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The prevalence of Cryptosporidium Oocyst in vegetables in Basra city

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Abstract

In recent years, an increase in the number of cases of food-borne illnesses linked to fresh vegetables has been reported. One of the causative agents of these infections is *Cryptosporidium* and it appears that one route of transmission to humans is food-borne, so a vegetable has important roles. The goal of this study was to determine the level of *Cryptosporidium* contamination in vegetable. Total of (45) samples of vegetable were collected from different markets in Basra city were investigated for the parasite in June and August 2024. A sediment concentration method followed by modified Ziehl-Neelsen's acid-fast staining was used to determine the presence of *Cryptosporidium* oocysts. Our findings revealed that 33.3% of studied samples were contaminated with *Cryptosporidium.* The highest rate of contamination was recorder in radish (40%) followed by basil (33.3%) and celery (26.6%). Statistical analysis showed No significant differences between contaminations of vegetables with *Cryptosporidium.*

Keywords: *Cryptosporidium*, Vegetables, Basra City.

Introduction

Cryptosporidium is a protozoan parasite that causes severe diarrheal disease (cryptosporidiosis) in mammals, including humans and livestock and is responsible for many food and waterborne outbreaks in many countries Cryptosporidiosis is a diarrhea-causing disease that is spread through germs that live in the poop of infected people or animals. When a person swallows *Cryptosporidium*, or "Crypto" germs, they can become infected [1, 2]**.**

This protozoan is transmitted by oocysts, passed in the faces can be transmitted via the fecal-oral route humans appear to be the sole host for the latter and a distinct seasonality has been observed in endemic areas around the world). Oocysts are remarkably resistant to common disinfectants and they can survive for several months in foods [3, 4].

Generally, Food-borne parasites can be divided in two main groups according to the route of

transmission to humans, These parasites reach human beings through the consumption of raw infected food such as muscle tissues of different animal species or vegetables, and contaminated food and water resources [5].

Cryptosporidium is a most common parasite and can contaminate salad vegetables if these vegetables are irrigated with contaminated water which is defecated by both human and animal due to poor hygienic condition of the environment *Giardia lamblia* and *Cryptosporidium* species are common intestinal parasites that contaminate fresh vegetables and create significant public health problems

Overall, this study provides important information on the frequency of *Cryptosporidium* spp. and *G. lamblia* detection in six common vegetables consumed in Kurdistan, Iraq [6]. Cryptosporidiosis is a most common parasitical infection caused by Cryptosporidium oocyts and microbial cause of diarrhea along with noticeable weight loss, pain and abdominal colic [7].

Significance of the Study

The significance of this study stems from the public health importance of Cryptosporidium, a protozoan parasite that causes intestinal diseases, particularly diarrhea. The parasite can be transmitted to humans through the consumption of vegetables contaminated with its oocysts, especially when vegetables are eaten raw or are not properly washed. Vegetables are essential components of the human diet; however, contamination by irrigation water, soil, or contaminated organic matter may make them potential vehicles for the transmission of intestinal parasites. This poses a risk to public health, particularly among children and immunocompromised individuals.

Theoretical Significance:

This study contributes to the scientific understanding of the prevalence of Cryptosporidium oocysts in vegetables sold in the markets of Basra City. It also provides scientific data that may help clarify the relationship between vegetable contamination and the transmission of intestinal parasites to humans. Furthermore, the findings may serve as a basis for future studies investigating parasitic contamination of food, environmental factors associated with its occurrence, and laboratory methods for parasite detection.

The study was conducted to isolate and identify Cryptosporidium oocysts from different types of vegetables in Basra city using conventional technique to have clear and solid epidemiological information of the pathogen.

Practical Significance:

The practical importance of this study lies in the potential use of its findings to assess the level of parasitic contamination in vegetables in Basra City and identify vegetable types that may represent potential sources of exposure to the parasite. The results may also contribute to raising health awareness among consumers and vegetable vendors regarding the importance of thoroughly washing vegetables before consumption and improving hygienic practices during cultivation, transportation,

storage, and handling. In addition, the findings may provide useful information to health and food safety authorities when developing awareness programs and measures to reduce the risk of foodborne parasitic transmission. Thus, the study may contribute to protecting public health and improving food safety [8].

Previous Studies

Contamination of fresh vegetables with intestinal parasites has received increasing attention in food safety and public health research because contaminated produce may serve as a vehicle for transmitting infective parasitic stages to humans. Cryptosporidium spp. is particularly relevant in this context because it is transmitted primarily through the fecal–oral route and may be associated with contaminated water and food.

