Study on Renal Function in Acute Diarrheal Disease with Dehydration

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Abstract

Background: Decreasing trend of exclusive breast feeding and faulty practices of bottle-feeding play an important role in the causes of acute diarrhoea. The main cause of death in acute diarrhoea is dehydration, which results from the loss of fluid and electrolytes in diarrheal stools. The present work was planned to assess renal function (Blood Urea and Serum Creatinine) in acute diarrheal disease with dehydration.

Subjects and Methods: The present hospital based prospective study was conducted at department of paediatrics GSL Medical College & General Hospital, Rajahmundry, which includes consecutive patients attending OPD and inpatients in view of acute diarrhea between 1 month and 5years of age. A detailed history from the patients with acute gastroenteritis was taken. The procedure of the study was explained & required consent for the study was taken. Examination of the patient was done & all relevant data was obtained.

Results: B. Urea levels were elevated (>35mg/dl) in 35.1% cases and normal in 64.9% cases with mean being 44.93 mg/dl. S.Creatinine levels were elevated (>0.7mg/dl) in 32% cases and rest having normal levels with mean being 0.68mg/dl. Maximum age incidence was found in age group of less than 1 yr (50.5%).

Conclusion: The present study aimed at noting the biochemical changes in patients having acute diarrhoea. Like any other electrolyte abnormalities which occur in conditions other than diarrhoea, are basically asymptomatic & does not require aggressive correction of electrolytes.

Keywords: Acute diarrheal disease, Dehydration, Blood urea, Serum creatinine.

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Introduction

Diarrhoeal disorders in childhood account for a large proportion (9%) of childhood deaths, with an estimated 0.71 million deaths per year globally, making it the second most common cause of child deaths worldwide.[1] In India, acute diarrhoeal disease accounts for about 8% of deaths in under-5 years age group. During the year 2014, about 11.6 million cases with 1,323 deaths were reported in India.[2]

The high incidence of diarrhoeal diseases in developing countries is related to under-nutrition, increased vulnerability to infections, poor education, socio-economic status and the unfortunate trend of early breast milk substitutes. Decreasing trend of exclusive breast feeding and faulty practices of bottle-feeding play an important role. The main cause of death in acute diarrhoea is dehydration, which results from the loss of fluid and electrolytes in diarrheal stools.

A study conducted in 2010 in Dhaka Shishu hospital showed that electrolyte disturbances in Acute Gastroenteritis was associated with increased morbidity, with hyponatraemic dehydration in 15% cases.[3]

Electrolyte abnormalities are common in children with diarrhoea. It may remain unrecognized and result in mortality and morbidity. Timely recognition, a high index of suspicion and thorough understanding of common electrolyte abnormalities is necessary to ensure their correction. The present study was undertaken to assess renal function in acute diarrheal disease with dehydration.

Objectives: To assess renal function (Blood Urea and Serum Creatinine) in acute diarrheal disease with dehydration.

Subjects and Methods

The present Hospital based prospective study was conducted in Department of Paediatrics, GSL Medical College & General Hospital, Rajahmundry. Consecutive Patients attending OPD and inpatients in view of acute diarrhea between 1 month and 5years of age.

Selection criteria:

Inclusion criteria:

Children between 1 month and 5years of age (with acute gastroenteritis), Large frequent stools (3 or >), Excessive vomiting (4 or >), Some & severe dehydration.
Exclusion criteria: Parenteral diarrhea, Gastroenteritis more than 14 days, Severe Acute Malnutrition.

Method of data collection: A detailed history from the patients with acute gastroenteritis was taken. The procedure of the study was explained & required consent for the study was taken. Examination of the patient was done & all relevant data was obtained. Detailed clinical examination will be done to look for thirsty, irritability, pinched look, sunken eyes, dry inner side of cheeks, abdominal distention, deep and rapid breathing, weak and thready pulse, falling blood pressure, reduced quantity of urine according to WHO dehydration assessment scale.

Laboratory investigations: 1. Basal Hematological and Biochemical investigations were done in all patients, including hemoglobin, total and differential white cell counts, platelets & peripheral smear examination 2. Basal blood urea nitrogen and basal random blood sugar was done in all patients. 3. Serum electrolytes were determined at ‘0’ hour(admission) and once between 24 to 48 hours(post hydration).

