ASSOCIATION OF SOCIODEMOGRAPHIC CHARACTERISTICS WITH ACUTE DIARRHEA IN CHILDREN AGED 2-5 YEARS: A HOSPITAL-BASED CASE CONTROL STUDY IN CMH PESHAWAR

Ayesha Ehsan, Shazia Saeed*, Fatima Ehsan**

Combined Military Hospital, Attock Pakistan, *Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Islamic International Medical College/Riphah International University, Islamabad Pakistan

ABSTRACT

Objective: To determine the relationship of socio demographic factors with acute diarrhea among children being treated in Out Patient Department of Combined Military Hospital, Peshawar.

Study Design: Case control study.

Place and Duration of Study: This study was under taken in family Out Patient Department, Combined Military Hospital (CMH), Peshawar, from Jul 2014 to Dec 2014.

Methodology: Three hundred and sixty three children aged 2 to 5 years were included in the study, out of which 121 were cases with acute diarrhea and 242 were healthy controls (1:2). Data was collected through structured questionnaire asked from mothers.

Results: There was statistical significant association between cases (with diarrhea) and controls (without diarrhea) regarding child's age, working status of mother and kacha type of house ($p<0.01$). Statistically highly significant association was also found between rural setting and absence of diarrhea ($p<0.01$).

Conclusion: Risk factors for childhood diarrhea vary by population with some factors being more important than others in particular settings. Children aged 2-3 years were relatively at a greater risk to develop diarrhea than 4-5 years. Similarly cases (children with acute diarrhea) have also shown a positive association with working status of mothers and urban setting.

Keywords: Acute diarrhea, Children 2-5 yrs, Sociodemographic factors.

INTRODUCTION

Diarrhea is considered a major cause of high child mortality and morbidity in developing countries including Pakistan[1]. Over half of these deaths occur in only five countries: India, Nigeria, Afghanistan, Pakistan and Ethiopia[2]. In this fight against child mortality, we need to dig out the underlying cause of illness for the proper eradication and prevention.

In Pakistan, the predisposing factors to childhood diarrhea include substandard socio-economic and hygiene conditions, contaminated water supply, lack of awareness among people and poverty[3]. Statistical data has shown that on an average, under-5 children in Pakistan, suffers around 120 million episodes per year[4]. It is imperative that the important risk factors associated with diarrhea should be identified first in communities through research. The commonly established associations have been studied through research done in industrialized nations, whereas these associations may vary in different geographical settings[5].

Pakistan has long developed a national program of Primary Health Care through Lady Health Workers (LHWs) which bring basic health services at doorsteps. Despite showing improvements in child health services like awareness on hygiene practices and vaccination schedule, it still has not sufficiently translated its message as evident by low recognition[6].

Certain demographic factors related to family like early age marriages, uneducated mothers and maternal employment were significantly associated with diarrhea morbidity. The prevalence of acute diarrhea is highest in children till

Correspondence: Dr Ayesha Ehsan, Medical Store Department, Combined Military Hospital, Attock Pakistan

Email: jawad29649@yahoo.com

five years of age and particularly in infants[7]. Higher rate of diarrhea has been observed in boys than girls in majority of the studies[4]. The gender difference observed could be because of some cultural influences where males are given priority over females.

Mothers are primary caregivers of under-five children and most of the studies have shown a positive correlation between educated mothers and absence of diarrhea[8]. Policies to reduce diarrhea among children should target children of the illiterate and less educated mothers[8]. However education does not act in isolation but interacts with other important factors and, depending on the context, it may or may not generate social benefits.

Regarding the age of mothers, in most of the studies younger mothers have complained diarrhea more frequently than older ones, which could be explained in part by their expertise in dealing with child care. Another reason could be the fact that older mothers appear to have more children and would be more experienced in effective diarrhea management[9].

