

**Bloody Diarrhea (Causes and Drug Sensitivity) Among Children Under Five Years of Age Admitted to the Maternity and Children Teaching Hospital in Al- Ramadi City Western of Iraq -A Retrospective Descriptive Study**



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Corresponding author:

1. Name; Dr. Salah A. **Alkubaisi**
2. Academic degree: DCH/ pediatric department .
3. Affiliation: Ramadi teaching hospital for gynecology and childhood.
4. Address: Ramadi city/Iraq
5. Mobile number:009647802285606
6. E-mail:thesalah1967@gmail.com

Coauthors:

1. Mohammed S. **Dawood**. Public Health Department/Al-Anbar Health Directorate/Al-Anbar province.
2. Raad H. **Khalaf**. CIB/ pediatric department/ Ramadi teaching hospital for gynecology and childhood.
3. Rafi Khaleel **Al-Ani**. CIB/ pediatric department/ Ramadi teaching hospital for gynecology and childhood.

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## **ABSTRACT:**

**Background:** Diarrhea is a leading cause of illness and death among children in developing countries, where an estimated 1300 million episodes and 3.2 million deaths occur each year in those under 5 years of age, and about 80% of death in last 2 years of life.

**Objective:** is to identify the etiological agents of bloody diarrhea with their antibiotics susceptibility and risk factors among children under 5 years of age admitted to maternity and children hospital in -Ramadi city during a specified period retrospectively.

**Subject & methods :** A retrospective descriptive study was subjected, including 125 children under 5 years of age selected from records for management of bloody diarrhea in the hospital, over a period of 4 months from 1st of May to the end of August 2004 and studied for identification of causative micro-organisms and risk factors of bloody diarrhea. Each child was studied for the following: age, sex, residence, source of water supply, frequency and duration of diarrhea, associated symptoms, type of feeding and positive history of other family members. General stool examination and Cultures of stool specimens were done for all patients.

**Results:** The majority of causative agents were of bacterial origin 82(65.6%) followed by unidentified causative organisms 25 (all of them received antibiotics) while *Entamoeba histolytica* represented 14.4% of all cases. *E.coli 0157* was the most frequent etiological agent among all studied cases 71(56.8%). In vitro isolates bacteria(as whole) showed high sensitivity to ciprofloxacin(92.7%) followed by ceftriaxone(82.9%), amikacin(81.7%) and cefotaxime(72.0%), on the other hand, bacteria isolates showed high resistant to augmentin(90.2%) then to ampicillin(87.-8%) and co-trimaxazol(78.0%) while moderate sensitivity found to gentamycin and nalidixic acid (51.2% & 50% respectively).

**Conclusion:** Bacterial agents are the commonest cause in this study and *E.coli 0157* was the most frequent etiological agent as compared with other causes. Ciprofloxacin appeared to have high sensitivity to all bacterial origin while susceptibility to other antibiotics was variable. Rural area, bottle feeding, and 'uneducated mothers were found to be significant risk factors for developing bloody diarrhea.

**Keywords:** Bloody diarrhea; antibiotic susceptibility; Ramadi city.

**Running title:** bloody diarrhea among Ramadi city children.

## INTRODUCTION

Diarrhea is a leading cause of illness and death among children in developing countries, where an estimated 1300 million episodes, and 3.2 million deaths occur each year in those under 5 years of age, and about 80% of death in the last 2 years of life <sup>(1)</sup>.

Bloody diarrhea (dysentery) is a clinical diagnosis that refers to any diarrheal episode in which the loose or watery stools contain visible red blood. This does not include episodes in which blood is present in streaks on the surface of the formed stool, is detected only by microscopical examination <sup>(2)</sup>.

In young children, bloody diarrhea is usually a sign of invasive-enteric infection, that carries a substantial risk of serious morbidity and mortality. This is especially for developing countries, where the problem occurs most frequently. About 15% of diarrheal-associated death occurs under the age of 5 years <sup>(3)</sup>. Compared with watery diarrhea, bloody diarrhea generally lasts longer, is associated with more complications, is more likely to adversely affect a child's growth, and has a higher case fatality rate <sup>(4-6)</sup>.

