Infant feeding and overweight in two Oxfordshire towns

MARGARET THOROGOOD, B.SC, ROSEMARY CLARK, SRN, HV, P. HARKER, MFCM, and J. I. MANN, DM, PH.D

SUMMARY. In a study of feeding and growth in the first year of life in two Oxfordshire market towns, the frequency of overweight babies was the same for the 'intervention' town (where a research health visitor gave intensive advice to mothers on feeding) as for the control town. Eighteen per cent of bottle-fed infants and three per cent of those breast fed were overweight at one year. It seems that an increase in the number of health visitors does not affect the frequency of overweight infants, but it may be that a greater emphasis on breast feeding might reduce the frequency.

Introduction

IN recent years there has been concern about the apparent increase in infantile obesity. This condition is known to increase morbidity, particularly chest infections (Tracey *et al.*, 1971), and it has also been suggested that obesity in infancy predisposes to obesity in later life (Eid, 1970) but this has not been confirmed (Poskitt and Cole, 1977).

There is uncertainty as to which, if any, feeding practices contribute to infant obesity, although both the early introduction of spoon-fed solids and the over-strong mixing of bottle feeds have been implicated (DHSS, 1974).

Margaret Thorogood, Research Assistant, Department of Social and Community Medicine, University of Oxford; Rosemary Clark, Research Health Visitor, Department of Social and Community Medicine, University of Oxford; P. Harker, Community Physician, Oxfordshire Area Health Authority; J. I. Mann, University Lecturer, Department of Social and Community Medicine, University of Oxford.

© *Journal of the Royal College of General Practitioners*, 1979, **29**, 427-430.

It has been suggested that the occurrence of infantile obesity might be reduced if health visitors had enough time to supervise feeding patterns more closely than at present, although there is no information available to show whether this practice would be effective.

Aims

Accordingly, we decided to undertake a study: first, to find out whether close supervision by a health visitor would reduce the prevalence of infant obesity, and secondly, to determine which, if any, feeding practices were predictive of obesity in the first year of life.

Method

Two small local market towns, of similar size and social class structure, were chosen and a small pilot study was carried out which consisted of weighing and measuring babies attending child health clinics. Similar weight-for-length ratios were found in the two towns.

A record of every birth to a mother resident in the two towns between 1 November 1975 and 4 September 1976 was obtained from the Oxfordshire Area Health Authority, with details of birth weight, place of birth, maternal parity, father's occupation, mother's family doctor, and address. The mother's hospital notes were scrutinized and details of the delivery, mother's antenatal feeding intention, and method of infant feeding on discharge were noted.

One town (A) was chosen as the 'intervention' town and the other (B) was used as the control. An extra full-time health visitor (R.C.) was appointed to town A for the duration of the study. She visited all babies in the study at the age of two weeks and subsequently interviewed their mothers in the clinic at one month, two months, three months, four months, six months, eight months, and one year. This programme of supervision was additional to the routine visits carried out by the usual family health visitors.

At each clinic visit the baby was weighed and a neonatometer used to measure the baby's length. It was

found, however, that at the age of one year the majority of babies were too long to fit into the neonatometer and these infants were therefore measured with a tape. Previous work had shown a correlation between obesity index and mid-arm circumference (Shukla *et al.*, 1972), so this was also measured with a tape.

A questionnaire was also completed at each clinic visit by the health visitor. Mothers were asked about the method of feeding, exactly how they made up bottles (if they used them), and whether they gave their babies additional food. The later questionnaires (at three, four, and six months) included a number of items about spoon-fed solids, while the eight-month and one-year questionnaires were concerned only with how often the baby ate certain kinds of food.

Mothers who failed to attend the clinic at the right times were followed up by home visits.

