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Research Article

### STUDY OF RISK FACTORS AND OUTCOME MEASURES ASSOCIATED WITH PROCUREMENT OF DIARRHEA IN INFANTS PRESENTING IN PEDIATRICS WARD OF A TERTIARY CARE HOSPITAL IN A DEVELOPING COUNTRY OVER A PERIOD OF THREE MONTHS

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**Abstract:**

**Introduction:** Diarrhea has significant morbidity and mortality in children <5 years of age. Reducing risk factors and improving healthcare measures can decrease diarrheal morbidity and mortality. **Objective:** To determine the risk factors associated with diarrhea and outcome measures such as morbidity and mortality in infants presenting in the Pediatrics ward of Mayo Hospital Lahore. **Study Design:** Analytical Cross-Sectional, **Study Duration and Place:** The study was conducted for a 3-month duration in Community Medicine Department, KEMU Lahore. **Subjects and Methodology:** A cross-sectional analytical study was carried out at the Pediatrics department of Mayo Hospital, Lahore. 78 children were selected based laid down inclusion criteria. Data was collected through a pretested questionnaire and analyzed using SPSS 23. **Results:** 55% of the parents reported an episode of diarrhea in the child within 2 weeks before questioning. Among the children, 49% were being breastfed exclusively. 95% of parents affirmed a positive relationship between hygiene and diarrhea. The most commonly reported response to diarrhea was taking a child to a doctor (55%), followed by giving ORS and/or meshed foods (42%). Recent weight loss was reported in 53% of the patients, with a significant correlation between weight loss and history of diarrhea. There were 53% confirmed cases who had received Rotavirus vaccination. **Conclusion:** Our study concluded that there is a significant relation between diarrheal disease in infants <1 year of age and morbidities such as weight loss and lack of proper growth. The major risk factors for the development of diarrhea, including poor hygiene, low vaccination coverage, and poor nutrition need to be considered more seriously. Measures such as supplying ORS at homes and teaching parents how to utilize ORS; vigorous efforts for Rotavirus vaccination and promotion of exclusive breastfeeding should be encouraged by the government and health authorities.

**Keywords:** Diarrhea, Rotavirus, ORS, Breastfeeding.

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**INTRODUCTION:**

Acute diarrheal and respiratory tract infections are the most frequent childhood illnesses and leading infectious causes of childhood morbidity and mortality. They are also the leading causes of attendance at health services in low-income and middle-income countries and remain the major causes of avoidable deaths with a worldwide incidence of 30% of all childhood deaths. A high proportion of deaths occurs in the first two years of life in which the percentile for diarrheal deaths is 72% and for deaths by pneumonia is 81%[1]

The diarrheal disease accounts for approximately 1.34 million deaths among children ages 0-59 months and continues to act as the second leading cause of death in this age group.[2] Children younger than 5 years are at much greater risk for diarrhea-related death than older children and adults and infants are at the highest risk of death.[3] Current estimates in the under-five show that 1.4 billion episodes of diarrhea with 9 million hospitalizations occur globally each year, leading to a loss of 62 million Disability-adjusted life years (DALYs).[4]

To effectively prevent diarrhea associated with morbidity among children in developing countries, local risk factors associated with diarrhea must be identified in the community. A thorough review of the literature revealed various factors that could lead to diarrhea in children. Those under consideration in this research include lack of breastfeeding, lack of hygiene, poor hand washing practices, maternal and child under-nutrition, and infection with Rotavirus.

Breastfeeding has a protective effect in the prevention of infant diarrhea. Among infants aged 0-5 months, exclusive protection confers greater protection against all outcomes than predominant and partial breastfeeding. Any type of breastfeeding also confers a protective effect against all outcomes among infants aged 6-23 months. Human milk is a source of nutrition uncontaminated by environmental pathogens and is directly protective owing to its anti-inflammatory and anti-microbial properties. Suboptimal breastfeeding may be linked with an increased incidence of diarrhea and pneumonia.[5] Breastfeeding works in two ways; it not only decreases diarrhea incidence, but also its duration. The predominant mechanism by which breastfeeding reduces diarrhea mortality is by reducing prolonged episodes of diarrhea.[6]

