ORIGINAL ARTICLE

# Nasogastric Drip Rehydration Therapy in Acute Diarrhea with Severe Dehydration

*by*

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**Abstract**

*WHO recommended severe dehydration without shock in acute diarrhea to be rehydrated by nasogastric drips (NGD) of oral rehydration solution (oralit). In this respect the criteria of a still palpable and countable pulse, the absence of meteorism and absence of complication, the reverse warranting iv fluid therapy, can be used as practical guidelines to identify the patient "without shock".*

*A clinical trial comparing the result of NGD oralit rehydration therapy to that of intravenous Ringer-lactate on small children with diarrhea and severe dehydration was conducted. Seventy five patients admitted to the Department of Child Health Palembang General Hospital from January up to July 1986, aged 1 to 59 months, suffering from acute diarrhea with severe dehydration fulfilled to above mentioned criteria. Randomly 36 were assigned to NGD rehydration therapy using WHO standard ORS (in Indonesia is named as oralit) and 39 were rehydrated with iv Ringer lactate solution, given in four hours consisting of 40 ml/kg.BW, 30 ml/kg.BW, 20 ml/kg.BW and 20 ml/kg.BW in the first, second, third and fourth hours respectively.*

*Based on the failure rate of rehydration in the first four hours, the recurrence of dehydration after rehydration and the side effects of fluid therapy, it was concluded that acute diarrhea cases with severe dehydration who fulfilled the above mentioned criteria can be rehydrated by NGD oralit as effective and safe as by iv Ringer lactate.*

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diarrhea, oral rehydration solution, oral rehydration therapy.

## Introduction

Oralit (the Indonesian official name for WHO standard oral rehydrating solution - ORS) has been proven efficient and effective for oral rehydration therapy (ORT). It is used for mild and moderate dehydration. WHO (1985) suggested to apply nasogastric drip (NGD) oralit for rehydrating severe dehydration without shock in acute gastroenteritis patients. In this respect "without shock" is a very relative term. It needs an operational definition in its application as a practical guideline to decide whether or not a case of severe dehydration can safely be rehydrated with NGD.

There are some theoretical risks in rehydrating patients with severe dehydration by using just oral oralit. Circulatory collapse may disturb oralit absorption, so shock can not be treated quickly enough thus leading to an irreversible shock, renal failure or prolonged cerebral anoxia. The unabsorbed oralit may generate meteorism, of which its ballooning effect may perpetuate mucosal anoxia and insufficiency.

We anticipate the following criteria: (1) still palpable and countable pulse; (2) absence of meteorism; (3) no complication, be used as practical guidelines to decide whether or not a case of severe dehydration can safely be rehydrated orally, without taking any of the before mentioned risks. The reverse of the three criteria, namely unpalpable and uncountable pulse, presence of meteorism; and presence of complication are all indicative for intravenous fluid therapy and contra indication to take something orally.

The aim of this study is to explore the clinical course of rehydrating children with severe dehydration due to acute diarrhea fullfilling the before mentioned criteria by NGD oralit and comparing the outcome to that of intravenous rehydration using Ringer-lactate solution.

## Materials and Methods

All children who were admitted to the Department of Child Health Palembang General Hospital/School of Medicine Sriwijaya University, between January and July 1986 who fulfilled the following criteria: (1) suffering from acute diarrhea with severe dehydration; (2) aged 1 month to 59 months; (3) without meteorism; (4) without complication; (5) pulse rate still palpable and countable, were assigned to the study.

By using predetermined random number the children were devided into the case and the control group. Besides routine physical and laboratory examinations, the degree of dehydration was hourly assessed after admission using the criteria recommended by WHO (1980). The children were weighed on admission and on discharge. The frequency and duration of diarrhea, vomiting at home and during hospitalisation were recorded. The known and anticipated side effects of fluid therapy such as meteorism, aspiration, hyperiritability, convulsion were also observed.

