

Dialogue on Diarrhoea



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The international newsletter on the control of diarrhoeal diseases

Diarrhoea, feeding and watching their weight

Diarrhoea kills Third World children two ways: dramatically quickly by severe dehydration in acute watery diarrhoea; and more slowly, but just as surely, in a deadly partnership with other infections and with malnutrition:

ORT: first step in child survival

Oral rehydration therapy (ORT) is immediately life-saving in acute diarrhoea. All health workers and all families must be given the knowledge and the means to carry out ORT. Its promotion is already keeping alive thousands of children who would otherwise have died.

On its own, oral rehydration may not be enough for many children. Previous issues of DD have emphasized the need to carry on feeding during diarrhoea (*DD 15*) and to give extra food afterwards. Both the nutritional and the protective values of breastmilk have been constantly stressed (*see DD 17*), and *DD 16* described the significant role immunization programmes can play, particularly against measles. Properly fed and immunized children, like those in the picture on this page, recover rapidly from acute dehydrating diarrhoea if given ORT and their growth and development will only be temporarily affected.

The situation of most Third World children is much less fortunate. Malnutrition goes hand in hand with ignorance and poverty. Safe water supplies and sanitation are seldom available and effective immunization programmes

have still to reach vast numbers of families. Primary health care services, if they exist at all, are always overstretched. Diarrhoea is a recurrent danger which needs more than just ORT if these children at such serious risk are to survive and to grow up into healthy adults. Their future can nevertheless become much brighter if feeding during and after diarrhoea is recognized as being equally as important as managing dehydration.



Properly fed and immunized children will recover rapidly from infections such as diarrhoea.

Convincing the mothers

In the short term, health workers must explain, in ways that mothers can readily understand, the need to feed children with diarrhoea appropriately — and to continue extra feeding for at least several weeks after the child has recovered. The child who is not hungry has to be persuaded to eat (*see page 6*). Already malnourished children who develop diarrhoea will need special care to improve their general health and to make sure they catch up to normal in their growth (*see pages 4, 5 and 6*). If this is done, they will then be less likely to be seriously affected by any further attacks of diarrhoea or other infections. And

giving suitable foods as well as oral rehydration fluids during diarrhoea has an immediate benefit that mothers will appreciate: the amount of the diarrhoea loss becomes smaller.

Growth monitoring as prevention

In the longer term, the problem of diarrhoea combined with malnutrition requires a preventive as well as a curative approach. Growth is the sign of a healthy child. Failure to grow steadily is the signal that something is wrong with a child's health. More often than not, growth faltering occurs simply because not enough food, or not enough of the right kinds of food, is being eaten. Making sure that all of the children are maintaining good growth and development should be the responsibility of everybody in a community, and not something that is left to busy and scarce health workers. Information about how to make better use of suitable local food resources (*see page 3*) can help a great deal to prevent malnutrition.

The weighing and measuring of children to detect poor growth or growth faltering need not be difficult. *DD 24* will contain a pull-out supplement, describing techniques and equipment suitable for growth monitoring at community and health centre levels. Records of child growth must be kept simple so that everyone concerned can see at once when children lose weight or fail to gain weight at the expected rate. Such children should then be given special care immediately in the form of extra food and treatment for any infection. With this care, children in deprived areas of the world will be much less at risk of serious illness or of death the next time they get diarrhoea.

K.M.E. and W.A.M.C.

Photo by R. L. Guerrant

In this issue . . .

- Feeding the anorexic child
- Issues in growth monitoring
- Persistent diarrhoea

AHRTAG

Appropriate Health Resources & Technologies Action Group Ltd

Reviews

Interventions for the control of diarrhoeal diseases among young children: supplementary feeding programmes. Feachem RG, WHO Bulletin: 61(6): 967-79.

The link between diarrhoeal diseases and nutritional status has been accepted for many years. Evidence that poor nutritional status predisposes to more frequent attacks of diarrhoea, or that supplementary feeding programmes can reduce the incidence of diarrhoea, is not strong. Research findings, however, suggest that poor nutritional status is associated with more severe diarrhoea when infection occurs, and with a higher case fatality rate.

This article reviews the effect of supplementary feeding programmes on diarrhoeal disease morbidity and mortality among pre-school children. It uses data from field studies in developing countries, where children received an enhanced food intake over several years on a continuing and community-wide basis. Therapeutic feeding has not been included; such feeding can be life-saving for the severely malnourished child. Also excluded are feeding programmes in emergency or disaster situations where shortage of food supplies may be the cause of malnutrition in a majority of children.

