

INVITED ARTICLE

Death Due to Diarrhea: Before and After National Rehydration Program

by

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Abstract

Diarrheal diseases still constitute one of the major causes of morbidity and mortality in Indonesian children. The etiology is multi-complex as in other developing countries. In 1974 a National Seminar on Rehydration was held in Jakarta and a rehydration program started with a standardized treatment of Ringer's Lactate and oral rehydration (ROSE SYSTEM). As a result the case fatality rate of diarrheal diseases has been dramatically reduced for gastroenteritis and cholera.

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A. GASTROENTERITIS

Magnitude of the problems

Gastroenteritis in Indonesia is still one of the major causes of morbidity and mortality in children, particularly those under 5 years of age. Longitudinal studies in several communities in Indonesia revealed that the incidence of diarrheal episodes in a community was more than 400 per 1,000 population per year, 70-80% of them are children under 5 years of age.

Diarrheal episodes in infants begin to increase after the age of 1-2 years.

On the average an infant will have at least one diarrheal episode per year, whereas a child between 1-2 years old will experience 2 episodes (Brotowasisto, 1975). See Table 1.

The number of patients admitted to the hospitals for diarrhea is always the largest and varies from 20 to 35% of the total admittance due to various diseases. Among the visiting patients of the Out Patient Department of almost all hospitals patients with diarrhea constitute the majority too i.e. 10-15% of the total visitors (Sutoto et al., 1974; Sudianto, et al., 1974; Sunoto et al., 1976).

The case fatality rates in the department of child health of various hospitals in Indonesia since 1959 until 1974 were still above 15%.

Kwari Satjadibrata and Sudjono D. Pusponogoro (1959) reported a case fa-

tality rate of 62.2% of 778 patients with gastroenteritis, dehydration and shock. After introducing a modified treatment, Sutejo et al. (1961) were able to reduce the case fatality rate to 20.2%.

After the National Seminar on Rehydration held in Jakarta in August 1974, a Rehydration Program was started with a standardized treatment of Ringer's Lactate and Oral Rehydration, which resulted in a decline of the case fatality rate. The case fatality rate of acute gastroenteritis with dehydration in hospitals decreased to less than 10%.

In 1975 this rate could be lowered to 9.1% (Adnan S. Wiharta and Suharyono, 1976) and 6% (Hernawan et al., 1976) in the Department of Child Health Medical School University of Indonesia Jakarta (see Table 2).

In the pediatric department of other hospitals, the figures varied from 3 to 14%. Most of the deaths are to accompanying diseases such as Encephalitis, Pneumonia, PCM, etc. because almost all of the patients admitted to the hospital were also suffering from systemic diseases such as pneumonia, bronchitis, otitis media acute (OMA), encephalitis, PCM, etc.

Etiology

A great number of factors are related to the incidence of diarrhea diseases in children such as socio-economic conditions, poverty, ignorance, taboos (beliefs), personal hygiene, environmental sanitation, high incidence of malnutrition and

infections, etc. It is very difficult to determine a single cause of etiology among these multi-complex factors.

Hospital studies of the possible etiologic factors revealed that EPEC (Enteropathogenic *E. coli*), *Salmonella* spp. and *Shigella* spp. are the most common findings. Their frequency varied from 20 to 35% (Tumbelaka, 1965; Suprapti Thaib et al., 1968; Johan Kurnia, 1973; Brotowasisto, 1974; Gracey et al., 1973; Sunoto et al., 1976; Efek Alamsyah et al., 1977). Besides these pathogenic bacteria, overgrowth of non pathogenic bacteria may also play a role in causing diarrhea of childhood (Gracey et al., 1973).

EPEC as a cause of diarrhea is now being questioned since it was also found in patients without diarrhea. ETEC (Enterotoxigenic *E. coli*) may be more important than EPEC as a cause of diarrhea (Teluk Sebodo et al., 1977).

In a small survey in Jakarta and Yogyakarta duovirus were found in 9 (47%) out of 19 patients and 15% out of 41 patients (Gracey et al., 1975; Teluk Sebodo et al., 1977). Helminthiasis of the gut, particularly Ascariasis and Trichuriasis, are very common in Indonesian children, but their contribution in causing diarrhea is still questioned.

Fungal infection, especially Candidiasis is also very common in Indonesian children with diarrhea or without diarrhea. Sunoto et al., (1977) found a frequency of 37% out of 1.000 children with diarrhea of more than 5 days dura-

tion. The high frequency of Candidiasis may be due to the wide use of antibiotics, the high incidence of malnutrition and the poor personal hygiene and environmental sanitation. Findings of other investigators revealed a frequency of 38.2% (Ono Dewanoto et al., 1968); 45% and 70.4% (Gracey et al., 1973, 1974) and 22% (Teluk Sebodo et al., 1977).

