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Maternal feeding practices and feeding behaviors of Australian children aged 12 to 36 months.

Abstract

Objectives

To explore parents' perceptions of the eating behaviors and related feeding practices of their young children.

Methods

10 Mothers (N=740) of children aged 12 to 36 months and born in South Australia were randomly selected by birth date in four 6-month age bands from a centralized statewide database and invited to complete a postal questionnaire.

Results

Valid completed questionnaires were returned for 374 children (51% response rate; 54% female). Although mothers generally reported being confident and happy in feeding their children, 23% often worried that they gave their child the right amount of food. Based on a checklist of 36 specified items, 15% of children consumed no vegetables in the previous 24 hours, 11% no fruit and for a further 8% juice was the only fruit. Of 12 specified high fat/sugar foods and drinks, 11% of children consumed none, 20% one, 26% two, and 43% three or more. Six of eight child-feeding practices that promote healthy eating behaviors were undertaken by 75% parents 'often' or 'all of the time'. However, 8 of 11 practices
20 that do not promote healthy eating were undertaken by a third of mothers at least 'sometimes'.

Conclusions

In this representative sample, dietary quality issues emerge early and inappropriate feeding practices are prevalent thus identifying the need for very early interventions that promote healthy food preferences and positive feeding practices. Such programs should focus not just on the 'what', but also the 'how' of early feeding, including the feeding relationship and processes appropriate to developmental stage.

Key words: Maternal feeding practices, infants, obesity

Introduction

30 Primary prevention of childhood overweight is a high priority because 20-25% of 2-8 year olds in Australia are currently overweight (1,2) with similar prevalences in other developed countries.(3) These children experience short term adverse outcomes and are at increased risk of becoming overweight adults with attendant increased risk of morbidity and mortality.(4-6) A focus on very young and preschool children is warranted for several reasons. Rapid early weight gain before two years of age is associated with a two to three fold increase in risk of later overweight (7, 8) and most excess weight gained before puberty is gained by the age of 5 years (91% girls, 70% boys).(9) Food preferences and eating patterns are well established by the age of five and lay the foundation for adult eating habits.(10) Data on the intake of children under two years
40 suggest that poor eating patterns emerge early, particularly with regard to fruit and vegetable intake and consumption of energy dense, nutrient poor foods.(11-13)

Parent early feeding practices determine infant exposure to food (type -both healthy and unhealthy, amount, frequency) and include parental responses to normal infant behavior (eg refusal of new foods) and control over intake (restriction, monitoring and pressure).(14) Children's early exposure to foods is important in the development of taste and food preferences.(15,16) Neophobia (rejection of new foods) is a normal adaptive response and newborns innately prefer sweet and reject sour and bitter tastes.(10) However, these genetic predispositions are readily modified by experience,
50 particularly familiarity, which is directly determined by access and availability;(10, 16) in short, parent feeding practices. Repeated neutral exposure (≥ 10 times) within a short

time frame enhances acceptance of new foods such as fruit and vegetables.(17)

Importantly, preferences for high fat/high sugar (non-core) foods are also enhanced by frequent exposure.(17, 18) Skinner et al. (19) demonstrated that exposure to fruit and vegetables before two years of age was predictive of variety of intake at school age, and that this effect was stable between two and eight years of age.(20) Overall these studies suggest that early food exposure, even in amounts that may not be nutritionally important, may contribute to the development of food preferences both in early and later childhood.

60 Infants have an innate capacity to self-regulate intake in response to internal cues of hunger and satiety (21) which is easily overridden by social and emotional cues from adults. Johnson & Birch demonstrated that the level of parental control of child feeding was inversely associated with the child's self regulation of intake and children who were less able to self-regulate had greater body fat stores.(22) Thus, promotion of parent early feeding practices that foster healthy food acceptance and preferences and preserve capacity for self-regulation of intake, offers a plausible, but largely untested approach to primary prevention of childhood and later obesity.(23, 24)

70 Current feeding practices stem from culture, tradition and family experience but have not adapted to our current environment of food excess.(15) New approaches that reflect the contemporary feeding environment and determinants of child eating behavior are required. A recent review provided detailed data on parent early feeding practices and beliefs.(25) The aim of this cross-sectional study was to explore parents' perceptions of

the eating behaviors and related feeding practices of children aged 12 to 36 months in South Australia by means of a self-administered questionnaire.

Methods

Ethics approval was obtained from the Flinders University Social and Behavioural Research Ethics Committee and the Women's & Children's Hospital Research Ethics
80 Committee.

