

# Epidemiology of Acute Gastroenteritis in Children in Defence Force Hospital, Bahrain

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## ABSTRACT

**A retrospective study of 130 children admitted to the Defence Force Hospital (DFH) in Bahrain with gastroenteritis during a period of one year from 1st November 1987 was undertaken. Fifty percent of the children were below one year and 25% were below six months. Fifty seven per cent of the infants were breastfed. Mean duration of illness prior to presentation was 2.5 days; 42 children (32.3%) had iron deficiency anaemia. Hypernatremic dehydration was noted in 4 infants (3%), parasitic and bacterial isolation rate was 23%, Shigella and Salmonella being the commonest organs, Shigella strains showed multiple drug resistance. There were no deaths. This study indicates that infantile gastroenteritis is less common and less severe in children admitted to DFH compared to other countries in the Gulf region. This is mainly due to the high incidence of breastfeeding in the population, better education levels in parents, and early presentation to the Hospital.**

Acute gastroenteritis is the commonest cause of admissions of infants and children under five years of age to the hospitals in developing countries.<sup>1</sup> Each year about 750 million children worldwide suffer from diarrhoeal illness; out of these 3-6 million die. The majority of these deaths occur in children below one year of age.<sup>2</sup> Studies from countries in the Middle East and Africa have shown that diarrhoea is an important cause of morbidity and admission to hospital.<sup>3, 4, 5</sup> The importance of breastfeeding in the prevention of gastroenteritis in infants has been highlighted by numerous studies.<sup>6, 7</sup> Unfortunately, the incidence of bottlefeeding is increasing in developing countries due to the changes in the socio-economic and cultural life of the

people.<sup>8</sup> Increase in the purchasing capacity of people without a parallel increase in educational level of mothers has resulted in slow progress in achieving the reduction in the incidence of gastroenteritis in children in this region.<sup>9</sup>

This is a retrospective study, the data of 130 children admitted with gastroenteritis to DFH highlights some of the significant differences in its epidemiology in comparison to other countries in the region.

## METHODS

All children and infants admitted to the paediatric ward of DFH in Bahrain with the diagnosis of gastroenteritis during a period of one year from 1st November 1987 to 31st October 1988 were included in this study. Individual files of these children were carefully scrutinised by the author and the results were recorded in a standard proforma and these were later analysed.

Stool culture from children with gastroenteritis are routinely done in DFH on Desoxy Cholate Citrate Agar, Mackonkey's Agar without salt, campylobacter selective supplemental medium - SR69 (DST oxoid) blood agar and TCBS cholera medium and subcultured on selenoid broth. Antibiotic sensitivity are done using Diagnostic Sensitivity Test Agar (DST).

## RESULTS

One hundred thirty children (13.2%) out of the total 980 paediatric medical admissions to the Unit had gastroenteritis and 51.6% of children were

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below one year. Age distribution of children is given in Table 1.

TABLE 1

Age	No of Patients	Percentage
Up to 3 months	13	10
3 to 6 months	19	14.6
6 months to one year	35	27
One to 2 years	25	19.2
Two to 12 years	38	29.2

Eighty percent of the children admitted with gastroenteritis to DFH belonged to families where one of the parents worked in Bahrain Defence Force or related government departments. The majority of these parents had attended school level education. The majority of children were Bahrainis (56%) followed by Jordanians (15%), Syrians (11%), Pakistanis (9%) and other nationalities (8.5%). Male to female ratio was 6:4. Mean duration of illness prior to admission was 2.5 days.

Sixty seven were infants under one year. Six babies out of 13 below the age of three months were exclusively breastfed. Thirty two babies (47.7%), most of them below six months were mainly breastfed with supplemental bottlefeeds. Twenty nine infants, most of them above six months were only on bottlefeeds.

Thirty eight children (30%) had incomplete vaccinations, 7.5% of children weighed less than 3rd centile for their age.

Hypernatremic dehydration ( $\text{Na} > 150\text{mmol/l}$ ) was present in 4 infants (3%). Hyponatremic dehydration ( $\text{Na} < 130\text{mmol/l}$ ) was present in one child. Severe acidosis ( $\text{pH} < 7.2$ ,  $\text{HCO}_3 < 12$ ) was present in 6 children. Only three children were assessed as having severe dehydration at the time of admission, 22 were classed as having moderate dehydration. Intravenous fluids were administered to 120 children.

Haemoglobin level of  $<10\text{g/dl}$  was seen in 27 children. Two children had Hb below  $8\text{g/dl}$  and were given blood transfusion. Forty two children (32.3%) had a mean corpuscular volume of less than  $70\text{fl}$  and the majority of these children had haematological

and biochemical evidence of iron deficiency anaemia (Peripheral blood picture: serum iron, TIBC, Ferritin levels and haemoglobin electrophoresis were done on the majority of children with a  $\text{MCV} < 70\text{fl}$ ).

