# Epidemiology of acute cryptosporidiosis among infants and young children in AL- Tameem Province

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## Abstract

This study was conducted in Kirkuk city, Al-Ta'meem Province , on 612 infants and young children up to six years of age, suffering from acute diarrhea for less than two weeks duration, who were diagnosed as acute gastroenteritis, attended Kirkuk Pediatric Hospital , Paediatric Departments of Saddam General Hospital, Al-Ta'meem General Hospital and three other Primary Health Centers round the city. The samples were chosen randomly. The main aim was to study the epidemiology of acute gastroenteritis due to acute Cryptosporidiosis among infants and young children in the city during one year, started from the first of August 1998 till the end of July 1999. Questionnaire, data collection, physical examination and general stool examination were carried out for each patient, direct method used; modified Zeil-Neelson technique to detect cryptosporidium oocysts was performed. It was found that the prevalence rate of acute Cryptosporidiosis was (8.82%) . There were no significant differences between the two sexes. It was highest in Spring months (13.09%), (26.2%), respectively. Followed by the three other seasons. The highest rate of acute Cryptosporidiosis was among children less than two years of age .There was no significant difference between the rate acute Cryptosporidiosis and the place of residency. It is indicated that the highest rates of both infections were among children from (6-10) family size. The highest rate of acute Cryptosporidiosis was recorded among (4-4.9) crowding index group. The study revealed that the attack rates of acute Cryptosporidiosis were lowest among children of educated mothers than those of illiterate or low educated mothers. The prevalence rates of was lower among children of house wives mothers than those of employed mothers, and was lowest among infants on breast feeding than those practicing artificial or mixed feeding, while rate of infection was highest among children in contact with poultry than those in contact with other animals or without contact.

## Introduction

Cryptosporidiosis is an acquired infection through ingestion of a oocysts from human or animal feces, it is identified as the etiologic agent of several extensive waterborne diarrheal outbreaks , usually due to surface infected ground water sources, involving from animals (1). Because the oocyst is only (4 Mm ) in diameter, it makes it difficult to be clarified through filtration and it is also resistant to routine chlorination (2). Tzipori (3) suggested that oocyst of cryptosporidium are infective when passed, and they are resistant to ordinary disinfectants .WHO surveys revealed that (11%) of diarrhea causes all over the world caused by cryptosporidium (4).

The most important risk factor for cryptosporidiosis is direct contact with patients with diarrhea, association with dogs and cats, consumption of untreated water supply, dummies and other fomities (5)

In Iraq few studies were investigated the role of cryptosporidium as a cause of acute gastroenteritis in infants and children .In Baghdad, Al- Gelang (6), showed that the rate of cryptosporidium infections among children was 14.6%,(17.8% in male, and 11.4% in female). She found that the attack rate of cryptosporidiosis was (37.8%) during march and (5.8%)in October in 1997. In Mosul province, Al-Alousy et al ,(7) mentioned that the rate of cryptosporidiosis in infants and children was (14.3%) in both sexes , while in Diyala province the attack rate of infection among children was (2.8%) (8) . Similar result was reported in Babylon province (9), with the rate was (10.9%).In

Basrah province, Nadham et al (5) found that (8.8%) of children under 5 years had cryptosporidiosis and were suffering from malnutrition and dehydration , they showed also the incidence rate of males was higher than females .

The present study was carried out to show the epidemiological factors of acute gastroenteritis caused by Cryptosporidium species among infants and young children in Al- Tameem province.

## Patients and Methods

Cross sectional study was carried out in Kirkuk Pediatrics Hospital / Al-Tameem province on infants and young children up to six years old suffering from acute diarrhea for less than two weeks duration .The period of study was from the first of August 1998 to the end of July 1999.

Stool samples, were collected from each patients who had diagnosed primarily as acute gastroenteritis case, from the following sources in Kirkuk city [Kirkuk pediatrics Hospital ,422 patients ;Saddam General Hospital 50 patients; Al- Tameem General Hospital 50 patients; and Patients attended the following Primary Health Care (P.H.C.) centers, 90 patients; (Shar'e Saddam P.H.C. center, Al-Wassity P.H.C. and Al-Andalus P.H.C. center )].

