Use of sucrose as a treatment for infant colic

Trond Markestad

Abstract

Aims—To examine if sucrose has an analgesic effect on infant colic.

Methods—Nineteen infants with typical infant colic were given 2 ml of 12% sucrose or distilled water when crying, in a double blind double crossover study. The effect was measured by parents’ score.

Results—Twelve improved specifically on sucrose and one on placebo (p < 0.01). Five showed a non-specific improvement.

Conclusions—Sucrose has a significant ameliorating effect on infant colic.

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Keywords: infant colic; sugar; sucrose

Infant colic is characterised by excessive crying in apparently healthy young infants. Uncertainty regarding causes is reflected in a multitude of approaches to treatment based on hypotheses that crying is due to either behavioural disturbances or organic pain.1,2 Sucrose has an analgesic effect in newborn infants.3,4 The purpose of the present study was to examine if sucrose also has an ameliorating effect on infant colic.

Subjects and methods

Twenty consecutive infants were recruited from public health care clinics in Bergen, Norway. Colic was defined as crying for a minimum of three hours per day three days a week for the last three weeks in 3 week to 3 month old infants.5 One infant was excluded because of organic disease. The parents of the remaining 19 infants gave written consent. The study was approved by the regional committee on medical research.

The trial was conducted as a double blind double crossover study. Sucrose as a 12% solution in distilled water and placebo as distilled water were prepared by a pharmacist, who also arranged and kept the coding, and distributed in identical coloured glass bottles. No information was given regarding content of either bottle. One bottle containing sucrose and one containing placebo were arranged in numbered pairs, and within the pair the sucrose and placebo were randomly designated the letter a or b. Each infant was randomised to a number, and to which of the pair of bottles to be tried first, by two separate draws using the sealed envelope technique.

The parents received oral and written instructions to give 2 ml of the distributed solution by syringe over 30–60 seconds, while holding the infant in their arms, when the infant continued to cry after attempts of consoling by feeding, changing the nappy, or by carrying had failed.

Repeat visits were scheduled 3–4 and 6–8 days after the first visit, and a telephone interview was conducted 3–4 days after the last visit. On each visit the bottle was returned and the other of the pair was distributed. At the repeated visits the infant was examined clinically, and on each contact the parents described the effect of the last treatment on a scale of 5 from ‘getting worse’ through ‘no improvement’, ‘some improvement’, ‘marked improvement’, and ‘complete stop of crying after each dose’.

Results

All the infants were healthy, had gained appropriately in weight, length, and head circumference, and had an appropriate psychomotor development. All the parents had tried various treatments before entry to the trial (table 1).

Twelve of the 19 infants (63%, 95% confidence interval 41 to 85%) experienced a specific ameliorating effect of sucrose judged from consistent improvements on sucrose with relapses on placebo. For five infants who improved during the trial, it was not possible to determine any specific effect because of lack of relapses when changing solutions. Only one infant did not improve, and one responded

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Characteristics of the 19 participating infants presented as absolute figures and mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys/girls</td>
<td>13/6</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>3502 (570)</td>
</tr>
<tr>
<td>Length at birth (cm)</td>
<td>49.1 (4.2)</td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>39.4 (2.1)</td>
</tr>
<tr>
<td>Age at study (weeks)</td>
<td>7.3 (3.4)</td>
</tr>
<tr>
<td>Weight at study (g)</td>
<td>4950 (825)</td>
</tr>
<tr>
<td>Height at study (cm)</td>
<td>47 (30)</td>
</tr>
<tr>
<td>Head circumference at study (cm)</td>
<td>39.0 (1.7)</td>
</tr>
<tr>
<td>Head circumference at study (cm)</td>
<td>48 (26)</td>
</tr>
<tr>
<td>Duration of colic (weeks)</td>
<td>5.2 (3.0)</td>
</tr>
<tr>
<td>Crying per day (hours)</td>
<td>5.7 (2.6)</td>
</tr>
<tr>
<td>Consistent diurnal pattern of crying</td>
<td>18</td>
</tr>
<tr>
<td>Crying only afternoon/evenings</td>
<td>18</td>
</tr>
<tr>
<td>Consoled in car</td>
<td>18</td>
</tr>
<tr>
<td>Purely breast fed</td>
<td>17</td>
</tr>
<tr>
<td>Partly breast fed</td>
<td>2</td>
</tr>
<tr>
<td>Previous treatment</td>
<td>19</td>
</tr>
<tr>
<td>Defoaming agents</td>
<td>19</td>
</tr>
<tr>
<td>Mother discontinued cows’ milk</td>
<td>15</td>
</tr>
<tr>
<td>Music/sound</td>
<td>15</td>
</tr>
<tr>
<td>Chiropractor</td>
<td>9</td>
</tr>
</tbody>
</table>

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specifically to the placebo. The effect of sucrose was markedly better than that of placebo (p<0.01, McNemar’s test).

