ORIGINAL ARTICLE

Oral Rehydration Therapy.

Sugar-Salt Solution using Special Scoop Measurement vs. Glucose-Electrolyte Solution

by

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Abstract

222 well nourished children aged between 6 - 24 months suffering from acute diarrhoea in the OPD Department Child Health, Medical School University of Sriwijaya, Palembang since August 1979until March 1980 were included in the study.

They divided into 2 groups, one group receiving ORS with standard formula and the other group receiving sugar salt solution using special scoop (blue spoon).

The conclusion made from this study is that the efficacy of the sugar-salt solution measured by a special scoop (blue spoon) was not significantly different from the glucose-electrolyte solution. Likewise, the side-effects found were similar in those two groups.

There are still some constraints made by some experts to use sugar-salt solution for oral rehydration. The result of this study can be used as an addition information to carry out the wider scale of clinical and field trial concerning this sugar-salt solution.

Received 10th. November 1980.

Introduction

Complete formula of Oral Rehydration Salt (ORS) containing glucose, sodium, potassium, chloride and base corrector has been proved very effective in preventing and treating dehydration due to diarrhoea. The efficacy of ORS will be optimal if treatment is started — usually at home — as soon as the diarrhoea begins. Therefore the package of ORS must be ready for use at every home.

The distribution and logistics of ORS in the community up till now are still difficult especially in rural areas. To simplify this distribution and logistics — as an alternative — sugar-salt solution is used since these two materials are usually available at home.

Numerous reports have been documented that the sugar-salt solution is effective to prevent and treat dehydration due to diarhoea (Moenginah et al., 1977; Sudaryat et al., 1979 and Islam et al., 1980). Many ways can be used to measure sugar and salt to prepare sugar-salt solution. One of those is by using a special scoop, which in Indonesia is more popular named "blue spoon".

Theoretically we must anticipate side-effects in using sugar-salt solution due to lack of potassium and base corrector and by using sucrose as the organic carrier of sodium.

The aim of this study is to evaluate the efficacy of the sugar-salt solution in oral rehydration where blue spoon is used as measurement.

Material and method

All 222 children with body weights of more than 70% of the Harvard standard (body weight for age) aged between 6 months and 2 years suffering from acute diarrhoea in the out-patient clinic of the Child Health Department, School of Medicine, Sriwijaya University/Palembang General Hospital, Palembang since August 1979 until March 1980, were included in this study.

The children were divided into two groups. Patients with even numbers were treated with complete ORS formula and their mothers were given instruction how to prepare and to give this solution to their children. Patients with odd numbers were given blue spoon and detailed instruction concerning how to use it. The blue spoon contains two scoops, the big one for sugar (5 gram) and the small one for common salt (0.65 gram). One big scoop of sugar and one small scoop of salt were diluted in one glass of water (200 ml) to make the concentration of sugar 2.5% and sodium 55 mEq/l. The complete ORS powder used in this study is "Pharolit", a local trade mark of glucose-electrolyte powder which contains NaCl : 3.3 gm, KCl : 1.3 gm. sodium bicarbonate: 2.5 gm and glucose 25 gm. One sacket was diluted in seven glasses of water, to make the solution-content approximately 64 mEq/liter of sodium, $\pm$ 14 mEq/liter of potassium, $\pm$ 21 mEq/liter of bicarbonate and 78 mMol/liter of glucose. On the first occasion the mother had to give

the child this solution as much as possible, followed by one glass of this solution after every bowel movement.

If the child was breastfed the mother must continue the breastfeeding. The child who obtained baby formula was given one third, two third dilution and full formula on the first and consequent days. If the child had already been given solid food, on first and second day the child was given semi-solid food (rice porridge).

The patients were asked to come again for follow-up on the second, third, fourth and seventh day. On every visit the weight and height, frequency of diarrhoea, skin elasticity, consciousness, fontanel, lips, pulse, respiration rate, meteorismus, hypotonia and cardiac arrythmia were recorded. Other accompanying

The effectiveness of the solution was assessed by comparing the degree of dehydration on the second and third day and changes of body weight in the seventh day in the two groups. The side-effects found in the two groups were also compared.

Results

Table 1 shows the number of children that came for follow-up on the 2nd, 3rd, 4th and 7th day.

The accompanying diseases in the two groups is presented in table 2. The changes of the degree of dehydration in both groups on the second and the third day as seen in table 3, did not differ statistically ($P > 0,05$); so there were changes of the body weight in both groups until the seventh day ($P > 0,05$) (see table 4).

The same is also true with the frequency of diarrhoea on the 2nd, 3rd, 4th, and 7th day in both groups. It did not differ statistically ($P > 0,05$) (see table 5).