It is suggested that supplementary feeding programmes are of questionable value, being expensive and requiring high logistic and managerial inputs. In addition, many programmes have failed to significantly improve the nutritional status of the most at-risk group. It is therefore unlikely that supplementary feeding programmes can be regarded as cost-effective interventions for national diarrhoeal disease control programmes. Nevertheless, the local health infrastructure can be used to identify those children who are at a high risk because of significant undernutrition. Feeding which is targeted effectively at this group can have a worthwhile impact on their nutritional status and thus on the duration, severity and outcome of diarrhoea episodes. Unfortunately this target group is hard to reach since it often includes the poorest and most underprivileged children below two years of age.

A new book, *Diarrhoeal Disease and Malnutrition: A Clinical Update* edited by Michael Gracey, Professor of Child Health, University of Western Australia, Director, Gastroenterology and Nutrition Research Unit, Princess Margaret Children's Medical Research Foundation, Perth, Western Australia, has recently been published. The book is available from the publishers, Churchill Livingstone, Robert Stevenson House, 1-3 Baxter's Place, Leith Walk, Edinburgh EH1 3AF and is priced at £30.00.

Guide to Mass Media Support Materials for Nutrition Education in Developing Countries. Griffiths et al, 1985.

The Guide was developed primarily for nutrition educators in developing countries, and describes and reviews 316 nutrition education resource tools from a variety of country sources. Copies of the Guide, which also contains contact addresses, are available from (INCS) International Nutrition Communication Service, Education Development Center, Inc, 55 Chapel Street, Newton, MA 02160, U.S.A. Free to developing countries.

Child Health in the Tropics: Edited by D. B. Jelliffe. Fifth edition. 1985. Published by Edward Arnold.

Writing about growth and development, F John Bennett describes the importance of growth monitoring and the serious consequences of malnutrition in both children and adults, and provides information on average weight and height levels. Low birth weight babies, methods of identifying the low birth weight baby, the causes and prevention of low birth weight, and the risks to and the management of the low birth weight infant — including feeding — are dealt with by Aaron Ifekwunigwe. The following chapter focuses on young child feeding and describes the benefits of breastfeeding and correct weaning procedures, preferably using locally available and affordable foods. This is particularly crucial in view of the widespread malnutrition which causes many deaths, either directly or from associated infections.

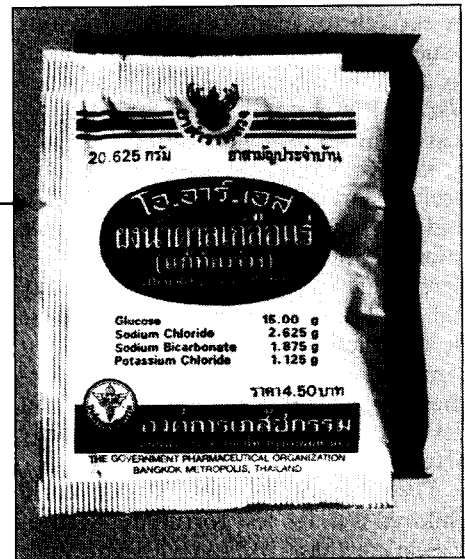
Although the importance of oral rehydration treatment in the management of diarrhoea is now generally recognized, Jelliffe and others were

advocating giving drinks of salt, sugar and water in currently acceptable proportions in the early 1960's, years before this therapy received scientific acclaim and intense promotion. Throughout the book, the sections on treatment have been updated, and preventive care is now strongly emphasized with new chapters on linking the health of the child with that of the mother, training primary health care workers, community participation and child health policies.

This book contains much useful information for doctors and health professionals working with children in tropical countries.

Easier to open

In DD issue 13 we highlighted the difficulty some mothers have in opening ORS packets without using their teeth or scissors. Since then, several manufacturers have modified ORS packet design to include a small V-shaped nick for easier opening. This picture shows an example produced by the Government Pharmaceutical Organization in Thailand.



WHO photo

Modified packet design for easier opening.

In the next issue . . .

In DD 24 we will be reporting on the Second International Conference on Oral Rehydration Therapy, held in Washington in December 1985. We will also focus on the promotion of oral rehydration therapy outside the health services.

Promoting better nutrition: Leaf Nutrient



Photo courtesy of Carol Martin, Find Your Feet

Pedal-operated leaf nutrient extraction in Sri Lanka.

