

# Relationship Between Bacterial Diarrhea and Food Types in Children Under Two Years Age in Baghdad City

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## Abstract:

**Background:** bacterial diarrhea is the most frequent gastroenterological disorder, and the main cause of dehydration in many children, especially in Iraq, therefore the aim of this study investigation the relationship between bacterial diarrhea and food types in children under two years age.

**Patients and methods:** About 200 children suffering from frequent diarrhea in Al-alwiyah Pediatric Teaching Hospital were enrolled during the period (April – August) 2020. Feecal specimens were taken and examined by microscopy, and cultured on agar, incubated at 37°C for 18–24/ 8 h. The bacterial isolates were identified by different biochemical tests and serotyping.

**Results:** current study show about (40%) of bacteria causing diarrhea in child under two years age Shigella species highest percentage

(21.25%) followed by *E.coli* (17.5%), so (26.3%) of child had bacterial diarrhea, compare to non- bacterial causing (60%).so highest percentages of bacterial diarrhea were recorded in male with age (1-6 months) as (21.3%) followed by (7-12 months) as (12.5 %); and females were having bacterial diarrhea (55%) more than males (45%). As well as our study appearance an exclusive breastfeeding compare to Bottle feeding (58.7 %). **Conclusions:** about (40%) of bacteria causing diarrhea in child under two years, highest percentages of bacterial diarrhea were recorded in male with age (1-6 months) as (21.3%), females were having bacterial diarrhea more than males, as well as our study appearance Shigella species highest percentage followed by *E.coli* so the type of feeding play an important role in increasing diarrhea rates in children under 2 years.

**Keywords:** diarrhea, under 2 years, breastfeeding, susceptibility, bacterial diarrhea.

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## Introduction:

Acute gastroenteritis is among the major causes of mortality among youngsters worldwide with 1.34 million deaths annually in children younger than five years . Diarrhea is defined by World Health Organization (WHO) as having 3 or more loose or liquid stools per day or as having more stools than is normal for that person<sup>(1)</sup> , diarrhea is common in all age groups but is more common in child, annually at least 1500 million episodes of diarrhea occur in children under age of 5 years<sup>(2)</sup> .

Diarrheal diseases accounted for 8% of all deaths in children under five years of age in 2016, and this translates to over 1300 young children dying each day, or approximately 480,000 children a year<sup>(3)</sup> . The cause of infections might be parasite; viral or bacterial and the severity of the infection varies in different geographical regions depending on comorbidities and the immune status of the host<sup>(4)</sup> .

the prevalence of bacterial infection in cases of diarrhea among children in many countries varies between 5.3% and 54%<sup>(5)</sup> , bacterial causes are ranked as the second most common cause of diarrhea in developing countries<sup>(6)</sup> , so higher bacterial prevalence (95%) in Kut city<sup>(7)</sup> .

Type of feeding play important role in incidence of bacterial diarrhea , also can consequences on other part of gastrointestinal tract can be prevented by breast feeding<sup>(8)</sup> , so breastfeeding can reduce the risk of infection and has a long term effect that can reduce the risk for obesity, hypertension, and reduce cholesterol level<sup>(9)</sup> .

## Patients and methods:

About two hundred children suffering from frequent diarrhea (more than three times per day), fever, and vomiting; dehydration; abdominal pain and loss of appetite in Al-alwiyah Pediatric Teaching Hospital were enrolled during the period (April – August) 2020.

Feecal specimens were taken by a sterile cotton swab and placed in the peptone water broth and transferred within an hour to the laboratory after all the patient's information was recorded. Feecal specimens examined with the naked eye to observe the color, density, presence of mucus or blood, as well as examined by microscopy, and cultured on agar ( blood ; MacConkey ; Eosin methylene blue (EMB) ; Xylose lysine deoxycholate (XLD) ;Sorbitol MacConkey ; thiosulphate citrate bile salt sucrose (TCBS) and Selenite broth, Salmonella–shigella agar (SSA). Then incubated at 37°C for 18–24/ 8 h . The bacterial isolates were identified by different biochemical tests and serotyping to confirmed diagnoses<sup>(10)</sup>.

**Results:****Table (1): Distribution of children with diarrheal infected under two years age according to types of microorganisms**

Types of microorganisms	children with diarrheal infected under two years age	
	No.	(%)
<b>Bacterial infection</b>	80	40
<b>Non-Bacterial infection*</b>	120	60
<b>Total</b>	200	100

\*others microorganism

Results in table (1) show (No.= 80, 40%) of bacteria causing diarrhea in child under two years, compare to non- bacterial causing (No.= 120, 60%).

