Obesity in children

Obesity is no longer rare in children and the prevalence is increasing at an alarming rate. Pathological processes (see 'Complications', below) start early in life and are accelerated by obesity. See also the separate articles Obesity in Adults and Bariatric Surgery.

How common is obesity in children? (Epidemiology)

- The National Child Measurement Programme (NCMP) measures the height and weight of school children in reception and Year 6 in England every year, which helps in establishing the prevalence of child obesity. In 2018/19:[1]
  - 20.2% of children in Year 6 (age 10-11) were obese.
  - 26.9% of Y6 children were classified as obese in the most deprived areas.
  - Greater rates of obesity were found in black children, possibly linked to greater levels of economic deprivation.
- A further 14.4% in Year 6 were overweight.
  - 10% of children in Reception (aged 4-5) were obese.
- The Millennium Cohort Study is following 19,000 children born in the UK over the turn of the century in 2000-2001.[2] The report from 2017 showed that a third of teenagers were starting adult life classified as overweight or obese. At the age 7 report, 7% had been obese, showing a large rise in obesity between the ages of 7 and 17.
- Obesity prevalence between nations in the UK varies, with figures for both obesity and overweight being highest in areas with the greatest poverty.

- Worldwide, there has been an escalation in obesity prevalence, with an estimated 39 million children under 5 years of age estimated to have obesity in 2020.[3] Low-income and middle-income countries have been affected by the same trend as richer countries. Obesity is one of the priorities of the World Health Organization (WHO).[3] The UK has one of the highest prevalence rates of childhood obesity in Europe.

Causes of obesity in children

Obesity is basically caused by an imbalance between energy input and expenditure.However, the cause of obesity is more complex and multifactorial originating from a complex interplay between genetic, biological, environmental, socio-economic, and cultural factors.[4] Genetics and biology are predetermined, but the remaining factors can be modified. These include the family's eating, sleeping, and exercise behaviours, access to healthy food at school and in the community, the availability of safe places for physical activity, and adverse childhood experiences. A few of those factors will be considered here.

Dietary habits

There is a growing cohort of children who develop bad eating habits and a taste for junk food that is high in fat and fast carbohydrates. Studies have repeatedly shown the link between neighbourhood fast-food outlets and rates of obesity in children and households. This also linked to household income.[5] t Another growing trend is highly sugared energy drinks, often containing caffeine. Sugary drinks have been linked to childhood obesity.[6]

Exercise

Reduction of physical exercise in the absence of dietary modification contributes to weight gain. However, a 2017 Cochrane review found little evidence that activity programmes aimed to promote physical exercise actually have little impact on children's body mass indices (BMIs).[7] Long periods in front of the television or playing on the games console ('screen time') also contribute to the increasingly sedentary lifestyle.[8]

Sleep

Sleep deprivation (fewer hours of sleep) is now known to be a contributory factor to obesity.[9] A possible trend of children going to bed later may be, in part, responsible, and also less physical exercise may also lead to poorer sleep. Two hormones, leptin and ghrelin, may be important. Leptin is released by fat cells to tell the brain that fat stores are adequate and ghrelin is released by the stomach, as a signal of hunger.

Genetic contribution

Studies suggest that obese children are likely to have obese parents. For many years the thinking was that children with a genetic predisposition to obesity became obese because they lived in an obesogenic environment. Further research has shown that gene polymorphims are linked with obesity.[10] For a fuller discussion, see separate article Obesity in Adults.

Socio-economic situation

Public Health England (now the Office for Health Improvement and Disparities) child obesity factsheets suggest an almost linear relationship between obesity prevalence and deprivation.[11] Children in the most deprived areas have almost double the obesity prevalence of those in the least deprived areas. Also, those children in households where the main wage earner has a professional occupation have lower rates of obesity than those who live in households where the main wage earner has a manual occupation.

The Millennium Cohort Study report at age 11 found no link with social class. It did, however, show a significant association with the level of parental education.[12] In households where neither parent had educational qualifications, 25% of the children aged 11 were obese and 14% overweight, whereas in households where at least one parent held a degree, 15% of children were obese and 15% overweight.

However, there is evidence that socio-economic status over a life course is inversely related to body mass (obesity).[13]

Medication

Some medication prescribed for children and adolescents may aggravate weight gain and the risks and benefits should always be considered. This includes:[14]

- Antidepressants including mirtazapine, paroxetine, imipramine.