Study participants

Based on statistics provided by the Pregnancy Outcome Unit in South Australia, the population size of children aged 12 to 36 months in 2005 was estimated to be around 35,000.(26, 27) The South Australian government-funded statewide child health promotion service (CHS) maintained a centralized statewide database that registered >95% of newborns. A random sample of 740 parents was selected according to the age of their child on August 1st 2005, with 185 children in each 6-month age range from 1 to 2.9 years. Assuming a response rate of 50%, this sample size would provide 95% confidence
90 of a 5% error range.

Questionnaire

Questionnaire design was based on the questionnaire used in our previous study on eating behaviors of infants born pre-term (28) and further informed by six focus groups with mothers of children in the study age range. It was reviewed by experienced practitioners

and piloted with nine parents of children in the study age range but not selected for the study.

The questionnaire comprised 51 questions and took about fifteen minutes to complete.

100 Most questions were closed and used a four or five point Likert scale or a tick-box specified list. Fourteen questions requested child information such as sex, age, birth weight and feeding history. Questions addressed the amount of food the child ate and mother's concern regarding their child's eating and growth (n=5); the variety of foods and drinks consumed and restrictions placed on intake (n=5); the child's eating behavior and environment (n=9) and sources of information and advice (n=4). The percent of children reported to consume any amount over the previous 24 hours of 36 specified foods (Table 1) based on 'core' and 'non-core' (energy dense, low nutrient) foods as defined by the Australian Guide to Health Eating (AGHE) was determined.(29) Standard demographics were collected of the mother, her self-reported weight status, and whether
110 she was a first-time mother. Self-reported child growth data were not collected due to uncertain validity.

The questionnaire, introductory letter and a reply paid envelope, pre-addressed to Flinders University, were mailed to the latest address on the database. A first reminder (n=475) and a second with replacement questionnaire (n=362) were sent at 4 and 8 weeks after the initial mail out.

Statistical Analysis

Data are presented as frequencies or means and standard deviations and were analysed using SPSS[®] for Windows 15.0 (SPSS Inc. Chicago). Postcode was used to compare socio-economic status between responders and non-responders using the Socio-Economic Indexes for Areas 2001 package (SEIFA).(30) SEIFA-Index of Disadvantage was used to classify responders into socio-economic status (SES) quartiles where responders in the first quartile represent those who were most disadvantaged and the fourth quartile represent those who were least disadvantaged. Positive and negative feeding practices scores were created from the responses to the 8 and 11 questions in Tables 5 and 6 respectively. Positive feeding practices that were practised ‘all the time’ were assigned five points, ‘very often’ four points, ‘often’ three points, ‘sometimes’ two points and ‘hardly ever’ one point. Negative feeding practices were reverse scored; ‘all the time’ was assigned one point, ‘very often’ two points, and so forth. Thus higher scores suggest more positive behavior with maximum possible being 40 (positive) and 55 (negative). ANOVA and Chi-square tests were used to compare the differences between continuous variables (feeding scores) or categorical variables (consumed a food yesterday - yes/no) respectively and SES or age categories.

Results

Characteristics of respondents and their child

Valid questionnaires were returned for 374 children (51% response rate; 54% female) with 101, 98, 88 and 87 children from age groups 12 to <18 months, 18 to <24 months, 24 to <30 months and 30 to 36 months respectively. If excluding the 95 questionnaires

that were returned undelivered, the overall response rate would be 58% (i.e. 374 out of 645). All questionnaires were completed by the mother of the child except two (father and grandmother). Most children (87%) were born full term with self-reported mean birth weight of 3.40 ± 0.55 kg.

Characteristics of respondents are given in Table 1. In terms of gross family income, language spoken at home and self reported weight status the respondents were similar to the general population according to the data from the 2001 census (31) and 2001 National Health Survey.(32) Based on the Socio-Economics Indexes for Areas 2001 (30) there was
150 no difference between responders and the reference values for the state but non-responders had significantly lower SES than overall for the state ($p < 0.05$).

Child growth and health

Eight percent and 23% of respondents indicated that they worried sometimes or more often about their child being currently, or becoming overweight respectively. In contrast 22% and 17% similarly worried that their child was currently or would become underweight. Most (66%) respondents reported no medical or behavioral problems requiring consultation with a doctor or other health professional. Only 6% and 12% of the children were taking medications and vitamins and/or herbal supplements
160 respectively at the time of survey.

