Postnatal weight loss in term infants: what is ‘‘normal’’ and do growth charts allow for it?

C M Wright, K N Parkinson

Background: Although it is a well known phenomenon, limited normative data on neonatal weight loss and subsequent gain are available, making it hard to assess individual children with prolonged weight loss.

Objective: To establish, using data from a large prospective population based cohort study, norms and limits for postnatal weight loss and its impact on current growth reference charts.

Method: A cohort of 961 term infants were recruited at birth and followed using parental questionnaires and community nursing returns. Routine weights were collected for half the cohort at 5 days and for all at 12 days and 6 weeks.

Results: Less weight loss was seen than the 3–6% suggested by previous studies, but one in five infants had not regained their birth weight by 12 days. Those lightest at birth showed least weight loss. Twenty six (3%) children had more than 10% weight loss, but none showed evidence of major organic disease. Actual weights in the first fortnight are half to one centile space lower than growth charts suggest, while birthweight centiles for children born at 37 weeks were two centile spaces lower.

Conclusions: Neonatal weight loss is brief, with few children remaining more than 10% below birth weight after 5 days. Growth charts are misleading in the first 2 weeks, because they make no allowance for neonatal weight loss.
Postnatal weight loss

Table 1  Baseline characteristics of children with and without weight data at different ages

<table>
<thead>
<tr>
<th>Age at health check</th>
<th>Mean gestationally corrected birth weight SDS</th>
<th>Mean Townsend deprivation score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight available</td>
<td>Weight missing</td>
</tr>
<tr>
<td>5 days</td>
<td>-0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>12 days</td>
<td>-0.03</td>
<td>0.23</td>
</tr>
<tr>
<td>6-8 weeks</td>
<td>-0.02</td>
<td>0.16</td>
</tr>
</tbody>
</table>

p Values calculated using the t test. SDS, Standard deviation score.

Table 2  Weight characteristics at different examination ages

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>5 (4-7)</th>
<th>12 (10-18)</th>
<th>48 (29-70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of weights</td>
<td>959</td>
<td>490</td>
<td>839</td>
<td>816</td>
</tr>
<tr>
<td>Actual age*</td>
<td>0</td>
<td>5 (5-5)</td>
<td>12 (11-14)</td>
<td>48 (44-54)</td>
</tr>
<tr>
<td>Weight change (g)</td>
<td>-</td>
<td>-50 (171)</td>
<td>+193 (246)</td>
<td>+1479 (468)</td>
</tr>
<tr>
<td>% weight change</td>
<td>-1.3 (5.0)</td>
<td>-6.0 (7.6)</td>
<td>+45 (16.3)</td>
<td></td>
</tr>
<tr>
<td>Weight SDS compared with UK 1990 reference†</td>
<td>-0.19 (11.1)</td>
<td>-0.56 (1.02)</td>
<td>-0.49 (0.99)</td>
<td>-0.03 (1.00)</td>
</tr>
<tr>
<td>Weight SDS compared with US reference†</td>
<td>-0.08 (0.99)</td>
<td>-0.42 (0.95)</td>
<td>-0.36 (0.97)</td>
<td>+0.17 (0.95)</td>
</tr>
<tr>
<td>Regained birth weight</td>
<td>34% (165)</td>
<td>81% (679)</td>
<td>100% (816)</td>
<td></td>
</tr>
<tr>
<td>More than 5% below birth weight</td>
<td>17% (82)</td>
<td>3.8% (32)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>More than 10% below birth weight</td>
<td>3.3% (16)</td>
<td>1.7% (14)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

The target examination age is given in days with the range in parentheses. *Median (interquartile range). †Mean (SD). 

DISCUSSION

Postnatal weight loss is a well known but little studied phenomenon. It represents mainly fluid loss but may also involve loss of fat stores during the establishment of milk feeding. Our findings suggest that this weight loss is usually of brief duration, with a rapid acceleration within the first week. However, if plotted on growth charts, all babies appear to fall in weight and remain half to one centile space lower for the first fortnight.

