RISK FACTORS FOR ACUTE DIARRHEA MORTALITY

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Abstract:
Background: Diarrhoeal diseases are a leading cause of childhood death and disease in the developing countries. Dehydration, dysentery and persistent diarrhea cause these deaths. Childhood morbidity and mortality associated with diarrhea share a dramatic burden of health services and cost in these countries.

Objective: Tostudy the important risk factors for death in children with acute diarrhea less than two years of age.

Methods: A retrospective study between 1996 – 2000 was performed to study the risk factors for death in children admitted to Al –Kadyhmia Teaching Hospital because of acute diarrhea below two years of age, the number of admitted cases were 336 case and there was 11 cases of death.

Results: The characteristics of the died cases are the followings: Young age mainly less than one year, low body weight, male sex, artificial feeding, and residency in a rural areas and severe degree of dehydration are important risk factors for death.

Conclusion: The important risk factors for death incases with acute diarrhea are severe dehydration , male sex ,artificial feeding ,low body wieght and residancy in rural areas.

Key words: Acute diarrhea , Severe dehydration , risk factor

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Introduction

Diarrhoeal diseases are still a major cause of morbidity and mortality among children in many developing countries. Acute diarrhea is a three or more loose or watery stool per day or definite decrease in consistency; increase in frequency based on individual baseline usually less than 14 days. Most patients with acute diarrhea will typically have 3-7 movements per day with total stool volume less than one letter per day[1]. The main dangers of acute diarrhea are death and malnutrition.

Epidemiology:

Diarrhoeal diseases are one of the leading causes of morbidity and mortality in children worldwide especialy in many developing countries and areas. In developing countries it has been found that the incidence of diarrhoea obtained 2.6 episodes per child per year was virtually the same as that estimated by Synde and Marson in 1982 while the global mortality estimated was lower 3.3 million deaths per year. range 1.5- 5.1 million .

The mortality estimated is based on a small number of active surveillance and prospective studies and thus associated with a large degree of uncertainty, reflecting the weakness of the global database[2].

In a current estimate of the problem in the united states of America that 16.5 millions of children younger than five years of age experience 21-37 million episode of diarrhea annually and this result in 325-425 childhood deaths annually.

The W.H.O. estimates that for children under 5 years of age in developing countries, there was a median of 3.2 episodes of diarrhea per child-year . the yearly infant mortality due to diarrhea revealed that 4.9 children per year , a decline from the previous estimates of 13.6 and 5.6 per 1000 per year.The decrease was most pronounced in children aged under one year. Despite improving rates, diarrhea accounted for a median of 21%of all deaths of children aged under 5years in these areas

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and countries, being responsible for 2.5 million deaths per year[3].

Patients and Methods

This retrospective study of acute diarrhea among children less thn 5 years of age including 363 cases who were admitted to Al- Kadyhmia Teaching Hospital for the period between 1996-2000, the number of died cases because of acute diarrhea and its complications were 11case (3.03 %). T hese cases were studied regarding deferent variables including the age, sex, body weight and percentile, degree of dehydration at time of admission, residency of these children and feeding patterns.

Results

Age and Sex

The total number of the admited cases was 336cases ,the number of male inthese cases was 205(62.01%), and there were eight of the eleven deid cases were male (72.72%), while the number of the female admited was 131 (38.98%) and only three cases were female (27.2 %) of the studied died cases .

The age of the cases who died was: nine cases were less than one year of age (81.8%) and only two cases who were one year and one and half year respectively. These results are shown in table 1.

Body weight and percentile

In our study we found that the mean weight of death for admitted children less than 2 years of age in our hospital in the period between 1996-2000 was (4.4kg) and their growth mostly below 3rd centile for their age and sex in seven of them and three cases were on the third centile and only one case was more than third centile according to the growth charts of the W.H.O growth charts. This may reflect the nutritional status of these children but there was no signs of malnutrition mentioned in the medical records of these children apart from their low body weight for their age and sex.

Residency

We found that 9 cases were residing in rural areas (81.8 %) and that only two cases were from urban areas (18.18 %) as shown in table 2.

Degree of dehydration

There were 75 cases in our study with severe dehydration at the time of admission (22.32 %) and all the death cases were with severe dehydration (100%) and all the cases were treated with intravenous fluid initially followed by oral rehydration therapy with continuing of breast or artificial feeding. ther wasno cases of no or some dehdration according to the W.H.O guidelines for prevention and treatment of acute diarrhea in 1985.

