SHORT REPORT

Antibiotics use, resistance and self-medication practices among healthcare workers in a federal teaching hospital in southwest, Nigeria.

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ABSTRACT

Antimicrobial resistance is a major threat to global health, and inappropriate drug use, including antibiotic self-medication, has been identified as an important factor in developing countries. This study assessed the knowledge, and attitude of antibiotic use and antibiotics resistance, as well as the practice of self-medication among healthcare workers. This is a cross-sectional study conducted in a federal teaching hospital in Southwest, Nigeria among 320 healthcare workers selected through a two-stage sampling technique. A thirty-four-item self-administered semi-structured questionnaire adapted from the questionnaire on antibiotic resistance: multi-country public awareness survey by the WHO was used for data collection. Descriptive statistics, cross-tabulation and logistic regression were carried out using SPSS version 25.0. The mean ±SD age of the participants was 36.3 ±9.2years and over one-third (37.5%) of them had 6-10years of experience. About two-thirds (66.3%) of the participants had good knowledge about antibiotic use and resistance while only 39.4% had positive attitudes. The prevalence of self-medication with antibiotics was 30%. The identified positive predictors of antibiotics self-medication included having primary education (AOR:5.874, 95%CI:1.020-33.836) compared with tertiary education, poor knowledge (AOR:1.683, 95%CI:1.015-2.789) compared with good knowledge about antibiotic use and resistance as well as negative attitude (AOR:1.861, 95%CI:1.102-3.143) compared with a positive attitude towards antibiotic use and resistance. The level of knowledge and attitude in this study was suboptimal. Self-medication was linked with a lower level of education, poor knowledge, and a negative attitude. Therefore, we recommend the provision of appropriate health education to promote the rational use of antibiotics.

Key words:
antibiotics, healthcare workers, Nigeria, resistance, self-medication

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INTRODUCTION

Antibiotic resistance is a serious threat to global health and inappropriate use of drugs including self-medication has been identified as a major contributing factor in developing countries.[1] Globally, estimates suggest that each year infections that do not respond to available drugs caused 700,000 deaths across all ages, of which over 200,000 were newborns; the vast majority of these deaths occur in developing countries like Nigeria.[2] In the United States, at least 2,000,000 people get an antibiotic-resistant infection, out of whom at least 23,000 die annually[2]. If no action is taken, the indirect costs from morbidity, disability and premature mortality of drug-resistant infections to individuals and society would range between 1-3.5 trillion USDs.[3]

Studies done in different parts of the world have shown that self-medication was the most common form of care among healthcare workers (HCWs).[4,5] HCWs including nurses, medical doctors, pharmacists, physiotherapists, and laboratory scientists among others are providers of promotive, preventive, curative, and rehabilitative healthcare services based on formal training and experience. They are known to use drugs including antibiotics when ill without a prescription or medical consultation.[6] Although this practice could enable them to make independent decisions about the management of their minor illnesses and reduce the burden on healthcare services.[7] However, it is highly prone to inappropriate and irrational use of drugs thereby fueling the increased resistance of micro-organisms to antibiotics.[8] Moreover, there has been a global concern that antibiotic self-medication could have aggravated the appearance of antibiotic-resistant strains of pathogens.[9]

A study in Egypt showed insufficiency in knowledge, poor attitudes, as well as many bad practices of antibiotic use among HCWs.[10] A systematic review in Ethiopia showed that the prevalence of self-medication varied from 12.8% to 77.1%.[11] Another study done in Nigeria revealed that self-medication among HCWs was 71% and that being a nurse, lower age, lower years of experience, higher working hours, lack of health insurance, fear of confidentiality and the lack of satisfaction with healthcare services were associated with self-medication.[6]

Although antibiotic resistance occurs naturally over time, the misuse and overuse of antibiotics are accelerating this process.[1] Without effective antibiotics for the prevention and treatment of infections, medical procedures such as organ transplantation and major surgery become very high risk.[12] Antibiotic self-medication, documented to be common among HCWs is linked with increased resistance[8]. It is also important to research into antibiotics self-medication among HCWs because medications including antibiotics are generally more accessible to them at their convenience. In addition, studies on antibiotics self-medication among HCWs are not common and to the best of our knowledge, none has been done in Southwest, Nigeria.