The children included in this study came from just one Northern English town, but proved highly comparable at birth and age 6 weeks to both British and US reference standards. At day five, only about half the cohort were

banners agreed to join the study. Of these, 961 were born at term (gestation ≥ 37 weeks) and are the subjects of this analysis. All but 36 were singleton births, and 475 (51%) were breast fed at birth. The participating midwife teams returned weights at 5 days for 63% of the babies compared with only 33% in non-participating teams. The mean weight SDS and age at measurement were very similar for both groups, and there was no difference in birth weight and little difference in levels of deprivation for those weighed or not weighed (table 1). Therefore all the weights were used: 490 weights from 51% subjects returned between age 5 and 7 days, with 86% returned on day 5. Weights were returned by health visitors for 838 (87%) subjects at median age 7 days, with 86% returned on day 5. Weights were returned from 51% subjects returned between age 5 and 6 weeks (table 2, fig 1). Without adjustment for gestation, the subjects as a group appeared to have below average birth weights compared with either standards, a discrepancy that was most pronounced in those of lower term gestations (fig 2). However, there was a good fit to the UK reference when birth weight was adjusted for gestation.

The degree of initial weight loss (or gain) was most strongly predicted by initial weight, with subjects with low birth weights showing little or no weight loss. Subjects with birth weights below the 9th centile showed a mean (SD) gain of 24 (145) g at 5 days, with only 31 (50%) still below birth weight. Those above the 91st centile at birth lost 180 (225) g at 5 days of age and remained well below the 50th centile at 12 days, although close to expected values by the age of 6 weeks (table 2, fig 1). Without adjustment for gestation, the subjects as a group appeared to have below average birth weights compared with either standards, a discrepancy that was most pronounced in those of lower term gestations (fig 2). However, there was a good fit to the UK reference when birth weight was adjusted for gestation.

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represented, this not being a standard age for weighing. The weights obtained appeared to be representative: there was little difference in the levels of deprivation between those weighed or not weighed at this age, or evidence that those with missing data had systematic differences in weight at birth. However, it is known that in general those babies who are weighed most tend to be growing least well,13 so it is possible that the average weight loss at 5 days has been slightly overestimated as a result. Those not weighed at later ages did have higher levels of deprivation and were slightly lighter at birth, but as the proportion of missing values at these ages was small, any effect should be slight. Another potential source of bias would be if ill children had not been weighed because they were in hospital. However, of the 32 children admitted to hospital during the first 3 weeks of life, 18 (56%) had weights returned at age 5 days, similar to the proportion in those not admitted (51%).

A limitation is that data are not available at the time of maximum weight loss, thought to be on days 2–3.1 It is not clear whether a 1.4% loss at 5 days is consistent with the predicted 4–7% loss three days earlier. However, for clinical purposes, a low point reached early on is less important than persisting loss over time. These data supply norms for ages when children are routinely seen by health professionals for screening purposes, when a judgment may need to be made about whether weight gain is normal.

The strength of the study is the large numbers, allowing estimates of normal limits. No previous study with data from birth has included more than 150 children, and most tended to be selected in some way, predominantly being hospital based. This study did not exclude children with major health problems, but the prospective nature of the study meant that we could show that those children with the largest weight loss did not have major organic disease.

The weights were not collected under research conditions, but careful cross checking against other data recorded for the child ensured that extreme erroneous values would be a rarity. Routinely collected weights have been a powerful resource for previous studies14 and make it possible to assemble a much larger data set than previous studies. These data are consistent with other studies at similar ages. A large US study14 with weights at 8, 14, and 28 days found very similar results; the mean weights given in the paper, translated into SDSs compared with the UK 1990 reference, produce means of –0.54, –0.48, and –0.18 SDS respectively. A much smaller Australian study measured children15 at birth and at 10 days and also produced similar values (means of –0.09 and –0.47 SDS respectively compared with the UK reference).

These findings suggest that the tools we currently have for assessing weight gain in infancy are not suitable for use in the first month. Both the US and UK charts give the impression that all children are below the norm in the first fortnight, as well as misrepresenting the growth of children born at the extremes of “term” gestation.

The US standard fits this cohort better from birth to 12 days than the UK standards, but less well at 6 weeks. Overall, however, the similarities in degree of fit are greater than the differences between the two standards, which suggests that British and US children show comparable similar early growth.

CONCLUSIONS

These data show that the traditional guidance that babies regain their birth weight by the age of 2 weeks is broadly true and that a sustained loss of more than 10% of birth weight is unusual, although not commonly associated with underlying pathology. However, weights plotted in the first month present a misleading picture of actual weight gain, because no account is taken of neonatal weight loss in current (or previous) weight charts. This would suggest that modifications to the UK and US growth references to allow for neonatal weight loss are desirable, as well as clarification of the role of gestational adjustment. In the meantime, users of charts should be warned of their major limitations in the first 3 weeks of life.

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REFERENCES


