

EXPERIENCE WITH DIARRHEAL DISEASE IN A UNIVERSITY PEDIATRIC HOSPITAL*

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In 1987, 3227 diarrhea cases, half of which were infants, presented at the Out-patient Department of the Istanbul University Children's Hospital. An examination of these cases showed that in 1,066 cases diarrheal disease (DD) was accompanied by a coexisting infection or other disease. The cases with severe dehydration, shock or severe systemic disease were immediately hospitalized. All the remaining cases were administered oral rehydration therapy (ORT) in the Diarrhea Unit, and 94.7 percent of them were successfully rehydrated with ORT. Severe dehydration, shock, severe systemic infection, abdominal distention, failure of rehydration by the enteral route, severe protein energy malnutrition (PEM), and the presence of convulsions were the indications for i.v. therapy. The overall mortality rate was 11 percent.

Our experience with DD indicates that widespread implementation of ORT in diarrheal disease and the establishment of Diarrhea Units in large hospitals will contribute not only to saving more lives but will also have an economic impact by reducing the number of admissions. *Key words: diarrhea, dehydration, oral rehydration therapy, infantile diarrhea, diarrhea mortality.*

Diarrhea is one of the major presenting symptoms in the pediatric age group, ranking second to upper respiratory tract infections which top the list. It has been reported that the frequency of diarrheal episodes per child under two years of age is two to three per year in industrialized countries^{1,2}. In developing countries the mean number of yearly diarrheal episodes per child ranges between six and ten³⁻⁶. Unlike the situation in industrialized countries, in areas where malnutrition and infectious diseases prevail, diarrheal disease is a major cause of death in infants and young children^{3,5,6}.

Diarrheal disease also frequently occurs in Turkey. A national survey conducted in 1986 by the Turkish Ministry of Health showed that depending on the area, 10 to 57 percent of children between 0-5 years of age had suffered from at least one

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episode of diarrhea within the previous fortnight⁷. According to data furnished by the Turkish Government, diarrhea ranks third as a cause of all infant deaths in the first year of life (9.3%), and second (13.4%) as a cause of death between the ages of one and four⁸. In this paper, our experience with diarrheal disease in a children's hospital, based on the examination of patient records accumulated in 1987, is presented.

Material and Methods

Since 1983, oral rehydration therapy (ORT)⁹ has been used instead of parenteral fluid therapy in the Istanbul University Children's Hospital at Çapa, as routine treatment for mild-moderate dehydration due to diarrhea. Routine management of these patients by residents practicing in the Out-patient Department necessitates that they grade patients according to a slightly modified World Health Organization (WHO) criteria⁹.

Thus, Grade 1 includes diarrheal disease (DD) cases with no clinical symptoms except for diarrhea (mild cases); Grade 2 includes DD cases with vomiting or history of severe purging and/or mild to moderate dehydration; Grade 3 includes DD cases with moderate dehydration accompanied by high fever, with or without symptoms of coexisting disease, and Grade 4 includes DD cases with severe dehydration with or without symptoms of other disease and also cases who are not severely dehydrated but have a severe coexisting disease. All the cases in Grades 1, 2 and 3 are transferred to the Diarrhea Unit (DU). Following reevaluation Grade 3 patients may be kept in the DU or sent to the Emergency Care Unit for admission. WHO standard ORS with 90 mmol/L sodium has been used in oral rehydration therapy.

Grade 1 patients are kept in the DU for only one hour, providing their condition is improving and the purging is not severe, during which time they are administered ORT. The mothers of the patients are then given a demonstration on how to administer the solution at home, the feeding routine, and are cautioned about watching for danger signs. Grade 2 and Grade 3 cases are administered ORT and are monitored closely for any vital signs, vomiting, fever, tolerance of ORT, and the rate of purging for a minimum period of four hours. At the end of this period, the patient may be kept in the Unit for another four hours, hospitalized in the Emergency Care Unit, or sent home, depending on the clinical assessment of the patient and also on whether or not the mother is capable of following instructions as to the administration of the therapy at home. All Grade 4 cases are admitted directly to the Emergency Care Unit. All the diarrheal disease cases who presented at the General Out-patient Department of the Istanbul University

Children's Hospital at Çapa from January to the end of December 1987, were studied.

A special form is filled for all diarrheal cases which includes the following: patient's age, duration of diarrheal episode, degree of dehydration, coexisting disease, route of administration of fluids, purging rate, reasons for resorting to nasogastric or i.v. administration of fluids, nutritional state, and if hospitalized, reasons for hospitalization and outcome. An etiological approach was not considered in this study.

