Brief Reports

Epidemiology of Diarrhea in Urban Slums

Piyush Gupta
M.V. Murali
Alka Seth

Acute diarrheal disease is one of the major causes of morbidity and mortality in the developing world, especially among infants and children below 5 years of age. The reduction in infant and child mortality due to diarrhea in developed countries has followed channelisation of sufficient resources towards major improvements in living conditions(l). However, comprehensive advances in living standards remain a long term prospect in most developing countries due to scarcity of resources. Hence government and aid agencies usually try to focus on single projects to reduce diarrheal morbidity and improve child health.

The health impact of various projects attempting to reduce the diarrheal morbidity have been conflicting(l-5). Before embarking on such projects, relevant information on the magnitude of diarrheal disease and their relationship to socio-environmental

and individual health characteristics are essential in planning, particularly so in developing countries, where the rational use of meager resources is mandatory(6). The present study is an attempt to assess the impact of eight different epidemiological factors on frequency of diarrheal episodes amongst children of under-privileged section of society living in the eastern part of the capital city of India.

Subjects and Methods

The study was carried out at the diarrhea Treatment-cum-Training Unit (DTTU) of the UCMS and GTB Hospital. Mothers of 450 consecutive children with acute diarrhea attending this clinic were included in the study. These mothers were permanent residents of urban slums of East Delhi. Slums of East Delhi situated around the GTB Hospital are constituted by either re-settlement colonies or unauthorised jhuggi jhopri clusters. These densely populated slums had experienced a severe outbreak of gastroenteritis and cholera in 1988. Since then, attempts have been made to improve the living conditions of these people. Deep hand pumps and "Sulabh Shauchalyas" (community latrines) have been provided in some of these colonies. However, well laid out sewer system is still non-existent in most of the area. Shallow water pumps have been painted red and people are warned not to use such pumps. The socio-economic status of people living in these slums range from lower to upper-middle income group families. These slums show a reasonable change in various environmental factors and these factors are not clustered in particular areas.

All the mothers, thus enrolled were ad-

ministered a pre-tested proforma. The total number of diarrheal episodes in the last 4 weeks, including the present one, were recorded by recall method. A diarrheal episode was defined as three or more loose or watery stools in a day. Two episodes of diarrhea were classified as being separate only if the mother clearly remembered that her child was passing normal stools for at least three days in between the two episodes. Age of the child, mother and weight of the child were recorded. Details regarding the: (z) source of water supply, *(ii)* maternal educational status, (in) access to proper toilet facilities, *(iv)* family income, *(v)* family size, *(vi)* type of housing, and *(vii)* personal hygienic practices (including hand washing, food and domestic hygiene) were also obtained. Water supply from a municipal tap/deep hand pump was considered potable. Mothers, who had achieved primary education, were labeled literate. Access to toilet facility was considered proper, if the family was using toilet at home/in colony. Socio-economic status was considered poor if the family belonged to lower socio-economic group as assessed by modified Kupuswamy's scale. Housing was ascertained as being pucca (concrete) or kuccha (mud, *etc.)*. Hygienic practices were classified as being poor or good after assessing the various factors including hand washing, observance of proper food and water storage and handling practices on a weighted scale. For the purpose of this study, severely malnourished (weight < 60% of expected for age) and the rest constituted the two nutrition groups.

Multivariate logistic regression analysis was performed to examine the independent association of the various epidemiological risk factors for diarrhea on the primary outcome variable. The primary outcome variable was taken as the number of diarrheal episodes (single vs multiple episodes in the preceding month). The risk factors incorporated into the multivariate logistic model for prediction included a total of eight variables. These prediction variables were categorized in terms of being *unfavourable* or *favourable* for increasing the risk of diarrhea *(Table I)*. All variables were considered simultaneously to detect which of these contributed to the occurrence of multiple diarrheal episodes. Odd's ratio was computed in case of each variable to estimate the relative risk (with 95% confidence interval limits) of having a single or more episodes of diarrhea.

