Bahrain Medical Bulletin, Vol.23, No.4, December 2001

Chronic Diarrhoea in Children: A Prospective Analysis of Causes, Clinical Features and Outcome

Felix Olukayode Akinbami, FMC (Paed), FWACP*
Poothirikovil Venugopalan, MRCP(UK), FRCPCH**
Ibtisam Babiker ElNour, MRCP(UK), FRCP** Vatakepat Nirmala, MD***

Objective: To evaluate the aetiology, clinical features and outcome of chronic diarrhoea in hospitalised children from an Arab Population of the Sultanate of Oman.

Design: Prospective study.

Setting: Tertiary care facility at the Sultan Qaboos University Hospital, Muscat, Oman.

Subjects: All hospitalised patients aged <13 years with chronic diarrhoea (diarrhoea persisting for >4 weeks) from November 1994 to October 1999.

Results: Among the 41 children studied, the major aetiological factors were post gastroenteritis syndrome 20(49%), enteric infections and infestations 11(27%), Coeliac disease 6 (14.4%), immunodeficiency states 2 (4.8%), cystic fibrosis 1 (2.4%), and abetalipoproteinaemia 1(2.4%). Twenty five patients (61%) were malnourished and 12 (29%) were anaemic and 16 (39%) were dehydrated on presentation. The duration of hospital stay ranged from 10 days to 3 months (mean 40 days; median 25 days). Majority of the patients 30 (73%) responded to initial therapy with oral rehydration solution, followed by careful nutritional supplementation. Specific therapy was required only in 11 (27%). Parenteral nutrition was required only in 2 patients. One patient with immunodeficiency died from gram-negative septicaemia.

Conclusion: Post gastroenteritis syndrome was the commonest cause of chronic diarrhoea, unlike some of the studies from other Arabian countries, and could be managed successfully with simple measures. Malnutrition was a major complication but early and energetic nutritional rehabilitation played a pivotal role in management.

Bahrain Med Bull 2001;23(4):166-68.

---

* Paediatric Gastroenterologist
** Consultant Paediatrician
*** Consultant Pathologist
Sultan Qaboos University Hosptial
Muscat, Sultanate of Oman

Diarrhoeal disease is an important health problem accounting for significant morbidity and mortality in young children, especially in the developing countries of the world[1]. Diarrhoea is usually self-limiting, however it may progress to a chronic illness in 3 to 20% of patients[2], and chronic or intermittent diarrhoea has a significant impact on the nutritional status and development of children[3]. The disease poses major difficulties in diagnosis and management. In this prospective study, we looked at the causes, clinical features and outcome of chronic diarrhoea in children in Oman.

METHODS

The study involved all children admitted to Sultan Qaboos University Hospital, Muscat, Oman, between November 1994 and October 1999 (5 years) with a diagnosis of chronic diarrheoa, defined as diarrhoea persisting for more than 4 weeks[4]. On admission, a detailed history was taken and physical examination carried out on all the patients. Nutritional status was assessed using weight and height centiles of the National Center for Health Statistics Standards[5]. Stool examinations for ova, cysts and parasites, for pH and reducing substances and culture for bacterial and viral pathogens were performed on all patients, in addition to a full blood count, serum electrolytes and blood urea. Other investigations performed as clinically indicated, included serum proteins, serum ferritin, folate, immunoglobulins, anti endomysial antibodies, flow cytometry, sweat chloride, stool chromatography, jejunal aspirate for Giardia lamblia trophozoites and jejunal biopsy. Data entry and analysis were performed using Statistical Package for Social Sciences (SPSS) 9 for Windows 98.

RESULTS

During the 5-year period, 41 children (26 boys, 15 girls, M: F=1.7:1) with chronic diarrhoea were studied and this accounted for 0.34% of hospital admissions to Paediatric Wards during the above period. Their ages ranged from 3 months to 12 years (mean 1.8 years) and 15 (37%) were below the age of 1 year.

The mean duration of diarrhoea at the time of presentation was 3.5months (5weeks to 7 months). Table 1 shows the associated symptoms and signs at presentation in the 41 children. Twenty five children were malnourished with their weights below the 3rd percentile. Twelve were anaemic with a mean haemoglobin of 9.4g/dl and 6 had iron deficiency. Sixteen children were dehydrated, 11 mildly and 5 moderately. Twelve children had also vomiting.

