



# Glimpse

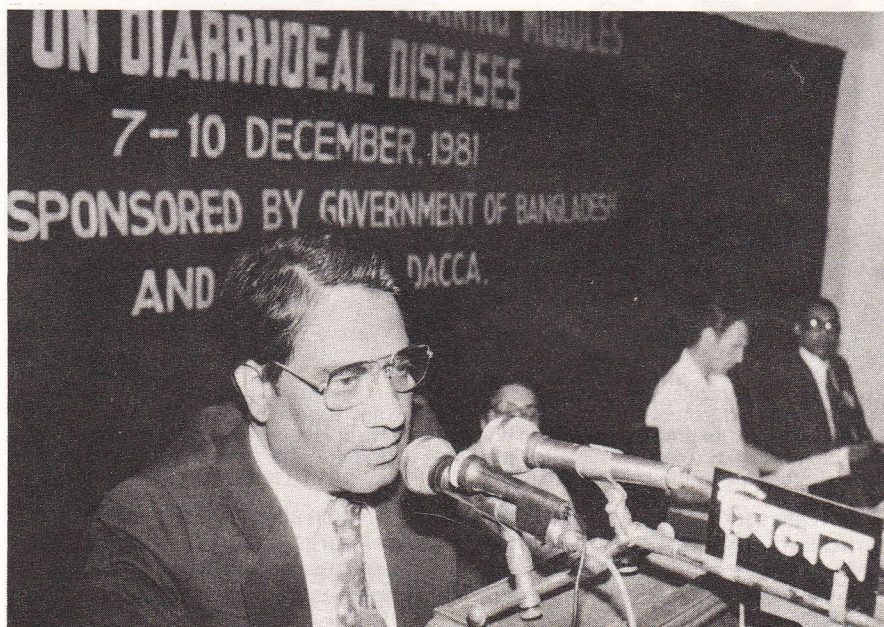
International centre for  
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## NATIONAL WORKSHOP TO DEVELOP TRAINING MODULES ON DIARRHOEAL DISEASES

A four-day national workshop to develop training modules on diarrhoeal diseases was inaugurated by Professor M.A. Matin, Minister for Home Affairs, Government of Bangladesh and Chairman of the ICDDR,B Board of Trustees, on December 7, 1981. This workshop was jointly sponsored by the Government of the People's Republic of Bangladesh and the International Centre for Diarrhoeal Disease Research, Bangladesh. This is the second workshop on the subject, the first one was held in Dacca on 15-21 November, 1980.

The current medical curriculum is basically oriented towards the western pattern of medicine. Hence the medical graduates often cannot develop the skills required for coping with their own local pathological conditions with particular reference to diarrhoeal diseases. The present curriculum followed by medical colleges in the country do not pay required attention to the priority health problems. Though there are departments of community medicine in all medical colleges, still their activities are often limited to didactic teaching. There is little scope for practical epidemiological field training in diarrhoeal diseases. In teaching basic science disciplines and com-



Prof. M.A. Matin, Minister for Home Affairs, Government of Bangladesh and Chairman of the ICDDR,B Board of Trustees speaking at the inaugural session of the National Workshop to Develop Training Modules on Diarrhoeal Diseases.

munity medicine, proper emphasis has not been placed on integration of basic science subjects to clinical and preventive aspects of diarrhoeal diseases. Practical aspects of laboratory training in relation to diarrhoeal diseases are also inadequate. It was also identified that the current curriculum and method of teaching cannot motivate the students to learn the basic in-

formation and to acquire adequate skills in coping with the problems of diarrhoeal diseases. In the first workshop on medical education on diarrhoeal diseases and related subjects it was felt that neither teaching materials (e.g. up-to-date information on diarrhoeal diseases), nor the time allocated for teaching was adequate. The objective of the first workshop was to

provide with a curriculum that will enable students with adequate integrated knowledge and skills in order to be able to cope with the local problems with particular reference to diarrhoeal diseases and related subjects.

