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Research Article

Assessment of Acute Diarrheal Diseases in Libyan Children

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Abstract

Background: Diarrheal disorders are continues to be a major cause of hospitalization in children under 5 years in children. Globally, there are nearly 1.7 billion cases of childhood diarrheal disease every year. Dehydration, metabolic disturbance and disseminated intravascular coagulation (DIC), responsible for the higher morbidity and mortality rates during acute phase, while as regarding long term complications of diarrhea is a leading cause of malnutrition in children under 5 years old. Children who are malnourished or have impaired immunity, are most at risk of life-threatening diarrhea. Clinical evaluation of the degree and type of dehydration are important first step in the management of the patients.

Aim of the Study: The aim of this study was to assess the clinical and laboratory parameters and compare it with our previous researches in this field (2).

Method and Subjects: A cross sectional survey was carried out for 12 months from, data were collected from (100) patients, September 2021 to September 2022. who were admitted to pediatric department of Gharyan teaching hospital suffering from acute diarrheal diseases. WHO chart for the dehydration was used for assessment of the degree of dehydration in these admitted children, blood samples from them were taken for serum electrolytes and blood urea level at the time of admission before patients were hydrated with intravenous fluid. Data was processed using the software Statistical Package for Social Science (SPPS ve.14). Descriptive statistics were used to describe all variables.

Results: Total were 100 cases, 61% are boys and 39% of cases are girls, with male to female ratio of 1.56:1 the mean age of children was 11.84 months. The majority of cases 77% are aged 1-12 months. 74% of the admitted cases had moderate dehydration, 21% were severely dehydrated and 5% of cases had mild dehydration. Electrolytes results showed that plasma sodium was significantly high in severely dehydrated cases compared to others. Also urea level showed significant elevation compared to mild and moderate cases. we conclude that acute diarrheal diseases are still a burden in our society and severe hypertonic dehydration was also high in severely dehydrated children although it less than before when we compare this study with our previous work. Further larger and multi-center studies are needed to validate our results and to fallow the disease progress and changes.

Keywords: Diarrhea; Dehydration; Gastroenteritis

Introduction

Diarrheal disorders are considered to be a major cause of morbidity and mortality among children all around the world and still accounts for more than two million deaths per year among children younger than 5 years globally [1]. In Germany, nearly 40,000 children under age five were admitted to a hospital with acute infectious gastroenteritis in 2017 [2]. The term Gastroenteritis denotes infections of the gastrointestinal tract caused by bacterial, viral, or parasitic pathogens [3]. Viral pathogens accounted for 93% of cases among hospitalized children, with rotavirus accounting for 47%, norovirus 29%, and adenovirus 14% [4,5].

Diarrhea as defined by WHO is the passage of loose or watery stools at least three times in a 24 hours period however, a change in stool consistency versus previous stool consistency is more indicative of diarrhea than stool number, particularly in the first months of life, and the usefulness of parental insight in deciding whether children have diarrhea or not [6,7].

In the United States an estimated 211 million to 375million episodes of acute diarrhea occur each year; such episodes are responsible for more than 900,000 hospitalization and 6000 deaths annually [8,9].

Dehydration is the most frequent and dangerous complication responsible for morbidity and mortality in children with acute diarrhea [10]. Consequently, Clinical evaluation of the degree of dehydration becomes important, and is often based on different dehydration assessment schemes [11,12]. These schemes are based on constellations of different clinical signs with proven ability to distinguish different levels of dehydration. Although we do not question the validity of these schemes upon appropriate use, children with severe dehydration can still be missed when sub optimally trained medical staff fails to use these schemes in busy and understaffed emergency departments and health centers [13]. Moreover the laboratory facilities often are not available or, even if available; there is a considerable time lag in obtaining the results.

The aim of this study was to assess the usefulness of clinical and laboratory parameters in the assessment of dehydration.

Methods

This was a hospital based cross-sectional type of observational study conducted in the pediatric department of Gharryan teaching hospital from September 2021toSeptember 2022. Data collected from 100 cases of both genders, aged one month to 60 months. All cases included in this study were admitted in the Pediatric department with acute gastroenteritis suffering from dehydration due to diarrhea with or without associated vomiting.

All patients were assessed clinically for dehydration using WHO chart for clinical assessment of degrees of dehydration, which is based on general condition, sunken eyes, mucus membrane and skin turgor, blood samples were sent to laboratory for serum level of urea, and electrolytes at the time of admission before patients were hydrated with ORS or intravenous fluid.