Satisfaction with feeding

Most respondents (70%) reported their child's appetite as 'very good/good', 25% as 'average' and 5% as 'poor/very poor'. Relative to other children, 17% of mothers considered their child's appetite to be 'more than average' and 10% 'below average'. Although 23% of mothers worried 'often/very often/all the time' whether or not they gave their child the right amount of food, few were similarly concerned that their child had a small appetite (17%) or a large appetite (6%). Eighty-five percent of respondents 'strongly agreed/agreed' that their child 'eats a good variety of food' but 33% and 24% worried 'often/very often or all of the time' whether or not they offered, and their child ate enough variety, respectively. Sixty-three percent of parents agreed their child 'was easy to feed', while 20% agreed their child 'was a fussy eater'. For 83% of mothers the feeding environment was often or more frequently 'pleasant and relaxed' and only 12% and 14% reported it as often a struggle or frustrating respectively.

Foods consumed

Table 2 shows the frequency of consumption of the specified foods and beverages at least once in the previous 24 hours. On the day of survey, 11% of children did not consume any fruit (cooked, raw or 100% juice) and a further 8% only had fruit juice. There was no significant difference in the percentage of children consuming fruit (including fruit juice) between the age groups. Fifteen percent of children did not consume any cooked or raw vegetable (including legumes and non-fried potato). Vegetable consumption varied with age ($\chi^2(3, n=373) = 11.11, p=0.011, \text{Cramer's } V=0.173$) with the youngest age group more likely to have consumed vegetables (92%) than the oldest age group (76%).

Seventy-seven percent of children consumed both fruit (including 100% fruit juice) and vegetables (including non-fried potato) and 2% had neither. Only 11% of children consumed no non-core items and 20%, 26% and 43% ate one, two and three or more respectively. There was a significant difference in the mean number of non-core foods consumed between the age groups: $F(3, 368) = 8.10, p < 0.001$. Mean number of non-core
190 foods was 1.9 in the youngest age group (12 to <18 months) and increased to 3.0 in the oldest age group (30 to 36 months). Thirty-nine percent of children had some kind of sweetened drink (fruit juice drink, cordial or soft drink) and this frequency increased to 66% if fruit juice was also included as a sweetened drink. Consumption of sweetened drinks varied with age (excluding juice $p = 0.025$; including juice $p = 0.004$) with the youngest age group in each case less likely to consume these drinks.

Management of feeding

Forty-six percent and 32% of mothers reported their child had snacks '1 to 2 times per day' or '3 to 4 times per day' respectively, with 21% reporting more than four snacks per
200 day or 'no set number of times, may eat as wishes between meals'. When asked to identify which one beverage (from a specified list) they offered most of the time when their child wanted a drink, 58% specified water, 10% offered a sweet drink (including 100% fruit juice) and 6% offered milk. The remainder gave multiple responses. Table 3 shows the extent to which parents restricted specified foods with the frequency of reported restriction of specific foods decreasing with increasing age. The exception was savory biscuits (eg Shapes) which were only restricted very or more often by 25% of parents and were the least frequently restricted snack food.

The frequency of child refusal of new foods and six specified parent responses is shown
210 in Table 4. A refused new food would ‘sometimes/often’ not be offered again by 29% of
respondents and only 15% indicated they would ‘very often’ or ‘all of the time’ keep
offering the food up to 10 or more times.

General food refusal was reported as ‘very often/often’ by 20% of respondents,
‘sometimes’ by 42% and ‘hardly ever’ by 38%. Forty-five percent of respondents ‘very
often/often’ tried to make their child finish their meals. The frequencies of feeding
practices, including response to general food refusal, categorized as those thought to
promote and support development of healthy child eating behaviors or not, are shown in
Tables 5 and 6 respectively. Twenty-eight percent of mothers report at least sometimes
220 offering food when their child is bored, 39% when the child is crying or upset, 45% when
the child has behaved and 33% when they themselves are busy and do not want to be
disturbed. In response to food refusal by their child, 54% of mothers reported at least
sometimes insisting the food is eaten and similarly 83% at least sometimes offer an
alternate liked food. Food or non-food rewards were offered at least sometimes in
response to food refusal by 43% and 33% of mothers respectively. Only 34% reported
their child hardly ever watched television during meals.

