Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.47750/jptcp.2023.30.12.011

Morbidity And Risk Factors Associated With Intestinal Parasite Infections Among Children Under Two Years Old In Duhok City, Iraq

Haveen Khalid Hasan[1*], Souzan Hussain Eassa[2], Haval Mohammed Khalid[3]

[1]Department of Medical Laboratory Technology, College of Health and Medical Technology-Shekan, Duhok polytechnic university, Duhok, Kurdistan Region, Iraq

[2]Department of Anatomy, College of Medicine, University of Duhok, Duhok, recently Molecular and Microbiology Division, School of Medicine, University of Kurdistan Hewler, Erbil, Iraq;

[3]Dept. of Biology, Faculty of Science, University of Zakho, Kurdistan Region, Iraq

***Corresponding author:** Haveen Khalid Hasan, Department of Medical Laboratory Technology, College of Health and Medical Technology-Shekan, Duhok polytechnic university, Duhok, Kurdistan Region, Iraq, Email: haveen.khalid@dpu.edu.krd

Submitted: 09 March 2023; Accepted: 15 April 2023; Published: 11 May 2023

ABSTRACT

Introduction: Diarrhea among children under two years of age continues to be a significant problem in Dohuk City, Iraq, due to its link with fatal occurrences. Children's behavioral patterns, as well as the environment and sociodemographic factors, can all contribute to causing diarrhea. The aim of the study is to evaluate the risk factors for disease in diarrhea among children under the age of two years old in Duhok city-Iraq.

Methods: A total of 260 diarrheic stool samples were taken from children under the age of two from September 2021 to January 2022, with differences in sex, residency, educated or noneducated parents, and feeding all were recorded. Stool samples were analyzed using macroscopy and microscopic techniques (saline and iodine wet mount and modified Ziehl Neelsen staining).

Results: out of 260 examined stool samples, 75 (28.85%) were positive for parasites infection. The number of parents who were educated was 166 out of 260 (63.8%) $P<0.05$, breastfeeding (78 out of 260), and feeding from a bottle (182 out of 260) $P<0.05$, Community (Rural=16.9%, urban=11.9%), economic status (Low to medium=23.9%, Good=5%) all factors significantly associated with the occurrence of diarrhea.

Conclusions: Sociodemographic, environmental, and childcare practices are related to diarrhea in children less than the age of two. This study highlighted the need to improve the environment and hygienic behavior to minimize diarrheal cases. It is inevitable that parents' awareness of breastfeeding's critical benefits will be raised through counseling and health promotion.

Keywords: *Diarrhea; intestinal parasite; risk factors*

INTRODUCTION

Diarrhea is a clinical condition characterized by abnormal defecation of three or more times a day with soft consistency. When the intestines cannot absorb enough liquid from bodily waste, diarrhea develops. Due to this, the affected individual experiences liquid-filled stools, which in turn leads to dehydration and then death (Tigabu, Taye, Aynalem, & Adane, 2019).

Every year, around two million children under the age of five die from diarrhea worldwide: 80% of the majority of these deaths take place within the first two years of life. Although infant death rates due to diarrhea have decreased significantly, it remains an important problem for the public, particularly in underdeveloped nations (Charoenwat et al., 2022; Shati et al., 2020).

In children under the age of two, intestinal parasite infections (IPIs) can induce diarrhea, and these organisms cause the majority of communicable diseases. Human parasitic infections cause significant morbidity and mortality in many communities. Parasitic infections cause significant morbidity and mortality in several communities around the world. IPs have infected almost 3.5 billion individuals worldwide, with 450 million becoming unwell as a result, the majority of them are children (Kiani, Haghighi, Salehi, Azargashb, & bench, 2016).

IPI prevalence and frequency rates differ by country due to environmental and geographical factors, family education level, children's feeding and residency (rural and urban).

The most serious impact of diarrheal disease, which also has long-term detrimental repercussions in the first two years of life, is mortality. Long-term effects include failing to thrive, having poor physical fitness, having diminished cognitive ability, and having bad academic achievement (Andrade et al., 2009). Inadequate child feeding habits, together with the extra consequences of social, economic, environmental, and behavioral factors, contribute to diarrheal illnesses. Childhood diarrhea is influenced by feeding behaviors such as early breastfeeding initiation, exclusive breastfeeding, the introduction of complementary feeding, complementary food hygiene, hand washing, and infant immunization. Numerous studies have confirmed that breastfeeding acts as a preventative agent for diarrhea, reducing the incidence and severity of childhood diarrhea. Poor drinking water quality, inadequate sanitation and hygiene procedures, with tropical climate are the primary causes of diarrheal illness worldwide (Shati et al., 2020).