Results

Total 100 children were enrolled in the study as per the inclusion criteria. The mean age of children was 11.84 months, 61 cases were males (61%) and 39 cases were females (39%), with male to female ratio of 1.56:1 (Figure 1).

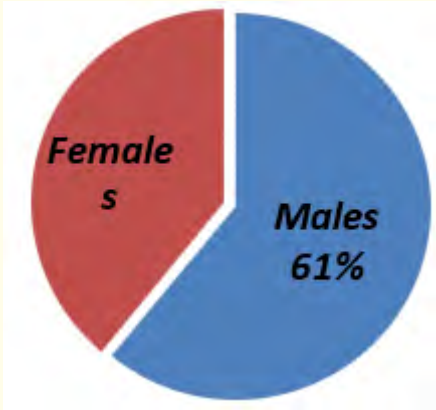

Figure 1: Showing the male (61) and female (39) percentage of cases in this study.

The distribution of cases according to the age showed that the majority of cases 77% are aged 1- 12 months, 17% aged 12-24 months and 6% aged 24-60 months (Figure 2).

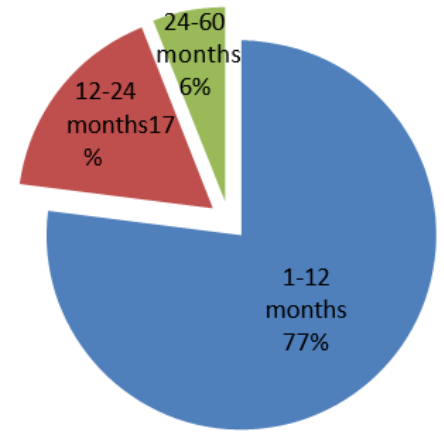

Figure 2: Showing the distribution of cases according to the age in this study.

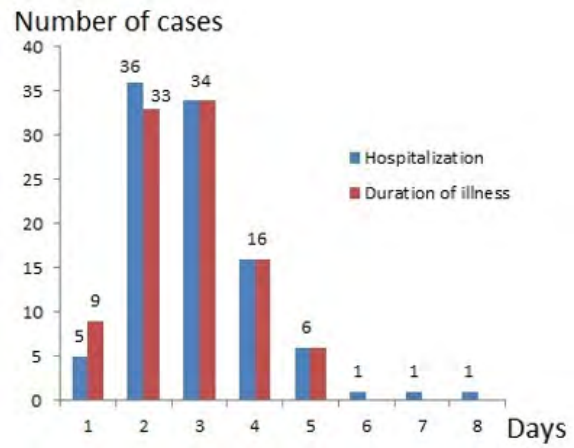

Figure 3: Showing the distribution of cases according to duration of illness and to the duration of hospitalization in days.

The duration of hospitalization in all cases studied showed significant relation to duration of illness as shown in table 1 and figure 3.

Mean duration of illness ± SEM	Mean duration in Hospital ± SEM
2.94 ± 0.12	*2.73 ± 0.11

Table 1: Showing the mean duration of illness in days and the mean duration of hospitalization in days in all studied cases.

*: Significance of differences by Student's t-test for paired data at P ≤ 0.05.

The cases are divided into three groups according to the severity of dehydration (mild, moderate, sever) depending in to clinical assessment. Table2showsthatthemajority (74%) of the cases had moderate dehydration, which was followed by the severely dehydrated cases (21%) and mild dehydration was the lowest (5%). Electrolytes investigated shows that the serum sodium was significantly high in severely dehydrated cases compared to mild and moderate cases of dehydration. Also the urea level showed significant elevated levels in severely dehydrated cases compared to mild and moderate cases (table 2 and figure 4).

Degree of Dehydration	Mean Age ± SEM	Mean serum Na^+ ± SEM	Mean serum$_{K^+}$ ± SEM	Mean serum Urea ± SEM	Mean duration of illness ± SEM	Mean duration in Hospital ± SEM
Mild 5% (3♂)(2♀)	7.8 ± 2.13	139.6 ± 2.82	4.58 ± 0.428	16.6 ± 2.46	1.8 ± 0.37	2.0 ± 0.00
Moderate 74% (42♂)(32♀)	13.4 ± 1.43	142.4 ± 0.99	4.12 ± 0.08	28.7 ± 2.31	2.5 ± 0.10	2.7 ± 0.11
Sever 21% (16♂)(5♀)	7.43 ± 1.04	157.3* ± 2.26	4.27 ± 0.19	77.9* ± 8.78	3.76 ± 0.19	3.76 ± 0.19

Table 2: Showing the mean age in months, the mean serum sodium level in mEq/L, mean serum potassium level in mEq/L, the mean serum urea level in mg%, the mean duration of illness in days and the mean duration of hospitalization in days in mild, distributed according to the degree of dehydration (mild, moderate and severe) cases.