Dark green leafy vegetables (DGLV) have long been recommended as a cheap, good and readily available source of protein, beta carotene (which the body can turn into Vitamin A provided that at least some fat or oil is also eaten), iron, calcium and unsaturated fats. But DGLV are bulky and it is difficult for children to eat sufficient quantities to offset an otherwise poor diet. A simple pulping machine, as shown, can separate the fibre (which makes excellent cattle feed) from the juice which contains the important nutrients. The juice is heated to 90°C to curdle it. After straining, the curd is washed and pressed before being added to local dishes or eaten as it is. Any non-poisonous green leaf can be used to make this leaf nutrient (LN), which field trials have shown to be an effective food supplement to promote growth and to prevent anaemia, night-blindness (xerophthalmia) and protein energy malnutrition (PEM). The process can become an appropriate and profitable community activity, and trials have so far not encountered any objections to the colour, flavour or texture of the LN. For further information, please write to: *Find Your Feet Ltd, 13-15 Frognal, London NW3 66LP, UK.*

Tata Trust

A donation from the Sir Dorabji Tata Trust in India has enabled us to set up a distribution office at the Christian Medical Association of India (CMAI), 'Suvarna' 58/C-1, Gokulpeth, Nagpur 440010, India, to begin the expansion of *DD* circulation in India. We would like to express our appreciation of this generous support for the *Dialogue*.

Nutrition forum

'Nutrition and Diarrheal Disease Control', the report of their third International Conference held at the West Dean Conference Centre, U.K. in August, 1985, was published by the International Nutrition Planners Forum in December, 1985. Edited by Dr. Jose O. Mora, the Conference Co-ordinator, and Mr. Jim McEuen, copies can be obtained from the Office of Nutrition, Bureau for Science and Technology, USAID, Washington DC 20523, USA.

WHO manual: ORS production

A revised manual: *ORAL REHYDRATION SALTS — Planning, establishment and operation of production facilities* — has been produced by the Diarrhoeal Diseases Control Programme in collaboration with the Pharmaceuticals Units of WHO and UNICEF. The guidelines in the manual may be adapted for use in different countries and are an updated version of *Guidelines for the production of oral rehydration salts* (80.3). Available from CDD Programme, WHO, 1211 Geneva 27, Switzerland.

Erratum

The clinical advice page in issue 22 of *DD* was co-authored by Dr Ahmed Youssef and Dr Norbert Hirschhorn. The editors would like to offer their sincere apologies to Dr Youssef for omitting his name from the credits for this article.

Note to readers

Copies of this page 'Successful ORT' are available from *DD* as an information sheet or as a large poster.

ORT: educational campaign in Malawi

This poster is one of a series of visual aids for ORT education being field-tested in 24 rural villages in Malawi. The results will be incorporated into a mass media campaign to combat childhood communicable diseases, including diarrhoea, being planned by the Ministry of Health*.

Sent to *DD* by Ann Kurth, Centre for Population and Family Health, Faculty of Medicine, Columbia University, 60 Haven Avenue, New York, NY 10032, U.S.A. (Formerly Research Fellow, Centre for Social Research, Zomba, Malawi.)

Editors' note: Where safe water is not available, and boiling water is difficult, the cleanest water available should be used without delay to make up oral rehydration solution.



Taken from: ORT education: results of a pilot study in the Lilongwe Agricultural Development District, 1985.

**USAID is supporting mass media and other ORT-related health education activities in Malawi.*

Practical issues in growth monitoring

Diarrhoea and growth

Frequent episodes of diarrhoea may result in malnutrition and set-backs in growth. Growth monitoring enables health workers to identify children at risk. David Nabarro discusses important factors to consider before growth monitoring is introduced as part of a community health programme.

Steady growth is a sign of a healthy child. Monitoring growth means that progress is regularly checked, and should be part of good health care. Growth faltering (poor weight gain, or weight loss) may result from malnutrition and/or other conditions which put the child's health at risk — such as infectious diseases, particularly diarrhoea. Recent studies in Bangladesh⁽¹⁾ confirm that poor weight gain or weight loss are sensitive indicators of the risk of child death in the succeeding two months. Growth monitoring, and the detection of those children whose growth is faltering, enables mothers and health workers to discover which children are in danger, and also to check a child's response to treatment. It is therefore a potentially valuable strategy to improve the health of children.

Issues of implementation

Two important issues to consider are: — will growth monitoring be worth the effort involved?

— how can growth best be monitored in the context of existing health services?

