Tropical Journal of
Medicine & Dental Practice

Website: http://www.tjmdp.org

Open Access

Original Research Article

Trop J Med Dent Pract
December 2020;1(2): 57-64
doi: https://doi.org/10.47227/tjmdp/v1i2.1

Antibiotics medication sharing practice: a cross-sectional study of prevalence and correlates among hospital attendees in Nigeria

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Abstract

Background Antibiotic sharing is a globally under-reported form of antibiotic misuse. The study sets out to assess the practice and correlates of antibiotic diversion to family members.
Methods: Consenting adult general out-patient clinic attendees in 5 secondary hospitals and one tertiary hospital in Edo Central senatorial district of Edo State, Nigeria were interviewed using a structured questionnaire on their knowledge and attitude towards antibiotic use, and practice of antibiotic sharing in the last one year. Data were analysed using Chi-square and logistic regression as appropriate. Appropriate institutional ethical board approval was obtained, and informed consent obtained from all participants.
Results. 798 patients (99.8%) returned questionnaires sufficiently completed to be used for further analysis. The mean age of respondents was 39 (14.6) years, 53.3% were females, the majority (45.9%) had tertiary education, were married (57.9%), and 40.1% were self-employed. Prevalence of antibiotic sharing with family members in the past one year was 49.7%, and was only significantly associated with the respondent's age (OR 0.11, CI: 0.02-0.58) not with knowledge of antibiotics or other sociodemographic variables. Holding a belief that one can treat oneself with antibiotics if the cause is known (OR: 1.78, CI: 1.29 – 2.44), having a positive attitude towards antibiotic diversion (OR: 2.5, CI:1.68 – 3.58) and self-medication (OR: 0.04, CI: 0.02-0.06) were significant predictors of antibiotic diversion. The predominant reason given for antibiotic sharing was the availability of the antibiotic in the house, 195(49.1%).
Conclusion: Antibiotic sharing is common practice within families, and can heighten the risk of antibiotic resistance. Clinicians and pharmacists should actively engage in counselling to discourage the practice among their patients and clients.

Keywords: Antibiotic, Sharing, Misuse, Resistance

Introduction

Antibiotic resistance has been described as the public health threat of the 21st century [1, 2]. Infections which were previously responsive to antibiotics are now becoming more difficult to treat with poorer clinical outcomes and higher mortality rates[3, 4]. Infections from resistant pathogens add considerable and avoidable costs to the overburdened healthcare systems particularly in low-income countries leading to prolonged hospital stay, prescription of expensive second-line antibiotics and increased mortality [5]. Improper use of antibiotics includes self-medication and irrational prescribing, and they all contribute to antibiotic resistance. Antibiotic medication sharing, also known as antibiotic diversion, is a form of self-medication. It is the practice of borrowing or lending antibiotics in situations where the recipient is not the one to whom the medications were allocated[6, 7]. Sharing of antibiotic medications carries inherent risks to the recipient, as they do not benefit from medication counselling from prescribers or other reliable sources

of drug information necessary to guide the appropriate use of the antibiotics. It also leads to delayed care-seeking and delayed initiation of appropriate treatment of the underlying condition[8]. There is also the likelihood of taking incomplete or incorrect doses, having adverse drug interactions and unexpected side effects [7]. Sharing of antibiotics is common among family members as with other prescription medications that are commonly shared[9]. In a United States study of 496 parents,159 (32.1%) reported sharing left-over antibiotics among their children [10]. In another study of 535 primary caregivers; 68 (12.7%) reported sharing prescription medication with their child/children, and of this number 14 (20.6%) shared antibiotics [11]. About 33.7% of 700 persons in the United States who participated in a study on medication sharing behaviour had either borrowed or loaned medication with antibiotics accounting for 20.6% of the medication shared [12].

Several studies have identified sociodemographic characteristics of persons [9, 13], attitude towards antibiotic use [14, 15], knowledge on antibiotics[13] and self-medication practice with antibiotic sharing. There is a paucity of information on the place of the family as an informal distribution channel for antibiotics in Nigeria, as well as the risk factors for this practice. This information is important to complement community-based programmes that promote the rational use of antibiotics. This study was conducted to determine the prevalence of antibiotic sharing practices and the sociodemographic qualities of, knowledge level, attitudinal disposition and self-medication practices within families in an adult population in Nigeria.

Methods

Study setting and sampling.