The mean value of diarrhoeal episode in the glucose-electrolyte group and the sugar-salt group was 2.85 days and 2.79 days respectively, which were not significantly different ($P > 0,1$). The side-effects of these two groups were not significantly different too (see table 6).

Discussion

In this study we can conclude that the efficacy of the sugar-salt solution with special plastic scoop (blue spoon) measurement did not differ statistically from the glucose-electrolyte solution. Also the side-effects that occurred on these two groups were not significantly different. This finding was similar with the result noted by other authors (Islam et al., 1980; Moenginah et al., 1977 and Sudaryat et al., 1979).

All patients in the glucose-electrolyte group as well as in the sugar-salt group need not be hospitalized. In other words there was no failure of treatment with this solution as an oral rehydration fluid.

The side-effects, which are stipulated to occur due to lack of potassium and base in the sugar-salt solution groups (acidosis, hypotonia, meteorismus and

cardiac arrythmia), were not significantly different in the two groups. Some authors had documented that absorption of glucose is better than sucrose in gastroenteritis patients (Nalin, 1978 and Sack, 1978). Nisard and Ranbaud (1979) noted that the possibility of temporary absorption disorder of sucrose was greater than glucose in viral diarrhoea, where usually the mucosal damage occurred in the jejunum.

In our study — the same as the above mentioned studies — rehydration and dehydration prevention is still effective in the sugar-salt solution group. The frequency and duration of diarrhoea were not significantly different in the two groups.

Sack et al. (1978) noted that sucrose can be used for oral rehydration in children suffering from diarrhoea caused by rotavirus although it is not as good as glucose. The other problem is the measurement used to prepare sugar-salt solution. Some used four-finger-scoop (for sugar) and the pinch (for salt) and the other used tea spoons.

The error of diluting by these measurements is possibly greater. This can cause more side-effects and can influence the efficacy of the solution (Sastrowidjojo et al., 1979).

In this study we have used special scoops which are relatively cheap, and quite accurate as a measurement of sugar and salt. The still existing problem is the glass in which to dilute the sugar and salt, namely the possible error which might be caused by the varied kinds of glasses used by mothers at home; though this error may also occur when preparing glucose-electrolyte solution. Hendrata et al. (1980) noted that the risk of error in making these two kinds of solution was similar.

Acknowledgement

The authors are grateful to Dr. Sunoto of the Sub-division of pediatric gastroenterology, Department of Child Health, Medical School, University of Indonesia for his kind assistance which makes this study possible and reading this manuscript.

TABLE I : *The number of children that came for follow up in the 2nd, 3rd, 4th and 7th day.*

group	Glucose-electrolyte solution						sugar-salt solution						total
	sex		mode-rate dehyd	mild dehyd	without dehyd	number	sex		mode-rate dehyd	mild dehyd	without dehyd	number	
	M	F					M	F					
A	12	9	6	13	—	21	11	10	10	11	—	21	42
B	5	6	7	4	—	11	4	6	4	4	2	10	21
C	10	7	10	7	—	17	14	4	7	10	1	18	35
D	12	15	13	14	4	27	8	10	9	8	1	18	45
E	23	12	12	19	6	35	27	17	25	16	3	44	79
Total	62	49	48	55	2	111	64	47	55	49	7	111	222

Note :

A : came for follow up 4 times (2nd, 3rd, 4th and 7th day)
B : „ „ 3 times (2nd, 3rd, and 4th day)
C : „ „ 2 times (2nd and 3rd day)
D : „ „ 1 time (2nd day)
E : did not come for follow up

TABLE : 2 *Accompanying diseases*

	glucose-electrolyte solution	sugar-salt solution
U.R.T.I.	38	45
L.R.T.I.	2	4
Otitis media	1	—
Skin infection	1	1
Measles	—	1

U.R.T.I. = Upper Respiratory Tract Infection
I.R.T.I. = Lower Respiratory Tract Infection

TABLE 3 : *Changes of the degree of the dehydration on the 2nd and 3rd day*

	decreased	constant
glucose-electrolyte solution	37	10
sugar-salt solution	39	7

Note : $P > 0,05$

TABLE 4 : *Changes of body weight on the 7th day*

	Increased/constant	decreased
Glucose-electrolyte solution	18	3
Sugar-salt solution	20	1

Note : $P > 0,05$

TABLE 5 : *Changes of frequency of diarrhoea on the 2nd and 3rd day*

	decreased	constant	increased
glucose-electrolyte solution	44	4	1
sugar-salt solution	47	2	—

Note : $P > 0,05$

TABLE 6 : *Clinical signs of the two groups*

	glucose-electrolyte solution	sugar-salt solution
Kuszmaul respiration	—	—
Hypotonia	—	—
Hyperirritability	—	—
Meteorismus	3	1
Cardiac arrythmia	—	—
Periorbital edema	—	—
Pre-tibial edema	—	—

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