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Original Research Article

Antibiotic prescriptions in the case management of acute watery diarrhea in under fives

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ABSTRACT

Background: Diarrhea disease is a leading cause of under-five mortality globally. The World Health Organization recommends low osmolality oral rehydration solution, zinc supplementation and adequate nutrition in the management. Antibiotic is indicated only in specific circumstances. This study was aimed at determining the antibiotic prescription in the management of under-fives with acute watery diarrhea.
Methods: An audit of under-fives managed for acute watery diarrhea was conducted between January and February 2012. A multi-stage stratified random sampling technique was used to select 32 health facilities (21 primary and 11 secondary) from two local government areas of Cross River State. Case records of children managed for the condition six months prior to the audit were retrieved and evaluated. The appropriateness, types and frequency of antibiotic prescriptions were assessed.
Results: A total of 370 case records were evaluated. Antibiotic was not indicated in any of the children but was prescribed for 291 (78.6%). Of this number, 169 (45.7%) received one antibiotic while 122 (33.0%) received two or more antibiotics. The difference in the prescription of multiple antibiotics between health workers in the primary and secondary facilities was statistically significant (p value = 0.00001). Metronidazole was the most prescribed antibiotic 228 (50.9%), followed by co-trimoxazole 88 (19.6%) and gentamicin 55 (11.8%).
Conclusions: There is a high level of irrational antibiotic prescriptions in the State with oral metronidazole being the most prescribed. Periodic training of health workers on indications for antibiotic prescriptions in the management of diarrhea in under-fives is necessary.

Keywords: Antibiotic, Diarrhea, Irrational, Prescriptions, Under-fives

INTRODUCTION

Diarrhea is currently second to pneumonia as the leading cause of under-five death globally. It is estimated that about 1.8 million people die annually from the disease.[1] Over 90% of diarrheal-related morbidity and mortality occur in sub-Saharan Africa and Asia with poverty, lack of portable water, poor food handling and contamination, poor environmental sanitation, unsafe sewage disposal and low immunization coverage as risk factors in the regions.[2] Diarrhea is broadly classified as acute watery diarrhea, persistent diarrhea or dysentery. Acute watery diarrhea is the commonest form of childhood diarrhea and is defined as the passage of three or more loose stools without visible blood in 24 hours lasting for less than a week.[3]

This form of diarrhea could result from secretion of copious amount of fluid into the intestinal lumen that is mediated by enterotoxigenic organisms like Vibrio Cholera and Escherichia Coli (E. Coli) or disruption of the normal secretory and absorptive functions of the

intestinal epithelial cells commonly due to Rota virus and Giardia lamblia infection.[3] The copious fluid loss that follows acute watery diarrhea often leads to dehydration, electrolyte derangement, shock, organ failure and death.[3] Therefore, prompt, appropriate and adequate fluid replacement remains the main strategy for effective case management of acute watery diarrhea.

In the bid to reduce diarrhea-related childhood deaths, the World Health Organization (WHO) recommends the use of low osmolality oral rehydration salt solution with oral zinc supplementation in the case management of under-five diarrhea globally. Antibiotic is indicated only in cases of persistent diarrhea, dysentery, cholera, pseudomembranous colitis and special circumstances like severe malnutrition, HIV/AIDS and in new born.[4] Adherence to the current WHO guideline is essential to the reduction of childhood diarrhea-related mortality. Some studies from diarrhea endemic countries have shown poor adherence to the above recommendation with variable proportion of irrational antibiotic prescriptions in the case management of acute watery diarrhea in under-fives. For example, in Pakistan, Nizami et al in a community-based study and Ali et al in a hospital-based study reported 39% and 86.2% of irrational antimicrobial prescription respectively.[5,6] Osam-Tewiah reported 73% of irrational antimicrobial prescription in Ghana while Howteerakul et al. reported 72.6% in Thailand.[7,8]

Since most diarrhea-related deaths occur in developing countries and care givers' of under-fives with acute watery diarrhea often visit public health facilities for treatment, it becomes necessary to periodically evaluate the extent of adherence of health workers to the current recommendations on the case management of acute watery diarrhea in these facilities. This study aimed to assess the antibiotic prescriptions in the case management of under-fives with acute watery diarrhea in health facilities in Cross River State, Nigeria.

