ORIGINAL ARTICLE

URINARY TRACT INFECTION IN CHILDREN WITH ROTAVIRUS DIARRHOEA ATTENDING A TERTIARY FACILITY IN NIGERIA

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ABSTRACT

Background : Acute diarrhoea caused by rotavirus infection is common in infants and children. Urinary tract infection(UTI) is the second most common bacterial infection. This study investigated the incidence of UTI and rotavirus infection in children aged less than five years presenting with acute diarrhoea to the Children Emergency Room (CHER) of the University of Calabar Teaching Hospital.

Method: This was a cross sectional study. A total of 115 children were sequentially recruited. Urine and stool samples were aseptically obtained from each child. Urine sample was examined macroscopically for appearance and microscopically for pus cells and bacteria. Urine samples were cultured on cysteine factors electrolyte deficiency agar. The resulting bacterial growth was counted and recorded as significant or non-significant for bacteriuria using the standard loop method. Rotavirus assay was performed using Prospect Rotavirus microplate Assay method.

Result: Rotavirus was detected in 51(44.3%) stool samples and three (2.6%) samples yielded bacteria. A total of 25 (21.7%) of the 115 urine samples were significant for bacteriuria. Twenty-five (25) were co-infected with rotavirus diarrhoea, of which 20 were in children less than 12 months of age. Echerichia *cofi* was isolated in both urine (92%) and stool (66%) samples. Age and gender were not significantly associated with co-infection of acute diarrhoea and UTI. Children who were exclusively breast fed and those fed with family diet hada significantly lower co-infection of rotavirus and UTI compared to children who were bottle (formula) fed *($p < 0.05$).*

Conclusion: This study revealed a high incidence of co-infection of rotavirus and UTI in the study population. Therefore, in children with acute diarrhoea, investigation for UTI may be needful.

Keywords: urinary tract infection, rotavirus diarrhea, tertiary facility, Nigeria

INTRODUCTION

Urinary tract infection is a major cause of childhood morbidity in the developing countries. It is the second most common bacteria infection in children[1-3] .Rotavirus is one of the major cause of acute diarrhea in infant and children.[1-4] According to the World Health Organization[5], there are about two billion cases of diarrheal disease worldwide every year, and 1.9 million under-5 children perish from diarrhea each year, mostly in developing countries, and over 60% of this is caused by rotavirus.[5,6] Most of the causative organisms of UTIs are colonic in origin and infection can be asymptomatic, hence diarrhea may have an association with UTIs.[1-4] This study was therefore aimed to investigate urinary tract infection in the under-5 with acute watery diarrhea of rotavirus eatiology in the Diarrhea Treatment and training Unit (DTTU) of University of Calabar teaching hospital, Calabar.

METHODOLOGY

The demographic and clinical data were obtained through parental interviews. Amongst other data obtained included the feeding methods of the children. A total of 115 samples each of urine and stool, were consecutively obtained at admission from under-5 children presenting with diarrhoea disease between November, 2018 to March, 2019 in the DTTU of the University of Calabar Teaching Hospital, Calabar.

STOOL: Stool samples were collected in a sterile plain sample bottle, each examined macro- and microscopically. They were assayed using rotavirus micro plate and cultured on a Cysteine Lactose Electrolyte Deficient (CLED) agar.

URINE: Urine samples were concurrently collected by clean catch (midstream urine) for children 3 years and above and bag urine for children below 3 years. Each urine sample was examined macro- and microscopically and also analysed with combi -9 urinary strip. Same were cultured on CLED agar. The resulting bacterial growth was counted and recorded as significant or non-significant for bacteriuria using the standard loop method. A positive urine culture was defined as one hundred thousand organisms per colony forming unit.

Antibiotic susceptibility testing was carried out using the Kirby-bauer disc diffusion technique.

The result obtained were analysed using SPSS version 20 and P-value of < 0.05 was considered significant.

RESULTS

Hundred fifteen (115) under-5 children with acute watery diarhoea were analysed, 40 (34.8%) were males, while 75 (65.2%) were females. Age group 0-12 months having the highest number of female participants 23 (71.9%) (table 1). Rotavirus was detected in 51 (44.3%) among which 25 (21.7%) were significant for bacteriuria (UTIs). Of the 25 subjects co-infected with rotavirus diarrhea and UTI, 20 were between zero and 12 months old ($P<0.05$). Three (2.6%) stool samples yielded bacteria species when cultured. Only one haboured E. coli in addition to rotavirus in stool. Females with both diarrhea of rotavirus aetiology (DORA) and UTI, were significantly higher than males with both DORA and UTI, 21 (28.0%) : 4 (10.0%) ($p<0.05$) (table 2). Escherichia coli was the most frequently occurring bacterial isolate in both urine 23(92%) out of 25 and stool 2(66.7%) out of 3 positive samples of the subjects (Tables 3). The 25 E. coli isolates obtained in this study were found to be completely sensitive to Augmentin, Rocephine and Cefuroxime, but resistant to Co-trimazole (21; 91.3%), Ampicillin (13; 56.5%), Ampiclox (6; 26.0%) and Azithromycin (3;13%) (table 4).