In Iraq, Ali et al. (2018) investigated the contamination of raw vegetables with Cryptosporidium oocysts in Koya City. Their study included 400 samples representing five vegetable types, and the samples were examined using the Ziehl–Neelsen staining method. The findings indicated the presence of oocysts in the examined vegetables, with some variation in detection rates among vegetable types and sampling seasons. This study is relevant to the present research because it provides evidence from an Iraqi setting and offers a basis for comparison with investigations conducted in other regions of the country. [9]

More recent research has emphasized the use of complementary diagnostic approaches for detecting intestinal parasites in fresh vegetables. The study entitled Prevalence and Molecular Diagnosis of Cryptosporidium spp. and Giardia lamblia in Fresh Vegetables from Kurdistan Region/Iraq represents this approach by investigating two intestinal protozoan parasites using different diagnostic techniques. The combination of microscopic examination and molecular methods is important because microscopy can provide preliminary morphological evidence, whereas molecular assays may provide additional evidence for parasite identification, depending on the specificity and validation of the test employed. [10]

At the international level, Nasser (2022), in the review entitled Transmission of Cryptosporidium by Fresh Vegetables, discussed potential sources of contamination and laboratory procedures used to recover, concentrate, and detect Cryptosporidium oocysts from fresh produce. The review identified contaminated irrigation water, inadequately treated animal manure, and poor food-handling practices as potential contributors to contamination. These findings highlight the importance of monitoring vegetables throughout production, transportation, and marketing, as well as applying suitable laboratory detection methods. [11]

Furthermore, a systematic review and meta-analysis published in 2022 investigated the global prevalence of intestinal protozoan contamination in vegetables and fruits. The study reported a pooled prevalence of approximately 20% for intestinal protozoa in vegetables and a pooled estimate of 11% for Cryptosporidium spp. in vegetables included in the analysis. These estimates indicate that parasitic

contamination of fresh produce is a relevant international food safety concern. However, pooled estimates from different geographical regions cannot be directly applied to Basra City because contamination rates may vary according to environmental conditions, agricultural practices, vegetable types, and diagnostic procedures. [12]

Overall, the available literature indicates that Cryptosporidium oocyst contamination in fresh vegetables warrants further investigation. Although studies have been conducted in other Iraqi regions, the prevalence of detectable oocysts in vegetables marketed in Basra City must be established through direct laboratory examination. Therefore, the present study aims to generate local evidence regarding the occurrence of Cryptosporidium oocysts in selected vegetables and to compare the findings with previously published research. This approach may contribute to the scientific understanding of food safety and parasitic contamination in the local environment.

Materials and Methods

The vegetable samples were initially processed at the collection sites and then brought to the laboratory of parasites in the Department of medical lab. technology, the study was conducted during the period of June to the end of August 2024, during the present study, a total of 45 vegetable samples of different varieties were collected from several markets. Almost one kilogram of each vegetable sample was collected in polythene bag and carried it to the laboratory.

The samples were washed distilled water and then initially passed through a mesh sieve to remove coarse particle and after that the samples were then centrifuged at 10000 rpm for 10 min and again concentrated by flotation techniques using saturated sugar solution. A drop of concentrate was smeared on slide and stained with modified Ziehl-Neelsen technique this methodology indicates you are performing a modified acid-fast stain (specifically, the Henriksen & Pohlenz technique). This approach is the standard gold method for screening and identifying microscopic coccidian parasites in concentrated fecal smears [13] and examined under microscope.

Data Analysis

Chi square (x2) test was done and this test was used to test for association between *Cryptosporidium* oocysts and types of vegetables from different markets. Occurrence was determined by dividing the positive number samples by the total number of samples.

The Results

Microscopic Examination:

Air dried slides were examined under light microscopy at X100 magnifications. oocyst of *Cryptosporidium* were found as pink colored round and spherical body (Figure 1).

