Clinical And Microbiological Profile Of Acute Diarrhoeal Disease In Paediatrics: A Study Of 100 Children

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Abstract: Background: To study clinical profile of acute diarrhoeal disease in children and describe pathogens isolated in the cases. Material & Methods: A cross sectional study was carried out in 100 children admitted in the pediatric ward at the tertiary care hospital in Ahmedabad with clinical diagnosis of acute diarrhoeal disease, over a period of 12 months. Rectal swab was collected in each patient and was subjected to macroscopic, microscopic evaluation and culture test. Data thus collected was analysed. Results: 66% cases reported in less than two years of age. 77% cases belong to lower socio-economic class. Among all cases, 12% cases were exclusively breastfed, rest 88% were on top feeding, mixed feeding or faulty feeding. 80% of the cases reported malnourished and all mortality cases reported malnourished. Mortality reported was directly proportional to degree of malnutrition. Conclusions: Acute diarrhoeal disease is a major disease burden in under-five children. Poor hygiene and sanitation play a major role for high incidence in lower socio-economic class. Reduced number of incidence reported in the exclusively breastfed children as compared to top fed or faulty fed, explaining the need of proper feeding practices. Malnutrition is a major risk for diarrhoeal disease in children with increased number of mortality. Malnutrition and diarrhoea make a vicious cycle. [Gadhvi H Natl J Integr Res Med, 2020; 11(2):58-61]

Key Words: Acute diarrhoeal disease, Dehydration, Malnutrition, Rectal swab.

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Introduction: Diarrhoea is defined as a passage of loose watery stools with increased frequency, when associated with fever and vomiting, it is usually labelled as acute gastroenteritis. It is also known as Acute Diarrhoeal Disease in children. Acute diarrhoeal disease is a major problem and is one of the top three causes of under-five mortality in developing countries like India. This is one of the common infectious diseases, especially among infants and younger children. Globally around one billion episodes of illness and 3-5million deaths occur as a result of diarrhoeal disease each year[1]. 80% of these deaths occur before the age of two[2]. In developing countries, on an average every child suffers 3-4 episodes of diarrhoea per year, but in some areas the average exceeds even nine episodes per year[3]. In India, 17% of all deaths in indoor patients are related to diarrhoeal illness[4]. The high incidence in developing countries is attributed to malnutrition, poor hygiene and sanitation. Mismanaged feeding, bottle-feeding, poverty, low socio-economic status, overcrowding, various cultural aspects are the other attributable factors.

Diarrhoea is an important contributing factor for malnutrition, which in turn predisposes the child to further diarrhoea, thereby initiating a vicious cycle[5]. It may be emphasized that the diarrhoeal episodes are 4-6 times more common and more persistent in children with Grade III and IV malnutrition. While its incidence is higher even in malnourished children with Grade I to II.

This necessitates the periodic assessment of causative organisms of the disease including viral studies wherever possible, with a view not only to ensure effective therapy but also to forestall its dreaded complications and also implement proper preventive measures. With this background, we conducted this study with the objective to know the clinical profile of acute diarrhoea and describe common causative organisms isolated.

Material and Methods: 100 randomly selected cases of clinically diagnosed acute gastroenteritis admitted in the paediatric ward at a tertiary care hospital in Ahmedabad and meeting inclusion & exclusion criteria were studied from January to December, 1992. Inclusion criteria: 1) Age up to 12 years, 2) Acute onset of diarrhoea, 3) Duration of diarrhoea less than 14 days. Exclusion criteria: 1) Insidious onset of diarrhoea, 2) Duration of diarrhoea more than 14 days, 3) Prior use of antibiotics before collection of rectal swab. Most of the cases were under 5 years. The illness was not more than 10 days duration in most of the cases. All the cases selected were dehydrated. A detail history and clinical examination were carried out in all the cases. A detailed pro forma

was used and filled up completely in each case by questioning parents or relatives. Important relevant investigations were carried out. Immediately after admission, rectal swabs were collected in all the cases before any treatment was administered. An autoclaved cotton wool with stick swab was gently introduced into the anal opening of the patient, taking proper care not to touch the perianal region and introduced beyond the internal sphincter & rotated gently. Then it was taken out and examined macroscopically for presence of blood or pus. This was then put into an autoclaved test tube which was plugged tightly and was then sent for bacteriological study immediately.