Results

Out of a total of 54,242 patients seen at the General Out-patient Department of the Hospital in 1987, diarrhea ranked second to upper respiratory tract infections as the presenting symptom. The number of diarrhea cases was 3,227 (6 % of total outpatient cases). In 1,066 DD patients (33%), the diarrhea was accompanied by a coexisting infection or other disease, while in 2,161 patients (67%) all the symptoms and signs were diarrhea-related. The lowest number of cases was seen between January and May, while a peak was observed in August (Fig. 1).

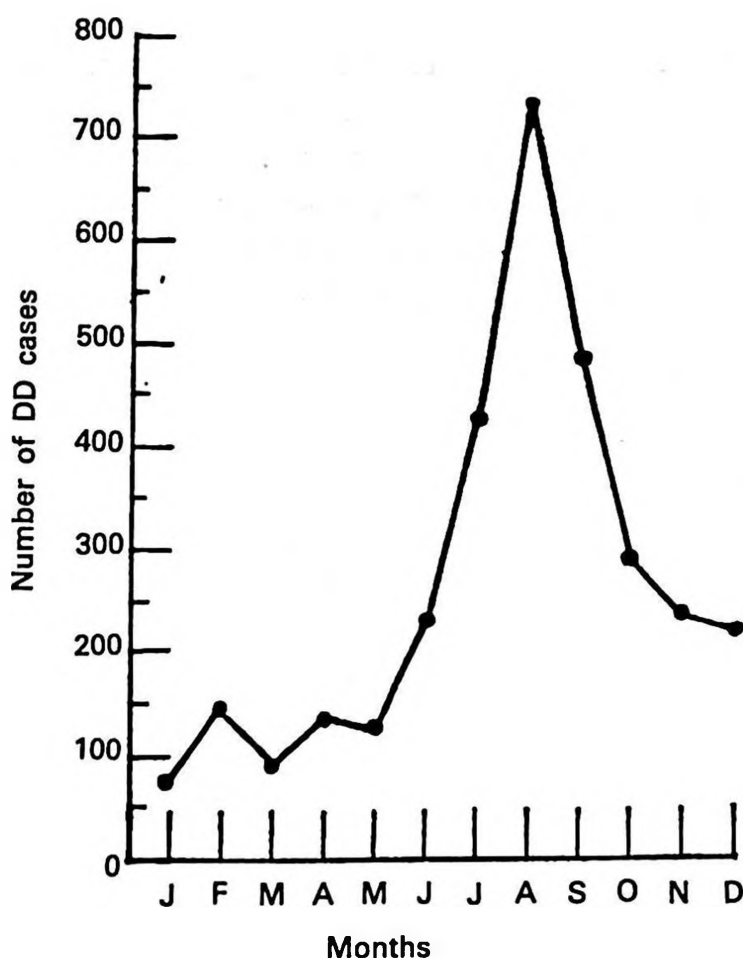


Fig. 1. Seasonal distribution of DD cases

As shown in Table I, about half of the patients were in the 0-1 year-old age group. The degree of severity of the diarrhea was found to be related to age. While the ratio of Grade 4 cases was 5.2 percent of the total group, this ratio was 15 percent for the youngest infants and showed a stepwise decrease with age (Table I).

TABLE I: Classification of DD Cases According to Age Group

Age Group	Grade 1		Grade 2		Grade 3		Grade 4		Total	
	n	%	n	%	n	%	n	%	n	% (of total group)
0-3 mo	248	59.1	61	14.5	48	11.4	63	15.0	420	13.0
4-12 mo	906	74.5	151	12.4	92	7.6	67	5.5	1216	37.7
13 mo-4 yrs	916	85.1	77	7.2	52	4.8	32	3.0	1077	33.4
≥5 yrs	442	85.9	33	6.4	31	6.0	8	1.6	514	15.9
TOTAL	2512	78.0	322	9.9	223	6.9	170	5.2	3227	100.0

Table II gives the body weight distribution of the group. Weight was below the 3rd percentile for age in 3.4 percent of the cases, and below the 10th percentile in 16.2 percent of the cases.

With the exception of the cases with severe dehydration, shock or severe systemic disease, all the patients in the Diarrhea Unit were administered ORT. Rehydration with ORT was successful in 94.7 percent of these cases. In the remaining cases, i.v. fluid administration had to be resorted to. The two major indications for changing to parenteral therapy in this group of patients was the development of abdominal distention and the worsening of the dehydration.

