Childhood obesity: a big problem for small people

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Introduction

Obesity is a major public health concern, with an ever-increasing prevalence in adult and child populations. The recent appearance of type 2 diabetes in children further emphasises the importance of the issue. As overweight children tend to become overweight adults, preventive strategies for diabetes should focus on this new generation of patients. This article examines the prevalence of obesity in young children in an English seaside community, providing an insight into certain lifestyle factors that could be contributing to the problem.

Obesity continues to increase in both adult and child populations throughout the world, with the prevalence having trebled over the past 20 years (Bourne et al, 2001). Currently, in the UK, one in four women and one in five men are obese (Bourne et al, 2001). The health and financial implications of this are huge; in 1998, 6% of all deaths in the UK were attributed to obesity, compared with 10% from smoking and 1% from road traffic accidents. Obesity is also responsible for 1.5% of NHS expenditure, and accounts for 18 million sick days per year (Bourne et al, 2001). For a condition that, in most circumstances, is either preventable or reversible, the current health and economic costs are excessive.

The link between obesity, diabetes and cardiovascular disease is well documented (Chan et al, 1994). Worryingly, type 2 diabetes, a disease previously only seen in older adults, is starting to appear in children (Fagot-Campagne and Venet Narayan, 2001). Insulin resistance, a precursor of diabetes, has also been reported in obese children as young as five, irrespective of their ethnic origins (Sinha et al, 2002).

The next generation

Until recently, the prevalence of obesity among British school children was thought to be low. Body mass index (BMI), which assesses both height and weight, is used to classify obesity:

$$BMI = \frac{[\text{weight (kg)}]}{[\text{height (m)}]^2}$$

A child's position on a BMI centile chart indicates the child's 'thinness' or 'fatness' with respect to his/her age (Cole et al, 1995). The incidence of overweight children, using the definition of overweight and obesity proposed by the International Obesity Task Force (IOTF; Cole et al, 2000), has increased substantially since the mid-1980s. In 1994, 9% of boys were overweight, compared with 5% in 1984 (Chinn and Rona, 2001). The percentage of overweight girls was 9% in 1984 but reached 13% within the decade.

Obesity in childhood is known to be an independent risk factor for adult obesity (Campbell et al, 2002), and children who progress to become obese adults have a far greater risk of serious health problems, with a twofold risk of dying prematurely (before the age of 60) from ischaemic heart disease (Gunnell et al, 1998). Fortunately, if a child loses weight and becomes a slim adult, this could effectively protect him/her from the development of components of the metabolic syndrome and subsequent raised cardiovascular risk (Vanhala et al, 1998).

Contributory factors

There are a variety of environmental and social factors that might contribute to the rise in obesity, although, in general, the cause is predominately environmental rather than genetic.

Sugar-sweetened drinks

One important factor might be increased consumption of sugar-sweetened drinks (Ludwig et al, 2001). Children consume these drinks in addition to their normal

ARTICLE POINTS

1 Obesity is on the increase in adult and child populations.

2 The causes are multifactorial and related to changing lifestyles.

3 The appearance of type 2 diabetes in children recently emphasises the importance of this issue.

4 Consumption of caffeinated sugar-sweetened drinks is increasing in children.

5 Interventions need to be found to reduce childhood obesity.

KEY WORDS

- Childhood
- Obesity
- Sugar-sweetened drinks
- Caffeine
- Diabetes

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1 Soft drinks are one of the main sources of added sugars in the diets of children.

2 A direct correlation has been shown between adiposity and television in children.

3 Schools provide an ideal environment to relay nutrition messages to a large number of individuals.

4 The aim of the study was to evaluate the prevalence of overweight and obesity among primary school children in a local community.

energy intake, and consequently have a total energy intake that exceeds their requirements (Ludwig et al, 2001). For example, children who drink an average of 270ml of soft drink per day have an energy intake that is 10% higher than that of their counterparts who do not consume soft drinks (Harnack et al, 1999).

The latest National Food Survey for children in the UK (Gregory and Lowe, 2000) has shown that soft drinks are one of the main sources of added sugars in the diets of children, and that the proportion of sugars provided by these drinks increases with age, rising from 27% for boys aged 4–6 years, to 42% for boys aged 15–18 years. This same survey found that, over a period of one week, only 46% of boys and 51% of girls drank fruit juice, whereas two-thirds of boys and girls consumed regular carbonated soft drinks. Only half the children surveyed drank tap water on a regular basis.

