RESEARCH STUDY

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Occurrence of Amoebic Versus Bacillary Dysentery among Children Under Five Years of Age in Baghdad City

ARTICLE INFORMATION

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ABSTRACT

Background: During Annual statistical report published by the Iraqi ministry of health the year 2004 showed that mortality rate was 0.15 per 1000 of diarrheal episodes among children under five years.
Objectives: To study the occurrence of Shigellosis and Entamoeba histolytica in a sample of children from certain hospitals in Baghdad and determine its relation to some demographic factors.
Methods: This cross sectional study was carried out in Baghdad city involving 400 children with bloody diarrhea under five years of age attending four hospitals, 130 cases from Central Pediatric Hospital, 110 cases from Al Mansoor Pediatric Hospital, 90 cases from Al Kadhimya Teaching Hospital and 70 cases from Mohammed Baaqir Al Hakeem Hospital for the period from the first of January through October 2005. Stool specimens were examined microscopically for detection the amoebic dysentery and negative cases were sent for stool culture for detection of Shigellosis.
Results: The study revealed that Entamoeba histolytica was the most frequently identified cause of bloody diarrhea 362 (90.5%), while shigella was identified in 38 cases (9.5%). young children below two years of age were more liable to have diarrhea than other age group. Both shigella and amoebic cases shared the following risk factors, lack of breast feeding, unboiled water, low level of education of mother and overcrowding.
Conclusions: Child health services should concentrate on health education of mother to encourage breast feeding, boiling of water, general personal and environmental hygiene to prevent spread of these infection.

Introduction:

Diarrhea is a leading cause of morbidity and mortality among children in developing countries, where an estimated 1.3 thousand million episodes and 3.2 million deaths occur each year in those under five years of age, and these children experience an average of 3.3 episodes of diarrhea per year, but in some areas the average exceeds nine episodes per year [(1)].

About 80% of deaths due to diarrhea occur in the first 2 years of life and about 10% of diarrheal episodes in children under five years of age have visible blood in the stool, and these account for about 15% of diarrhea associated death in this group [(2)].

Diarrheal disease also represents an economic burden for the developing countries. In many countries, more than one third of hospital beds for children are occupied by patients with diarrhea. These patients are often treated with expensive intravenous fluids and ineffective drugs. In the USA 3 million doctor visits because of diarrhea, and 300000 hospitalizations a year with an annual price for not using oral rehydration treatment (ORT), in USA alone is over one billion USA dollars a year [(3)]. While a study in Dhaka and Calcutta revealed that 80% of IV fluid could be saved if patients rehydrated by ORT alone knowing that cost of ORT packet is 10 USA cents only [(4)].

Bloody diarrhea is an important variety of diarrhea, which is caused mainly by shigella species, salmonlla, campylobacter jejuni, Entamoeba histolytica, E.coli and yarsenia. Entamoeba histolytica is prevalent all over the world and the prevalence varies between 5-81% with highest prevalence in tropics and annual mortality 40000-110000 death per year. Food and water contaminated with Entamoeba histolytica and feco-oral contact are the most common modes of infection. It occurs in all ages but slightly more in 1-5 years of age. Shigella remains a common and an important cause of diarrhea especially in preschool children throughout the world; infection occurs mostly in warm climate, equal in both sexes, common in the first 2-3 years of age, and person to person transmission is the most common source. It is estimated that shigella responsible for 57600 death per year among children less than five years of age in developing countries [(5)].

The present study is an attempt to shed light on the frequency of those two diseases among children with bloody diarrhea and determine related risk factors.

Methods:

A cross-sectional convenient descriptive study involving cases of bloody diarrhea among children under five years of age was conducted in Baghdad city for the period from the first of January through October 2005. Sample of 400

children was collected from patients attending the outpatient or admitted in the following hospitals: 130 cases from Central Pediatric Hospital, 110 cases from Al Mansoor Pediatric Hospital, 90 cases from Al Kadhimya Teaching Hospital and 70 cases from Mohammed Baaqir Al Hakeem Hospital.

All children complaining of bloody diarrhea were included in the study after being diagnosed by the senior pediatrician. The sample included all patients presented with loose or watery stools contain visible red blood. This does not include:

1. Episodes in which blood is present in streaks on the surface of formed stool.
2. Cases in which blood is detected only by microscopic examination or biochemical tests.

Questionnaire that includes information about the patient and the course of the disease was constructed; the information was taken directly from the parents or any member of the family available with the child after confirming that the faeces contain visible blood.