Bacterial and parasitic isolates in the stool numbered 30 (23%). Pattern of stool isolates is given in Table 2.

TABLE 2

Bacterial and Parasitic Isolates in the stools

Shigella		15
flexneri	8	
sonnei	4	
dysenteriae	3	
Salmonella		9
Enteropathogenic E. coli		2
Campylobacter		3
Giardia		1

Thirteen children with Shigellosis were above the age of two years. Five children with non-typhoidal Salmonella isolates from their stool were infants under one year. Resistance to Ampicillin and Co-trimoxazole was present in 13 (86%) and 10 (66%) respectively of Shigella strains isolated. Three strains of Shigella were resistant to Chloramphenicol and one strain was resistant to Cephaloridine as well. Two Salmonella strains showed resistance to Ampicillin and one to Co-trimoxazole. All strains of Salmonella and Shigella were sensitive to Cefuroxime and Pivmecillinam.

The majority of children with gastroenteritis were discharged from the Hospital within three days, 25% of children were discharged within 24 hours. There were no deaths. Three children had secondary lactose and cow's milk protein intolerance and responded to lactose and cow's milk-free diet for a period of two months.

## DISCUSSION

Eighty per cent of the children admitted with gastroenteritis to the DFH belonged to families where one of the parents worked in the Defence Force or related government departments. The majority of the parents of these children had



completed school level education and had some awareness of the health needs of their children. This is most probably the reason for the lower incidence of infantile diarrhoea in DFH compared to neighbouring countries in the Gulf region. Fifty percent of our admissions for gastroenteritis were in children below one year, 25% being below six months of age. Reports from Riyadh (Saudi Arabia), Kenya, Jordan and Sudan<sup>3, 4, 5, 9</sup> showed that 80% of their children hospitalised with gastroenteritis were below one year, 66% being below six months of age.

Most of the children were assessed as having mild dehydration at the time of admission. This is due to early presentation to the Hospital, the mean duration of gastroenteritis prior to hospitalisation being 2.5 days. The mild nature of gastroenteritis encountered in infants in this study may also be the result of increased incidence of breastfeeding.

Nearly 70% of babies under three months were breastfed, this figure declined to 56% when all infants below one year were taken into consideration. This is similar to figures reported in other studies from Bahrain<sup>10, 11</sup> and is in contrast with figures reported from elsewhere in the Middle East where bottlefeeding is common.<sup>9, 12</sup>

Hypernatremic dehydration was present in a minority of infants (3%) and all these infants had an uncomplicated course without any sequelae. This pattern of lower incidence of hypernatremia is similar to the trend prevailing in developed countries<sup>13</sup> and in contrast with the reports from other countries in the Middle East.<sup>9, 12, 14</sup>

Overall isolation rate of bacteria and parasites were 23%. This figure is similar to the one reported from Saudi Arabia<sup>9</sup> and Jordan<sup>4</sup> but lower compared to figures from Africa.<sup>5</sup> Our figures for the incidence of bacterial gastroenteritis in children are probably very near to the actual incidence as only a minority of our children were given antibiotics prior to hospital admission and facilities for isolation of all common bacterial pathogens of gastroenteritis are available in the Hospital. Virological studies in stool could not be done because of lack of facilities; however we presume that the majority of our children had viral gastroenteritis.

Our study confirms other studies which have reported the emergence of multiple drug resistance of Shigella strains to commonly used antibiotics<sup>14, 15</sup> such as Ampicillin, Co-trimoxazole, Chloramphenicol and Cephaloridine. All strains of Shigella and Salmonella were sensitive to Cefuroxime and Pivmecillinam. Use of Pivmecillinam in the treatment of Shigellosis needs further study as regards efficacy, cost and feasibility of its use in children. However, antibiotics should only be used when a severe invasive bacterial gastroenteritis is suspected in ill infants and children.

There were no deaths. Sequelae were confined to one case of secondary lactose and two cases of combined lactose / cow's milk protein intolerance. Malnutrition resulting from recurrent and prolonged gastroenteritis was rare in our series.

A significant number of children (32%) had evidence of iron deficiency anaemia. Further research is needed to look at the prevalence of iron deficiency anaemia in children in this community and to clarify the aetiological factors.

## CONCLUSION

**Infantile diarrhoea is less common and less severe in children admitted to DFH. Compared to other countries in the Gulf region, mortality and morbidity due to gastroenteritis is rare. This favourable picture is due to better educational level of the parents, high incidence of breastfeeding, easy accessibility to hospital facilities and readiness with which these facilities are being used.**

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