Sex differences in weight in infancy and the British 1990 national growth standards

Charlotte M Wright, Sally S Corbett, Robert F Drewett

Abstract

***Objectives*—To determine if there is a sex difference in infancy in the new British national standards for weight (based on data from 1990).**

***Design*—Weight data in a birth cohort were compared with the 1990 standards and Tanner and Whitehouse (1966) standards up to age 12 months.**

***Setting*—Newcastle upon Tyne.**

***Subjects*—3418 term infants.**

***Results*—Our cohort showed a mean difference in standard deviation scores of 0.42 between boys and girls (P<0.0001) when compared with the 1990 standards. Two and a half times as many girls as boys had weights below the 3rd centile during the first year, with an equivalent excess of boys above the 97th centile (P<0.0001). Similar results were found with Tanner and Whitehouse standards.**

***Conclusions*—These differences could result in substantial sex bias in the identification of poor growth in early childhood. The standards need modification.**

Introduction

Growth standards for the United Kingdom, based on data from 1990,[1] represent a major advance in the process of weight monitoring in Britain, as older standards show major discrepancies with contemporary patterns of weight gain.[2] However, an unexpected problem with the weight standards in infancy has emerged. The problem was uncovered by the observation that there were nearly three times as many girls as boys in a proposed study population of children with early failure to thrive; in population based studies, failure to thrive has previously shown an even sex divide.[3] This led us to explore the possibility that the new growth standards were inadequately standardised for sex.

Method

We hold a longitudinal dataset of weights collected routinely between birth and 24 months from a birth cohort of 3418 term infants born between 1987 and 1988.[4] The weights nearest to 6 weeks and 3, 9, and 12 months were identified and transformed into standard deviation scores in comparison with the 1990 standards[1] as well as with the previous national standard,[5] by using the Castlemead Growth Package,[6] and means for boys and for girls were compared.

The crude weight data were also grouped in monthly age bands up to 15 months. The median values for this monthly grouping were compared directly with the 1990 curves for median weight.

Table 1—*Mean weight standard deviation scores for weight of children in Newcastle compared with 1990 national growth standard*

	Boys		Girls			
Age band	No	SD score (95% confidence interval)	No	SD score (95% confidence interval)	P value (*t* test)	Mean difference
Birth	1591	−0.15 (−0.18 to −0.12)	1580	−0.09 (−0.12 to −0.06)	0.16	−0.06
6 Weeks	1405	−0.08 (−0.11 to −0.05)	1418	−0.36 (−0.39 to −0.33)	<0.0001	0.28
3 Months	1361	−0.01 (−0.04 to 0.02)	1368	−0.42 (−0.45 to −0.39)	<0.0001	0.41
6 Months	1331	0.06 (0.03 to 0.09)	1337	−0.36 (−0.39 to −0.33)	<0.0001	0.42
9 Months	1062	0.11 (0.08 to 0.14)	1046	−0.32 (−0.35 to −0.29)	<0.0001	0.43
12 Months	1084	0.14 (0.11 to 0.17)	1113	−0.26 (−0.29 to −0.23)	<0.0001	0.40

*Only one weight in each age band per child in birth cohort.

Table 2—*Percentage of children in Newcastle below 3rd and above 97th centile of 1990 national growth standard*

	<3rd Centile			>97th Centile			
Age band*	Boys	Girls	Female: male ratio	Boys	Girls	Female: male ratio	P value (χ^2 test for trend
Birth	5.9	6.8	1.15	3.30	3.20	0.97	0.69
6 Weeks	4.3	6.6	1.53	2.00	1.00	0.50	<0.0001
3 Months	3.5	7.3	2.09	2.20	1.00	0.45	<0.0001
6 Months	2.5	6.8	2.72	2.90	1.20	0.41	<0.0001
9 Months	2.9	7.0	2.41	4.40	1.30	0.30	<0.0001
12 Months	2.5	6.8	2.72	4.70	2.00	0.43	<0.0001

*Only one weight in each age band per child in birth cohort.

