Adherence to Prescribed Antibiotics by Some Nigerian University Students

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ABSTRACT

Poor adherence to antibiotic therapy is a current public health problem in light of the increasing scourge of antimicrobial resistance (AMR) globally. The aim of this work was to assess adherence to two of the most commonly prescribed oral antibiotics (Amoxicillin and Ciprofloxacin) at the health centre of Ahmadu Bello University Zaria, Nigeria. The study was prospective and carried out between April and August 2016. Two hundred students (100 for each antibiotic) who were prescribed either drug for 5 days were followed up. Data was collected directly from participants using exit interviews and phone calls and also from their patient records. Investigators called the students at a time when they should have taken all but one dose of their antibiotic and asked them how many tablets they had left. Those with only one dose remaining were deemed adherent. Adherence to the antibiotics was remarkably low, with less than half of the students (34% & 44%) respectively being adherent to Ciprofloxacin and Amoxicillin. Paradoxically, adherence to Amoxicillin was better than that to Ciprofloxacin. Average quantity of antibiotic tablets/capsules remaining with non-adherent participants was 3.36 for both medicines. There is an urgent need for better patient education on the proper usage of antibiotics

KEYWORDS: Antibiotics, Medication adherence, Nigeria, Pill count

INTRODUCTION

Non-adherence to all types of therapies is a common occurrence and has been identified as a worldwide public health problem by the World Health Organization (Sabarte, 2003). Adherence is usually considered a major concern in the drug therapy of chronic disease conditions like diabetes mellitus, HIV and hypertension. However, poor adherence to antibiotic therapy is becoming especially problematic in light of the increasing scourge of antimicrobial resistance (AMR) globally (WHO, 2014). It is believed in some quarters that the efficacy of antibiotics and the risk of development of resistance are negatively influenced by how these drugs are used by patients within the community setting (Kardas *et al*., 2005).

A meta-analysis by Kardas and colleagues that included 46 studies estimated mean compliance with antibiotic therapy as 62.2% (95% confidence interval (CI), 56.4–68.0%). The included studies used both subjective and objective means to estimate adherence, and were carried out in all regions of the world. However, only one study was included from the African continent, suggesting an apparent lack of information on antibiotic adherence patterns on the continent.

Assessing patient adherence to antibiotic therapy is thus a useful means of defining the problem and providing data that can be used to develop effective interventions. Thus, the aim of this study was to assess adherence rates to two of the most commonly prescribed oral antibiotics (Amoxicillin and Ciprofloxacin) at the University Health Centre located at the Samaru campus of Ahmadu Bello University Zaria, Nigeria. Students were chosen as the study participants for two reasons: firstly, students of Nigerian tertiary institutions are covered by the National Health Insurance Scheme (NHIS), and are given drugs free of charge. Secondly, students of a higher institution would be literate and understand English, allowing them to understand the counselling provided by the dispensing pharmacists and/ read written information.

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METHODS

Ethical approval was sought for and obtained from the ethics committee of the health centre before the study was carried out. The study was prospective and carried out between May-July 2016. A convenient sample of two hundred students (100 for each antibiotic) who were prescribed either drug for 5 days were followed up. Data was collected directly from the students using both exit interviews and phone calls as well as from their patient records at the health centre. Study specific information was collected from the students through the use of exit interviews, while information about disease diagnosis was obtained from their patient records within the health centre. Students were approached by investigators as they exited the pharmacy unit of the health centre and verbal consent sought for their participation in the study. Exit interviews were then used to capture relevant baseline information as well as their mobile phone numbers on a specially designed data collection form. During these interviews, respondents were asked to identify each of their prescribed medicines and tell the investigators what they thought the drugs were used to treat. In addition, the investigators specifically asked the students when they were going to start taking their prescribed drugs, and sought permission to call them at an unspecified later date to ask them how many tablets of their prescribed medicines they had left. The students were then called at a time when they should have taken all but one dose of the antibiotic. Students with only one dose remaining were deemed adherent, others were classified as non-adherent.

RESULTS

Demographic characteristics of study participants are presented below in table 1.

Table 1: Demographic characteristics of study participants (***n***=100)

		Amoxicillin	**Ciprofloxacin**
		n	***n***
Gender	*Male*	48	51
	Female	52	49
Student Faculty	*Arts*	13	13
	Sciences	20	29
	Vet. Medicine [a]	03	0
	Pharm. Sciences [b]	09	09
	Medicine	14	14
	Engineering	11	04
	Env. Design [c]	09	09
	Social Sciences	06	05
	Education	15	17
Level of study	*1st year*	04	14
	2nd year	27	29
	3rd year	20	15
	4th year	36	34
	5th year	11	05
	Masters	01	02
	Diploma	01	01

[a] Veterinary Medicine, [b] Pharmaceutical Sciences, [c] Environmental Design

The male to female ratio of the followed up students for both drugs was almost equal. Majority of the students (97 for ciprofloxacin and 98 for amoxicillin) were undergraduates in their 1st -5th years, and were studying a wide variety of courses across several disciplines offered by the university. Other data collected during the study are presented in the next table (Table 2).

