

## Risk Factors for Diarrhea in Children under Five Years of Age Attending El Amal Maternal and Child Health in Quasar City: A Cross-sectional study

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### Abstract:

**Background:** To date, there is a lack in the published literature that reported the risk factors for diarrhea for under-five children in Egypt.

**Objectives:** we conducted the present cross-sectional study to investigate the role of a number of possible risk factors for diarrhea among under-five children in Egypt.

**Patients and methods:** The present study was a cross-sectional study that carried out from February 2017 to August 2017 at the pediatric outpatient clinics of El Amal Maternal and Child Health in Quasar city.

**Results and conclusion:** A statistically significant higher proportion of patients who did not exclusively breastfeed were more likely to have more than four episodes of diarrhea per day ( $p = 0.026$ ). Similarly, diarrheal episodes more than four motions per day was significantly more prevalent among children who consumed unstored cooked food ( $p = 0.1$ ) or did not receive measles vaccine ( $p = 0.04$ ). Notably, children of mother who knew the benefits of breastfeeding were less likely to suffer from diarrheal episodes ( $p < 0.001$ ). However, diarrheal episodes per day did not have significant associations with age ( $p = 0.656$ ), sibling number ( $p = 0.645$ ), number of rooms within the house ( $p = 0.145$ ), and number of people number living in the house ( $p = 0.721$ ).

**Keywords:** Diarrhea; Risk factors; vaccination; Cross-sectional.

### Introduction

Diarrhea is mainly defined as the presence of three or more loose or watery stools a day. It is a leading cause of childhood morbidity and mortality in developing countries which accounts for approximately one million deaths annually in children < 5 years of age,

ranking second among all causes of pediatric deaths worldwide (Liu et al., 2012). Moreover, the current body of evidence shows that chronic diarrhea has long-term adverse effects on physical and cognitive development, and can lead to marked growth retardation in a

considerable proportion of the patients (Berkman et al., 2002; World Health Organization, 2012).

According to 2014 Egypt Demographic and Health Survey (El-Zanaty, 2014), the under-five childhood mortality was reported to be 27 cases per 1000 live births; diarrhea was the fifth leading cause of under-five childhood mortality with estimated 5 deaths per 1000 live births. Moreover, previous epidemiological surveys from Egypt showed that the frequency of diarrhea in the previous 2 weeks and last 24 hours were 23.6% and 8.7% respectively (El-Gilany and Hammad, 2005). Diarrhea causes great socio-economic burden for families in Egypt, which could result in significant delay in seeking health care (Barakat and Halawa, 2013).

While diarrhea is classically classified to infectious and non-infectious according to the cause, previous studies have identified various risk factors for diarrhea. Younger age, male gender, early weaning, seasonal patterns, low maternal education, and lack of piped water supply were all identified as a significant risk factor which contribute to the occurrence of diarrhea (Zella and Israel, 2012). Additionally, storage of cooked food for

long periods leads to and the presence of animal or flies in the kitchen were proposed as significant contributors to the occurrence of diarrhea (Milbaket al., 1989). Measles vaccine certainly has a potential in reducing mortality attributed to diarrheal disease since measles is associated with diarrhea in some 20 % of the cases (Keusch et al., 2006).

To date, there is a lack in the published literature that reported the risk factors for diarrhea for under-five children in Egypt. Thus, we conducted the present cross-sectional study to investigate the role of a number of possible risk factors for diarrhea among under-five children in Egypt.

#### **Patients and Method:**

School we confirm that the present trial run in concordance with international ethical standards and applicable local regulatory guidelines. The present trial gained the approval of the local ethics and research committee of pediatric department of El Amal Maternal and Child Health in Quasar city. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement during the

preparation of this study (Elm et al., 2014).

#### **Study Design, Setting, and Patients:**

The present study was a cross-sectional study that carried out from February 2017 to August 2017 at the pediatric outpatient clinics of El Amal Maternal and Child Health in Quasar city. We used non-probability convenience sampling technique to collect the data.

We included patients who fulfilled the following criteria: 1) children aged from 2 months to 5 years, and 2) patients who had at least one episode of diarrhea in the 6 months before the study. We excluded patients who presented with comorbidities or congenital anomalies, and patients whose parents refused to sign the informed consents.

