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Diarrheal disease and nutritional status among children ≤ 5 years of age in jamalpur district, Bangladesh

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Abstract
Children under or within 5 years old is most vulnerable and high risk group who need special health care services. Various infectious diseases, diarrhea and/or malnutrition are very common in children in developing country like Bangladesh. A cross sectional study was conducted in the dept. Of Paediatrics, 250 Bedded General Hospital, Jamalpur, Bangladesh during the period from January 2017 to December 2017. A total of 200 children with diarrhea selected as a study participants. The aim of the study was to observe diarrheal disease and nutritional status among under 5 year's children in Bangladesh. The study determine nutritional status of under ≤ 5 years children by anthropometric measurement, MUAC measurement and bio-chemical assessment. Anthropometric measurements were performed by standard methods. In the present study, 46.20% were found to be malnourished (under-weight) using W/A as indicator in the age range of 0-60 months in children with diarrhea. We also observed prevalence of wasting and stunting was 47% and 47.60% respectively. Age group 0-12 months shows the highest prevalence of wasting, under-weight and stunting. The factors which influence malnutrition and diarrhea were limited access to sanitation facilities, unhygienic water drinking and handling, mother's education, misconception about food, infectious diseases and weaning practices. These results suggested that improving nutritional status of urban poor requires direct, focused and integrated strategies that are preferably community based and involve the behavior modification by education in addition to providing comprehensive preventive and curative health and nutritional services.

Keywords: Diarrhea, malnutrition, children ≤ 5 years

1. Introduction
Diarrhea is a condition in which faeces are discharged from the bowels frequently and in a liquid form. It is more frequent stools than in normal. It affects most people from time to time and is usually nothing to worry about. However, it can be distressing and unpleasant until it passes, which normally takes a few days to a week. There are many different causes of diarrhea, but a bowel infection (gastroenteritis) is a common cause in both adults and children. Gastroenteritis can be caused by: (a) a virus – such as norovirus or rotavirus (b) bacteria – such as campylobacter and Escherichia coli (E. coli), which are often picked up from contaminated food (c) a parasite – such as the parasite that causes giardiasis, which is spread in contaminated water. Diarrhea is one of the major factors that contribute significantly to high child morbidity and mortality in many developing countries [1]. Among the viruses, rotavirus seems to be the most common [2]. In developing countries, diarrheal infections under 5 years child are generally associated with rotavirus often at the time of weaning [3]. The infectious agents associated with diarrheal disease are transmitted chiefly through the fecal-oral route [4, 2]. Food contamination is one major route for the transmission of enter opathogens, especially under the hygienic conditions prevailing in a rural setting. Various studies have reported that the source of enteropathogens was either water or food [5, 6]. For most people in developing countries, the major source of food is cereals, and dairy products are limited to a very small segment of affluent groups. Presumably, the reports of food as the origin of diarrhea refer to cereal- based diets, since all the cases cited came from developing countries [7, 8]. Diarrhea is an intestinal disorder characterized by abnormal fluidity and frequency of fecal evacuations, generally the result of increased motility in the colon; may be an important symptom of such underlying disorders as dysenteric diseases, lactose intolerance GI tumors and inflammatory bowel disease. Yet diarrheal illnesses in young children continue to be a leading cause of morbidity and mortality worldwide [9]. Every year around 10 million children under 5 years die, about half of these deaths are associated with under nutrition and about 2 million with diarrhea (out of a total of 2.5 billion episodes of diarrhea). Most mortality related to diarrhea occurs in less developed countries, and the highest rates of diarrhea occur among malnourished children [7]. The case fatality rate is highest among children aged 6-12 months because at this age the immune system is not yet fully mature, maternal antibodies are waning, and the foods introduced to complement breastfeeding may be contaminated. The synergistic effect of poor nutritional status and diarrhea on immunity to infection has been well described [10]. Poor nutrition adversely affects a child's ability to resist or respond to infection, and infection adversely affects a child's appetite and ability to effectively use energy and nutrients obtained from the diet. The extent to which immunity is impaired is likely to vary with seasonal nutrient intake and distribution of infectious diseases [11, 12]. Although the effectiveness of oral rehydration therapy has been proved, only about 20% of children with diarrheal episodes worldwide currently receive it appropriately [13]. Furthermore, know-ledge and use of appropriate home treatments to manage diarrhea

successfully may be declining. Adherence to recommendations for children is poor because oral rehydration therapy does not reduce the duration of diarrhea, which often leads to use of antibiotics and other treatments of no proved value. The continued high morbidity, mortality, and malnutrition associated with diarrheal diseases have led to a search for adjunctive treatments. Numerous randomized controlled trials have shown the therapeutic benefits of zinc supplementation during diarrhea and WHO and UNICEF have recently recommended the therapeutic use of zinc for 10-14 days at a dose of 10 mg daily in infants less than 6 months old and 20 mg daily in older children [14]. The effectiveness of different delivery strategies for zinc is currently being evaluated. Thus the clinical management of acute diarrhea has four main components: replacement of ongoing losses of fluid and electrolytes, zinc therapy, antimicrobial therapy when indicated, and continued feeding to supply enough nutrients to meet both the patient's usual maintenance requirements and the increased needs imposed by infection and mal-absorption.