**Table (2): Distribution of children with bacterial diarrhea in children according the gender and age.**

Age (months)	Gender				Total	
	Male		Female			
	No.	(%)	No.	(%)	No.	(%)
<b>1-6</b>	17	21.3	14	17.6	31	38.9
<b>7-12</b>	10	12.5	16	20	26	32.5
<b>13- 18</b>	6	7.5	7	8.7	13	16.2
<b>&gt;19</b>	3	3.7	7	8.7	10	12.4
<b>Total</b>	<b>36</b>	<b>45</b>	<b>44</b>	<b>55</b>	<b>80</b>	<b>100</b>

The highest percentages of bacterial diarrhea were recorded in male with age (1-6 months) as (21.3%) followed by (7-12 months) as (12.5 %); while compare to female more common (20%) in the age group of (7-12 months) (Table 2).

So, results in same table showed that more females were having diarrhea (55%) as compared to males (45%).

**Table (3): Bacterial isolate isolated from children with diarrheal infected**

Bacterial isolate	No.	%
<i>Shigella spp</i>	17	21.25
<i>Escherichia coli</i>	14	17.5
<i>Enterobacter areogenosa</i>	10	12.5
<i>Proteus mirabilis</i>	10	12.5
<i>Klebsiella pneumonia</i>	7	8.7
<i>Pseudomonas aeruginosa</i>	7	8.7
<i>Staphylococcus aureus</i>	5	6.2
<i>Enterobacter areogenosa</i>	4	5
<i>Staphylococcus haemolyticus</i>	3	3.7
<b>Enterobacter</b>	2	2.5
<i>Acinetobacter baumannii</i>	1	1.2
<b>Total bacterial isolated</b>	<b>80</b>	

Shigella species were found to be highest constituting 17 (21.25%) followed by *Escherichia coli* 14 (17.5%) and both *Enterobacter areogenosa* and *Proteus mirabilis* as 10 (12.5%), whilst *Acinetobacter baumannii* only one isolate as depicted in table 3.

**Table (4): Relationship between type of feeding and diarrhea**

Types of feeding	No.	%
<b>exclusive Breast feeding</b>	21	26.3
<b>exclusive Bottle feeding</b>	47	58.7
<b>Mix feeding (Breast and Bottle feeding)</b>	12	15
<b>Total</b>	<b>80</b>	<b>100</b>

Results in table (4) showed 21 child (26.3%) had an exclusive breastfeeding, 47 child (58.7 %) had an exclusive Bottle feeding whilst 12 child (15%) as Mix feeding (Breast and Bottle feeding)

## Discussion:

Current study show (No.= 80, 40%) of bacteria causing diarrhea in child under two years, The highest percentages of bacterial diarrhea were recorded in male with age (1-6 months) as (21.3%) followed by (7-12 months) as (12.5 %); while compare to female more common (20%) in the age group of (7-12 months).

So, results in same table showed that more females were having diarrhea (55%) as compared to males (45%). While other Study in Iraq/Baghdad recorded the increase rate of infection diarrhea among males than female and lower level of education for parents lead to increased risk of frequent diarrhea besides the mother's nutrition<sup>(11)</sup>, also many previous study as hariff *et al.*, 2003; Sherchand *et al.*, 2009; Klein *et al.*, 2006 and Moyo *et al.*, 2011)<sup>(12,13,14,15)</sup> appearance the higher positivity rate among boys compare to female.so but this difference between both sexes was statistically non-significant ( $p > 0.05$ ). This agrees with other studies conducted by<sup>(16)</sup> in Tehran (Iran), Johargy *et al.*, 2010 study in Makkah<sup>(17)</sup>, This may be due to the fact that both sexes have the same chance of exposures to the environmental conditions and contaminated sources of infection such as food and water. While some other studies reported higher rate of diarrhea in male children<sup>(18 and 19)</sup>.

The increased risk for serious infections among youngsters of less than 4 years of age is usually associated with the uncompleted schedules of vaccines resulting in a weakened immunity against microorganisms; and thus, a peak of infection cases among this group<sup>(20)</sup>. Shigella species were found to be highest constituting 17 (21.25%) followed by

*Escherichia coli* 14 (17.5%) and both *Enterobacter areogenosa* and *Proteus mirabilis* as 10 (12.5%), whilst results of Muhsin,2017 study show most important bacterial *E. coli* infected 58.43%, *Klebsiella spp.* 20.12%, *Shigella spp.* 2.30%, and *Pseudomonas spp.* 0.77%<sup>(21)</sup>.