Assessment of dehydration with treatment

| Look: | 1. Thirst | Drinks normally | Drinks eagerly | Unable to drink
|-------|-----------|-----------------|---------------|----------------|
| 2. Condition | Well, Alert | Restless, Irritable | Lethargic, unconscious
| 3. Eyes | Normal | Sunken | Very sunken
| 4. Tears | Present | Absent | Absent
| 5. Oral cavity | Moist | Dry | Very dry
| Feel: | Skin pinch | Goes back | Goes back | Goes back very slowly(<2 sec)
| | | | | slowly(2-3 sec)
| | | | | slowly(>3 sec)
| Hydration | NO | SOME | SEVERE
| Treatment | Plan A | Plan B | Plan C

Fluid therapy: This was designed to correct dehydration, electrolyte imbalance, acidosis and maintain urinary output.

Statistical analysis: Descriptive statistics such as mean, SD and percentage was used.

Results

Table 1: Age distribution

| Age(Yrs) | Frequency | Percentage |
|----------|-----------|------------|
| <1       | 49        | 50.5       |
| 1-2.     | 17        | 17.5       |
| 3-5.     | 31        | 32         |
| Total    | 97        | 100        |

Majority of the patients belongs to age less than one year (50.5%) followed by 3-5 years (32%) and 1-2 years (17.5%).

Table 2: Sex distribution

| Sex | Frequency | Percentage |
|-----|-----------|------------|
| M   | 53        | 54.6       |
| F   | 44        | 45.4       |
| Total | 97        | 100        |

In the present study, male patients (54.6%) are more predominant than female (45.4%).

Table 3: Distribution of dehydration

| Dehydration | Frequency | Percentage |
|-------------|-----------|------------|
| Some        | 59        | 61         |
| Severe      | 38        | 39         |

In the present, severe dehydration was observed in 38 (39%) patients only.

Table 4: Blood urea levels

| Blood Urea(Mg/Dl) | Frequency | Percentage |
|-------------------|-----------|------------|
| >35               | 34        | 35.1       |
| <35               | 63        | 64.9       |
| Total             | 97        | 100        |

Table 5: Blood urea levels in different age groups of children studied (n=97).

| Age(Yrs) | SEX | BLOOD UREA (mg/dl) |
|----------|-----|-------------------|
| <1       | M   | 10(10.3%)/17(17.5%) |
|          | F   | 8(8.3%)/14(14.4%)  |
| 1-2.     | M   | 5(5.3%)/4(4.2%)    |
|          | F   | 2(2.1%)/6(6.2%)    |
| 3-5.     | M   | 6(6.2%)/11(11.3%)  |
|          | F   | 3(3.1%)/11(11.3%)  |
| TOTAL    |     | 34(35.1%)/63(64.9%) |

Table 6: Serum Creatinine Levels In Children Studied (N=97).

| Serum Creatinine (mg/dl) | Frequency | Percentage |
|--------------------------|-----------|------------|
| >0.7                     | 31        | 32         |
| <0.7                     | 66        | 68         |
| Total                    | 97        | 100        |

Table 7: Serum Creatinine Levels In Different Age Groups Studied Children Studied (N=97).

| Age(yrs) | SEX | Serum creatinine (mg/dl) |
|----------|-----|-------------------------|
| <1       | M   | 9(9.3%)/18(18.6%)       |
|          | F   | 5(5.2%)/17(17.5%)       |
| 1-2.     | M   | 5(5.2%)/4(4.1%)         |
|          | F   | 2(2.1%)/6(6.2%)         |
| 3-5.     | M   | 6(6.2%)/11(11.3%)       |
|          | F   | 4(4.2%)/10(10.3%)       |

Discussion

Age: The most common age group in the present study was age
less than 1 year (50.51%) followed by 3-5 years (31.95%).
M M Okposio et.al study shows similar age distribution
with present study and reported, children who are less than 5
years of age of which 103(55.7%) falls under an age of
<1year and 82(44.3%) above 1 year.
Conway et.al.[5] study conducted on 1148 children younger
than 16 years admitted to a sub-regional infectious disease
hospital with a diagnosis of gastroenteritis over a 1 year
period. Of the admitted children, 55% (635/1148) were
younger than 1 year while 5% were over 5 years of age.
Habibullah babar et. al,[6] conducted similar study, in which
majority of patients admitted were below 24 months of age
i.e., 114(65.5%).
Ahmad M S et.al.[7] According to age, 11 (10.6%) patients
were below one month, 48 (46.1%) were between 1 month
and 11 months, 32 (30.8%) were between 1 year and 4 years
and 11 months, and 13 (12.5%) were 5 years.
Srivastava et.al.[8] conducted a study, 110 hospitalized
children up to 3 years of age suffering from diarrhoea were
investigated. The peak of admission due to diarrhoea was in
the month of June. Cases aged 0-12 months constituted
72.8% of the total number of cases.