Malabsorption syndrome

Malabsorption syndromes, particularly secondary lactose intolerance and fat malabsorption occur very frequently in Indonesian children with diarrhea. This high incidence may be in correlation with the high incidence of acute and chronic recurrent gastroenteritis, Protein Calorie Malnutrition, low birth weight infants and the absence of lactose in the food after the weaning period (Suharyono et al., 1972; Sutejo et al., 1971; Sunoto et al., 1974).

B. CHOLERA

Cholera especially *Vibrio Eltor*, has been recognized in Indonesia since 1937, when an epidemic broke out in Makasar (Ujung Pandang), Celebes and its surroundings (de Moor, 1939).

In Jakarta the first case of *Eltor* was detected in 1957 (Gan Kun Han, 1958), while in 1961 epidemics occurred in Central Java, West Java and several places of East Java. Then, since 1970, Cholera *Eltor*, has become endemic in Indonesia.

The reported cases of cholera from 1970 to 1977 could be seen in Table 3 and the results of positive cultures of *V. cholera* could be seen in Table 4. In the last few years cholera cases has been reported also in younger children below 2 years of age (Haroen Noerasid et al., 1975; Suharyono et al., 1976; Komalari-ni and Sanborn, 1976; Budi Santosa et al., 1977).

The case fatality rate due to cholera in the big hospitals before 1965 was still very high i.e. more than 15%, which was reduced to 3% in 1970 and finally to 0% (see Table 5) after the National Seminar on Rehydration in 1974, particularly after the ROSE System was introduced. In this ROSE System R stands for Rehydration with Ringer's Lactate; O for Oral Glucose-Electrolyte Solution; S for Simultaneous-ly and E for Education.

Solving the Problem

In solving the problem of diarrheal disease it was divided into 2 parts, i.e. the long term program and the short term program (Brotowasisto, 1976). A long term program which is aimed at reducing the incidence of diarrhea is carried out through the provision of safe water supply and good latrines, particularly in rural areas. Health Education as an integral part of health activities is expected to improve the personal hygiene of the community while the nutritional program which is aimed at reducing or preventing undernutrition will also decrease the incidence of diarrheal disor-

ders. Since the long term program will take a long time and require a large amount of budget, a short term program is urgently necessary.

This short term program which is also known as Rehydration Program has set as its objective the prevention or reduction of deaths due to diarrhea through the prevention of dehydration and proper treatment of dehydrated cases. With the existing simplified method of rehydration which is recommended by our experts and the WHO, this short term program appears to be most encouraging.

Oral glucose-electrolyte solution, known in Indonesian as ORALIT, is used to prevent dehydration due to any kind of diarrhea. This ORALIT is given orally ad libitum as early as possible to diarrheal cases. It is also used for mild and moderate dehydration or as maintenance therapy after initial rehydration with intravenous fluid therapy in severely dehydrated cases.

A single parenteral solution is used eventhough this solution is not the ideal one. This solution is Ringer's Lactate solution, which is easily available throughout Indonesia, stable, cheap and very practical to use as a single solution.

The composition of ORALIT is as follows:

Ingredient	per liter	per glass
NaCL	3.3 gm	0.6 gm
NaHCO ₃	2.5 gm	0.5 gm
KCL	1.2 gm	0.2 gm
Glucose	22 gm	5 gm

This formula of ORALIT has been made available to all the dispensaries in Indonesia as well as pharmaceutical industries. In places where ORALIT is not available, other oral glucose-electrolyte solutions could be used i.e. WHO or UNICEF formulas or local made formulas with variable composition of glucose and electrolytes. ORALIT is effectively promoted through TV programs, radio, newspapers, magazines and is taught directly to the community workers as well as mothers how to use it properly.

Another aspect in reducing the incidence of diarrhea is by promoting breast feeding up to 2 years particularly in urban areas. A national program of the use of breast milk up to 2 years is now being carried out by the formation of the Working Unit for Promoting Breastfeeding in Jakarta as well as other cities in the rural areas.

One of the activities of this body is to hold a symposium on the promotion of breast feeding, which was attended by various organizations such as women's organization, midwives, nurses, teachers, mothers, etc. A short movie film, radio and TV spot news, newspaper and journals are used in the campaign for promoting breastfeeding. A big poster on the topic is now being made in collaboration with UNICEF and will be held on 22nd December 1977 and the International year of the child in 1979 will also focus on the importance of breastfeeding.

Last but not least the annual evaluation of the National Program of Rehydration which was launched in 1974, revealed a dramatical decline of the case fatality rate of gastroenteritis and cholera which could be seen in Table 5 and 6.