Viral diarrheas form a major portion of diarrhea cases, with rotavirus accounting for the most common identifiable viral cause of diarrhea in children. According to an estimation, 29% of all

diarrheal deaths are due to rotavirus in children and rotavirus affects approximately 95% of children <5 years, regardless of the socio-economic or environmental conditions and as compared to other causes, more frequently leads to dehydration.[7]

According to a Randomized Controlled Trial conducted in Pakistan, in communities in which diarrhea is the leading cause of childhood death, the wash water is contaminated with fecal matter and no provisions were made for clean drying of hands. The RCT showed that children living in neighborhoods that were encouraged to wash their hands with plain or antibacterial soap had 53% lower incidence of diarrhea and a 50% lower longitudinal prevalence of diarrhea than children living in control neighborhoods who did not receive soap.[8]

There is a bidirectional relationship between malnutrition and diarrhea. Malnutrition predisposes children to a greater incidence and duration of diarrhea; malnutrition can also be triggered or worsened by severe diarrhea since diarrhea causes decreased absorption and increased loss of macro and micronutrients. Nutritional supplements such as zinc and ORS have also been shown to reduce diarrhea morbidity and are recommended as standard therapies for the treatment of acute diarrhea.[9]

This study aims to develop an association between the documented risk factors leading to diarrhea, as well as the subsequent outcome measures attributable to specific risk factors. The study also aims to document a decrease in the incidence of infant diarrhea after prevention for specific risk factors.

**METHODOLOGY:**

Our study was an analytical cross-sectional study. The study setting was the Pediatrics department at Mayo Hospital, Lahore. The study was conducted over a duration of 3 months with a sample size of 78 patients. The sample size was calculated using a 95% confidence interval and 10% absolute precision with an expected percentage of diarrheal deaths as 72%. The sampling technique used was Simple Random Sampling. Patients presenting to the OPD or Emergency as well as patients admitted in the Pediatrics ward during the time of data collection were included in the study. Age <1 was selected as inclusion criteria and children >1 year were excluded from the study. The Data Collection Procedure used by all members of the batch was the data collection tool (pre-tested questionnaire).

Feeding behavior of the children was characterized by three categories: Breastfeeding, Top Feeding, and Mixed (breast plus top) Feeding.

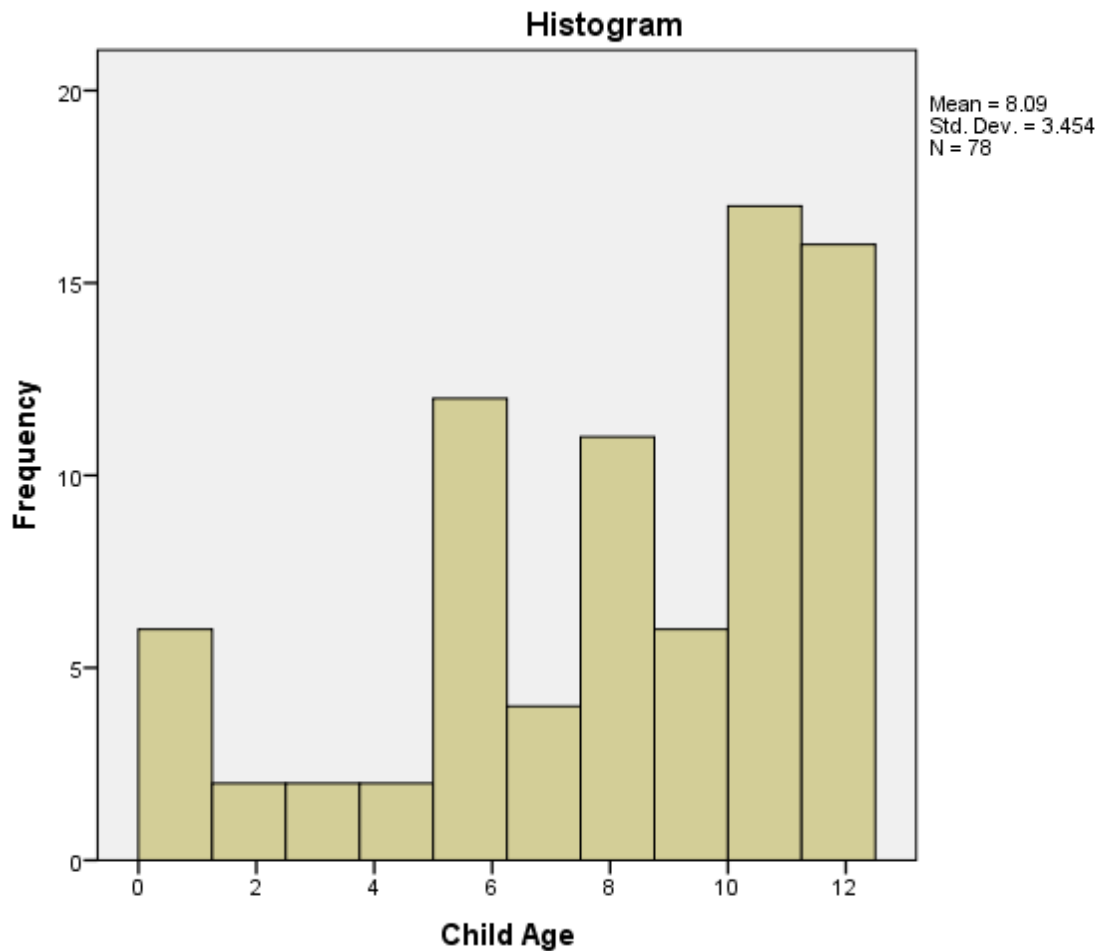
The knowledge of parents regarding the role of hygiene and sanitation in preventing diarrhea was assessed. Measures taken by the parents in case of diarrhea such as giving ORS and meshed foods or soda water, or consulting a doctor were also noted. Parents' information regarding the preparation and effectiveness of ORS as well as its availability at home was also noted.