- Anticonvulsants including sodium valproate, gabapentin, vigabatrin and carbamazepine.
- Antipsychotics, especially the atypical antipsychotics aripiprazole, chlorpromazine, clozapine, olanzapine, pimozide, quetiapine, and risperidone.
- Lithium.
- Corticosteroids.

Other risk factors [4]

- High birth weight. Also low birth weight associated with catch-up growth.
- Intrauterine exposure to maternal gestational diabetes or maternal obesity.
- Timing or rate of maturation.
- Other behavioural or psychological factors - eg, learning disability.
- Physical conditions such as endocrine causes (rare):
    - Hypothyroidism.
    - Cushing's syndrome - look for truncal obesity, hypertension, hirsutism.
    - Growth hormone deficiency - there may be weight gain with delayed puberty.
    - Muscular dystrophy and other causes of immobility.
    - Polycystic ovary syndrome.
    - Hypothalamic damage.
    - Spina bifida.
    - Genetic syndromes associated with hypogonadism (eg, Prader-Willi syndrome, Laurence-Moon syndrome, Bardet-Biedl syndrome).

Diagnosis of obesity in children[15]

National Institute for Health and Care Excellence (NICE) guidelines recommend using the UK 1990 BMI charts to assess weight in children and young people.[16] These are adapted charts based on 1990 UK population data for use from age 2 to 18. Up to the age of 4 years charts incorporate data from the WHO (known as the UK-WHO charts) but from age 4, UK 1990 data are used. The charts create centiles which are age- and gender-specific. Using these charts, a child with:

- A BMI over the 91st centile is classified as overweight.
- A BMI over the 98th centile is classified as obese.
- A BMI over the 99.6th centile is classified as severely obese.

The measurement of waist circumference is not recommended in children.

In the separate article Centile Charts and Assessing Growth, the problem of diagnosing childhood obesity is discussed more fully.

Assessment

Raising the issue

Studies have shown that parents often have an incorrect perception of their child's weight. [17] Charts may be needed to drive the message home. Endocrine causes for childhood obesity are rare. It is worth stressing that obesity is a clinical term with health implications rather than just the way somebody looks.

It can be a delicate issue to raise with a parent and this may mark the (good or bad) start to a long therapeutic period. The issue may be raised:

- If the family expresses concern about the child's weight. Try: "We can measure [child's] weight and see if he or she is overweight for his or her age."
- If the child has weight-related comorbidities. Try: "[Condition] can sometimes be related to a child's weight. I think we should check [child's] weight."

- If the child is visibly overweight. Try: "I see more children these days who are a little overweight. Could we check [child's] weight?"

This may be the first time that weight has been raised with the family. It is a time to be reassuring and supportive. "By taking action now, we have a chance to improve [child's] health in the future."

Assessment should include the following:[15]

- Height and weight should be in light clothing with no shoes. Establish BMI using UK 1990 charts.[16] NICE recommends tailored clinical intervention if a child's BMI (adjusted for age and sex) is at the 91st centile or above and that assessment for comorbidities should be considered if their BMI is at the 98th centile or above
- Explore why help is being requested; is it the child or the family or are there comorbid problems? The child may have been flagged up during the course of the NCMP.
- Explore problems caused by weight, physical symptoms or distress caused by bullying, teasing or low self-esteem.
- Explore factors which might be contributing to weight gain, including:
    - Lifestyle.
    - Diet.
    - Exercise.
    - Social, environmental and family circumstances.
    - Medication or medical problems.
    - Disability.
    - Roles of family or care workers.
- Explore motivation and willingness to change.
- Discuss what has already been tried and how successful it has been. Explore beliefs of the child and the parent(s) about weight, eating and physical activity.

- Perform a physical examination, looking for features of physical causes (see 'Other risk factors', above). If acceptable to the child, evaluate pubertal development.
- Test urine for protein and glucose.
- Check blood pressure; however, the cuff needs to be suitably sized.
- Consider measuring lipids and HbA1c.

Management of obesity in children [15]

General points

- Rapid changes in BMI occur during normal growth; there is a great potential for reducing overweight in children and adolescents.
- Unless the child is seriously overweight or has significant comorbidities, be led by the child's/parent's wishes. Make decisions with the child and their parent(s), and tailor interventions to their individual needs and preferences.
- As children are still growing, the aim is often not weight loss but weight maintenance or even a reduction in the rate of gain of weight.
- Apart from the basic principle that energy intake should be reduced and energy output in the form of physical activity increased, there is little in the way of evidence to support any particular intervention. [18] NICE recommends that school, family and societal interventions should be considered in the management and prevention of obesity in children. This may include involving parents in weight loss programmes. Ensure all interventions address lifestyle within the family and social settings.
- Encourage parents to take responsibility for any lifestyle changes, particularly for children under the age of 12.
- Multi-component interventions (diet/exercise/behaviours) are the treatment of choice.
- The suggestion that inadequate sleep in children may aggravate obesity has been noted above. Ensuring adequate sleep is important.
- Beware of potential underlying psychological factors. There may be 'comfort eating' or even clinical depression that needs treatment.