Poor socio economic status has also been positively related to diarrhea in children. The increased household income may help to reduce diarrhea morbidity among toddlers by improving their dietary requirements and providing better sanitary conditions. In 2016 a study within 3 teaching hospitals of Peshawar showed that 86.4% families had income less than 5000 to 20000 per month and because of low income status the child's nutritional requirements were not met. As a result their immunity weakened and they became prone to infection, like diarrhea[10].

Since Pakistan harbors a high burden of diarrheal infection, the present study was carried out to assess the sociodemographic variables associated with acute diarrhea in children 2-5 years of age in North West of Pakistan. Pinpointing the causes of diarrhea is very decisive for the effective prioritization of child health promoting programs and policy formulation along with resource requirements in a particular region. Therefore,

this study was conducted to identify the socio demographic risk factors for the occurrence of childhood diarrhea in children aged 2–5 years in Peshawar, CMH hospital.

METHODOLOGY

The study was approved by the ASRB Khyber Medical University Peshawar (DIR/ KMU-EB/RF/000504). This case control study was under taken in Outpatient Department OPD, of Combined Military Hospital (CMH), Peshawar, from July 2014 to December 2014. People belonging to lower, middle and upper class form the clientele of the hospital.

Children 2-5 years of age were selected from the Family Outpatient Department FOPD of CMH who were confirmed to be cases of acute diarrhea based on the confirmation by history taking. Children with chronic diarrhea, any other disease or severely malnourished were excluded from the study. Children between 2 to 5 years of age confirmed to be healthy and not suffering from acute diarrhea based on history and signs/ symptoms were taken as controls. They were selected from the Immunization center of CMH and FOPD of CMH. It was also ensured that the child had no other medical or surgical morbidity.

Using WHO sample size calculator, minimally required sample size was calculated (n) 121 for each group at 95% confidence level and 5% margin of error. Power of the test defined as 80% and test value of Odds ratio was 1. Anticipated probability of the exposure given disease = 0.2754 (60). Non probability consecutive sampling was used for data collection. Hence, 363 subjects were recruited into the study amongst whom 121 had diarrhea and 242 were children without diarrhea keeping diarrheal to non-diarrheal ratio as 1:2.

Data was collected through structured questionnaire comprising of semi closed questions from mothers. The questionnaire consisted of two parts; the first one was related to the demographic and socioeconomic characteristics, second part dealing with queries about hygienic practices. Only the first part of questionnaire has been included in this study. Two research assistants

(medical officers of the same hospital) were trained about the data collection procedure. Two types of variables were used in the study, namely dependent and independent variables. Only acute diarrhea was dependent variable whereas the independent variables in the present study included demographic and socio-economic factors.

Permission from the participants was taken after explaining the purpose and benefit of the study and participation in the study was totally voluntary. SPSS version 22 was used for data entry and analysis. Descriptive statistics including means, modes and standard deviation were calculated for continuous data while the categorical data were expressed through frequencies and percentages. For comparative aspects between different categories chi-square test was used, a *p*-value ≤0.05 was considered as significant.

RESULTS

A total of 363 children were included out of them, 223 (61.4%) were males and 140 (38.6%) were females. The mean age of all 363 children in the study was 3.52 ± 1.17 years whereas the mean age of mothers of all 363 children was 28.94 ± 7.52 years.

Ninety four (25.9%) children were of 2 years of age, 92 (25.3%) were of 3 years, 68 (18.7%) of 4 years and 109 (30%) were of 5 years of age. One hundred and seventy two (47.4%) children were living in urban areas. However, data from original sources indicated that majority of them had migrated from other areas of Pakistan to Peshawar. Majority of mothers 309 (85.1%) were house wives while only 54 (14.9%) were working as full time employees. When they were asked to tell about the range of monthly income, 211 (58.1%) of the parents said that their monthly income was between Rs.10000-Rs.30000 (table-I).

Various risk factors were compared among cases (children with diarrhea) and controls (children without diarrhea) and chi square test along with odds ratios determined the statistical and epidemiological significances of differences.

