Prevalence and trends in overweight and obesity in three cross sectional studies of British children, 1974-94

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Abstract

Objectives To report trends in overweight and obesity, defined by new internationally agreed cut-off points, in children in the United Kingdom.
Design Three independent cross sectional surveys.
Setting Primary schools in England and Scotland.
Participants 10 414 boys and 9737 girls in England and 5385 boys and 5219 girls in Scotland aged 4 to 11 years.
Main outcome measures Prevalence and change in prevalence of overweight and obesity, as defined by the international obesity task force, in 1974, 1984, and 1994, for each sex and country.
Results Little change was found in the prevalence of overweight or obesity from 1974 to 1984. From 1984 to 1994 overweight increased from 5.4% to 9.0% in English boys (increase 3.6%, 95% confidence interval 2.3% to 5.0%) and from 6.4% to 10.0% in Scottish boys (3.6%, 1.9% to 5.4%). Values for girls were 9.3% to 13.5% (4.1%, 2.4% to 5.9%) and 10.4% to 15.8% (5.4%, 3.2% to 7.6%), respectively. The prevalence of obesity increased correspondingly, reaching 1.7% (English boys), 2.1% (Scottish boys), 2.6% (English girls), and 3.2% (Scottish girls).
Conclusion These results form a base from which trends can be monitored. The rising trends are likely to be reflected in increases in adult obesity and associated morbidity.

Introduction

Recently the need for estimates of overweight and obesity in children to assess preventive measures, monitor secular trends, and identify high risk groups has been emphasised.[1 2] There has been a lack of consensus over the definitions, but internationally based cut-off points have now been published.[3] On the basis of these cut-off points we report prevalence and secular trends in overweight and obesity from 1974 to 1994 in white children in the United Kingdom.

Participants and methods

The national study of health and growth, which started in 1972, included 22 English areas in 1974, 1984, and 1994, six Scottish areas in 1974, and 14 Scottish areas in 1983-4 and 1993-4. All white children from the national study of health and growth were eligible for our study. The samples included too few non-white children for useful analysis; ethnic minority groups were included in a separate inner city sample not reported here. We chose to study (*a*) 1994 because this was the final year of the national study, (*b*) trends from 1984 to 1994 in weight for height because these data have been reported,[4] and (*c*) 1974 because this was representative of the earlier years. Areas were chosen by stratified random sampling for England and Scotland separately, with weighting towards poorer areas. If a school needed to be replaced a comparable school was chosen in the same area when possible or from another area in the same stratum.[5]

When the national study of health and growth began in 1972 a system of ethical committees for community based studies had not been established, but the coordinators at the time obtained ethical approval from St Thomas's Hospital medical ethics committee. Participation of schools was agreed with the health and education authorities and head teacher in each area. Parents were notified of the study in advance and were able to withdraw their child.

Height was measured on a Holtain stadiometer to the last 0.5 cm in 1974 and to the last 0.1 cm in 1984 and 1994; 0.25 cm or 0.05 cm was added as appropriate. Weight was recorded to the last 100 g with a mechanical

Table 1 Published cut-off points for body mass index for overweight and obesity by sex between 4 and 12 years of age

	Body mass index 25		Body mass index 30	
Age (years)	Boys	Girls	Boys	Girls
4	17.6	17.3	19.3	19.1
4.5	17.5	17.2	19.3	19.1
5	17.4	17.1	19.3	19.2
5.5	17.5	17.2	19.5	19.3
6	17.6	17.3	19.8	19.7
6.5	17.7	17.5	20.2	20.1
7	17.9	17.8	20.6	20.5
7.5	18.2	18.0	21.1	21.0
8	18.4	18.3	21.6	21.6
8.5	18.8	18.7	22.2	22.2
9	19.1	19.1	22.8	22.8
9.5	19.5	19.5	23.4	23.5
10	19.8	19.9	24.0	24.1
10.5	20.2	20.3	24.6	24.8
11	20.6	20.7	25.1	25.4
11.5	20.9	21.2	25.6	26.1
12	21.2	21.7	26.0	26.7

Adapted from Cole et al.[3]

balance in 1974 and 1984 and electronic digital scales in 1994. Details have been given elsewhere.[4]

Body mass index was calculated as weight (kg)/(height (m)^2). Using linear interpolation between the cut-off points for each six months of age we calculated the percentage of children who were overweight or obese for each country, sex, and year. Children were divided into three age groups, 4 to 6, 7 to 8, and 9 to 11 years. The definitions of overweight and obesity were based on average centiles estimated to pass through body mass index 25 and 30, respectively, at age 18.[3] Table 1 shows the cut-off points for ages 4 to 12 years.