Stool specimens were collected within 24 hours after reaching the hospital. Samples were transported to the laboratory within six hours after collection. General stool examination was done for each child included in the study in the inpatient and outpatient clinic in which samples were examined microscopically using saline and iodine preparation to detect the presence of amoebic dysentery. For shigella isolation, stool specimens were inoculated into tubes of thiocyonate enrichment broth and incubated at 40 C for 24 hours. On the second day a largeful of grown culture was sub cultured in salmonella-shigella agar. Detection of shigella from salmonella-shigella agar colonies were identified by IMVIC test, H_2S production from kligler, motility and then diagnosis was confirmed by specific antisera for shigella.

Results:

Table 1 shows that Entamoeba histolytica was the most frequently identified cause of bloody diarrhea (n=362, 90.5%), while shigella was identified in 38 cases (9.5%).

Table1: The distribution of the cases according to type of microorganism.

Type of Microorganism	Patient No. (%)
Entamoeba histolytica	362 (90.5)
Shigellosis	38 (9.5)
Total	400 (100)

Table 2 shows that the highest frequency of occurrence of amoebiasis is among the age group 0-12 months; 149 (41.2%), while in shigellosis is among the age group 13-24 months, 15(39.5%; P<0.05). The number of cases in general is declining with the older age group.

Table 2: Age distribution of cases with bloody diarrhea.

Age group	Amoebiasis No. (%)	Shigellosis No. (%)	P value
0-12	149 (41.2)	13 (34.2)	
13-24	97 (26.8)	15 (39.5)	
25-36	62 (17.2)	7 (18.5)	
37-48	32 (8.8)	2 (5.2)	< 0.05
49-60	22 (6)	1 (2.6)	
Total	362 (100)	38 (100)	

Table 3 shows that the male children for both diseases are more affected than the female children (p > 0.05).

Table 3: Distribution of cases according the sex.

Gender	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Male	211 (58.3)	27 (71)	
Female	151 (41.7)	11 (29)	> 0.05
Total	362 (100)	38 (100)	

Table 4 represents the distribution of cases according to the residency. The highest frequency of both diseases occurs in those who live in urban areas (p > 0.05).

Table 4: distribution of the cases according to their residence.

Residence	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Rural	129 (35.7)	14 (36.9)	
Urban	233 (64.3)	24 (63.1)	> 0.05
Total	362 (100)	38 (100)	

Table 5 represents the distribution of cases according to the source of water. The highest frequency in both diseases, where those using tap water [311(85.91%) in amoebiasis and 32(84.2%) in shigellosis; P < 0.05].

Table 5: Distribution of the cases according to the source of water.

Source of water	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Tap	311 (85.9)	32 (84.2)	
Tank	15 (4.15)	5 (13.2)	< 0.05
River	36 (9.94)	1 (2.6)	
Total	362 (100)	38 (100)	

Table 6 shows that the highest frequency of both diseases were in children fed on formula rather than exclusive breast feeding [86 (34.9%) in amoebiasis and 11(35.5%) in shigellosis; p > 0.05].

Table 6: distribution of cases according to the feeding practice among children under two years.

Type of Feeding	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Breast	18 (7.3)	2 (6.5)	
Bottle	86 (34.9)	11 (35.5)	
Mixed	19 (7.7)	6 (19.3)	
Breast + food	27 (10.9)	2 (6.5)	> 0.05
Bottle + food	82 (33.4)	9 (29)	
Solid food	14 (5.8)	1 (3.3)	
Total	246 (100)	31 (100)	

Table 7 shows that more than two thirds of cases (72.75%) were among children whose mothers were <30 years of age whereas the frequency declines among children whose mothers were > 30 years of age (P < 0.05).

Table 7: Distribution of the cases according to mother age.

Mother age (years)	Amoebiasis No. (%)	Shigellosis No. (%)	P value
< 20	37 (10.2)	3 (7.9)	
20-24	116 (32)	19 (50)	
25-29	104 (28.7)	12 (31. 5)	< 0.05
30-34	47 (12.9)	3 (7.9)	
> 35	58 (16.2)	1 (2.7)	
Total	362 (100)	38 (100)	

Table 8 shows that the mothers of amoebic cases were mainly of low education [illiterate, read and write, 101(27.9%), 129(35.6%) respectively]. The same thing is observed for shigella cases; 9 (23.7%) illiterate and 18 (47.3%) read and write (p > 0.05).

Table 8: Distribution of the cases according to mother education..

Mother education	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Illiterate	101 (27.9)	9 (23.7)	
Read & write	129 (35.6)	18 (47.3)	
Primary	67 (18.5)	8 (21)	> 0.05
High school	54 (14.9)	2 (5.3)	
College	11 (3.1)	1 (2.7)	
Total	362 (100)	38 (100)	

Table 9 shows that the frequency of children whose mothers were housewives was higher in both categories (82.3% and 94.7%; P < 0.05).

