Why are babies weaned early? Data from a prospective population based cohort study

C M Wright, K N Parkinson, R F Drewett

Original Article

Background: The recommended age of introduction of solids food to the diet of infants (weaning) has recently been increased in the UK to 6 months, but most babies are still weaned before the age of 4 months.

Aims: To examine what predicts the age of weaning and how this relates to weight gain and morbidity using data from a population based cohort.

Methods: Parents of 923 term infants born in a defined geographical area and recruited shortly after birth were studied prospectively using postal questionnaires, weaning diaries, and routinely collected weights, of whom 707 (77%) returned data on weaning.

Results: The median age of first weaning solids was 3.5 months, with 21% commencing before 3 months and only 6% after 4 months of age. Infants progressed quickly to regular solids with few reported difficulties, even when weaned early. Most parents did not perceive professional advice or written materials to be a major influence. The strongest independent predictors of earlier age at weaning were rapid weight gain to age 6 weeks, lower socioeconomic status, the parents’ perception that their baby was hungry, and feeding mode. Weight gain after 6 weeks was unrelated to age of weaning. Babies weaned before 3 months, compared to after 4 months, had an increased risk of diarrhoea.

Conclusions: Social factors had some influence on when weaning solids were introduced, but the great majority of all infants were established on solids before the previously recommended age of 4 months, without difficulty. Earlier weaning was associated with an increased rate of minor morbidity.

METHODS

The Millennium Baby Study recruited subjects shortly after birth between June 1999 and May 2000. All babies born to Gateshead resident mothers in 34 prespecified weeks were eligible for recruitment. Parents then received questionnaires at 6 weeks, and 4, 8, and 12 months, which all included questions to be completed once complementary solids had been commenced. These asked the age when weaning solids were first given, as well five questions exploring why, answered using a five point Likert scale (strongly agree to strongly disagree). Each questionnaire also asked whether any breast milk was being given at that age, whether the child had seen their family doctor, suffered a cold, diarrhoea, a rash or a chest infection, or been admitted to hospital.

Families were also issued with a parent held record which included a self carbonating weaning diary. Parents completed this when the first five solid feeds were given and returned it with the next questionnaire. For each feed the parents recorded the date, type of food, and how the child responded, as free text; this was subsequently coded as “positive”, “negative”, or “indifferent”.

Parents also transcribed routine baby clinic weights from their parent held record onto each questionnaire; subjects were weighed at a health check at the age of 13 months.

For this analysis, infants born before 37 weeks gestation were excluded, as well as the few infants from minority groups with different weaning customs from the rest of the population.

Analysis

All weights were converted into standard deviation (SD) scores compared to the UK 1990 growth reference.15 16 Weight gain was measured using the Thrive Index (TI), a measure of change in weight SD over time, adjusted for regression to the mean.15

Sustained Faltering growth was defined as a weight gain (TI) below the 5th centile, persisting across two of four age bands in the first year.

Socioeconomic information collected at recruitment was used to dichotomise families into affluent (homeowner, car owner, and one or more employed parents) and deprived

A fuller version of this paper (including tables 1 and 4) appears on the ADC website (www.archdischild.com/supplemental)

See end of article for authors’ affiliations

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RESULTS
Of the 923 eligible subjects, 707 (77%) mothers returned questionnaire data on weaning and 604 (65%) completed weaning diaries. Subjects without weaning data were significantly more deprived compared to the whole cohort (table 1; see web version).

The median age at which parents reported first giving solids was 15 weeks (interquartile range = 13–16; see fig 1); 146 (21%) children received solids before 3 months (13 weeks), but only 41 (6%) after 4 months (17.3 weeks). In the weaning diaries, the median age of the first weaning food was 14.6 weeks (13–16 weeks). The geometric mean (± 1SD) interval from first to fifth offer of a weaning food was 4.7 (2.4 to 9.0) days. Infants weaned before 3 months took slightly longer than those weaned at 3–4 months to progress from 1st to 5th solid feed (geometric mean = 5.0 (± 1SD = 2.3 to 11.1 days) versus 4.5 (1.7 to 8.3) days; p = 0.08). Those weaned later were no different (4.4 (2.3 to 8.3) days).

