Original article:

Study of etiology of acute diarrhoea among children at a tertiary care teaching centre

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Abstract

Objectives: Present study was conducted with the objective to know hospital prevalence and clinical features of acute diarrhoea and describe the common bacterial pathogens isolated in these cases of diarrhoea in children.

Materials and methods: 120 children between 1month to 12 years of age presenting with acute diarrhea admitted to Department of pediatrics, Teerthanker Mahaveer medical college and research centre, Moradabad, Uttar Pradesh were included in the study. Cases of abrupt onset of four or more loose stools per day of less than 14 day's duration were included. All cases who received antibiotics before collection f stool samples were excluded. Detailed history was taken and clinical examination performed. An evaluation of degree of dehydration was done. Two samples of stool were collected; one sample in a sterile bottle for microscopic examination and the other for culture sensitivity study.

Results& Conclusions: Hospital prevalence of gastroenteritis was 11.5 %. In the present study the maximum number of cases of diarrhoea occurred in first 2 years of life 79 (65.83%).The male to female ratio was 1.26: 1. In the present study 46.67% of the patients had varying grades of malnutrition, Grade I (26.67%) and Grade II (11.67%) were the most common types seen in present study. Some dehydration was present in 94(78.33%) of the cases and 19(15.83%) had severe dehydration and 07(5.83%) had no dehydration. Majority of patients having moderate dehydration had 8- 10 stools/day. In this study the association between frequency of loose stools and severity of dehydration was statistically significant. Microscopic examination of stool revealed that pus cells > 10/HPF was seen in 32 cases, and RBC's were seen in 17 cases. Stool culture was positive in 64(53.33%) of the cases. Escherichia coli were found to be the predominant organism accounting for 51(40.683%) of the cases. Salmonella, Klebsiella and Shigella were also detected. In 56(46.67%)of the remaining cases, no enteropathogenic bacteria could be isolated.

Keywords: Diarrhoea, Escherichia coli, Malnutrition, Dehydration

Introduction

The diarrheal disease in babies and young children continues to be a problem for the clinicians, both because of the high number of demands for this pathology, and because of the possible diagnosis and treatment issues it involves. Globally around one billion episodes of illness and 3-5million deaths occur as a result of diarrheal disease each year.[1] Eight out of ten of these deaths occur in first two years oflife.[2]

In the first 3 years of life, children present between 1 and 3 episodes of acute diarrhoea disease with favourable response to the oral rehydration and diet, however existing a percent of 1-4% of the total cases of acute gastroenterocolitis that can evolve lethally.[3,4] In

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India, children under 5 years of age suffer from 2-3 episodes of diarrhoea annually.[5]

Poor food hygiene, water, poverty, poor education, low socio-economic status and poor sanitation are common in communities with high levels of diarrheal disease. Underlying conditions, such as malnutrition, which modify the risk of contracting diarrhea, are also common in developing countries. These factors combine to facilitate the spread of enteropathogens, and epidemics are common in such settings.

Repeated attacks of diarrhoea also aggravate the compromised nutritional status of under privileged children, with a consequent heightened susceptibility to infectious diseases. Hence, diarrhoea is an important contributing factor for malnutrition, which in turn predisposes the child to further diarrhoea, thereby initiating a vicious cycle.[6]

With improved diagnostic methods, it became possible to detect an etiological agent in 70-75% of acute cases of diarrhoea in children treated at hospitals in developed countries.[7,8] In comparable etiological surveys in developing countries, the rate of positive identification of microorganisms has been slightly lower, and compared with viruses the role of bacterial agents has been greater.[9-14] Moreover, in developing countries it has been recognized that enteric pathogens can frequently be encountered also in healthy children, making it more difficult to determine their true etiological role in causing diarrhoea.[10,11]

Furthermore, in developing countries it is not uncommon to isolate more than one enteric pathogen from the same child.[7-14]

This, necessitates regular assessment of etiological patterns of diarrhoea and therapeutic trials to ensure effective therapy. Present study was conducted with the objective to know hospital prevalence and clinical features of acute diarrhoea and describe the common bacterial pathogens isolated in these cases of diarrhoea in children.

Material And Methods

120 children between 1month to 12 years of age presenting with acute diarrhea admitted to Department of pediatrics, Teerthanker Mahaveer medical college and research centre, Moradabad, Uttar Pradesh were included in the study. Cases of abrupt onset of four or more loose stools per day of less than 14 day's duration were included. All cases who received antibiotics before collection f stool samples were excluded. Detailed history was taken and clinical examination performed. An evaluation of degree of dehydration was done. Two samples of stool were collected; one sample in a sterile bottle for microscopic examination and the other for culture sensitivity study.

Fresh stool samples were obtained from each patient before initiation of therapy and transported immediately for detection of established enteropathogens using standard techniques. A battery of culture media including Mac Conkeys agar, deoxycholate agar, Xylose-lysine deoxycholate agar and salmonella differential agar were used. The isolates were identified by standard methods and were tested for their susceptibility to various antimicrobials by disc diffusion techniques.

Qualitative data are expressed as percentages with 95% Confidence Interval and quantitative data presented as mean with standard deviation.

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Table 1: Demographic Details.

Age in Months	No of cases	Percentage
1month-2 years	79	65.83
2 – 5 years	26	21.67
5-12 Years	16	12.5
Total	120	100
Sex	No of cases	Percentage
Males	67	55.83
Females	53	44.17
Total	120	100
Social class	No of cases	Percentage
I	5	4.17
II	34	28.33
III	55	45.83
IV	22	18.33
V	4	3.33
Total	120	100

Table 2: Nutritional status of study population

Nutritional status	No of cases
Normal	64(53.33%)
Malnutrion	56(46.67%)
Grade I	32(26.67%)
Grade II	14(11.67%)
Grade III	4(3.33%)
Under nutrition(<3rdcentile weight for age	6(5%)

Table 3: Hydration Status

Severity of dehydration	No of cases
No	07(5.83%)
Some	94(78.33%)
Severe	19(15.83%)
Total	120(100)

Table 4: Stool microscopy Characters of study population.