The most commonly recognized bacterial enteric pathogens in developing countries are *E.coli*, *Salmonella*, and *Shigella*, whereas *Campylobacter* and *Salmonella* spp. are the most common causes of bacterial enteritis in developed countries <sup>(8)</sup>.

Studies in communities and health facilities have shown that the Management of patients with bloody diarrhea is frequently irrational. Many medications prescribed are ineffective or dangerous, and where effective medications are advised the amount given is often too little, the duration of treatment is too short, or both and oral rehydration solution amount is insufficient <sup>(9-11)</sup>.

This study aims to identify the etiological agents of bloody diarrhea with their antibiotics susceptibility and risk factors among children under 5 years of age admitted to maternity and children hospital in Ramadi city during a specified period retrospectively.

## **SUBJECTS & METHODS**

Children under 5 years of age admitted to maternity and children hospital in Ramadi city for management of bloody diarrhea, were studied for identification of causative micro-organisms and some factors might be related to bloody diarrhea.

A retrospective descriptive study was subjected, including 125 children under 5 years of age selected from records for management of bloody diarrhea in the hospital, over 4 months from 1st of May to the end of August 2004 and studied for identification of causative micro-organisms and factors that might be related to bloody diarrhea.

Each child was studied for the following: age, sex, residence, source of water supply, frequency and duration of diarrhea, associated symptoms, type of feeding and positive history of other family members. Certain anthropometrics measures (weight & length) and careful examination for a sign of dehydration were done for all subjects.

Bloody diarrhea is considered when loose or watery stools contain visible red blood (2).

Stool samples were collected in wide-mouth sterile containers before antibiotic therapy was started. After that, the fecal sample was carried directly to the hospital laboratory to be examined and processed under the supervision of a microbiologist.

Stool specimens were macroscopically inspected for consistency, color, and presence of blood and mucus were microscopically examined for pus cells, RBCs, parasites and yeasts, as-well-as, biochemical tests were done including PH and reducing substance of stool.

Cultures of stool specimens were done for all patients and the bacterial isolates were identified according to their cultural characteristics, microscopical appearances, and biochemical tests. The following commercial preparations cultures media were used :

1. MacConkey agar (oxoid, England).
2. Blood agar (oxoid, England).
3. S.S agar (oxoid, England).

As well as, the following kits were used for identification of microorganisms :

1. Antisera for shigella including anti-shigella ( Bio-Meriex, France).

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2. Antisera for salmonella including : anti-salmonella A-67, Germany.
3. Antisera for E.coli 0157 Sifin, Germany.

Statistical analysis was done using SPSS version 11 computer software (Statistical Package for Social Sciences). The statistical significance of the association between 2 categorical variables was assessed by the Chi-square test. A P-value of less than 0.05 was considered statistically significant.

## RESULTS

One hundred twenty-five children under 5 years of age complaining from bloody diarrhea admitted to maternity and children hospital in Ramadi city over a period- of 4 months were studied for etiological agents of bloody diarrhea, 77 of them were male,(61.6%) and 48 were female,(38.4%) with male to female ratio 1.7:1 (statistically significant,  $P < 0.009$ ). The majority of cases (52.0%) were under one year of age while 27.2% of all cases were between 1-3 years of age and 20.8% were within the age ranged from 3-5 years, the difference was significant among the 3 age groups ( $P < 0.001$ ). Table (1)

Rural area, bottle & mixed feeding, and uneducated mother were found to be significant risk factors for developing bloody diarrhea ( $P < 0.001$  for each one) whereas the source of water supply showed no significant difference ( $P = 0.125$ ). Table (2).

The majority of causative agents of bloody diarrhea were of bacterial origin 82 (65.6%) followed by unidentified causative organisms 25 (all of them received antibiotics) while *Entamoeba histolytica* represents 18 (14.4%) of all cases. *E.coli* 0157 was the most frequent etiological agent among all studied cases 71 (56.8%), majority of them were detected in children under one year of age (62.0%) followed by children aged 1-3 years (25.4%) while a minority, of cases, were within age ranged from 3-5 years (12.6%). *Shigella* represents 4.8% of etiological agents equally distributed at age groups  $< 1$  and 1-3 years (3 cases for each one), while no cases were detected at age group 3-5 years. However, *Salmonella* was isolated in 5 cases (4.0%), all of them under one year of age. On the other hand, *Entamoeba histolytica* as a causative agent of bloody diarrhea. found to be mainly affecting children aged 3-5 Years (72.2%) followed by 1-3 years (22.2%) while only 5.6% of cases were under one year of age. Table (3)

