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A Study on Hospitalized Under Five Children Presenting with Acute Diarrhoea

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ABSTRACT

Background: Diarrhoea is the second leading cause of death in children under five years old. Diarrhoea is more prevalent in the developing world due to the lack of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional status. This study was conducted to assess clinical spectrum and Epidemiological Factors associated with Acute Diarrhoea in Under Fives.

Methods: Hospital based descriptive cross sectional study was conducted over 12 months among Under Five children admitted with Diarrhoea in Paediatrics IPD.

Results: Out of 116 studied children, 67.2% were infants while only 32.8% were between age 1 to 5 years. Loose stools were watery in 73.14%, bloody in 27.59%, containing worms in 6.03%. There was some and severe dehydration in 26.7%, 15.5% of cases respectively. Associated other symptoms were vomiting, fever and pain in abdomen.

Conclusion: Diarrhoeal spells were found significantly associated with child's immunization status (p-0.047), mother's education (p-0.002), drinking water quality (p-0.008), nutritional status (p<0.001), faulty feeding practices (p-0.044), mother's hand washing practices, residence surroundings and toilet habits. There is need to improve safe drinking water, Sanitation, Hygiene, as well as feeding practices, immunization coverage & mother's education.

Key words: Acute Diarrhoea, Under fives, Dehydration, Feeding Practices

BACKGROUND

Diarrhoeal disease is the second leading cause of death in children under five years old. It is both preventable and treatable. Globally, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year. Each year diarrhoea kills around 525 000 children under five. [1] This amounts to 18% of all the deaths of children under the age of five and Means that more than 5000 children are dying every day as a result of diarrheal Diseases. Of all child deaths from diarrhea, 78% occur in the African and south-east Asian regions. [2]

Diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual). Frequent passing of formed stools is not diarrhoea, nor is the passing of loose, "pasty" stools by breast-fed babies. [1] Acute diarrhea is defined as sudden onset of excessively loose stools of >10 ml/kg/day in infants and >200gm/24hr in older children, which lasts <14 days. [3]

Clinical features of diarrhoea may vary with the causative organisms. The common presenting features are fever, vomiting, abdominal pain, bloody stools with signs of dehydration like tachycardia,

postural hypotension, supine hypotension and absence of palpable pulse, dry tongue, sunken eyeballs, skin pinch etc. [2] The most severe threat posed by diarrhoea is dehydration. During a diarrhoeal episode, water and electrolytes (sodium, chloride, potassium and bicarbonate) are lost through liquid stools, vomit, sweat, urine and breathing. Death can follow severe dehydration if body fluids and electrolytes are not replenished, either through the use of oral rehydration salts (ORS) solution, or through an intravenous drip. [1]

Diarrhoea is more prevalent in the developing world due to the lack of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional status. [4] About 88% of diarrhea-associated **deaths** are attributable to unsafe water, inadequate sanitation, and insufcient hygiene. Rotavirus is the leading cause of acute diarrhea and causes about 40% of hospitalizations for diarrhea in children under Five. [5]

The current estimates in under five children suggest that due to diarrhoea there are about 123 million clinic visits annually and 9 million hospitalizations worldwide, with a loss of 62 million disability adjusted life years (DALY's). [6] In India, acute diarrhoeal disease accounts for about 8 per cent of deaths in under five year age group. During the year 2011, about 10.6 million cases with 1,293 deaths were reported in India. [7]

This study was done to evaluate various clinical presentations of diarrhoea contributing for the hospitalizations of under five also the influencing factors for under five diarrhea

MATERIALS & METHODS

A Hospital Based Cross Sectional Study was conducted in Paediatrics and Infectious diseases Wards of Sir J.J. Hospital Mumbai during April 2013 to February 2014 among under five children admitted with diarrhea. All the children of age 0-5 year including both male and female children of any socioeconomic status or any locality region but admitted with history of diarrhoea during 01/06/2013 to 31/08/2013 were included in the study. Admissions from June- August months were taken as maximum number of diarrhea cases are found during this period which is verified from last 3 years' hospital admission data. An Interview based pretested Questionnaire was used for collecting data. Clinical examination was done for all study participants. Before starting the interview, every respondent was well informed regarding purpose of study and motivated to participate in the study and informed written consent was taken. Approval for the study was taken from Institutional Ethical Committee.