Diarrhea in childhood occurred as a result of a combination of socioeconomic factors. The literature indicates the educational status of parents, the economic status of the family, the age of the children, improper child-feeding practices, and other socioeconomic factors play a role in diarrheal diseases (Woldu, Bitew, Gizaw, & health, 2016). According to etiquette, socioeconomic factors influence infectious disease occurrence through their indirect linkages with life quality, accessibility to health care facilities, the availability of adequate drinking water and sanitation in the environment, ability to apply various sanitary procedures, and knowledge (Santika et al., 2020; Tetteh et al., 2022). Although the health burden of diarrheal diseases is widely recognized globally, there is limited information on its prevalence and the socioeconomic factors that contribute to its incidence among the city of Dohuk, Iraq.

METHODS

Subjects and patients

This study was carried out on 260 children aged two years or younger who had diarrhea and were admitted to Heevi Hospital Duhok City, Kurdistan Region, in north Iraq (Kurdistan Region), from September 2021 to January 2022.

Questionnaire

The questionnaire was designed to collect demographic information characteristics (gender, age, and location (rural& urban), parent's education, economic status of the family that will be used to evaluate possible risk factors for IPIs.

Stool Collection and Processing

Following macroscopic examination, all stool specimens were direct wet mounted with normal saline (0.85% NaCl solution) for the detection of motile intestinal parasites and trophozoites, and lugol's iodine stain was conducted to differentiate cysts of intestinal parasites. (Garcia, 2002). After concentration, modified Zeihl- Neelsen staining was used to detect coccidian parasites (Cryptosporidium spp.) (Kiani et al., 2016).

RESULT

This study was carried out from September 2021 to January 2022. 260 diarrheic stool samples (170 males and 90 females) were collected to isolate and identify diarrhea associated with risk factors in children under the age of two at Heevi Pediatric Hospital in Duhok city, Kurdistan Region/ Iraq.

Prevalence of parasitic species among diarrheic children

Out of the 260 diarrheic stool samples, 75 (28.85%) were positive with parasites infection (Table 4.1). E. histolytica was the most common intestinal parasite among study participants with an infection rate of 15% (39 samples). Cryptosporidium was the second most common type of parasite agent with an infection rate of 13.5% (i.e., 35 samples out of 260). In this study, the infection rate with G. lamblia was as low as 0.4% (1 sample out of 260).

TABLE 1: Distribution of parasitic species among total number of diarrheic stool samples examined in children under two years

	E. histolytica	Cryptosporidium	Giardia lamblia
No.	39/260	35/260	1/260
%	15%	13.5%	0.4%

Factors Associated with Diarrhea

The present study shows the results of the socioeconomic factors such as the children's age and gender, the economic status, and the educational of the parents and feeding in children less than two years.

Table (4.2) illustrates the distribution of diarrheic sample in rural and urban community the highest rate of childhood diarrheal associated with community was seen with those children who live in rural regions which was 44 out of 260and those children who live in urban was 31 out 260.

With respect to the gender shows that among 260 cases of diarrhea under two years (42male and 33 female).

According to the economic factor the highest rate of childhood diarrheal of children associated with economic status was seen with those children who were in low economic status which was 62 out of 260, and the lowest infection rate seen with those children who were in good economic status which 13 out of 260.

According to the parents' educational levels, 43 out of 260 children whose parents did not educated had an infection rate, while 32 out of 260 children whose parents educated had an infection rate.

With respect to feeding, the highest rate was observed when artificial feeding was used which was 55 out of 260, although those who breastfed their children had the lowest rate of infection rate (20 out of 260),

TABLE 2: Occurrence of diarrheal disease among under-two children (n = 260) and their association with socioeconomic factors.

Associated Factors			P value
	Male	Female	
Gender	42	33	
	16.2%	12.7%	
Community	Rural	Urban	
	44	31	
	16.9%	11.9%	
Economic status	Low	Good	P<0.05
	62	13	
	23.9%	5%	
	Artificial	Natural	
Feeding	55	20	
	21.2%	7.7	
	No formal education	Formal education	
Educational status	43	32	
	16.5%	12.3%	

DISCUSSION

Diarrhea is one of the most frequent childhood infections, with serious health consequences. Death and its consequences, particularly in developing countries (Oyegue-Liabagui et al., 2020; Zambrana et al., 2022).

In underdeveloped nations, intestinal parasite infections (IPIs) are the most frequent infections among children (Oyegue-Liabagui et al., 2020). This study aimed to investigation the prevalence of intestinal diarrheal disease and its related factors among children less than the age of two from the community. Out of 260 stool samples examined, the rate of 75 (28.85%) were positive with parasites infection among under-two children in Duhok city, Iraq. This could be due to insufficient hygiene and sanitation.

