DETERMINANTS OF DIARRHEA IN CHILDREN UP TO TWO YEARS OF AGE: IN A TERTIARY CARE HOSPITAL, RAWALPINDI

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ABSTRACT

Objective: To determine the demographic, environmental and behavioral factors leading to diarrhea in children up to 2 years of age.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Children out patient department of a tertiary care hospital in Rawalpindi city, from Feb 2016 to Jul 2016.

Material and Methods: Two hundred and sixty four children who had diarrhea in last two weeks were included using non-probability consecutive sampling. A structured pilot tested questionnaire was used to interview mothers of the respective children after informed consent. Questionnaire was designed to collect information regarding various demographic, environmental and behavioral characteristics. Statistical Package for Social Sciences (SPSS) version 20 was used for data entry and analysis. A *p*-value<0.05 was considered statistically significant, after applying Chi Square test.

Results: Mean age of the participants' mothers was 31.53 ± 6.58 years. Mean age of the children was 10.29 ± 4.24 months with highest number of children, 169 (64%) in age group 7-11 months. Males children were 152 (57.6%) and females were 112 (42.4%). Among them only 40 (15.2%) children were exclusively breast fed for six months. Most common combination was breast milk and cow's milk 97 (36.7%). Feeding bottle was used by 252 (95.6%) mothers. Hand washing with soap after toilet use was practiced by 158 (58.9%) mothers, before preparing food by 180 (68.2%) mothers and before feeding child by 156 (59.1%) mothers. As per Expanded Program on Immunization (EPI) schedule only 166 (70.8%) of the total 235 eligible children were vaccinated against measles. There was statistically significant difference between mothers' education and exclusive breast feeding and hand washing practices (*p*=0.001).

Conclusion: The study showed that diarrhea was most commonly found in children in age group 7-11 months, i.e. at the time of weaning. Water boiling for domestic and cooking purpose was not practiced by most mothers. Most of the children in the study sample were not exclusively breast fed. Similarly children were mostly bottle fed and bottle was not washed and boiled before use. Vaccination for measles was not achieved by all participant children as per EPI schedule.

Keywords: Children, Diarrhea, Exclusive breast feeding.

INTRODUCTION

Future of any nation is linked to its children, and it is the sole responsibility of societies to ensure their development, growth, and health. One major goal among the Sustainable development Goals (SDGs) was SDG3. The specific target of this goal is to reduce under 5 mortality to at least as low as 25 per 1,000 live birth by the year 2030[1]. Diarrhea is an important global health issue and it accounts for an estimated 1.9 million children deaths per year[2]. In 2011, total 6.9 million children under 5 years old died, out of which 4.4 million (58%) deaths were due to infectious causes of pneumonia (1.4 million) and diarrhea (800 000)[3]. In 2013, this number reached up to 1,600 young children deaths each day, or more than 580,000 deaths per year. South Asia and sub-Saharan Africa were worst affected and most, if not all, deaths from diarrhea occurred in children below two years of age living in this region[4]. In developing countries diarrheal diseases present as a major cause of morbidity

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and mortality. There is an estimate of 470 million children under age 5 years living in developing countries and if one child experiences three episodes of diarrhea each year it would still mean 1.4 billion total episodes of diarrhea per year[5]. It has been studied that various factors are playing a major role in mortality and morbidity of children in developing countries. Socio-demographic, environmental, and behavioral factors interact and affect the occurrence of a child's world is mainly controlled by and experienced through the mother. Additionally, various familial, social, and cultural factors govern the extent to which mother can take care of her child. There is a biological linkage between mother and child and she also takes care of her child's important basic needs[7]. More recent research and studies have found maternal behavior towards child care as one of strongly related indicators of diarrheal disease and has

Table-I: Demographic characteristics of the participants.