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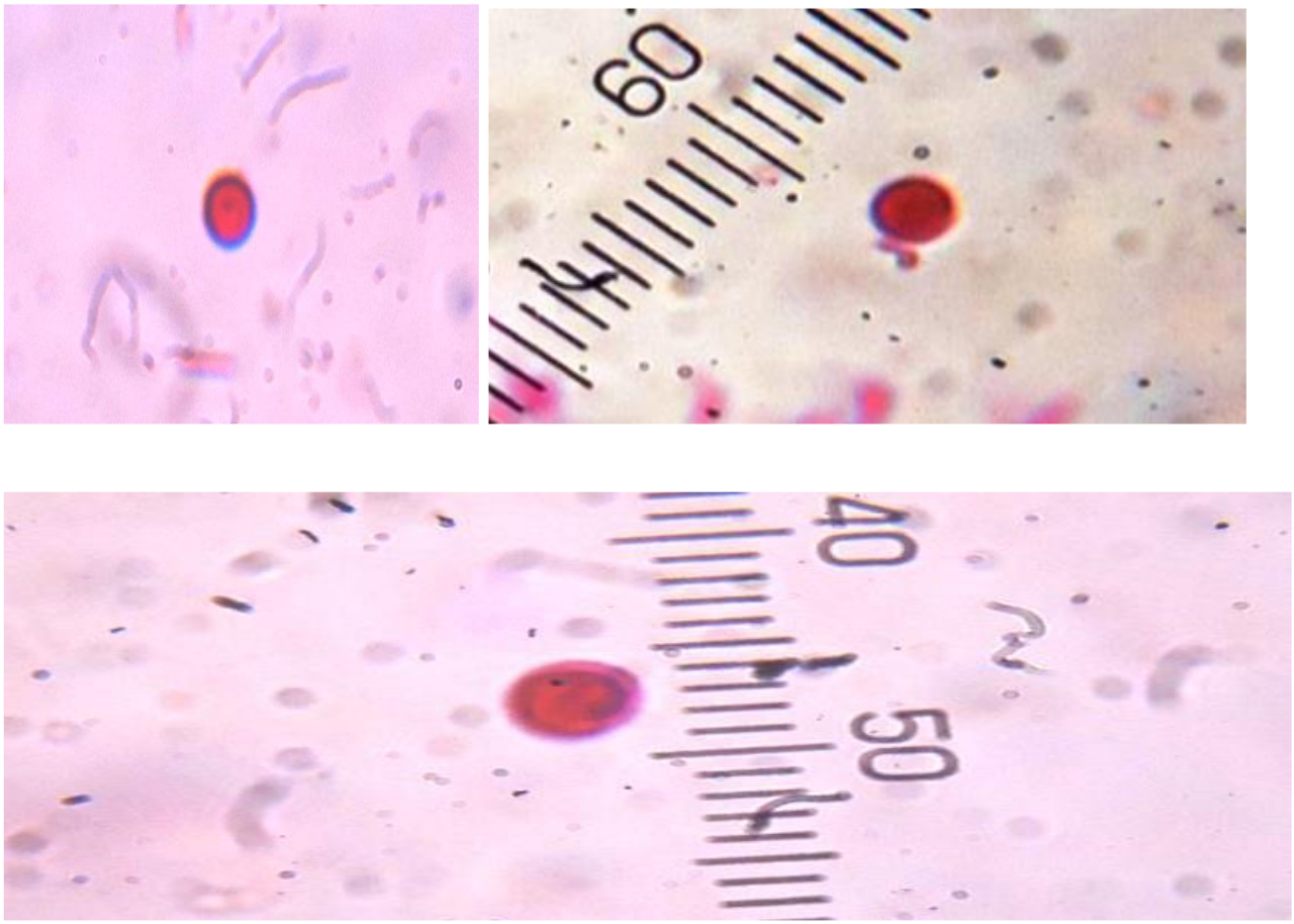


Figure (1): oocysts of *Cryptosporidium* isolated from vegetables

A Total number of 45 vegetable samples examined, 15 (33.3%) of which were positive with *Cryptosporidium oocysts*. In this study three varieties of vegetable were examined and all were positive with *Cryptosporidium* oocysts contamination. Among of all examined samples radish had showed the highest (40%) contamination rate followed by basil (33.3%), and celery (26.6%). There was no significant difference among prevalence of *Cryptosporidium* oocysts in commonly vegetables table (1).

Table (1): shows the prevalence of *Cryptosporidium* oocyst in vegetables

Type of vegetables	Number of examination samples	Number of positive samples	Percent positive samples
Radish	15	6	40.0%
Basil	15	5	33.3%
Celery	15	4	26.6%
Total	45	15	33.3%

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The Discussion

Oocyst of *cryptosporidium* was detected commonly by using Ziehl -Neelsen technique during this study. Conventional methods include examination of fecal smears with acid-fast stains such as Ziehl-Neelsen which is commonly used by diagnostic facilities, The oocysts of *Cryptosporidium spp*. were investigated in backyard chickens, and study the effect of age and sex on the infection rate. All samples taken from feces and intestinal contents were examined microscopically by staining methods, including modified acid-fast stain, Malachite Green Stain at a concentration of 5%, 1%, Nigrosin Stain (1%), and Safranin methylene blue staining. The overall infection rate was 48.7%. The oocyst appeared in an oval to spherical shape with a bright red color in the modified acid-fast stain [14].

Still in use in many laboratories of the world as a cost-effective detection method of *Cryptosporidium*. In this study *Cryptosporidium* oocyst from concentrated vegetable sample was examined under microscope following stained with Ziehl -Neelsen stain for screening of the sample. A Total number of (45) vegetable samples examined, 15 (33.3%) of which were positive with *Cryptosporidium* oocysts, this result lower compared to results of [10]. in Mosul-Iraq which was (60%) and higher prevalence than result of [15].which were (16%, 31.7%) in Bangladesh and Egypt. In this study three varieties of vegetable were examined and all were positive with *Cryptosporidium* oocysts contamination. Among of all examined samples radish had showed the highest (40%) contamination rate followed by basil (33.3%), and celery (26.6%), this may possibly be because of the fact that the degree of contamination varies according to shape and surface of vegetables and type of samples, methods used for detection, type of water source used for irrigation which are different from country to another.

