Risk Factors of Persistent Diarrhoea in Children below Five Years of Age

Smrity Roy[1,*], ASM Bazlul Karim[2], Shiplu Kumar Das[3], Shams Ibne Maksud[4], Shahjadi Nasreen Sultana[5], Azmeri Sultana[6]

[1]Medical officer, Pediatrics outdoor, Rangpur Medical College Hospital.

[2]Professor of Pediatric Gastroenterology & Nutrition, BSMMU.

[3]Senior Medical Officer, Universal Medical College Hospital, Mohakhali, Dhaka.

[4]Asst. Professor Paediatrics, Shaheed Monsur Ali Medical College & Hospital, Dhaka.

[5]Medical Officer, on deputation at Dhaka Mohanagar General Hospital, Dhaka South City Corporation, Ministry of LGRD.

[6]Associate Professor Paediatrics, Dr MR Khan Shishu Hospital & Institute Of Child Health, Dhaka.

Abstract

Background: Persistent diarrhoea is a commonly observed phenomenon both in Bangladesh and all over the developing countries. It is the single most important cause of diarrhoea related deaths in the community, accounting for over half of them. If associated factors are properly identified & treated, it is possible to prevent most cases of persistent diarrhoea.

Objective: This study was undertaken to find out the possible risk factors associated with persistent diarrhoea in children below 5 years of age.

Methods: This was a prospective analytical case control study carried out in a tertiary care hospital, Dhaka. A total of 30 consecutive cases of persistent diarrhoea and 60 consecutive acute diarrhoea controls (matched for age and sex) under 5 comprised the study subjects in this study. Children beyond the age and whose parents didn't give written consent were excluded from the study. Data were collected using a structured questionnaire and a standered case definition of acute & persistent diarrhoeawere adopted. Data were later processed and analyzed using SPSS (Statistical Package for Social Science version 12) in the year 2012. Results were considered statistically significant when p value was <0.05.

Results: According to the study, 56.6% of cases and 63.3% of controls were in the '6 to 12 months' age group and about two-third of the participants in both cases [20 (66.7%)] and controls [39 (65.0%)] were males.Strong association was found with 'bottle feeding' [RR=2.2556; 95% CI: 1.259-4.0414 and OR=2.7938; 95% CI: 1.3621-5.7304], 'presence of blood/mucus' [RR=2.5038; 95% CI: 1.4129-4.4369 and OR=3.2545; 95% CI: 1.5978-6.629], 'WAZ≤ 2)' [RR=2.8867; 95% CI: 1.7202-4.8442 and OR=4.3275; 95% CI: 2.1998-8.5128] and 'early complementary feeding [RR=4.67; 95% CI: 2.5017-8.7175 and OR=7.8858; 95% CI: 3.6791-16.9

Conclusion: In the present studyfour factors showed some association with persistent diarrhoea, namely: 'use of animal milk'; 'antibiotic use during acute diarrhoea'; 'history of diarrhoea in previous 3 months' and 'pre-lacteal feed'. Strong association was found with 'bottle feeding practices' 'presence of blood &/or mucus in stool', WAZ <-2 and 'early complementary feeding

Introduction

Persistent diarrhoea (PD) may be defined as a diarrhea episode with a presumably infectious etiology that starts as an acute episode and lasts for 14 days or more, causing the deterioration of the nutritional status and a high life risk condition[1]. The term does not include chronic or recurrent forms of diarrhoea, such as tropical sprue, celiac disease, cystic fibrosis, etc. PD remains an important epidemiological entity, because it carries a higher risk of mortality and has a greater impact on nutritional status than acute diarrhoea in developing countries.[2] Though 3-23% of acute diarrhoea (AD) episodes among children younger than 5 years of age become persistent, the incidence of PD from various studies ranged from 7 to 10 episodes per 100 child-years.[2,3] Though the clinical characteristics of PD are known, it's exact pathogenesis is still unclear and is probably multifactorial.[10,11] Risk factors for PD include poor nutritional status, prior recent diarrhea illness, lack of exclusive breast feeding during first 6 months of age, antibiotic use in recent diarrhoea and use of unsafe drinking water.[2-9] In Bangladesh, during January 1998 to July'99 a prospective case control study regarding risk factors of PD was conducted and in that study malnutrition, unsafe drinking water, antibiotic use in recent diarrhoea and lack of exclusive breast feeding were found to be significant risk factors. There are very few recent studies regarding PD, hence this study was undertaken to find out the possible host and environmental risk factors associated with persistent diarrhoea in Bangladeshi children below 5 years of age who attended or admitted in a tertiary care hospital Dhaka.

