as fruit and vegetables (green), moderate energy foods (orange) and high energy foods (red). 'Green' foods may be eaten often, 'orange' foods in moderation and 'red' foods should be eaten sparingly (10,18).

Family factors

Parent-child interactions and the home environment can affect the risk of developing obesity. Traditional family meals tend to decrease television viewing and improve dietary quality; the child takes a diet with less saturated and trans fats, less fried foods, lower glycaemic load, more fibre, fewer soft drinks and more fruit and vegetables.

Prevention and treatment

Prevention and treatment ultimately involves eating less and exercising more. Most efforts to reduce obesity in children have used family-based or school-based approaches and only in severe cases are pharmacological and surgical treatments considered. Following a review of randomised controlled trials, Epstein et al. (10) concluded, somewhat soberly, that most interventions to treat childhood obesity are marked by only small changes in weight or BMI and very high rates of subsequent relapse.

School-based interventions have been oriented towards prevention of obesity, targeting all children. The Pathways programme (12), for American Indian children at high risk of type 2 diabetes and cardiovascular disease, aimed to reduce dietary fat consumption and increase physical activity. This 3-year programme produced a significant decrease in fat consumption and a trend towards increased physical activity but the BMI did not differ between children in the intervention and the control schools at the end of the programme. The Planet Earth trial (11) focussed largely on changing the school environment over two school years to include reduced television viewing, increased physical activity, decreased fat intake, increased fruit and vegetable intake, altered class curricula and extensive education of families. In this trial there was a significant reduction in obesity in girls (absolute risk 0.47, CI 0.24-0.93), with trends in the same direction in boys, although not reaching statistical significance. The authors reported that the effect observed was largely attributable to observed reductions in television viewing.

Most children managed in the community will have simple obesity with no underlying medical cause and without comorbidity. Treatment should be offered when the obese child and family are willing to make the necessary life-style changes. For children who are overweight and most children who are obese, weight maintenance is an acceptable goal (13). Weight maintenance can only be achieved by sustained behavioural changes, including healthier eating, an increase in physical activity to a minimum of 30 minutes per day and reduction of physical inactivity (e.g., watching television or playing computer games) to less than 2 hours per day. Particular attention should be given to methods for increasing physical activity in adolescents (18).

Suggestions for parents

Suggestions for increasing physical activity:

- any increase in activity will help,
- aim for simple changes at first, such as walking, cycling and using stairs rather than lifts,
- develop an active life-style for the whole family,

- encourage active play that is enjoyable and do all you can to keep exercise fun,
- decrease TV viewing and other sedentary activities,
- schedule unstructured free playtime on a daily basis.

Dietary suggestions:

- a balanced, varied diet for the whole family,
- serve meals at regular times; avoid 'grazing' and TV snacks,
- serve smaller portions,
- avoid snacks as rewards or treats,
- offer healthy snacks (e.g., fruit) as alternatives to sweets, chocolates, potato crisps, biscuits and cakes,
- use less energy dense food (e.g., semi-skimmed milks and low fat spreads),
- provide whole foods that take time to eat (e.g., fruits and wholemeal bread),
- promote low calorie drinks (preferably water),
- ensure at least five portions of fruit and vegetables per day,
- grill, boil or bake foods rather than frying them,
- "Eat to live, don't live to eat",
- pare down the amount of 'junk' food in the house,
- comfort with attention, listening and hugs instead of food.

The perfect meal plan

Modern families may rarely sit down to a meal all together, and one major suggestion is to bring back the traditional family meal; the perfect meal plan entails:

- firstly turn off the TV,
- involve children in the cooking process,
- switch mobile phones to silent,
- make sure that everyone sits down together at the table,
- serve the plates from a central location to ensure control over portion sizes,
- the meal should last at least 20 minutes,
- share the positive events of the day,
- be mindful while eating of the colour, texture and smell of the food,
- make dessert a continuation of the meal and not something too special,
- substitute fruit for dessert at times,
- parents, not children, should be responsible for food decision making,
- limit soft drink consumption.

Drug treatment for obesity

Drug treatment is not recommended for children under 12 years, and in adolescence it is only

recommended in situations where there are medical complications (orthopaedic complications or sleep apnoea) or severe psychological issues arising from the obesity. Medication used as part of a structured life-style modification produces an average weight loss of 5 to 10%, which typically reaches a plateau at 4 to 6 months of treatment, and weight regain is common after the drug is withdrawn (16,18). Prescribing should be made by a specialist multidisciplinary team. The drugs used are orlistat and sibutramine and they are generally used for a 6-12 month trial with regular reviews of effectiveness, adverse effects and adherence. Sibutramine is an appetite suppressant and orlistat works as a reversible lipase inhibitor (18). Drug treatment may be used to help the adolescent maintain weight loss as well as to continue to lose weight. Four experimental drugs have produced weight loss in small studies involving children with special conditions, specifically, metformin in obese adolescents with insulin resistance, octreotide for hypothalamic obesity, growth hormone in Prader-Willi syndrome and leptin for congenital leptin deficiency (17).

Bariatric surgery for obesity

Surgery is generally not recommended for children and adolescents and constitutes, at best, a last resort for severely obese adolescents. Exceptional circumstances in which surgery might be considered are when the BMI is >40, or when in the case of a significant complication, such as hypertension or type 2 diabetes that could be improved by weight loss, all appropriate non-surgical measures have failed or when they are receiving intensive care.

Key points to remember

- Obesity is now the commonest chronic condition affecting children across the EU.
- Obesity is due to an imbalance between energy consumption and energy expenditure. Obese children do not have low energy needs.
- Family support is necessary for treatment to succeed.
- Generally the aim of treatment is to help children and adolescents to maintain their weight.
- In younger children the main impact of obesity is social and emotional rather than medical.
- A medical cause for obesity is more likely in children who are both short and obese for age.
- Most children are not obese because of an underlying medical problem, but rather as a result of their life-style.
- Weight reduction or stabilization goals should always be kept reasonable.
- The major calorie culprits are high-fat fast food, large portions and sugar-containing soft drinks.

- If a child is at risk of obesity due to family history, the earlier the modifications (e.g., reducing TV time) the better.

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