2. Objectives

General objective

- To evaluate diarrheal disease and nutritional status among children ≤ 5 years of age in Jamalpur District, Bangladesh

Specific Objectives

- To evaluate the socio-economic and demographic factors associated with nutritional status and childhood diarrhea in Bangladesh

3. Materials and Methods

A cross sectional study was conducted among the total of 200 children with diarrhea in the dept. Of Paediatrics, 250 Bedded General Hospital, Jamalpur, Bangladesh during the period from January 2017 to December 2017. The aim of the study was to assess diarrheal disease and nutritional status among ≤ 5 years children. Pre-school children under-5 years of age were selected randomly. This study covered 200 children (boys 104, girls 96) aged between 0-60 months and the data were collected via standard questionnaire, mother interview, anthropometric measurements such as-weight, height, age, MUAC and dietary history of both mother and children. Data was coded and entered into a computer database, summarized and presented descriptively. Z-scores were calculated for height-for-age (H/A), weight–for–height (W/H) and weight-for-age (W/A) using Epi-Info software. Prevalence of stunting, wasting and underweight was determined using <-2 SD of H/A, W/H and W/A, respectively of the National Centre for Health Statistics (NCHS) reference standards. The figures therefore represent malnutrition and prevalence of diarrhea in the age group. Relationships among nutritional variables, birth weight and parental education etc were analyzed using Spearman's Chi square test using SPSS software.

4. Results

A cross sectional study was conducted among the total of 200 children in in the dept. Of Paediatrics in 250 Bedded General Hospital, Jamalpur, Bangladesh during the period from January 2017 to December 2017. The aim of the study was to observe diarrheal disease and nutritional status among ≤ 5 years children. We observed diarrhea among them with special reference to the socioeconomic status of parents. Distribution of children by age, sex, family size, family income, educational qualification of parents, and types of house are being depicted in this phase. Children's age was in a range of 0-60 months with a mean of 30.50 months. Amongst 200 children, 52% were male and 48% were female, highest number 33% of children were in the age group 0-12 months. Percentage of children in age group of 13-24, 25-36, 37-48 and 49-60 months were 18.5%, 18.5%, 16% and 14% respectively. In this study, 46.20% were found to be malnourished (under-weight) using W/A as indicator in the age range of 0-60 months. In this study we found 39% of the parent's only formal primary education, 38% received education below S.S.C. and only 23% received education up to S.S.C. and or more. Near about same pattern exists for both short term and long term malnutrition, with parents educational qualification is strongly linked to the nutritional status of her children. Most of the study subjects used sanitary latrines. Nutritional anthropometry revealed that average 47.60% of the children aged less than 5 years were stunted, 46.20% were under-weight, and 47% were wasted. Age group 0-12 months shows the highest prevalence of wasting, underweight and stunting. It has been shown that 55% of mothers wash their hands before cooking and 68% use soap after coming from latrine.

Table 1: Distribution of children according to Age and Sex. (n=200)

Age in months	Sex						Mean age(months)
	Male		Female		Total		
	n	%	n	%	n	%	
0-12	40	20	26	13	66	33	30.5
13-24	19	9.5	18	9	37	18.5	
25-36	17	8.5	20	10	37	18.5	
37-48	16	8	16	8	32	16	
49-60	12	6	16	8	28	14	
Total	104	52	96	48	200	100	

Table 2: Percent Incidence of stunting, wasting and underweight according to age Group. (n=200)

Age (months)	Stunted (-2SD or below)	Wasted (-2SD or below)	Underweight (-2SD or below)
0-12	53	52	53
13-24	48	50	46
25-36	47	46	41