In the four-day second national workshop to develop training modules for diarrhoeal diseases it was recommended that top priority should be placed on teaching management of diarrhoeal diseases to under-graduate medical students. To attain this goal, it was recommended that the knowledge of teachers of medical schools should be updated on diarrhoeal diseases. ICDDR,B would provide the teachers with recent literature on the subject and help develop a manual for training, it was also recommended that ICDDR,B, if possible would supply audio-visual materials. The teaching manual should contain up-to-date and practical knowledge on prevention and management of diarrhoeal diseases, specially in the acute stage.



Professors of Medicine, Paediatrics and Community Medicine from all the eight Medical Colleges and the Institute of Post-Graduate Medicine and Research, Bangladesh discussed the limitations of the present curriculum and came up with recommendations to develop a curriculum which will equip the medical graduates with knowledge to manage the particular medical problems of the region better.

It was recommended that the curriculum should be so designed that it provides knowledge and develops the skills of the students as follows:

1. to diagnose and manage diarrhoeal diseases in the field, health centres and hospitals;
2. to enable the students to train persons in the community, either practitioners or paramedics or the public, regarding management of diarrhoeal diseases and on the preparation of the oral rehydration solution;
3. to be able to organize a team for taking appropriate steps to diagnose and treat diarrhoeal diseases in case of outbreaks;

# UTILIZATION OF NUTRIENTS DURING AND AFTER DIARRHOEA

## Nutrition and Diarrhoea

The interaction between malnutrition and infection has been clinically and epidemiologically established in children living in developed countries<sup>1</sup>. Frequency, duration and the severity of infection has been shown to be inversely related to the nutritional status of a child<sup>2</sup>.

In developing countries diarrhoea is the most common illness among the children aged under 5 years. Factors known to influence the nutritional status in diarrhoea are:

- (1) decreased food intake due to anorexia or loss of appetite;

- (2) practice of withholding of food as a measure to control diarrhoea;

- (3) loss of nutrients in the faeces due to rapid transit or malabsorption in the gut;

- (4) increased catabolism due to infection.

As long as the child is breast-fed he gets enough nutrients, though not adequate quantity of calories, which may be manifested by marasmus. During and after weaning, which in Bangladesh takes place around 2 years of age or later the child is usually cutoff from his main source of protein i.e. breast milk.

Drs. Majid and Ayesha Molla in their study "Role of Nutrition in the Management of Acute Diarrhoea" reviewed some studies and tried to answer the questions: How long does it take to revert back to normal appetite after diarrhoea? What is the pattern of absorption of macronutrients in diarrhoea due to different etiologies? Should food be offered in diarrhoea? and if so, what kind of food?

The daily required amount recommended by FAO/WHO in 1973 is 100 Kcal/kg and 1.25 gm/kg of protein. Studies in other countries showed that among all the childhood diseases, diarrhoea had the greatest impact on food intake of the children. Chen et al<sup>3</sup> of ICDDR,B carried out a study in Matlab to compare the food intake of children with diarrhoea and a control group of healthy children matched for age. This study demonstrated a reduction of 40% food intake in diarrhoea compared to healthy children. Most important point in this study was that intake of calories derived from breast milk did not decrease even during acute diarrhoea.

## Impact of Diarrhoea on the Nutrient Absorption

Absorption of nutrients in diarrhoea was thought to be affected by rapid transit time or reduced enzymatic activities or because of damage to the mucosa by the

4. to be able to make epidemiological surveys and take appropriate measures for the prevention of diarrhoeal diseases.

Students must practice treatment of diarrhoea in the indoor and outdoor facilities of medical colleges under the supervision of an instructor assigned to rehydration therapy. During field practices, the students should be placed to acquire practical skills in rehydration centres.

Professors of Medicine, Paediatrics and Community Medicine from eight Medical Colleges in Bangladesh and Institute of Post-Graduate Medicine and Research participated in the workshop.

invasive organisms. The whole gut transit time and its relationship with absorption of macronutrients during diarrhoea and after recovery was studied<sup>4</sup>. Results suggest that the transit time of the food through the gut does not provide any index for the measurement of malabsorption in any stage of diarrhoea, rather it seems that both the processes are controlled by independent mechanisms. It was concluded that whole gut transit time alone probably does not explain the malabsorption in diarrhoea.

the contrary they suffer for a prolonged period of time with a result of decreased food intake even after 2 weeks of recovery. The impact of diarrhoea in rotavirus was further reflected by the absorption data. The conclusions of their study were: though on an average 30% reduction in food intake takes place in the acute stage of diarrhoea of all etiologies, feeding, including breast milk should be continued. There is no apparent adverse effect from food intake on the volume/duration of diarrhoea. Despite

gard to absorption of nutrients during acute and recovery stages of diarrhoea.