So current study showed 21 children (26.3%) had an exclusive breastfeeding, 47 children (58.7 %) had an exclusive Bottle feeding whilst 12 children (15%) as Mix feeding (Breast and Bottle feeding), The event of diarrhea is lower in exclusively breastfed child. According to<sup>(22)</sup>, this is because of the presence of sIgA (secretory Immunoglobulin A) in the breastmilk. SIgA has a role in the local protection on the mucous layer of the digestive tract. There are other protective contents in breastmilk such as IgG, IgM, IgD, Bifidobacterium bifidum, lactoferin, lysozyme, macrophage, neutrophil, lymphocyte and lipids. The role of breastfeeding in reducing infection of diseases can also be seen in the cohort study of<sup>(23)</sup>, stating that in child who were exclusively breastfed for 6 months, the diarrhea proportion were 8.6% lower and the respiratory tract diseases are 20% lower ( $p = 0.03$ ) compared to non , According to<sup>(24)</sup> the incidence of diarrhea in child who were breastfed was lower than those who were fed formula milk, this shows the role of breastmilk to control the disease .As well as Ip *et al.*, concludes that breastfeeding can reduce the risk of diarrhea on infants of less than one year of age compared to non breast fed infants<sup>(25)</sup>.

### Conclusions:

- ❖ About (40%) of bacteria causing diarrhea in child under two years,
- ❖ Highest percentages of bacterial diarrhea were recorded in male with age (1-6 months) as (21.3%) .

- ❖ Females were having bacterial diarrhea more than males
- ❖ Shigella species highest isolate followed by *E.coli*
- ❖ The types of feeding plays an important role in increasing diarrhea rates in children under 2 years.

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## العلاقة بين الاسهال البكتيري وانواع الغذاء في الاطفال بعمر اقل من سنتين في مدينة بغداد

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### الخلاصة :

يعتبر الإسهال البكتيري من أكثر أسباب الجفاف لدى العديد من الأطفال ، وخاصة في العراق ، لذلك تهدف هذه الدراسة إلى التحقق من العلاقة بين الإسهال البكتيري وأنواع الغذاء لدى الأطفال دون سن الثانية. المرضى وطرق العمل : شملت الدراسة 200 طفل يعانون من الإسهال المتكرر في مستشفى العلوية التعليمي للطفل من الفترة ( نيسان - اب ) لسنة 2020 ، ود تم اخذ العينات البراز وفحصها مجهريا ، وزرعها على وسط الزرع ، وحضنت الاطباق بدرجة 37م لمدة 18-24 ساعة ، وقد تم تشخيص الانواع البكتيرية بالاعتماد على الاوساط الزرعية والاختبارات الكيميائية اضافة الى الفحوصات المصلية . النتائج: أظهرت الدراسة الحالية حوالي (40%) من البكتيريا المسببة للإسهال لدى الأطفال دون سن الثانية مقارنة بالمسببات غير البكتيرية (60%) ، وقد تم تسجيل أعلى نسبة من الإسهال البكتيري عند الذكور بعمر (1-6 أشهر) وبنسبة (21.3%) (تليها (7-12 شهراً) بنسبة (12.5%) ؛ وكانت الإناث يعانين من الإسهال البكتيري (55%) أكثر من الذكور (45%) . وقد بينت الدراسة الحالية ان بكتريا الشيغيلا اكثر العزلات وبنسبة (21.25%) تليها الإشريكية القولونية (17.5%) ، وايضا فان الاطفال اللذين حصلوا على رضاعة طبيعية بنسبة (26.3%) اكثر مقارنة بالرضاعة بالقناني الحليب) وبنسبة 58.7%. الاستنتاجات: حوالي (40%) من البكتيريا المسببة للإسهال عند الأطفال دون سن الثانية ، سجلت أعلى نسب الإسهال البكتيري عند الذكور بعمر (1-6 أشهر) حيث بلغت (21.3%) للإناث أكثر من الذكور بالإضافة إلى ظهور دراستنا بأنواع الشيغيلا أعلى نسبة تليها الإشريكية القولونية لذا فإن نوع التغذية يلعب دوراً مهماً في زيادة معدلات الإسهال لدى الأطفال دون سن الثانية. الاستنتاجات: حوالي (40%) من البكتيريا المسببة للإسهال عند الأطفال دون سن الثانية ، سجلت أعلى نسب الإسهال عند الأطفال دون سن الثانية ، سجلت أعلى نسب الإسهال الجراثومي عند الذكور بعمر (1-6 أشهر) حيث بلغت (21.3%) للإناث مقارنة بالذكور بالإضافة إلى ظهور عزلات بكتريا الشيغيلا أعلى نسبة تليها الإشريكية القولونية لذا فإن نوع التغذية يلعب دوراً مهماً في زيادة معدلات الإسهال لدى الأطفال دون سن الثانية.

**الكلمات المفتاحية :** إسهال ، أقل من سنتين ، رضاعة طبيعية ، حساسية ، إسهال بكتيري