

**PERSISTENT DIARRHEA:  
MANAGEMENT IN A  
DIARRHEA TREATMENT  
UNIT**

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**ABSTRACT**

Five hundred ninety two children (6.0%) were diagnosed as -persistent diarrhea (PD) out of a total attendance of 9795 cases in the Diarrhea Training and Treatment Unit (DTU) over a period of 1 year. Most of the cases were initially managed as outpatients on dietary advice and treatment of associated infections. Eighty eight per cent of the cases followed as outpatients from the DTU responded to treatment and only 11.6% of them had to be hospitalized. A total of 49/592 cases (8.3%) required to be hospitalized on account of treatment failure from outpatients and other indications. Clinical spectrum of hospitalized children included severe malnutrition (40.8%), pneumonia (40.8%), urinary tract infection (32.7%), lactose intolerance (32.7%), anemia (28.6%), septicemia (16.3%), dysentery (8.2%) and neck flop due to hypokalemia (4.1%). Dietary management included modifications in the diet already offered to hospitalized patients. Thirty eight children were fed on one of these diets. Of these 13/35 children (37.1%) were successfully managed with lactose reduced diet, 18/22 cases (81.8%) with lactose free diet and only in 2 cases carbohydrate free diet was given.

Persistent diarrhea (PD) refers to an episode of diarrhea which is presumed to be caused by infectious agents, that begins acutely but lasts more than 14 days(1,2). Studies from several developing countries have shown that 3-20% of acute diarrheal episodes in children under 5 years of age become persistent(1). A number of risk factors have been associated with PD(2-6). From management point of view, PD is largely a nutritional disease and a number of dietary recommendations have been suggested by several workers(7,8). However, such special diets may not be available in most of the hospitals which

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*In 3 cases, normal feeding was continued. Eleven cases were too sick to be offered any oral feeding. Eleven of forty nine cases (22.4%) expired. Mortality was highest in infants <6 months (31.6%). The causes of death included severe malnutrition (14.3%), septicemia (14.3%) and pneumonia (12.2%).*

*Screening and treating cases of PD for associated infections like septicemia, pneumonia and urinary tract infection seems to be a key factor which determines morbidity and mortality in these cases. Feeding on a hospital food modified as lactose reduced/free diet can benefit majority of cases with PD and a very small proportion of cases may require carbohydrate free diet.*

**Key words:** *Persistent diarrhea, Risk factors, Nutritional management.*

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face the major brunt of PD. The present study highlights clinical profile and management of PD in a hospital having limited resources and faced with the responsibility of managing a heavy patient load of PD.

### Material and Methods

This prospective study was conducted for a period of 1 year in Diarrhea Training and Treatment Unit (DTU) at Kalawati Saran Children's Hospital, New Delhi and included routine diarrhea cases attending the unit. In addition to historical data collected routinely on standard diarrhea case record forms of the DTU like duration, consistency, frequency and presence of blood in the stool, additional information regarding details of feeding, history of recent introduction of animal milk or formula, recent diarrheal illness and consumption of antibiotics/drugs before reporting to hospital were recorded for all those cases who had diarrhea for >14 days. A thorough clinical examination was performed. Assessment and treatment of dehydration, and indications for the use of antibiotics were based on standard treatment protocol(9).

Majority of patients were investigated on outpatient basis and sent home on appropriate treatment for associated infections and dietary advice of reducing lactose content in the diet which the child was already getting. Admissions were restricted to those cases who did not improve on dietary management at home; infants less than 4 months of age; with evidence of severe dehydration, severe malnutrition, severe lactose intolerance or associated infections. Hospitalized cases were investigated thoroughly