In Statistical Analysis, Pearson's Chi-square test was applied to test the relationship of categorised independent and dependent variables. If expected number in the cell is below 5 in a table, Fisher's Exact Test (Exact Two sided) was used. Odds Ratio and 95% Confidence Intervals were calculated for all 2×2 tables. A p value (significance) of < 0.05 was deemed statistically significant.

Definitions & Tools

Diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual). Frequent passing of formed stools is not diarrhoea, nor is the passing of loose, "pasty" stools by breast-fed babies. [1]

Acute diarrhea is defined as sudden onset of excessively loose stools of >10 ml/kg/day in infants and >200 gm/24 hr in older children, which lasts <14 days. [3]

Socioeconomic status was assessed using Modified Kuppuswamy Classification of Socioeconomic status 2013, Nutritional status was assessed by WHO weight for age classification colour coded graphs in which green colour meaned normal weight, yellow (weight between WHO mean-2SD to mean-3SD) as MUW (Moderate under weight) and red (weight less than WHO mean-3SD) for SUW (Severe under weight). [4]

Fully immunized considered here as when received all BCG, Polio (0, I, II, III), DPT (I, II, III), Measles, Vit A1 within 1 yr age. Partially immunized means completed 1 yr age but missed any of above vaccine. Unimmunized means, completed 1 yr age but not taken any vaccine since birth. Till date means not completed 1 yr age but received all vaccines to be taken till that age. Not till date means not completed 1 yr age and missed any vaccine to be taken till that age. [4]

Clean Surroundings taken here as no open gutter or wastes kept open or vector breeding places within 15 m surrounding residence. Unclean means any of above present within 15 m of residence. Purified Drinking water considered here is either boiled or candle filtered or by purifier at home. Unpurified is not boiled or filtered at home.[4]

RESULTS

During 1/06/13 to 31/08/13 total 116 under five children were admitted for diarrhea in paediatrics and infectious disease wards. Out of them 63 were boys while 53 were girls. 67.2% of the patients were infants while only 32.8% were between age 1 to 5 years.

Table 1: Spectrum of clinical presentation of diarrhea

Symptoms/Signs	Total cases (%)
Stools	
Watery	86 (0.7414)
Blood in stools	32 (0.2759)
Worms in stools	7 (0.0603)
Pain in Abdomen	63 (0.5431)
Vomiting	74 (0.638)
Fever	70 (0.6035)
Dehydration	
Some	31 (0.2672)
Severe	18 (0.1552)

Spectrum of clinical presentation:

In diarrhea there were loose stools which were watery (74.14%), bloody (27.59%), containing worms (6.03%). There was no dehydration in 57.76%, some dehydration in 26.72% and severe dehydration in 15.52%.

Diarrhoea was associated with other symptoms like vomiting (63.8%), fever (60.35%) and pain in abdomen (54.31%).

Table 2 shows distribution of some modifiable and non-modifiable risk factors of diarrhoea in under five children.

Age: Though the age group considered in the study was 0-5 yr, median age of sample was 12 month i.e. 1 yr, showing that infant age which deals with starting faulty complementary feeding practices, hygiene problems make them more vulnerable to diarrhea.

Stool frequency: In the definition, more than 3 stools a day were considered to be called diarrhoea. Mean daily stool frequency was found 7 with maximum 20 episodes per day, showing propensity to develop dehydration.

Lag hour: It was the time taken to seek medical care after starting symptoms. Average lag hour was found 2 days, which resulted in dehydration and increasing risk of mortality.