Variables		Frequency (n)	Percentage (%)
Age of the children	1-6 months	29	10.9
	7-11 months	169	64
	12-24 months	66	25.1
Area of residence	Urban	199	75.4
	Rural	65	24.6
Mothers' educational status	No formal education	29	11
	Primary	47	17.8
	Middle	38	14.4
	Metric	46	17.4
	Intermediate	48	18.2
	Bachelors	56	21.2
Mothers' occupation	Housewife	165	62.5
	Working	99	37.5
Fathers' monthly income (in rupees)	Less than 10,000	08	3.0
	10,000-20,000	135	51.0
	21,000-30,000	65	25.0
	31,000 and above	56	21.0
Gender of the child	Male	152	57.6
	Female	112	42.4
Place of delivery	Hospital	212	80.3
	Home	52	19.7
Household size	≤4	76	28.8
	≥5	188	71.2
No of children under five years	1	126	47.7
	≥2	138	52.3

morbidity in children due to diarrhea[2]. Diarrhea is one of those diseases, which is most common and frequent among children in Pakistan. Despite the fact that it is a preventable and treatable condition it accounts for about two-thirds of total annual deaths among children under 5 years of age in Pakistan[6]. Child diarrhea needs to be explained and understood by the mother because long lasting mediating effects on resources available and the environment. Efforts also need to be focused on water, sanitation and hygiene (WASH) programs so that most diarrheal diseases can be prevented. All these programs hit the chain of disease transmission at interrupting faeco-oral transmission pathways, commonly

known to us as five ''F'' (fluids, fields, flies, fingers and food)[8].

The rationale of the study is to have a deep insight into various environmental and behavioral factors that contribute to increasing cases of diarrhea in our community. Modifying these important factors can help to reduce the morbidity and mortality due to this preventable disease. It will help health system to develop new health interventions andto train health workers at community level.

The objective of this study was to measure frequency of demographic, environmental and behavioral factors leading to diarrhea in children up to 2 years of age.

MATERIAL AND METHODS

It was an analytical cross sectional study conducted in children out patient department of a tertiary care hospital in Rawalpindi, over a period of six months from Feb to Jul 2016. Using World Health Organization sample size calculator with assumed proportion of diarrhea, p=0.22%[9]. Sample size was computed to be 264 at 95% confidence interval and 5% permissible margin of error. Non probability consecutive sampling was used for data collection. Children aged 1 month up to 24 months who had diarrhea at the time of survey or had diarrhea in last two weeks were included in the study. Children suffering from organic/ non-infectious causes of diarrhea e.g. endocrinopathies, malabsorption syndrome and drug induced were excluded from the study. Mothers of children fulfilling the inclusion criteria were interviewed after informed consent using a structured questionnaire. The questionnaire was developed after thorough literature search. The questionnaire was divided comprised of three parts. In the first part, data on mothers and fathers demographic profile such as education, occupation, house hold size, area of residence and number of children under five was obtained. Age of the child, gender and place of delivery was also asked. In the second part, questions regarding various environmental factors like source of drinking water, water boiling prior to domestic use, type of toilet facility and type of domestic waste disposal were inquired about. In the third part, behavioral factors like feeding practices, hand hygiene measures adopted by mothers and vaccination status of the children were assessed.

Data was entered and analyzed using SPSS 20. Descriptive statistics in terms of frequency and percentages were used to describe qualitative variables. Mean with standard deviation was calculated for quantitative variables. Chi square test was used to calculate association of various

Table-II: Child feeding practices adopted by respondent mothers.

Variable		Frequency (n)	Percentage (%)
Duration of exclusive breast feeding	Less than 6 months	199	75.4
	Up to 6 months	40	15.2
	Not breast fed at all	25	9.5
Current breast feeding status	Yes	129	48.8
	No	135	51.1
Milk combinations given to child	Breast milk + cow milk	97	36.7
	Only cow milk/ fresh milk	50	19
	Formula milk	45	17.0
	Cow milk + formula milk	40	15.2
	Breast milk + formula milk	32	12.1
Use of feeding cup or bottle	Feeding bottle	252	95.6
	Feeding cup	12	4.6
Washing and boiling of bottle before use	Yes	68	25.75
	No	196	74.2

factors like maternal education, area of residence and hand washing habits with diarrhea. A *p*-value ≤0.05 was considered statistically significant.