HCWs are an important group of the population and research into the knowledge and attitude of antibiotic use among them is important because the rational prescription of antibiotics requires adequate knowledge which is crucial in the prevention of antibiotic resistance.[13] A good attitude towards antibiotic use influences the prescription of antibiotics as well. Thus, gathering and analyzing information on knowledge, attitudes toward antibiotic use and resistance as well as self-medication among HCWs is key to the development of actions aimed at decreasing the burden of antibiotic resistance.

METHODS

This is an institution-based cross-sectional study conducted at the Federal Teaching Hospital, Ido-Ekiti, Southwest, Nigeria. The Hospital is a tertiary center with twenty-five departments and 2,622 staff. The study included HCWs that have been in the services of the hospital for at least 6 months before the study. HCWs that were on industrial training, leave and those that were absent during the study period were excluded from the study.

The sample size was calculated using Leslie Fisher's formula.[14] A prevalence of self-medication among HCWs in a previous study[6], confidence interval (95%), degree of accuracy (5%), correction for a population <10,000 and an upward adjustment of 10% for non-response gave a minimum sample size of 314 HCWs and was rounded up to 320.

A two-stage sampling technique was used to select participants for this study. Stage one involved the selection of twelve departments out of the twenty-five departments by balloting. The number of participants selected from the departments was determined using proportionate allocation based on departmental staff strength. Stage two involved the selection of HCWs from the department by balloting after the list of all staff in each selected department was obtained from the Hospital registry.

A thirty-four-item self-administered semi-structured questionnaire was used for data collection. The questionnaire was adapted from the questionnaire on antibiotic resistance: multi country public awareness survey by the World Health Organization.[15] The questionnaire obtained information on sociodemographic variables, awareness, knowledge, and attitude toward antibiotics use and resistance in addition to antibiotic self-medication. The survey questionnaire was pre-tested on a sample of twenty HCWs in another hospital away from the study area and the Cronbach's Alpha score for test-retest reliability was 0.87. Following the pre-testing, statements and questions that were misinterpreted and ambiguous were reviewed by infectious disease and public health consultants at Federal Teaching Hospital, Ido-Ekiti. The questionnaires were administered by research assistants who visited the HCWs at their duty posts and handed over the questionnaires after their consent had been taken.

The computer software SPSS (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was used to enter, clean and analyze the data. There were twenty-one questions (thirteen questions on a five-point Linkert scale and eight True/False questions) that assessed the knowledge of participants on antibiotic use and resistance. Also, there were nine questions on a five-point Linkert scale that assessed the attitude of participants toward antibiotics use and resistance. Scores of participants were calculated and then converted to percent using the total obtainable score of 81 for knowledge and 45 for attitude. Any participant with a knowledge score ≥75% was categorized as having good knowledge while a score <75% was taken as poor knowledge.[16] Similarly, a score ≥75% was taken as a positive attitude while a score <75% as a negative attitude.[16]

Descriptive statistics such as frequency and percentage were used to summarize categorical data while mean, standard deviation (SD) and range were used for continuous variables. Chi square test and binary logistic regression analysis were used to determine the predictors of antibiotics self-medication. The logistic regression analysis follows the underlying assumption of linearity, independence of observations, and absence of multicollinearity according to Harris.[17] P-values were considered significant at <0.05. Ethical Approval to carry out the study was obtained from the Ethical Review Committee of the Federal Teaching Hospital, Ido-Ekiti, Nigeria.

RESULTS

About two-thirds (62.8%) of the participants were females and their mean ±SD age was 36.3 ±9.2years with over one-third (37.5%) of them having 6-10years of experience. [Table 1] Two hundred and sixty-three (82.2%), had heard of antibiotic resistance. The most common source of information for the participants was through doctors and nurses (41.1%) while a few of them could not remember their source (2.7%). [Table 2]