Table 2: Data collected during the study

		Amoxicillin	**Ciprofloxacin**
		n	***n***
Type of antibiotic prescribed by diagnosis	*Respiratory tract infections*	28	01
	Genitourinary infections	15	19
	Gastrointestinal infections	01	61
	Skin & soft tissue infections	31	19
	Eye & ENT infections	25	0
Total no. of medicines prescribed to study participants	*1*	01	0
	2	56	13
	3	38	68
	4	05	19
	Average	**2.46**	**3.06**
Ability to correctly identify antibiotic and state indication	*Able*	32	34
	Unable	68	66
Adherence to prescribed antibiotic	*Adherent*	44	34
	Non adherent	56	66
Quantity of antibiotic tablets/capsules remaining with non-adherent participants	*2*	12	11
	3	20	28
	4	16	19
	5	08	08
	Average	**3.36**	**3.36**
Reasons given by participants for non-adherence	*Forgetfulness*	24	30
	Recovery	22	22
	Side effects	05	06
	Taking too many meds	01	08
	Forgetfulness & recovery	04	0

Ciprofloxacin was mostly prescribed for gastrointestinal infections; usually typhoid, while Amoxicillin was used across a variety of other infections including respiratory, genitourinary as well as skin & soft tissue. Respondents were prescribed between 1-4 medicines including the antibiotics, depending on their diagnosis and the presence of other conditions. On the average, students prescribed ciprofloxacin were prescribed 3.06 medicines compared to the 2.46 for students prescribed amoxicillin.

As earlier stated, students were asked to identify each drug they had been prescribed and to tell the investigator what they thought the drug was to be used for. Generally, most students had no idea about the classes and uses of their medicines. As is to be expected however, students studying science-based and/ medical related courses were substantially more knowledgeable especially with regards to the antibiotics. In total, 32 and 34 students respectively were able to correctly identify amoxicillin and ciprofloxacin and correctly state their indications. Having this knowledge seemed to ultimately influence adherence to these drugs as 56.8% (25) and 76.5% (26) of the knowledgeable students went on to be adherent to Amoxicillin and Ciprofloxacin respectively.

Generally adherence was poor (less than 50%) for both drugs, but paradoxically students were more adherent to amoxicillin therapy (taken thrice daily) when compared to Ciprofloxacin (taken twice daily). All non-adherent students had between 2-5 tablets/capsules of antibiotics (average of 3.36 for both medicines) leftover at the time of data collection. The major reasons for non-adherence to either drug given by the students were forgetfulness and recovery.

DISCUSSION

The scourge of increasing resistance to antibiotics is a very topical issue worldwide, and needs to be urgently tackled before we return to the pre-antibiotic era where simple infections were untreatable and often fatal. Correctly adhering to antibiotic prescriptions by patients is very important, and is known to reduce morbidity and mortality rates to infections for both individuals and their communities. On the other hand, inappropriate/poor antibiotic adherence is of no benefit at all and is associated with several negative cost implications both direct and indirect.

Adherence to antibiotic therapy was remarkably low in this study, with both antibiotics having adherence rates of less than 50%. This is in contrast to a study by Jackson *et al* (2006) that utilized a somewhat similar methodology, but reported adherence rates of over 75%. A major concern with this finding would be that of treatment failure and/ reoccurrence of infection as well development of resistant strains of bacteria. However, even though it is widely believed that patients have to take the complete dose of their antibiotic, it is pertinent to note that there is actually no evidence to support the popular notion that continuing antibiotics past the resolution of signs and symptoms of infection, will in fact reduce the emergence of antibiotic resistance (Spellberg, 2016). Nonetheless, several other potential problems can arise from the unused/remaining medicines including storing remaining medicines for self-medication/ future use by others; which can be deadly, poor antibiotic disposal practices amongst several others (Ali *et al*., 2010).

Several Meta analyses have shown the benefits of fewer doses per day in encouraging adherence/ compliance to antibiotic therapy (Srivastava *et al.*, 2013; Falagas *et al.*, 2015). In this study, adherence to Ciprofloxacin was paradoxically worse than that of amoxicillin. This finding may however be explained by the fact that patients taking Ciprofloxacin were taking an average of 3.06 medicines when compared to the 2.46 average of patients taking Amoxicillin. This is further supported by the fact that 8 students taking Ciprofloxacin complained of taking too many medicines compared to only 1 taking Amoxicillin. The effects of taking an increasing number of medicines on adherence have been extensively described in other studies (Mathes *et al*., 2014). Nevertheless, this is an interesting finding requiring further study.

Major reasons given for non-adherence in this study were forgetfulness and recovery, similar to those reported in other studies carried out both within and outside the country Yamamoto *et al*., 2012; Kehinde and Ogunnowo, 2013). Moreover, since adherence seemed to be better in students who were knowledgeable about antibiotics, lack of knowledge on antibiotics could also be suggested as another reason for non-adherence. A 2012 study by Chan *et al* in Hong Kong supports this assertion. They showed that lack of antibiotic knowledge was a significant determinant of non-adherence in their community. This knowledge gap can be remedied to improve adherence by several means including educational interventions (Munoz *et al*., 2014) and use of modern technologies like short message service (Suffoletto *et al.*, 2012) or mobile applications (Dayer *et al*., 2013).

In summary, while the study had several limitations including small sample sizes and potential biases that can arise from self-reported adherence rates, adherence to both of the studied antibiotics was less than 50%. There is an urgent need for better patient education and counselling at the study site on the proper usage of antibiotics. This is an area where pharmacists can put their drug knowledge and skills to good use.

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