37-48	43	45	42
49-60	47	43	49
Total	47.60	47.00	46.20

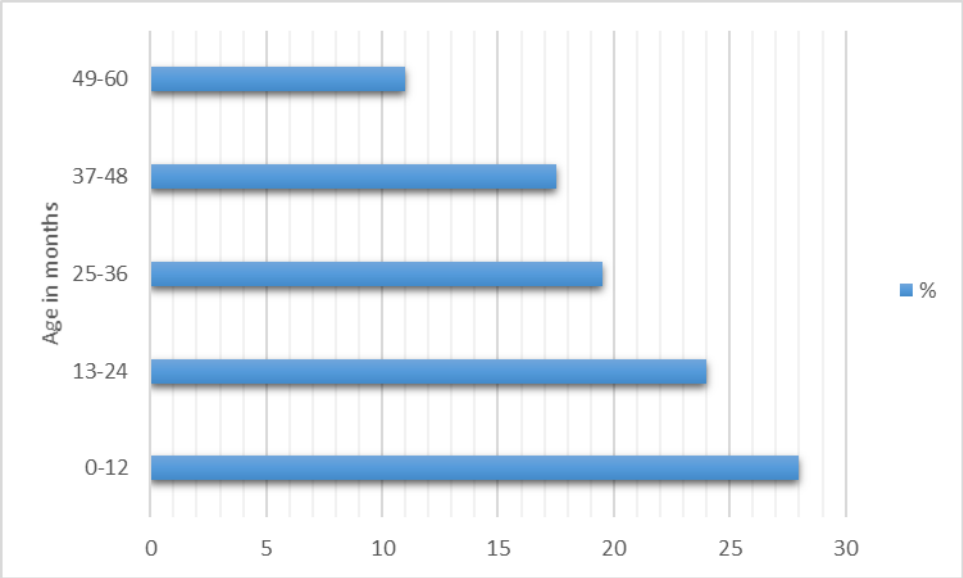

Fig I: Prevalence of Diarrheal Disease According to age. (n=200)

Table 3: Prevalence of diarrheal disease according to age group (n=200)

Age in months	N	%
0-12	56	28.00
13-24	48	24.00
25-36	39	19.50
37-48	35	17.50
49-60	22	11.00
Total	200	100

Table 4: Parent's education, type of latrine and source of drinking water of the study participants. (n=200).

Characteristics	n	%
Level of education		
Primary	78	39
Below S.S.C	76	38
Up to S.S.C	46	23
Type of latrine		
Sanitary	122	61
Non-sanitary	42	21
others	36	18
Source of drinking water		
Tube well	146	73
Supply water	42	21
Others	12	6

Table 5: Personal Hygiene practice of the mothers of the study children

	Personal hygiene practice			
Number of mothers	Washing of hands before cooking		Use soap after coming from latrine	
		%		%
	Yes	55	Yes	68
	No	45	No	32

5. Discussion

In Bangladesh interventions to reduce diarrheal deaths are available, but reach too few children. Reducing child mortality is one of the eight Millennium Development Goals (MDGs), which are the world's time-bound targets for reducing poverty in its various dimensions by 2015. Achieving this goal will require urgent action to reduce childhood diarrhea deaths, which at present account for 19 percent of all under-five deaths. This cross sectional study was carried out by survey of dwelling condition, face to face interviews with the mother and examination of physical condition and different reports of hospital and diagnostic centre of children aged less than 5 years. Household, environment and personal hygiene related factors are important contributors to the occurrence of diarrhea. Anthropometric measurements were performed by standard

methods (NCHS), and MUAC measurement. Parent's educational qualification is strongly linked to the nutritional status of her children. In our study 39% of the parents had only primary education and only 23% had completed Secondary Certificate. Most of the study subjects used the sanitary latrines (61%) whereas 29% of had non-sanitary latrines. One hundred and forty six (73%) of the households use tube-well water and 21% supplied water for drinking and none of them used boil water for drinking. About 55% mother wash their hands before cocking and 68% used soap after coming from latrine. Diarrhea has been reported to occur among all age groups particularly in the developing countries and has been highly prevalent among children in the first two years of life. In our study, nutritional anthropometry revealed that 47.6% of the children aged less than 5 years were stunted, 47% were wasted and 46.20% were under weight. About 12.5-15% of world population are in this age group. In developing countries, 25-30% of mortality occurs in this group. Among the major life threatening infectious diseases diarrhea is one of the major preventable gastrointestinal health problem. Risk factors for diarrhea include malnutrition, poor gastrointestinal absorption, poor personal hygiene, environmental sanitation problems, un-hygienic food preparation, improper sewage disposal and improper use of latrines, early discontinuation of breast feeding, and unhygienic bottle-feeding. Prevalence of diarrhea is quite alarming amongst our children who belong to low socioeconomic status. The stools passed were more likely to be watery in consistency and to contain mucus. However, acute diarrhea due to bacterial infections is an important cause of morbidity and mortality in infants and young children in most developing countries including Bangladesh.

6. Limitations of the study

This was a study in a single community with comparatively small number of sample size. So, the study result may not reflect the exact scenarios of the whole country.

7. Conclusions and Recommendations

The awareness building seemed to be considered as the first initiative to minimize the problems regarding diarrheal diseases here. The high prevalence of diarrhea are suspected and reported in community level and in tertiary level in our country. Our recommendations are surveys in targeting population to know better of the etiology of diarrheal disease. Apart from poverty alleviation, action must be done to the underlying factors of food security, food safety, social status, gender discrimination, women's education, housing, adequate healthcare practice, supply of portable water and sanitation for the betterment of the population.

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