- Overweight adults need caring, compassionate and empathetic attention. This is equally important in children. Praise success at every occasion, however small.

Diet and exercise

The primary aims of management are dietary modification and the initiation of exercise. Losing weight without exercise is very difficult but the obese child may find it very tough taking exercise up initially.

Diet

- NICE does not recommend using a dietary approach alone.
- Tailor any dietary changes to individual preferences. Allow a flexible, individual approach.
- Do not recommend unduly restrictive, nutritionally unbalanced diets.
- It may be helpful to keep a food diary (assists cognitive approach). Do not forget snacks and drinks.
- It is very unpleasant being hungry and, rather than just cutting back on all food, it may be easier to move to a diet with less fat and more fibre in it.
- NICE advises that calorie intake should be below energy expenditure, but gives no specifics about diet or numbers of calories. It emphasises the general benefits of healthy eating.
- There may be occasions where there is benefit in referral to a dietician, particularly where there is a large amount of weight to be lost and caloric cut has to be balanced by adequate nutrition for ongoing developmental needs.
- This is not easy for the patient and it is important to be positive and reinforcing.

Exercise

- The value of exercise is more than just the calories expended in the session. It tends to increase basal metabolic rate and, after vigorous exercise, metabolism is stimulated for the subsequent 36 hours. It has cardiovascular benefit, and reduces the risk of diabetes. It also promotes a sense of well-being.

- Overweight children may shun exercise. It is important to discuss the options to find something appropriate and sustainable. The age and aptitudes of the individual must be taken into account. It must be something that the individual will enjoy or he or she will not persevere. This is very important, as the ethos of exercise is not just for the duration of weight loss but for life.
- It is recommended that children and young people should participate in at least 60 minutes of moderate-intensity physical activity each day.[19]
- Exercise need not always be 'formal' - walking, using stairs, cycling and active play all count.
- Reduce time spent on inactive pursuits, such as watching television and playing video games.
- Although it has been standard practice to advise involvement of all the family in an active lifestyle, a Health Technology Assessment of a 'Famillies for Health' programme showed it was neither effective, nor cost-effective.[20]

Cognitive approach

This is important and should accompany all the other approaches described above. It is as important in helping the individual understand the problem as it is to help them through treatment. Behavioural interventions require a trained professional and strategies supported by NICE guidelines include:

- Stimulus control.
- Self-monitoring.
- Goal setting.
- Rewards for reaching goals.
- Problem solving.

Parents should be encouraged to role-model desired behaviour. See separate article Cognitive and Behavioural Therapies which discusses behaviour modification.

Pharmacological intervention

- Orlistat is currently the only pharmacological intervention licensed for the treatment of obesity in the UK.
- Drug treatment is not usually recommended for children. Orlistat does not have market authorisation for use in children.[21] A Cochrane review suggests that the use of orlistat in adolescents over the age of 12 may have a small effect on weight loss but the trials were of low quality. Pharmacists will not issue over-the-counter orlistat to individuals under 18 years of age.[22]
- In children over the age of 12 where there are physical comorbidities (such as orthopaedic problems or sleep apnoea) or severe psychological comorbidities, there may be a role for drug treatment after dietary, exercise and behavioural programmes have been started and evaluated.
- NICE does not recommend the use orlistat in children aged less than 12 other than in exceptional circumstances and under specialist care.[15]
- Treatment should be initiated in a specialist paediatric setting, by multidisciplinary teams with experience of prescribing in this age group. It may be continued in primary care, if local circumstances and/or licensing allow.
- Regular monitoring of physical parameters, psychological factors, behaviour, diet and exercise should be part of the treatment package.
- If used, a trial of treatment for 6-12 months is advised.
- Consider supplementation with multi-vitamins.