Stool Microscopy	No of cases
Pus cells (> 10/HPF)	32
RBC's	17
No pus cells or RBC's	68
Cyst of E. Histolytica	2
Hookworm ova	1

Table 5: Stool Culture Characters of study population.

Culture positive- Organisms isolated	No of cases
Escherichia coli	51(40.683%)
Salmonella	4(3.3%)
Klebsiella	4(3.3%)
Shigella	3(2.5%)
S. Dysentriae	2(1.67%)
Total	64(53.33%)
Culture negative	56(46.67%)

Results

Total numbers of cases admitted during study period to the paediatric ward was 2113. Among them gastroenteritis occurred in 243 cases in children between 1month to 12years. This makes hospital prevalence of gastroenteritis as 11.5%. Among these 120 cases were taken for the study according to the inclusion and exclusion criteria. In the present study the maximum number of cases of diarrhoea occurred in first 2 years of life 79 (65.83%).

The male to female ratio was 1.26: 1. In the present study 46.67% of the patients had varying grades of malnutrition, Grade I (26.67%) and Grade II (11.67%) were the most common types seen in present study.

Some dehydration was present in 94(78.33%) of the cases and 19(15.83%) had severe dehydration and 07(5.83%) had no dehydration. Majority of patients having moderate dehydration had 8- 10 stools/day. In this study the association between frequency of loose stools and severity of dehydration was statistically significant.

Microscopic examination of stool revealed that pus cells > 10/HPF was seen in 32 cases, and RBC's were seen in 17 cases.

Stool culture for bacteria was carried out in all the study cases, and was positive in 64(53.33%) of the cases. Escherichia coli were found to be the predominant organism accounting for 51(40.683%) of the cases. Salmonella, Klebsiella and Shigella were also detected. In 56(46.67%)of

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the remaining cases, no enteropathogenic bacteria could be isolated.

Discussion

The prevalence of gastroenteritis in the present study was 11.5% of total admissions. The prevalence of diarrheal disorders in children as seen in the previous studies varies roughly from 5.5% to 24.6%.[15-19] Most diarrheal episodes occur during the first 2 years of life, and the incidence of acute diarrhoea below 2 years was 65.83% in present study. The high incidence of diarrheal disease inthe first 2 years of life is probably related to faulty weaning, unhygienic handling and storage of milk and food, higher incidence of parental infection, malnutrition, development of mouthing habits at this age.[17,20] Immaturity of the immune system of the body rendering it susceptible to an attack by the enteric pathogens, especially in association with malnutrition can also play role in pathogenesis of diarrhea.

In the present study the male to female ratio was 1.26: 1. Many authors in past have reported no sex difference for diarrhea in children. Although higher male incidence can be explained by the fact that males are more prone to all infections. It could possibly be attributed to our unfavourable social outlook, ignoring and neglecting, the ailments of female children and bringing mostly the boys to the hospital. There is a representation bias of boys in hospital.

Poor sanitation was noted in majority of the cases leading to face-oral spread. Only 35.83% of the families were using sanitary latrines while the remaining 64.17% of the patients practiced open air defecation. Improper disposal of excreta results in water pollution, food contamination and propagation of flies thus leading to disease transmission.

The higher incidence in lower socioeconomic status as found in present study may contribute to higher incidences of diseases because of poor sanitation, unhygienic practices, malnutrition, illiteracy etc.

The consistency of stools in our series varied from watery stools to semisolid stools. Majority of the cases had watery stools (81.67%) and 18.33% had semisolid stools. Similar results were noted in previous studies.[5,21,22]

In the present study 78.33% of the patients had some dehydration, 5.83% had no dehydration and 15.83% severe dehydration. Our observations are nearly in concordance with those of T.S. Daralet al[23] who reported some dehydration in 76.5%.

In our study stool examination revealed pus cells in 32 cases and RBC's were seen in 17 cases. The different organisms isolated were Esch. coli (40.68%); Salmonella (3.3%); Klebsiella (3.3%) and Shigella (2.5%) in our study. But it is important to note that isolation of bacteria from the stools of patients does not establish an etiological relationship; and the diarrhoea in a bacterial carrier may not be caused by the pathogenisolated. In previous studies, entero-pathogenic bacteria have been detected in from 30 to 67%.[23-26]In our study E. coli were isolated in 40.68% of the cases. Recognised classes of Escherichia coli (EPEC, ETEC, EHEC, EAEC, and EIEC) were not isolated due to lack of facility in the institution.

In our study there was no mortality mainly because our study comprised of a small group of patients and because when compared to other studies the children in this trial had a shorter

duration of diarrhoea before admission and only 15.83% had severe dehydration and individuals with systemic infections or other disease were excluded. So the prevalence of prognostic indicators of poor outcome was lower than other studies. There was a rapid initiation of treatment on admission that included correction of dehydration and immediate introduction of feeds.

Conclusion

From present study it can be concluded that the incidence was more during first 2 years of life as well as no sex predilection was found. The higher incidence in lower socioeconomic status as found in present study may contribute to higher incidences of diseases because of poor sanitation, unhygienic practices, malnutrition, illiteracy etc.In the present study 78.33% of the patients had some dehydration, 5.83% had no dehydration and 15.83% severe dehydration. Enteropathogenic bacteria could be isolated from 53.33% of cases of which E.coli constituted 40.68%, Salmonella 3.3%, Klebsiella 3.3% andShigella 2.5%.

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