The case group was rehydrated by NGD oralit, while the control group by intravenous Ringer-lactate. The rate of fluid therapy was the same as what has been recommended by WHO (1980), namely 40 ml/kg.BW, 30 ml/kg.BW, 20 ml/kg.BW and 20 ml/kg.BW in the first, second, third and fourth hour respectively. The oralit used was according to the WHO formula containing NaCl 3,5 gm/l, Nat.Bic 2,5 gm/l, KCl 1,5 gm/l and glucosa 25 gm/l ($Na^+$ = 90 mEq/l, $K^+$ = 20 mEq/l, $Cl^-$ = 80 mEq/l, $HCO_3$ = 30 mEq/l, glucose = 132 mOs/l). The Ringer-lactate solution contained $Na^+$ 130 mEq/l, $K^+$ 4 mEq/l, $Ca^{++}$ 2,7 mEq/l, $Cl^-$ 108.7 mEq/l, lactate 28 mEq/l. If within the first hours of treatment the vomiting and diarrhea in the case group became more frequent, oral therapy was stopped and intravenous therapy started. In this case, the oral therapy was defined as a failure. Antibotics were given in case of dysentery or stool leucocytes more than 10 per high power field. Food was introduced after rehydration had been obtained. The efficacy or the failure of rehydration therapy was evaluated by comparing the progress of rehydration, and the duration and amount of fluid therapy needed. The safety was evaluated by looking for complication and side effects.



## Results

There were all 75 children studied, 36 belonged to the NGD oralit case group and 39 to the intravenous Ringer lactate control group.

The age and sex distribution of the case and control groups are shown in table 1

Table 1 : *The age and sex distribution of the case and control groups*

| Group | 1-11 month | | 12-23 month | | 24-59 month | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | male | feml | male | feml | male | feml | male | feml | ml + fl |
| case | 22 | 9 | 4 | 1 | - | - | 26 | 10 | 36 |
| control | 16 | 15 | 4 | 2 | 1 | 1 | 21 | 18 | 39 |

The mean body weight on admission in the case group was 6,03 kg (± 1,67 kg), whereas in the intravenous group it was 6,65 kg (± 1,83 kg), which was not significantly different ($p > 0,05$).

The mean frequency of diarrhea per day before admission in the case group was 5.87 times ($0.05 > p > 0.01$). The duration of diarrhea before admission was not significantly different ( $p > 0.05$).

The mean frequency of vomiting per day before admission in the case group was 2.28 times and in the control group 5.87 times ($0.05 > p > 0.01$) while their duration was not significantly different ($p > 0.05$).

The results of the stool microscopic examinattion in both groups on admission can be seen in table 2, the difference being not significant ($p > 0.05$).

There were all 75 children studied, 36 belonged to the NGD oralit case group and 39 to the intravenous Ringer lactate control group.

The age and sex distribution of the case and control groups are shown in table 1 ($0.05 > p > 0.01$). The mean duration of illness at home in the case group was 2,5 days (± 1,6 days), whereas in the control group it was 2,71 days (± 1,61 days). The difference was not statistically significant ($p > 0,05$).

Table 2 : *The result of microscopic stool examination on admission*

| Stool microscopy | NGD group | Intravenous group |
|---|---|---|
| fat | 6 | 8 |
| erythrocyte | – | – |
| leuko neutrophil/HPF | 1 | 2 |
| ascaris ova | 1 | 1 |
| candida | 1 | 1 |
| ameba | – | – |

Within the first hour of treatment, 2 patients from the case group continued purging heavily and as there was no sign of improvement of dehydration, the oral therapy was defined as a failure, thus NGD oralit was stopped and intravenous Ringer-lactate was started instead.

One patient from the case group contracted meteorism in the first four hours, so NGD was changed to intravenous fluid drip.

In the control group, 1 patient developed seizures in the first four hours, 1 patient continued to purge frequently so that rehydration was not achieved in the first four hours. Both of them had to be given intravenous fluid drip longer to achieve rehydration.

The failure of rehydration in the first four hours, occurred in 3 patients (8,3%) in the case group and in 2 patients (5,1%) in the control group. Statistically there was no significant difference ($p > 0,05$).

After the first four hours, 2 children (6,1%) from the case group who had been rehydrated became again dehydrated. One was because the diarrhea became more prequent and voluminous and the other one because the patient did not drink sufficient ORS for the maintenance. Four children (10,8%) from the 37 patients in the intravenous group fell into dehydration again because the diarrhea became more frequent and voluminous and could not be overcome by ORT. The recurrence of dehydration in both groups were not significantly different ($p > 0.05$).

The mean duration of hospital stay was 3,19 days ($\pm$ 1.46 days) in the case group and 3,21 days ($\pm$ 1,64 days) in the control group ($p > 0.05$).

The mean duration of diarrhea in the hospital was 2,16 days in the case group and 2,03 days in the intravenous group. This difference was not statistically significant ($p > 0,05$). The proportion of patients who still suffered from diarrhea and vomiting in both groups according to the days of hospital stay, are shown in figure 1. The decrease of the proportion was not significantly different in both events.