with complete hemogram; urine (routine and culture); stool microscopy, pH, reducing substances and culture; Mantoux test and X-ray chest. All the children who were able to take orally were given normal diet for first 24 hours during which the child was rehydrated with ORS/intravenous Ringer's lactate depending upon the state of hydration. Thereafter they were started on lactose reduced diet for next 3 days. In case there was improvement in volume, consistency and frequency of stools, the same diet was continued and gradually the intake was increased. If there was no improvement in volume, consistency or frequency of stools, feeding was changed to lactose free diet and if it also was not helpful the child was put on carbohydrate free diet. Already available hospital diet was modified to suit the needs of the hospitalized children. Diets offered to infants less than 6 months of age included (a) *Lactose reduced diet*: breast milk + puffed rice with curd (puffed rice 5 g, curd 75 ml, sugar 2.5 g, water q.s. to make 100 ml), (b) *Lactose free*: chicken-glucose puree (chicken 10 g, glucose 4 g, coconut oil 4 g, water q.s. to make 100 ml). For children more than 6 months of age diets offered included: (a) *Lactose reduced*: khichri (rice 10 g, cooked moong dal 5 g, vegetable oil 2.5 g, sugar 2.5 g, water q.s. to make 100 ml) + curd- the ratio of khichri to curd being 3:1, (b) *Lactose free diet*: semisolid khichri (rice 15 g, moong dal 5 g, sugar 2.5 g, vegetable oil 2.5 g, water q.s. 100 ml) (Table 1). Children were encouraged to feed to achieve a caloric target of 90-100 kcal/kg/day along with plain water *ad libitum* and then gradually increased. In anorexic children, mothers were encouraged to offer

TABLE I—Dietary Regimen

Dietary regimen	Total calories (KCal/100 ml)	Protein g%	Carbohydrate g%
(a) Lactose reduced			
<6 months			
Puffed rice with curd 100 ml	72	2.7	7.1
>6 months			
Khichri (100 ml)	83	1.9	8.8
Curd (33 ml)	20	1.0	1.3
(b) Lactose free			
<6 months			
Chicken-glucose puree 100 ml	72	2.6	4.0
>6 months			
Khichri (semisolid) 100 ml	97	2.3	11.9

small frequent feeds to achieve the minimum caloric target. It was not possible to offer lactose free diet to infants <6 months of age and carbohydrate free diet from the hospital and therefore, parents were asked to buy lactose free milk and chicken from the market wherever indicated. Oral supplementation of vitamins and minerals was given to all the patients.

### Results

The study was conducted from January-December 1992. Out of a total attendance of 9795 cases of diarrhea, 592 children (6.0%) with male female ratio of 3:2 had diarrhea for more than 14 days. Duration of diarrhea before coming to DTU ranged from 17 to 35 days. Peak incidence of PD was noticed between April and September. Age distribution ranged

from 2 months to 34 months. Clinical profile of PD cases revealed that majority of cases were below 2 years of age (91.7%), on artificial milk (84.6%) and had consumed one or the other antibiotic/drug of unknown nature (92.8%). Other features included bloody stools, history of recent introduction, of animal milk and recent diarrheal illness (*Table II*). Most of these cases were sent home on dietary advice with specific treatment for their associated infections. Only 233 cases (39.4%) came for regular follow up in the DTU; 206/233 cases (88.4%) responded to domiciliary treatment and only 27 (11.6%) cases were admitted as they did not improve. Twenty two cases were directly admitted in the first visit on account of other indications for admission.

Forty nine cases (8.3%) out of 592

TABLE II—Clinical Profile of Persistent Diarrhea

Clinical profile	Outpatients (n=453)		Hospitalized cases (n=49)			
	No. of cases	%	Cases admitted		Cases died	
			No. of cases	%	No. of cases	%*
Age distribution (mo)						
<6	177	32.6	21	42.8	6	28.6
6-11	198	36.5	16	32.7	4	25.0
12-23	123	22.6	9	18.4	1	11.1
24-36	45	8.3	3	6.1	-	-
Recent introduction of animal milk in infant <1 year	75	20.0	8	21.6	2	25.0
Prior use of antibiotics/ drugs of unknown nature	504	92.8	38	77.5	7	18.4
Recent diarrheal episode	64	11.8	23	46.9	6	26.1
Severe malnutrition	89	16.4	20	40.8	7	35.0
Blood in stool	106	19.5	4	8.2	-	-
Dehydration	119	21.9	5	10.2	-	-
Pneumonia	31	5.7	20	40.8	6	30.0
Oral thrush	7	1.3	4	8.2	-	-
Vitamin A deficiency	7	1.3	4	8.2	-	-
Severe hypokalemia with neck flop	-	-	2	4.1	-	-
Lactose intolerance	16	4.8	16	32.7	-	-
Urinary tract infection	20	3.7	16	32.7	-	-
Anemia	31	5.7	14	28.6	-	-
Septicemia	-	-	8	16.3	-	-