TABLE 1: Demography of study participants enrolled in the study

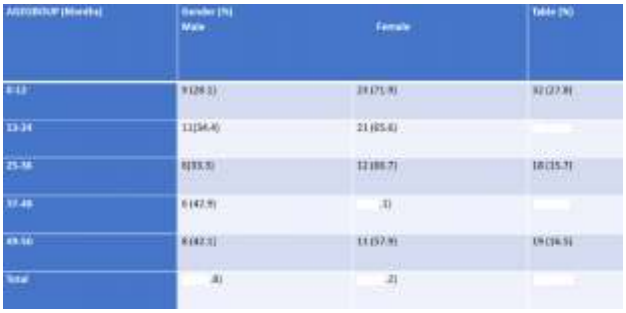

TABLE 2: Co-morbidity of children with diarrhea of Rotavirus aetiology and urinary tract infection among participants by gender

Gender	No. enrolled	DORA No. (%)	DOBA No. (%)	UTI No. (%)
Male	40	16 (40.0	1 (33.3)	4(10.0)
Female	75	35 (46.7)	2 (66.7)	21 (28.0)
Total	115	51 (44.3)	3 (2.6)	25 (21.7)

TABLE 3: Bacteria isolated from urine samples of children with DORA

Bacteria from urine sample	No. (%) of cases	Bacteria from stool sample	No. (%) of cases
Pseudomonas species	2 (8.0)	Escherichia coli	2 (66.7)
Escherichia coli	23 (92)	Salmonella species	1 (33.3)
Total	25 (100)	Total	3 (100)

TABLE 4: Antibiotic susceptibility of E. coli isolated from urine/stool of children with DORA

Antibiotics	Susceptibility
Augmentin	9 (100)
Rocephine	0 (100
Zinnat	0 (100
Zithromax	3 (87.0)
Ampiclox	6 (74.0)
Septrin	21 (8.7)
Ampicillin	13 (43.5)

DISCUSSION

The study shows that about half of the acute watery diarrhoea in the study population are of rotavirus aetiology (43.3%). It also showed a probable association between DORA and UTI, implying that children with DORA stand a greater chance of developing UTI as it increases with decreasing age. Based on the results of this study, there was a significantly higher rate of occurrence of UTI among female children with DORA than their male counterparts as corroborated by other studies[7-10] This could be due to general high susceptibility of UTIs in the females. The high prevalence rate of diarrhoea due to rotavirus as observed in this current study suggests poor hygiene and sanitation practices by the parents of the children as well as the children themselves crawling. Antibiotics are frequently administered to children for the treatment of other infections such as pneumonia, and this could have probably accounted for the low prevalence of UTI in this current study. Although children who had received antibiotic therapy within 5 days prior to this study were excluded from the study, previous antibiotic treatment tin the subjects may have influenced the low isolation rate of bacteria among these subjects. Based on the results of this study, there was a significantly higher rate of occurrence of UTI among female children with DORA than their male counterparts as corroborated by other studies[7-10] The higher frequency in females has been attributed to the shorter female urethra and the proximity of this to the gastrointestinal outlet, hence making it easier for enteric flora to colonize this area.[11-13]The high prevalence of UTI in this age group especially among female may not be unconnected with the fact that the children are frequently worn diapers into which they pass both urine and stool. This waste is often carried for prolonged periods before they are cleaned up. The frequency of diarrhea and UTI among children who were bottle fed was found to be significantly higher compared to children who were exclusively breast fed or fed with adult food. This could be attributed to the hygiene and sanitary practices of the mother as well as the formulation of the bottle feed. Also, breast milk is believed to be healthy for children since it provides them with mother's immunity which laid in combating diseases in the child. This is in accordance with the report of Riccabona et al[14] who suggested that breastfeeding may provide some protection against UTI in children. This study

demonstrated a positive association between DORA and UTI, implying that children with DORA stand a greater chance of developing UTI, the high co-infection of DORA and UTI in this study calls for additional research. This may be a coincidence as rotaviruses are not known etiologic agents of UTI. However, the revelation that children aged 1-12 months were most infected with UTI and rotavirus diarrhea, indicates some relationship. All the E. coli isolated were found to be sensitive to Augmentin, Rocephine and Zinnat and hence should be used as the drugs of choice in the management of UTI among children attending the University of Calabar Teaching Hospital.

CONCLUSION

The high prevalence of co-infection of rotavirus diarrhoea and UTI, emphasizes the need for investigation of children with acute watery diarrhoea for UTIs.

ACKNOWLEDGEMENT: We would like to thank all the participants, laboratory scientists, and teachers who contributed to the success of this work. We give God the glory.

FUNDING: None

CONFLICT OF INTEREST: None

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