

An Epidemiological Study of Factors Associated With Acute Diarrheal Diseases in Children 1-4 Years of Age in an Urban Slum of Pune City

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Abstract:

Every year some 12 million children in developing countries die before they reach their fifth birthday, Many during the first year of life. 7 in 10 deaths are due to acute respiratory infections, diarrhea, measles, malaria or malnutrition or a combination of these conditions. This longitudinal study is formulated with the objectives to determine the incidence of diarrhea among urban children and study some of the epidemiological factors responsible for such morbidity. By using Pre design semi structure questionnaire, a Cross Sectional Study was conducted on 195 children of 1-4 year aged by house to house visit residing in the Landewadi slum, Pune from Nov 2008- Dec 2009. There were 346 households from which 195 children formed the study population. In the present study incidence of acute diarrhea was highest in monsoon season and lowest in winter. The incidence of acute diarrheal disease was higher in male as compare to female and the difference was not statistically significant. Children in the age group of 13-24 months had the highest incidence of diarrhea. Among the risk factor similar child living in overcrowded space, living in house with insanitary excreta disposal and with poor water supply had a higher risk of acute diarrhea. Risk of diarrhea was 2.7 times more in undernourished children as compare to normal nutrition stats children. This study examined the relative strength of the different factors contributing to diarrhea among young children in India. The results point to the importance of good hygiene practices within the home in reducing the incidence of diarrhea among young children. Furthermore, children born to undernourished, i.e. anemic, mothers may be more susceptible to infection than children whose mothers are well nourished.

Keywords: Diarrhea, longitudinal survey, 1-4 year children's, incidence

1. Introduction:

Diarrhea is defined as the passage of three or more loose or liquid stools per day. Diarrheal disease is the second leading cause of death in children, and is responsible for killing 1.5 million children every year [1].

Diarrhea constitutes one of the major causes of infant mortality and morbidity especially in developing countries. 23% of all deaths among children under five in the South East Asian Region are caused by diarrhea. India is one of the top 15 countries ranked according to the number of deaths in under fives due to diarrhea [2]. India alone is responsible for more than half a million diarrheal deaths. Among all child deaths each year, seven in ten of these deaths are due to diarrhea, acute respiratory infections, malnutrition or combination of these conditions[2]. An estimated burden of diarrhea was 16.5% in under-6 year of children in rural area and mortality due to diarrhea in under 6 year children 9.1%[3]. Poor environmental sanitation and lack of safe drinking water result into high rate of infections and protein energy malnutrition [4]. In India, the under 5 population is about 15% of the total population and most of the deaths occur due to such communicable diseases which comes under the 'Integrated

Disease Surveillance Project' (IDSP). The Government of India has already prepared a project implementation plan for integrated disease surveillance in the country with World Bank / WHO assistance[.5], The Union Health and Family Welfare Minister stated that IDSP will bring about a sea change in understanding disease patterns and monitoring risk factors for disease control and prevention[.6],[7]

This longitudinal study is formulated with the objectives to determine the incidence of diarrhea among urban slum children and association of sociodemographic variable with such morbidity.

2. Materials And Method:

A Community-based longitudinal surveillance of all children in the age group of 1-4 years residing in Landewadi slum of Pune city was carried out for a period of one year. A house to house survey was conducted from 01 November 2008 to 31 December 2009. Data on symptoms suggestive of diarrhea was collected for last 24 hours by taking history from parents/ attendants of the children. Study population comprised of 195 children out of a total population of 346 households. A follow up visit to each child under study was made in every two

months to know the occurrence of either of the target diseases among the study subjects.[4]

The purpose of the study was explained to the parents / guardians of the child and an informed consent was taken from them before enrolling a child in the study group. The relevant information on socio-demographic and epidemiological variables of the study population was collected by interviewing the parents/ guardian of the child using pre-designed proforma validated by pre-testing. A detailed information about family background and socio-economic factors was collected and a clinical examination was conducted at the time of registration of children during the first visit which concluded in a period of one month from start of work. Follow-up information of the study population was also collected on the same Performa in subsequent visits. Second and subsequent visits were made at the interval of two months to monitor occurrence of either of the above mentioned target diseases. Last visit was conducted on completion of one year from the date of registration. The data was compiled on Epi info 2002 and Excel sheet and appropriate statistical tests as chi-square tests were applied wherever required. The association between risk factors and diarrhea was estimated by odds ratio and 95% CI.