\* Percentage of deaths out of total cases admitted in that group

children with PD were hospitalized for different indications. Majority of them were infants less than 1 year of age (75.5%). It was interesting to observe that 33/49 cases (67.3%) had one or more associated infections like pneumonia, urinary tract infection and septicemia besides dysentery (8.2%) (Table II).

Amongst hospitalized children, proportion of cases with severe malnutrition, pneumonia, lactose intolerance, and urinary tract infections was higher than those managed as outpatients. Pathogens isolated/detected from the stool included *Escherichia coli* (n=6), *Shigella* (n=2), trbphozoities of *G. lamblia* (n=2)

and non-pathogenic organism (n=4). Out of these 49 cases, 35 were put on different diets (Table I). Three cases continued normal feeding since they showed improvement within 24 hours of hospitalization. These diets were supplemented with oral intake of vitamin 13 complex, vitamin A, and zinc in therapeutic doses. Iron supplementation was given as 1 mg/kg/day of elemental iron and the dose gradually increased later on wherever indicated. A large proportion of cases had anorexia and hence minimum caloric target could not be achieved in the beginning. However, with management of associated infections and persuasion by the mother, the intake gradually improved. None of the cases required gavage feeding. Three of the thirty eight cases (7.9%) improved on normal diet, 13/35 (37.1%) on lactose reduced diet, 18/22 (81.8%) on lactose free diet and 2/2 (100.0%) on carbohydrate free diet. Fifty three per cent of 38 cases who survived improved on one or the other dietary regimen and were discharged after diarrhea stopped and they showed a weight gain. Forty two per cent had significant reduction in stool volume and frequency, and improvement in consistency of stools but had no weight gain till the time of discharge. Duration of hospital stay ranged from 5-18 days (average  $9.8 \pm 3$  days). Two of the thirty eight infants (5.3%) less than 4 months of age did not improve on lactose free diet and left the hospital against medical advice. However, it was reassuring to note that 5/15 infants (33.3%) below 6 months of age responded to modified hospital diet with reduced lactose content.

Eleven cases (22.4%) who eventually expired were too sick for oral feeding

and continued on intravenous fluids. Mortality was highest in patients with septicemia, severe malnutrition, age less than 6 months and pneumonia (Table II).

### Discussion

Identification of children with PD amongst a large number of patients of diarrhea is of paramount importance as they need special attention. Diarrhea Training and Treatment Units in referral hospital can play a vital role in this regard as the health personnel working in such a setup are quite aware and well versed with the problems associated with PD and their management. In our DTU, 6% of cases were diagnosed as PD over a one year period which is slightly lower than reported by Shahid *et al.*(5). Prevalence was highest during April-September which incidentally followed the same trend as that of diarrheal diseases in general. No seasonal variation has been noticed by others(2,5). Ninety two per cent of our total cases were below 2 years of age, with majority of them (69.1%) aged less than 1 year. Bhan *et al.*(2) have also noticed highest incidence of PD among infants less than 11 months, incidence being greatest among 3-5 month olds. However, in another study(5) the peak age was 2 years, probably due to a different patient population.

Association of known risk factors like recent introduction of animal milk(2,4,5) was noticed in 20% of infants below 1 year of age. The reason for this association is believed to be due to unhygienic circumstances and bottle feeding which is the leading cause of contamination of animal milk with pathogenic bacteria, intestinal mucosal

damage by animal proteins and/or osmotic diarrhea due to secondary lactose intolerance during acute diarrheal episodes. A much higher risk of persistence of acute diarrhea has been noticed with liquid animal milk in comparison to spray dried infant formula(4). None of our cases was on any infant formula.