Results

Over 97% of children were measured in 1974 and 1984 and over 94% in 1994. Table 2 shows the prevalence and changes in prevalence in overweight. From 1974 to 1984 there was little overall change. From 1984 to 1994 there was an overall increase in all four groups of children: 3.6% in boys and 4.1% and 5.4% in English and Scottish girls, respectively. The increase was greatest in the oldest age group, the differences between age groups being significant in English boys (logistic regression, test of interaction P = 0.009). The prevalence reached nearly 20% in the oldest Scottish girls in 1994. Table 3 shows the prevalence of obesity, but this is relatively small and is not shown subdivided as there is low power to detect differences between age groups. A decrease in obesity in boys occurred from 1974 to 1984 and an increase in all groups from 1984 to 1994, with Scottish girls having a final prevalence of 3.2%.

Table 2 Prevalence of overweight in children in 1974, 1984, and 1994 in England and Scotland. Values are percentage overweight unless stated otherwise

				Change in prevalence (95% CI)	
	1974	1984	1994	1974 to 1984	1984 to 1994
English boys					
No	4139	3259	3016		
Age (years):					
4 to 6	6.8	4.6	5.4	–2.2 (–4.1 to –0.2)	0.7 (–1.2 to 2.7)
7 to 8	6.2	5.7	9.0	–0.5 (–2.5 to 1.6)	3.3 (0.8 to 5.7)
9 to 11	6.2	5.8	12.7	–0.4 (–2.2 to 1.4)	6.9 (4.4 to 9.4)
Total	6.4	5.4	9.0	–1.0 (–2.1 to 0.1)	3.6 (2.3 to 5.0)
English girls					
No	3871	3008	2858		
Age (years):					
4 to 6	9.5	7.5	10.9	–2.1 (–4.6 to 0.4)	3.4 (0.7 to 6.1)
7 to 8	7.6	10.6	12.5	3.0 (0.3 to 5.6)	1.9 (–1.3 to 5.1)
9 to 11	9.9	9.9	16.7	0.0 (–2.4 to 2.3)	6.9 (3.8 to 10.0)
Total	9.1	9.3	13.5	0.3 (–1.2 to 1.7)	4.1 (2.4 to 5.9)
Scottish boys					
No	1172	2141	2072		
Age (years):					
4 to 6	7.0	5.7	7.6	–1.3 (–4.5 to 1.9)	1.9 (–0.9 to 4.8)
7 to 8	4.2	6.4	8.0	2.2 (–0.8 to 5.3)	1.6 (–1.5 to 4.7)
9 to 11	5.0	6.9	13.4	1.9 (–0.7 to 4.6)	6.5 (3.5 to 9.5)
Total	5.4	6.4	10.0	1.0 (–0.1 to 2.7)	3.6 (1.9 to 5.4)
Scottish girls					
No	1078	2105	2036		
Age (years):					
4 to 6	10.1	9.3	11.9	–0.8 (–5.0 to 3.4)	2.5 (–1.1 to 6.1)
7 to 8	7.0	11.3	15.1	4.2 (0.1 to 8.3)	3.8 (–0.4 to 8.0)
9 to 11	9.1	10.6	19.6	1.5 (–1.9 to 5.0)	9.0 (5.3 to 12.7)
Total	8.8	10.4	15.8	1.6 (–0.7 to 3.8)	5.4 (3.2 to 7.6)

Table 3 Prevalence of obesity in children in England and Scotland in 1974, 1984, and 1994

	No (%) of obese children				
	1974	1984	1994	1974 to 1984	1984 to 1994
English boys	58/4139 (1.4)	18/3259 (0.6)	52/3016 (1.7)	–0.8 (–1.2 to –0.4)	1.2 (0.6 to 1.7)
English girls	59/3871 (1.5)	38/3008 (1.3)	75/2858 (2.6)	–0.3 (–0.8 to 0.3)	1.4 (0.6 to 2.1)
Scottish boys	20/1172 (1.7)	19/2141 (0.9)	44/2072 (2.1)	–0.8 (–1.7 to 0.0)	1.2 (0.5 to 2.0)
Scottish girls	20/1078 (1.9)	38/2105 (1.8)	66/2036 (3.2)	–0.1 (–1.0 to 0.9)	1.4 (0.5 to 2.4)

Discussion

Although the prevalence of overweight and obesity in children has been reported previously in the United Kingdom and elsewhere, the results have always been difficult to interpret as they have relied on the 85th and 95th centiles of reference or study based values or a preset excess level of relative weight.[2 6 7] We have on several occasions reported increases in weight for height in children,[4–8] but until now we have not reported prevalence of obesity. Previously this information would have shed little light on the magnitude of the problem as different studies have used different definitions. The recently agreed cut-off points for overweight and obesity in children have given us the opportunity to provide baseline information and, uniquely, trends in overweight and obesity over a 20 year period.[3] The data from the national study of health and growth for 1990 formed the greater part of the data for children aged 5 to 11 years in the United Kingdom dataset, which contributed to the international standards.[9] Our study gives an appropriate base against which estimates from other studies in the United Kingdom and elsewhere can be compared with the same methodology.