RESULTS: Landewadi slum area had a total population of 346 households including 195 children below 1-4 years of age, which is 56.3% of total slum population of Landewadi and was taken as the study population.

A total of 195 children (1-4 years) were studied. Majority of the study subjects i.e. 75 (38.5 %) were between 25-36 months age-group and belonged to Hindu religion 100 (51.3 %) and they come under the IVth class of the social classification given by the B.G.Prasad method of the social classification. Overcrowding was present in more than half of the houses (83.0%) and majority of father of study population (88.2%) were illiterate. It was also observed that 37.4% of children were undernourished.

The above table shows the seasonal incidence rate (spells) of acute diarrheal diseases was highest in the monsoon season (177.5/1000 per month) followed by summer (120.5/1000 per month) and winter season (83.8/1000 per month). This difference was not statistically significant. (Table 2)

Children in the age group 13-24 months had the highest incidence of diarrhea to the extent of 46.8% followed by the age group 25-36 month. The age group 37-48 months had lowest incidence. This difference between acute diarrheal episode and different age group was not statistically significant and no statistically significant association found between sex and acute diarrheal episode in study population ($\chi^2 = 0.98$, df. = 1; $P > 0.05$). As on immunization status, it was found that partially immunized children had 4.6 times higher risk for acute diarrhea and when the personal hygiene of mother or respondent was not satisfactory, the risk of acute diarrhea was higher (OR 1.2). Similar child living in overcrowded space, living in house with insanitary excreta disposal and with poor water supply had a higher risk of acute diarrhea. Risk of diarrhea was 2.7 times more in undernourished children as compare to normal nutrition stats children. (Table 3)

Table 1: Distribution of study subjects according to their background characteristics

Characteristics	N=195(%)
Age (months)	
13-24	67 (34.3)
25-36	75 (38.5)
37-48	53 (27.2)
Sex	
Male	93 (47.7)
Female	102 (52.3)
Religion	
Hindu	100 (51.3)
Buddhist	79 (40.5)
Muslims	16 (8.2)
Education of Mother	
Illiterate	62 (31.8)
Primary	97 (49.7)
Secondary	28 (14.4)
H. Secondary	8 (4.1)
Education of Father	
Illiterate	23 (11.8)
Primary	91 (46.7)
Secondary	40 (20.5)
H. Secondary	33 (16.9)
Graduation	7 (3.6)
Post. Graduation	1 (0.5)
Type of family	
Joint	69 (35.4)
Nuclear	126 (64.6)
Socioeconomic class	
III	7 (3.6)
IV	99 (50.8)
V	89 (45.6)

Table-2: Seasonal distribution of cases of diarrhea

Seasons	Male N (%)	Female N (%)	Total N (%)
Summer	10 (52.4)	13 (68.1)	23 (120.5)
Monson	21 (109.4)	13 (68.1)	34 (177.5)
Winter	5 (26.2)	11 (57.6)	16 (83.8)
Total	36	37	73

* Figures in the parenthesis are incidence rate (spells) per 1000 per month, $\chi^2 = 4.511$, df. = 2; $P > 0.05$, not significant

Table 3: Association of socio demographic characteristics with occurrence of diarrhea among the study population