In this study, the common protozoa involve was E. histolytica was the most frequent intestinal parasites 28.85%followed by Cryptosporidium 19% then G. lamblia 13.85%. Similar studies have reported close results elsewhere (Salman & Salih, 2013).

In the current study, with respect to the parents' education the highest rate of infection incidence was seen among children whose parents were uneducated which was 43 out of 260 (16.5%). Compared to children whose parents attended formal education, those whose parents did not were more likely to experience diarrhea as children. Similar study was found by (Astutik et al., 2020) in Indonesia found that a low level of parents education have a strong relationship with childhood diarrhea, similar results also was found by (Woldu et al., 2016) . This is possibly because education gives information on hygiene, feeding and weaning methods, and symptom interpretation, all of which promote timely intervention on children illnesses. Parents with a poor level of education do not have the opportunity to obtain information through books, newspapers, mass media, and other reading sources, thus they are unaware of them. If parents have a higher level of knowledge, they will have

a better realization of the importance of their children's health (Turyare, Mativo, Kerich, & Ndiritu, 2021).

In this study, among 260 children under two years of age, the lowest infection rate, 7.7%, was recorded among breastfed children. Similar study was found in (JAMEEL & EASSA, 2021; Shati et al., 2020). After adjusting for other factors, there is a strong correlation between diarrhea and exclusive breastfeeding and bottle feeding in children under the age of two. This is similar with previous studies carried out in Indonesia (Santika et al., 2020). Additionally, the prevalence of diarrhea in children in Iraq was most significantly influenced by exclusive breastfeeding. The optimum nourishment for a baby is breast milk because it contains all of their nutritional needs. Breast milk activates the innate immune system as well as the epigenetic program, which is critical for avoiding disorders such as diarrhea. Furthermore, exclusive breastfeeding protects the baby from potentially contaminated food. (Dhami et al., 2020; John, Devgan, & Mitra, 2014).

In the current study, male children were more (16.2%) than female children. There was a significant association between child sex and diarrhea among the children. The rate of diarrhea was higher in males 16.2% than in females 12.7%. Similar studies was found in Ethiopia with a rate 31.6% (Tigabu et al., 2019; Zambrana et al., 2022).

In the present study, the highest rate of infection were among children whose families were in the low to medium status with the rate 23.9%. Similar study was found by (Shahid et al., 2022). Children who live in a poor family were more likely to develop diarrhea than those who live in a rich family. Related studies were also found by (Hubbard et al., 2020; Khaliq, Jameel, Krauth, & journal, 2022; Wilunda & Panza, 2009; Woldu et al., 2016).

In this study, a significant difference was found between rural and urban areas in the diarrheal disease prevalence among under two years. People who reside in rural areas are more probable to develop the disease. Use of unimproved drinking water, unimproved sanitation facilities, and lack of access to healthcare facilities in rural areas were found to be positively associated with the prevalence of diarrhea. Moreover, most literature evidence on childhood diarrhea shows that the environment and personal hygiene are significant risk factors for acute diarrhea among rural populations. Similar studies were found by (Kiani et al., 2016; Srivastava, Banerjee, Debbarma, Kumar, & Sinha, 2022).

CONCLUSIONS

The education of the parents, the family's economic status, living in an unknowledgeable community, and bottle feeding continue to be important factors in the occurrence of diarrhea in children under the age of two. Diarrhea prevention should be emphasized for young and uneducated parents. The existing health programs, such as zero open defecation and an exclusive breastfeeding program, should be expanded throughout the communities.

REFERENCES

1. Andrade, I. G., Queiroz, J. W., Cabral, A. P., Lieberman, J. A., Jeronimo, S. M. J. T. o. t. R. S. o. T. M., & Hygiene. (2009). Improved sanitation and income are associated with decreased rates of hospitalization for diarrhoea in Brazilian infants. 103(5), 506-511.
2. Astutik, E., Efendi, F., Sebayang, S. K., Hadisuyatmana, S., Has, E. M. M., Kuswanto, H. J. C., & Review, Y. S. (2020). Association between women's empowerment and diarrhea in children under two years in Indonesia. 113, 105004.
3. Charoenwat, B., Suwannaying, K., Paibool, W., Laoaroon, N., Sutra, S., & Thepsuthammarat, K. J. B. P. H. (2022). Burden and pattern of acute diarrhea in Thai children under 5 years of age: a 5-year descriptive analysis based on Thailand National Health Coverage (NHC) data. 22(1), 1-10.
4. Dhami, M. V., Ogbo, F. A., Diallo, T. M., Agho, K. E., Maternal, G., Research, C. H. R. C. J. I. J. o. E., & Health, P. (2020). Regional analysis of associations between infant and young child feeding practices and Diarrhoea in Indian children. 17(13), 4740.

