Effects of immediate modified feeding on infantile gastroenteritis

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SUMMARY

Background. *Standard treatment of infants who are dehydrated as a result of acute gastroenteritis is to administer oral rehydration therapy (ORT). Traditionally, food has been withdrawn for 24–48 h, but there is no conclusive evidence that this is of any real benefit to the patient. Immediate modified feeding, in which an infant on ORT is not starved but administered a limited diet, may have benefits in the treatment of gastroenteritis, especially in children who are nutritionally compromised before they develop the illness.*

Aim. *A pilot study was carried out to investigate the effects of giving infants suffering from acute gastroenteritis a limited modified diet in conjunction with ORT.*

Method. *Infants recruited into the study by their general practitioner or by a research doctor in the hospital casualty unit of Bristol Children's Hospital were randomly allocated to receive ORT with or without immediate modified feeding. The duration of diarrhoea, weight change, and incidence of vomiting and lactose intolerance were measured in both treatment groups, and the results were compared.*

Results. *Of the infants studied, 27 received ORT and immediate modified feeding, and 32 ORT alone. The duration of diarrhoea, and incidence of vomiting or lactose intolerance were no greater in the group receiving immediate modified feeding. Patients who received ORT and immediate modified feeding appeared to gain more weight than the infants who were starved for 24–48 h, but this difference was not statistically significant.*

Conclusion. *Immediate modified feeding is safe and effective, and may have nutritional advantages over traditional ORT with starvation. A similar but multicentre study using unmodified diet, i.e. child's normal diet, is being carried out by a working group of The European Society of Paediatrics, Gastroenterology and Nutrition (ESPGAN).*

Keywords: infantile gastroenteritis; oral rehydration therapy; immediate modified feeding.

Introduction

INFANTS who are becoming dehydrated as a result of diarrhoea and vomiting caused by gastroenteritis are most effectively treated with oral rehydration therapy (ORT) with a glucose electrolyte solution; this is the method of treatment recommended by the World Health Organization.[1–3] However, it has been suggested that rice or cereal-based solutions are more beneficial in treating this dehydration than glucose-based solutions because they reduce the stool output and provide more nutrients than the glucose-based solutions.[4–7] This advantage may be particularly important in the treatment of malnourished infants.

In an attempt to decrease the severity and duration of the illness, infants with gastroenteritis are traditionally denied food for the first 24–48 h of ORT.[8] The practice of immediate modified feeding, in which an infant is given foods with which he or she is familiar jointly with the ORT, has been suggested as a cheaper, more convenient alternative to rice or cereal-based ORT. Immediate modified feeding is thought to have the same advantages as rice or cereal-based ORT, but may theoretically increase vomiting, the duration of diarrhoea and induce lactose intolerance in the infant.[9]

A preliminary study was undertaken to compare the effects of immediate modified feeding with the traditional method of ORT without feeding in a group of infants in the Bristol area suffering from acute gastroenteritis.

Method

Patients

Infants were entered into the study either by their general practitioner or by the research physician of the casualty department of Bristol Children's Hospital, to whom the infant had been brought by the parents without previously consulting their general practitioner. The study group comprised infants under 3 years of age who had acute gastroenteritis of less than 7 days duration, with liquid stools and increased frequency of defecation but with no other associated illness. All the subjects had been on a solid diet before their illness. Infants in whom vomiting was severe (most feeds) or in whom dehydration was more than 5% were admitted to hospital for treatment and were not included in the study. The infants in the home study group were all treated by their parents. The study was carried out from 1991 to 1993.

The patients were randomly allocated into two groups in a single-blinded fashion. Group 1 received ORT with glucose electrolyte solution alone for 24–48 h without food; group 2 was administered a modified diet at the same time as the ORT. The following modified foods were recommended: baby rice, dried baby food mixed up with water, ready-made baby food, clear soup (chicken, beef or vegetable), yoghurt, boiled potato, boiled rice, or cereal (rice crispies). Parents were instructed to avoid giving their child cows' milk, and if not already on them, wheat products. After 24–48 h on ORT, the infants in group 1 were also allowed the modified diet and both groups were monitored until the diarrhoea ceased.

The glucose electrolyte solution used in the study was constituted according to the recommendations of the European Society of Paediatric Gastroenterology and Nutrition.[10]

Assessment

Before treatment, the naked weight of each infant was measured. Stool samples were collected and analysed for bacterial and virus infection, and presence of reducing substances (test for lactose intolerance). The parents of each child were asked to record the

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consistency and amount of stool output, how long the diarrhoea continued, the diet given to the child, and whether any vomiting occurred. On the fifth day of treatment, the infants were weighed again and a second stool sample tested for reducing substances. Presence of 0.5% or more reducing substances indicated lactose intolerance.

Complications of treatment, as measured by development of lactose intolerance and increase in amount of vomiting, were assessed in each patient.

The duration of diarrhoea and percentage change in weight of the infants in the two groups were compared. Percentage weight gain (as an alternative to actual weight change) is reported here, to allow for the considerable variation in the starting weight of the children in both groups. An increase of 50% in the main outcome variable (duration of diarrhoea) was considered as an unacceptable aspect of the treatment: this equated to a mean increase in duration of symptoms of 24–72 h. A sample size of 30 in each group would be sufficient to detect this difference with 95% confidence and 80% power. Mann–Whitney tests were used in the analysis; median differences (with 95% confidence intervals) are reported. Differences in proportions were assessed by Fisher's exact probability test.