For bacteriological study, the rectal swab sent was kept in peptone water for 6-8 hours and then streaks were made on blood agar and Mac-Conkey's medium and were incubated at 37^0c for 24 hours. After 24 hours of incubation, few colonies were taken out from these medias for gram's staining. Others were examined for colony characteristics. After completing bacteriological procedures, final results were noted. Viral study and serotyping of E.Coli were not done due to unavailability of the facility in the institute.

Results: In our 100 cases, 55% were male and 45% were female. 16% babies were below 6 months of age and 50% babies were in 6 months to 2 years age group. 77% cases belong to lower socio economic class. Frequency of stool, vomiting, fever, oliguria, thirst, lethargy, irritability of restlessness, distension of abdomen, perianal redness, abdominal pain, convulsion, cough and cold, dehydration, tachycardia, acidosis etc. were the clinical features seen in this study.

Table – 1: Age And Dietary Distributions

Type of Diet	0-6 Months	6-24 Months	3-5 Years	6-12 Years	Total Percentage
Only BF	8	4	-	-	12%
BF + TF	2	24	-	-	26%
Only TF	6	12	10	-	28%
Mixed Diet	-	10	16	8	34%

As shown in Table – 1, 12% babies were on breast milk alone 26% babies were on breast milk as well as on Artificial milk. 28% babies were only on top feeding and 34% were on mixed diet.

Table – 2: Nutritional Status & Mortality (IAP Classification)

Weight	State of Nutrition	Total Percentage	Mortality Percentage
Expected Weight			
70-80%	PEM gr I	20%	-
60-70%	PEM gr II	28%	1%
50-60%	PEM gr III	21%	3%
less than 50%	PEM gr IV	11%	6%
Satisfactory Nutrition	Normal	20%	-

PEM – Protein Energy Malnutrition
IAP – Indian Academy of Pediatrics

As shown in Table – 2, 80% cases showed various grades of malnutrition: Grade I – 20%, Grade II – 28%, Grade III – 21% and Grade IV – 11% according to IAP classification for protein energy malnutrition. All the cases (100%) had varying degree of dehydration: Mild dehydration – 20%, Moderate dehydration – 60%, Severe dehydration – 20%.

20% cases had parenteral infections, 29% cases had associated illness in addition to gastroenteritis. Microscopic stool examination had 2% E. histolytica cyst, 2% had Giardia lamblia and 4% had Ascariasis positive.

Table – 3: Etiologic Agent & Mortality

Sr. No.	Pathogen	Total No. of Cases	Mortality
1	E. Coli	14%	2%
2	Vibrio Cholerae	16%	Transfer to IDH
3	Klebsiella.	8%	-
4	B. Proteus	1%	-
5	Salmonella	2%	-
6	No bacteria isolated	59%	8%

IDH – Infectious disease hospital
As shown in Table – 3, Stool culture Examination shows E. Coli positive in 14% of cases, V. Cholerae positive in 16% of cases, Klebsiella positive in 8% of cases. B. Proteus in 1% and Salmonella in 2% of cases.

Discussion: In the this study of 100 cases of Acute Gastroenteritis, Bacteria was isolated in 41% of cases, of which E. coli was isolated in 14% of cases, V. Cholerae in 16% of cases, Klebsiella in 8% of cases, Salmonella in 2% and B. Proteus in 1% of cases. No organism was isolated in 59% of cases in which possibility of viral aetiology was

more likely. Because of lack of facility, we could not do viral study. Rotavirus is the commonest viral aetiological agent. From a study of 642 cases conducted all over India, Udani[6] reported the following microbiological finding: Bacterial isolation in 66.2%, E.Coli in 44%, Shigella in 3.8%, Staphylococci and streptococci in 8%, virus was isolated in 22% and no organism was isolated in 33.8%. 10% mortality is noted in this study, out of this 2% was due to E. Coli diarrhoea and no growth was isolated in 8%. P.M.Udani[7] reported 27.7% mortality in 1983-84, S.K. Behera[8] reported 9% mortality in 1980 and Khatua[9] reported 9% mortality in 1984.