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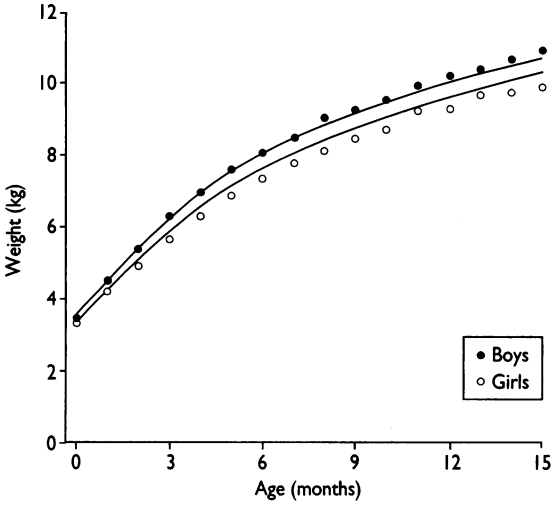

Fig 1—*Median weights for infants in Newcastle upon Tyne, birth to 15 months (points), compared with median curves of 1990 national data (continuous lines)*

Results

The mean standard deviation score for weight of boys was 0.42 higher than that for girls after the age of 3 months (table 1), and twice as many girls as boys fell below the 3rd weight centile during the first year. There was an equivalent excess of boys above the 97th centile (table 2).

The boys' weight curves rose slightly above the British median while those for girls fell substantially below the median (fig 1). Comparing the means for boys and girls in Newcastle with the Tanner and Whitehouse standards showed mean differences in standard deviation scores of 0.34-0.37 after the age of 3 months.

Discussion

The differences observed in this study are not trivial, being equivalent to over half an intercentile space and resulting in major imbalances in the number of boys and girls who fall outside the normal range for weight. Although the new standards present problems, these were present to a similar order in the standard they have replaced.

Although it is puzzling to find that children in Newcastle show such striking discrepancies with the two growth standards, it should be remembered that these standards are based, in infancy, on small numbers of children (160 children for the Tanner and Whitehouse standard; 252 for the 1990 standard). The Newcastle dataset comprises 3418 children, with 60-90% of the birth cohort represented in each 3 month age band. This observation thus cannot be easily explained by sampling error or bias. A smaller cohort of children studied in Glasgow showed similar differences.[7] These findings imply that there is either a substantial and previously unrecognised regional variation or a more general problem with the standards.

It is a matter of urgency to discover whether similar sex differences are observable in southern Britain. If they are, the current weight curves are not representative and require modification. In the meantime, researchers using weight centiles or standard deviation scores as selection criteria should investigate the possibility of sex differences in their study populations so that they avoid inadvertently recruiting a study sample with a major sex imbalance.

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Cohort study of peanut and tree nut sensitisation by age of 4 years

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Abstract

***Objective*—To determine the prevalence of sensitisation to peanuts and tree nuts in all children born during one year in one geographical area.**

***Design*—Birth cohort study with structured review at ages 1, 2, and 4 years.**

***Setting*—All children born on the Isle of Wight between January 1989 and February 1990.**

***Subjects*—Of 1456 children originally included, 1218 were reviewed at age 4 years. Of these, 981 had skin prick tests.**

***Main outcome measures*—Positive skin test results, clinical atopic disease, and risk factors for the development of atopy.**

***Results*—15 of 1218 (1.2%) children were sensitised to peanuts or tree nuts (13 to peanuts). Six had had allergic reactions to peanuts (0.5% of the population), one to hazelnuts, and one to cashew nuts; three had had anaphylactic reactions. Seven children had positive skin test results or detectable IgE to peanuts without clinical symptoms. Two children who reacted to peanut in infancy had lost their sensitivity by 4 years. Family history of atopy, allergy to egg (odds ratio 9.9, 95% confidence interval 2.1 to 47.9, and eczema (7.3, 2.1 to 26.1) were important predictors for peanut allergy.**

***Conclusions*—IgE mediated allergy to peanuts is common in early childhood. In many the allergy persists but a minority may develop tolerance.**

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Introduction

Peanuts cause a potentially serious form of food allergy,[1] and some people with no physical reaction to peanuts have been found to have specific IgE antibody in the serum on radioallergosorbent testing (RAST) or a positive skin prick test result. Sensitisation to peanuts may occur when very young and is usually life long.[2,3] Although parents are advised that young children should not eat whole nuts, peanut butter and nuts mixed in food are allowed. There is concern about hidden nuts in processed foods and improved labelling is