Epidemiological study on Cryptosporidium among children in Basra Province-Iraq

To cite this article: M Salim 2018 J. Phys.: Conf. Ser. 1032 012072

View the article online for updates and enhancements.
Epidemiological study on Cryptosporidium among children in Basra Province-Iraq

M Salim
Sothern Technical University, Basra province, Iraq
Epru2007@yahoo.com

Abstract. The study included examination of 134 stool samples from several reigns in Basra province includes AL-Hyani reign and some Health Centers in Basra province from February to June 2015 for detection of Cryptosporidium spp oocysts. Each sample was concentrated with sedimentation method and stained with a modified Zheil - Nielsen detect of Cryptosporidium Oocysts. The study revealed 23.8% were positive with highest infection rate in young children between days - 1 > year and 5 - >15 which reached 28% and 25% respectively.

Keywords: Cryptosporidium epidemiology, Basra.

1. Introduction
Cryptosporidiosis is a zoonotic and anthropoontic disease which caused by protozoan parasites genus Cryptosporidium, it has a worldwide distribution and in the most surveys it is considered to be among the four major pathogens causing diarrheal diseases in children (Xiao et al., 2000). It has major public health implications because infections can result from exposure to low doses of Cryptosporidium Oocysts. The Oocysts are highly resistant to chlorination and common household disinfectants, ability to pass through physical water treatment processes, and survive long periods in the environment. Humans can acquire Cryptosporidium infections through several transmission routes, such as direct contact with infected persons or animals, and ingestion of contaminated food (food borne transmission) and water (waterborne transmission) (Xiao and Cama, 2006), insects play a significant role in Oocysts transmission. House flies, cockroaches, beetles and synanthropic flies can transmit the Oocysts by their exoskeletons and in their digestive tracts too (Graczyk et al., 2005; Yen et al., 2007).

There are more than ten species of Cryptosporidium, Cryptosporidium parvum and Cryptosporidium hominis are the two species responsible for the most cases of human Cryptosporidiosis worldwide (Victoria et al., 2000; Mosallanejad et al., 2010). Age group play an important role in Cryptosporidium infection, the pathogen can be found infecting all age groups but it is more common among children and elderly as most studies have indicated (Amin, 2007). This study was done to evaluate the correlation between prevalence and some factor e.g. age and sex.

2. Material and Methods
Source and collection of specimens: The study included examination of 134 stool samples from several reigns in Basra province includes AL-Hyani reign and some Health Centers in Basra province from February to June 2015 for detection of Cryptosporidium spp oocysts. A total of 134 stool samples taken from children age between 1 month to 15 years (66 males and 68 females). The
stool samples were collected directly from the rectum in plastic containers with a detailed history about age (days - <1), (1-5), (5-15), sex and were transported to the parasitological laboratory.

**Oocyst detection:** The samples were concentrated by formalin method (Nasser, 2014). A drop was taken from each deposit by Pasture pipette and was smeared on a glass slide; the slides were stained by the modified acid - fast method. In this method Oocysts of *Cryptosporidium* were visualized as red spots, all the smears were examined by light microscope with 40X and 100 X objectives. The Percentage of infected samples was calculated by using the following:

\[
\text{Percentage of infected samples} = \frac{\text{Number of infected samples}}{\text{Number of total samples}} \times 100%
\]

3. **Statistical Analysis:**

The data was put into a Microsoft Excel Spreadsheet, after data cleaning; the data was transported into SPSS (Statistical Package for the Social Sciences version 15.) package software program for statistical analysis. Descriptive statistics (percentage) were calculated for all variables, as well as analytical statistics was done to find the relations between the variables. The relation between variables was calculated by using the appropriate statistical tests by Chi-square. Values were considered to be statistically significant when the p-value obtained was less than 0.05.

4. **Results**

134 stool samples were examined in a trial for studying *Cryptosporidium* prevalence in Basra city. High prevalence (23.8%) of the parasite was recorded among human population (Fig. 1, Table 1).