RESULTS

Mean age of the participant mothers was 31.53 ± 6.58 years whereas mean age of the children was 10.29 ± 4.24 months. Of total 264 children 152 (57.6%) were males and 112 (42.4%) were females and 199 (75.4%) were from urban setting and 65 (24.6%) from rural area of residence. Highest number of children, 169 (64%) were in age group 7-11 months. Rest of demographics are highlighted in table-I.

Important environmental factor influencing diarrhea are source of cooking and drinking water at home. Of total 264 participants, 127 (48.1%) participants were using water from tube well, 109 (41.3%) from public tap and 28 (10.6%) from open wells. Water was boiled before cooking and drinking by 50 (18.9%) of the participants while majority 214 (81.1%) didn't boil it. When the participants were inquired about type of toilet facility majority 232 (87.8%) had established flush system at their homes while only 16 (6.1%) were using pit latrines and 16 (6.1%) were using conventional open field defecation as done in remote villages. Regarding domestic waste disposal it was safe and closed in 212 (80.3%) of the houses while it was open in 52 (19.7%) houses.

The most important behavioral factor is the child feeding practice, which are illustrated in table-II. In this study 166 (70.8%) children were vaccinated against measles of total 235 eligible children according to EPI schedule while 69 (29.36%) were not vaccinated. Mothers' own hygiene practices regarding hand washing while handling and feeding the child are illustrated in figure. As illustrated, mothers often practiced hand washing measures.

When the test of significance was applied it was found that there was significant association between area of residence and exclusive breast feeding for six months (p=0.001 and x^2=16.13). There was also strong association between mothers education and bottle washing and boiling before each use (p=0.001 and x=158.25), education and hand washing after toilet use (p=0.001, x^2=133.3), education and duration of exclusive breast feeding (p=0.001, x^2=41.50). Area of residence has a strong association with current breast feeding status of the child (p=0.001, x^2=24.30). Relation between mother's educational status & period of exclusive breast feeding is given in table-III.

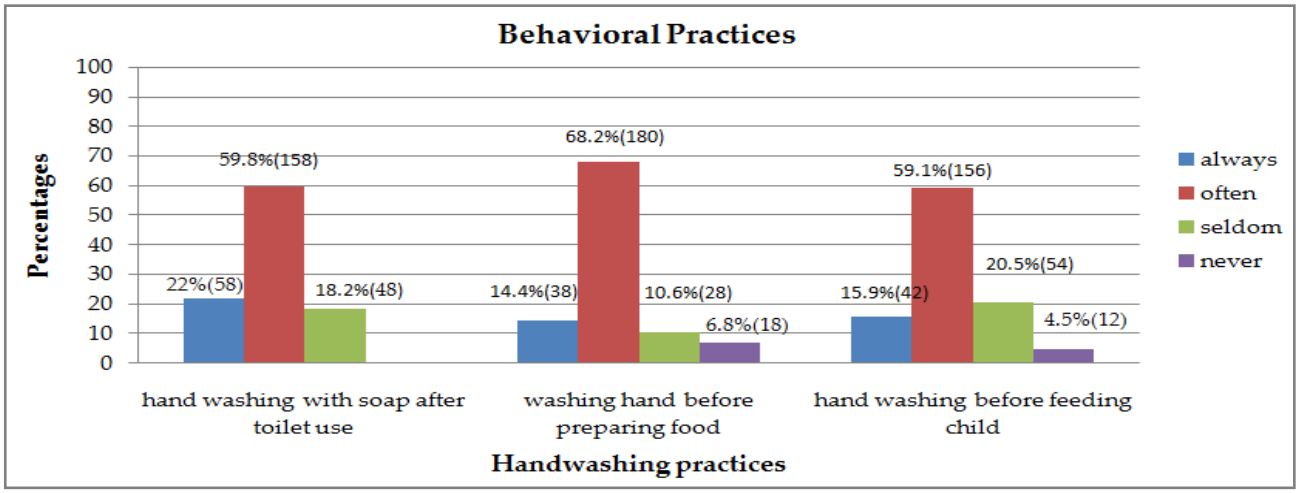

Figure: Respondent mothers' hand-washing practices.