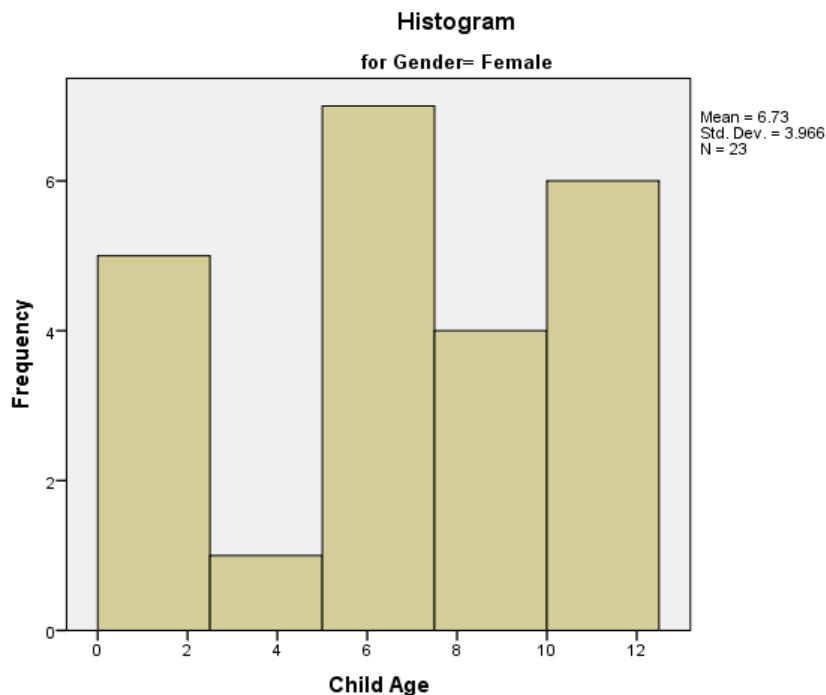
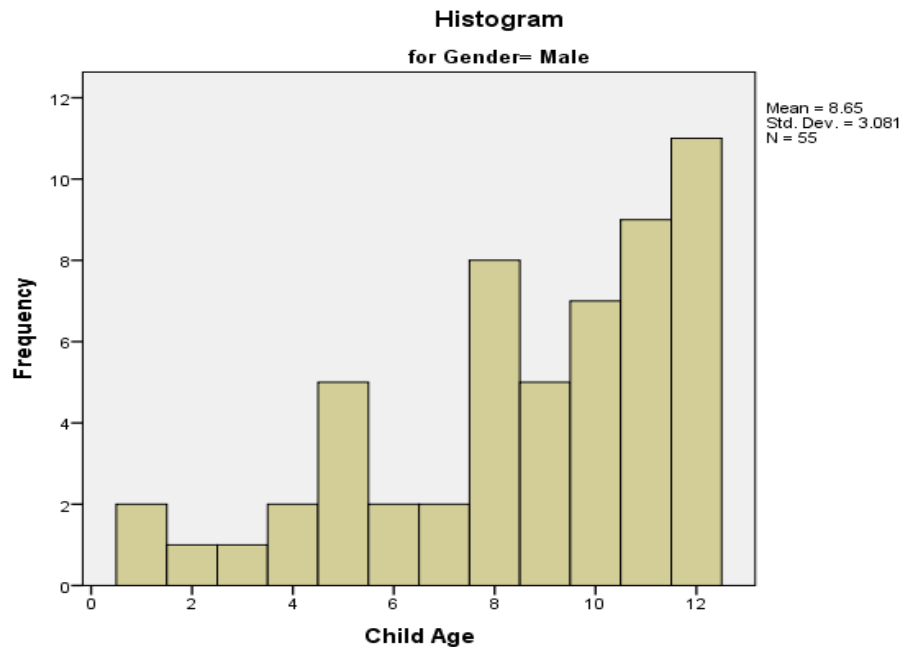
The association of weight gain and weight loss with diarrheal illness was also assessed. We also inquired about vaccination of the children against diarrheal related illnesses.