Subjects and Methods

A study was conducted in a tertiary care hospital, Dhaka over a period of 6 (six) months from April 2012 to September 2012.As the duration of study was 6 months, so sample size calculation was not possible. This was an exploratory study. At the time of study, 30 consecutive persistent diarrhoea cases were enrolled and controls were two fold of the cases (30x2=60).Children who fulfilled the inclusion/ exclusion criteria were initially enrolled in the study. After enrolment, history was taken regarding duration of diarrhoea, exclusive breast feeding history, history of bottle feeding, complementary feeding time, history of use of safe drinking water and history of antibiotic use during acute diarrheal.

Then patients' dehydration status was assessed and anthropometric measurements were taken by the researcher herself. Data were recorded in a pre-structured form. Data were processed and analyzed using computer based software SPSS (Statistical Package for Social Science version 12, in the year 2012.At the end of each interview a cross-check was performed to detect and gather any missing information. Regular entry of each fully completed questionnaire was done using the SPSS programme.

Results

This study was undertaken with the objective to identify the risk factors associated with persistent diarrhoea in a tertiary care hospital in Dhaka, Bangladesh. A total of 30 cases & 60 controls were included in this study.

Majority of the cases & controls were between 6-12 months of age (Table 1) and male to female ratio was 2:1(Figure 1).Good healthy practice, i.e. 'Exclusive breast feeding up to 6 month of age' and 'Use of safe drinking water' were found more among the control group than the cases. Four factors showed some association with persistent diarrhoea, namely: 'use of animal milk', 'antibiotic use during acute diarrhoeal

Table 1. Distribution of the participants by their age				
Age	Case (n=30) Percent	Control (n=60) Percent	t-test	p-value
≤ 6 months	30.0	23.3		
6-12 months	56.6	63.3		
> 12 months	13.4	13.3	0.598	0.555
Total	100.0	100.0		
Mean ± SD (months)	8.037 ± 4.7547	8.138 ± 4.4092		

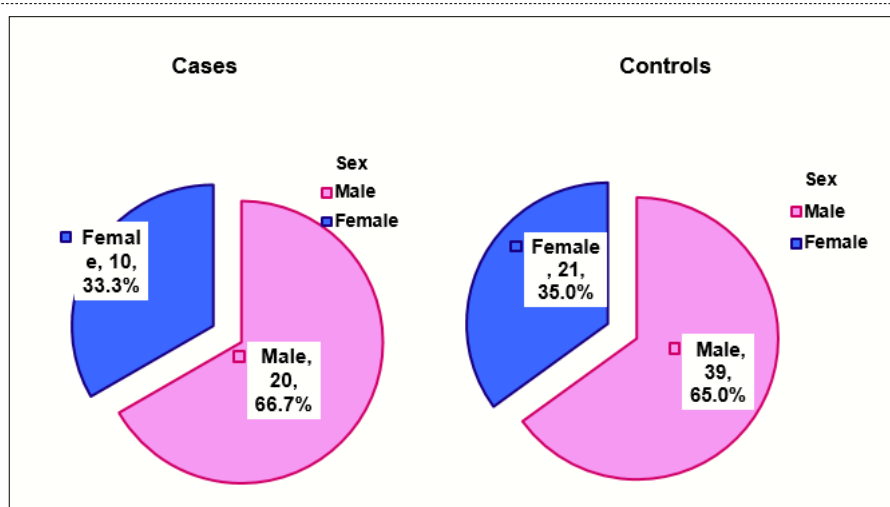X^2 = 1.217, df=2; p-value = 0.54416651

Figure 1. Distribution of the participants by their gender

episode', 'history of diarrhoea during previous three months period' and 'pre-lacteal feed'. Strong association was found with 'bottle feeding practice', 'presence of blood and/or mucus in stool', 'weight for age Z score ≤ 2' and 'early complementary feeding practices. (Table 2)

Socio-Demographic Profile of Patients

Age

Table 1 shows that, in both cases and controls most of the respondents were in the 6 to 12 months age group, 56.6% of cases and 63.3% of controls were in this age group. Mean ± SD of age was calculated to be 8.037 ± 4.7547 months for cases and 8.138 ± 4.4092 months for controls. The p-value was 0.555 for t-test and 0.54416651 for chi-square, which means there is no statistically deference in age distribution between the groups.