DISCUSSION

The mean age of the participant mothers was 31.53 ± 6.58 years while in a study in

Ethopia[10] the mean age was 29.5 ± 6.7 years in consistent with our study however our 89% of the participants had formal education which is much higher to 38% of the participant in the same study. The reason being most of our study participants were from urban area of residence. In our study 62.5% of the participants were house wives and 37.5% were working which is in consistent with a study conducted in Iran[11] where 80.4% were housewives and 14.6% working . This is because both the countries share same social and cultural values.

In our study the household size consisting of >4 members was seen in 71% of the participants while 15% was found in a study conducted in urban Indonesian population[12], this vast difference is because of joint family system prevailing in our country. It is also an important determinant of diarrhea in our children as they may get less due attention.

The mean age of the children was 10.29 ± 4.24 years with highest proportion (64%) of children in our study in age group 7-11 months which is similar to a study in Ethiopia[13] and Nigeria[14] and this is because this the age when children are exposed to weaning diets other than milk. The lowest percentage (10.9%) in our study was reported in age group up 1-6 months similar to a study in Nigeria[14] showing the protective effects of breast feeding and less exposure to infectious agents. In our study 80.3% of the children were delivered in hospital similar to a study in Bolivia[7] where 79.28% were delivered in a health institution indicating better understanding of institutional deliveries among the study participants or they required it on medical grounds. Under five children is another important determinant of diarrhea. In our study it was found that almost 47.7% had only one under five while (52.3%) of the participants had 2 under five children at home which is quite opposite to 88.8% and 11.1% respectively in a study in North West Ethopia[15]. This indicates lack of birth spacing and efficient family planning services.

In our study exclusive breast feeding was practiced by 15.2% of the participants while 34% was reported in a study in Brazil[16] showing a dire need to increase exclusive breast feeding among children.

In our study, 95.6% of the children were bottle fed which is much higher compared to 74.8% reported in a study conducted in Kerala state of India[17] indicating similar behaviors of the mothers.

In our study children with complete vaccination status as per EPI schedule were 70.8% which is much better to the findings of a study conducted in Yemen[18] where only 44% of the children had got complete vaccine coverage, this is because of better EPI coverage in our country and a strong determination to lower the burden of vaccine preventable diseases.

Hand hygiene practice included hand washing with soap after toilet use which was observed by 81.8% of our respondents which is very close to 93.2%[17] observed by Indian mothers, highlighting it to be important preventive measure .

Table-III: Comparison between mother's educaitonal status and duration of exclusive breast feeding.

Variables	Duration of Exclusive Breast Feeding				***p*-value**
Mothers educational status		Less than six months	Six months	Not breast fed at all	p=0.001 x^2=67.211
	No formal education	21	8	0	
	Primary	30	8	9	
	Middle	20	16	10	
	Metric	28	0	2	
	Intermediate	48	0	0	
	Bachelors	52	0	4	

Regarding domestic waste disposal 80.3% used to have safe and proper waste disposal which is quite better to a study conducted in Ghana[19] where it was only 30.6% accounting for better waste disposal facilities in our population settings.

CONCLUSION

The study showed that diarrhea was reported highest among children age group 7-11 months. Water boiling for domestic and cooking purpose was not practiced by most of mothers. Most of the children in study sample were not exclusively breast fed. Similarly children were mostly bottle fed and bottle was not washed and boiled before use. Vaccination for measles was not achieved by all participant children as per EPI schedule.

RECOMMENDATION

The study showed that diarrhea was most commonly found in children in age group 7-11 months, i.e. at the time of weaning. Water boiling for domestic and cooking purpose was not practiced by most mothers. Most of the children in the study sample were not exclusively breast fed. Similarly children were mostly bottle fed and bottle was not washed and boiled before use. Vaccination for measles was not achieved by all participant children as per EPI schedule.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by the author

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