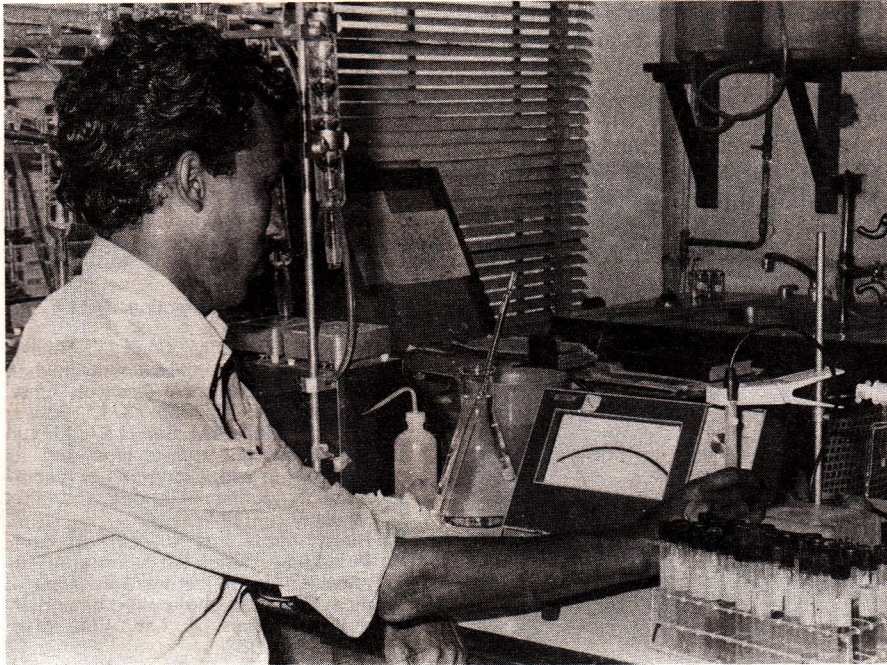
Twenty-nine male children all aged below 5 years with a history of acute watery diarrhoea with moderate to severe dehydration were studied. There were 13 with rotavirus, 10 with *E. coli* and 6 with shigella. Some physical and clinical features of the study patients are presented in Table 1.

Patients with rotavirus were younger than those with ETEC and shigella. Body weight increased between acute and recovery stages 1 and 2 in all groups (recovery stage 1 is two weeks after recovery, recovery stage 2 is eight weeks after recovery). During the acute stage, absorption of nitrogen was significantly less ( $P < .01$ ) in rotavirus than in ETEC. At recovery 1 absorption of nitrogen did not differ significantly between the three etiologies.

During the acute stage absorption of fat and calories was significantly less in rotavirus patients compared to ETEC patients ( $P < .01$ ). There was no statistical difference in the absorption of either fat or calories between rotavirus and shigella patients during the acute stage of diarrhoea.

In all etiologies of diarrhoea, absorption of carbohydrate was least affected, this was seen during the acute stage. In diarrhoea due to ETEC, all nutrients were comparatively better absorbed in the acute stage than the recovery stage 1. However in recovery stage 2, absorption of nutrients in ETEC diarrhoea substantially increased compared to stage 1.

Serum xylose levels were also measured during the different stages of the study. On an average 75% of the diarrhoea patients were found to be xylose malabsorbers at the acute stage (absorbing less than 20 mg% of xylose). However this was reduced to 10% at recovery 1. When attempt was made to see the relationship between xylose absorption and the absorption of nutrients, discrepancies were obvious, specially between the absorption of carbohydrate and xylose. Despite the lower xylose absorption level, absorption of carbohydrate was 74% in rotavirus, 92% in ETEC and 77% in shigella during the acute stage. This discrepancy between xylose absorption and carbohydrate absorption may indicate that the absorption status of xylose is not a valid reflec-



The different aspects of absorption of the nutrients were measured in the laboratory. It was interesting to note that serum xylose absorption is not always an indicator of carbohydrate absorption. A technician is measuring the pH of the intestinal contents.