Sex

Figure 1 illustrates that, about two-third of the participants in both cases [20 (66.7%)] and controls [39 (65.0%)] were Male. In both groups male were more prone to develop persistent diarrhoea than female and male: female ratio was 2:1. But there is no statistically significant difference in male-female distribution between the groups (X^2 = 0.06, df =1; p-value = 0.806496).

Clinical Information

Table 2, shows that all the cases & controls (100.0%) were suffering from diarrhoea and all had watery diarrhoea. All the studied children were properly immunized as per EPI schedule. Good hygienic practices were found more among the controls than the

Table 2. Distribution of the participants by the risk factors

Factors	Case (n=30) Percent	Control (n=60) Percent	Statistical calculations
Duration of diarrhoea (≥14 days)	100.0	0.0	RR=∞; OR=∞; X^2 = 200; p-value <0.0001
Watery diarrhoea	100.0	100.0	RR=1; OR=NA
Presence of blood &/or mucus	33.3	13.3	RR=2.5038; 95% CI: 1.4129-4.4369 OR=3.2545; 95% CI: 1.5978-6.629 X^2 = 11.19; p-value = 0.000822
Antibiotic use during present diarrhoea	80.0	50.0	RR=1.6; 95% CI: 1.2851-1.992 OR=4.0; 95% CI: 2.137-7.4917 X^2 = 19.78; p-value < 0.0001
H/O diarrhoea during previous 3 months	20.0	11.7	RR=1.7094; 95% CI: 0.8782-3.3273 OR=1.8868; 95% CI: 0.8629-4.1253 X^2 = 2.58; p-value = 0.108222
Pre-lacteal feed	23.3	13.3	RR=1.7519; 95% CI: 0.9482-3.2368 OR=1.9803; 95% CI: 0.9445-4.152 X^2 = 3.34; p-value = 0.067615
Exclusive breast feeding up to 6 months	33.3	58.3	RR=0.5712; 95% CI: 0.4135-0.7891 OR=0.357; 95% CI: 0.2009-0.6348 X^2 = 12.59; p-value = 0.000388
Bottle feeding	30.0	13.3	RR=2.2556; 95% CI: 1.259-4.0414 OR=2.7938; 95% CI: 1.3621-5.7304 X^2 = 8.22; p-value = 0.004143
Early weaning	46.7	10.0	RR=4.67; 95% CI: 2.5017-8.7175 OR=7.8858; 95% CI: 3.6791-16.9012 X^2 = 33.15; p-value < 0.0001
Use of animal milk	53.3	36.7	RR=1.4523; 95% CI: 1.0587-1.9922 OR=1.9686; 95% CI: 1.1184-3.465 X^2 = 5.57; p-value = 0.018271
Vaccination appropriate for age	100.0	100.0	RR=1; OR=NA
Use of safe drinking water	60.0	78.3	RR=0.7663; 95% CI: 0.6334-0.927 OR=0.4157; 95% CI: 0.2233-0.7739 X^2 = 7.85; p-value = 0.005082
H/O measles in previous 3 months	6.7	0.0	RR=∞; OR=∞
WAZ score <- 2	43.3	15.0	RR=2.8867; 95% CI: 1.7202-4.8442 OR=4.3275; 95% CI: 2.1998-8.5128 X^2 = 19.39; p-value < 0.0001
Total	100.0	100.0	