Results

The mean age of children was 18 months (range 1-98 months) and that of their mothers was 25.8 years (range 17-40 years). Total episodes of diarrhea suffered by 450 children in the study numbered 726 in the preceding month. Children with more than one diarrheal episode constituted 45.6% (n=205) of total population. Assuming that the 4-week period included in the study was representative of diarrheal morbidity in the entire year, the mean annual incidence of diarrhea was 19.4 episodes/child/year. The risk of having multiple diarrheal episodes in a child was assessed vis-a-vis epidemiological risk factors being favorable or not. The result of multiple logistics analysis with respect to these variables is depicted in *Table II.*

Discussion

Diarrhea alone leads to a loss of 40 million disability adjusted life years (DALY) in under fives of the developing world(7). Diarrheal morbidity is essentially an interplay between three factors, viz., agent, host and environment. The present study was undertaken to examine the relationship between few host and environmental factors that may influence the diarrheal incidence. Patients hailing from urban slums of Delhi were chosen because of the diverse envi-

TABLE I–*Categorization of Various Epidemiological Risk Factors for Diarrhea in 450 Children of Urban Slums*

S.No.	Variable	Outcome measure	
		Favorable n (%)	Unfavorable n(%)
1.	Source of water supply	non-potable 99 (22.0)	potable 351 (78.0
2.	Maternal education	illiterate 34 (76.4)	literate 106 (23.6)
3.	Toilet facilities	improper 140 (31.1)	proper 310 (68.9)
4.	Socio-economic satus	poor 367 (81.6)	fair 83 (18.4)
5.	Number of family memebrs	more than five 120 (26.7)	less than five 330 (73.3)
6.	Type of housing	kuccha 136 (30.2)	pucca 314 (69.8)
7.	Hygienic practices	poor 246 (54.7)	good 204 (45.3)
8.	Nutritional status	weight ≤ 60% of expected for age 134 (29.8)	> 60% of expected for age 316 (70.2)

ronmental conditions prevailing in these areas, which are by and large unhygienic with relative lack of civic amenities. Inadequate and overcrowded housing, absence of sanitation and drainage facilities, insufficient quantities of water of an acceptable quality, poverty, inadequate nutrition and lack of education result in low levels of domestic hygiene and child care and increase the chances of an infection.

Results of many programmes aimed at reducing diarrheal diseases by provision of safe drinking water and adequate sanitation have often been disappointing. In Bangladesh the introduction of tube wells had little effect on cholera incidence and on the island of Panama the provision of piped water to kitchens was ineffective in reducing diarrhea(l). Some other studies also concluded that introduction of safe drinking water and basic sanitation facili-

ties alone have very little effect on rates of diarrhea(3). The probable reasons could be improper utilization or reluctance to use the new facilities and clinging to traditional beliefs and practices. In our study, almost 70% were getting piped potable water supply but its availability did not lower the incidence of diarrhea. This was probably due to contamination in storage and handling.

In the present study, maternal literacy *per se* had no effect on the incidence of diarrhea. Education, especially of women, is frequently stressed as a necessary component of many health programmes. It is not clear what aspect of education is responsible for health improvement. Studies have shown that specific health related instructions given to mothers such as importance of hand washing or information on the hygienic use of latrines are beneficial(9). Specific and related education may induce a

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TABLE II—*Results of Multivariate Logistics Analysis: Impact on Frequency of Diarrheal Episodes*

S.No.	Risk Factor	Co-efficient	SE	Z-score	Odd's ratio (95% confidence interval)	p-value
1.	Non-potable water	0.3121	0.2945	1.0597	1.366 (0.767-2.434)	0.2893
2.	Illiterate mother	0.3255	0.2938	1.1081	1.385 (0.779-2.463)	0.2678
3.	Improper toilet	0.0646	0.2791	0.2316	0.937 (0.542-1.620)	0.8169
4.	Poor socio-economic status	0.6742	0.3335	2.0212	1.962 (1.021-3.773)	0.0433
5.	Large family	0.3598	0.2527	1.4237	1.433 (0.873-2.353)	0.1545
6.	Kuccha housing	0.1192	0.2769	0.4306	1.127 (0.655-1.939)	0.668
7.	Poor hygienic practices	1.8531	0.2356	7.8662	6.380(4.020-10.124)	0.0000
8.	Malnutrition	0.7794	0.2475	3.1488	2.180 (1.342-3.542)	0.0016
	Constant	2.4881	0.3640	6.8349		

change of attitude contributing positively to health of the community.

