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Prevalence and Bacterial Species Associated with Gastroenteritis: A Case Study with Students in Michael Okpara University of Agriculture, Umudike.

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Abstract

A study of the prevalence and bacterial species associated with gastroenteritis among students in Michael Okpara University of Agriculture, Umudike was conducted. Fifty stool samples from students that indicated cases of gastroenteritis from the questionnaire shared were examined. The stool samples were inoculated using the streak plate method. The following bacterial species were isolated, *Escherichia coli*, *Salmonella* species, *Shigella* species. *Escherichia coli* had the highest frequency of 54.2%, followed by *Salmonella* species (29.25) while the least occurrence was recorded against *Shigella* species (16.7%).more cases were observed in females (52%) than in males (48%). Also those living in the school hostel had more cases (66%) than those living off campus (34%). The risk factor associated with gastroenteritis amongst were identified to be variable food sources and water sources (96% and 90% respectively), not washing their fruits (vegetables well before consumption (86%)), use of antibiotics (6%) and contact with persons both outside and inside the home/room in last two weeks that had loose bowel actions or vomiting (12% and 23% respectively).

Keywords: Gastroenteritis, Bacterial species, Prevalence, Umudike

1. Introduction

Gastroenteritis constitutes an important cause of morbidity and mortality among humans worldwide, most especially in the developing countries where sanitation is suboptimal (Caleb, Roger, Joseph & Christopher, (2003). Gastroenteritis is a general word and a symptom of any condition/disorder or disease that causes irritation and inflammation of the gastrointestinal tract (Singh, 2010; Marquis, 2009). People with these health issues find it difficult to drink any liquid and still retain the fluid due to the disease especially when it is in the case of diarrhoea.

Globally, in many children, this problem is caused by rotavirus but less common sources include other bacterial species and toxin (WHO, 2005). However, the prevalence of bacterial gastroenteritis infections varies considerably from place to place in relations to the pattern of transmission of the disease (Luka, Ajoju, & Umoh, (2007). Bacterial gastroenteritis, each has a direct history being transmitted from persons to person by faecal

oral route during which the organism are discharged in human stool, thus wide spread contamination of the environment occurs (Ethelberg, Olsen, Gerner-Smidt, & Molbak (2004). Bacterial gastroenteritis is usually uncomfortable but self-limited. It can occur in any age group or population. It can be a symptom of a mild condition such as stress or indigestion. Most cases are highly infectious, although gastroenteritis may occur after ingestion of drugs and chemical toxins e.g. metals and plant substances. However, the geographical location and pattern of transmission of the disease are related to the variation observed in prevalence and bacterial species associated with gastroenteritis (CDCP, 2017).

Certain bacterial species like *Salmonella*, *Shigella*, *Campylobacter*, *Escherichia coli*, *Aeromonas* and *Yersinia* have been identified as organisms which are likely to cause this disease in an environment (Szajewska, 2010; Collee & Miles, 2007; Ronald, 1997).

Lanata (2007) and Yeager, Husty, Bartolini, Roja & Lanata (2005) documented certain predisposing factors of bacteria species associated with gastroenteritis. These includes living or travelling to areas of poor sanitation facilities, eating a food that is mass prepared without proper quality control, drinking untreated water from stream or well or still from any unreliable source, consuming a raw food like fish oyster unwashed fruits/vegetable or an improperly cooked food and a weakened immune system due to system malfunction like HIV/AIDS, cancer or diabetes.

Poor socio-economic conditions promotes the survival and transmission of the bacterial gastroenteritis. Also feacal contamination of food or water is the main route of transmission. Federal health bulletin (2007) reported that about 40% of people are liable to undergo or are most affected by bacterial gastroenteritis because of heavy infection and unfavourable conditions encountered in institution and also for their vulnerability to nutritional deficiencies.

Nevertheless, the pertinent of the prevalence of bacterial gastroenteritis among students in an institution cannot be over emphasized, hence check-up at intervals is required concerning this disease condition among students. This study therefore is aimed at determining the prevalence and bacterial species associated with gastroenteritis amongst students of Michael Okpara University of Agriculture Umudike and to identify the risk factor associated with it.

