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Research Article

Knowledge, Attitude towards Antibiotic Use, Prevalence and Associated Factors for Non-Adherence among Adult Outpatients in Public Health Facilities in Edo State, Nigeria

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ABSTRACT

Background: The observed poor prognosis in several infectious disease treatment emerging from antibiotic resistance has been attributed to failure to achieve optimum drug concentrations *in vivo* as a result of non-adherence to prescribed antibiotic therapy. The study aimed to assess the prevalence of non-adherence and associated factors in Nigeria.

Methods: Using a cross-sectional study design, 800 consenting attendees at adult general outpatient clinics of 5 secondary and tertiary hospitals in Edo central senatorial district, Edo State, Nigeria were interviewed using pretested questionnaires following ethical approval to conduct the study. Independent variables were socio-demographic, knowledge (good/fair/poor), attitude (positive/negative), perceived doctor's support and perceived family support. The dependent variable was non-adherence to antibiotic treatment in the past 6 months. Data were analysed using Statistical Package for Social Sciences. Chi-square test was used for bivariate analysis and significant variables analyzed with multivariate logistic regression, with statistical significance, p, set as<0.05.

Results: Response rate was 100%. Majority, 360 (45.0%), had poor knowledge and 74 (50.3%) had poor attitude towards antibiotics use.

One hundred and forty-seven respondents (18.4%) had received an antibiotic prescription in the last 4 months, of which 75 (51.0%) did not complete the dose, with the most common reason given as remission of symptoms (65.3%). In multivariate analysis, attitude, perceived support from doctor and family members were negatively associated with non-adherence.

Conclusion: Interventions to improve antibiotic adherence should be centred around education. clinician-patient interactions and fostering family support for the sick patient.

Keywords: Non-adherence; Antibiotic; Misuse; Resistance; Public health; Medication; Risk factors

INTRODUCTION

Mediation non-adherence is a global problem that negatively impacts on therapeutic success, and deepens the economic burden placed on patients and the health system with the need for additional consultations, extra and possibly more expensive drug prescriptions, and increased hospitalization [1]. Non-adherence to prescribed antibiotics is another form of antibiotic misuse in a population. Studies have found that non-adherence has a strong causal relationship with antibiotic resistance due to failure to achieve optimum antibiotic drug concentrations. Determinants of non-adherence lie with the patient dispositions (socio-demographic, knowledge and perceptions towards antibiotics), the quality of doctor-patient relationship/communication and factors related to the medication such as taste and dosing [2]. Common reasons cited for non-adherence to prescribed antibiotics have included a cessation of symptoms, forgetfulness, focus on other priorities, lack of information about the dose [3]. However, factors responsible for non-

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adherence differ across countries and interventions to improve adherence must be tailored to what obtains in a particular locality. Antibiotic resistance in Nigeria is an issue that is not fully studied and understood and yet can disrupt the already weak health system in the country. There is paucity of information on the knowledge, attitude and factors responsible for antibiotic non-adherence in Nigeria and particularly from the oil-rich south-south parts of the country. The study was undertaken to investigate the knowledge, attitude prevalence and associated factors of adult patient non-adherence to antibiotic prescription. By identifying population groups at increased risk of non-adherence, appropriately designed educational support can be provided.

MATERIALS AND METHODS

Study area

The study was carried out in Edo state, in the rain forest of South-south region of Nigeria, between latitude 50 44" and 70 34" N of the equator and longitude 50 04" and 60 43" E of the Greenwich Meridian. The state has a land mass of 19,187 km^2, and shares boundary with Kogi State in the north, Delta in the south-east, Ondo State in the west, and Anambra State in the east. The state is divided politically into three senatorial districts and administratively into 18 Local government areas.

Study population

Study population comprised adult out-patients to government owned secondary and tertiary health facilities in the study area.

Study design

The study used an observational cross-sectional analytic study design.

Selection criteria

To be eligible to participate, persons were required to be up to 17 years, to have lived in the community for up to 6 months and were willing to give consent.

Sample size

The study is a sub-analysis of data collected from 800 participants of a cross-sectional study to assess antibiotic misuse patterns and determinants in adult populations attending out-patients clinics conducted from July to December 2018. For that study, a minimum sample size of 248 was calculated based on the formula for determination of sample size in a cross-sectional study [4], prevalence value of 82.2% for antibiotic misuse practices in a previous study [5], a 5% error margin, and a non-response rate of 10%.

Sampling technique

The full details of data collection are contained in another study to be published. Briefly, respondents were selected from amongst patients attending the general out-patient department of five government and one tertiary health facility in Edo central senatorial district of Edo state. The centers had previously been chosen through a multi-stage sampling technique. Respondent recruitment was carried out from Monday to Friday till the desired number of participants was reached. The first respondent each day was selected by random sampling and subsequent respondent by systematic sampling following the list of patients who were registered to see the doctor for that day. Recruitment continued till the required numbers of patients were selected. Where a selected patient was not eligible, the next person in line was approached.