The stool specimens were collected in clean plastic cups , labeled with the number of sample, patients name, sex age and place (Hospitals or P.H.C. centers) and date of collection. Then transported to the Laboratory of Pediatrics Hospital and examined immediately or within two hours.

General stool examination was carried out for each specimen using wet mount technique. From each specimen, two samples were collected (about 1 –2 mg), in one sample a drop of normal saline was added and in the other, one drop of lugol's iodine was added. Both samples were examined under light microscope using 10x and 40 x objectives to detect the presence of ova, cysts or trophozoites of protozoa and helminthes.

Cryptosporidium infection was diagnosed by finding the oocysts in the feces using modified Zeil Neelson technique (10).

The crowding index is estimated by dividing the number of house holds by number of house rooms.

The data was analyzed using chi-square and student t-test.

## Results

Of the 612 patients with acute gastroenteritis in infants and young children up to six years of age , 291 were males and 321 were females.

Cryptosporidium oocysts were found among 54 (8.82%) 24 (8.25%) of males and 30 (9.35%) of females.

Regarding the age distribution, the prevalence of cryptosporidiosis gastroenteritis among six age group was significantly different ($P<0.05$). The highest rate of infection was among 2 years old, followed by 3,4,1,5, and 6 years old respectively (table 1).

It indicates that the attack rate of infection was highest in spring (13.09%) followed by winter (12.33%). Autumn (5.84%) and summer (3.26%).

Concerning residency distribution of cryptosporidiosis gastroenteritis, it is indicated that the rate of infection did not differ significantly between urban (8.86%) and rural (8.75%) patients.

According to the family size, the distribution of crytosporidiosis was highest among those with 6-10 individual groups (12.97%) and the lowest was among those with 1-5 (3.26 % ) individuals. (table 2).

Table 3, shows the relationship of cryptosporidiosis with crowding index. The rate of infection was highest among those with (4-4.9) (22.45 %), followed by (6-6.9) (21.73%), (5-5.9) (16.66 %) ,(3-3.9) (8.02%), (2-2.9) (5.97% ) and (1-1.9) (5.42%) respectively.

Concerning educational level, the prevalence of cryptosporidiosis was highest among illiterate mothers children (21.1 %), followed by read and write (10.2%), primary (6.1%), intermediate and secondary (6%) and university (4%) respectively.

It is revealed that mother's occupation has an important role for the infants and young children infections. It is indicated that the rate of cryptosporidiosis was higher among patients whose mother

suggested throughout their studies to practice the breast feeding for children.

Comparing the urban and rural areas, this study showed that the rate of cryptosporidiosis in urban infants and young children did not differ from those in rural areas. This finding is not in agreement with that reported by Hassan and his colleagues (28) in Adha " Suadia Arabia" the rate of infection among Bedouin infants was and Chai and his colleagues (4) in Korea, the attack of infection in rural areas (14%) was higher than that in urban areas(3.7%).

Regarding relationship between the prevalence of infection and family size, it was shown that the rate of infection was lowest among families with low family members. This reflects that the infection is widely distributed among crowded families. This is also confirmed by finding that the rate of infection was higher among families with high crowding index than low crowding once as indicated in table 7.As there may be big opportunity to have contamination with the parasite in the crowded families (29.30).

A decrease attack rate of the infection among children with high education level of mothers indicates important role of mother's education n the health status of their children. The higher rate of cryptosporidiosis in families with employed mothers in comparison with unemployed mothers or house wives .This throw alight about the important role of mother education in nursing their children and other persons can not replace the mother of children in their feeding and caring about hygienic conditions.

The highest distribution of cryptosporidiosis in this study among those in contact with poultry followed by those in contact with other animals (cattle & sheep) and those not in contact with animals. This indicates the big role of animals in the epidemiology of cryptosporidiosis. This result also clearly showed that poultry is an important reservoir of Cryptosporidium species which help in disseminating of infection among humans.

