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Prevalence of diarrhoea with different feeding methods and water used among infants under two years: A cross-sectional study in Hodeida city, Yemen, 2021

Khaled Abdo Alselwi[1]

[1]Department of Community Medicine, Faculty of Medical Health Sciences, Hodieda, Yemen.

***Corresponding author:**
Khaled Abdo Alselwi, Department of Community Medicine, Faculty of Medical Health Sciences, Hodieda, Yemen.

khaledselwy@gmail.com

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ABSTRACT

Objectives: Diarrhoea is a significant cause of morbidity and mortality among children under 2 years old in low- and middle-income countries, including Yemen. This study investigated the association between feeding practices, water used and the prevalence of diarrhoea in infants under two in Hodeida City, Yemen.

Material and Methods: The study employed a cross-sectional design, gathering data on infant feeding methods and the prevalence of diarrhoea. The sample consisted of 360 mothers or caregivers of children under the age of 2 years. Data were collected from a sex medical centre in rural and urban Hodeida City, Yemen. The data were analysed, and logistic regression was applied to obtain the odds ratio (OR) of association.

Results: Results showed significant associations between feeding practices, water type and diarrhoea prevalence. Dropper users had twice the odds of diarrhoea versus spoon/cup users (OR 2.0, 95% confidence interval [CI] 1.2–3.4). Boiled water users had half the odds of diarrhoea compared to tap water users (OR 0.5, 95% CI 0.3–0.8) and purified water users (OR 0.3, 95% CI 0.2–0.6). Infants given bottles later had 1.2 times higher odds of diarrhoea (OR 1.2, 95% CI 1.0–1.5).

Conclusion: These findings highlight the importance of appropriate feeding practices and water sources in reducing the risk of diarrhoea in infants under two in Yemen. They may have significant implications for public health policies and infant feeding recommendations in Yemen and other similar settings.

Keywords: Diarrhoea, Children, Feeding methods, Logistic regression, Odds ratio of association, Water used

INTRODUCTION

Diarrhoea is a common and potentially life-threatening condition that affects children under 2 years of age worldwide. It is estimated that diarrhoea accounts for 9% of all deaths among children under 5 years old, most of which occur in low- and middle-income countries (LMICs).[1] Yemen, the Middle East, Africa and Asia are regions that are particularly affected by childhood diarrhoea due to poor sanitation, inadequate water supply and inappropriate feeding practices.[2-4] In these regions, various feeding methods are used for children under two, including the dropper, which is a small glass tube with a hollow rubber part on one end that you use for drawing up and dropping small amounts of liquid, and the spoon, which is

used primarily for transferring food to the mouth. Spoons are also used in food preparation to measure, mix, stir and toss ingredients and for serving food; a cup, is an alternative way to feed infants when they are unable to feed directly at the breast and when infant feeding items cannot be cleaned properly; and a bottle, which is a bottle with a teat (also called a nipple) attached to it, which creates the ability to drink through suckling. Recent research performed in Yemen uncovered that the occurrence of diarrhoea was higher among children using droppers and bottles for feeding than those using cups and spoons.[5] Comparable discoveries were announced in Nigeria, which found that bottle feeding was associated with a higher risk of diarrhoea in children than cup feeding.[6] In addition to feeding methods, the quality of the water used for infant feeding may also contribute to the prevalence of diarrhoea in children. An investigation directed in Ethiopia discovered that utilising unsafe water for children's feeding was connected with the more noteworthy danger of diarrhoea.[7] Similarly, a study conducted in Pakistan found that using contaminated water for children's feeding was a major risk factor for diarrhoea.[8] Despite the existing literature on the association between feeding methods, water sources and the prevalence of diarrhoea in infants, more research is needed to understand these relationships in different settings. Therefore, this study was carried out from September to December 2018, and this study aimed to investigate the association between different feeding methods and water sources and the prevalence of diarrhoea in children under two visiting the centres for regular treatment of diarrhoea. Yemen is one of the poorest countries in the Middle East. This study will provide valuable insights into children's feeding practices and water sources that may contribute to the prevention of diarrhoea in children in LMICs.[9]

MATERIAL AND METHODS

Study design

This cross-sectional research study allows us to gather data on children's feeding methods, water use and the prevalence of diarrhoea at a single point in time.