● **Growth monitoring takes time.** The incidence of malnutrition and of diarrhoea varies with age and, often, with the seasons. Children becoming malnourished can only be identified through regular growth monitoring — at least every two months. Growth monitoring is a time-consuming activity for health workers and community members alike. Most health workers have far more to do than the available time allows. Mothers are expected to bring children for regular monitoring, whether or not a child is unwell. This takes time for travel and waiting at the clinic, and a day's wages may be lost.

● **Growth monitoring on its own is not enough.** If growth monitoring is to lead to an improvement in child health:

— Health workers must have time to weigh or measure children, record results and interpret them, discuss them with mothers and recommend action. This takes a minimum of four minutes per child.

— Health workers need to be trained to recognise growth faltering and to diagnose reasons for it.

— Health workers must also have access to facilities that will permit successful intervention if a child is not growing adequately.

● **Mothers can play an important role.** Some problems can be overcome if they, rather than health workers, are responsible for monitoring their children's growth. Reports from Indonesia show that, while mothers cannot be treated as 'professional weighers', a different approach has led to good results. Neighbourhood nutrition clubs were established, using social marketing techniques to emphasize the importance of weight gain rather than reaching a particular nutritional status, and to stress the 'wisdom of village motherhood' rather than the 'scientific basis' of nutrition⁽²⁾.

● **Is the measuring technique the key to a successful growth monitoring programme?** Not necessarily. The energy, skill and commitment of the health worker, the degree of community involvement and the resources available for intervention when growth failure is detected, are all as important in determining the results of any programme as the technique that is selected.

Infection and weight loss

Facilities for treating illness must be available since in many cases weight loss results from infection. Infections, such as diarrhoea and measles, cause decreased appetite, reduction in food intake and nutrients and a breakdown of tissues. Together these cause weight loss. The role of infections in precipitating malnutrition has been well-documented in Central America⁽³⁾, Bangladesh⁽⁴⁾, and The Gambia⁽⁵⁾. In one programme in Nepal, over 95 per cent of malnourished children attending a Mother and Child Health Centre were suffering from infectious illness⁽⁶⁾. Studies carried out in Bangladesh suggested that, even if mothers are given additional food for their children and intensive

education, the potential for increasing child food intake during illness is limited. Children with severe malnutrition or anorexia need careful re-introduction of food (see page 6). Without appropriate medical treatment and restored appetite, children will not eat and regain the weight that has been lost. Growth monitoring therefore must be associated with an effective curative service, if the incidence of malnutrition is to be reduced in an environment where infections and diarrhoeal disease are common. Health education and nutrition education on their own are not enough.

Integrating health and nutrition

The incidence of malnutrition and diarrhoeal disease is likely to be highest among the poorest families in the least developed countries. A growth monitoring programme can do little to overcome the underlying economic and social causes of malnutrition and disease, but may help to direct interventions to those at greatest risk. Where well-developed primary health care services do not exist, it might be better to concentrate resources on programmes that benefit all the children in the groups at greatest risk of malnutrition rather than to try to identify individuals in difficulty.

Dr David Nabarro, Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA.

1. Baigari R et al, 1985. *Alternative anthropometric indicators of mortality. Am. J. Clin. Nut.* 42 pp 296-306.
2. Rohde J and Hendrata L, 1983. *Development from below: transformation from village-based nutrition projects to a national family programme in Indonesia. Practising Health for All: by Morley, Rohde and Williams, Oxford, OUP.*
3. Mata L, 1978. *The children of Santa Maria Cauque: a prospective field study of health and growth. Cambridge, Mass, NUT Press.*
4. Black R E et al, 1984. *Effects of diarrhoea associated with specific enteropathogens on the growth of children in rural Bangladesh. Pediatrics* 73: 799-805.
5. Rowland M G M et al, 1977. *A quantitative study into the role of infection in determining nutritional status in Gambian village children. Br. J. Nut.* 37: 441-50.
6. Padfield N and Nabarro D, 1985. *The management of children with protein energy malnutrition in Nepal: results of treatment in the Dhankuta Nutrition Unit. J. Inst. Med (Nepal): in press.*

Home fluids: food or drink?

When designing health care interventions, in-depth knowledge of local cultural attitudes and beliefs is needed. Survey information and results alone may not give the whole picture.

A study carried out in an urban 'shanty town' area near Lima examined mothers' beliefs and practices during diarrhoea. Using this information, a culturally appropriate intervention to encourage early home rehydration of children, aged six months to two years with acute watery diarrhoea, was designed and is currently being tested. From the start, the study was interested in a local remedy which mothers themselves make at home called 'panetela'. This is made by boiling toasted rice or bread with carrots, water, cinnamon and sugar. Recent health education efforts have encouraged mothers to add salt, but while many knew salt should be added, very few actually did it. It seemed that panetela might be a good 'traditional liquid' to promote for use during diarrhoea, as the survey showed that over half the mothers said they already used it.