S.N	Characteristics	Diarrhea present N =15(%)	Diarrhea absent N= 180(%)	Total N=195
1.	Age			
	13-24	7(46.8)	60(33.3)	67(34.3)
	25-36	4(26.6)	71(39.4)	75(38.4)
	37-48	4(26.6)	49(27.3)	53(27.1)
2.	Sex			
	Male	9(60.0)	84(46.6)	93(47.6)
	Female	6(40.0)	96(53.4)	102(52.4)
3.	Religion			
	Hindu	14(93.3)	165(91.6)	179(91.8)
	Non Hindu	1(6.7)	15(8.4)	16(8.2)
4.	Family type			
	Joint	3(20.0)	66(36.6)	69(35.4)
	Nuclear	12(80.0)	114(63.4)	126(64.6)
5.	Education of father			
	Literate	11(73.3)	161(89.4)	172(88.2)
	Illiterate	4(26.7)	19(10.6)	23(11.8)
6.	Storage of water			
	Hygienic	5(33.3)	45(25.0)	50(25.6)
	Unhygienic	10(66.7)	135(75.0)	145(74.4)
7.	Waste disposal			
	Public latrine	5(33.3)	122(67.7)	127(65.1)
	Private latrine	1(6.7)	48(26.6)	49(25.1)
	Open air defecation	9(60.0)	10(5.5)	19(9.8)
8.	Exclusive breast feeding			
	Yes	3(20.0)	157(87.2)	160(82.0)
	No	12(80.0)	23(12.8)	35(18.0)
9.	Nutritional status			
	Under nutrition P	9(60.0)	64(35.5)	73(37.4)
	Normal	6(40.0)	116(64.5)	122(62.6)
10.	Immunization status			
	Partially immunized	4(26.6)	13(7.2)	17(8.7)
	Fully immunized	11(73.4)	167(92.8)	178(91.3)
11.	Personal hygiene			
	Unsatisfactory	11(73.4)	124(68.8)	135(69.2)
	Satisfactory	4(26.6)	56(31.2)	60(30.8)

3. Discussion: The present study was an attempt to determine the magnitude and causes of morbidity among under five children in the Landewadi urban slum of Bhosri Pune.

According to “National Child Survival and Safe Motherhood Programme” module [8], diarrhea is the major reasons for which the children are brought to hospital and health facilities. Diarrhea is the major causes of mortality [9] and leading cause of child mortality in India followed by diarrhea.[10] Thus cases associated with diarrhea remain the major cause of morbidity and morbidity in the study which is consistent with the findings published in National CSSM Programme modules.[8]

In the present study, association between age in months and history of acute diarrheal diseases among the base-line study population shows that as age increases there was decrease in

incidence of diarrhea and this difference is not statistically significant. The findings are almost similar to the findings of S.Sutariya [11], C.Shiva ram on diarrheal disease in rural Kerala.[12] It was observed that about maximum number of diarrheal disease occurred in monsoon followed by summer and later on winter season. Similar findings were observed in studies of S. Villa [13] and others in seasonal diarrheal disease morbidity in Mexican countries and the study of Dr. C.P.Mishra et al.[14] The present study shows that partially immunized children had 4 times more risk of diarrhea than compared to fully immunize. It was obviously due to protective effect of immunization. Undernourished children have 2.4 times higher risk of diarrhea than well nourished children. This is in confirmatory statement made by International centre for diarrheal disease research in Bangladesh that diarrhea is common in malnourished

children.[15] Storage of drinking water and cooked food was hygienic only in 5 (2.6%) and 2 (1.0%) respectively. The children from families who practice open air defecation are more prone to diarrhea. This difference is highly significant. When further interrogated it was observed that the higher percentage of diarrhea was attributed to unhygienic practices like handling and storage of milk and ignorance of the scientific weaning pattern. The findings are almost similar to the findings of M. Saran et al (1979)[16] conducted an epidemiological study of diarrhea and found that higher prevalence of diarrhea was observed amongst the children practicing open air defecation and in children who consumed well water.

The present study shows good personal hygiene has better protection against diarrhea. Similar finding seen in the study of Khadse et al [17] who have stated that hand washing with soap after defecation and before meal has protective effect on diarrhea.

CONCLUSION: This study examined the relative strength of the different factors contributing to diarrhea among young children in India. The results point to the importance of good hygiene practices within the home in reducing the incidence of diarrhea among young children. Furthermore, children born to undernourished, i.e., anemic, mothers may be more susceptible to infection than children whose mothers are well nourished.

The paper also found evidence to suggest that the benefits of improved domestic hygiene are at least as large as those emanating from improvements in the quality of drinking water. The problem, however, is that the level of domestic hygiene is a choice variable for households and improvements in it can only be affected by altering maternal literacy, easy access to water, and institutional support. This makes improvements in the level of domestic hygiene not easily open to policy intervention. Raising female literacy level and awareness regarding hygiene and immunization will go a long way in prevention of morbidity amongst children in general and diarrhea. These observations emphasize the need for research aimed at health system to determine the most appropriate approaches to control diarrheal disease and thus could be utilized to strengthen the diarrhea control programme.

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