2. Materials and Methods
2.1. Study Area

The study was conducted in Michael Okpara University of Agriculture, Umudike. The University is located in the well-known agricultural training and research community of Umudike along Umuahia to Ikote Ekpene road, in the south eastern zone of Nigeria. It lies between longitude 7 degrees and 7 degrees 05'E and latitude 5 degrees 25'N.

2.2. Collection of Samples

Fifty stool samples were collected from students that indicated cases of gastroenteritis from the questionnaire (the questionnaire covered symptoms experienced by a person in the previous two week and exposure to potential risk factors preceding these symptoms). Among the fifty samples, 17 samples were from those living off campus (8 females and 9 males) and 23 samples from those living in the school hostel (females -18; males -15). Well

labelled sterile universal containers are used for the collection of the stool this was taken to the laboratory within 30minutes to 1hour after provision.

2.3.   Isolation of the Bacterial Species

Each of the stool samples was inoculated onto a culture media (nutrient agar, MacConkey agar and salmonella-shigella agar) using the streaking method of the inoculation and thereafter, the plates were incubated at 37°C for 24 hours. After inoculation, distinct colonies were picked and sub-cultured at the same temperature and time to obtain a pure culture.

2.4.   Morphological Examination and Biochemical Identification of the Isolates

The isolates were morphologically examined through grams staining and biochemically identified through motility testing, sugar fermentation test, IMViC test, catalase test and oxidase test.

3. Result

The number of cases of gastroenteritis among students in relations to their gender and residency is shown in table 1. Out of the 137 questionnaire obtained, 50 students indicated having gastroenteritis. 52% (26) of the cases was recorded against females while 48% (24) was recorded against males. Most cases of gastroenteritis was observed with students living in the school hostel (66%) and 34% gastroenteritis was observed with those living off-campus.

Table 1: Distribution of bacterial gastroenteritis by gender and residential status

Residential status	Gender		Percentage
	Male	females	
Hostel	15	18	66%
Off-campus	9	8	34%
Total	24	26	
Percentage	48%	52%	100%

NB: Total number of questionnaire shared = 200; total number of questionnaire returned = 137; number indicative of gastroenteritis = 50

The cultural, morphological and biochemical examination revealed that *Escherichia coli*, *Salmonella* sp and *Shigella* sp are the most common bacterial pathogens responsible for gastroenteritis amongst students of Michael Okpara University of agriculture, Umudike. The frequency of the occurrence of these bacterial isolates are shown in table 2. Among the three bacterial isolates *E. coli* had the highest frequency of occurrence (54.2%) followed by *Salmonella* sp (29.2%) and the least *Shigella* sp (16.7%).

Table 2: Frequency of occurrence of the bacterial isolates

Bacterial isolates	Number of isolated bacteria	Percentage occurrence
Escherichia coli	13	54.2%
Salmonella species	7	29.2%
Shigella species	4	16.7%

Table 3 shows the risk factors of gastroenteritis. As observed from the table, 96% of the students got the food from variable sources like the meal prepared by self, bought from food vendors and eating from the cafeterias in the campus. Only 4% of the students eats food that was prepared by themselves. Again 90% of the students indicated that they drink and make use of water from variable sources like bore-hole, rain water, sachet water and bottled water. 54% of the students always wash their hands after visiting the comfort room while 46% does not. 86% of the students indicated that they do not always wash their fruits/vegetables well before consumption. It is also that only 6% of gastroenteritis among students was induced by the use of antibiotics. 12% of the students indicated that they had contact home/room with persons who had vomiting or loose bowel action in the last two weeks while 23% indicated that they had contact with person who had vomited or had loose bowel actions in the last two weeks inside their homes/rooms.