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**Table (1):** Prevalence of acute cryptosporidiosis (gastroenteritis according to the age)

| Age groups (Years) | Total No. Examined | Cryptosporidiosis* | |
|---|---|---|---|
| | | No. Positive | % |
| 1 < | 417 | 25 | 6 |
| 2 - | 106 | 23 | 21.7 |
| 3 - | 27 | 3 | 11.11 |
| 4 - | 15 | 1 | 6.66 |
| 5 - | 19 | 1 | 5.26 |
| 6 - | 28 | 1 | 3.57 |
| Total | 612 | 54 | 8.82 |

$X^2$=24.03 D.F.=5 ( P < 0.05)

**Table ( 2 ):** Distribution of Cryptosporidiosis (Gastroenteritis according to the family size)

| Family size Groups | No. Examined | Cryptosporidiosis * | |
|---|---|---|---|
| | | No. Positive | % |
| 1-5 | 100 | 6 | 6 |
| 6-10 | 262 | 34 | 12.97 |
| 11-15 | 154 | 13 | 8.44 |
| 16 - > | 12 | 1 | 8.33 |
| Total | 612 | 54 | 8.82 |

$X^2$ =14.89 D.F.=3 (P<0.05)

**Table (3):-** Prevalence of Cryptosporidiosis gastroenteritis among 612 infants and young children according to crowding index (C.I.).

| Crowding Index | No. Examined | Cryptosporidiosis* | |
|---|---|---|---|
| | | No. Positive | % |
| 1-1.9 | 166 | 9 | 5.42 |
| 2-2.9 | 134 | 8 | 5.97 |
| 3-3.9 | 212 | 17 | 8.02 |
| 4-4.9 | 49 | 11 | 22.45 |
| 5-5.9 | 28 | 4 | 16.66 |
| 6-6.9 | 23 | 5 | 21.73 |
| Total | 612 | 54 | 8.82 |

$X^2$ =12.69 D.F.=5 (P<0.05)

C.I= No. of house holds/ No. of house( bed) rooms

**Table (4):** Distribution of acute cryptosporidiosis according to mothers' education

| Mothers education level | No. examined | cryptosporidiosis | |
|---|---|---|---|
| | | No. positive | % |
| Illiterate | 71 | 15 | 21.1 |
| Read & write | 186 | 19 | 10.2 |
| Primary | 163 | 10 | 6.1 |
| Intermediate & secondary | 117 | 7 | 6 |
| University | 75 | 3 | 4 |
| Total | 612 | 54 | 8.82 |

**Table (5):**Distribution of acute cryptosporidiosis according to mothers occupation

| Mothers accupation | No. examined | cryptosporidiosis | |
|---|---|---|---|
| | | No. positive | % |
| House wife | 453 | 33 | 7.3 |
| Employee | 159 | 21 | 13.3 |
| Total | 612 | 54 | 8.82 |

**Table (6):**-Prevalence of acute Cryptosporidiosis (gastroenteritis according to the type of feeding for the infants and young children up to two years of age).

| Type of Feeding | No . Examined | Cryptosporidiosis | |
|---|---|---|---|
| | | No. Positive | % |
| Breast feeding | 285 | 18 | 6.3 |
| Artificial /bottle feeding | 87 | 8 | 9.19 |
| Mixed feeding | 152 | 10 | 6.58 |
| Total | 524 | 36 | 6.87 |

$X^2$ =0.89 D.F.=2 ($p<0.05$)

**Table (7):** Distribution of cryptosporidiosis with or without animal contact

| Types of animal | No. examined | Cryptosporidiosis | |
|---|---|---|---|
| | | No. Positive | % |
| Poultry | 253 | 36 | 14.16 |
| Cattle and sheep | 144 | 10 | 9.94 |
| None | 215 | 8 | 3.8 |
| Total | 612 | 54 | 8.82 |