Figure 1. Pie diagram showing the aetiology of chronic diarrhoea in children

Table 1. **Associated symptoms and signs in children with chronic diarrhoea (n=41)**

Presenting feature	Number (%)
Failure to thrive*	25 (61)
Dehydration	16 (39)
Vomiting	12 (29)
Pallor	10 (24)
Oedema	3 (7)

** Weight for age <3rd percentile as per National Center for Health Statistics Standards*[5]

The identified aetiologies for the chronic diarrhoea are shown in figure 1. Post gastro-enteritis syndrome was responsible for almost half (20) the cases. Seven of them had secondary lactose intolerance diagnosed by positive stool for reducing substances, and confirmed by stool chromatography and clinical response to elimination of lactose from diet. Two other children had cow's milk protein intolerance. They responded to cow's milk protein exclusion and exhibited a positive response to cow's milk challenge.

Enteric pathogens were identified in 11 children. Giardia lamblia was isolated in the stool and or jejunal aspirate/mucosa of 6 children, cryptosporidium in 3 and enteropathogenic Escherichia coli (Esch. coli) in 2. The patients with Esch. coli had other pathogens in their stools, one of them had shigella and the other had rota virus.

Six (14.4%) children had flat mucosa on jejunal biopsy, positive anti endomysial antibodies, and clinical and histological response to gluten free diet. Two children (4.8%) had congenital immune deficiency states, one had severe combined immunodeficiency and the other common variable immuno-deficiency. Sweat chloride estimation was consistently high (>80mmol/l) in one child with cystic fibrosis. Abetalipoproteinaemia was diagnosed in a girl who presented with oily stool and severe malnutrition. Her blood film showed marked acanthocytosis and her small intestinal biopsy revealed accumulation of fat droplets in the enterocytes with otherwise relatively normal villi.

The duration of hospital stay ranged from 10 days to 3 months (mean 40 days; median 25 days). Thirty children were managed with oral rehydration and careful nutritional support jointly with the dietician and remained well on follow up. The diarrhoea decreased in frequency in about a week and normal stools were recorded in majority in 3 weeks. Additional measures required for the child with cystic fibrosis included enzyme supplements, prophylactic antibiotics and regular chest physiotherapy. Six children with enteric pathogens required specific therapy, while 3 with cryptosproidium and 2 with enteropathogenic Esch. coli isolated from the stool responded to nutritional supplements alone. The child with abetalipoprotenaemia responded to a low fat diet with supplementary medium-chain triglycerides and fat soluble vitamins including a high dose

of vitamin E. Two children with severe malnutrition and persistent diarrhoea despite dietary manipulation required total parenteral nutrition for a period of 3 weeks. The child with severe combined immunodeficiency died of gram-negative septicaemia.

DISCUSSION

The outcome of acute diarrhoea has improved significantly with worldwide use of oral rehydration solutions,. However, chronic diarrhoea is still harmful, especially for the growth and development status of children and continues to occur in up to 20% of children with gastroenteritis[2].

Post gastroenteritis syndrome was the commonest cause of chronic diarrhoea in our study, accounting for almost half of the patients. This is similar to the findings of Shaltout et al[6] from Kuwait who found 66% of their patients had post gastroenteritis syndrome, whereas Abdullah[7] from Saudi Arabia reported it only in 33% and Altuntas et al[3] from Turkey in 10% of their patients. Acute injury to the gut when inadequately or improperly managed results in continued small intestinal mucosal injury. Associated factors such as protein malnutrition, deficient enzymes, infection, increased absorption of native foreign protein, ineffective villous repair and malabsorption of nutrients result in a chronic enteropathy[3,8,9]. Malabsorption of nutrients leads to further malnutrition setting up a vicious cycle, that renders the management of these children a real challenge.