![Image](image.png)

**Table 1. The Overall Prevalence of Cryptosporidium**

| Name of Parasite | No. of Examined samples | No. of infected samples | Percentage of infected samples |
|------------------|-------------------------|-------------------------|--------------------------------|
| Cryptosporidium  | 134                     | 32                      | 23.8%                          |

There were no significant differences between the sexes as to the prevalence percentage in males (24.2%) which is nearly the same in females (23.5%). (Table 2).
Table 2: Prevalence of *Cryptosporidium* sp. according to sex

| Genus  | No. of Examined samples | No. of infected samples | Percentage of infected samples |
|--------|-------------------------|-------------------------|--------------------------------|
| Male   | 66                      | 16                      | 24.2%                          |
| Female | 68                      | 16                      | 23.5%                          |
| Total  | 134                     | 32                      | 23.8%                          |

The standard Pearson chi-square statistic is defined as:

\[ X^2 = \sum \frac{(Oij-Eij)^2}{Eij} = \frac{(66-24.4)^2}{24.4} + \frac{(68-23.5)^2}{23.5} = 155.18 \]

Table 3 shows the prevalence of *Cryptosporidium* infection according to the age. The highest infection (28.0%) was recorded in age group 1 (< 1) year, while the lowest (21.6%) was appeared in age group 2 (1-5) years old. Statistical analysis showed no significant difference appears between ages.

Table 3: Prevalence of *Cryptosporidium* sp. according to ages

| Year     | No. of Examined samples | No. of infected samples | Percentage of infected samples |
|----------|-------------------------|-------------------------|--------------------------------|
| Group 1 < 1 | 50                      | 14                      | 28.0%                          |
| Group 2 (1-5) | 74                      | 16                      | 21.6%                          |
| Group 3 (5-15) | 8                       | 2                       | 25.0%                          |
| Total    | 132                     | 32                      | 74.6%                          |

\[ X^2 = \frac{(50-28.0)^2}{28.0} + \frac{(74-21.6)^2}{21.6} + \frac{(8-25.0)^2}{25.0} = 155.95 \]

5. **Discussion**

From 134 stool samples examined 32 samples were positive for *Cryptosporidium* infection with rate of 23.8%, these results agreed with Nasser, (2014) who showed that the increased rate of cryptosporidiosis infection in Basra province were associated with contaminated drinking water supplied to these population or contaminated food which linked to consuming fresh vegetables, This is result in comparison with other studies is a little agrees with Ali(2013) who recorded 15.2% in Sulimani.
city, and with worldwide prevalence of parasite which was between 0.3-32% (Obiadet et al., 2012), but disagreement with Mahdi and Ali (2002) in Basra, Al-Alousi (2004) in Tikrit and Othman (2000) in Kirkuk were recorded 5%, 9.42%, 12.62%.

The differences between this results and the other studies because of the technique used for the diagnosing or due that the parasite prevalence is not constant from year to year and from one area to another in the same country (Amin, 2007), or due to sample size differences or because most of studies was concentrated on one age group (infants) or children.

There were no significant differences between the sexes as to the prevalence percentage in males (24.2%) which is nearly the same in females (23.5%) which may indicates that both sexes have equal chance of being infected. These results were in agreement with other studies conducted worldwide (Ali, 2008; Hossein et al. 2010; Rahiet et al. 2013), the data of age groups infection showed there is no significant difference among the three age groups in this study the rate of infection first group (< 1) which higher (28.0 %) compare other groups, that due to their weak immunologic status of lacking protective immunity to prevent themselves from getting infection.

6. Conclusions
1. The results showed that (23.8%) of the fecal samples were positive for Cryptosporidium Oocysts.
2. Although both genders were sensitive to infection with Cryptosporidium a higher rate of infection was recorded in males rather than females with no significant difference of infection.
3. Children of (< 1) year recorded a higher rate of infection than other groups of ages.