Caffeine

With the increasing consumption of sugar-sweetened fizzy drinks, there is also concern regarding their caffeine content. The physiological consequences of a caffeine-containing soft drink (48mg of caffeine) in an average 6-year-old child weighing 20kg are equal to those in an adult drinking two cups of filter coffee (170mg caffeine) (Goldstein and Wallace, 1997). Studies have shown that, following an oral glucose tolerance test, the addition of caffeine causes a rise in insulin and glucose, which is suggestive of a caffeine-associated increase in insulin resistance (Graham et al, 2001).

Screen-watching

'Screen watching', including television, handheld computer games and personal computers, are very much part of our modern lifestyles. An American study has shown a direct correlation between adiposity and television watching in children (Crespo et al, 2001). However, the study failed to determine conclusively whether watching a lot of television caused obesity or whether obese children just watched more television.

Aim of the present study

Clearly, there is a need for interventions to promote a healthier lifestyle and prevent the prevalence of overweight and obesity from increasing further.

Schools provide an ideal environment in which to relay messages on nutrition to a large number of individuals (Atkinson and Nitzke, 2001). The aim of this study was to evaluate the prevalence of overweight and obesity in primary school children in our local community. We also wanted to gain insight into certain lifestyle factors, including preferred drinks and screen-watching behaviour.

Study subjects

A local junior school, from a middle class, southern English seaside community, was contacted, and permission was sought from the head teacher, board of governors and local council for the school to participate in the study. Ethical approval was also obtained from the local research and ethics committee, and written consent was obtained from each child and his/her parents.

Children were measured for height (without shoes, to the nearest 0.1cm) and weight (in light clothes, to the nearest 0.1kg). The prevalence of overweight and obesity in this population was established using the age- and gender-specific BMI centile charts.

Methods

Comparison of the results of different studies can be misleading because of the lack of agreement on a standard method for assessing and evaluating childhood overweight and obesity. There are three recognised methods for comparing rates of overweight and obesity in children:

- The British BMI chart, in which the 91st centile defines overweight and the 98th centile defines obesity (Cole et al, 1995).
- The recent internationally agreed cut-off points for BMI devised by the IOTF. These cut-off points for childhood overweight and obesity are based on international data and are linked to the adult cut-off points of overweight (BMI >25kg/m^2) and obesity (BMI >30kg/m^2) (Cole et al, 2000).
- The commonly used American definition of the 85th centile for overweight and the 95th centile for obese (Barlow and Dietz, 1998).

The children were also asked to complete 3-day drink and activity diaries.

Dietary data can be collected using a variety of methods, including recall after a 24-hour period, and food frequency checklists. To obtain best estimates of actual intake, data should be collected in a diary over 3 days, including one weekend day (Campbell et al, 2002).

In the current study, children were each given their own diary and wrote down every drink they consumed over the 3-day period, from Thursday to Saturday. They also recorded each television programme they watched and for how long they watched it.

Results

Weight

Of a possible 278 children between the ages of 7 and 11 years, parental consent was obtained for 56%. Four children withheld their consent. Overall, measurements were obtained for 54% of the 278 children, including 77 girls and 72 boys. The prevalences of overweight and obesity found by this study are shown in *Tables 1* and 2. The three definitions for establishing overweight and obesity are listed, highlighting the different results obtained when different definitions are used.

Our data were compared with the national average for childhood overweight and obesity from 1994 (*Figure 1*), using the internationally agreed cut-off points (from the IOTF) for BMI in both cases. Interestingly, when this method was used, none of our boys was obese but we had far greater rates of overweight than the national averages and a higher proportion of obese girls.

Drinking behaviour

Drink and activity diaries were returned and completed by 71% (n=108) of the participating children. Over the 3-day period, 52% (95% confidence interval; 43–61%) of the children consumed varying amounts of fizzy drinks, the majority drinking the sugar-sweetened variety. Forty-three per cent of the children drank just over one glass of a sugar-sweetened fizzy drink each day. One third of the children regularly drank caffeine-containing sugar-sweetened fizzy drinks. *Figure 2* shows the average volume of fizzy, sugar-sweetened drinks (caffeine- and non-caffeine-containing) consumed on a daily basis; the standard deviation (SD) of 128 demonstrates the huge variation in the volumes consumed by the children.