The cross-sectional study was part of a larger study to assess the prevalence and correlates of antibiotic misuse in adult populations in Nigeria carried out between July2018 and January 2019. The study was conducted in Edo Central senatorial district in Edo state, Nigeria. The senatorial districts are made up of 5 local government areas and share boundaries with Kogi and Delta state Edo North senatorial district and Edo South senatorial district. The area covers a landmass of 2,814.347 km2 and is predominantly occupied by Esan speaking people

The study was conducted in 5 general hospitals: one hospital in each local government, and the only tertiary hospital within the senatorial district.
The study population were general out-patient clinics attendees with criteria for participation being that they must be age 18 years and above, resident in the study area for more than 6 months and willing to give consent. Attendants and persons who were very ill, unconscious or in a mentally deranged state were excluded. The minimum sample size was determined using Leslie's formula for prevalence studies, $n = z^2pq/d^2$, assuming a prevalence of 82.2%[17], 95% confidence interval, 5% margin of error, and correcting for 10% non-response rate. The required number of respondents from each centre was determined by probability proportionate to size, and using the average weekly attendance at the out-patient clinics calculated over 3 months. Systematic random sampling was applied to select respondents during the weekdays and within the clinic operational hours until the required number for each site was achieved.

Data were collected using pretested English language interviewer-administered questionnaire designed by the researchers' extensive literature search on the topic with technical input from experts in the field of antimicrobial resistance (AMR). The questionnaire was assessed for face and content validity by a group of local experts: three senior faculty members (two with expertise in research methods and one with clinical expertise and teaching experience in infectious diseases) and two public health experts. This consultation process led to redrafting and re-organizing items in the questionnaire. Pre-test of the questionnaire took place in two comprehensive health centres within the vicinity of the study area to ensure that the questions were valid and that they captured exactly the information that was sought. Following this, modification to the questions was made.

Reliability was ensured by a test-retest after the development of all aspects of the instrument. To achieve this, the questionnaire was administered to 20 patients seeking medical care in a private health facility in the study area and re-administered 4 hours later. Comparison of responses was carried out and the coefficient of reliability computed.

The questionnaire was divided into 4 sections. The first collected information on demographic characteristics of the respondent including sex, marital status, average monthly income, religion, age, education and employment status. Section 2 had 6 questions to test general knowledge on antibiotics with the available responses being 'Yes', 'No' or 'I am not sure'. In computing individual scores for knowledge, one (1) 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 respondents' number of correct responses to the knowledge statements [18]. Thus, the range of total knowledge score was 0 to 6 for any respondent, so scores < 50% were classified as having low knowledge, and > 75% as good knowledge. Those between 50-75 % were said to have average knowledge. [19, 20]. Thus, total knowledge score was graded either as poor (0-2), average (3-4) and good (5-6).

Section 3 had 5 questions on attitude towards antibiotic use with responses in Likert style as 'strongly agree', 'agree', 'not sure' to 'disagree', and 'strongly disagree'.

For the categorical presentation of responses, "strongly agree" or "agree" were grouped as "strongly agree/agree" and "strongly disagree" or "disagree" grouped as "strongly disagree/disagree". [15, 18]. Responses were scored by assigning a score of '4' to a response that should be 'strongly disagree' if the response is correct, '3' for 'disagree', '0' for 'not sure', '2' for 'agree' and '1'for 'strongly agree'. Reverse score marking was done for a negative statement. The highest possible score was 20. Attitude was graded as bad or good depending on total scores obtained by the respondent. A grade was negative if the respondent's total score fell <50% of total, and positive if ≥ 50%.

Section 4 assessed respondents' practice of antibiotic sharing with the question: " In the past year, have you ever given antibiotics to your family members?" with an affirmative response indicating the practice of antibiotic diversion[9]. Self-medication practice was also assessed with the question: 'In the last 6 months, have you taken antibiotics without a doctor's prescription?'

Study variables

The dependent variable was antibiotic sharing. Independent variables included sex, number of years of residence in the study area, religion, age, average monthly income, Level of education, occupation, marital status, general knowledge and attitude towards antibiotic use and the practice of self-medication.

Results

Seven hundred and ninety-eight returned questionnaires out of 800 were sufficiently completed to be used for further analysis. Mean age of respondents was 39±14.6 years and the majority 366 (45.9%) had tertiary education, 462 (57.9%) were married and 40.1% were self-employed. Average monthly income was N5,000- N24,999.00 for the majority (42.2%). Table 1.