Because of the reduced power of an analysis of a dichotomous variable compared with an analysis of the underlying continuous measure, the results do not show a clear picture of the age group differences in the increase in prevalence. An analysis of a weight for height index, however, showed a clear trend of a greater

What is already known on this topic

Mean weight for height increased in children in the United Kingdom from 1984 to 1994

Previously there were no agreed definitions of overweight and obesity that could be used to quantify the increase

Internationally agreed definitions have recently been published

What this study adds

Prevalence of overweight was 5-6% in both 1974 and 1984 in white boys and 9-10% in white girls, and it rose to 9-10% in boys in 1994, to over 13% in English girls, and to nearly 16% in Scottish girls

The prevalence of obesity in children is low, but it has increased substantially since 1984

Overweight in children is a serious public health problem in Britain

increase in older age groups from 1972 to 1994, which was particularly noticeable in Scottish children.[8]

Although debate over the cut-off points will continue, this should not detract from the urgency of tackling the problem of obesity. Our data indicate that overweight and obesity on the basis of body mass index have increased noticeably since 1984. Most studies have shown poor prediction of adult obesity from child assessments but a consistent positive correlation between child and adult overweight and obesity.[10] Rising trends in children will almost certainly be represented in later trends in adult overweight and obesity and probably in an increase in associated adult morbidity.

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How women with a family history of breast cancer and their general practitioners act on genetic advice in general practice: prospective longitudinal study

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The most important risk factor for breast cancer, besides advanced age, is a family history of breast cancer. General practitioners play an important role in identifying women who are at increased risk of breast cancer,[1] especially women who are too young to be eligible for population screening. In a prospective longitudinal study with three years of follow up, we studied women's compliance with advice provided by their general practitioner that was based on assessment of genetic risk and whether this genetic advice was in line with the advice of a clinical geneticist.

Participants, methods, and results

The women were patients at a primary healthcare centre linked to a university in the Netherlands. The centre, whose six general practitioners serve 11 500 patients, uses only computerised medical records. This system allows records of patients with specific risk factors and diseases to be marked and selected. A total of 2000 of the 2220 patients aged between 25 and 50 consulted their general practitioner between April 1994 and July 1995, and of these 81 sought advice on their familial risk of breast cancer.[2] These women were subsequently interviewed twice. In summer 1995, 67 of the 81 women were interviewed about their family history of breast cancer. A clinical geneticist reviewed each family history, calculated a relative risk of breast cancer for each woman (from <2, representing a normal or slightly increased risk, to ≥ 3, a highly increased risk) and gave genetic advice to the general practitioner (table). The genetic advice was in line with Dutch national guidelines as developed in 1999-2000. In autumn 1995 the general practitioners discussed this advice and the risk assessment with each woman in a single consultation (n = 63; four women had moved). In autumn 1998, 42 of the women were asked about their reasons for their compliance (or non-compliance) with the genetic advice and with advice on breast self examination. Data on the genetic advice given by the general practitioner to each patient, the surveillance given by the general practitioner (annual palpation by the general practitioner and annual mammography), and patients' visits to family cancer clinics were extracted from the medical records (n = 63). The medical ethics committee of the Leiden University Medical Centre approved the study protocol.

The clinical geneticist's advice was not followed by the general practitioner in 30% of the individual consultations; the general practitioners advised surveillance more frequently than did the geneticist (table).

Genetic advice given by clinical geneticist to general practitioner, based on relative risk of breast cancer calculated for each woman, and advice given by general practitioner to patient. Values are numbers of women

	Relative risk and genetic advice of clinical geneticist			
Genetic advice given by general practitioner*	**<2; reassurance**	**2-3; surveillance†**	**≥3; referral to family cancer clinic**	**Total**
Reassurance	19	0	0	19
Surveillance†	8	17	11	36
Referral to a family cancer clinic	0	0	8	8
Total	27	17	19	63

*All women received advice on breast self examination.
†Surveillance=annual palpation by the general practitioner and annual mammography.