It was discovered, however, that panetela was thought to have soothing properties, and was given to replace milk and the child's normal food during what the mothers perceived to be severe episodes of diarrhoea. The panetela is usually strained before use and the solid portion discarded; therefore the actual liquid given has very little food value. The study showed that, during early diarrhoea, mothers continue to give a near normal diet to the child until they themselves notice the following danger signs: increased stool output, stomach pains, loss of appetite, vomiting and fever. These signs of severe illness often cause mothers to seek medical help.

If a mother is asked to give panetela earlier than she normally would during an episode of diarrhoea, this may unintentionally worsen the child's nutritional status. The danger of promoting the use of this liquid for

rehydration is that it carries a hidden message: that when panetela is given, other food is avoided. Therefore, it was decided instead to promote the giving of extra sips of teas and soups which are part of the normal diet. In this way confusion is avoided when mothers are also advised to continue feeding their children during diarrhoea.

Problems of perception

When planning interventions of this type, it is important to take into consideration such local customs. In this situation the mother may either not comply at all because what she is being asked to do goes against all her beliefs; or, if she does comply, she may withhold food as this is traditionally not given at the same time as the panetela. Advice given to mothers about early rehydration at home must include instructions about continuing feeding during diarrhoea and giving extra food afterwards. Adequate research must be done to identify suitable liquids for early rehydration at home.

Dr Claudio Lanata and Josephine Gilman SRN, Instituto de Investigacion Nutricional, Apartado 55, Miraflores, Lima, Peru.

Promoting ORT correctly

Since it began in 1980, the Jamaican Diarrhoeal Disease Control Programme has successfully promoted oral rehydration therapy (ORT) throughout the health care system and the community.

Before ORT began to be widely used in Jamaica, mothers tended to respond in two ways when their children had diarrhoea. They had commonly given the child breastmilk or teas, black mint or spearmint served sweetened with brown sugar, coconut water or fruit syrup and water. A few mothers had used 'purging' to give the child a 'good wash-out' and get rid of the 'bad do-do', and a few also continued to believe that a laxative was appropriate. In line with this, a recent Jamaican newspaper article recommended the use of Epsom Salts as a more mild and suitable alternative to castor oil and other strong laxatives.

Misunderstanding advice

In a recent survey of what they do when their children have diarrhoea, we inter-

viewed mothers in the community and those bringing children with diarrhoea to health centres and hospital out-patient clinics. The latter group were given oral rehydration fluid for the child to drink there, a talk from the nurse, and a packet of ORS to take home. They were told not to use teas or fruit syrup drinks any more, but only the contents of the packet mixed with boiled water*. To get an additional packet mothers had to invest further money and time in travel and waiting to obtain one from the health centre or hospital.

Although the talk the nurse gave was medically correct, in interviews immediately afterwards only five per cent of mothers knew that the purpose of the therapy was to replace fluid. The rest understood the packet as 'medicine' to stop diarrhoea or facilitate a 'good wash-out' and, of those who had an opinion about the content, 40 per cent thought it was a laxative salt. Some said 'we used to give mint tea but now we give salt water' or 'fine salts'.

Confusion with other types of salts

The salts most widely available in pharmacies are Epsom Salts (magnesium sulphate) done up in ORS-type packets, Andrew's Salts (magnesium sulphate), Glauber's salts (sodium sulphate) and other similar preparations. Because reference to oral rehydration 'salts' reinforces the lay concept of purging with salts, it would seem better in Jamaica for nurses to talk of an oral rehydration 'drink'. Packets should not be labelled oral rehydration salts, and also should be made available in the private sector where mothers can get them with minimum inconvenience. Nurses might also look for new ways to explain to mothers why they should not purge children with diarrhoea, and use less teaching time dissuading mothers from using traditional drinks.

Carol MacCormack and Alizon Draper, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, in collaboration with the Jamaican Ministry of Health.

**See Editors' note on page 3.*

Feeding the anorexic child

Children with diarrhoea may not want to eat, yet feeding at this time is particularly important. Shanti Ghosh suggests ways to overcome this problem.