There was highly statistical significant association of acute diarrhea occurrence in children aged 2-3 years and declined with increasing age. A child being 2-3 years had 21 times more odds of developing an acute diarrhea as compared to a child 4-5 years old (table-I). Working status of mothers, urban setting and kacha type of house also showed a high significant association

Table-I : Socio demographic characteristics of the study sample.

Variable	Frequency (n)	Percentage (%)
Age of Child		
2-3 years	186	51.2
4-5 years	177	48.8
Gender of Child		
Male	223	61.4
Female	140	38.6
Age of Mothers		
Uptil 30 years	244	67.2
More than 30 years	119	32.8
Settings		
Urban	172	47.4
Rural	191	52.6
Maternal Educational Status		
Formal Education	301	82.3
No Formal Education	62	17.7
Working Status		
Working	54	14.9
House Wife	309	85.1
Monthly Income		
<Rs.10000	52	14.3
Rs.10000-30000	211	58.1
>Rs.30000	100	27.6
House Type		
Kacha	170	46.8
Pakka	193	53.2

(*p*<0.01). No association of acute diarrhea was found with educational status of mother (*p*=0.84) and monthly income of the father (*p*=0.56).

DISCUSSION

In our study, the risk of diarrheal occurrence was higher at ages of 2–3 years as compared to children 4-5 years of age which is supported by study conducted in Tanzania by Mashoto, who stated that prevalence of diarrhea decreased gradually after second birthday in under-five[11].

These results confirm with the previously available literature that stated that the chances of becoming a victim of diarrhea decrease as the child grows up.

In our study the gender of the child was not a statistically significant predictor of childhood diarrhea which was in line with the same study conducted by Kijakazi et al[12]. However, some

the World Bank including 348,706 children from 40 developing nations. Along with other factors lack of maternal education was associated with diarrhea (OR=1.416; 95% CI 1.283-1.564)[7]. Another cross sectional study conducted in Kashan city, Iran by Ghasemi et al was designed to evaluate the awareness of the mothers with children less than five years age about diarrhea, its timely management and to determine the associa-

Table-II: Comparison of risk factors with acute diarrhea.

Socioeconomic Variables	Diarrhea (2-5 years)		*p*-value	Odds Ratio	95% CI
	Cases, n (%)	Control, n (%)			
Age of Child					
2-3 years	110 (59.1%)	76 (40.9%)	*p*<0.01**	21.84	11.10 - 42.96
4-5 years	11 (6.2%)	166 (93.8%)			
Gender of Child					
Male	80 (35.9%)	143 (64.1%)	0.19	1.35	0.85 - 2.13
Female	41 (29.3%)	99 (70.7%)			
Mothers' Education					
No formal education	20 (32.3%)	42 (67.7%)	0.84	0.94	0.52 - 1.69
Formal education	101 (33.6%)	200 (66.4%)			
Working Status of Mother					
Less than Rs.30000	90 (34.2%)	173 (65.8%)	*p*<0.01**	3.27	1.81 - 5.93
Rs.30000 or more	31 (31%)	69 (69%)			
Monthly Income					
Less than Rs.30000	90 (34.2%)	173 (65.8%)	0.56	1.15	0.70 - 1.89
Rs.30000 or more	31 (31%)	69 (69%)			
House Type					
Kacha	70 (41.2%)	100 (58.8%)	*p*<0.01**	1.94	1.25 - 3.03
Pakka	51 (26.4%)	142 (73.6%)			
Settings					
Urban	69 (40.1%)	103 (59.9%)	*p*<0.01**	1.79	1.15 - 2.78
Rural	53 (27.2%)	138 (72.8%)			

*Statistically significant variables at *p*<0.05; **statistically highly significant variables at *p*<0.01

have shown a significant relation of childhood diarrhea to boys as in a study conducted by Anteneh et al[13] in which boys were more affected than female counterparts. This may be due to the fact that males playing outdoors were more likely to pick dirt from the ground.