Spells of diarrhea: For last 6 months most of children gave history of 3 spells of diarrhoea.

Mother's education: Though the median education found was up to 5th class, mode shows that most of the mothers were illiterate.

Hand wash: Average frequency of hand washing per day in mothers was found 6 with minimum found 2 times a day.

Hospital stay: Mean admit stay in hospital due to diarrhoea was 5 days, which reflects loss of daily wages of parents accompanying the child.

Further in study association of epidemiological factors was studied by applying Pearson's chi-square test of significance of association.

Table 3 shows there was no significant association between birth weight of under five children and number of spells of diarrhoea in last 6 month but in low birth weight babies occurrence of diarrhoeal spells 3 or more times in 6 months was found 2.5 times higher than normal birth weight babies. Diarrhoea was more related with immunization, hygiene and faulty feeding practices. Unimmunized as well as partially immunized children were having more risk of diarrhoea. Unimmunized as well as partially immunized children also showed highly significant association with dehydration, shown in table 4.

As shown in table 3, Diarrhoeal spells were more in children of illiterate mothers (53.66%) as compared to mothers educated post primary (19.23%). Also it was highly significantly associated with dehydration shown in table 4. Higher level of education and literacy leads to greater awareness and also contributes to prevention and early management of diarrhea in their children.

Table 3 shows that though Diarrhoeal spells were more in children belonging to lower socioeconomic status (36.84%) as compared to middle socioeconomic status (30%), it was not found statistically significant. But dehydration was more prevalent in children from lower socioeconomic status (50%) as compared to middle status (27.5%) which was found highly significant as shown in table 4.

Severe underweight children (73.53%) suffered with more episodes of diarrhea than moderate underweight (41.94%) or normal weight children (3.92%).

Table 2: Statistics from the study subjects

Variables	Mean	Median	Mode	Std. deviation	Min	Max
Age (months)	15.46	12	12	12.31	1	59
Stools (episodes/ day)	7.05	6	6	3.13	3	20
Lag hour	45.52	48	48	31.89	6	144
Similar Complaints (last 6 mth)	1.83	2	3	1.35	0	5
Mother's Education (Std)	4.78	5	0	4.27	0	15
Mother's Hand wash (no/day)	6.24	6	6	2.09	2	12
Hospital Stay (Days)	4.80	4	3	2.88	2	25

Table 3: Association of Socio-demographic factors and Spells of Diarrhoea in last 6 months

Socio- demographic factors	Spells of Diarrhoea in last 6 month			$\chi 2$ value	P value
	< 3	≥ 3	Total		
Birth Weight (kg) (Information received from 102 cases)					
≥ 2.5	60 (87)	24 (72.7)	84 (82.4)	3.11	0.078
< 2.5	9 (13)	9 (27.3)	18 (17.6)		OR-2.5
Immunization of Child					
Immunized / Till date	62 (81.6)	26 (65)	88 (75.9)	3.9337	0.047
Partially / Unimmunized	14 (18.4)	14 (35)	28 (24.1)		
Mother's Education					
Illiterate	19 (25)	22 (55)	41 (35.34)	12.028	0.002
Primary	15 (19.7)	8 (20)	23 (19.83)		
Post primary	42 (55.3)	10 (25)	52 (44.83)		
Socioeconomic status					
Lower (upper & lower)	48 (63.2)	28 (70)	76 (65.5)	0.543	0.461
Middle (upper & lower)	28 (36.8)	12 (30)	40 (34.5)		OR-1.36
Nutritional status (weight/age)					
SUW	9 (11.84)	25 (62.5)	34 (29.31)	44.791	0.001
MUW	18 (23.68)	13 (32.5)	31 (26.72)		
Normal	49 (64.47)	2 (5)	51 (43.97)		
Surroundings					
Clean	46 (60.5)	11 (27.5)	57 (49.1)	11.437	0.001
Unclean	30 (39.5)	29 (72.5)	59 (50.9)		
Quality of Drinking Water					
Purified	22 (28.9)	3 (7.5)	25 (21.6)	7.13	0.008
Unpurified	54 (71.1)	37 (92.5)	91 (78.4)		
Toilet Habits					
Open Air	0 (0.00)	3 (7.5)	3 (2.59)	12.845	0.002
Public toilet	42 (55.26)	30 (75)	72 (62.07)		
Own toilet	34 (44.74)	7 (17.5)	41 (35.34)		
Mother's Hand washing (times/day)					
≥ 6	61 (80.3)	17 (42.5)	78 (67.2)	16.967	<0.001
< 6	15 (19.7)	23 (57.5)	38 (32.8)		