In addition to asking questions about feeding, the health visitor also gave advice on the best way to feed the baby. She followed the recommendations of the DHSS Working Party (1974) with particular emphasis on making up bottles correctly and on delaying the introduction of solid foods until the baby was at least four months old. She also encouraged mothers to use non-cereal foods. At two weeks she gave each mother a specially prepared leaflet, giving advice on feeding and in particular emphasizing the importance of not introducing solid foods too early, and a simplified normal weight gain chart. Weights were plotted on these charts throughout the year so that both the health visitor and mother could see at a glance when a baby was beginning to deviate from the expected weight gain.

In the control town no change was made in the usual practices, except that an attempt was made by the health visitors to weigh and measure the babies as described above at one month, two months, four months, six months, eight months, and one year. During the course of the study it became clear that the health visitors could not cope with the additional task and as a result the research health visitor went to the control town two afternoons a week to weigh and measure the babies. Consequently not all the babies were weighed at each age, but a special effort was made to weigh and measure all the babies at 12 months.

Several different sets of scales were used for weighing, but they were all checked against each other at the start of the study. Two sets of scales (one in each town) were portable so that babies could be weighed on home visits.

An obesity index was calculated using the method developed by Shukla and colleagues (1972), that is (actual weight/actual height)/(50th centile weight for age/50th centile height for age) x 100. Using this index, a child with a value above 110 is considered overweight and one with a value over 120 obese. Poskitt and colleagues (1977) felt that this index tended to give too high a value to babies who were tall for their age and they suggested a different index of obesity [(actual weight/50th centile weight at age when child's height is on 50th centile) x 100]. We recalculated our indices using this method, but found no important difference, so the Shukla index was used in all subsequent analyses.

Results

Table 1. Total number of babies born, with numbers entered in study and reasons for exclusion in the two towns.

	Town A	Town B
Total number of babies born	161	247
Reasons for exclusion:		
Moved away	25	48
Medical reasons*	16	21
Refusal/failure to contact	4	3
Total excluded from study	45 *(30%)*	72 *(29%)*
Total included in study	116	175

*Includes those weighing less than 2.5 kg (5.5 lb) at birth, those with major congenital abnormalities, and serious illness in the infant or the mother.

Table 1 shows the numbers of babies born in each town during the period of the study, with reasons for exclusion and numbers entered in the study. Babies with a birth weight of less than 2·5 kg (5·5 lbs), those with major congenital abnormalities, those who had spent more than 14 days in the special care baby unit, or who suffered serious illness, were excluded. Serious maternal illness also led to exclusion of the baby from the study.

Table 2. Mean and range of weights and Shukla indices for both towns.

	Town A		Town B	
	Mean	*Range*	*Mean*	*Range*
Birth weight (kg)	3.43	2.50 to 5.31	3.42	2.50 to 4.48
1 year weight (kg)	10.09	8.25 to 13.30	10.08	7.60 to 15.65
Shukla index at 4 months	102	76 to 129	98	73 to 120
Shukla index at 8 months	101	85 to 135	97	79 to 122
Shukla index at 1 year	100	84 to 124	98	75 to 150

Mean birth weights and one-year weights in both towns, and also the mean Shukla indices at four months, eight months, and one year, are shown in Table 2. There were no significant differences between the two towns with respect to any of these values. In town A there was one child who was obese at one year (one per cent) while in town B there were four such children (two per cent). The mean mid-arm circumference at one year in town A was 15·5 cm (6·11 ins) and in town B, 15·3 cm (6·03 ins). Mid-arm circumference was found to be positively correlated with the obesity index, r = 0·65.

Table 3. Intention to breast feed and duration of breast feeding by father's occupation (town A). Figures are given as percentages. N = 116.