TABLE II: Nutritional Status of the Patients

Weight for age percentile	n	%
< 3	110	3.4
3 – 10	413	12.8
> 10	2704	83.8

A total of 333 patients were hospitalized directly or as transfers from the DU. The hospitalization rate was 100 percent for the total group and was inversely correlated with age, being highest (24.3%) for infants under three months of age (Table III).

TABLE III: Rate of Hospitalization According to Age Group

Age group	n	Rate of hospitalization %
0 – 3 mo	102	24.3
4 – 12 mo	146	12.0
13 mo – 4 yrs	50	4.6
≥ 5 yrs	35	6.8
TOTAL	333	10.0

The reasons for hospitalization were severe dehydration and/or shock, severe systemic infection, abdominal distention, failure of rehydration by the enteral route, severe protein energy malnutrition (PEM) and convulsions, respectively. All these patients received fluids parenterally. Indications for i.v. administration are shown in Table IV.

In 70 (21%) of these cases, it was possible to change to ORT at the end of a four-hour period.

TABLE IV: Reasons for I.V. Therapy in Hospitalized DD Cases

Reasons	n	%
Severe dehydration / shock	223	67.0
Severe infections except diarrhea	77	23.1
Abdominal distention, paralytic ileus	16	4.8
Severe PEM	10	3.0
Convulsion	7	2.1
TOTAL	333	100.0

Overall mortality rate was 11 percent (37 hospitalized cases), and it was highest in young infants (Table V).

The causes of death are given in Table VI. Weight for age was below the third percentile for age in 35 out of 37 fatal cases with severe PEM in eight¹⁰.

TABLE V: Mortality in DD Cases According to Age Group

<u>A g e</u>	<u>n</u>	<u>Mortality rate (per 1000)</u>
0 - 3	22	52
4 - 12 mo	11	9
13 mo - 4 yrs	3	3
> 5 yrs	1	2
TOTAL	37	11

TABLE VI: Cause of Death in Fatal DD Cases

	<u>n</u>
Sepsis and septic shock (Paralytic ileus in one)	15
Severe PEM	8
Bronchopneumonia	7
Acute renal failure	4
Encephalitis	2
Immune deficiency (Thymic hypoplasia at autopsy)	1
TOTAL	37

Discussion

Although the aim of this study was not epidemiological, the high frequency of diarrhea occurring among the children brought to our Out-patient Department, many in a dehydrated state, stresses the importance of DD as a major pediatric problem in a large city of Turkey.

Our experience with this group of patients shows once again that dehydration resulting from diarrhea can be successfully treated with ORT in the large majority of cases^{11,12}. Thus, most of our patients were kept in the DU, and the rate of hospitalization in this group was much lower (10%) as compared to the years before the advent of ORT as routine treatment for DD in our hospital. The rate of admission of diarrheic patients seen in our Out-patient Department was 38 percent in 1981¹³.

This study also documents that diarrhea, complicated by severe coexisting disease and/or severe dehydration with consequent need for parenteral therapy and

hospitalization, occurs more frequently in young infants. As reported by other workers, neonates and young infants are more prone to developing severe dehydration in a relatively short period of time, and the microorganisms responsible for the diarrhea may also cause systemic severe infection in this age-group¹⁴⁻¹⁷. Young infants are also more prone to undesirable effects of oral rehydration such as abdominal distention, hypernatremia and/or persistent diarrhea¹⁷. The particular importance of close observation and careful follow-up in this vulnerable age group cannot be overemphasized.

An overall mortality rate of one percent associated with DD is reported in non-industrialized countries^{18,19}. In a recent report, it was stated that 500 pediatric deaths from DD occur annually in the U.S.A., 400 of which are infants under one year²⁰. According to data furnished by the Turkish Ministry of Health⁸, approximately 30,000 deaths occur annually from diarrhea in Turkey. Overall mortality in this series was one percent. Since this is a selected group of cases, consisting of children brought to the hospital, the said high mortality rate does not reflect overall diarrhea mortality in Istanbul. Indeed, the risk of death was ten-fold in patients who presented with diarrhea complicated by severe dehydration and/or metabolic disorders, or accompanied by the late stage of a severe coexisting infection. Age and nutritional state were also factors influencing prognosis. Almost all the deaths occurred in malnourished infants under one year of age.

In conclusion, our experience with DD indicates that a Diarrhea Unit should be an indispensable part of a hospital in areas where diarrhea is a major pediatric problem. The establishment of such units will contribute not only to saving more lives, but will also have an economic impact, in that the number of admissions will be less.

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