Data obtained was analyzed by the Statistical Package for Social Scientist (SPSS) version 23. The synopsis was approved by the Institutional Review Board of King Edward Medical University. Proper consent per WHO and institutional guidelines was taken.

### RESULTS:

The demographic profile of the patients showed the distribution of age and gender only. Most of the cases were male with female patients accounting for only 29.5% of the total sample size





Among the parents questioned, 49% used breastfeeding exclusively as a feeding source, while 45% relied on mixed feeding. 90% of the mothers were breastfeeding their child at the time of data collection. 55% of the parents reported that their child had an episode of diarrhea within 2 weeks before questioning. When we cross-tabulate breastfeeding against episodes of diarrhea within 2 weeks, we find that 57% of the children breastfed had diarrhea within a period of 2 weeks. However, the p-value for this correlation is 0.290, which means there is no statistically significant

correlation between breastfeeding and diarrheal episode within 2 weeks.

Regarding the association of household hygiene and development of diarrhea, 95% affirmed a positive relationship between poor hygienic and sanitary conditions and the development of diarrhea in children. 91% of the parents had taught their children the technique for proper handwashing in between frequent visits to the toilet, and 95% reported affirmative for providing healthy food and clean water to their children. All

of the parents (100%) washed their hands before and after changing the diaper of the baby.

The most common measure adopted in any case of childhood diarrhea was visiting the doctor (55%), followed by giving ORS and/or meshed food to the child (42%). 71% of the parents knew how to prepare ORS at home; however, only 55% reported keeping ORS at home. Boiling water was used to prepare ORS by 56% of the parents involved in the study. Only 45% of the patients affirmed that ORS can be used to treat Rota virus-associated diarrhea; 50% expressed a lack of knowledge on the matter. 47% of the parents reported that their child had been gaining weight properly, while 53% reported recent weight loss in the children. When recent weight loss was cross-tabulated against a history of diarrhea within 2 weeks, 73% of patients with recent weight loss also reported diarrhea within the last 2 weeks. The p-value for this correlation is 0.03, which means that a statistically significant correlation exists between diarrhea and weight loss in children.

Only 53% of the parents reported getting their child vaccinated against diarrhea-related diseases, while 42% reported a lack of knowledge regarding the vaccination status of their child against diarrheal illness. 69% of the parents questioned believed that diarrhea can be fatal for the child.