Of the 12 who responded to sucrose, five were reported to stop crying immediately for one half to several hours, in five there was a marked effect, and two a mild effect. The one responding to placebo had a mild effect.

Discussion

This study suggests that small volumes of 12% sucrose given orally when the infant is crying has an ameliorating effect above that of placebo on infant colic. The results were recorded as subjective scores by the parents. Given the repeated crossover nature of the study at only 3–4 day intervals, it is likely that the present method was at least as reliable as keeping a meticulous diary as piloting showed that parents found it difficult to delineate crying episodes accurately and to comply with that method. At the end of the study the parents claimed that they had not tasted the solutions. It is also unlikely that they had any prejudice regarding expectation to the different solutions as the content of both bottles were unknown, and it was ascertained that neither health professionals nor lay people had any knowledge of a possible analgesic effect of sucrose at the time of the study.

Although there is no agreement as to the cause of excessive crying defined as infant colic, it is likely that those who cry intensely, and do not respond to soothing, have pain probably of visceral origin. It is therefore likely that sucrose is effective through a pain relieving effect. Indeed, the observations that sucrose reduces pain related behaviour in newborn infants and in newborn experimental animals, and that experimental studies indicate that sucrose may exert an analgesic effect by inducing the release of endogenous opioids, were the basis for the study.

Twenty five per cent of the infants had an immediate improvement which could not be attributed to the treatment underscoring the significance of carefully blinded studies when evaluating effects of treatment on infant colic. Considering that improvement has repeatedly been reported after individualised behaviour modification and psychological support to the parents it is likely that the concern and reassurance offered through the project had a similar non-specific effect on many of the infant-parent dyads.

Sucrose was given as a dose of 2 ml of a 12% solution when the infant was crying. This concentration and volume was chosen because it had been used successfully in a previous study on pain in newborn infants. A recent study suggests that a higher concentration may be even more effective and worth trying if the effect is not satisfactory. If no improvement is noted during a 1–2 day trial it is unlikely that the infant will respond.


Commentary

The paper by Markestad describes a double blind double crossover trial study comparing the effects of 12% sucrose with distilled water in the treatment of 20 infants suffering from infant colic. Sucrose was clearly more effective. Is this because of its sweetness, or something to do with the glucose and fructose released by its hydrolysis in the gut wall? The authors relate that five infants responded ‘immediately’ for up to ‘several’ hours. If ‘immediately’ means within two minutes, the effect is unlikely to be due to intestinal sugar absorption: it is a pity that the time for a response to be observed was not reported. If taste is the trigger, however, if taste is the trigger, however, mediated, other sugary syrups, such as honey, or other sweeteners, could be used.

As the authors of this paper state, most of the studies on the analgesic effect of sucrose have been done on newborns, human and animal. The observation of Blass and Hofmeyer that pain thresholds in newborn rats were raised by intraoral sucrose, and that this effect was abolished by pretreatment with naltrexone, an opioid antagonist, suggests that this antinociceptive effect is in some way mediated by endorphins. The response may be related to the concentration (that is sweetness) of the solution used: Rushforth and Levene found that a 7.5% sucrose solution was ineffective, whereas two years later investigators in the same department showed a 50% solution to be effective within one minute and a 25% one at two minutes.

The sucrose analgesic effect seems to be age specific: while many studies show that in the first week of postnatal life, sucrose reduces crying in term and premature babies subjected to heel prick blood sampling, its effect diminishes after 2 weeks of age. This may be due to the slower rate that small babies metabolise opiates compared with older children.

The apparent pain relieving effect of sweet things is not exactly news. Generations of orthodox Jewish baby boys have had their Bris eased by the Mohel (circumciser) putting a finger previously dipped in a sweet wine on the baby’s tongue immediately before the rite, and putting him on the breast, for the sweetest of milks, immediately afterwards. The value of chewed dates (70% sugar as glucose and fructose) put inside the boy’s mouth before circumcision was known to the prophet Muhammad and its use continues. The use of sweet wine, or sugar alone in these circumstances, offers a circumpect researcher point-

1 I thank pharmacist Ingrid Grønlie for preparing the solutions and organising the coding, and Rolf Terje Lie, PhD for statistical advice.
ers for studies into whether alcohol increases the analgesic effect.

That sugary fluids may ease infantile colic is not new either. For decades a mixture of dill flavoured sugar solution with alcohol was sold as ‘Gripe-water’. It is now out of fashion and the alcohol was removed from the formulation in 1992. It just requires a further study to show that alcohol eases infantile colic, for history to have turned full circle!

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6 Katme AM. Analgesic effects of sucrose were known to the prophet. BMJ 1995;311:1169.
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