The use of medication in children is continually being assessed and may well play an increasing role in the face of the obesity epidemic. Studies have shown that metformin can be prescribed for a reduction in BMI.[23]

A 2017 survey of anti-obesity drug prescribing in primary care in the UK suggested that prescribing of anti-obesity medicines in primary care had low adherence to NICE guidance.[24] 47% of those surveyed were prescribed metformin, 59% orlistat and 5% both drugs. Orlistat was largely prescribed by GPs independently and metformin by GPs on specialist recommendation. Orlistat was largely prescribed in those over 16 years of age without physical comorbidities. Metformin was initiated for treatment of polycystic ovarian syndrome (70%), insulin resistance (25%) and impaired glucose control (9%). The paper concludes that further work is needed to better support GPs in the use of anti-obesity drugs in children and young people.

Surgery

Bariatric surgery is limited to the severely obese who are refractory to other management. In young people, it is generally not recommended but may be considered in exceptional circumstances if:[15] Research suggests bariatric surgery is safe and effective in adolescents with class II obesity with a comorbidity, or class III obesity.[25]

- Physiological maturity has been reached, or almost reached.
- The child or young person has had a full assessment for underlying treatable causes of obesity, including genetic screening.
- All appropriate non-surgical measures have failed to produce adequate results over six months.
- They have had a comprehensive psychological, educational, family and social assessment.
- They are receiving intensive specialist multidisciplinary assessment, treatment and support.
- They are fit for anaesthesia and surgery.
- They have a comprehensive follow-up package of care.

. See the separate article Bariatric Surgery for more information.

Follow-up

As with any chronic disease, follow-up must be arranged. This implies interest in the patient's progress. Obesity is a chronic disease and needs to be managed throughout the person's life, as relapse is common. "Yo-yo dieting" with weight going up and down is undesirable and unhealthy.

The management of obesity is a lifelong process. Attitudes towards diet and exercise must change for life

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Referral

Before referral to secondary care, consider referral to a local community-based treatment programmes if available.

NICE public health guidelines promote the development of lifestyle weight management programmes in the community.[26]

Consider referral to a paediatrician if:[15]

- BMI is above the 98th centile.
- There is serious comorbidity, or problems related to the weight (eg, sleep apnoea, orthopaedic problems).
- There is a significant learning disability.
- The height is below the 9th centile, the child is unexpectedly short for the family or if there is a slowed growth velocity.
- There is precocious puberty or delayed puberty (ie younger than 8 or older than 13 in girls, and 15 in boys).
- There are symptoms/signs suggestive of an endocrine or genetic problem.
- There is severe or progressive obesity before the age of 2.
- You have other significant concerns.

Complications of obesity in children[4]

These include:

- Insulin resistance and type 2 diabetes.
- Breathing problems - eg, sleep apnoea and reactive airway disease.
- Orthopaedic conditions.
- Non-alcoholic fatty liver disease.
- Psychosocial morbidity and stigma.
- Polycystic ovary syndrome.
- Metabolic syndrome.
- Vitamin D and iron deficiency.

There are then problems if these children carry their obesity into adulthood. There may be an increased future risk of impaired fertility, some cancers, atherosclerosis, early cardiovascular disease, hyperlipidaemia and hypertension.

Screening children for obesity

There is no screening programme for childhood obesity currently, because few treatments have been shown to be effective and cost-effective. In 2005, an annual National Child Measurement Programme (NCMP) was introduced in England for surveillance (not screening) of two school year groups: Reception and Year 6. This information is collated by local NHS providers. In some areas, parents of children whose weight lies outside the normal range are sent a letter informing them of the results.[27]

Policy development

The English cross-government 'Healthy Weight, Healthy Lives' strategy in 2008 aimed to reverse the trend in rising childhood obesity so that levels return to those of 2000 by 2020. This led to the introduction of the Change4Life initiative which was launched in 2008, which has now changed its name to Better Health Healthier Families. This aimed to improve children's diets and levels of activity.[28] This was followed by the 2011 "Healthy lives, healthy people. A call to action on obesity in England" policy.[29] However, two years later, the Royal College of Physicians issued a report criticising the Government's lack of progress in combating the obesity epidemic. They were particularly critical of the lack of facilities for children, who often do not qualify for medication or bariatric surgery. They have called for less variation in the provision of obesity services and leadership at all levels of NHS provision.[30]

The Royal College of Paediatrics and Child Health issued a position statement on childhood obesity in 2012. This identified many possible initiatives to combat the problem. The salient points were:[31]

- An increase in training for health professionals.
- Encouraging breast-feeding.
- Extending the free school meals programme.
- Increasing the amount of moderate-intensity exercise undertaken daily by schoolchildren.
- Banning the advertising on television of unhealthy food before the watershed.
- Increasing the tax on unhealthy food.

Further reading

- NDR (Nutrition and Diet Resources) UK
- Obesity; NICE CKS, August 2023 (UK access only)
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