Conclusions

1. The study revealed that 33.3% of the examined vegetable samples in Basra City were contaminated with Cryptosporidium oocysts.
2. The highest contamination rate was recorded in radish (40 %), followed by basil (33.3%) and celery (26.6%).
3. All three vegetable types showed contamination, indicating a potential risk of parasite transmission through contaminated vegetables.
4. No statistically significant differences were observed in contamination rates among the examined vegetable types.

Recommendations

1. Vegetables should be thoroughly washed with clean water before consumption, especially those eaten raw.
2. Irrigation water sources should be monitored to ensure they are free from parasitic contamination.

3. Health authorities should strengthen sanitary inspection of vegetables in local markets.
4. Public awareness should be increased regarding personal hygiene and proper food handling practices.
5. Further studies should include a larger number of samples and different vegetable types, using molecular diagnostic techniques such as PCR.

References

1. CDC. (2025). Cryptosporidium (crypto). ESPANOL

   https://www.cdc.gov/cryptosporidium/about/index.html.
2. Jade Hall. (2026). (Cryptosporidium: A Persistent Waterborne Parasite https://krakensense.com/blog/cryptosporidium-a-persistent-waterborne-parasite
3. Ewa Tomczak, MD; & Michael Stuart Bronze, MD. (2025). Cryptosporidiosis. https://emedicine.medscape.com/article/215490-overview
4. Pinto DJ, Vinayak S. (2021). Cryptosporidium: Host-Parasite Interactions and Pathogenesis. Curr Clin Microbiol Rep. 8(2):62-7.
5. Pozio, E. (2008). Epidemiology and control prospects of food borne parasitic zoonoses in the European Union. Parassitologia 50: 17-24.
6. Renas G. Abdullah& Abdullah A. Hama. (2026). Prevalence and Molecular Diagnosis of Cryptosporidium ssp. and Giardia lamblia in Fresh Vegetables from Kurdistan Region/Iraq. The Scientific Journal of Koya University Vol. XIV, No.1 (2026)
7. Aryn Andrzejewski; Diogo Bento; Jessica Snowden. (2026). Cryptosporidiosis

   https://www.ncbi.nlm.nih.gov/books/NBK448085/
8. Henriksen SA & Pohlenz JFL. (1981). Staining of cryptosporidia by a modified Ziehl-Neelsen technique.Acta vet.Scand, 22:594-6.
9. Ali, H. S., et al. (2018). Contamination of Cryptosporidium spp. Oocysts in Raw Vegetables Produced in Koya City, Iraq. Journal of Food Quality and Hazards Control, 5(3), 89–93.
10. Abdullah, R. G., & Hama, A. A. (2026). Prevalence and Molecular Diagnosis of Cryptosporidium ssp. and Giardia lamblia in Fresh Vegetables from Kurdistan Region/Iraq. ARO—the Scientific Journal of Koya University
11. Nasser, A. M. (2022). Transmission of Cryptosporidium by Fresh Vegetables. Journal of Food Protection, 85(12), 1737–1744. https://doi.org/10.4315/JFP-22-152.

12. Global Prevalence of Intestinal Protozoan Contamination in Vegetables and Fruits: A Systematic Review and Meta-analysis. (2022). Food Control, 133, 108656. https://doi.org/10.1016/j.foodcont.2021.108656.
13. Saidu, A. S., et al. (2023). Prevalence and risk estimates of Cryptosporidium oocysts infection associated with consumption of raw-eaten vegetables in Maiduguri metropolis LGAs, Northeast Nigeria. Scientific Reports, 13, 23079. https://pmc.ncbi.nlm.nih.gov/articles/PMC10754946/.
14. Abdullah Salem Abdullah, Nadia Hamid Mohammed. (2025). Evaluation of Different Staining Techniques for Detection of Cryptosporidium Oocysts in Backyard Chickens (Gallus gallus domesticus). Basrah Journal of Veterinary Research, 2025, 24(1):52-65. https://bjvr.uobasrah.edu.iq/
15. Bakir, M. H. (2005). The sttudy off epiidemiiollogy, experriimenttall iimmuniitty and ttrransmiissiion fforr crrypttosporriidiiosiis iin Niineveh goverrnorratte.. Ph..D.. Thesis. Univ. Mosul, PP. 130.
16. Asaduzzaman, M.d., Golam, M.d., Ashraf, Mohummad, M. R., Sharifuzzaman, M.d., S. (2016). Investigation of Cryptosporidium oocyst in vegetables in Bangladesh. International Journal of Natural and Social Sciences, 2016, 3(1): 37-41.