### DISCUSSION:

Diarrheal illness is the second most common cause of death in children aged less than 5 years. According to a WHO study, out of 1426 deaths of children aged 1-59 months in Pakistan during 2006-2007, 318 were reportedly due to diarrhea with the majority occurring in infants 1-11 months old. The most common cause of diarrheal related illness and death was persistent diarrhea.[10]

Breastfeeding has been shown to have a beneficial effect in reducing child morbidity and mortality from diarrheal illness, through natural immunological mechanisms as well as reducing exposure to contaminated fluids and foods.[6,11] Exclusive breastfeeding has a positive and cost-effective impact on child survival.[12] In Pakistan, the rate of exclusive breastfeeding as reported by UNICEF is only 37% as of 2012, which top feeding and mixed feeding constituting the major alternatives.[13] Feeding practices in Pakistan are suboptimal, which leads to an adverse effect on child health.[14] Our study shows the rate of exclusive breastfeeding to be 49%, which is predictable. In our study, we show that there is no statistically significant relationship between breastfeeding and the occurrence of diarrhea within 2 weeks. Different studies suggest that the incidence and mortality of diarrhea are higher in

infants who did not receive breastfeeding compared to those who did.[15] Our study contained only a small sample (3%) of infants who received exclusive top feeding, hence any significant correlation cannot be drawn.

Studies show a 53% reduction in incidence and a 50% reduction in the longitudinal prevalence of diarrhea among children who used plain or antibacterial hand-wash[8] Our study shows a high level of awareness regarding the need for proper hygiene and sanitation, as well as handwashing after visiting the toilet. Moreover, 100% of the sample size reported handwashing before and after changing diapers of children, which is an effective way of reducing the transmission of diarrheal pathogens.

Current WHO guidelines propose the use of ORS (oral rehydration salts) solution, zinc supplements, nutrient-rich food, and rehydration for the treatment of diarrheal disease.[15] According to statistics provided by the UNICEF, the percentage use of ORS to treat diarrheal disease in Pakistan is 41% among the poorest 20% and 44% among the richest 20%.[16] Our study shows that 42% of the parents' response to diarrhea was giving ORS and/or meshed foods to the child. Although 71% of the parents knew how to prepare ORS themselves, only 55% had ORS readily available at home, and 56% used boiling water to prepare ORS. This indicates a lack of sufficient knowledge regarding the importance of ORS as well as the use of boiling water for disinfection, especially in Pakistan where many areas are deprived of clean drinking water. Rotavirus affects almost 95% of all children <5 years old and is also accountable for 29% of all diarrheal deaths.[7] Vaccination against Rotavirus has been estimated to prevent 45% of deaths and approximately 58% of medical visits.[17] The WHO reports global Rotavirus vaccination coverage at 25%.[18] In our study, we report 53% parents getting their child vaccinated against diarrheal disease due to Rotavirus; 42% were not aware of their child's vaccination status against Rotavirus, which can be attributed to the fairly recent introduction of the vaccine in the Extended Programme on Immunization (EPI) schedule in Pakistan. An extensive literature review shows that diarrhea caused by Rota-virus, and some bacterial diseases can be avoided in children by immunization against these specific organisms.[19] Our study also estimated a statistically significant failure to gain weight in children in correlation with the occurrence of diarrhea. The relationship between diarrhea and malnutrition is bimodal; malnutrition can predispose to a greater incidence of diarrhea and diarrhea can cause weight loss and malnutrition due to inadequate absorption of nutrients.[9] Both pneumonia and diarrhea are

linked to a reciprocal cycle of malnutrition and infection.[20]

Summarizing the above discussion, we note from our research and comparison with data from other researches that childhood diarrhea can lead to significant morbidity and mortality. Several risk factors such as improper hygiene, lack of handwashing, and lack of a nutritious diet can predispose to diarrhea. Reduction in these risk factors can improve the outcomes of diarrheal related illness. There is adequate knowledge regarding proper hygiene and sanitation among parents; however, they need to be educated further regarding the benefits of exclusive breastfeeding against sub-optimal feeds, as well as regarding the need for proper and timely vaccination of their children against Rotavirus. Parents also need to be encouraged to keep and use ORS more frequently and prepare it with boiling water for adequate disinfection.

### CONCLUSION:

Our study concluded that there is a significant relation between diarrheal disease in infants <1 year of age and morbidities such as weight loss and lack of proper growth. The major risk factors for the development of diarrhea, including poor hygiene, low vaccination coverage, and poor nutrition need to be considered more seriously. Measures such as supplying ORS at homes and teaching parents how to utilize ORS; vigorous efforts for Rotavirus vaccination and promotion of exclusive breastfeeding should be encouraged by the government and health authorities.

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