7. Recommendation
1. Routine microscopically diagnostic method is recommended and technical medical staff must be trained to diagnose Cryptosporidium in our hospital and primary health care centre in Iraqi country.
2. Further study for the detection of Cryptosporidium in food.
3. A more detailed epidemiological study is recommended to contain all society factors.
4. Introduce diagnosis based on molecular technique, genotyping and sub-typing for the Cryptosporidium Species.
5. Raising the health awareness about cryptosporidiosis among the population through health education, seminars and leaflets.

References
[1] Al-Alousi, T.I. 2004 Prevalence of Cryptosporidium spp. in different resources with a trial treatment by using medical plants extracts. Ph. D. Thesis, Coll. Med. Tikrit Univ.

[2] Ali, F. M 2013 Cryptosporidiosis in Sulaimani pediatric teaching hospital and comparison of different diagnostic methods for its detection. M.Sc. Thesis, Sulaimani Univ., 100 pp.

[3] Ali, M. A 2008 Prevalence of Cryptosporidium among children at Ramadi city. M.Sc. thesis. College of medicine, Al-Anbar Univ., 46-48 pp.

[4] Amin O.M 2007 Prevalence, distribution and host relationships of Cryptosporidiumparvum(protozoa) infections in the United States,2003-2005. Parasitol. Cent. Inc. (PCI) explores 16(1): 22-28.

[5] Graczyk T. K Knight R and Tamang L 2005 Mechanical transmission of human protozoan parasites by insects. Clin. Microbio. Rev., 18(1): 128-132.
[6] Hossein S, Omid Y, Amene Y, Mohammad M and Mohsen S 2010 Infection Rate of Cryptosporidium parvum among Diarrheic Children in Isfahan. J. Ped. 20 (3): 343-347.

[7] Mahdi N. K and Ali N. H 2002 Intestinal parasites including Cryptosporidium species in Iraq patients with sick cell anemia. Basrah. East. Med., Health J. 8: 1-7.

[8] Mosallanejad B, Hamidinejat H, Avizeh R, Ghurbanpoor N. M and Razifakali M. H 2010 Antigenic detection of C. parvum in urban and rural dogs in Ahvaz district, southwestern Iran. J. Iranian Vet. Res, Shiraz Univ., Vol. 11(3): 32.

[9] Nasser S. K 2014 The distribution of Cryptosporidium in Some Resources of Water, Vegetables and Animals Feces in Basra Province. M. Sc. Thesis, College of Education for pure sciences, Basra Univ. 88 pp.

[10] Obiad H.M, Al-Alousi T. I and Al-Jboori A. H. 2012 An epidemiologic study on Cryptosporidium spp. in Kirkuk city with some trials for in vitro treating the parasite. Second Scientific Conference – Science College – Tikrit Univ.

[11] Othman, N. F. 2000 Comparison between different laboratory methods for diagnosis of Cryptosporidium species. ( PDCLI ). Tikrit Univ.

[12] Rahi, A. A, Ali M. . and Al-Charrakh A. H. 2013 Prevalence of Cryptosporidium parvum among children in Iraq. American J. Life Sci., 1(6): 256-260.

[13] Victoria H. B, Vasquez J, Nelson R.G, Forney J. R, Rosowsky A and Sibley C. H 2000 Identification of Cryptosporidium parvum Dihydrofolate Reductase Inhibitors by Complementation in Saccharomyces cerevisiae. Ant. Agents and Chemotherapy. 44 (4): 1019–1028.

[14] Xiao L. and Cama V 2006 Cryptosporidium and Cryptosporidiosis in: Ortiga,Y. editor. "Food Born Parasitology". Springer Sci. USA. 289 pp.

[15] Xiao L, Morgan U.M, Fayer R, Thompson R.C and Lal A.A 2000 Cryptosporidium systematics and implications for public health. Parasitol. Today. 16: 287–292.

[16] Yen M. L, Chien C. C, Chin L. M and others 2007 Multilinegedifferentiationand characterization of the human fetal osteoblastic 1.f1. cell linc: a possible in vitro model of human mesenchymal progenitors. Stem cell. 25(1): 125-131.