Values are represented as mean ± SEM.

The number and gender of observations are given in parentheses.

*: Significance of differences from (mild and moderate) level calculated by LSD at P ≤ 0.05.

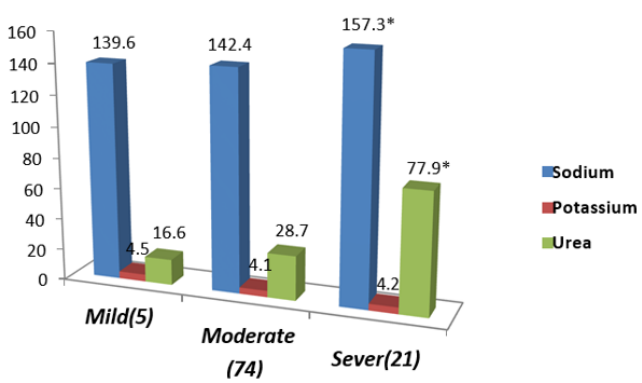

Figure 4: Showing the serum sodium level in mEq/L, potassium level in mEq/L and the urea level in mg% in the mild, moderate and severely dehydrated cases.

Values are represented as mean ± SEM.

The number of observations is given in parentheses.

*: Significance of differences from (mild and moderate) level calculated by LSD at P ≤ 0.0.

Discussion

Studies in developing countries have shown that children in the first 2 years of life may have up to 10 episodes of diarrheal disease, and continues to be a major cause of hospitalization and associated with significant morbidity and mortality rates [14].

In our study, prevalence of diarrhea was almost common among males 61% than in females 39%. Although some studies show greater incidence in males [15] and some in females [16], and most of the affected children are less than two years of age (94%) as compared to those above two years of age (6%). Signs and symptoms is more valid for predicting the dehydration severity, though signs like as skin turgor, deep breathing and capillary filling time have some limitations to use for dehydration severity assessment [17]. In order to improve accuracy of assessment of clinical dehydration, several laboratory parameters have been suggested. Some pediatricians believe that blood chemical analysis is not essential among children with diarrheal disorders while evaluation of electrolyte disturbances is important to identify the extent of dehydration and severity of the disease [18].

Laboratory indexes revealed statistically significant discriminatory values between dehydration groups. Patients with 'severe' dehydration had more hypernatremia (157.3 vs. 139.6-142.3), $P < 0.001$), and higher mean serum urea (77.9 vs. 16.6-28.7, $P < 0.001$).

A review of the literature reveals several publications with conflicting messages regarding the value of laboratory variables in predicting dehydration levels [19]. Serum urea was the best studied and was found a useful predictor of dehydration by some[19-21], where others doubted its usefulness [13,22,23]. The results in our study showed a trend for urea concentration to increase with the degree of dehydration.

American Academy of Pediatrics practice parameters [24] and the European guidelines [18], state that serum electrolytes in patients with acute gastroenteritis is unnecessary. However, these guidelines are based on the assumption that a careful physical examination and assessment are feasible. In the real life of developing countries, we do have deep concerns regarding the availability of skilled medical personnel and optimal setups in first-line health care facilities.

Hospitalization time (2 - 3.76 days) was shown to be related on duration of illness and dependent on clinical assessment only and not related to laboratory parameters.

Conclusions

- Serum urea, sodium, potassium, was useful independently in augmenting clinical examination to diagnose the degree of dehydration status among children presenting with gastroenteritis. Serum urea performed the best among all.
- To prevent diarrhea or at least to decrease the episodes of the acute diarrheal disease in our society we should strict to WHO preventive measures plus early rehydration with low osmolarity oral rehydration salts (ORS) solution, Zinc supplements Rehydration with intravenous fluids in case of severe dehydration or shock.
- The vicious circle of malnutrition and diarrhea can be broken by continuing to give nutrient-rich foods – including breast milk – during an episode, and by giving a nutritious diet – including exclusive breastfeeding for the first 6 months of life – to children when they are well.

- Consulting a health professional, in particular for management of persistent diarrhea or when there is blood in stool or if there are signs of dehydration
- Multi centre studies are needed to validate our results and to examine their impact on final outcomes.

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