Feeding pattern

There were 7 cases between the died cases were artificially fed and other 3 were mixed breast and artificially fed and only 1 case who was breast fed infant. So the predomenant mode of feeding was artificial feeding, the distribution of mode of feeding are shown in table 2 .

Table 1: Age And Sex Distribution Of The Died Cases.

Age	No. of cases	Male	Female
<1year	9	7	2
1 year	1		1
> year	1	1	

Table 2: Feeding Pattern And ResidancyOf theDied Cases

Type of Feeding	No. of Cases	Rural	Urban
Breast feeding	1	1	
Breast and Artificial	3	2	1
Artificial Feeding	7	5	2

Discussion

Diarrhoeal diseases remian the mian cause of childhood mortality and morbidity in developing countries, although diarrhoeal deaths have significantly declined in recent years mostly due to the success in the implantation of oral rehydration therapy (ORT) as the prenciple treatment modality[4].

The subject of acute diarrhea has been one of the future goals of the WHO because of its gross participation in the infant mortality worldwide.

Two main dengers of diarrhea are death and malnutrition, death is mostly caused by loss of large amount of water and salts i.e., dehydration[5]. In our study the mortality mostly occur in the first 6 month of life the can be explained by the immature immune system accompanied by decrement in the passive immunity and exposure to diarrheal agents at this stage which leads to diarrhea and may cause death[6]. So age less than one year is the mian characteristic for death in children with acute diarrhea[7-9] and the mortality was highest among children 6-11 months[10]. In a study done in Callacatta in 1990, it was found that the maximum death occur among children aged between 7-36 months in all admitted cases of acute diarrhoea up to 5 years old[11].

It has been found that diarrhoeal deaths were most commonly occur among children less than one year, these lives in rural areas[10,12]. The geographic and economic access barriers were identified in rural areas which contribute to increase mortality in children from these areas[7]. The access to piped water in the houses of the rural areas is lacking and low hygiene level which increase the risk of diarrhoea morbidity and mortality[13] and usually the people from these areas are of low income, low educational level, the general hygienic conditions were poor and the medical services insufficient in defferent aspects so the rate of diarrhoea is high among them and hence the mortality[14].

The residency of the patients with acute diarrhea had significant effect on the outcome of the disease, in our retrospective study we found that 8 of the cases (72.72%) were from rural area while only 3 (27.27%) were from urban area. This high mortality rate in children from rural areas may indicate the water supply and storage is unwell and it has been found that water storage is more important than water source as a risk factor for diarrhoea and its complications, this was the finding of Mohammed in 1992[15].

The residency itself alone was found as a separate risk factor in other studies. The incidence of diarrhoea found to be higher in rural areas than urban areas according to Al-Mazon[16].

A retrospective study done in Pakistan found the same results of predominant male sex between the died children because of acute diarrhoea[17]. Another study for acute diarrhea mortality in Cuba showed that the higher mortality was found among male sex a result support the finding of our study that 7 of 11 dead children were male[18].

The method of feeding among patients with acute diarrhea in our study was mostly artificially feeding (132) cases of 336 cases of acute diarrhea (36.36%) and there was 7 cases of the dead ones were artificially fed (63.63%) and 4 (36.36%) of them were breast and artificially fed. This indicate that artificial feeding is a risk factor for acute diarrhea and increase mortality in children with acute disease .There is a defintive role of breast feeding in the etiology of diarrhoeal diseases in lactating children .

It has been found that breast-feeding has a protective effect and specific protective elements including antibodies, lymphocytes, and macrophage[19]. The breast feed infants showed sustained increment of weight and improvement in growth at least during the first months of life there by reducing the risk of severe diarrhoea and death[20].

Exclusive breast feeding of infants aged 0-3 months and partial breast feeding through out the remiander of infancy could

substanially reduce the infants mortality so the interventions to promote breast feeding should target the younger infants[21].

The body weight is a risk factor for acute diarrhea and is associated with increase morbidity and mortality in a child who is malnourished, in our study 7 of 11 (63.63%) cases who died their body weight were less than the third centile for their age and sex. There is a strong association with diarrhea and its complications and the nutritional status of the infants[22].

There is a strong association between the nutritional status mortality due to diarrhea , the mildly malnourshed children had twice the risk of diarrhea than well nourished child and the moderatly malnourished had more than twice the risk, while the severely malnourished admitted to the hospital had a significant association with death because of diarrhea[22].