METHODS

A clinical audit of the case management of acute watery diarrhea in under-fives was conducted between January and February 2012. A multi-stage stratified random sampling technique was used to select 32 health facilities (21 primary and 11 secondary) from two Local Government Areas of Cross River State, Nigeria. In each of the selected facilities, case records of under-fives managed for acute watery diarrhea six months prior to the study were retrieved. Fifteen case records were assessed in facilities with high patient visit while 10 were assessed in facilities with low patient visit. Trained field personnel extracted relevant information from patients' case records using a validated audit tool.

The prescription of antibiotic, type of antibiotic, frequency and appropriateness of antibiotic prescription were assessed. Patients' confidentiality were preserved using personal identification numbers and the audit tool secured under lock in a safety cabinet. Data was entered and analyzed using Microsoft Excel. Chi-square was used as a test of significance for categorical variables.

RESULTS

Antibiotic prescriptions in under-fives with acute watery diarrhea

The overall prevalence of antibiotic prescriptions in this study was 78.6%. Antibiotic prescription was slightly higher in the primary than secondary health facilities but the difference was not statistically significant (χ^2 = 1.11; p value = 0.29) (Table 1).

Frequency of antibiotic prescriptions in under-fives with acute watery diarrhea

The study showed that 79 (21.4%) under-fives did not receive any antibiotic, 169 (45.7%) received one antibiotic while 122 (33.0%) received two or more antibiotics.

Multiple antibiotic was more likely to be prescribed in the primary health facilities compared with the secondary facilities. This difference in frequency of antibiotic prescriptions between the facilities was statistically significant (χ^2 = 18.96; p value = 0.00001) (Table 2).

Table 1: Antibiotic prescriptions in under-fives with acute watery diarrhea.

Nature of treatment	Primary facilities 279	Secondary facilities 91	Both facilities 370
Treatment without antibiotic	56 (20.1%)	23 (25.3%)	79 (21.4%)
Treatment with antibiotic	223 (79.9%)	68 (74.7%)	291 (78.6%)

χ^2 = 1.11; p value = 0.29

Table 2: Frequency of antibiotic prescriptions in under-fives with acute watery diarrhea.

Frequency of antibiotics prescription	Primary facilities (N=279)	Secondary facilities (N=91)	All facilities (N=370)
None	56 (20.1%)	23 (25.3%)	79 (21.4%)
One	114 (51.6%)	55 (60.4%)	169 (45.7%)
Two	77 (27.6%)	11 (12.1%)	88 (23.3)
Three	28 (10.0%)	2 (2.2%)	30 (8.8)
Four or more	4 (1.4%)	0 (0%)	4 (1.1%)

Pattern of antibiotic prescriptions in under-fives with acute watery diarrhea

The audit shows that 11 different antibiotics were prescribed in the management of under-fives with acute watery diarrhea with metronidazole being the most prescribed of them. The prescription of metronidazole was higher in the secondary than primary health facilities. Metronidazole, co-trimoxazole, injectable gentamicin and injectable penicillin constituted about 85% of the overall antibiotic prescriptions as displayed in Table 3.

Table 3: Pattern of antibiotic prescriptions in under-fives with acute watery diarrhea.

Pattern of antibiotic prescriptions	No. prescribed in primary facilities (365)	No. prescribed in Secondary facilities (83)	No. prescribed in both facilities (448)
Metronidazole	170 (46.6%)	58 (69.9%)	228 (50.9%)
Co-trimoxazole	83 (22.7%)	5 (6.0%)	88 (19.6%)
Gentamicin	46 (12.6%)	7 (8.4%)	53 (11.8%)
Penicillin	25 (6.8%)	1 (1.2%)	26 (5.8%)
Erythromycin	15 (4.1%)	1 (1.2%)	16 (3.6%)
Amoxicillin	12 (3.3%)	2 (2.4%)	14 (3.1%)
Ampicillin	9 (2.5%)	0 (0.0%)	9 (2.0%)
Ampicillin/Cloxacillin	3 (0.8%)	6 (7.2%)	9 (2.0%)
Cefuroxime	1 (0.3%)	1(1.2%)	2 (0.4%)
Ceftriaxone	0 (0.0%)	1 (1.2%)	1 (0.2%)
Tetracycline	0 (0.0%)	1(1.2%)	1 (0.2%)
Chloramphenicol	1(0.3%)	0 (0.0%)	1 (0.2%)