The commonest first food offered was baby rice, given by 454 (74%) of mothers; 575 (92%) were commercially produced foods. The child's reaction to the first food offer was positive for 278 (42%) and negative for 191 (29%), rising to 470 (77%) responding positively to the fifth offer. There was no effect of age at weaning on the child's reaction.

Weaning before 3 months was associated with male gender, deprivation, and bottle feeding, while continued breast feeding at 4 months and female gender predicted weaning after 4 months (table 2). Earlier weaning was associated with agreeing with the statement “I started solid food because my baby seemed hungry” as well as “my family and friends told me to”, while “a book or leaflet suggested I should” was associated with later weaning (table 3).

Heavier babies were on average weaned earlier, but the strongest predictor was weight gain (Thrive Index) from birth to 6 weeks (table 4; see web version). Weight gain after 6 weeks was unrelated to age at weaning. Sustained faltering growth was seen in 30 (4.2%) children within the first year; none of these had been weaned before 3 months, but they were also significantly less likely to have been weaned after 4 months ($p = 0.011$).

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**Table 2** Demographic predictors of early and late weaning

<table>
<thead>
<tr>
<th>Total no.</th>
<th>Weaning age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;3 mth (&lt;13 wk)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>352</td>
</tr>
<tr>
<td>Female</td>
<td>355</td>
</tr>
<tr>
<td>Markers of deprivation</td>
<td></td>
</tr>
<tr>
<td>One or more</td>
<td>303</td>
</tr>
<tr>
<td>None</td>
<td>404</td>
</tr>
<tr>
<td>Breast fed</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>322</td>
</tr>
<tr>
<td>&lt;6 wk</td>
<td>162</td>
</tr>
<tr>
<td>6 wk–4 mth</td>
<td>71</td>
</tr>
<tr>
<td>&gt;4 mth</td>
<td>133</td>
</tr>
<tr>
<td>No feeding information</td>
<td>19</td>
</tr>
</tbody>
</table>

---

**Table 3** Parents’ rating of reasons to commence weaning and the weaning process

<table>
<thead>
<tr>
<th>Question</th>
<th>Total no.</th>
<th>Response</th>
<th>Weaning age</th>
<th>Before 3 mth (&lt;13 wk)</th>
<th>3–4 mth</th>
<th>&gt;4 mth (&gt;17.3 wk)</th>
<th>$p \chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I started solid food because:&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health visitor or doctor advised me</td>
<td>661</td>
<td>Agree*</td>
<td>39% (55)</td>
<td>40% (196)</td>
<td>43% (14)</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>A book or leaflet suggested I should</td>
<td>651</td>
<td>Agree*</td>
<td>12% (16)</td>
<td>31% (146)</td>
<td>43% (14)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>My family and friends told me to</td>
<td>655</td>
<td>Agree*</td>
<td>40% (55)</td>
<td>30% (146)</td>
<td>25% (9)</td>
<td>0.024</td>
<td></td>
</tr>
<tr>
<td>I thought it was the right time</td>
<td>681</td>
<td>Agree*</td>
<td>99% (141)</td>
<td>96% (481)</td>
<td>90% (35)</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>My baby seemed hungry</td>
<td>678</td>
<td>Agree*</td>
<td>99% (140)</td>
<td>92% (458)</td>
<td>79% (31)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Has it been easy to wean your baby onto solid food?</td>
<td>700</td>
<td>Easy†</td>
<td>76% (107)</td>
<td>71% (370)</td>
<td>68% (28)</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>I thought my baby started weaning</td>
<td>704</td>
<td>Too early</td>
<td>9% (13)</td>
<td>3% (18)</td>
<td>2% (1)</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Too late</td>
<td>1% (2)</td>
<td>3% (13)</td>
<td>5% (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes strongly agree. †Includes very easy.
All the variables that were individually predictive of either early or later weaning were put together into a logistic regression model, and non-significant variables removed successively in order of diminishing statistical significance. In the final model deprivation, weight gain to 6 weeks and not breast feeding at age 4 months remained significant predictors of early weaning, while agreeing with the statement "my baby was hungry" was of borderline significance. For later weaning, only continued breast feeding at age 4 months was significantly more likely to have episodes of diarrhoea and disagreeing with the statement "my baby was hungry" remained significant (table 5).