Table 3: Risk factors associated with gastroenteritis

S/N	Variables	Number (n=50)	Percentage
A	**Sources of food**		
i	Cooked by self	2	4%
ii	Bought from vendors	–	–
iii	From cafeterias in campus	–	–
iv	Variable sources (self, café, vendors)	48%	96%
B	**Water sources**		
i	Bore-hole	–	–
ii	Rain water	–	–
iii	Sachet water	5	10%
iv	Bottled water	–	–
v	No particular one (i.e. any of the above available)	45	90%
C	**Hygiene practice**		
i	Always washes hand after visiting comfort room	Yes: 27	54%
		No: 23	46%
ii	Always washes hands after contact with soil/dirt	Yes: 21	42%
		No: 29	58%
iii	Washes fruits/ vegetables well before consumption	Yes: 7	14%
		No: 43	86%
iv	Drug induced diarrhoea		
v	Took antibiotics in the last two weeks	Yes: 3	94%
		No: 47	6%
D	**Persons contact**		

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i	Contact outside home/room with persons who had vomiting or loose bowel action in last two weeks	Yes: 6	12%
		No: 1	2%
		Don't know: 43	86%
ii	Presence of a person who had vomited or had loose bowel action in last two weeks inside home/room	Yes: 23	46%
		No: 27	54%
E	**Socio-economic status**		
i	Lowest	–	–
ii	Lower middle	9	18%
iii	Upper middle	37	74%
iv	Highest	4	8%

4. Discussion

The prevalence of gastroenteritis as observed in this study was relatively not high. This indicates a high. This indicates a high level of hygiene practices and safe care amongst students of Michael Okpara University of Agriculture, Umudike. In this study, the presence of a person with gastroenteritis may indicate either person to person transmission or simultaneous exposure to a point source. This is in line with what was reported by Kay, Fleisher & Salmon (1994) and Uhnoo, Wadell & Svensson (1986). That person to person transmission of gastroenteritis is a common route of transmission. In a study of gastroenteritis amongst bathers, Kay *et al.*, (1994) found that prior gastroenteritis in a family member was a risk factor. This explains why those students who indicated that they had contact with indicative symptoms of gastroenteritis in the last two weeks before the time of sampling came down with gastroenteritis. Potentially there is an opportunity through health education, to reduce the spread of gastroenteritis amongst people sharing the same home/room.

Antibiotics-associated diarrhoea is a well-recognized phenomenon (McFarland, 1998). In this study antibiotics use was associated with 6% occurrence of gastroenteritis. While the use of antibiotics may be necessary, potentially there are opportunities to reduce the prevalence of diarrhoea in terms of both choice and over prescribing antibiotics.

The detection of bacterial gastroenteritis by gender and residential status that gastroenteritis is highest among students living in the school hostel (66%) while those living off campus had least percent of 24%. Also more cases of gastroenteritis were recorded among females (52%) than males (48%). This is indicates that both sexes spend more time in either washing or hanging around unhygienic environments. They are also often in contact with dirt hands through handshakes.

However, three bacterial species were identified to be associated with gastroenteritis amongst students in Michael Okpara University of Agriculture, Umudike. Amongst the three bacterial isolates were *Escherichia coli* (54.2%), *Salmonella* species (29.2%) and *Shigella* species (16.7%). The trend in the rates of occurrence of these isolates resembles what was reported by Pawlowski, Warren & Guerrant, (2009) were *Escherichia coli* was implicated in the majority of cases of gastroenteritis, followed by *Campylobacter* sp, *Salmonella* sp and *Shigella* sp in that order. Aside from this, these findings are comparatively related to a report of a research study carried in an Australian University by Robins, Bordun, Tauschek, Bennett, Russel & Oppedisamo (2004) where he reported that *Escherichia coli* had the

highest occurrence of 28%, *Salmonella* species had 12% and *Shigella* species had just 4%. Natro & Kaper, (2009) also reported that the rate of *Escherichia coli* is possibly the only organism with the highest occurrence and detection from a stool sample of a gathering like an institution. Research studies have attributed this high endermicity to poor environmental states, poor hygiene, lack of good water supply and also indiscriminate defecation (Faecheem & Jamison, 2009).

5. Conclusion

Gastroenteritis is a significant cause of morbidity amongst students. Its prevalence was relatively not high amongst students of Michael Okpara University of Agriculture, Umudike; though it varied with gender and residential status of students. The leading etiological agent of gastroenteritis was *Escherichia coli*, followed by *Salmonella* sp and the least *Shigella* species. The major risk factors identified were poor water sources, unhygienic practices, use of antibiotics amongst others. Since this infection can cause reduction in health status of an individual, it is advisable that those practices that could lead to bacterial contamination of food and water be strictly avoided.

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