Regarding the education status of mothers, no significant association was observed with maternal education and decreased incidence of diarrhea. It was worth noting that this finding was relatively counter-intuitive compared to other such studies. A multilevel analysis of data from the Demographic and Health Surveys and

tion of this knowledge with certain demographic characteristics. The knowledge of the mother had no statistically significant association with the education of the mothers (chi square 10.748, *p*-value 0.096)[14]. These data showed that we cannot rely merely on maternal education alone, in terms of expected beneficial effects on child health. Super additive measures may be necessary preconditions for higher levels of maternal education to result in improved child health.

When maternal occupation was compared with childhood diarrhea, it was found to have significant association. According to our study

the children of working mothers had a higher risk of diarrhea compared with children whose mothers were house wives. A study extracted from the National DHS data using data extraction tools in North West Ethiopia manifested that children of mothers who were engaged in any outdoor work were about two times more likely to have diarrhea compared to children of mothers who were not working[15]. Children of working mothers had 14% more chances to have diarrhea than non-working mothers. This finding assists those who suggest that a mother's work is undesirable to her child's well-being. Mothers' absence from the household not only disturbs the internal system of the home, but with poor socioeconomic support leads to deleterious effects on child health[16].

The association of diarrhea and nature of houses (Kacha or Pakka) again had a statistical significant association in the current study. Nigeria study by Oluranti Epko, as in our study, showed a positive correlation between Kacha house and diarrhea in young children (OR = 0.73, 95% CI = 0.40-1.19)[17].

When compared in terms of Dwelling, it was observed that urban settings are more prone to acquire childhood diarrhea than rural settings. Majority of the households in Pakistan drink bacterially contaminated water as our water pipes are choked with filth. Another study was conducted in Mbour in a four-year time period. A total of 111,302 child-visits were included in the 24 health facilities. It was concluded that the occurrence of diarrheal cases was higher in urban areas compared to rural settings (24.4% vs. 19.9%)[22]. Similar findings were seen in another study conducted in Kenya where children living in rural area were less likely to have experienced diarrhea than children in urban areas[18].

When categories of monthly income were inquired in our study, majority 211 (58.1%) stated to have been earning between Rs 10,000 to Rs 30,000 and surprisingly no association was observed between diarrhea and monthly income less than Rs 30,000/- or more (p=0.56). In a study con-

ducted by Kalakheti, diarrhea prevalence was low if father had a regular or stable job irrespective whether it was more or less than 30000/ month[19].

CONCLUSION

Diarrhea morbidity varies across the geographical zones but still we were in a position to stress for the importance of some factors which may be helpful for the implementation of disease control programs in children.

Child's age had significant association with acute diarrhea. Children aged 2-3 years of age had more odds of developing diarrhea which decreased with increasing age. Similarly working status of mother and urban setting was significantly associated with cases as compared to controls. The independent variables that did not have significant association among cases and controls were child's gender and monthly income. Surprisingly maternal education also did not show any significant association in our study. These factors need to be further evaluated in eradicating the root cause of diarrhea.

CONFLICT OF INTEREST

This study has no conflict of interest to be declare by any author.