Results

A total of 62 infants were recruited into the study. Two were later withdrawn by their parents (one from each group); a third (from group 2) developed severe vomiting, resulting in more than 10% weight loss and requiring hospital admission. This infant had not received any food at the time of admission.

The study was completed by 59 infants, 29 recruited by their general practitioner and 30 by a hospital doctor. All the infants were being bottle fed with formula milk. Group 1 comprised 32 infants (16 entered by general practitioner, 16 by the hospital doctor); group 2 contained 27 (14 entered by general practitioner, 13 by hospital doctor). The mean age of the study group as a whole was 11.8 months, with the mean age of group 1 being 11.9 (range 7–36) months and that of group 2 11.6 (range 6–32) months. The mean age of the infants entered into the study from hospital was 11.1 months and of those entered by their general practitioner 12.6 months.

The duration of diarrhoea and percentage weight gain in both groups are presented in Table 1. The median duration of diarrhoea in patients entered into the study by hospital doctor was longer than in those entered by their general practitioner in both treatment groups, but this difference was not significant (non-feeding infants, $P = 0.06$; feeding infants, $P = 0.07$) and the duration of diarrhoea did not differ significantly between the treatment groups ($P = 0.41$). The median percentage weight gain was greater in group 1 than in group 2, but this difference was also not significant ($P = 0.24$).

The complications observed were similar in both treatment groups. On day 1, one infant from group 1 and two from group 2 developed lactose intolerance; on day 5, these figures had gone down to zero in group 1 and one in group 2. In group 1, vomiting occurred in 12.5% of the infants studied and in 11.1% in group 2. None of these differences were significant.

Discussion

The results of this study suggest that the traditional practice of starving an infant for 24–48 h during ORT has no benefit over immediate modified feeding with ORT. The modified diet did not significantly increase the incidence of vomiting or development of lactose intolerance. Duration of diarrhoea was shorter in the infants who received the immediate modified feeding and the percentage weight gain in infants receiving this treatment was apparently higher than in the infants who were starved for 24–48 h, although the differences were not significant.

The traditional treatment of acute gastroenteritis has included a period of starvation which is sometimes protracted but which usually lasts 24–48 h. Just as the traditional practice of gradual introduction of milk (regrading) during acute diarrhoea has been shown to be of no benefit to infants with acute gastroenteritis,[11–13] evidence is gradually emerging that withdrawal of food during treatment of these patients is also of no benefit — there has never been any scientific evidence to suggest that withdrawal of food is in fact beneficial. Fasting is thought to maintain increased intestinal permeability in acute gastroenteritis while early feeding may reverse this permeability.[14] Administration of a lactose-free diet during acute gastroenteritis has been shown very clearly to benefit malnourished infants suffering from gastroenteritis.[15] The pilot study discussed in this paper was designed to follow the effects of administering a non-synthetic low-lactose diet which is familiar to

Table 1. Duration of diarrhoea and percentage weight change experienced by infants receiving ORT with starvation (group 1) and ORT with immediate modified feeding (group 2).

	Total study group	Patients recruited by hospital doctor	Patients recruited by general practitioner
Median duration of diarrhoea (hours)			
Feeding group	56.0 (24.0 to 216.0)	67.5 (31.5 to 216.0)	50.0 (24.0 to 69.0)
Non-feeding group	66.5 (11.0 to 192.0)	84.0 (21.0 to 192.0)	57.0 (11.0 to 120.0)
Median difference	-8.0 (-24.0 to +8.0)*	0 (-36.0 to +36.0)*	-12 (-30.0 to +4.0)*
Median percentage weight change			
Feeding group	+0.96 (-3.97 to +16.66)	+0.89 (-2.41 to +6.65)	+1.27 (-3.97 to +16.66)
Non-feeding group	+0.005 (-9.90 to +7.27)	+0.005 (-9.90 to +4.39)	+0.615 (-.397 to +7.27)
Median difference	+0.82 (-0.86 to +2.56)*	+0.82 (-1.89 to +2.95)*	+1.01 (-1.87 to +3.98)*

Values in parentheses are ranges. *95% confidence interval.

the child and which is easily obtainable in primary care.

Although most of the infants in this study were not nutritionally compromised when they developed gastroenteritis, administration of food supplements in addition to ORT with a glucose electrolyte solution may be nutritionally beneficial. This factor is particularly important in children in developing countries who may suffer five or more episodes of diarrhoea each year. Each episode makes the infant more malnourished, and therefore, more prone to further attacks. The cost of commercially prepared rice-based ORT solutions is three times that of the standard glucose electrolyte solution recommended by the World Health Organization and there is a need to evaluate locally based immediate modified feeding in developing countries.[16]

The results of this pilot study suggest that immediate modified feeding in conjunction with ORT is safe and effective. The historical starvation of infants during ORT for acute gastroenteritis should be discontinued. A similar study, in which normal diet is introduces after 4 h of ORT is being undertaken by a working group of The European Study of Paediatric Gastroenterology and Nutrition to investigate this question further.

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