Three hundred and ninety -seven respondents (49.7%) had shared antibiotics with family members in the past year. Of this number, 179 (44.3%) had obtained an antibiotic prescription for the last course of antibiotic taken. Majority of respondents, 337 (65.7%) who received a prescription at the last antibiotic treatment undertaken did not practice antibiotic sharing compared to those who did not get a prescription, 64 (22.5%) (χ^2 **=** 1.37, p <0.001**).**

Reasons given by the respondents for sharing antibiotics included availability at home, 195(49.1%), the need to help out in an 'emergency', 48 (12.1%), no money to buy drugs, 120 (30.2 %), similarity of illness, 101 (25.4%) and to complete a course of treatment, 12 (3.0%).

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (n=800)	Percent (%)
Age group (years)		
Mean age ±SD	39 ± 14.6	
≤20	28	3.5
21 – 29	232	29.1
30-39	183	22.9
40 -49	154	19.3
50-59	113	14.2
60-69	67	8.4
≥70	21	2.6
Sex		
Male	373	46.7
Female	425	53.3
Marital status		
Single	267	33.5
Married	462	57.9
Divorced	15	1.9
Widowed	54	6.8
Religion		
Christianity	687	86.1
Islam	97	12.2
Others*	14	1.7
Highest level of education attained		
No formal education	26	3.3
Primary	118	14.8
Secondary	265	33.2
Tertiary	366	45.9
Vocational	23	2.9
Average monthly Income (Naira N)		
No income	158	19.8
<5,000	82	10.3
5000 -24,999	337	42.2
25,000 – 49,999	38	4.8
>50,000	183	22.9
Employment status		
Employed in private sector	51	6.4
Employed in government sector	157	19.7
Self -employed	320	40.1
Unemployed	247	31.0
Retired	23	2.9
Occupational skill level[ʃ]		
Unclassified**	232	29.1
Skill level 1	108	13.5
Skill level 2	246	30.9
Skill level 3	199	24.9
Skill level 4	13	1.6
Years of residence		
<10	281	35.2
10-19	211	26.4
20-29	162	20.3
30-39	70	8.8
40-49	33	4.1
>50		

*Others- African traditional religion, atheists
** Housewives, student, retired, unemployed, applicant.
[ʃ] *International Labour Organization's (ILO) International Standard of Classification of Occupations 2008 (ISCO-08) grouping* [21] *: 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.*

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Sociodemographic qualities and antibiotic sharing practice

In bivariate analysis, antibiotic sharing practice was associated with age, marital status, average monthly income, occupational skill level and employment status. Table 2.

In logistics regression, age remained a significant predictor of antibiotic sharing practice. Respondents who were older than 70 years were 0.11 times likely to share antibiotics compared with younger age groups (p< 0.00). Marital status, sex, educational level, monthly income, employment status were not significant predictors of antibiotic sharing. Table 3.

Knowledge was graded as poor for 359 (45.0%) respondents, fair for 307 (38.5%) and good for 132 (16.5%). Knowledge had no statistical significance with practice of antibiotic sharing (χ^2 = 2.47, P= 0.21).

Attitude towards antibiotics and practice of antibiotic sharing

Three hundred and fifty-three (44.1%) respondents had bad attitudes towards antibiotic use, while 445 (55.9%) held a good attitude. Attitude was significantly associated with the practice of antibiotic sharing as 202 (57.2%) respondents who had good attitude did not practice antibiotic sharing compared to 199 (44.7%) of those with bad attitude. The odds of sharing antibiotics were higher among respondents whose supported self-medication (OR 1.78, p<0.001, 95% CI 1.29-2.44) and those who were in favour of antibiotic sharing (OR 2.5, 95% CI 1.68 – 3.58, p < 0.00).

Respondent self-medication habit and practice of antibiotic sharing

Practice of self-medication in the last 6 months was significantly associated with antibiotic sharing as 77.5% (221/285) of respondents who self-medicated with antibiotics practiced antibiotic sharing compared to 34.4% (176/513) of respondents who did not practice self-medication (OR 6.6, P < 0.001, 95% CI 4.74-9.22).