A child with diarrhoea may lose his appetite (become anorexic) and, as a result, be difficult to feed. Anorexia can reduce the amount of food consumed by up to 40 per cent. In many cultures, deliberate withholding of food during diarrhoea is very common and further reduces intake. In addition, medical advice often supports withholding of food both during and after diarrhoea, in the belief that food is not absorbed and that the bowel needs to be rested. This leads to rapid worsening of the nutritional status of a child who may already be malnourished.

Breastfeeding

Fortunately, even an anorexic child will usually breastfeed happily. This is because, as well as nourishment, breastfeeding gives comfort and a feeling of closeness to the mother which is particularly important when a child is unwell. Studies have shown that the amount of breastmilk a child takes does not de-

crease dramatically when a child becomes ill with diarrhoea. Therefore it is important to continue breastfeeding, even after the age of six months when diarrhoea is more common. (After six months breastmilk alone is not enough for the total nutritional needs of the child and additional semi-solid foods should be given.) As far as possible, this additional food should continue to be given to the child with diarrhoea, even though the appetite may be reduced. It has now been shown that the ability of the intestine to absorb nourishment is not greatly diminished in diarrhoea.

Even the most dedicated mother may find it difficult to feed an anorexic child; she will have to use all her powers of persuasion and ingenuity to make the child eat. Often the child will turn its head away when food is offered, and may not want to eat the usual family food. The anorexic child may find chewing difficult as not enough saliva is produced, so rolls the food around in its mouth and either keeps it there or spits it out. Small quantities of 'soft' foods, which do not need chewing, and which can easily be swallowed, should be offered frequently. There are suitable foods in every culture. For example, porridge, gruel, boiled rice, a mixture of rice and lentils, yoghurt, mashed banana, boiled potatoes or carrots. Fish and eggs can be given where culturally acceptable and available. A mother needs plenty of patience not to get cross with her child, especially if she is tired and busy.

Give the child the food it wants

Some children may want to eat savoury foods, and others may prefer something sweet. Mothers should not be too particular about what the sick child eats, as long as it eats something. Many mothers have their own ideas about which foods are easily digestible and which are not. They may insist that a child takes what



TALC photo

A mother needs plenty of patience when feeding an anorexic child.

they consider to be more suitable, while an anorexic child may have its own preferences. The child may not want to eat bland or tasteless food, instead it may prefer familiar foods that have more flavour or are spicy. What is important is that food is eaten, rather than which food.

The bulkiness of cereal based foods can be a problem, as a large volume may contain little nourishment. This can be even more of a problem for the anorexic child. The bulk can be reduced by roasting the cereal before cooking, or, better still, by malting, a process involving germination, drying and then roasting again. Adding some oil or butter will increase the energy density.

During the recovery phase of diarrhoea the appetite increases and the mother should take advantage of this to offer more food to the child. Extra food at this stage is important as it helps a child's growth catch up some of the loss which occurs during the illness.

Dr Shanti Ghosh, A1/18 Panchshila Enclave, New Delhi 110017, India.

The feeding and care of infants and young children, 1985. Ghosh S. Voluntary Health Association of India (VHAI), C-14 Community Centre, Safdarjung Development Area, New Delhi 110016, India. Price: 14 rupees.



Photo by K Indirabai (DD photographic competition)

Breastfeeding gives comfort as well as nourishment to the sick child.

Adding to malnutrition

Most episodes of diarrhoea only last for a few days, but diarrhoea persists in an important group of children. Andrew Tomkins discusses possible reasons for and ways to manage persistent diarrhoea.

Diarrhoea lasting more than fourteen days is usually called persistent (protracted) diarrhoea (PD). (PD usually develops from acute diarrhoea, whereas chronic diarrhoea does not necessarily start with an attack of acute diarrhoea.) There have been few prospective studies on how many attacks of acute diarrhoea go on to PD but results from The Gambia suggest that it may be up to 10 per cent. PD is often accompanied by severe growth faltering and the "PD/malnutrition" syndrome is an important cause of death during the second and third years of life.

What causes PD?

The main feature is damage to the small and/or large intestine. Several factors are thought to cause PD:

● **Persistent colonisation by a microbe.** *Shigella*, *Salmonella* and *Campylobacter* are important bacterial pathogens isolated in faecal specimens. Many children have abnormally high levels of *E. coli* and *Klebsiella* in the upper intestine. These may play a role in causing PD. *Giardia lamblia*, *Cryptosporidium* and *Entamoeba histolytica* may all contribute to PD during an initial infection, but thereafter, when some immunity has been established, these parasites may not cause so much damage. No consistent pattern of virus excretion exists.