Table 9: Distribution of the cases according to the mother employment.

Mother employment	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Worker	64 (17.7)	2 (5.3)	
House wife	298 (82.3)	36 (94.7)	< 0.05
Total	362 (100)	38 (100)	

Table 10 shows that the frequency of children who consumed unboiled water is higher among cases of both diseases (76.8%, 76.3%; P > 0.05).

Table 10: Distribution of the cases according to the practice of water boiling.

Water boiling	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Yes	84 (23.2)	9 (23.7)	
No	278 (76.8)	29 (76.3)	>0.05
Total	362 (100)	38 (100)	

Table 11 shows the highest frequency of diarrhea was among children whose mothers use the refrigerator for food storage among cases of both diseases (P < 0.05).

Table 11: Distribution of the cases according to the presence of food storage (refrigerator).

Using refrigerator	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Yes	269 (74.3)	36 (94.7)	
No	93 (25.7)	2 (5.3)	< 0.05
Total	362 (100)	38 (100)	

Table 12 shows that, similarly, the amoebic cases and shigella cases were mainly from big families [229(63.3%) and 25(65.8%), respectively; P > 0.05].

Table 12: Distribution of the cases according to the family size.

Family size	Amoebiasis No. (%)	Shigellosis No. (%)	P value
< 4	133 (36.7)	13 (34.2)	
> 4	229 (63.3)	25 (65.8)	>0.05
Total	362 (100)	38 (100)	

Table 13 shows that the frequency of other members suffering from the same diseases at the same time was higher among shigella cases in comparison to amoebic cases (P < 0.05).

Table 13: Distribution of the cases according to the presence of other family member suffering the same diseases.

Other Family Member	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Present	86 (27.7)	29 (76.3)	
Absent	276 (72.3)	9 (23.7)	< 0.05
Total	362 (100)	38 (100)	

Table 14 shows that fever; tenesmus and vomiting were the main associated clinical features in both diseases (P > 0.05).

Table 14: Distribution of the cases according to the clinical features.

Clinical Features	Amoebiasis No. (%)	Shigellosis No. (%)	P value
Fever	298 (45.4)	28 (42.4)	
Vomiting	221 (33.6)	24 (36.4)	> 0.05
Tenesmus	138 (21)	14 (21.2)	
Total	657 (100)	66 (100)	

Table 15 shows that about two thirds of both cases (68 %) have some dehydration (P < 0.05).

Table 15: Distribution of the cases according to the degree of the dehydration.

Degree of dehydration	Amoebiasis No. (%)	Shigellosis No. (%)	P value
None	77 (21.3)	1 (2.7)	
Some	242 (66.8)	30 (78.9)	< 0.05
Severe	٤٣(11.9)	7 (18.4)	
Total	362 (100)	38 (100)	

Discussion:

The results of current study showed that Entamoeba histolytica was the most frequently identified cause of bloody diarrhea. This finding is consistent with previous studies that have demonstrated that amoebiasis commonly causes bloody diarrhea in children like that in Iraq and in Bangladesh [6-8], while other studies showed the opposite as in Bolivia [9].

On other hand the study showed that Shigella infection was less frequently identified cause of bloody diarrhea. This is in agreement with the result of studies which carried out in Latin America [10], while this result is in contrast with the result of other studies which showed that most frequent pathogens were shigella as in Egypt, Zambia and Vietnam [11-13].

Also the study result showed that the highest frequency of amoebiasis and shigellosis were among children below two years of age (i.e.; the age group 0-12 months followed by the age group 13-24 months). This is in agreement with the result of another study on dysentery conducted in Baghdad which has shown the age of maximum frequency to be 13-18 months [14], and study on dysentery conducted in Bangladesh which has shown the age of maximum frequency to be 18-23 months [15].

Susceptibility of this age group to dysentery may be explained by many factors such as declining level of maternal immunity, introduction of complementary food (which may be contaminated by enteropathogens) and the increase in activity of the child that leads to contact with human and animal faeces and to possible consumption of contaminated food [1].

Both diseases affected males slightly more than females and the males to females ratio was 1.4:1. Many studies show the same finding, including a study conducted in multi-center in five countries [16], while others showed the opposite as in Bolivia [9] and in Basra [6], but still others reported that males and females were equally affected as in Jordan [17].

The increase of male to female ratio in our study may be due to the preference of boys rather than girls by the parents, as a result, parents seek medical help for boys more than girls.