Study variables

The dependent variable in this study was antibiotic non-adherence determined by a self-report of failure to commence or complete the prescribed course of treatment with antibiotics in the last episode of illness for which antibiotics were prescribed by a clinician within the past 6 months [6]. Independent variables included sex, number of years of residence in the study area, religion, age, average monthly income, Level of education, occupation, marital status, knowledge and attitudinal dispositions of respondents towards antibiotic use, perceived physician's support, and perceived family support.

Study instruments

Data was collected using pretested interviewer-administered questionnaire designed by the researcher through extensive literature search on the subject matter to ensure validity, and with technical input from experts in the field of AMR. Variables included in the instrument for measure were demographic characteristics of the respondent, their general knowledge about antibiotics- antibiotic action, side effects, need for a prescription, resistance; attitude towards antibiotic-use and adherence to prescribed antibiotics in the last illness episode were collected. Knowledge about antibiotics was assessed using 6 questions that sought binary responses of Yes, No or "I don't Know" depending on correctness of the answers regarding antibiotics in general and 3 regarding antibiotic resistance.

Attitudinal dispositions towards self-medication and adherence to prescribed antibiotics was assessed using 5 items with a 5-point Likert style response format as 'strongly agree', 'agree', 'not sure' to 'disagree', and 'strongly disagree'.

Data analysis

All data were coded and entered into the computer-assisted software SPSS for Windows version 21, (SPSS Inc., Chicago, IL, USA) for statistical analysis. To simplify presentation of the responses to attitudinal statements in the text, "strongly agree" or "agree" were grouped as "agreed", and "strongly disagree" or "disagree" grouped as disagreed [7,8]. A scoring system was applied to measure the respondents' knowledge and attitudes towards antibiotics. In computing individual scores for knowledge, one mark was awarded for each correct answer and zero (0) for each wrong or 'I am not sure' answer. The antibiotic knowledge score was obtained on a continuous variable by adding up the respondent' number of correct responses to the knowledge statements [8]. Thus, the range of total knowledge score was 0 to 9 for any respondent, so scores<50th percentiles

were classified as having low knowledge, and>75th percentiles as good knowledge. Those between 50th- 75thpercentile were said to have average knowledge [9,10]. Thus, total knowledge score will be graded as poor (0-4), average (5-6) and good (7-9).

For attitude, one point was awarded for each appropriate response (strongly agree or agree for positive statement and strongly disagree or disagree for negative statement) and zero for each inappropriate or uncertain response, with the highest possible score as 20. Attitude was graded as negative or positive depending on total scores obtained by the respondent for the sections. A grade was negative if the respondent's total score fell<50th percentile, and positive if>50th percentile of the total.

Descriptive data were presented in frequency tables with percentages calculated. Measures of central tendency- mean and standard deviation for interval scale, were used to summarize quantitative data. Chi-square test of independence (x 2) was performed to identify variables that were associated with antibiotic non-adherence, the dependent variable. A p value less than 0.05 was considered as statistically significant. Risk factors of non-adherence with p<0.05 in the bivariate analysis were included in multivariate logistic regression analysis to determine those that were independently associated with the dependent variable. Odds ratios (OR), 95% confidence intervals (CI), and p values were calculated for each independent variable.

RESULTS

Demographic characteristics

One hundred and forty-seven (28.2%) respondents out of 521 who had ever used antibiotics in the last 6 months had obtained a doctor's prescription in the last illness encounter. Females were slightly more than males in number (51.7% and 48.3% respectively), respondents with tertiary level of education (49.7%), married (56.5%) and those self-employed (34.0%) were in the majority shown in Table 1.

Table 1: Socio-demographic characteristics of respondents (N=147).

Variables	Frequency (n=147)	Percent (%)
Age group (years) Mean age+SD	39.9+14.4	
< 20	2 8	3.5
21 – 29	234	29.2
30-39	183	22.9
40 -49	154	19.2
50-59	113	14.1
60-69	67	8.4
>70	21	2.8
Sex		
Male	71	48.3
Female	76	51.7
Marital status		
Single	48	32.7
Married	83	56.5
Divorced	1	0.7
Widowed	15	10.2
Highest level of education attained		
No formal education	4	2.7
Primary	22	15
Secondary	47	32
Tertiary	73	49.7
Vocational	1	0.7
Occupational skill level*		
Unclassified	40	27.2
Skill level 1	20	13.6
Skill level 2	42	28.6
Skill level 3	41	27.9
Skill level 4	4	2.7
Employment status		
Employed in private sector	9	6.1
Employed in government sector	36	24.5
Self -employed	50	34
Unemployed	46	31.3
Retired	6	4.1