In vitro isolate *E.coli* 0157 showed high susceptibility to ciprofloxacin, ceftriaxone and amikacin (94.4%, 84.5% and 83.1% respectively) and least susceptibility to augmentin, ampicillin and co-trimoxazol (7.0%, 14.1% and 22.5% respectively) while their susceptibility to cefotaxime, gentamycin, and nalidixic acid were 69.0%, 52.1%, and 49.3% respectively. *Shigella* appeared to have very high sensitivity to amikacin (100%) followed by ciprofloxacin, cefotaxime and ceftriaxone (83.3%, 83.3% and 66.7% respectively) whereas it was highly resistant to ampicillin (100%) then gentamycin (83.3%), co-trimoxazol (83.3%), nalidixic acid (66.7%) and augmentin (66.7%). The susceptibility of isolate *Salmonella* to cefotaxime was very high (100%) followed by ceftriaxone, ciprofloxacin and nalidixic acid (80.0% for each one), and high resistance to ampicillin (100%) then to

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gentamycin, co-trimaxazol and augmentin (80.0% for each one) while their resistant to amikacin was found as 60.0%. ( Table 4).

Figure (1) gives an idea about the susceptibility of isolate bacteria(as whole) to different types of antibiotics, there was high sensitivity to ciprofloxacin(92.7%) followed by ceftriaxone (82.9%), amikacin (81.7%) and cefotaxime(72.0%), on the other hand, isolate bacteria showed high resistance to augmentin (90.2%) then to ampicillin(87.8%) and co- trimaxazol (78.0%) while moderate sensitive to nalidixic acid and gentamycin (50% & 48.8% respectively).

Tenesmus represents the most frequent symptom of bloody diarrhea (89.6%) followed by fever (85.6%) and vomiting 49.6% of all studied cases, whereas convulsion reported only in 2.4% of cases (E.coli 0157 found to be the causative agent of bloody diarrhea for all of them). Figure (2).

## DISCUSSION

Most diarrheal episodes occur during 1st 2 years of life and incidence is highest in the age group 6-11 months when weaning often occurs<sup>(12)</sup>, in the present study the majority of cases were under 1 year of age. This pattern reflects the combined effects of the declining level of maternity acquired antibodies, lack of active immunity in infants and the introduction of food that may be contaminated with fecal bacteria<sup>(1)</sup>.

This study showed that males were affected more frequently than females, similar results were reported by other studies<sup>(13-15)</sup>, and this is in line with the general concept of Male susceptibility to infection<sup>(16)</sup>.

As well known, certain factors increase susceptibility to infection with enteropathogens including young age, lack of breastfeeding, exposure to unsanitary conditions, ingestion of contaminated food or water and level of maternal education<sup>(17)</sup>. In the present study rural area, bottle feeding and uneducated mothers were found to be significant risk factors for developing bloody diarrhea. Many studies<sup>(1, 18, 19)</sup>.

reported that bottle-feeding dominated breastfed among children with gastroenteritis and this related to that breast milk is fresh and free of contaminated bacteria<sup>(17)</sup>, furthermore, breastfeeding has been associated with a reduced risk of diarrhea with evidence that secretory immunoglobulin antibody in breast milk could protect against *E.coli*<sup>(20'.21)</sup>.

Among young children in developing countries, most episodes of bloody, diarrhea result from intestinal infections and nearly all of these are caused by invasive enteric bacteria, *Entamoeba histolytica*, the only important non-bacterial pathogen usually account for less than 3% of episodes<sup>(5' 22)</sup>. In this study, the majority of causative agents of bloody diarrhea were of bacterial origin and *E.coli* 0157 was the most frequent etiological agent among all studied cases, similar observations were reported by other studies in certain developing countries.<sup>(15,23-26)</sup>

Furthermore, Ansaruzzaman et al<sup>(27)</sup>, Echeyrya et al<sup>(28)</sup>, Tardelli et al<sup>(29)</sup> and Vidotto et al<sup>(30)</sup> reported that *E.coli* is not a frequent cause of diarrhea in developed countries but it's very commonly associated with enteric disease in developing

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countries. *Shigella* was found as the 2nd commonest bacterial Cause of bloody 'diarrhea among our cases, similar observation was reported by Al-Ani<sup>(15)</sup>, Taha<sup>(31)</sup> in Ramadi city and Ismail<sup>(32)</sup> in Bahrain, while many studies conclude, that *Shigella* is the most frequently isolated organism from the stools, of young children with bloody diarrhea in developing countries<sup>(5'22'33)</sup>, this variation of causative organisms among different Countries may be related to lifestyle of each country and the pattern .of antibiotic use.