Father's occupation	Intention to breast feed	Breast feeding at: Discharge	2 weeks	1 month	2 months	3 months	4 months	6 months
Non-manual	*70*	*70*	*59*	*51*	*35*	*27*	*26*	*10*
Manual	*50*	*50*	*38*	*34*	*32*	*25*	*23*	*13*
Total	58	58	46	41	33	26	24	11

Mothers in town B were not interviewed at all so there is no information about feeding after discharge from hospital. At the time of discharge 58 per cent of mothers in town A and 62 per cent of mothers in town B were breast feeding. Eighty-nine per cent of the mothers who had said antenatally that they intended to breast feed were breast feeding at discharge, compared with 12 per cent of those who had intended to bottle feed, and 50 per cent of those who had been undecided. There was a significant difference with father's occupation in the percentage intending to breast feed ($p<0{\cdot}01$), although by two months this difference had disappeared (Table 3).

Table 4. Proportion of overweight babies at age of one year by the duration of breast feeding.

Duration of breast feeding	Number (percentage) of overweight babies aged 1 year (Shukla index>110)	Total
Not breast feeding at discharge	9 *(18)*	50
Breast fed for 1 month or less	0 *(0)*	27
Breast fed for 1 to 2 months	1 *(11)*	9
Breast fed for 3 to 4 months	0 *(0)*	2
Breast fed for 5 to 6 months	1 *(6)*	16
Breast fed for 6 months or more	0 *(0)*	12
Total breast feeding	2 *(3)*	66

Table 4 shows the percentage of overweight or obese babies at the age of one year by the length of time for which the babies were breast fed. It is striking that nine of these 11 babies were already being bottle fed on discharge from hospital. In other words, 18 per cent of the babies who were bottle fed at discharge, compared with three per cent of those who were breast fed at discharge, were overweight at one year ($p<0{\cdot}02$). There was no relationship between the Shukla index at one year and the age of starting solid foods. Fifty per cent of the babies were being given spoon-fed solids by the age of 12 weeks, 98 per cent by the age of 18 weeks, and all by 22 weeks.

Table 5 shows the mothers' methods of making up the bottle feeds at two weeks and four months. A correct method was defined as following exactly the manufacturers' instructions. There was no relationship between social class and the way that the bottles were made up. Eight of the nine overweight babies who had been bottle fed at discharge had bottled milk which was made up either according to the manufacturers' instructions or more dilute. The ninth baby had milk made up correctly except that at one month the mother had started to put cereal into the bottle but, following advice from the health visitor, had stopped doing this by the time of the two-month interview.

Table 5. Methods of making up bottle feeds at two weeks and four months. Percentages are given in brackets.

	Two weeks	*Four months*
Correctly made	95 *(82)*	80 *(69)*
Too dilute	11 *(10)*	14 *(12)*
Too strong	5 *(4)*	1 *(1)*
Correctly made but cereal added	1 *(1)*	7 *(6)*
Too dilute but cereal added	2 *(2)*	7 *(6)*
Too strong and cereal added	1 *(1)*	1 *(1)*

Discussion

The fact that around 60 per cent of the babies in this study were breast fed initially confirms the findings of other workers (Sloper *et al.*, 1977; White, 1978) that breast feeding is now on the increase, and provides an encouraging contrast with the report in 1974 by the DHSS Working Party on Child Nutrition.

Eighteen per cent of these babies who were bottle fed at discharge, compared with three per cent of those who were breast fed, were overweight at one year. On the other hand, there was no relationship between the age of introduction of solids and the one-year Shukla index. This agrees with the findings of Davies and colleagues (1977) that the early introduction of solid food does not affect growth in the first three months of life. In our study very few (seven per cent) of the mothers introduced solids before eight weeks and the results may have been different had more mothers introduced solids at an earlier age.

Poskitt and Cole (1977 and 1978), in a study of the children first studied by Shukla, have recently reported

that overweight in infancy is not correlated with overweight at five years and, further, that overweight at five years correlates best with overweight in the mother. However, in comparison with our study, fewer of the infants they studied were breast fed and the age of weaning was much earlier. Four times as many (40 per cent) of them were found to be overweight at one year, compared with the infants in our study. This might be because only a small percentage (28 per cent) of them were breast fed at all, and only 14 per cent for more than four weeks.