Table 4: Association of Socio-demographic factors and Dehydration

Socio- demographic factors	Dehydration		Total	$\chi 2$ value & P value	
	Present	Absent			
Age of child in months					
0-12	34 (69.4)	44 (65.7)	78 (67.2)	0.1774	0.674
13-60	15 (30.6)	23 (34.3)	38 (32.8)		OR-1.18
Immunization of Child					
Immunized / Till date	28 (57.1)	60 (89.6)	88 (75.9)	16.234	<0.001
Partially / Unimmunized	21 (42.9)	7 (10.4)	28 (24.1)		
Residence of Patient					
Apartment/ separate house	19 (38.8)	48 (71.6)	67 (57.76)	20.092	<0.001
Chawl	7 (14.3)	12 (17.9)	19 (16.38)		
Zopadpatti / Footpath	23 (46.9)	7 (10.5)	30 (25.86)		
Mother's Education					
Illiterate	29 (59.2)	12 (17.9)	41 (35.3)	23.209	<0.001
Primary	9 (18.4)	14 (20.9)	23 (19.8)		
Post primary	11 (22.4)	41 (61.2)	52 (44.8)		
Socioeconomic status					
Lower (upper & lower)	38 (77.6)	38 (56.7)	76 (65.5)	5.4378	0.02
Middle (upper & lower)	11 (22.4)	29 (43.3)	40 (34.5)		
Nutritional status (weight/age)					
SUW	25 (51)	9 (13.4)	34 (29.3)	19.481	<0.001
MUW	10 (20.4)	21 (31.4)	31 (26.7)		
Normal	14 (28.6)	37 (55.2)	51 (44)		

Malnutrition was found significantly associated with diarrhoeal spells as well as dehydration as shown in table 3 and 4.

As in table 3, frequent sufferings of diarrhoea were found in children residing in unclean surroundings (49.15%), drinking unpurified water (40.66%) where as diarrhoeal spells were minimum in children using their own toilets (17.07%) and in children whose mothers had frequent hand washing habit (21.79%).

In children living in zopadpatties or on footpath dehydration following diarrhea was more prevalent (76.67%) as shown in table 4. Thus surroundings, quality of drinking water and toilet habits were significantly associated with diarrhoeal spells in children. Mothers hand washing practices were found significantly associated with diarrhoeal spells.

To examine the relationship of each independent variable with the dependent variable (dehydration), Binary Logistic Regression was performed. This procedure examines above relationship after accounting for interaction and confounding. Entry into the analysis was $p < 0.1$ in a univariate analysis.

Table 5: Dehydration – Logistic Regression analysis

Variable	OR	95% CI	P value
Residence-			
Chawl	0.61	0.14-2.63	0.503
Zopadpatti/ Slums	1.13	0.21-6.02	0.886
Mother's education-			
Primary	2.11	0.38-11.6	0.392
Illiterate	7.63	1.32-44.08	0.023
Hand washing	2.21	0.62-7.89	0.221
Weight for Age			
MUW	1.23	0.28-5.31	0.782
SUW	6.08	1.33-27.82	0.02
Immunization	5.02	1.27-19.77	0.021
Socio economic status	1.17	0.0007-0.093	0.823

CI=C**onfidence Interval; OR=Odds Ratio**

Table 5 shows association between variables and the dehydration among the under five children admitted for diarrhoea. Multiple logistic regression analysis revealed that mother's education (p=0.023), malnutrition (p=0.02) and immunization (p=0.021) were significantly associated with presentation of dehydration in under five diarrhoea.