5. Garcia, L. S. J. J. o. c. m. (2002). Laboratory identification of the microsporidia. 40(6), 1892-1901.
6. Hubbard, S. C., Meltzer, M. I., Kim, S., Malambo, W., Thornton, A. T., Shankar, M. B., . . . Cunningham, L. C. J. N. C. W. (2020). Household illness and associated water and sanitation factors in peri-urban Lusaka, Zambia, 2016–2017. 3(1), 26.
7. JAMEEL, H. S., & EASSA, S. H. J. D. M. J. (2021). Intestinal parasite infestation and its risk factors: a cross-sectional survey among children in Duhok city, Kurdistan Region Iraq. 15(1), 81-95.
8. John, B., Devgan, A., & Mitra, B. J. M. j. a. f. I. (2014). Prevalence of rotavirus infection in children below two years presenting with diarrhea. 70(2), 116-119.
9. Khaliq, A., Jameel, N., Krauth, S. J. J. M., & journal, c. h. (2022). Knowledge and practices on the prevention and management of diarrhea in children under-2 years among women dwelling in urban slums of Karachi, Pakistan. 26(7), 1442-1452.
10. Kiani, H., Haghighi, A., Salehi, R., Azargashb, E. J. G., & bench, h. f. b. t. (2016). Distribution and risk factors associated with intestinal parasite infections among children with gastrointestinal disorders. 9(Suppl1), S80.
11. Oyegue-Liabagui, S. L., Ndjangangoye, N. K., Kouna, L. C., Lekolo, G. M., Mounioko, F., Kwedi Nolna, S., & Lekana-Douki, J. B. J. B. I. D. (2020). Molecular prevalence of intestinal parasites infections in children with diarrhea in Franceville, Southeast of Gabon. 20, 1-11.
12. Salman, Y. J., & Salih, L. A. J. J. K. M. C. (2013). Detection of some microbial infectious agents among children aging below two years in Kirkuk city. 1, 53-63.
13. Santika, N. K. A., Efendi, F., Rachmawati, P. D., Has, E. M. M. a., Kusnanto, K., Astutik, E. J. C., & Review, Y. S. (2020). Determinants of diarrhea among children under two years old in Indonesia. 111, 104838.
14. Shahid, M., Cao, Y., Shahzad, M., Saheed, R., Rauf, U., Qureshi, M. G., . . . Ahmed, F. J. C. (2022). Socio-economic and environmental determinants of malnutrition in under three children: Evidence from PDHS-2018. 9(3), 361.
15. Shati, A. A., Khalil, S. N., Asiri, K. A., Alshehri, A. A., Deajim, Y. A., Al-Amer, M. S., . . . health, p. (2020). Occurrence of diarrhea and feeding practices among children below two years of age in southwestern Saudi Arabia. 17(3), 722.
16. Srivastava, S., Banerjee, S., Debbarma, S., Kumar, P., & Sinha, D. J. P. o. (2022). Rural-urban differentials in the prevalence of diarrhoea among older adults in India: Evidence from Longitudinal Ageing Study in India, 2017–18. 17(3), e0265040.
17. Tetteh, J., Adomako, I., Udofia, E. A., Yarney, E., Quansah, H., Yawson, A. O., . . . Yawson, A. E. J. P. o. (2022). Hygienic disposal of stools and risk of diarrheal episodes among children aged under two years: Evidence from the Ghana Demographic Health Survey, 2003–2014. 17(4), e0266681.
18. Tigabu, A., Taye, S., Aynalem, M., & Adane, K. J. B. r. n. (2019). Prevalence and associated factors of intestinal parasitic infections among patients attending Shahura Health Center, Northwest Ethiopia. 12, 1-8.
19. Turyare, M. D., Mativo, J. N., Kerich, M., & Ndiritu, A. K. J. T. P. A. M. J. (2021). Prevalence and socio-demographic determinants of diarrhea among children below 5 years in Bondhere district Somalia. 38.
20. Wilunda, C., & Panza, A. J. J. o. H. R. (2009). Factors associated with diarrhea among children less than 5 years old in Thailand: a secondary analysis of Thailand multiple indicator cluster survey 2006. 23(Suppl.), 17-22.
21. Woldu, W., Bitew, B. D., Gizaw, Z. J. T. m., & health. (2016). Socioeconomic factors associated with diarrheal diseases among under-five children of the nomadic population in northeast Ethiopia. 44(1), 1-8.
22. Zambrana, J. V., Carrillo, F. A. B., Ojeda, S., Mercado, B. L., Latta, K., Schiller, A., . . . hygiene. (2022). Epidemiologic Features of Acute Pediatric Diarrhea in Managua, Nicaragua, from 2011 to 2019. 106(6), 1757.