The results show that the majority of the cases of bloody diarrhea were living in urban areas; this might be due to the fact that in the urban areas children are living in large families with unsafe or insufficient water supplies which lead to inadequate sanitation exposing the children to more chances of being infected with pathogens. A study conducted in Basra city showed the same finding [6].

Regarding the type of water supply the results showed that the higher percentage of bloody diarrhea cases in children were using tap water (85.75%). As untreated tap water is usually contaminated with pathogens that causes diarrhea, this is in agreement with the result of other study carried by Al-Rubai in Baghdad city which showed high frequency among those used tap water [14], while other study carried by Mohammed in Al-Mugdadia city, showed high significant association between using of river water and increasing numbers of cases [18].

Concerning the feeding pattern among patient aged less than two years, the present study revealed that the occurrence of bloody diarrhea is higher among children fed on formula than those on exclusive breast feeding; the same result was proved by a study carried by Khalifa et.al in Libya [19].

The age of the mother may be related to the occurrence of diarrheal diseases in their children. The result of the present study showed that more than two thirds of the cases were among children of mothers aged less than thirty years. Similar results were also observed in Iraq [20].

The present study showed that the children of mothers of low education had higher percentage in the occurrence of bloody diarrhea. This is in consonant with the study conducted in Libya which showed a decrease incidence of disease associated with higher education of the mothers [19], while a correlation between the level of mothers' education and the presence of diarrhea in the children was revealed in the study performed in Mosul [21]. This might be partially due to the danger of artificial feeding when practiced by uneducated mothers and lack of appropriate knowledge and attitude about handling a child with diarrhea. In addition to the above explanation, most of the low educated mothers are found among the socioeconomic stratum of the community where there is over crowding which increases the risk of spread of infection.

Mothers of children with bloody diarrhea were mostly housewives; similar results were obtained in Mosul [21] and in Saudi Arabia [22]. The possible explanation is that housewives were less educated and hence their children are at higher risk of developing bloody diarrheal diseases.

The use of unboiled water showed a higher percentage of bloody diarrheal cases, this finding is in line with what was reported by Omran and Yasin in Qurna city of Basra [5] and by Nimri and Megdam in Jordan [23]. Unboiled water increases the risk for bloody diarrhea by 2.56 this is explained by the fact that boiling water for one minute is adequate to kill shigella and other pathogens which are major causes of bloody diarrhea [24].

The lack of food storage in refrigerators increases the risk of bloody diarrhea, this is due to the effect of freezing which slow down the growth of bacteria but don't kill them, especially in shigella which is the main cause of bloody diarrhea [25]. Our study shows high percentage of cases (76.25%) among those who use refrigerator for food storage; this may be due to the continuous interruption of electrical power, while the opposite was demonstrated by AL-Eghadie, who reported that lack of food storage in refrigerator increase the risk of bloody diarrhea to 12 times [26].

Concerning overcrowding, our study shows that a higher percentage of bloody diarrhea cases are found among children living within big families, this is because overcrowding is associated with poor socioeconomic status or with low educational standards of the parents. A similar finding has been reported in Baghdad city [14], while study conducted in Al-Mugdadia showed the opposite [18].

The frequency of amoebic dysentery in other members of the house-hold was low while it was high in shigellosis; this may reflect the common route of transmission of enteropathogens in shigellosis (feco-oral route and person to person infection) and the fact that only a small number of bacteria is needed to cause infection.

Fever was documented in 81.5% and vomiting in 61.25% of the cases. These are the main associated clinical feature of bloody diarrhea; several study revealed the same finding as that carried by Al-Eissa et.al in Saudi Arabia [27] and by Abu-Elyazeed et.al in rural Egypt [11].

Dehydration occurred in 78.7% of the amoebic cases and in 97.3% of shigella cases but sever cases of dehydration are approximately equal in both diseases (11.9 and 18.4%, respectively). Dehydration may due to the fact that fever, loss of appetite, fluid loss through stool and vomiting is more in bloody diarrhea. This is in agreement with the study carried by Chopra et.al in southern Africa [28], while the opposite was reported by Biswas et.al in Hong Kong, who showed that none was severely dehydrated [1].

Conclusions:

1- Entamoeba histolytica is the most frequently identified cause of bloody diarrhea.
2- Children aged below two years of age are more prone to bloody diarrhea.
3- Both amoebiasis and shigellosis share the association with all risk factors.

Recommendations:

Child health services should concentrate on health education of mother to encourage breast feeding, boiling of water, general, personal and environmental hygiene, as measure to decrease spread of these infections.

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