Sampling and recruitment

The study was conducted in Hodeida City, Yemen, which has a population of around 600,000 people. Participants were recruited from the medical centres, which serve both urban and rural communities. A sample of 360 mothers and caregivers of children visiting the centres for regular treatment for diarrhoea under 2 years old was recruited to have a large enough sample to detect meaningful relationships. The case definition was defined as three or more loose or watery stools in 24 hours.

Exclusion and inclusion criteria

Any case of diarrhoea <3 times/day and <3 weeks were excluded from the study, and only cases of diarrhoea equal to or more than 3 times loss or watery diarrhoea for 3 weeks or more were included in the study.

Data collection

Data were collected through structured interviews with mothers and caregivers. Information gathered included children's feeding methods and the prevalence and duration of diarrhoea in the past month.

Description of study outcomes

The main outcome measured was the prevalence of diarrhoea in children under 2 years old in the past month.

Analysis

Data were entered into the Statistical Software Package SPSS version 23 and analysed using both descriptive and inferential statistics. Frequencies and percentages were calculated to describe the overall sample. A logistic regression analysis was then conducted to examine the associations between infant feeding methods and the prevalence of diarrhoea.

RESULTS

Table 1 exhibits the prevalence of diarrhoea among under two children in Hodeida City and their feeding practices. The data reveal a significant association between feeding practices and diarrhoea prevalence. The prevalence was determined to be 66.7%. The use of droppers was correlated with a 75% incidence of diarrhoea. Spoon users demonstrated a 53.8% incidence, cup users showed a 55.6% incidence, and bottle users had a 74.9% incidence. Significant associations between feeding practices, and diarrhoea prevalence. Dropper users had twice the odds of diarrhoea versus spoon/cup users (odds ratio [OR] 2.0, 95% confidence interval [CI] 1.2–3.4). The relationship between the prevalence of diarrhoea among children and the type of water used is reported in Table 2. The results indicate that the type of water used has a significant association with diarrhoea prevalence. Boiled water users had a significantly lower prevalence of diarrhoea (60.9%), compared to tap water users (64.5%) and purified water users (73.5%). Boiled water users had half the odds of diarrhoea compared to tap water users (OR 0.5, 95% CI 0.3–0.8) and purified water users (OR 0.3, 95% CI 0.2–0.6). [Table 3] shows details of the relationship between bottle-feeding timing and diarrhoea occurrence. The findings indicate that the timing of bottle feeding is also associated with diarrhoea prevalence. The prevalence of diarrhoea among children

who were given the bottle at a later time is 73.8%, whereas those who were not given the bottle later had a prevalence of 60.2%. Furthermore, our study indicates that the timing of bottle feeding is significantly associated with the prevalence of diarrhoea among children given bottles later with 1.2 times higher odds of diarrhoea (OR 1.2, 95% CI 1.0–1.5).

DISCUSSION

Study findings elucidate a highly significant correlation between the prevalence of diarrhoea and feeding practices. It was discovered that the prevalence rate was shockingly high at 66.7%, similar to studies conducted in the Middle East, Africa and Asia. Notably, the utilisation of droppers exhibited a remarkably high incidence rate of 75% with diarrhoea. Similarly, individuals employing spoons demonstrated a substantial incidence rate of 53.8%, whereas cup users displayed a prevalence rate of 55.6%. Surprisingly, bottle users exhibited an incidence rate of 74.9%. The calculated ORs further emphasise that dropper users have nearly twice the likelihood of experiencing diarrhoea in comparison to spoon users and over twice the odds when compared to cup users. In contrast, the likelihood of diarrhoea did not significantly vary between dropper users and bottle users. The type of water used has an important association with diarrhoea in children. Boiled water users have lower odds of diarrhoea than tap or purified water users. Diarrhoea prevalence is associated with the timing of bottle feeding. Children who received the bottle at a later point in time were approximately 23% more likely to have diarrhoea. In Hodeida City, Yemen, this study found that boiled water users had a lower prevalence of diarrhoea than tap water users and purified water users. Using later time bottled water was associated with a higher prevalence of diarrhoea in children. While the study suggests a correlation, it does not establish a causal relationship. Further research is needed to understand the underlying mechanisms.