Table 1: Socio-demographic characteristics of respondent health care workers

Variable	Frequency (N = 320)	Percentage (%)
Age group (years)		
20–29	82	25.6
30–39	122	38.1
40–49	85	26.6
50–59	31	9.7
Mean age ±SD	*36.3 ±9.2*	
Range	*20 – 59*	
Gender		
Male	119	37.2
Female	201	62.8
Ethnicity		
Hausa	6	1.9
Igbo	45	14.1
Yoruba	248	77.5
Others	21	6.6
Marital Status		
Married	234	73.1
Single	76	23.8
Divorced/Separated	7	2.2
Widowed	3	0.9
Highest level of education		
Primary	6	1.9
Secondary	43	13.4
Tertiary	271	84.7
Occupation		
Medical Doctor	64	20.0
Dental Surgeon	8	2.5
Pharmacist	12	3.8
Nurse	103	32.2
Laboratory Scientist	25	4.4
Physiotherapist	14	4.4
CHEW	12	3.8
Others	82	25.6

Variable	Frequency (N = 320)	Percentage (%)
Years of experience		
<1	39	12.2
1–5	88	27.5
6–10	120	37.5
11–15	46	14.4
>15	27	8.4

Table 2: Respondents' awareness of antibiotic resistance

Variable	Frequency (N = 320)	Percentage (%)
Ever heard of antibiotic resistance		
Yes	263	82.2
No	57	17.8
Source(s) of information, if yes (n=263)*		
Doctor and Nurse	109	41.4
Pharmacist	39	14.8
Family member/Friend	20	7.6
Media	26	9.9
Literature	89	33.8
Specific campaign	10	3.8
Can't remember	7	2.7
Others	19	7.2
Ever heard of		
Superbugs	107	33.4
Antimicrobial resistance	227	70.9
Drug resistance	261	81.6
Antibiotic resistant bacteria	228	71.3
Ever heard of any of the above		
Yes	288	90.0
No	32	10.0
Source(s) of information, if yes (n=288)*		
Doctor or Nurse	130	45.1
Pharmacist	47	16.3
Family member / Friend	23	8.0
Media	27	9.4
Literature	111	38.5
Specific campaign	11	3.8
Can't remember	8	2.8
Others	21	7.3

**Multiple responses*

About two-thirds (66.3%) of the participants had good knowledge about antibiotic use and resistance while only 39.4% had positive attitudes towards antibiotic use and resistance. About one-third (30%) self-medicate antibiotics and the common reasons for taking antibiotics without a doctor's prescription were experience of similar symptoms like before (54.2%) and convenience (22.9%). More

than half of the participants (55.6%) stopped taking antibiotics after the dosage was completed, 15.3% when recovered from diseases and 2.2% never stopped in the last six months. [Table 3]

Table 3: Respondents' knowledge, attitude of antibiotic use and resistance, practice towards antibiotic administration as well as self-medication

Variable	Frequency (N=320)	Percentage (%)
Knowledge		
Good (≥75%)	212	66.3
Poor (<75%)	108	33.7
Mean score ±SD (%)	*75.9 ±15.8*	
Range (%)	*10.0 – 100.0*	
Attitude		
Positive (≥75%)	126	39.4
Negative (<75%)	194	60.6
Mean score ±SD (%)	61.6 *±22.5*	
Range (%)	5.6 - *100.0*	
I take antibiotics without doctor's prescription		
True	96	30.0
False	224	70.0
Reason(s) for taking antibiotics without doctor's prescription (n=96)		
Trusted my own experience more than a doctor's diagnosis	18	18.8
Similar symptoms before	52	54.2
Convenient	22	22.9
Cheaper	10	10.4
No time to consult a doctor	19	19.8
Recommendation by relatives	8	8.3
Reason(s) I stopped taking antibiotics after last prescription		
When recovered from diseases	49	15.3
When dosage was completed	178	55.6
Sometimes forgot	45	14.1
Cannot take medication during work	29	9.1
It is better to take antibiotics as few as possible	9	2.8
Did not know antibiotics were included in the medication	9	2.8
Want to reserve the drug for when sick again	10	3.1
Doctors asked me to stop	38	11.9
I have never stopped in the last six months	7	2.2
Others	8	2.5
I will increase the dose of antibiotics during the course of treatment		
If symptoms do not subside	42	13.1
To recover faster	35	10.9
If expiry date is near	17	5.3
If doctors recommend	202	63.1
Others	26	8.1
I will switch to another antibiotics during treatment		
If the former did not work	65	20.3
If the latter one is cheaper	21	6.6
To reduce adverse reaction	23	7.2
If the doctor recommends	225	70.3
Others	17	5.3