When compared with under five children of mothers educated up to post primary education, the children of illiterate mothers were found 7.63 times likely to be presented with dehydration in diarrhoea.

When compared with children with normal weight for age, the severely underweight children were found 6.08 times likely to be presented with dehydration in diarrhoea.

When compared with immunized (fully / till date) children, the improperly immunized (unimmunized / partially immunized / not till date immunized) children were found 5.02 times likely to be presented with dehydration in diarrhoea.

DISCUSSION

The results showed that in present study of acute diarrhea there were loose stools which were watery (in 73.14%), bloody (in 27.59%), containing worms (in 6.03%), some dehydration in 26.72% cases and severe dehydration in 15.52%. In study of Haricharan et. al. [8] majority of the cases had watery stools (84%) and 16% had semisolid stools and RBC's were seen in 14% of the cases. Some dehydration was present in 80% of the cases and 14% had severe dehydration and 6% had no dehydration.

Other symptom like fever was seen in 60.35% of cases in our study. This could be attributed to infective origin. Naruka et al[9] reported fever in 56% of his cases. Pain abdomen was seen in 54.31% of our cases. Naruka et al observed pain abdomen in 20% of cases. In present study vomiting was seen in 63.8% cases while in study of Ekong E et al[10] it was in 47.8% of cases.

the determinants of acute diarrhoeal spells in this study were Immunization of child, mother's education, Nutritional status, Surroundings, drinking water quality, toilet habits and hand washing practices in mothers while birth weight and socioeconomic status were not found significantly associated with diarrhea in under five.

In study of Khalid Mohammad et al,[11] immunization of child and good hand washing practices were not found significantly associated with diarrhea, while improved toilet facility was found significantly associated.

In the study of Shubhada Avchat et al,[12] diarrhoea was found more prevalent in upper class of socioeconomic status & found statistically significant. Satisfactory sanitation is found beneficial in preventing diarrhea which was highly significant. Diarrhoea was found more prevalent in malnourished children (21.1%). Prevalence of diarrhea in children of illiterate mothers (14.4%) was more than in children of educated mothers (8.2%), but was not statistically significant.

Study by Fazly Azry Abdul Aziz et al[13] diarrhoea was seen more in children of illiterate mothers,

children in poor community and in families drinking untreated water which was found significantly associated.

Study of Godana W et al[14] revealed that the occurrence of diarrhoea was significantly associated with lack of latrine ownership lack of home-based water treatment and lack of improved water sources.

Immunization and malnutrition as a part of vicious cycle of infection as they relate with immunity of child, there is strong influence of these factors on diarrhoeal spells as well as the dehydration. With education, awareness and capacity improves in mothers about identification of symptoms, health seeking and decision making in prevention and cure of diarrhea or dehydration.

CONCLUSION AND RECOMMENDATIONS

Acute diarrhoea in under five children clinically presents most commonly as watery diarrhea, other presentations are blood in stool, pain in abdomen, vomiting, fever and signs of dehydration.

Major determinants of frequent diarrhoeal spells in children are immunization status of child, education of mother, nutritional status of child, surrounding cleanliness, quality of drinking water, toilet habits and hand washing practices. Important influencers of dehydration in children with diarrhea are age of child, Immunization status of child, residence, socioeconomic status, nutritional status of child and mother's education.

So there is a need to put efforts to still further improve and sustain immunization coverage and nutritional status of the children. Mothers are key persons for the success of any programme so there is need of women empowerment in the form of education, income etc. There is a community need to improve the sanitary and clean drinking water facilities and awareness about hygienic practices like hand washing.

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