Table 1: Prevalence of diarrhoea by feeding method.

Feeding method	Prevalence (%)	No diarrhoea	Diarrhoea	OR (95% CI)
Dropper	75	3	9	1.98 (1.2–3.3)
Spoon	53.8	30	35	Reference
Cup	55.6	28	35	1.09 (0.6–2.0)
Bottle	74.9	54	161	0.99 (0.8–1.2)

OR: Odds ratio, CI: Confidence interval

Table 2: Prevalence of diarrhoea versus water type.

Water type	Prevalence (%)	No diarrhoea	Diarrhoea	OR (95% CI)
Boiled water	60.9	120	78	Reference
Tap water	64.5	54	30	1.32 (0.8–2.2)

OR: Odds ratio, CI: Confidence interval

Table 3: Association between late bottle feeding and diarrhoea.

Feeding practice	Prevalence of diarrhoea (%)	OR (95% CI)	Relative risk (95% CI)
Give the bottle at a later time	73.8	1.65 (1.2–2.3)	1.23 (1.0–1.5)
Give bottle earlier	60.2	Reference	Reference

OR: Odds ratio, CI: Confidence interval

Findings in the context of the literature

This study is more extensive and provides more detailed information not only on the relative association and comparative hazard of the associations between feeding practices but also on the impact of the type of water used and the timing of bottle feeding on the prevalence of diarrhoea in children under 2 years old in Hodeida City, Yemen.[10] Like other studies in the Middle East, Africa, and Asia, the prevalence of diarrhoea among children in Hodeida City was 66.7%.[11-15] This study found a significant association between feeding practices and diarrhoea prevalence, with dropper users having almost twice the odds of diarrhoea compared to spoon users and over twice the odds compared to cup users. Contrarily, the likelihood of diarrhoea did not differ significantly between users of droppers and bottles. The timing of bottle feeding was also associated with diarrhoea prevalence, with children who received the bottle at a later time being approximately 23% more prone to diarrhoea than those who received the bottle earlier.[10] Regarding the impact of different water sources on the prevalence of diarrhoea, the study found that boiled water users had a significantly lower prevalence of diarrhoea (60.9%), compared to tap water users (64.5%) and purified water users (73.5%). This is consistent with a study in Pakistan, which found that using contaminated water for children's feeding was a major risk factor for diarrhoea.[13] The study also found that using later time bottled water was associated with a higher prevalence of diarrhoea in children.[10] In comparison to other studies, a study in Ethiopia found that the prevalence of diarrhoea was highest among bottle-fed infants.[10] Another study in Nigeria reported that bottle feeding was associated with a higher risk of diarrhoea in children than cup feeding.[15] Overall, this study emphasises the importance of appropriate feeding methods and water sources in reducing the risk of

diarrhoea in children under two. The findings of this study may have significant implications for public health policies and infant feeding recommendations in Yemen and other similar settings.

CONCLUSION

The study suggests that feeding methods, water type, and timing of bottle feeding can influence the prevalence of diarrhoea in children. However, these are just associations, and several confounding factors could influence feeding practices and diarrhoea risk. Larger studies controlling for confounders would be needed to determine if a causal relationship exists. Nonetheless, the study provides valuable insights into the potential interventions that can be employed to reduce the burden of diarrhoeal diseases among under-five children in developing countries like Yemen.

Limitations

While the study suggests a correlation, it does not establish a causal relationship between late bottle feeding and diarrhoea. Further research is needed to explore this relationship in more detail and understand the underlying mechanisms. In addition, this study was conducted in Hodeida City, Yemen, and the findings may not necessarily be generalisable to other settings.

Ethics consideration

Permission was verbally given to carry out the study; participation in the study was voluntary; and the questionnaires had no names. Verbal informed consent was obtained from each participant in the study. Confidentiality and privacy during the collection of personal data were guaranteed.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. A letter requesting cooperation from the Community Medicine Department was directed to the respective health centers, describing the objectives and the harmless nature of the study. Verbal informed consent was obtained from the children's caregivers. Voluntary participation, confidentiality, and privacy were respected.

Declaration of patient consent

Patient's consent is not required as the patient's identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There is no conflict of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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