cases, i.e. 'exclusive breast feeding up to 6 months of age [RR=0.5712; 95% CI: 0.4135-0.7891; OR=0.357; 95% CI: 0.2009-0.6348] and 'use of safe drinking water' [RR=1.4523; 95% CI: 1.0587-1.9922; OR=1.9686; 95% CI: 1.1184-3.465] which is statistically significant (X^2=12.59; p-value = 0.000388) and (X^2=5.57; p-value = 0.018271). Four factors showed some association with persistent diarrhoea, namely: 'use of animal milk' [RR=1.4523; 95% CI: 1.0587-1.9922 and OR=1.9686; 95% CI:1.1184-3.465]; 'antibiotic use during present acute diarrhoea' [RR=1.6; 95% CI: 1.2851-1.992 and OR=4.0; 95% CI: 2.137-7.4917]; 'history of diarrhoea in previous 3 months period [RR=1.7094; 95% CI: 0.8782-3.3273 and OR=1.8868; 95% CI: 0.8629-4.1253] and 'pre-lacteal feed' [RR=1.7519; 95% CI: 0.9482-3.2368 and OR=1.9803; 95% CI: 0.9445-4.152]. Strong association was found with 'bottle feeding practices' [RR=2.2556; 95% CI: 1.259-4.0414 and OR=2.7938; 95% CI: 1.3621-5.7304], 'presence of blood &/or mucus in stool' [RR=2.5038; 95% CI: 1.4129-4.4369 and OR=3.2545; 95% CI: 1.5978-6.629], 'WAZ <-2 [RR=2.8867; 95% CI: 1.7202-4.8442 and OR=4.3275; 95% CI: 2.1998-8.5128] and 'early complementary feeding [RR=4.67; 95% CI: 2.5017-8.7175 and OR=7.8858; 95% CI: 3.6791-16.9012].

Discussion

In this study among both cases and controls most of the respondents were in the 6 to 12 months age group; 56.6% of cases and 63.3% controls were in this age group. The p-value was 0.555 for t-test and 0. 54416651 for chi-square, which means there is no statistically deference in age distribution between the cases & controls. Karim et al.[12] found that most of the children (82%) were below 2 years of age in their study. Ahmed et al.[13] found that the maximum incidence of persistent diarrhoeal episodes occurred in children below one year of age. About two-thirds of the participants in both cases (20, 66.7%) and controls (39, 65.0%) were male. In both groups males were found more prone to develop persistent diarrhoea than females & male: female ratio was 2:1. In a study at Dow Medical College, Karachi male to female ratio was found to be 3:2.[13]

According to the present study four factors showed some association with persistent diarrhoea,

namely: 'use of animal milk'; 'antibiotic use during acute diarrhoea'; 'history of diarrhoea in previous 3 months period' and 'pre-lacteal feed'. Strong association was found with 'bottle feeding practices' (p <0.004143), 'presence of blood &/or mucus in stool' (p <0.000822), WAZ <-2 (p<.0001) and 'early complementary feeding (p< 0.0001)'. At a tertiary care hospital in Bangladesh, among the risk factors, Grade III malnutrition (p<0.008), irrational antibiotic use during acute diarrhea episode (p<0.0000005), use of unsafe drinking water (p<0.004) and lack of exclusive breast-feeding up to first four months of age (p<0.004) were found to be significantly associated with persistent diarrhoea.[12] In that study logistic regression analysis showed irrational antibiotic use (p<0.0001) during an episode of acute diarrhoea and lack of exclusive breast-feeding (p<0.05) during the first four months of age were found as independent risk factors associated with persistent diarrhoea.[12] In Karachi, Pakistan risk factors associated with persistent diarrhoea were found to be young age, poor nutritional status, irrational use of antibiotics during acute diarrhoea, lack of exclusive breast feeding, incomplete vaccination, lack of tap water supply, poor sanitation facility at home and family income of <rupees 2000/month.[13] In a study in Papua New Guinea, logistic regression analysis showed only malnutrition as a significant risk factor (odds ratio, 2.7; 95% confidence interval, 1.8-4.0) associated with persistent diarrhoea.[14] It is speculated that malnutrition associated with improper complementary feeding practices accounted for the high rate of persistent diarrhoea among the studied children between 12-23 months of age.[14]

Conclusion

Persistent diarrhoea is an important health problem in our country. The identification of risk factors for PD is necessary for the prevention and control of PD. In this study four factors showed some degree of association with persistent diarrhoea, namely: 'use of animal milk'; 'antibiotic use during acute diarrhoea'; 'history of diarrhoea in previous 3 months period' and 'pre-lacteal feed'. Strong association was found with 'bottle feeding practices' 'presence of blood &/or mucus in stool', WAZ<-2 and 'early complementary feeding'. The findings of the study indicates that all children should be exclusively breastfed up to 6 months with

introduction of appropriate complementary feeding after 6 months of age to prevent malnutrition and risk of persistence of diarrhea. In addition, interventions on rational use of antibiotics, preventive measures focusing on hygiene and health education should be reinforced. Large studies involving both urban & rural children are necessary to find out the actual risk factors associated with persistent diarrhea in Bangladeshi children.

Source of Funding

None

Conflict of Interest

None

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