On the other hand, *Salmonella* was isolated in 5(4%) cases only, our findings fall in the range reported by WHO(1995) that *Salmonella* causes 1- 5% of gastroenteritis cases in most developing countries<sup>(34)</sup>, furthermore, many studies conclude that the frequency of isolation of *Salmonella* from diarrheal cases in developing countries is low <sup>(35-37)</sup>. *Entamoeba histolytica* can cause serious dysentery in young adults but is rarely the cause of dysentery in young children, in this study *Entamoeba histolytica* was detected in the stools of 18 cases only that represent 14.4% among all etiological agents of bloody diarrhea. Finally, unidentified causative organisms were reported in 25 (20%) cases, this may be related to partial treated bloody diarrhea as all those patients were received antibiotics before admission or due to other causative agents which missed in our study because of unavailability of kits that specific for these agents like a kit of campylobacter spp..

Regarding antibacterial susceptibility, the isolated micro-organisms from studied cases showed high sensitivity to ciprofloxacin, ceftriaxone, and cefotaxime. A similar observation was reported <sup>(13)</sup>. Other studies in developing countries<sup>(38-4°)</sup>. Furthermore, many studies<sup>(41-53)</sup> conclude that *Shigella* and other organisms showed little or no resistant to ciprofloxacin. On the other hand, in this study the isolates microorganisms showed high resistant to ampicillin, augmentin, and co-trimaxazol, similar results were reported by Wafy et al <sup>(39)</sup> and Jamal et al. Further, *E.coli* and *Shigella* that isolated from studied cases showed high susceptibility to amikacin and high resistant to nalidixic acid, in contrast to salmonella that showed exactly opposite of that. This variation of antibiotics susceptibilities may be related to the abuse of antibiotics which becomes a worldwide problem, especially in developing countries.

## Conclusion:

1. In children under 5 years of age, bacterial agents are the commonest cause of bloody diarrhea among children under 5 years of age admitted the maternity & children hospital in Al-Ramadi city and *E.coli* 0157 was the most frequent bacterial

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agent as compared with other causes.

2. Ciprofloxacin appeared to be the most effective to all bacterial origin of bloody diarrhea while susceptibility to usually used antibiotics was variable.
3. Rural area, bottle feeding, and uneducated mothers are significant risk factors for developing bloody diarrhea.

## Recommendation:

1. Further studies should be performed to give an idea about the role of *E.coli* 0157 in diarrhea and other systemic diseases like hemolytic uremic syndrome.
2. Program for mothers should be done to encourage breastfeeding as a preventive measure for diarrhea.
- 3- further studies should be done to evaluate antibiotic susceptibility in the hospital at least every year.

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**Bloody Diarrhea (Causes and Drug Sensitivity) Among Children Under Five Years of Age Admitted to the Maternity and Children Teaching Hospital in Al- Ramadi City Western of Iraq -A Retrospective Descriptive Study**



د. صلاح احمد الكبيسي      د. محمد صباح داود      د. رعد حميد خلف      د. رافع خليل العاني

**Table (1): Sex Difference Among All Studied Samples**

Age groups(years)	Gender		Total
	Male(%)	Female(%)	
< 1	40(61.5)	25(38.5)	65(52.0)
1-3	25(73.5)	9(26.5)	34(27.2)
3-5	12(46.2)	14(53.8)	26(20.8)
<b>Total</b>	<b>77(61.6)</b>	<b>48(38.4)</b>	<b>125(100)</b>