The logistic regression showed that participants who had a primary level of education were about 6 times more likely to self-medicate with antibiotics than those with a tertiary level of education (AOR: 5.874, 95%CI: 1.020-33.836). Participants with a poor knowledge than good knowledge about antibiotic use and resistance were 1.7 times more likely to indulge in antibiotics self-medicate (AOR: 1.683, 95%CI: 1.015-2.789). Likewise, participants with a negative attitude than a positive attitude towards antibiotic use and resistance were about two times more likely to self-medicate with antibiotics (AOR: 1.861, 95%CI: 1.102-3.143). [Table 4]

Table 4: Predictors of antibiotic self-medication among the respondents

Variable	Antibiotic Self-medication		Bivariate Analysis	Binary Logistic Regression		
			Chi-square	Adjusted Odd Ratio	95%Confidence Interval	
	Yes n (%)	No n (%)	(p-value)		Lower	Upper
Age group (years)						
20–29	23 (28.0)	59 (72.0)	0.795			
30–39	38 (31.1)	84 (68.9)	(0.851)			
40–49	24 (28.2)	61 (71.8)				
50–59	11 (35.5)	20 (64.5)				
Gender						
Male	39 (32.8)	80 (67.2)	0.694			
Female	57 (28.4)	144 (71.6)	(0.405)			
Ethnicity						
Hausa	2 (33.3)	4 (66.7)	2.295			
Igbo	15 (33.3)	30 (66.7)	(0.514)			
Yoruba	70 (28.2)	178 (71.8)				
Others	9 (42.9)	12 (57.1)				
Marital Status						
Married	65 (27.8)	169 (72.2)	3.583			
Single	27 (35.5)	49 (64.5)	(0.310)			
Divorced/Separated	2 (28.6)	5 (71.4)				
Widowed	2 (66.7)	1 (33.3)				
Highest level of education						
Primary	4 (66.7)	2 (33.3)	6.400	5.874	**1.020**	**33.836**
Secondary	17 (39.5)	26 (60.5)	(**0.041**)	1.562	0.793	3.076
Tertiary	75 (27.7)	196 (72.3)		1.000		
Occupation						
Medical Doctor	26 (40.6)	38 (59.4)	9.108			
Dental Surgeon	2 (25.0)	6 (75.0)	(0.245)			
Pharmacist	4 (33.3)	8 (66.7)				
Nurse	24 (23.3)	79 (76.7)				
Laboratory Scientist	6 (24.0)	19 (76.0)				
Physiotherapist	7 (50.0)	7 (50.0)				
CHEW	4 (33.3)	8 (66.7)				
Others	23 (28.0)	59 (72.0)				

Variable	Antibiotic Self-medication		Bivariate Analysis	Binary Logistic Regression		
			Chi-square	Adjusted Odd Ratio	95%Confidence Interval	
	Yes n (%)	No n (%)	(p-value)		Lower	Upper
Years of experience						
<1	6 (15.4)	33 (84.6)	6.560			
1–5	31 (35.2)	57 (64.8)	(0.161)			
6–10	40 (33.3)	80 (66.7)				
11–15	11 (23.9)	35 (76.1)				
>15	8 (29.6)	19 (70.4)				
Knowledge						
Good	55 (25.9)	157 (74.1)	4.922	1.000		
Poor	41 (38.0)	67 (62.0)	(**0.027**)	1.683	**1.015**	**2.789**
Attitude						
Positive	28 (22.2)	98 (77.8)	5.987	1.000		
Negative	68 (35.1)	126 (64.9)	(**0.014**)	1.861	**1.102**	**3.143**

DISCUSSION

This study showed that over three-quarters (82.2%) of the respondents were aware of antibiotic resistance. This is similar to a study done in Spain among Pharmacists[18], where 86% were aware of antibiotic resistance. The rates of awareness in both studies could be due to the high level of knowledge expected of these groups of people as HCWs. This study revealed that the most common source of information on antibiotics was through the doctors (41.4%). In a study on misuse of antibiotic therapy among university community in South Jordan, 33.7% obtained information from physicians.[19] This figure is lower than that of this study and could be because of limited access of the students to doctors as compared to the participants in this study who work in the hospital and may likely have better access to physicians or being the same.