● **Dietary allergies.** Damage to the intestinal lining provides easier access by dietary proteins to immune cells lying in the intestinal lining. Certain dietary proteins cause a strong immune reaction in susceptible individuals, releasing chemicals from the immune cells which damage the lining further. It is important to recognize that reliable diagnosis of dietary allergies is complex and difficult even in sophisticated paediatric units.

● **Carbohydrate intolerance.** Whatever the individual or combined cause of intestinal damage, many children have some carbohydrate malabsorption during and after diarrhoea — a majority of children in African, Asian, Latin Ame-

rican and Mediterranean communities suffer a decline in lactase concentration in the intestinal lining from about four months of age. They are known as 'lactase-deficient' populations — this condition is rare among those of European stock.

Lactase is necessary for the digestion of lactose (the main sugar in milk), splitting it into glucose and galactose for easy absorption by the small intestine. If undigested lactose enters the large intestine, it causes watery diarrhoea and abdominal distension because of an osmotic effect. Lactase deficiency is *clinically significant* in very few children, and lactose in *small* amounts can usually be digested by healthy lactase-deficient populations; excess lactose may contribute to PD.

(Even severely malnourished children with marked thinning of the intestine and low levels of intestinal lactase, usually have enough of the enzyme to digest lactose if fed 'little and often'. Good absorption of food and fast rates of growth can in fact be achieved using dried skimmed milk as the only protein source — it is best given with sugar and oil to supply adequate quantities of energy for growth.)

Risk factors in PD

Among the risk factors which may predispose to PD are:

● **Decreased host immunity**, which reduces the body's defences. Measles, for example, may depress immunity for several months after the attack, during which time a variety of microbes — (especially *Shigella*) can establish a PD. Post-measles PD is well-recognized as a major cause of malnutrition and death in West Africa. Children with moderate or severe protein energy malnutrition (PEM) may often develop PD, possibly due to the depressed immunity and decreased gastric acid production.

● **Delayed repair of intestinal damage.** In a well-nourished child damaged intestinal cells are rapidly replaced. However, nutritional deficiencies such as PEM, or lack of folate or zinc can each

slow the rate of repair.

It has been suggested that other risk factors to consider are: young age; previous history of diarrhoeal illness; inappropriate drug treatment of acute diarrhoea; disorders of the pancreas and intestinal mucus layer; and abnormal intestinal motility, especially in young infants.

Nutritional problems

Many children lose weight or stop growing when they have PD because of:

● **Reduced food intake.** This is probably the most important cause. Children with PD in The Gambia eat 30 per cent less than they do when they are well. This decreased appetite may be because the child is miserable, has abdominal pain, or anorexia, and perhaps fever. Mothers may have firm ideas about which foods should be avoided during diarrhoea. Individual dietary taboos vary widely, but the overall result is usually that most children with PD eat less food than normal, and certainly less than they need to grow.

● **Malabsorption.** In spite of intestinal damage and abnormal absorption in PD, the intestine usually absorbs more than 70 per cent of dietary calories, including most of the protein and fat, even in cases of severe diarrhoea. In severe cases fat malabsorption may adversely affect the absorption of certain fat soluble vitamins (especially vitamin A), and xerophthalmia may develop.

● **Intestinal losses.** Loss of blood and mucus from the large intestine is an important precipitating cause of PEM. When fever accompanies the PD, as it may in *Shigella* infections, extra energy is needed.

Prevention and treatment

It is far more difficult to manage PD than acute diarrhoea. It is especially difficult to evaluate whether treatment is effective as the pattern of diarrhoea in many children is so variable. Nevertheless there are several steps which can help:

● **Prevention.** Proper control of acute diarrhoea is the most effective way to prevent PD developing. General improvement of hygiene and sanitation, and measles immunization are particularly important.

● **Improved nutrition.** Whatever the

continued overleaf

cause of PD, it is important to ensure that adequate food intake is maintained. Mothers may be concerned at the 'waste' of food in diarrhoea and need to understand that much is still being absorbed. It is also important to advise them to increase the energy content and frequency of feeds. Any harmful beliefs, about breastmilk for example, should be corrected.

● **Antimicrobials.** Various drugs may be useful. Metronidazole and tinidazole are effective against *G. lamblia*, *E. histolytica*, and certain bacteria which colonize the upper intestine of children with PD. Children with post-measles PD may be helped by a short course of ampicillin or co-trimoxazole, if the local antibiotic sensitivity pattern suggests that *Shigella* sensitive to these antibiotics may be present.

