ORIGINAL ARTICLE

Edema in Oral Rehydration

by

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Abstract

During 7 months from February through September 1978, 160 cases of moderate dehydration due to diarrheal diseases had been admitted to the Department of Child Health of the General Hospital, Ujung Pandang.

All of them received ORS orally ad libitum or by gastric drips. Seven children (5 females and 2 males) showed periorbital with or without pretibial edema, aged 2 - 16 months with a bodyweight of 3.4 - 9.5 kg.

Three out of seven children had good nutritional status, 3 others were undernourished and 1 had severe malnutrition.

All children got ORS ranging between 500 - 4400 ml. Edema disappeared within 9½ - 48 hours after withdrawal of ORS.

The relationship between edema and age, sex, nutritional status and total amount of ORS/Na+ received was still not understood but edema appeared more frequently in cases receiving ORS/Na+ excessively.

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Introduction

The Rehydration Seminar in Surabaya (1971) introduced 2 kinds of Oral Rehydration Solution (ORS) known as Cholera Oral Solution (COS) and Gastroenteritis Oral Solution (GOS). The electrolyte content of both solutions is different in accordance with the stool electrolyte losses in paediatric cholera and infantile diarrhea respectively.

The first National Rehydration Seminar in Jakarta (1974), only suggested one kind of oral rehydration solution, namely ORALIT = oral electrolyte which could be given both to cholera and non-cholera diarrheal patients. The composition of this new proposed solution was in between COS and GOS, i.e. :

Na Cl 3.3 g/L (85 mEq/L Na+)

KCL 1.2 g/L (15 mEq/L K+)

NaHCO3 2.5 g/L (30 mEq/L HCO3—)

glucose 22.0 g/L (120 mOsm/L glucose)

Oralit as a single ORS proved to be favourable for mass treatment because there was no need to determine before the kind of diarrhea.

Considering the suggestion of the Second National Rehydration Seminar in Jakarta (1978) that therapy begins at home, oralit must be improved further to lessen its side effects. Nausea and vomiting had been corrected by the addition of orange like taste such as Pharolit and Eltolit.

The increase of diarrhea due to hyperosmolar electrolyte content could be diminished by dilution of oralit, as follows :

0 - 1 month : 1 sachet/200 ml dissolved in 600 ml of water.

1 - 6 months : 1 sachet/200 ml dissolved in 400 ml of water.

Edema as another side effect was reported by Chatterjee (1978). The aim of this study is to present our experience on edema in oral rehydration.

Material and methods

This study was carried out from February 1978 through September 1978 and comprised 160 diarrheal patients suffering from moderate dehydration (criteria of Maurice King) from the Department of Child Health of the General Hospital Ujung Pandang. There were 67 females and 93 males, aged between 5 days and 12 years (mean 10.44 months) with the following distribution :

0 — 1 months : 14 (8.8%)

1 month — 2 years : 126 (78.7%)

over 2 years : 20 (12.5%)

The bodyweight varied from 2.250 kg to 21 kg (mean 6.34 kg).

The nutritional status was divided into 3 groups according to "Wellcome Classification" i.e. :

well nourished (more than 80% standard bodyweight) : 58 (36.2%)

undernutrition (60 — 80% standard bodyweight) : 95 (59.4%).

severe malnutrition (less than 60% standard bodyweight) : 7 (4.4%).

Oralit without additional dilution was given to all
by gastric drips for 24 hours which should be continued on the second day if dehydration still persisted. The amount of oralit given to a child less than 1 month old corresponded with its total needs and to older children as much as they liked. So the total amount of oralit used ranged between 200 — 4400 ml (mean 897.6 ml) for a duration of 1 — 4 days (mean 1.53 days). If edema appeared, oralit administration was stopped quickly and replaced by boiled water or tea with sugar.

We used the following trade names of oralit as shown in table 1.

TABLE 1 : *Kinds of oralit.*

Oralit	electrolyte content (mEq/1 mOsm/L)				
	Na+	K+	HCO3—	Cl—	glucose
Eltolit	86.1	15.6	30	71.7	136.36
Pharolit	86.1	15.6	30	71.7	136.36
Oratrolit	89.1	19.5	30	78	136.36
average	87.1	16.9	30	74	136.36

Results

Seven (4.4%) out of 160 patients showed periorbital with or without pretibial edema, aged between 2 - 16 months with a bodyweight ranging from 3.4 - 9.5 kg. Edema disappeared slowly within 9½ - 48 hours after withdrawal of oralit administration (Table 2).

To ascertain the role of oralit/Na+ in edema, table 3 demonstrates the normal daily requirements of some electrolytes in infants and children, the stool electrolyte losses in infantile diarrhea and the oralit electrolyte composition.