The mean (SD) positive and negative feeding practices scores were 29.0 (4.1) and 47.8
(4.3) respectively suggesting that while negative feeding practices were not frequent,
230 (high score 48/55) parents were less likely to have positive practices (29/40). Sub-group

analysis on these scores according to quartiles of SES indicated no significant difference for the positive practices score ($p=0.33$) but a weakly significant association for the negative practices score ($p=0.032$). Post-hoc analysis, however did not detect any significant differences between groups. Similarly, no significant differences were detected between feeding practices and maternal education, data not shown. As for age, although there was a statistically significant difference in positive feeding practices score according to age with the youngest age group having the lowest score ($p=0.031$), the mean difference of 1.6 points between the highest and lowest scoring groups is not clinically significant. No statistically significant difference in negative feeding practices score was detected ($p=0.122$).

Sources of information and advice

From a specified list parents identified their own knowledge (84%), friends (72%), relatives (71%) and books/magazines/videos (69%) as the four most common sources of child feeding information. Nurses from CHS (48%), general practitioners (37%), mothers' groups (33%), media (28%) and the CHS telephone help line (25%) were also identified. All other options, including the CHS web site, the internet, pediatricians, dietitians and Breastfeeding Association were nominated by less than 20% of respondents. Seventy-nine percent of parents would like more information on recipes and food ideas, 43% on nutritional value of foods and 37% information dealing with food fussiness or refusal.

Discussion

This study is one of few to provide detailed descriptive data on the feeding practices of a large representative sample of mothers of children aged 12-36 months. Overall, mothers reported being generally confident and happy with feeding their children. About two-thirds indicated their child was easy to feed and had a good appetite and less than one in four were worried about current or future over- or underweight. However, the data suggest that, despite mothers' confidence, there is cause for concern with respect to dietary quality, response to both new and general food refusal and the frequency of coercive feeding practices that override infant cues of hunger and satiety and undermine the capacity to self-regulate.(10, 33)

Our data suggest inadequate dietary quality in terms of food exposure as a key determinant of food preference. Exposure to fruit and vegetables was poor in terms of both frequency and variety. In our study, one in ten of the children did not consume fruit (including juice) and by 30-36 months one in four did not eat any vegetables even once in the previous 24 hours. Only three-quarters of children consumed both fruit and vegetables. For almost one in ten children juice was their only source of fruit and for a similar proportion potato was the only vegetable. Fruit juices can be classified as sweetened beverages and may be subject to excess intake due to the sweet taste and because parents see juice as nutritious and fail to limit consumption.(34) One third of children drank fruit juice in the previous 24 hours.

Similarly, the high use of non-core foods is of concern. Nearly 90% of children had at least one non-core food and two thirds had two or more. It should be noted that our assessment of intake of non-core foods was based on response to a specified list of 12 non-core items which was by no means exhaustive (for example, ice cream was not
280 included), thus exposure to non-core foods is likely to be underestimated. Consistent with this high use of non-core foods was the reported low frequency of restriction of these foods. Whilst one-half to two-thirds of mothers 'most of the time' restricted sweet foods (confectionary, soft drink/cordial), a similar restriction to high fat foods was reported by a third or less. These data and the frequency of reported concerns regarding amount and variety suggest that increased access to nutritional information may be helpful, particularly since the three most common sources of feeding advice and information were own knowledge, friends and relatives.

The recent US national cross sectional study (N=3022, 4-24 months) which used a 24-
290 hour recall (35) reports similar issues – poor fruit and vegetable intake and frequent exposure to highly sweetened foods and beverages and fried potato.(13) The Australian Child Asthma Prevention Study (CAPS) (11) (N=429, 16-24 months) also reported high exposure to non-core foods. At least once over the three days of weighed dietary record 57% of children ate fried potato, 60% confectionary, 70% sweetened non-milk beverages (excluding 100% fruit juice), 29% soft drink and 39% snack foods (eg crisps, corn chips). Indeed 99.9% of these toddlers were reported to have eaten at least one of the energy dense, nutrient poor or non-core foods over the three days with a mean per capita intake of 157g representing 27% of total energy intake. Overall these studies suggest that even

before they are two years of age children are experiencing substantial early exposure to
300 foods high in sugar, fat and salt that may be contributing to development of preference
for these foods. In a recent review, Cooke (36) concluded that familiarity was a key
determinant of a child's preference for a food and that '*children like what they know and
eat what they like*'. Given the longitudinal stability of early food preferences (19, 37) and
the association with food acceptance and consumption (10, 15, 16, 36) it is plausible that
delaying introduction of and exposure to these non-core food items for as long as possible
may be an important strategy to promote longer term healthy eating patterns.