#### **Data Collection:**

We used a self-administrated questionnaire that consists of three parts: 1) socio-demographic characteristics; 2) risk factors for diarrhea which included the frequency and characteristics of diarrheal episodes, history of exclusive breast feeding, history of consumption of stored food, patient dehydration status, history of vaccination, history of the presence of flies or animals in kitchen,

source of drinking water, and methods of water treatment; and 3) general knowledge and attitude towards handwashing.

#### **Statistical Analysis:**

Data entry, processing, and statistical analysis were carried out using SPSS version 22 for windows. Frequency tables with percentages were used for categorical variables and descriptive statistics (mean and standard deviation) were used for numerical variables. Either Student-t or Mann-Whitney tests were used to compare quantitative variables, while Pearson's Chi-square test was used to analyze categorical variables. A multiple linear regression models were conducted to explore the contribution of different risk factors to the risk of diarrhea. A p-value < 0.05 is considered statistically significant.

#### **Results:**

At the present study included 334 children who had at least one episode of diarrhea in the 6 months before the study. The mean diarrheal episodes per year was  $2.26 \pm 0.94$  episodes among the included children who had a mean age of  $3.05 \pm 1.09$  years. While the average number of house's rooms and the people living

within the house were  $2.54 \pm 0.55$  rooms and  $4.56 \pm 1.18$  persons, respectively. A statistically significant higher proportion of patients who did not exclusively breastfeed were more likely to have more than four episodes of diarrhea per day ( $p = 0.026$ ). Similarly, diarrheal episodes more than four motions per day was significantly more prevalent among children who consumed unsorted cooked food ( $p = 0.1$ ) or did not receive measles vaccine ( $p = 0.04$ ). Notably, children of mother who knew the benefits of breastfeeding were less likely to suffer from diarrheal episodes ( $p < 0.001$ ). However, diarrheal episodes per day did not have significant associations with age ( $p = 0.656$ ), sibling number ( $p = 0.645$ ), number of rooms within the house ( $p = 0.145$ ), and number of people number living in the house ( $p = 0.721$ ).

With regard to diarrhea frequency all over the year, mothers' of patients with more than diarrheal frequency per year were more likely to wash their hands with water only ( $p < 0.001$ ). However, there were no significant associations between diarrhea frequency all over the year and other risk factors. Severe dehydration was significantly more prevalent among children in which flies

can enter in to their kitchen ( $p = 0.017$ ) and consumed un-stored cooked food in refrigerator ( $p = 0.033$ ). Children who did not receive exclusive breastfeeding were more likely to suffer from severe dehydration ( $p = 0.039$ ).

Our linear regression analysis showed that that diarrheal episodes per year had insignificant very weak regression with all above socio-demographic factors ( $p > 0.05$ ).

#### Discussion:

**Obesity** Although recent demographic reports showed that diarrhea ranks as the fifth leading cause of under-five childhood mortality in Egypt, with estimated 5 deaths per 1000 live births (El-Zanaty, 2014); there is a lack in the published literature that reported the risk factors for diarrhea for under-five children in Egypt. Thus, we conducted the present cross-sectional study to investigate the role of a number of possible risk factors for diarrhea among under-five children in Egypt.

Our results showed that higher frequency of diarrheal episodes is not significantly associated with poor housing conditions, the diarrheal

episodes did not significantly correlated with number of rooms or number of living people within the household ( $p > 0.05$ ). In contrary to our findings, **Bahartha and colleagues (Bahartha and Alezzi, 2015)** found a statistically significant positive correlation between diarrhea and crowded housing. Another report demonstrated a significant correlation between household wealth index and diarrheal episodes (**Patel et al., 2012**). **El-Gilany and colleagues (El-Gilany and Hammad, 2005)** reported that children in larger families were more likely to have diarrhea, partly because children received less attention and had poorer hygiene due to the large family size. The exact causes of the discrepancies in the reported results between our study and previous reports are unclear. However, they can be attributed to the difference in sample size or the methodological differences between these studies.