**P. value of sex difference (using Chi square test): 0.009 P.value**

**among 3 age groups (using Chi square test): <0.001**

**Table(2) Risk Factor for Bloody Diarrhoea by Different Variables.**

variable	classification	No. ofcases	%	p.value
<b>Residency</b>	<b>Rural</b>	<b>91</b>	<b>72.8</b>	<b>&lt; 0.001</b>
	<b>Urban</b>	<b>34</b>	<b>27.2</b>	
<b>Water supply</b>	<b>Pipe</b>	<b>71</b>	<b>56.8</b>	<b>0.128</b>
	<b>Other sources</b>	<b>54</b>	<b>43.2</b>	
<b>Type of feeding</b>	<b>Breast</b>	<b>21</b>	<b>16.8</b>	<b>&lt; 0.001</b>
	<b>Bottle (&amp; others)</b>	<b>104</b>	<b>83.2</b>	
<b>Educatio n of mother</b>	<b>Uneducated</b>	<b>95</b>	<b>76.0</b>	<b>&lt; 0.001</b>
	<b>Educated</b>	<b>30</b>	<b>24.0</b>	

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**Table (3): the causative agent of bloody diarrhea among different age groups.**

Causative agent*		No.(%)	Age group(years)		
			<1%	1-3%	3-5%
Culture +ve	E.coli 0157	71(56.8)	44(62.0)	18(25.4)	9(12.6)
	Shiglla	6(4.8)	3(50.0)	3(50.0)	0(0.0)
	Salmonella	5(4.0)	5(100)	0(0.0)	0(0.0)
Culture -ve*		25(20.0)	12(48.0)	9(36.0)	4(16.0)
<b>Total</b>		<b>107(100)</b>	<b>65(52.0)</b>	<b>34(27.2)</b>	<b>26(20.8)</b>

\* of 125 as a total studied cases; 18 cases were diagnosed as E.histolytica

\* Culture -ve for E.coli 0157, Shigella, Salmonella.

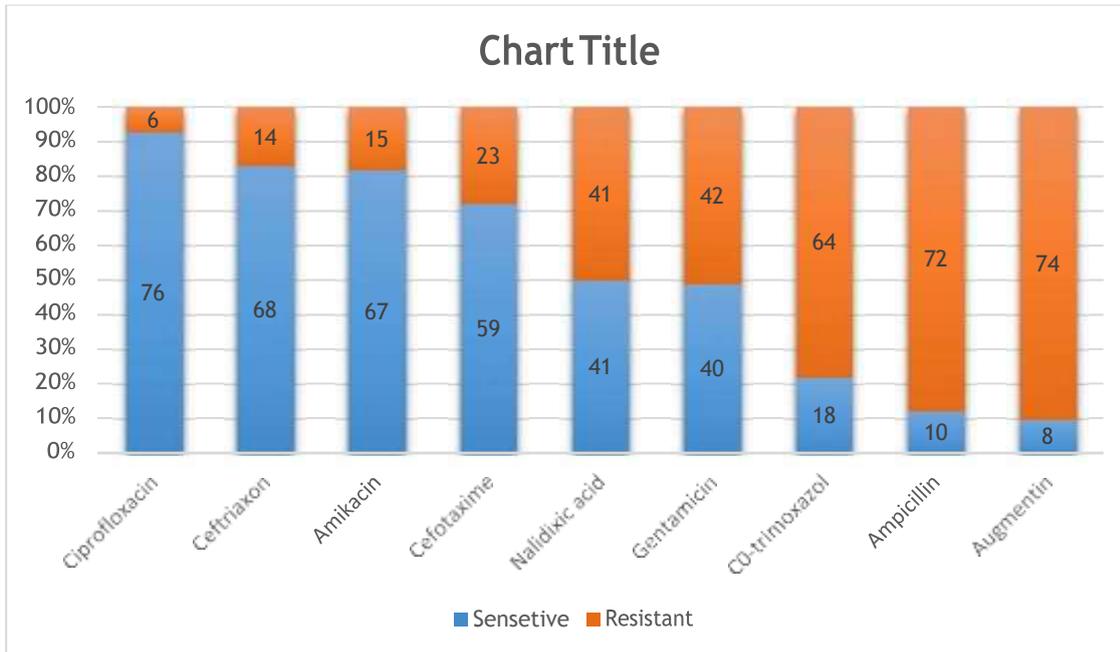
**Table (4): Results of the susceptibility of different antibiotics against isolating micro-organisms**