*International Labour Organization's (ILO) International Standard of Classification of Occupations 2008 (ISCO-08) grouping (11) : Skill Level 1 – elementary occupations e.g. cleaner, labourers, mason, Skill Level 2- technicians e.g. hairdressers, welders, mechanics, bus drivers, Skill Level 3- technical and associate occupations e.g. radiographers and Skill Level 4 – professionals e.g. managers, doctors, engineers nurses

A greater proportion of respondents knew that antibiotics were effective against bacterial infections, 82.3%, while slightly more respondents opined that antibiotics were effective against viral infections (50.4%). Knowledge gaps were observed in the use of antibiotics to treat common cold mentioned by 89.1% of

respondents, cessation of treatment when symptoms improved (61.9%), and the need for a prescription (78.1%), shown in Table 2.

Table 2: Respondents' general knowledge of antibiotics (n=147).

Knowledge question	Correct (%)	Incorrect (%)
Antibiotics are medicines effective in treating bacterial infections	121(82.3)	26 (17.7)
Antibiotic are useful in the treatment of viral infections	73(49.7)	74 (50.4)
Antibiotics can be used to treat common cold	16 (10.9)	131 (89.1)
Antibiotics have side effects	121(82.3)	26 (17.7)
Antibiotics can be stopped when symptoms stop	56 (38.1)	91 (61.9)
Antibiotics can be taken without a prescription	31(21.1)	116 (78.9)
Antibiotic resistance is a problem in Nigeria	76(51.7)	71 (48.3)
Antibiotic resistance means bacteria will no longer be destroyed by antibiotics	100 (68.0)	47 (32.0)
Antibiotics can lose their effectiveness over time if taken when not necessary or inappropriately	92 (62.6)	55 (37.4)

A greater proportion of respondents had poor knowledge, (41.5%), 31.3% had average knowledge, and 27.2% had good knowledge of antibiotics. Majority would stop antibiotics if their symptoms improved, shown in Table 3.

Table 3: Respondents' attitude towards antibiotic use.

Attitudinal statements	Disagree/Strongly disagree	Not sure	Agree/Strongly agree
I am okay with treating myself with antibiotics if I know the cause of the disease	81 (55.1)	14 (9.5)	52 (35.4)
I am happy to give my leftover antibiotics to my family member who is sick.	112 (76.2)	16 (10.9)	19 (12.9)
I am not bothered that I need a prescription to buy antibiotics.	99 (67.3)	17 (11.6)	31 (21.1)
When taking antibiotics, I feel I can increase or reduce the dose without consulting my doctor if I wish to.	117 (79.6)	12 (8.2)	18 (12.3)
I feel okay to stop my antibiotics once I feel better.	55 (37.4)	31 (21.1)	61 (41.5)

Slightly more respondents had negative attitude, 74(50.3%) than positive attitude 73(49.7%) towards antibiotic use.

75(51.0%) respondents did not complete the prescribed treatment during the last encounter, while 72(49.0%) claimed they completed the course of treatment [11]. Common reasons given for non-adherence in the last illness experience included the feeling of improvement in health 49(65.3%), experience of side effects, 9(12.0%), exhaustion of the quantity that was bought, 5(5.3%) and forgot to continue 4(5.3%).

Respondents' completion of prescribed antibiotics in the last treatment encounter was only significantly associated with age of the respondent, as respondents who were older than 60 years had a greater proportion who had completed than those who did not ($p<0.01$). Adherence to antibiotic regimen was not significantly associated with level of education, sex, occupation, marital status, employment status, number of years of residence or income, shown in Table 4.

Table 4: Association between demographic characteristics with treatment adherence.

Variable	Completion of antibiotic prescribed regime		x 2	p value
	Yes (%)	No (%)		
	n=72	n=75		
Sex				