This study showed that about two-thirds of the participants (66.3%) had good knowledge of antibiotic use and resistance. A higher proportion (84.7%) among HCWs with good knowledge of antimicrobial resistance in Ethiopia has been reported.[20] Less than half (45%) of paramedic students in another study in Ethiopia had good knowledge of antibiotic resistance.[21] This discrepancy could be because the study's participants were paramedics in training and are expected to have lower knowledge compared to practicing professionals. Also, only about half (49.2%) of HCWs in a study conducted in six states in Nigeria had good knowledge of antimicrobial resistance.[22] This study was conducted in the three tiers of healthcare system: primary, secondary, and tertiary and may be responsible for the differences as this present study was carried out in a teaching hospital where continuous training, research and learning are ongoing.

This study showed a lower level of HCWs' attitude compared with their knowledge as only about two-fifths (39.4%) of them had a positive attitude towards antibiotic use and resistance. In the United Kingdom, less than two-thirds of HCWs felt that they have a key role in controlling antibiotic resistance.[23] Similarly, in a study among nurses in an acute healthcare environment in Riyadh, Saudi Arabia, none of the participants showed a clear, positive attitude, with the majority of them (76.7%) having only a fair attitude towards antibiotic use and the prevention of antibiotic resistance.[24]

In this study about one-third (30%) of participants practice antibiotics self-

medication. Similarly, 32.7% of participants in Egypt self-medicate with antibiotics[10]. In Southwestern Nigeria, it was revealed that self-medication among doctors and nurses was 39.2% within the preceding year.[6] About one-sixth (15.3%) of participants in this present study stopped taking their antibiotic drugs when they felt better while in Egypt about two-thirds (63.7%) stopped taking antibiotics when they found no improvement. Additionally, it was revealed that over half (55.3%) of the participants in this study stopped antibiotics only when the dosage was completed, which is fair. This could be because the participants in this study are HCWs and the majority of them most likely understand the implications of not completing their medications. However, 2.2% never stopped using antibiotics in the last six months. Unfortunately, this study didn't probe further to understand the reason for this but possible explanations could be that of antibiotics addiction and abuse, long-term prophylactic use, therapeutic indications among others.

In this study, the positive predictors of using antibiotics without prescription were primary education, poor knowledge and negative attitude. Similarly, educational status, using mass media and previous experiences as sources of information on antibiotics, having awareness of antibiotic resistance, and knowledge of antimicrobial resistance were significantly associated with self-medication of antibiotics in Northeast Ethiopia.[25] Also, in another study in the community of Asmara, Eritrea, sex, knowledge and attitude of the participants were associated with the practice of antibiotics self-medication[26]. This research showed that those who were more educated were less likely to self-medicate and this may be because a more educated individual is more likely to have a better understanding of the negative effects of self-medication. This equally explains the link between good knowledge and in turn positive attitude and self-medication of antibiotics. This indicates a need to implement policies that will improve the knowledge and disposition of HCWs by raising their levels of education.

This study explored the experience of the participants on antibiotic use and self-medication in the past and is therefore prone to recall bias. In addition, the study was carried out among HCWs in a teaching hospital, in Southwestern Nigeria and may not be generalizable among all HCWs as it did not cover HCWs in other levels of healthcare in the country viz primary and secondary healthcare.

RECOMMENDATIONS

This study provides a baseline of knowledge, attitude and personal behavior regarding antibiotic use and resistance among teaching hospital HCWs. About two-thirds of the participants had good knowledge of antibiotic use and resistance, however, only about one-third had a positive attitude. Antibiotic self-medication was prevalent among about one-third of the HCWs. Identified positive predictors of self-medication with antibiotics were primary education, poor knowledge and negative attitude towards antibiotic use and resistance. Findings from this study should guide stakeholders and policy-makers to increase knowledge and promote attitude toward proper antibiotic use and prevention of resistance. Interventions such as health education should target HCWs with primary education to reduce antibiotic self-medication among them.

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