Television scores

The children also recorded how much time they spent watching television and were asked whether they had access to a television in their own bedroom. Forty-one per cent had a television in their own room and these children watched an average of 83 minutes (SD 50) of television per day, which was 22% more than that watched by children who shared a television with their family (P=0.05, using independent samples t-test).

Discussion

Our data from a small sample of children showed that there is a significant problem of childhood overweight and obesity in our local area. Unfortunately, we only succeeded in obtaining consent from just over half the

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1 Over a 3-day period, children recorded every drink they had and how much television they watched.

2 Measurements were obtained for 149 children, aged between 7 and 11 years.

3 Forty-three percent of the children drank just over one glass of sugar-sweetened fizzy drink each day.

4 Compared with children who shared a television with their family, those with a television in their own room watched 22% more television per day.

Table 1. Prevalence of overweight status (95% confidence interval) in children aged 7–11 years

Subject	International Obesity Task Force	>91st centile (British)	>85th centile (American)
Girls (n=77)	22% (14%, 33%)	14% (8%, 24%)	21% (13%, 31%)
Boys (n=72)	18% (11%, 29%)	13% (7%, 22%)	11% (6%, 20%)

Table 2. Prevalence of obesity in children aged 7–11 years

Subject	International Obesity Task Force	>98th centile (British)	>95th centile (American)
Girls (n=77)	3% (1%, 9%)	4% (1%, 11%)	8% (4%, 16%)
Boys (n=72)	0% (0%, 5%)	8% (4%, 17%)	13% (7%, 22%)

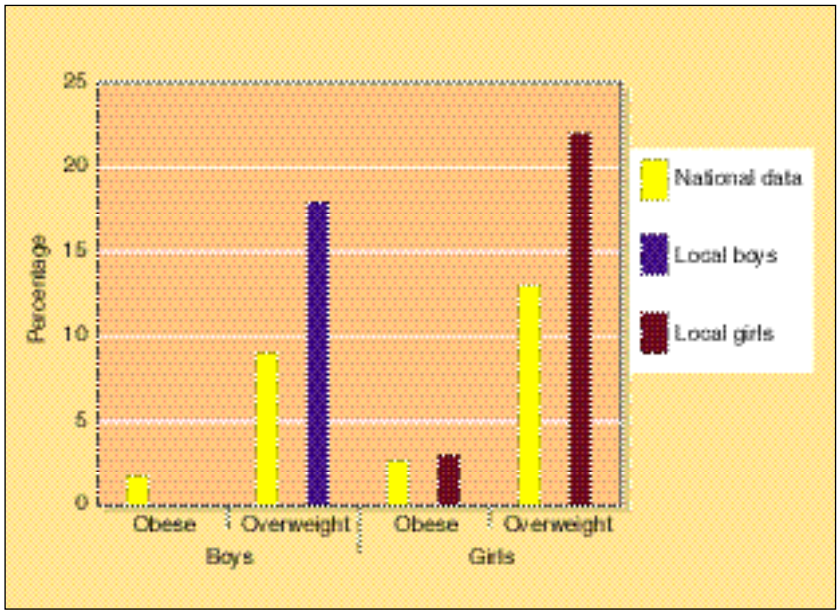

Figure 1. Comparison of overweight and obesity with UK national averages from 1994 and current local averages. (Data from the new international cut-off points (International Obesity Task Force) were used to determine overweight and obesity.)