The role of malnutrition in child mortality was studied and results from 53 developing countries with nationally representative data on child weight for age indicate 56% of child deaths were atributable to malnutrition potentiating effects and 83% of these were atrebutable to mild-moderate apposed to severe malnutrition, these results show that malnutrition has a far more powerful effects on child mortality than generally appreciated and suggest that strategies involving only screening and treating the severely malnourshed will do little to adress disease impact[23]. In addition to malnutrition, the factors that worsening the outcome of diarrhea episiods are the inappropriate treatment provided by private physicians and the deficient huosehold care of diarrheaepisiode[24].

The state of dehydration on admission to the hospital we found that 75 cases (22.32%) of the 336 cases admitted to the hospital with acute diarrhea were severely dehydrated, and all the 11 died cases were severely dehydrated on admission and all the patients were treated by intravenous fluid for initial rehydration.

The high mortality caused by diarrhoeal diseases in the hospital were related to the problems in the case management that stemmed from pediatric staff and also from diarrhea case management, training of clinical staff with bias towards the pediatric staff within the hospital[25]. The principle stratgy employed to improve case mangment through rehydration and better feeding through assured production and distribution of ORS, eduction of famlies and health workers thruogh training programs and creating of rehydration corners thruogh out the established primary care centers and hospitals[26].

Management of dehydration remains the corner stone of therapy of diarrhea, the use of IVF to prevent and treat dehydration quickly; this in turn will prevent the other risk of acute severe diarrhea in children, which is death if not treated.

Increase fliud intake remian the corner stone in early mamgment of diarrhoeal diseases since severe dehydration ,malnutrition and persistant diarrhoea associated with high mortality[27]. Because many of these deeaths can be prevented by early rehydration, further efforts shuold be directed at educating health care provider about the continuing problem and recognition of the high risk infants and teaching the mother of such infants to begin rehydration early and to seek medical advice when their infants develop diarrhoea[28].

Most children with gastroenteritis can be treated with physiologically balanced ORS, in cases with severe dehydration the intial treatment with I.V.F. then theORS also these children need nutrition to restore digestive function and general foods shuold not be withheld[29]. The ORT is well established therapy the treatment and prevention of dehydration that the majority of deaths occur because of it and it is effective use has saved the life of millions around the world and the expert panal noted that the majority of deaths and the hospitalization and visits to the emergency department could be prevented by

apropriate use of ORT and the diarrhoea mortality had signifacantly declined in recent years mostly due to implantation of ORT[30-31].

Conclosions

The important risk factors for death in acute diarrhea are severe dehydration, male sex, and low body weight, malnutrition, and residence in rural areas and artificial feeding.

Recommandations

1. Diarrhea mortality in a busy referral hospital should be investigated regularly for Lapse in the management because some of these deaths can be prevented by simple interventions.
2. Majority of deaths, hospitalization and visits to the emergency department could be prevented by appropriate use of ORT together with training of the health care providers could substantially reduce diarrhea mortality and decrease the hospitalization of children.
3. Encourage breast-feeding are needed through deferent mass media plans with enhancement of nutrition must be included.
4. Education of the mothers about proper hygienic standards of child care. This approach contribute further towards reduction in diarrhoea mortality.