The mean duration of vomiting in the hospital was, in the case group 0,8 days, whereas in the control group it was 0,6 days ($p > 0.05$).



The mean volume of fluid therapy consumed in the case group was 1554,34 ml (NGD oralit 621,93 ml and oral oralit 932,41 ml) while in the control group 1311.8 ml (Ringer lactate 645.9 ml and oralit 665.9 ml) which was not significantly different ($p > 0,05$). No other complications such as aspiration or arrythmia was detected.

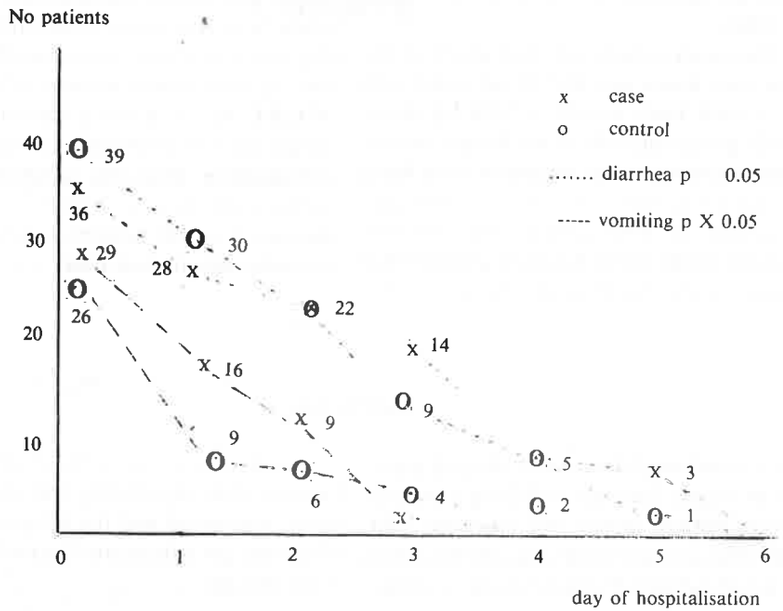


Figure 1 : *The changes of patients who still suffered from diarrhea and vomiting during hospitalisation*

## Discussion

The failure rate of rehydration rate in the first four hours and the recurrence of dehydration in the case and control group were not significantly different. Our failure rate of rehydration in the first 4 hours by NGD oralit was 8,3%, while Sharifi et al (1985) reported it to be just 0.4%. The causes of the failure in our cases were excessive purging (2 out of 36 cases) and meteorism (1 out of 36 cases) while in the Sharifi et al series it was excessive purging (1 out 236 cases). Sharifi et al reported 4 (1,7%) cases with meteorism though not the main cause of failure of NGD, although 29 out of 36 of our cases suffered from vomiting on admission and 16 still suffered from vomiting on the first day of admission.

The causes of failure of rehydration in the first four hours by iv Ringer lactate was convulsion besides excessive purging. Sharifi et al, found seizures in 6 out of 234 cases

(2,5%) while in our series we found 1 out of 39 cases (2,6%). No convulsion was found in NGD group either in our series or in Sharifi et al series. This is supposed to be one of the superioritis of ORT. Pizzaro et al (1984) even reported that hypertonic dehydration can safely be rehydrated by ORS.

The mean volume of fluid given in the first four hours was 932.41 ml oralit with an average body weight of 6.03 Kg in the NGD group and 645.9 ml Ringer lactate with an average body weight of 6.65 Kg in the Ringer lactate group. The sodium consumption in both groups was proportionate, while the potassium content was higher in the NGD oralit group. In this study we did not examine the serum electrolyte content routinely. Sharifi et al, in their study giving solutions in quite the same volume, concluded that NGD oralit quickly corrected the electrolyte imbalance.

There are some advantages in rehydrating severe dehydrated patients with NGD oralit; a.o. it is easier to perform, reduces the cost of therapy, convinces the community and the health workers of the benefit of ORT. But we know it can not fully substitute the iv fluid therapy in treating severe dehydration. Thus the capability of practising iv rehydration therapy is still a must, because it is still needed to treat the more severely dehydrated cases.

## Conclusion

It is concluded that severe dehydration due to acute diarrhea fulfilling the following criteria: pulse still palpable and countable, no meteorism, no complication can be rehydrated by NGD oralit as effective and safe as by intravenous Ringer-lactate, while inpalpable and uncountable pulse, meteorism and the presence of complications are indications for performing iv fluid therapy.

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