Table 4 shows the total oralit/Na+ requirement based on the degree of dehydration and duration of diarrhea and table 5 the ratio between total Na+ requirement and administration of these 7 cases.

TABLE 2 : *Data of 7 cases contracting edema*

No.	Age in months	Sex	BW kg	Nutritional status	Oralit ml/days	Duration of edema
1	2	F	3.4	78%	500/2 days	10 hours
2	7	F	3.6	<60%	1500/2 days	10 hours
3	7	F	7	>80%	3200/2 days	24 hours
4	11	M	7.4	77%	800/1 day	10½ hours
5	12	F	7.5	75%	1000/1 day	48 hours
6	14	M	8	>80%	4400/3 days	27 hours
7	16	F	9.5	>80%	800/3 days	9½ hours

TABLE 3 : *Daily electrolyte requirements according to age, stool electrolyte content in infantile diarrhea and oralit electrolyte composition.*

Electrolyte	Daily requirements (mean value)			Stool inf. diarrh mEq/L	Oralit mEq/L
	Neonatus	Up to 2 years	Over 2 years		
natrium	4	17	51	56	87.1
kalium	13	20	26	21	16.9
carbonate	—	—	—	14	30
chlorida	—	—	—	—	74

TABLE 4 : *Total oralit/Na+ requirement based on the degree of dehydration and duration of diarrhea.*

No.	Age in months	BW kg	PWL ml/mEq	CWL ml/mEq	Daily requir.	Oralit* days	Total** mEq
1	2	3.4	255 /14.28	85 / 4.75	17	2	57.78
2	7	3.6	270 /15.2	90 / 5.04	17	2	59.2
3	7	7	525 /21	175 / 9.8	17	2	74.6
4	11	7.4	555 /31.08	185 /10.30	17	1	58.44
5	12	7.5	567½/31.78	185¾/10.4	17	1	59.18
6	14	8	600 /33.6	200 /11.2	17	3	118.2
7	16	9.5	712½/39.9	237½/13.3	17	1	70.2

* Duration of oralit administration = duration of diarrhea (days)
** Total requirement = PWL + (CWL × day) + (daily requirement × day)
PWL = 75 ml/kg BW
CWL = 25 ml/kg BW/day

TABLE 5: *Ratio between total Na+ requirement and Na+ administration.*

No.	Oralit administration ml/Na mEq		Na+ requirement mEq	Comment	Duration of edema
1	500	43.55	57.8	Na+ deficit	10 hours
2	1500	130.65	59.2	Na+ excess	10 hours
3	3200	278.72	74.6	Na+ excess	24 hours
4	800	69.68	58.44	Na+ excess	10½ hours
5	1000	87.1	59.18	Na+ excess	48 hours
6	4400	383.24	118.2	Na+ excess	27 hours
7	800	69.68	70.2	Na+ balance	9½ hours

Discussion

Na+ has a very close relation to edema. In some metabolic disorders edema appears as soon as sodium retention occurs. In certain cases of diarrhea, edema caused by oralit seemed to be influenced by many factors.

In our study all cases contracting edema were 2 - 16 months old. The significance of age was not clear because the majority of patients (78.75%) was 1 month to 2 years old. Edema was found not only in children over 2 years (12.5%) but also in infants less than 1 month of age receiving oralit without additi

The influence of sex is also vague although 5 out of 7 cases were females. The role of the nutritional status related to edema is also dubious because edema was present in all possible nutritional status.

Chatterjee (1978) reported 4 cases of hypernatremia with a nutritional status respectively 63%, 61% 59% and 42% of standard bodyweight and only in the former edema was found.

Table 5 illustrates that not all cases of edema have received oralit/Na+ excessively. Case no. 1 had a sodium requirement of 57.8 mEq but the receipt was only 43.55mEq.

Case no. 7 showed a Na+ balance while the remaining five cases had a surplus of Na+. These finding give the impression that the relationship of the quantity of oralit/natrium and the manifestation of edema is not evident. Although we had not determined sodium plasma levels, our cases could be similar to those of Chatterjee. He studied children less than 2 years old suffe-

ring from diarrhea who received ORS containing 90 mEq/L Na+ in 19 children and 50 mEq/L Na+ in 20 cases. He found hypernatremia in 4 children of whom only one was accompanied with edema, in the other 10 cases with periorbital edema nine had normal sodium plasma levels.

We experienced that the quantity of Na+/oralit excess did not influence the duration of edema. Case no. 5 with a nutritional status of 75% standard BW, oralit receipt of 1000 ml in one day and a Na+ surplus of 27.02 mEq showed edema for 48 hours. On the other hand case no. 3 with a nutritional status of 80% standard BW, oralit receipt of 3200 ml in 2 days and a sodium excess of 208.12 mEq lost its edema faster within 24 hours.

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