Secondary lactose intolerance was documented in about one third of our patients with post gastroenteritis syndrome. Lactase is a brush border enzyme in the small intestine and any injury to the gut mucosa leads to a loss of this enzyme activity. Furthermore, the regenerating mucosal cells that migrate up from the crypts do not mature fast enough to provide the enzyme in adequate concentrations. This problem is usually self-limiting and all our patients did well on conservative management with a lactose exclusion diet for periods ranging from 2 to 6 months. All of them could be restarted on milk feeds subsequently.

Enteric pathogens are well recognized causes of chronic diarrhoea[6,7]. These were the second commonest causes of chronic diarrhoea in our patients. Enteric pathogens alter the morphology of the intestinal mucosa leading to malabsorption. Giardia lamblia and cryptosporidium reported to be commonly associated with intestinal mucosal enteropathy and chronic diarrhoea[10,11] were isolated from 9 of our patients. Patients with giardiasis responded to metronidazole therapy and those with cryptosporadiasis resolved spontaneously.

Coeliac disease was diagnosed in 14.4% of our patients and all of them demonstrated flat intestinal mucosa with positive anti-endomysial antibodies. Exclusion diet commenced under supervision in hospital did bring about a rapid improvement of the diarrhoea, however continuing compliance at home was very difficult. The social custom of all family members sharing food from a common bowl, low level of parental awareness and restricted availability of gluten free diet could have contributed to this. It is interesting to note that coeliac disease was equally prevalent in the studies of Shaltout et[6] and

Abdullah[7] although the disease was the second commonest cause in their patients. Both these reports also have emphasized the difficulty in enforcing dietary modifications in this group of patients.

Malnutrition is a common sequel of chronic diarrhoea. Sixty one percent of our patients were malnourished and 29% anaemic. Early nutritional rehabilitation can break the vicious cycle of malnutrition, intestinal mucosal damage and depressed immunity and helps to re-establish gut function and integrity. It should therefore always play a major role in the management of children with chronic diarrhoea. Supervised careful nutritional rehabilitation without any other specific therapy was effective in the treatment of 11 of our patients with post gastroenteritis syndrome in whom a treatable cause could not be found.

CONCLUSION

The common causes of chronic diarrhoea in children include post gastroenteritis syndrome, enteric pathogens and celiac disease. Malnutrition is a major complication of chronic diarrhoea and therefore early and adequate nutritional rehabilitation plays a pivotal role in the management of these children.

REFERENCES

1. Synder JD, Merson MH. The magnitude of the global problem of acute diarrhoeal disease: a review of active surveillance data. Bull WHO 1982; 60:605-13.
2. Bhan MK, Arora NK, Khoshoo V, et al. Chronic diarrhoea in infants and children. Indian J Pediatr 1985;53:483-95.
3. Altuntas B, Gul H,Yarali N, et al. Etiology of chronic diarrhoea. Indian J Pediatr 1999;66:657-61.
4. Fitzgerald JF, Clark JH. Chronic diarrhoea. Pediatr Clin North Am 1982;29:221-31.
5. Hamill PV, Drizo TA, Johnson CL, et al. Physical growth: National Center for Health Statistics percentiles. Am J Clin Nutr 1979;32:607-29.
6. Shaltout AA, Khuffash FA, Hilai AA, et al. Pattern of protracted diarrhoea among children in Kuwait. Ann Trop Pediatr 1989;9:30-2.
7. Abdullah AMA. Aetiology of chronic diarrhoea in children: experience at King Khalid University Hospital, Riyadh, Saudi Arabia. Ann Trop Pediatr 1994;14:111-17.
8. Sullivan PB, Marsh MN, Mirakian R,et al. Chronic diarrhoea and malnutrition-histology of the small intestinal lesion. J Pediatr Gastrenterol Nutr 1991;12:195-203.
9. Rossi TM, Lebenthal E, Nord KS, et al. Extent and duration of small intestinal mucosal injury in intractable diarrhoea of infancy. Pediatrics 1980; 6:730.
10. Sullivan PB, Marsh MN, Phillips MB, et al. Prevalence and treatment of Giardiasis in chronic diarrhoea and malnutrition. Arch Dis Child 1991;66:304-6.
11. Phillips AD, Thomas AG, Walter-Smith JA.. Cryptosporidium, chronic diarrhoea

and the proximal small intestinal mucosa. Gut 1992; 33:1057-61.