Infants weaned before 3 months were significantly more likely to suffer diarrhoea and marginally more likely to have seen their GP between 6 weeks and 4 months, after adjustment for feeding mode and deprivation level, but no more likely to suffer other ailments (table 6). There was no influence of age at weaning on illness rates at any other ages; in particular, infants weaned after 4 months were no more likely to have episodes of diarrhoea between the ages of 4 and 8 months than those weaned earlier (data not shown).

**DISCUSSION**

This is the first study to simultaneously examine both social and biological correlates of age of weaning, while tracking the process of weaning in detail, using both questionnaires and weaning diaries. There was some attrition, most commonly in the most deprived families, but since the study took place in a relatively deprived urban borough, those remaining still had deprivation scores representative of the northern region. The proportion weaned before 3 months was comparable to recent UK data, although the proportion weaned at age 4 months and disagreeing with the statement "my baby was hungry" remained significant (table 5).

Infants weaned before 3 months were significantly more likely to suffer diarrhoea and marginally more likely to have seen their GP between 6 weeks and 4 months, after adjustment for feeding mode and deprivation level, but no more likely to suffer other ailments (table 6). There was no influence of age at weaning on illness rates at any other ages; in particular, infants weaned after 4 months were no more likely to have episodes of diarrhoea between the ages of 4 and 8 months than those weaned earlier (data not shown).

**Table 5** Independent predictors of early and late weaning compared to weaning aged 3–4 months

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Early weaners (&lt;13 wk)</th>
<th></th>
<th></th>
<th>Late weaners (&gt;17.3 wk)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OR</td>
<td>p</td>
<td>OR</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Deprivation markers</td>
<td>One or more versus none</td>
<td>1.95</td>
<td>0.0013</td>
<td>0.53</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>My baby seemed hungry</td>
<td>Strongly agree versus rest</td>
<td>4.1</td>
<td>0.035</td>
<td>0.33</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Breast fed at 4 mth</td>
<td>Yes versus no</td>
<td>0.21</td>
<td>0.038</td>
<td>2.94</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Number in model</td>
<td></td>
<td>649</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values are odds ratios from logistic regression models, including all other significant predictors, plus weight gain (Thrive Index) from birth to 6 weeks as continuous variable.

**Table 6** Risk of parentally reported morbidity between age 6 weeks and 4 months, by age of weaning

<table>
<thead>
<tr>
<th>% (no.) aged 6 wk to 4 mth who:</th>
<th>Age of weaning</th>
<th>Unadjusted</th>
<th>Adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OR</td>
<td>p</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(95% CI)</td>
<td></td>
</tr>
<tr>
<td>Have seen GP</td>
<td></td>
<td>1.54</td>
<td>0.009</td>
</tr>
<tr>
<td>Been admitted to hospital</td>
<td></td>
<td>2.96</td>
<td>0.02</td>
</tr>
<tr>
<td>Had episode of:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any diarrhoea</td>
<td>615</td>
<td>1.79</td>
<td>0.004</td>
</tr>
<tr>
<td>Diarrhoea and saw GP</td>
<td>615</td>
<td>1.79</td>
<td>0.004</td>
</tr>
<tr>
<td>Cold</td>
<td>644</td>
<td>1.54</td>
<td>0.009</td>
</tr>
<tr>
<td>Ear infection</td>
<td>605</td>
<td>1.54</td>
<td>0.009</td>
</tr>
<tr>
<td>Rash</td>
<td>605</td>
<td>1.54</td>
<td>0.009</td>
</tr>
<tr>
<td>Chest infection</td>
<td>605</td>
<td>1.54</td>
<td>0.009</td>
</tr>
</tbody>
</table>

*From logistic regression model including other significant predictors.
†Adjusted for deprivation and breast feeding aged 4 months.
‡Adjusted for breast feeding aged 4 months.
promotion of exclusive breast feeding did find a significant reduction in gastrointestinal infections, but it was not possible to disaggregate the effects of age at weaning from those of breast feeding itself. In conclusion, a majority of mothers introduced complimentary foods before the previously recommended age of 4 months and the important influences they recognised were the perceived needs of their baby, rather than external advice. The majority of infants progressed without difficulty to taking regular solids within a few days. However, even with the use of mainly processed weaning foods, early weaning seems to be associated with increased rates of diarrhoea over the weaning period.

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REFERENCES

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