TABLE 1: *Number of Diarrhoeal Disease and Age Specific Attack Rate Lingkungan Layang, Ujung Pandang, 1973*

Age (y)	No. of Population	No. of Cases	Attack Rate (%)
< 1	145	143	98.5
1 — 4	492	801	162.8
5 — 9	487	195	40.0
10 — 14	367	57	15.5
15 — 24	698	62	8.9
25 — 34	515	71	13.7
35 — 44	388	50	12.8
45 — 54	224	48	21.4
55 — 64	84	19	22.8
≥ 65	68	19	28.2
Total	3388	1455	43.0

TABLE 2: *Case Fatality Rate (CFR) of Infantile Gastroenteritis and Dehydration Hospitalized in the Department of Child Health, Medical School University of Indonesia Jakarta (1959 — 1975)*

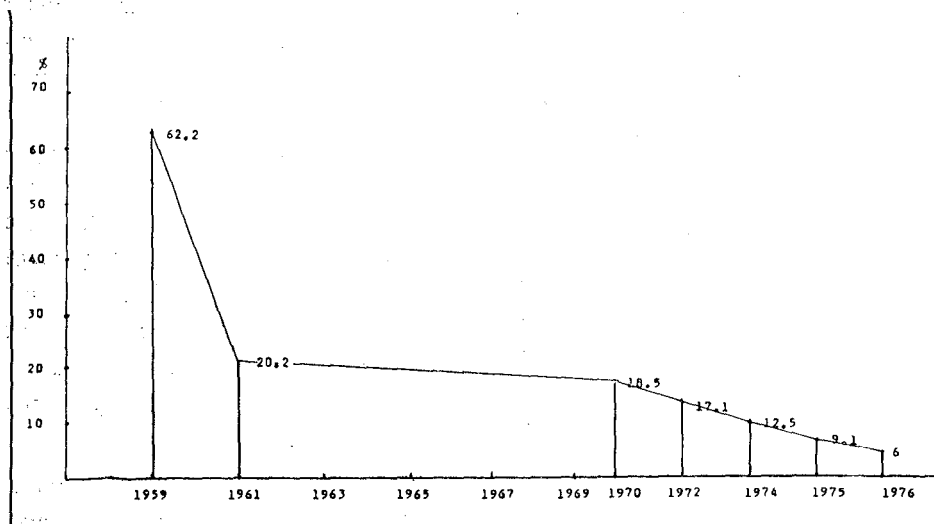


TABLE 3: *Number of cases, death, Incidence per 100.000 and CFR (Case Fatality Rate) of cholera and suspected cholera in Indonesia, 1970 — 1977**

Year	Population per thousand	Case	Death	Incidence per 100.000	C.F.R. (%)
1970	117.333	6.525	1.376	5.5	21.1
1971	120.149	23.351	3.683	19.4	15.6
1972	123.115	43.359	7.004	35.2	16.1
1973	126.088	51.016	2.875	40.5	5.6
1974	129.083	51.702	4.605	40.5	8.8
1975	132.110	53.695	3.790	40.6	7.0
1976	135.279	44.159	2.751	32.6	6.2
1977*	137.973	9.610	480	6.9	4.9

* data collected up to week 21.

TABLE 4 : Results of Positive cultures for *Vibrio cholera*, in Indonesia, 1970 — 1977*

Year	Number of specimens examined	Number of Positive <i>Vibrio cholera</i>	Percentage
1970	1.948	612	32.6
1971	11.663	3.244	27.8
1972	17.727	4.907	27.8
1973	32.629	6.780	20.8
1974	8.697	1.689	19.4
1975	11.520	2.397	20.8
1976	6.730	2.143	31.8
1977*	1.307	270	20.6

* Up to week 21.

TABLE 5 : Number of cases, kind of fluid given, and Case Fatality Rate in general hospitals in Indonesia

Hospital	Number of Cases	Kind of fluid	CFR (%)
1. Dr. Kariadi, Semarang (1961)	14	Ringer — glucose	28.6
2. Dr. Sutomo, Surabaya (1962)	163	Saline + Glucose 5% (2a) or Ringer + Saline + Glucose 5% (3a)	29.0
3. Dr. Hasan Sadikin, Bandung (1965)	60	Saline + glucose + Na-lactate (3a)	16.0
4. Dr. Sutomo, Surabaya (1965)	129	1 L Saline + 1/3 L Na. bicarbonate + glucose 5%	6.2
5. Dr. Sutomo, Surabaya (1971)	153	Modified PCRS *	3.9
6. Dr. Hasan Sadikin, Bandung (1976)	105	ROSE ** System	3.6
7. General Hospital Palembang (1976)	156	ROSE ** System	3.6
8. Pelamonia Hospital Ujung Pandang (1976)	23	Ringer's lactate	0
9. Dr. Cipto Mangunkusumo Hospital, Jakarta (1976)	170	ROSE System	0
10. Sanglah Hospital, Denpasar, Bali (1976)	?	ROSE System	0
11. Pugaran Hospital, Yogyakarta (1976)	?	ROSE System	0

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