Food refusal either of new or familiar foods was common with only around one-third of
mothers reporting this was hardly ever a problem. As discussed above repeated neutral
310 exposure may be required to establish sufficient familiarity to support acceptance of a
new food.(10) Only one quarter of mothers reported often taking this approach. An
important strategy in preserving infant capacity to self regulate is to recognize and trust in
child cues. Satter conceptualizes this trust as '*parent provide, child decide*', where the
parent is responsible for providing safe, nutritious, developmentally appropriate food at
structured predictable meal and snack times and the child decides if and how much to
eat.(33) In practical terms it means that general food refusal should be interpreted as the
child is either not hungry or satiated (33, 38, 39) with the food simply taken away and/or
not offered again until the next usual snack or meal time. Less than one-third of mothers
reported they 'very often' responded to general food refusal in these ways. Only a third of
320 the respondents indicated that they 'very often' interpreted general food refusal as satiety
and half would 'often' offer a liked alternative food. Overall these data suggest that there

is scope to improve maternal response to both neophobia and general food refusal with potential outcomes of increased food acceptance, expanded food preference and support for child self-regulation of intake.

The Satter approach also discourages coercive or emotional feeding, including explicit encouragement and praise, overt control, and provision of alternatives or rewards. Such strategies are probably counterproductive for improving eating patterns.(15, 23, 38)

330 Approximately three-quarters of mothers reported feeding behaviors that could be considered coercive. Half of the respondents reported ‘often’ making their child finish a meal or insisting they eat. Between a half and a third at least sometimes used emotional feeding, such as when the child was upset or bored, and used food or other rewards to encourage eating. Of great concern are the two-thirds of respondents reporting their child watched television whilst eating. The feeding practices commonly reported in our study potentially provide incidental learning that encourages children to ignore their internal hunger and satiety signals and eat to satisfy their own or others emotional or psychosocial cues. In essence, they fail to teach young children to eat only when they are hungry and to stop eating when they are full and in our study, these inappropriate eating behaviors were evident regardless of socio-economic status and the level of maternal education.

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The strengths of this study include an acceptable response rate from a random sample of parents who on key demographic characteristics were similar to the general population. As with all self-reported data, there is the potential for acquiescence bias. However, if there is under-reporting of the indicators of poor dietary quality and the frequency of

coercive behavior, the overall conclusion that there is scope to improve early feeding practices is strengthened. The dietary intake data collected in this study are semi-quantitative and limited to the proportion of children consuming any amount of a food or food group from a specified list at least once in the previous 24 hours; hence we were not able to evaluate either variety or amount consumed. Although the data must be
350 interpreted with caution, they do give a general indication of frequency of use and hence extent of exposure to fruit and vegetables and non-core foods, which are key indicators of dietary quality.(40, 41) Another limitation of our study was that the positive and negative feeding practices scores have not been validated and might not be sensitive enough to detect differences between groups; nevertheless, they still give an indication of the overall trend.

In conclusion, this study suggests that the dietary quality and feeding practices experienced by Australian children 12-36 months of age are not consistent with the development of longer term healthy food preferences and intakes and eating behaviors.
360 High exposure to non-nutritive, energy dense food, limited exposure to fruit and vegetables, use of non-neutral approaches to food refusal, emotional feeding and coercive feeding practices that fail to respond appropriately to infant cues of hunger and satiety are prevalent. Evidence suggests these issues are prevalent in other countries.(13, 42, 43) Importantly these practices have been linked to increased obesity risk.(25) Furthermore, although mothers expressed reasonable confidence and satisfaction regarding feeding, they also reported concerns about the amount and variety of food, appetite, food refusal and fussiness, and weight status.

Overall, our data suggest that poor eating patterns are evident early and that poor early
370 feeding practices are prevalent and have not adapted to our current food environment
where excess food is a major threat to child health.(15, 23) There is a need for very early
interventions that promote healthy food preferences and positive feeding practices.
Programs that provide knowledge to address parents' perceptions and concerns and assist
them to acquire skills and confidence to respond to normal toddler feeding behavior
within an environment of food excess appear to be justified. Such programs should focus
not just on the 'what', but also the 'how' of early feeding, including the feeding
relationship and processes appropriate to developmental stage. Further research to
provide an evidence base for promoting new approaches to early feeding that reflect key
contemporary determinants of child feeding behavior is required.

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