Sex:
In this study, total 97 children where studied, male children
53 (54.6%) outnumber female children 44(45.4%), with a
male to female ratio of 1.2:1.
Habibullah barbar et. al,[6] conducted similar study, in which
majority of patients admitted were males 112(64.4%) and
Female patients were 62(35.6).
Acute Diarrheal Disease was more common in boys than
girls with the ratio of 1.2:1, a finding which is similar to that
reported by Srivastava et al8 and Behera et al.[9]
Rebecca Oketcho et al,[4] showed that nearly all children
(99.5%) resided in Morogoro and there were more male
children (57.9%) than female children (42.1%).
M M Okposio et.al,[4] study shows similar findings in age
distribution. A total of 185 children met the inclusion
criteria out of the 302 admitted for diarrhoeal disease during
the study period. Of these, 107 (57.8%)were males and 78
(42.2%) were females with a male female ratio of 1.4:1.

Blood Urea levels:
In this study most of the patients 64.9% had normal urea
levels followed by increased levels in 35.1% patients.
In the present study, out of 38 severely dehydrated children
20(52.6%) children had high blood urea levels and 18
(47.3%) children had normal blood urea levels.
In present study, out of 59 some dehydrated children 45
(76.3%) children had normal blood urea levels and 14
(23.7%) had high blood urea levels.
Ahmad M S et.al.[7] study, out of 104 severe dehydration
patients studied Urea level was high in 88 (84.6%) patients.
Gauchan E et.al,[10] study showed similarity with present
study, high blood urea was found in 20 (90.9%) of Severe
dehydration as compared to 63 (51.2%) of Some and 15
(34%) of No dehydration.
A clinical and biochemical study by K. R. Purohit et al of
100 cases of acute diarrhoea in infancy was done, Blood
urea was raised in 53 cases.[11]

Serum Creatinine levels:
In present study, majority of the patients (68%) had normal
levels followed by increased levels in 32% patients.
In the present study, out of 38 severely dehydrated children
17 (44.7%) children had high serum creatinine levels and
21 (55.3%) children had normal high serum creatinine
levels.
In present study, out of 59 some dehydrated children 45
(76.3%) children had normal serum creatinine levels and 14
(23.7%) had. high serum creatinine levels.
Ahmad M S et.al study shows similarity with present study
Creatinine level was high in 36 (34.6%) patients.[7]
Alireza Soleimani et. al study showed, Out of 121 patients,
28 patients (23.9%) serum Cr level was higher than 1.5
mg/dL on admission. Of these patients, 13 persons (46.4%)
were affected by the mild form of the increase in the serum
Cr (1.5<plasma Cr <3 mg/dL) and 15 patients (53.6%) had
a plasma Cr level above 3 mg/dL.[12]
Gauchan E et.al, study showed, out of 114 children studied,
high serum creatinine was found in 18 (81.8%) of Severe, 79
(64%) of Some and 17(39.5%) of No dehydration.[10]
A clinical and biochemical study by K. R. Purohit et al of
100 cases of acute diarrhoea in infancy was done. S.
creatinine levels increased in 53 cases.[11]

Case Fatality Rate:
In the present study, out of 97 children 3 (3.1%) children
died and 94 (96.9%) children survived.
All 3 (3.1%) children who died of electrolyte abnormality
also had high levels of blood urea and serum creatinine.
In a study by Shan GS showed, out of 46 patients with
abnormal electrolyte pattern 5 died while there was no death
amongst 11 patients with normal electrolytes. However,
statistically significant mortality was observed in patients
presenting with either hyponatremia or hypokalemia as
compared to the group with normal electrolytes.[13]

Conclusion
The present study aimed at noting the biochemical changes
in patients having acute diarrhoea. Like any other electrolyte
abnormalities which occur in conditions other than diarrhoea,
are basically asymptomatic & does not require aggressive
correction of electrolytes. They do very well with ORS &
fluid correction as recommended by W.H.O.

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