In the present study 16% cases were up to 6 months of age and 66% cases were below 2 years of age in all cases. Naruka et al[10] & Mohapatra et al[11] have reported that infancy is the most vulnerable period of life for acute gastroenteritis following explanation can be given for this;

This is the age when weaning usually starts and introduction of top feeding invites the infection. Simultaneous generalized catarrhal manifestation, gingival hypertrophy and inflammation, voracious appetite of infants and tendency to put anything in mouth.

Various wrong ideas and superstitions adds to the problem directly and indirectly by perpetuating malnutrition e.g. use of prelacteal feed, throwing of colostrum etc.

In this study, 12% babies were on breast feeding only, 26% babies were on breast feeding as well as supplementary feeding. 28% babies were only on top feeding while 34% babies were on mixed diet (Milk + solid diet). Among this, 54% were on top feeding only or breast feeding and top feeding. Dipika Sur et al[12] have also observed low incidence of acute gastroenteritis among exclusively breastfed infants and they conclude that breast fed infants are less vulnerable to acute gastroenteritis than those who are top fed. Reasons for beneficial effects of breast feeding are lowering of intestinal pH and inhibitory effect of lactoferrin content of breast milk on growth of E.Coli in intestine[13]. Breast milk is more digestible and is very less subjected to contamination by fingers, flies and other infective agents[14]. Breast milk contains IgA which protects baby from gastroenteritis for first six months. A bottle fed babies are more prone to gastroenteritis because of unhygienic preparation of milk and improper sterilization & faulty feeding technique.

In this study, 80% cases showed varying grade of malnutrition (Grade I - 20%, Grade II - 28%, Grade III - 21% and Grade VI – 11%). The seriousness of diseases was more in severally malnourished cases. Similar observations were also reported by various investigators[15,16]. It is evident that malnutrition predisposes to diarrhoea and tends to make it more severe creating a vicious cycle.

- The possible correlation between malnutrition, infection and diarrhoeal disease is that:
- In childhood malnutrition, there may be high bacterial population in jejunum, which may be basis for mucosal inflammatory reactions.
- Malnutrition decreases the resistance, so that the potential pathogens e.g. proteus, pseudomonas etc. may become pathogenic.
- Achar[17] has given explanation that reduction of digestive enzymes occur due to atrophy of pancreatic exocrine cells in malnourished cases; which favour the higher incident of acute Gastroenteritis.
- Higher mortality among malnourished infants has been reported by investigators [7,8,18].

Table – 4: Correlation Of Dehydration Status, Pathogen And Mortality

Pathogen	Dehydration			Total	Mortality
	Mild	Moderate	Severe		
E. Coli	4	10	-	14	2%
V. Cholerae	-	11	5	16	Tr. to IDH
Klebsiella	2	4	2	8	-
B. Proteus	-	1	-	-	-
Salmonella	1	1	-	-	-
No growth	13	33	13	59	8%

In this study, out of 10 cases expired, 6 cases (60%) had severe dehydration while 4 cases (40%) had moderate dehydration. Those 4 cases who had moderate dehydration at the time of admission, 2 patient developed septicaemia had expired within 48 hours while the other two patient had clinical picture of encephalitis. Many host factors, such as nutritional status, general resistance, virulence of infection etc. may occur for this state of affair. All the investigators are of the same opinion that severity of acute gastroenteritis depends upon the severity of

dehydration and severe the dehydration, higher will be mortality rate [7,8,18,19,20,21].

Conclusion: Acute diarrhoeal disease is a major problem of developing countries and carries major disease burden in the lower socio-economic class. Viral diarrhoea remains the most common aetiology in the children. Breastfeeding and feeding practices play a major role in the incidence of diarrhoea. Malnutrition and diarrhoeal disease make a vicious cycle. Severity of malnutrition and dehydration is correlated with increase in mortality. Thus, proper hygiene & sanitation, appropriate breastfeeding and complementary feeding practices, prevention of malnutrition, complete immunization and prompt and effective rehydration therapy help reduce the incidence of diarrhoeal disease in children.

Limitations: Viral study and serotyping of E.Coli were not done due to unavailability of the facility in our institute.

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Conflict of interest: None
Funding: None
Cite this Article as: Gadhvi H, Mod H, Shah B M. Clinical And Microbiological Profile Of Acute Diarrhoeal Disease In Paediatrics. Natl J Integr Res Med 2020; Vol.11(1): 58-61