REFERENCES

1. Pinzón-Rondón ÁM, Zárate-Ardila C, Hoyos-Martínez A, Ruiz-Sternberg ÁM, Vélez-van-Meerbeke A. Country characteristics and acute diarrhea in children from developing nations: a multilevel study. Bio Med Coll Public Health 2015; 15(1): 811.
2. Seyal T, Hanif A. Knowledge, attitude and practices of the mothers and doctors regarding feeding. Annals King Edward Med Uni 2009; 15(1): 38-40.
3. Luby SP, Agboatwalla M, Hoekstra RM. The variability of childhood diarrhea in Karachi, Pakistan. Am J Tropical Med Hygiene 2011; 84(6): 870-77.
4. Irfan M, Zaidi SM, Waseem HF. Association of socio-demographic factors with diarrhea in children less than five years: a secondary analysis of multiple indicator cluster survey sindh 2014. Pak J Pub Health 2017; 7(2): 85-9.
5. Mehal JM, Esposito DH, Holman RC, Tate JE, Callinan LS, Parashar UD. Risk factors for diarrhea-associated infant mortality in the United States. Pediatr Infec Dis J 2012; 31(7): 717-21.
6. Wang Y, Zhu J, He C, Li X, Miao L, Liang J. Geographical disparities of infant mortality in rural China. Arc Dis Childhood-Fetal Neonatal Edit 2012; 97(4): F285-90.
7. Pinzón-Rondón ÁM, Zárate-Ardila C, Hoyos-Martínez A, Ruiz-Sternberg ÁM, Vélez-van-Meerbeke A. Country characteristics

and acute diarrhea in children from developing nations: a multilevel study. Bio Med Coll Publ Health 2015; 15(1): 811.

8. Desmennu AT, Oluwasanu MM, John-Akinola YO, Oladunni O, Adebowale SA. Maternal education and diarrhea among children aged 0-24 months in Nigeria. Afr J Reprod Health 2017; 21(3): 27-36.

9. Abdinia B. Knowledge and practice of mothers in the management of children's Diarrhea, in Northwest, Iran. Arch Pediatr Infect Dis 2014; 2(4): e17581.

10. Nazneen S, Haq NU, Shah A, Jahan S. Frequency of diarrhea and its risk factors among children under five years in three teaching hospitals of Peshawar, Pakistan. Intl J Innova Res Develop 2016; 5(12): 8-15.

11. Mashoto KO, Malebo HM, Msisiri E, Peter E. Prevalence, one week incidence and knowledge on causes of diarrhea: household survey of under-fives and adults in Mkuranga district, Tanzania. Bio Med Coll Public Health 2014; 14(1): 985-90.

12. Walker CL, Aryee MJ, Boschi-Pinto C, Black RE. Estimating diarrhea mortality among young children in low and middle income countries. Public library Sci One 2012; 7(1): e29151.

13. Anteneh ZA, Andargie K, Tarekegn M. Prevalence and determinants of acute diarrhea among children younger than five years old in Jabithennan District, Northwest Ethiopia, 2014. Bio

Med Coll Publ Health 2017; 17(1): 99-05.

14. Ghasemi AA, Talebian A, MasoudiAlavi N, Moosavi GA. Knowledge of mothers in management of diarrhea in under-five children, in kashan, iran. Nurs Midwifery Stud 2013; 1(3): 158-62.

15. Mihrete TS, Alemie GA, Teferra AS. Determinants of childhood diarrhea among underfive children in Benishangul Gumuz regional state, north West Ethiopia. BioMed Coll Pediatr 2014; 14(1): 102-8.

16. Kawakatsu Y, Tanaka J, Ogawa K, Ogendo K, Honda S. Community unit performance: factors associated with childhood diarrhea and appropriate treatment in Nyanza Province, Kenya. Bio Med Coll Publ Health 2017; 17(1): 202-07.

17. Ekpo O. Careseeking for childhood diarrhoea at the primary level of care in communities in Cross River State, Nigeria. J Epidemiology Global Health 2016; 6(4): 303-13.

18. Thiam S, Diène AN, Sy I, Winkler MS, Schindler C, Ndione JA. Association between childhood diarrhoeal incidence and climatic factors in urban and rural settings in the Health District of Mbour, Senegal. Intl J Environ Res Public Health 2017; 14(9): 1049-55.

19. Kalakheti B, Panthee K, Jain KC. Risk factors of diarrhea in children under five years in urban slums. J Lumbini Med Coll 2016; 4(2): 94-98.

....