A study on the enzymatic activities in diarrhoea<sup>5, 6</sup> showed that diarrhoea caused depression of the disaccharidases activities during the acute stage but all returned to normal after recovery. Except lactase the transient reduction in the activities of the other enzymes would not affect the digestion and absorption of food during diarrhoea. In a study Chung et al<sup>7</sup> showed that the duration of diarrhoea was comparatively shorter in the group who were fed, compared to the group who were starved during diarrhoea.

In another study<sup>8</sup> it was found that food intake was reduced in the acute stage by about 30%. In rotavirus the reduction in food intake was less remarkable, 18%, compared to shigella which was 56%. It does not necessarily mean that the children with rotavirus ate more during acute diarrhoea but on

various pathophysiological mechanisms involved, a substantial amount of nutrients are absorbed in the acute stage of diarrhoea due to any etiology. Carbohydrate absorption is least affected in the diarrhoea due to any etiology.

#### **Effects of Diarrhoea on Absorption of Macronutrients during Acute Stage and after Recovery**

The effect of diarrhoea on absorption of macronutrients during acute stage and after recovery was studied in ICDDR,B<sup>9</sup>. The effect of diarrhoeal illness on the coefficients of absorption of macronutrients were estimated in a group of children both in the acute stage of diarrhoea and at two and eight weeks after recovery. The results of this study indicated several differences between the etiologies of diarrhoea with re-

tion of the absorption of a natural carbohydrate and other nutrients.

Both during the acute and recovery stages stool weight was taken every 24 hours, during the acute stage of diarrhoea there was a general tendency for the stool weight to decrease gradually.

### Rotavirus

In the acute stage of rotavirus, diarrhoea absorption of all the nutrients were significantly lower compared to absorption in ETEC diarrhoea. Absorption of nitrogen in rotavirus did not improve even eight weeks after recovery, signifying a prolonged malabsorption period. In rotavirus infection the villous epithelial cells are specifically affected<sup>10</sup> and the inflam-

absorbed compared to 92% in ETEC and 77% in shigella.

### ETEC

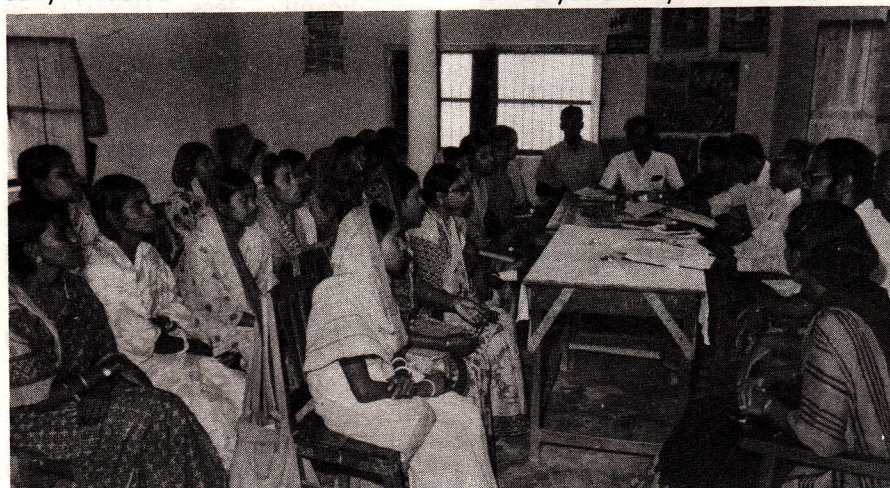
In the group of ETEC patients studied there were 4 with pure ST, 2 with pure LT and 4 with a mixture of ST and LT toxins. During the acute stage of ETEC, absorption of all nutrients were comparatively better than in the other etiologies, but failed to improve two weeks after recovery. The combined presence of LT and ST toxins on the epithelial cells of the gut may have affected the absorption of nutrients two weeks after recovery which showed gradual improvement. At eight weeks there was an increase in the absorption of nutrients. However the mechanism of mucosal damage by the ST toxin is not yet clearly understood.

which was in the range of 62-77%. Shigella is a disease of the lower bowel and malabsorption of nitrogen was probably due to direct loss of protein from the gut rather than failure of intestinal absorption. Absorption of all nutrients improved considerably two weeks after recovery.