The present study lends strength to the age-old relationship of diarrhea and malnutrition. Not only is diarrhea more frequent and serious among the malnourished but it also tends to make malnutrition worse. So, tackling malnutrition may help in breaking this cycle. At the same time, size and income of the family and type of housing was not found to appreciably increase the risk of diarrhea. It is important to realize that when evaluating the role of any one intervention, it is extremely difficult to avoid the issue of confounding variables. For example, family income and size directly determines the economic status of a family and influences food availability per person. A lower economic status does contribute towards malnutrition. Malnutrition, however, was found to be an important factor responsible for increasing the risk of diarrhea.

The ideal solution is to tackle all the possible risk factors simultaneously to get the best results. But with limited resources it may not be feasible. Till then: *(i)* improving nutritional status of the children, and *(it)* improving personal and food hygiene are the two most important factors that could lead to a decrease of diarrheal incidence in our slums. Both the issues can be simultaneously tackled by increasing the health awareness through imparting specific health education to the mother. This way she will understand the relationship between malnutrition and disease and get motivated for adopting various safe hygienic practices. At the same time she can encourage the family to use the facilities provided by the government agencies in a proper and suitable way. A smaller family, better income, more maternal time per child will definitely improve child nutrition and help break the infection and malnutrition cycle. Better maternal awareness can be brought about by using the mass media and utilizing present infrastructure available for primary health care. Besides decreasing the incidence of diarrhea, the strategy may also result in lowering morbidities from other infections in the community.

REFERENCES

1. Pickering H. Social and environmental factors associated with diarrhea and growth in young children: Child health in urban Africa. Soc Sci Med 1985; 21: 121-127.

2. Henry EJ. Environmental sanitation and nutritional status in infants in rural St. Lucia, West Indies. Trans R Soc Trop Med Hyg 1981; 75: 507-513.

3. Shuval HI, Tilden RL, Perry BH, Grosse RN. The effect of investment in water supply and sanitation on health status: A threshold saturation theory. Bull Wld Hlth Org 1981; 59: 243-248.

4. Chakraborty AK, Das JC. Comparative study of incidence of diarrhea among children in two different environmental situations in Calcutta. Indian Pediatr 1983; 20: 907-913.

5. King J, Bratt D. Socio-economic dietary and cultural factors associated with diarrheal disease in Trinidad and Tobago. J Trop Pediatr 1988; 34:104-107.

6. Friej L, Wall S. Quantity and variation in morbidity: THAID analysis of the occurrence of gastroenteritis among Ethiopian children. Inf J Epidem 1979; 8: 313-325.

7. World Development Report 1993, New York, Oxford University Press, 1993; p 222.

8. Brisco J. The role of water supplies in improving health in poor countries. Am J Clin Nutr 1978; 31: 2100-2114.

9. Khan MV. The interruption of Shigellosis by hand washing. Trans R Soc Trop Med Hyg 1982; 72:164-168.

Childhood Histiocytoses: A Review of Twenty Two Cases

Anju Goyal
Sudha Rani
Tejinder Singh
Panna Choudhury*
A.P. Dubey*

Histiocytoses are a group of uncommon disorders characterized by proliferation of

From the Department of Pathology and Pediatrics, Maulana Azad Medical College and Associated Hospitals, New Delhi 110 002.*

Reprint requests: Dr. Sudha Rani, D-3/9, Vasant Vihar, New Delhi 110 057.

cells of the mononuclear phagocyte system and the dendritic system(1). Each of the histiocytoses of childhood is characterized by localized or generalized, reactive or neoplastic proliferation of cells similar if not identical to one of these cell types(2). As per Writing Group of the Histiocyte Society(3), various histiocytoses of childhood have been classified into Class I, Class II and Class III. In case of Class I Histiocytosis, the proliferation cell is the Langerhans cells(2). We present 22 cases of childhood histiocytosis diagnosed over a span of 10 years (1985-95). This is a retrospective study emphasizing the clinicopathological features alongwith a brief review of literature.

Subjects and Methods

Twenty two children were diagnosed as histiocytosis at the Lok Nayak Hospital,