Refrences

1. Dupont HL: Guidelines on acute infectious diarrhea. The practice parameters Committee of the American Collage of Gasteroenterology. Am J Gasterenterol, 1977; 92: 1962.
2. Martnes JB, Dezorsa I, et al: The magnitude of the global problem of diarrhoeal diseases, a ten years up date. Bull World Health Organ, 1992; 70 (6): 705-14.
3. Kosek M, Bern C, and Guerrant RL: The global burden of diarrhoeal disease, as estimated from studies published between 1992-2000. Bull World Health Organ, 2003; 81(3): 197-204.
4. Alam NH, and Ashraf H: Treatment of infictious diarrhoea in children. Pediatr Drugs, 2003; 5 (3): 151-65.
5. Diarrhea management training course, Participant Manual ,CDD/ SER/90.3 Rev.1 in 1992.
6. Suskind RM: Malnutrition and the immune exposure. NEW YORK; Raven press, 1977; p.p. 156-211.
7. Reyes H, Tome P, Guitierrez G, et al: Mortality of diarrhea and accessiblity or quality of care. Salud Publica Max, 1998; 40 (4): 316-23.
8. Vanderlei LC, da-silva GA, and Braga JU: Risk facters for hospitalization due to acute diarrheain children less than two years: a case-control study. Cad Saude Publica, 2003; 19 (2): 455-65.
9. lee WS, and Ooi TL: Deaths following acute diarrhoeal diseases among hospitalised infants in KualaLumpur. Med J Malaysia, 1999; 54 (3): 303-9.
10. Villa S, Guiscafre H, Martinez H, et al: Seasonal diarrheal mortality among Maxican children. Bull World Health Organ, 1999; 77 (5): 375-80.
11. Dutta P, Mitra U, Rasaily R, et al: Assessing the cause of in-patients pediatric diarrheal deaths:an analysis of hospital records. Indian Pediatri, 1995; 32 (3): 313-21.
12. Ho MS, Glass RI, Pinsky PF, et al: Diarrhea death in American children. JAMA, 1998; 260 (22): 3281-5.
13. Semenza JC, Roberts L, Henderson A, et al: Water distribution system and diarrhoeal diseases transmission. Am J Trop Med Hyg, 1998; 59 (6): 941-6.
14. Olaiz-Fernandes G, and Barragan-de-Olaiz C: Living conditions and gasteroenteritisin low income papulation of Tijuana, Maxico. Salud Publica Max, 1989; 31 (1): 46-53.
15. Mohammed HQ: Astudy on diarrhea disease in children under 5 year of age. Ann Saudi Med, 1992, 12(5): 459-62.
16. Al-Mazon YY, et al : Role of social factors in the prevalence of diarrhea Disease in children under 5 years. J Trop Pediatric, 1995; 41 (1): 45-52.
17. Shah SM, Lakhani Y, et al: Prevalence and correlatesof diaeehea. Indian J Pediatr, 2003; 70 (3): 207-11.
18. Vidal-Garcia I, Padilla-Perez O, Tomedo-via Ch, et al: Mortality due to acute diarrhoea in Guba, 1987-1993. Rev Gubana Med Trop, 1998; 50(1): 66-70.
19. Victor CG, Smith PG, Vaughan JP, et al: Infant feeding and death due to diarrhea. Am J Epidmiol, 1989; 129 (5): 1032-41.
20. Dezoya L, Rea M, and Martines J: Why premote breast feeding in diarrhea disease control programs. Health Policy Plann, 1991; 6 (4): 371-9.
21. Betran AP, de-Onis M, Lakhani, et al: Ecological study of effect of breast feeding on infant mortality in Latin America. BMJ, 2001; 323 (7308): 303-6.
22. De-Andrede JA, de-Olivcira JO, and Fagundes-Neto U: Lethality in hospitalized infants with acute diahoea: risk factors associated with

diarrhoea. Rev Assoc Med Bras, 1999; 45 (2): 121-7.
23. Pelletier DL, Frongillo EAJr, Schroeder DG, et al: The effects of malnutrition on child mortality in developing countries. Bull World Health Organ, 1995; 73 (4): 443-8.
24. Tome P, Reyes H, Radrigucz L, et al: Deaths caused by acute diarrhoea in children: a study of prognostic factors. Salud Publica Mex, 1996; 38(4): 227-35.
25. Reyes H, Tom P, et al: Mortality of diarrhea disease in Maxico. Salud Publica Max, 1998; 40(4): 316-23.
26. Miller P, and Hirschhorn N: The effects of a national control of diarrhoeal diseases program on mortality: The case of Egypt. Soc Sci Med, 1995; 40(10): S1-S30.
27. Vince JD: Diarrhoea in children in Papua New Guinea. PNG Med J, 1995; 38(4): 262-71.
28. Kilgore PE, Holmen RC, Clarke MJ, et al: Trends of diarrhoeal diseases-associated mortality in children, 1968 through 1991. JAMA, 1995; 274(14): 1143-8.
29. Eliason BC, and Lewan RB: Gasteroenteritis in children: principles of dignosis and trearment. Am Fam Physician, 1998; 68(8): 1769-76.
30. Santosham M, Keenan EM, Tulloch J, et al: Oral rehydration therapy for diarrhoea: an example of reverse transfer of technology. Pediatrics, 1997; 100(5): E10.
31. Victora CG, Bryce J, Fontaime, et al: Reducing deaths from diarrhoea through ORT. Bull World Health Organ, 2000; 78 (10): 1246-55.