The experimental increase in the number of health visitors in town A appears to have had no effect on the number of overweight children. But no attempt was made in this study to influence mothers antenatally and it may be that, since breast feeding appears to protect against overweight, greater emphasis should be placed by health visitors on the antenatal encouragement of mothers to breast feed.

References

Davies, D. P., Gray, O. P., Elwood, P. C., Hopkinson, C. & Smith, S. (1977). Effects of solid foods on growth of bottle-fed infants in the first three months of life. *British Medical Journal,* **2**, 7-8.

Department of Health and Social Security (1974). *Present Day Practice in Infant Feeding.* London: HMSO.

Eid, E. E. (1970). Follow-up study of physical growth of children who had excessive weight gain in the first six months of life. *British Medical Journal,* **2**, 74-76.

Poskitt, E. M. E. & Cole, T. J. (1977). Do fat babies stay fat? *British Medical Journal,* **1**, 7-9.

Poskitt, E. M. E. & Cole, T. J. (1978). Nature, nurture and childhood overweight. *British Medical Journal,* **1**, 603-605.

Shukla, A., Forsyth, H. A., Anderson, C. M. & Marwah, S. M. (1972). Infantile overnutrition in the first year of life: a field study in Dudley, Worcestershire. *British Medical Journal,* **4**, 507-515.

Sloper, K. S., Elsden, E. & Baum, J. D. (1977). Increasing breast feeding in the community. *Archives of Disease in Childhood,* **52**, 700-702.

Tracey, V. V., De, N. C. & Harper, J. R. (1971). Obesity and respiratory infection in infants and young children. *British Medical Journal,* **1**, 16-18.

White, M. (1978). Infant feeding. *Nursing Mirror,* **46**, 42-44.

Will your general practitioner be able to help?

Doctors have no magic cures for sleep problems. But they may be able to offer help by:

1. Giving you some sleeping pills.

2. Treating an illness which is keeping you awake. This may include treatment for depression (the medical condition which goes by this name—not straightforward misery, which doctors cannot do much about).

3. Helping you to work out what is causing the sleep problem, or whether there really is a problem at all. This may include discussing causes of sleep disturbance and things that might help you sleep. A common difficulty with people who have persistent sleep problems is that they overestimate their sleeplessness. Laboratory tests, for example, have shown that people who believe they have chronic insomnia (persistent lack of sleep) may be sleeping for only 40 minutes or so less than 'normal' sleepers. They may also blame a variety of daytime symptoms—tiredness, headaches, and so on—on their lack of sleep when it is uncertain which started first. Of course, you may be able to get to the bottom of your sleep problem by talking it out with a friend or relative instead of your general practitioner.

About three quarters of our group of members had seen their general practitioners about their sleep problems. About one in five said the doctor had discussed sleep difficulties and treatment with them, and their own particular problems; one in eight had found the doctor unsympathetic. Only a few doctors had made positive suggestions about ways of getting to sleep. The majority simply handed out prescriptions for sleeping pills—though this, to be fair, was all that a third of our members had wanted.

So, generally, general practitioners did not make a great deal of effort to get at the *causes* of the sleep problems members took to them.

Our members' doctors had generally been very liberal with—but uninformative about—the sleeping pills they prescribed:

1. Nine out of 10 members had been given a prescription (a few, for tranquillizers rather than sleeping pills).

2. Very few doctors gave warnings about the side effects of the pills they prescribed. Sleeping pills may make you drowsy the next morning—dangerous if you operate machinery or drive. They can react badly if taken with some drugs. And they must not be mixed with alcohol: this combination can even kill you.

3. It was generally very easy to get more pills without seeing the doctor again—three out of four members found they could do this. Only one in 10 said that the doctor had given them a small number of tablets originally, and had stressed that they should be used only occasionally.

The one bright spot was that most had got their patients off barbiturate sleeping pills—only 27 were taking them compared with 99 who had been prescribed them when they first had a sleep problem.

Reference

Which? July 1978. p. 379-381.