Other known risk factors like recent history of diarrheal episode, severe malnutrition, blood in the stool and vitamin A deficiency were noticed in a much higher percentage of cases in comparison to other workers(5,6). Indiscriminate use of antibiotics/other drugs has been associated with, etiology of PD(5,6). Ninety three per cent of our cases had consumed some antibiotic/drugs of unknown nature prior to reporting to the hospital. However, it is very difficult to clearly differentiate between cause and effect relationship with these risk factors.

Persistent diarrhea is largely a nutritional disease as it leads to self perpetuation due to severe malnutrition and malabsorption. These patients are also likely to be deficient in various vitamins and minerals. Those of particular importance, because of their role in the renewal and repair of intestinal mucosa and/or in normal immunological response, include folate, vitamin B12, vitamin A, zinc and iron. Therefore nutritional therapy needs to be tailored to meet all these requirements. Many workers have suggested a number of dietary regimens with good results(7,8). However, it may not be possible to offer these diets in most of the referral hospitals which have a common kitchen for all types of patients including adults. Incidentally a major proportion of PD

cases are managed in such hospitals.

Bhutta *et al.* (11) have observed clinical results with traditional rice-lentil based diet mixed with yoghurt to be as effective as lactose free soy based diets. Rice is easily tolerated by children and has rarely been associated with allergy(12,13). In addition, the hydrolysis of the starch and protein provides cotransport molecules which may improve mucosal ion transport(12)<sup>v</sup> and a greater reduction in stool volume. Carbohydrates and proteins in khichri may also aid intestinal mucosal repair mechanisms(14). Our results highlight that 89.5% of hospitalized cases could be supported nutritionally by normal, lactose reduced or lactose free diet. It was quite reassuring to observe that all the children more than 6 months of age responded to khichri + curd/semisolid khichri and none of them required chicken feeds. It was also encouraging to observe that even 33.3% infants <6 months of age responded as well to simple lactose reduced diet with puffed rice and curd like the older children. However, 10 infants in this age group (47.6%) who were mostly less than 4 months of age did not respond to this regimen and commercially available lactose free milk/chicken had to be procured for them. Two infants had to be put on carbohydrate free diet. Therefore, we feel that management of infants less than 4 months is quite difficult particularly in non breast-fed babies as providing lactose free and carbohydrate free formula to these babies is quite expensive for a hospital set up with average resources. However, those patients who are too sick to take orally or through nasogastric tube are at the greatest risk since facilities for total or

partial parenteral nutrition do not exist in most of the hospitals. Our results are not comparable with that of Bhutta *et al.*(11) because 42.8% of our cases were below 6 months of age, and many patients could not remain with us till a satisfactory weight gain could be recorded. Moreover, dietary therapy was supplemented by antibiotic therapy since 75.5% of our cases had gastrointestinal infection or associated sepsis elsewhere.

Visible blood was noticed in the stool in only 4 cases, Shigella isolated in 2 cases and trophozoites of *G. lamblia* detected in only 2 cases. No attempt was made to isolate enteroaggregative *Escherichia coli* due to lack of facilities. Association of infections like septicemia, pneumonia and urinary tract infection was observed to be quite high. Our observations suggest that suspecting associated infections, investigating them thoroughly and instituting appropriate treatment is the key to proper management of PD as these problems seem to play a greater role as far as the morbidity and mortality is concerned. Therefore, optimum utilization of investigatory facilities like X-ray chest and urine culture studies are quite rewarding as urinary tract infection and sometimes pneumonia may be easily missed on clinical examination.

Mortality remains quite high in PD in association with septicemia and pneumonia(4). Despite appropriate management of infection, 22.4% of our cases expired. Mortality was highest in infants less than 6 months of age, and those with severe malnutrition, septicemia and pneumonia. To what extent parenteral nutrition, if available, together with antibiotic therapy could

have reduced the mortality needs to be evaluated by further studies.

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