● **Low lactose diets.** If children fed with cow's milk formula are given half strength feeds for a few days, the diarrhoea may improve. Lactose free milks available commercially are often expensive. Fermentation of milk (yoghurts), as practised by many traditional communities, reduces the lactose concentration.

● **Exclusion diets.** If the particular cause of any dietary allergy can be established, exclusion diets can be helpful. Certain cereals may act as dietary allergens, but further research is necessary.

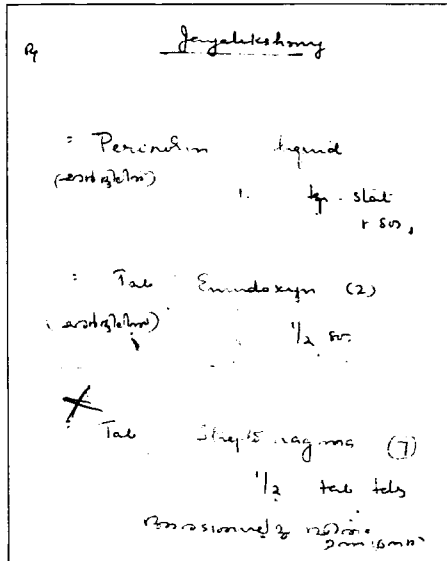
Future developments

It is obvious that our understanding of the causes of PD and the best way to manage such children is unimpressive. At present, we should emphasize careful combined use of: attention to increasing food intake; and careful, selective use of antimicrobials. Considerable interest exists in improving the dietary management of PD. Further work on appropriate exclusion diets for use in poor communities may be valuable.

Dr Andrew Tomkins, Department of Nutrition, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, U.K.

Doctors still need convincing

I am tremendously impressed by the efforts made by *DD* to circulate the idea of ORT in developing countries. But



with all this publicity I really doubt if the idea has penetrated well into the minds of all the medical profession in this country. I enclose the discharge slip and prescription given for a child who was in hospital for two weeks, was given various drugs, and it was advised that she stop being breastfed altogether. In medical colleges, the emphasis is still on drugs and not ORT. Asked what they knew about ORT, the parents told me that they were given some fluid by the nurse to be given to the child, without mentioning or showing any interest in what the contents were, and the baby never took it because of the bad taste.

Quite a number of medical officers in rural areas are not convinced of the role of ORT in preventing dehydration and saving the patient. Also the emphasis continues to be on drugs and stopping mothers breastfeeding sick children, rather than treating the child with ORT.

Though I cannot suggest any magical remedies, I am convinced that the message has still to reach many places.

Dr E G Suresh, Palace Ward, Alleppey 688 001, India.

Solar dryer for Vitamin A

It is unfortunate that in your article on sources of vitamin A in *Diarrhoea Dialogue* No. 21, you include a picture of what appears to be a type of solar vegetable dryer that destroys most of the carotene in the vegetables. In the text, you quite correctly bring out the point that direct solar radiation does the damage, but I cannot see any way that the air will pass through the dryer, and if it is not so warmed it will not flow.

I suppose that if the frame was covered with black plastic rather than a transparent surface, it would be satisfactory. We have had some experience here with black PVC tent dryers into which we place trays of vegetables or fruit for drying. Another possible design is basically a box in which trays of vegetable matter for drying can be placed, attached to a panel in which incoming air is heated by direct solar radiation.

I favour plastering the lower surface of the heating panel (i.e. the one that absorbs the incoming heat radiation) with a cement plaster containing enough black oxide to give it a black colour. This is commonly done in rural kitchens, so the technique is familiar to the people, the air warmed over this surface will contain no contaminants from the heating panel. Glass as the upper surface of the panel admits more radiation than polythene, but is much more expensive.

I hope my brief comments will ensure that none of your many readers who, like myself, find *DD* such a valuable source of information, get the wrong idea from that picture.

Brian McGarry, Silvira House, Development Education Centre, Chishawasha, PO Box 545, Harare, Zimbabwe.

Scientific editors: Dr Katherine Elliott (U.K.) and Dr William Cutting (U.K.)

Editor: Kathy Attawell

Editorial assistant: Maria Spyrou

Editorial advisers: Dr David Candy (U.K.), Dr Richard Feachem (U.K.), Dr Michael Gracey (Australia), Dr N. Hirschhorn (U.S.A.), Dr Leonardo Mata (Costa Rica), Dr Mujibur Rahaman (Bangladesh), Dr Jon Rohde (U.S.A.), Ms E. O. Sullesta (Philippines), Dr Andrew Tomkins (U.K.), Dr Paul Vesin (France), Dr M. K. Were (Kenya).

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