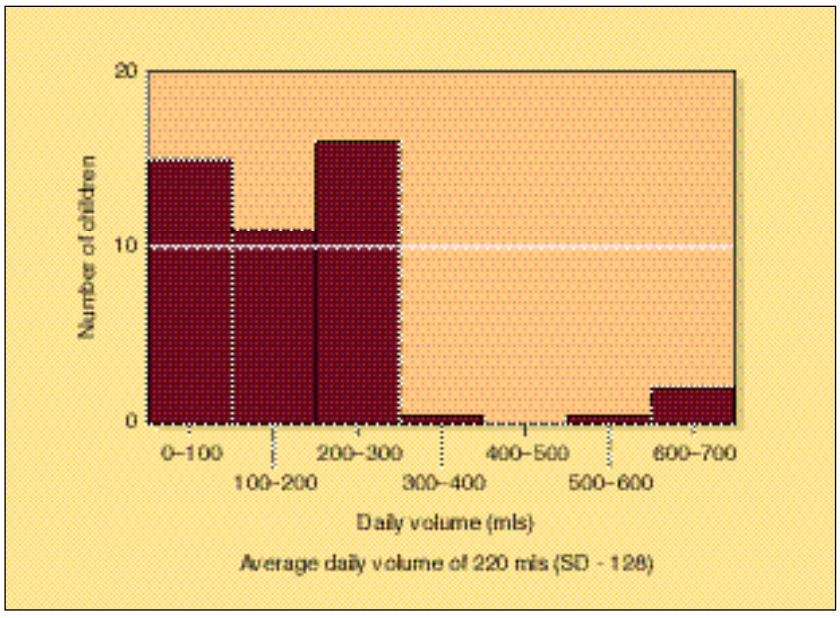

Figure 2. Daily consumption of fizzy sugar-sweetened drinks.

sample. The cause of this low return rate is unknown, but parents of more overweight children might have been less inclined to allow their children to participate.

Diet diaries

Diet diaries are fraught with difficulties: there is a tendency for respondents to under-report energy intake, and under-reporting is greater in obese and overweight individuals (Campell et al, 2002). Hence, the accuracy of diaries is debatable; however, they still showed that a large proportion of the children consumed sugar-sweetened drinks on a regular basis, highlighting the need for education on this issue.

How to deliver education

The home is an ideal environment for health education and could potentially provide the best results. However, this is impractical for large-scale implementation of health education strategies (Fruhbeck, 2000).

Schools provide an environment in which the nutrition message can be relayed to a large number of individuals, but the effectiveness of a school-based programme is controversial (Atkinson and Nitzke, 2001).

Previous studies

A recent school-based study in Leeds that aimed to the reduce risk factors of obesity successfully implemented changes at school level, but, following intensive education, achieved only very modest behavioural changes in the children (Sahota et al, 2001). Although the children did not change their lifestyles, those who participated in the education had a greater knowledge and awareness about healthy nutrition.

The Planet Health Study from America, another intensive school-based education programme, successfully reduced obesity in girls but had no effect in boys (Gortmaker et al, 1999). Conversely, a school-based study in Singapore showed very impressive results in reducing obesity and overweight among both genders (Mui Toh, 2002). The interventions in this study were intensive and included changes to the food sold in school canteens and extra education on nutrition in the classroom. In addition, overweight children participated in an extra exercise and health education programme.

All these studies took a very broad approach and focused on all areas relating to a healthy diet and increased exercise. Clearly, there is a need for interventions to promote a healthier lifestyle and prevent childhood overweight and obesity.

Conclusion

Childhood obesity is a significant problem, and can be attributed to the unhealthy lifestyles that children are adopting today. It is a multisystem disease, with potentially devastating medical and psychosocial

consequences, including a clustering of risk factors for the later development of cardiovascular disease and diabetes. It is essential to promote health education, and schools provide an in ideal environment for this. Childhood obesity is a major public health issue, and interventions need to be found to try to combat the problem. ■

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PAGE POINTS

1 Childhood obesity can be attributed to the unhealthy lifestyles that children are adopting today.

2 It has potentially devastating medical and psychosocial consequences, including a clustering of risk factors for the development of cardiovascular disease and diabetes.

3 There is a clear need for interventions to promote a healthier lifestyle and prevent childhood overweight and obesity.

Sonnet to the NSF

While pondering over the delay of the promised NSF, a Shakespearean-like sonnet came to mind:

The editor of *Diabetes and Primary Care* gives his apologies to the Bard.

Dedication to the NSF:

Shall I compare thee to this new delay?
Thou art more lowly and more desperate.
Rough estimates that you'd be out in May,
And summer's lease hath all too short a date.
Sometime too hot the eye of Hope doth shine,
And often is our expectation dimmed;
And NSF new dates again defined,
By chance, for Labour's changing course is dim;
But thy eternal summer shall now fade
You'll lose possession of that care thou knowst;
Now shall Health lag, we wonder, new-delayed,
When your infernal lies in time are grossed:
So long as men can breathe and eyes can see,
So long we wait, and soon it's 2K3.

Shakespeare's original:

Shall I compare thee to a summer's day?
Thou art more lovely and more temperate.
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date.
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimm'd;
And every fair from fair sometime declines,
By chance or nature's changing course untrimm'd;
But thy eternal summer shall not fade
Nor lose possession of that fair thou ow'st;
Nor shall Death brag thou wander'st in his shade,
When in eternal lines to time thou grow'st:
So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

Hippocrates