Male	38 (53.5)	33 (46.5)	1.13	0.29
Female	34 (44.7)	42 (55.3)		
Age group				
<21	1 (50.0)	1 (50.0)	13.8	0.03*
21 – 29	15 (31.9)	32 (68.1)		
30-39	14 (53.8)	12 (46.2)		
40 -49	19(54.3)	16 (45.7)		
50-59	10 (47.6)	11 (52.4)		
60-69	8 (72.7)	3 (27.3)		
>70	5 (100.0)	0 (0.0)		
Level of education				
None	0 (0.0)	4 (100.0)	7.82	0.1
Primary	13 (59.1)	9 (40.9)		
Secondary	27 (57.4)	20 (42.6)		
Tertiary	32 (43.8)	41 (56.2)		
Vocational	0 (0.0)	1 (100.0)		
Employment status				
Employed in private sector	6 (66.7)	3 (33.3)	6.82	0.15
Employed in government sector	18 (50.0)	18 (50.0)		
Self -employed	26 (52.0)	24 (48.0)		
Unemployed	17 (37.0)	29 (63.0)		
Retired	5 (83.8)	1 (16.7)		
Occupational skills level				
Unclassified	13 (32.5)	27 (67.5)	7.71	0.1
Skill level 1	12 (60.0)	8 (40.0)		
Skill level 2	20 (47.6)	22 (52.4)		
Skill level 3	25 (61.0)	16 (39.0)		
Skill level 4	2 (50.0)	2 (50.0)		
Marital status				
Single	47 (56.6)	36 (43.4)	6.55	0.09
Married	17 (35.4)	31 (64.6)		
Divorced	0 (0.0)	1 (100.0)		
Widowed	8 (53.3)	7 (46.7)		

The patient's perception of the quality of support he/she received from the doctor was significantly associated with treatment adherence, (OR 0.04, 95% CI 0.15-0.94, p=0.04). Respondents failure to complete treatment was also significantly associated with attitude towards antibiotic use (OR 0.48, 95% CI 0.24-0.95, p=0.04). Knowledge about antibiotics was not significantly associated with completion of drugs, shown in Table 5.

Table 5: Associated factors with treatment non- adherence (n=147).

Variable	Completion of antibiotic prescribed regime		x 2			
	Yes (%)	No (%)	OR	Upper, lower CI		p value
	n=72	n=75				
Knowledge of antibiotic use						
Poor	24 (51.1)	23(48.9)	0·4			0.83
Average	29 (46.0)	34 (54.0)				
Good	19 (51.4)	18 (48.6)				
Attitude towards antibiotic use						
Negative	30 (40.5)	44(59.5)	4·3	1	0 .24	0. 04
Positive	42 (57.5)	31(42.5)		0.5	0.95	
Support from Doctor						
No or little support	10 (27.8)	26 (72.2)	8.6	1	0.15	0.04
Some or much support	62(55.9)	49 (44.1)		0.4	0.94	
Support from family						

No or little support	3 (17.6)	14 (82.4)	7.6	1	0.08	0.12
Some or much support	69 (53.1)	61 (46.9)		0.3	1.34	

DISCUSSION

The awareness by the majority that antibiotics were effective against bacteria, and ignorance about their effect on viruses and treatment of common cold has also been documented in other studies [12-14]. Most respondents thought antibiotics could be stopped when symptoms cleared, and a prescription was not always necessary. Although knowledge was not significantly associated with treatment compliance, as opposed to some other studies [15], these misconceptions need to be addressed through counseling by the prescriber and during dispensing of the antibiotic. The high proportion of non-adherent respondents is similarly reported in other studies [12,16,17]. On the contrary, high completion rates have been documented in some studies [17,18]. Primary reason for cessation of antibiotic was the improvement in health condition. This tallies with the observation that only one-third of respondents were uncomfortable with ending their treatment if they felt better. Other studies concur with this finding [19]. Interestingly, when it came to altering the dose of antibiotic, the majority preferred to consult their clinician. The experience of side-effects and exhaustion of quantity bought were other common reasons given by the respondents for non-adherence and have been reported in other studies. Sometimes symptoms perceived to be side-effects of a drug may indeed just be related to the disease process itself, so it is important that dispensers inform patients of what to expect when taking a drug to avoid discontinuation. The study did not find demographic variables to be significantly associated with treatment adherence, similar to other studies [17]. On the other hand, having a negative attitude towards antibiotic use, the elderly and having little or no family or clinician support were significantly associated with non-completion of antibiotics at bivariate analysis. Multivariate analysis left only attitude and clinician's support as predictive of adherence. This finding highlights the role that the provider-patient relationship plays in improving treatment outcome [17,20]. Encouragement and positive reinforcement from the provider when rendering care as opposed to poor communication about the benefits, instructions for use, and side effects of medications contributes to adherence and should be encouraged.

CONCLUSION

Antibiotic non-adherence is a challenge in Nigeria that cuts across all socio-demographic groups but can be influenced by addressing the quality of the doctor-patient relationship and improving attitude towards antibiotic use through targeted health education programs to correct misconceptions about antibiotics and their usage.

DECLARATIONS

Ethics approval and consent to participate

Approval for the study was obtained from the Ethical committee of the Irrua Specialist Teaching Hospital. Approval for the inclusion of the study site and participants was also sought from the facility heads of the hospitals where the study was conducted. Informed consent was duly obtained from all study participants.

Authors' contributions

ET conceived the study, ET and NA developed the protocol. Both authors were involved in data collection, analysis and writing the manuscript. All authors read and approved the final manuscript.

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