Antibiotics		E. coli 0157		Shigelloses Salmonella (71 case) (6 cases)			
		NO.	(%)	NO.	(%)	NO.	(%)
Cefotaxime	S	49	(69.0)	5	(83.3)	5	(100.0)
	R	22	(31.0)	1	(16.7)	0	(0.0)
Ceftriaxone	S	60	(84.5)	4	(66.7)	4	(80.0)
	R	11	(15.5)	2	(33.3)	1	(20.0)
Gentamycin	S	37	(52.1)	1	(16.7)	1	(20.0)
	R	34	(47.9)	5	(83.3)	4	(80.0)
Arnickacin	S	59	(83.1)	6	(100.0)	2	(40.0)
	R	12	(16.9)	0	(0.0)	3	(60.0)
Ciprofloxacin	S	67	(94.4)	5	(83.3)	4	(80.0)
	R	4	(5.6)	1	(16.7)	1	(20.0)
Nalidexic acid	S	35	(49.3)	2	(33.3)	4	(80.0)
	R	36	(50.7)	4	(66.7)	1	(20.0)
Co-trimaxazol	S	16	(22.5)	1	(16.7)	1	(20.0)
	R	55	(77.5)	5	(83.3)	4	(80.0)
Ampicillin	S	10	(14.1)	0	(0.0)	0	(0.0)
	R	61	(85.9)	6	(100.0)	5	(100.0)
Augmentin	S	5	(7.0)	2	(33.3)	1	(20.0)
	R	55	(93.0)	4	(66.7)	4	(80.0)

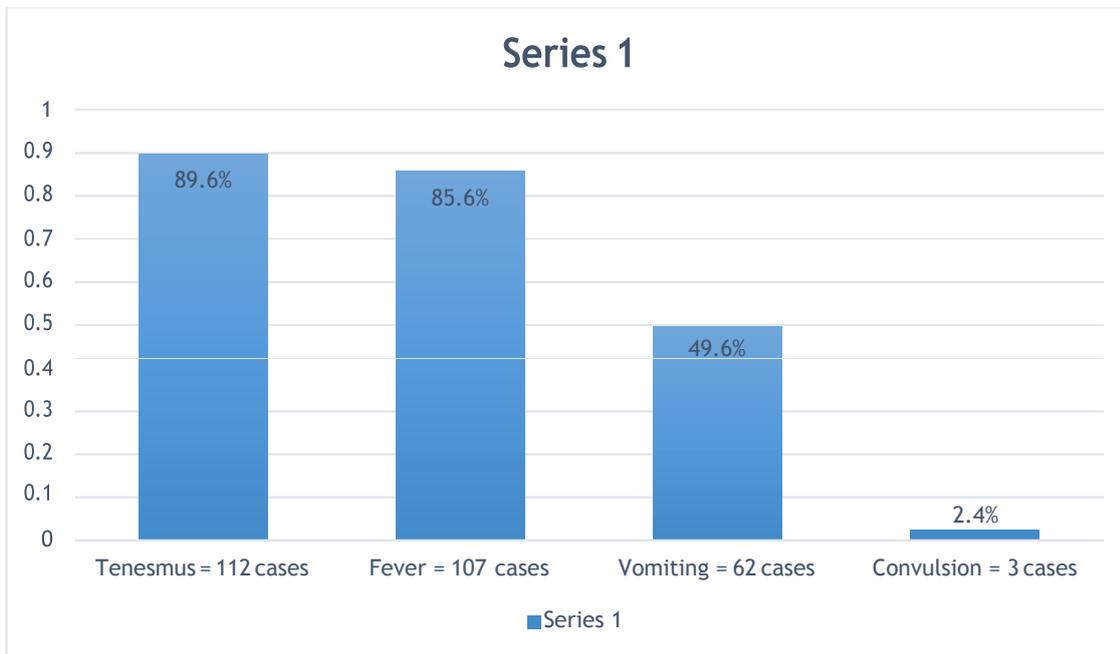
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**Figure (1): Bar chart showing the frequency of microorganisms (*E.Coli*, *Shigella*, *Salmonella*) susceptibility to different types of antibiotics**



**Figure(2): the frequency of clinical manifestation of bloody diarrhea among all studied cases**