DISCUSSION

This study shows that only about one-fifth of the children managed for acute watery diarrhea in the health facilities received oral rehydration salt solution (ORS) without inclusion of antibiotic. The others had one or more antibiotic(s) prescribed when there was no indication for it. The prescription of ORS in this study is comparable to 22.6% prescription rate reported in a survey among health workers in primary health facilities in Benin City, Nigeria.[9] The frequency of one or more antibiotics prescription observed in this study is similar to the finding of Howteerakul et al in Thailand, Osam-Tewiah in Ghana and Gwimile et al in Tanzania.[7-10] Poor education of health workers, poor diagnostic skills and patient pressure have been identified as determinants of drug use and prescribing behavior.[11] The high proportion of irrational antibiotic prescriptions in this study may indicate lack of knowledge of health workers on when to prescribe antibiotic in childhood diarrhea as well as the importance of adequate fluid replacement in the management of acute watery diarrhea in under-fives. This may probably explain the high level of under-five diarrhea-related deaths in most developing countries of Africa and Asia where the disease is endemic.

The current WHO recommendation of low osmolality oral rehydration salt solution and oral zinc supplementation for the case management of acute watery diarrhea in under-fives is based on the proven efficacy of these low cost interventions.[12] As acute watery diarrhea continues to exert a great toll on child health in developing countries, a number of governmental and non-governmental agencies have made concerted effort to scale up the procurement and supply of these interventions.[13] Unless the current WHO recommendation on diarrhea case management in under-fives is universally accepted, implemented and promoted at the facility levels, the under-five diarrhea-related mortality will remain on the high side.

On the whole, a single antibiotic was prescribed in about half of the children managed for acute watery diarrhea while two or more antibiotics were prescribed in about one-third of them. The frequency of prescribing a single antibiotic was slightly higher among health workers in the secondary health facilities when compared with those in the primary facilities whereas the prescription of multiple antibiotics was significantly higher among health workers in the primary health facilities. The frequency of prescription of a single antibiotic in this study is comparable to the 43.0% prescription reported in India but lower than 71.5% reported in Ghana while the prescription of multiple antibiotics in this study is higher than reports from Ghana and Thailand.[7,8,14]

There was a wide range of antibiotic prescriptions in the case management of diarrhea in the children. Eleven different antibiotics were prescribed in the facilities assessed in this study. This is similar to the number prescribed in the studies conducted in Ghana, Thailand and India.[7,8,14] Almost all classes of antibiotics seem to be susceptible to irrational prescription though the relative frequency of such prescription often varies with study

setting. Metronidazole was the most frequently prescribed antibiotic in this study. This finding is similar to what was observed in Ghana but different from India and Thailand where floroquinolone and co-trimoxazole respectively were reported as the most frequently prescribed antibiotics.[7,8,14] Thus, the pattern of irrational antibiotic prescriptions for childhood diarrhea seems to vary with locality and facility type.

The use of metronidazole in the case management childhood diarrhea is usually based on the detection of parasitic organisms like *Entamoeba histolytica* or *Giardia lamblia* on stool microscopy.[15] The basis of the high frequency of metronidazole prescription in this study could not be elucidated as the implicating organisms were not detected on stool microscopy. However, Uchendu et al.[16] in a study conducted in Enugu among caregivers' of under-fives with acute watery diarrhea showed that about 60.0% of them administered metronidazole to their children because they considered it to be an anti-motility agent. Irrational prescription of metronidazole as seen in this study has the potential of worsening the child's condition in view of the fact that nausea, vomiting, diarrhea and stomach cramp are common side effects of the drug.[17]

It is worthy of note that some of the health workers prescribed injectable formulations of antibiotics like crystalline penicillin and gentamicin. Injections would have been justified in children with a co-morbid condition like suspected or confirmed septicaemia which however was not the case in this audit. Besides causing undue pain, the use of injectable medications puts the children at risk of complications like thrombophlebitis, injection abscess, injection neuropathy, bleeding, bacterial infections, tetanus or HIV infection.[18-20] The prescription of antibiotics generally increases the cost of care and this increase becomes quite remarkable when multiple antibiotics or injectable formulations are prescribed as seen in this study. In addition to the above, the use of injectable antibiotics prolong the period of hospitalization, increases the risk of transmission of nosocomial infections among hospitalized patients and increases the work load on the limited health personnel in the facilities.

CONCLUSION

There is a high proportion of irrational antibiotic prescriptions in the case management of acute watery diarrhea among under-fives in health facilities in the State. This treatment practice which is grossly at variance with the WHO recommendations has great implication on the health of the children and finances of their caregivers. Periodic training and supervision of health workers on the national and WHO treatment guideline in the case management of acute watery diarrhea in under-fives is therefore needful. This will go a long way in reducing the under-five diarrhea-related morbidity and mortality as well as the frequency of irrational antibiotic prescriptions in health facilities in the country.

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