The following conclusions can be drawn from this study: In spite of reduction in the absorption of nutrients, feeding of children should be encouraged because substantial absorption does take place even during the acute stages of diarrhoea. Continuation of normal diet during diarrhoea will definitely prevent further worsening of the malnutrition.

### REFERENCES

1. Taylor CE and Taylor E. Multifactorial causation of malnutrition. In McLaren D.S. (ed) Nutrition in the Community. London, John Wiley & Sons, 1976.
2. Schrimshaw NS. Synergism of malnutrition and infection. JAMA 212: 1685, 1970.
3. Hoyle B, Yunus M, Chen LC. Breast-feeding and food intake among children with acute diarrhoeal diseases. Amer. J. Clin. Nutr. 33:2365-2371, 1980.
4. Molla A, Molla AM, Sarker SA, Khatun M. Whole gut transit time and its relationship with absorption of macronutrients during diarrhoea and after recovery (unpublished).
5. Hirschhorn N, Rosenberg IH. Sodium-Potassium stimulated adenosine triphosphatase of the small intestine of man: Studies in cholera and other diarrhoeal diseases. J. Lab. Clin. Med. 72:28-39, 1968.
6. Hirschhorn N, Molla A, Molla AM. Reversible jejunal disaccharidase deficiency in cholera and other acute diarrhoeal diseases. Johns Hopkins Med. J. 125:291-300, 1969.
7. Chung AW, Viscorova B. Effect of early oral feeding versus early oral starvation on course of infantile diarrhoea. J. Pediatr. 33:14-22, 1948.
8. Molla AM, Molla A. Role of nutrition in the management of acute diarrhoea. ICDDR,B (unpublished).
9. Molla A, Molla AM, Sarker SA, Khatun M, Rahaman MM. Effects of diarrhoea on absorption of macronutrients during acute stage and after recovery. Will be published in a book on "Interactions of diarrhoea and malnutrition," Edited by NS Schrimshaw and LC Chen. Plenum Publishers, U.S.A.
10. Davidson GP, Gall DG, Petrie M, Butler DG, Hamilton JR. Human rotavirus enteritis induced in conventional piglets: intestinal structure and transport. J Clin Invest 60:1402-1409, 1977.



The field assistants collect data for the demographic surveillance system, in addition they also collect information on all diarrhoeal incidence. Every week the FAs meet at the Head-quarter in Matlab to have a meeting with doctors and supervisors who brief them.

mation may continue longer resulting in malabsorption of nitrogen. As far as the absorption of carbohydrate in the acute stage was concerned, in rotavirus 74% was

### Shigella

In shigella patients the absorption of nitrogen was minimum (41%) in the acute stage compared to the absorption of other nutrients

Table 1. Characteristics of the Study Patients (Mean  $\pm$  ISD)

Particulars	Rotavirus	ETEC	Shigella
No.	13	10	6
Age (months)	23 $\pm$ 14.2	36.3 $\pm$ 10.6	34.1 $\pm$ 8.8
Admission body wt (kg)	8.7 $\pm$ 1.8	9.2 $\pm$ 2	9.4 $\pm$ 1.7
Body wt at recovery 1	9.1 $\pm$ 1.9	9.8 $\pm$ 2	9.9 $\pm$ 2.2
Body wt at recovery 2*	10.2 $\pm$ 2	10.0 $\pm$ 1.8	10.9 $\pm$ 2.4
Serum HCT on admission	31.2 $\pm$ 3.8	32.6 $\pm$ 2.5	33.3 $\pm$ 4.9
1st 24 hr stool volume (litres)	0.70 $\pm$ 0.31	0.68 $\pm$ 0.55	0.93 $\pm$ 0.57

\*The number of patients available for the study at stage 2 was 8, 6 and 4 for rotavirus, ETEC and shigella respectively.

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