In the present study, 13.8% of the infants exclusively breastfeed till complete six months. Our analysis showed that diarrhea prevalence was lower among children whose mothers practiced early initiation of

breastfeeding, exclusive and predominant breastfeeding, and there is significance association between exclusive breastfeeding and prevalence of diarrhea ( $P = 0.026$ ). Moreover, severe dehydration status is significantly more prevalent among children in which they mother do not exclusively breastfeed or do not know the benefits of breastfeeding. In concordance with our findings, **Ahmed and colleagues (Ahmed et al., 1995)** showed a statistically significant smaller number of infants and children with persistent diarrhea were exclusively breast fed during first 4 months of life. This finding highlights the importance of breast feeding which protects against the risk of allergy in early life, may aid in child spacing and provides IgA lactoferrin and lysozyme, thus protecting against infections. Another report from Egypt showed that the number of non-exclusively breastfed children with culture-positive diarrhea was significantly higher compared to children with culture-negative diarrhea cases (**El-Shabrawiet al., 2015**).

The current body of evidence shows that storage of cooked food for

long periods leads to bacterial multiplication at high levels, especially when food hygiene standards are low and the food is heavily contaminated (Milbaket al., 1989). Our analysis demonstrated that higher frequency of diarrheal episodes is significantly more prevalent among children ate un-stored cooked food. Severe dehydration status is significantly more prevalent among children in which they ate un-stored cooked food in refrigerator. Similar to our findings, Mansour and colleagues (Mansour et al., 2013) reported a statistically significant association between risk of diarrhea and the consumption of stored food. In addition, another study reported a statistically significant association between bad storage of food and the risk of diarrhea (George et al., 2014).

Of the existing vaccines, measles vaccine certainly has a potential in reducing mortality attributed to diarrheal disease since measles is associated with diarrhea in some 20 % of the cases (Keusch et al., 2006). The present study showed that high frequency of diarrheal episodes is significantly more prevalent among

children in which they have not been vaccinated against measles. Bawankule and colleagues (Bawankule et al., 2017) found that children who were given the measles vaccine had a lower risk of diarrhea than those who did not receive it. Similarly, it was found that incomplete vaccination is a statistically significant risk factor for the occurrence of diarrhea (OR=2.02; CI: 1.08-3.80) (Bahartha and Alezzi, 2015).

Hand washing is one of a range of hygiene promotion interventions that can interrupt the transmission of diarrhea-causing pathogens. In the present study, high frequency of diarrheal episodes was significantly more prevalent among children, whose mothers wash their hands with water only, compared to those whose mothers wash their hands with water and soap. The findings from this study are supported by previous report from George and colleagues (George et al., 2014) who showed that caregiver lack of awareness of practices related to personal and food hygiene for diarrhea prevention were a significant risk factors for diarrheal disease in this cohort of children < 5 years of age in

Cochabamba, Bolivia. In a recent systematic review, hand washing resulted in a 29% reduction in diarrhea episodes in institutions in high-income countries and a 31% reduction in such episodes in communities in low- or middle-income countries(**Ejemot-Nwadiaro et al., 2015**).

With regard to safe water supply, we found no significant association between diarrheal disease with source of water or method of water treatment. Similar to our findings, **Bahartha and colleagues (Bahartha and Alezzi, 2015)** found no significant association with diarrheal disease. Similarly, **Patel and colleagues(Patel et al., 2012)** water safety had no impact on the incidence and the duration of diarrhea. Another report showed that running water and taps, poor water storage, and handling practices are significant risk factors for the development of diarrhea (**Sobel et al., 2004**).

In the present the study, severe dehydration status was significantly more prevalent among children in which flies or animal can enter into their kitchen. In concordance with these findings, **Nhampossa and**

**colleagues(Nhampossa et al., 2015)** reported that having animals in the compound, less frequently reported in cases compared to their controls, was only associated with diarrhea in children aged 12–23 month. In contrary, other reports showed no significant association between animal contact and diarrheal disease(**Bahartha and Alezzi, 2015; Karambuet al., 2013; Yilgwan and Okolo, 2012**).

We acknowledge that the present study had certain limitations. The study had no control group in order to account for possible confounder. Moreover, the sample size was relatively smaller than previous reports.

In conclusion, diarrhea is a common morbid condition in Egypt which is significantly linked to a wide range of risk factors. Absence of exclusively breastfeed, consumption of unstoredcooked food, absence of measles vaccine, ignorance about the benefits of breastfeeding, and the presence of flies or animals into kitchen are significant risk factors for diarrhea.

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