Discussion

Slightly below half of the respondents in the study practised antibiotic sharing in the past one year, with the predictors of practice being respondent's age, holding a belief that one can treat oneself with antibiotics if the cause is known, having a positive attitude towards antibiotic sharing and individual practice of self-medication. The predominant reason given for antibiotic sharing was the availability of the antibiotic at home,

The one-year prevalence of antibiotic sharing in this study is similar to what was reported in Kuwait 51.9% [15] and Oman 40%[22], and lower than what was obtained in the Philippines, 78.0%[14],and India 64.4%[23]. The observed prevalence was higher than findings from Ethiopia, 25.3%[13], Lebanon 30.3%[24] and Thailand,30.1%[25].These differences in prevalence may be due to the differences in sociodemographic characteristics, perceptions towards antibiotics use including self-medication, and accessibility to antibiotics including over the counter purchase.
Respondents who held a favourable attitude towards sharing antibiotics had higher odds of antibiotic sharing. In African traditional societies, family members feel the need to support each other during times of need, including times of ill health. Respondents who favourably disposed towards self-medication with antibiotics and those who practiced self-medication in the last 6 months were also at higher risk of antibiotic sharing. This finding is corroborated by a study in Ethiopia that demonstrated a low prevalence of antibiotic sharing and a high proportion of respondents with the belief that antibiotics should not be obtained from family or friends without a physician consultation[26]. Similarly, a study in Singapore found respondents had a low prevalence of self -medication, high prevalence of consultation with physicians before antibiotic use and very low levels of antibiotic sharing behaviour [27]. This underpins the need for continued engagement of the public on the risks of self -prescription, as those who self-medicate are not only a danger to themselves but also to their unknowing family members.

Antibiotics that are shared often come from leftovers from previous medication including prescription from doctors. In this study, a large percentage of antibiotics shared came from leftovers. Leftover antibiotics are usually the products of incomplete treatment as when antibiotics are stopped when symptoms disappear or when side effect set in [28].Although there was no significance between those who had ever shared antibiotics and those who had not in terms of attitude towards early cessation of antibiotic therapy, a salient observation was the gap

Table 2: Bivariate analysis of sociodemographic factors associated with practice of antibiotic sharing.

Variable	Practice of antibiotic sharing		χ^2	p value
	Yes (n =397)	No (n = 401)		
Sex				
Male	180 (48.3)	193 (51.7)	0.62	0.43
Female	217(51.1)	208 (48.9)		
Marital status				
Married	250 (54.1)	212 (45.9)	8.94	0.03
Single	116 (43.3)	151 (56.6)		
Divorced	8 (53.3)	7 (46.7)		
Widowed	23 (42.6)	31 (57.4)		
Level of education				
None	13 (50.0)	13 (50.0)	13.83	0.01
Primary	56 (47.5)	62 (52.5)		
Secondary	115 (43.4)	150 (56.6)		
Tertiary	195 (53.3)	171 (46.7)		
Vocational	18 (78.3)	5 (21.7)		
Average monthly income				
No income	65 (41.1)	93 (58.9)	24.57	0.00
<5,000	27(32.9)	55 (67.1)		
5000 -24,999	171 (50.7)	166 (49.3)		
25,000 – 49,999	23 (60.5)	15 (39.5)		
>50,000	111 (60.7)	72 (39.3)		
Age group				
≤20	14 (50.0)	14 (50.0)	22.0	<0.001
20 – 29	97 (41.8)	135 (58.2)		
30-39	111 (60.7)	72 (39.3)		
40 -49	84 (54.5)	70 (45.5)		
50-59	53 (46.9)	60 (53.1)		
60-69	33 (49.3)	34 (50.7)		
≥70	5 (23.8)	16 (76.2)		
Religion				
Christianity	340 (49.5)	347 (50.0)	1.40	0.71
Islam	48 (49.5)	49 (50.5)		
Others*	9 (66.7)	5 (33.3)		
Years of residence				
<10	150 (53.4)	131 (46.6)	7.37	0.19
10-19	109 (51.7)	102 (48.3)		
20-29	68 (42.0)	94 (58.0)		
30-39	35 (50.0)	35 (50.0)		
40-49	13 (39.4)	20 (60.6)		
>50	22 (53.7)	19 (46.3)		
Occupational skills level				
Unclassified	94 (40.5)	138 (59.5)	11.94	0.02
Skill level 1	54 (50.0)	54 (50.0)		
Skill level 2	132 (53.7)	114 (46.3)		
Skill level 3	110 (55.3)	89 (44.7)		
Skill level 4	7 (53.8)	6(46.2)		
Employment status				
Employed private	28 (54.9)	23 (45.1)	11.8	0.02
Employed govt	87 (55.4)	70 (44.6)		
Self-employed	170 (53.1)	150 (46.9)		
Unemployed	101 (40.9)	146 (59.1)		
Retired	11 (47.8)	12 (52.2)		

in knowledge where majority opined that antibiotics could be stopped when symptoms ceased. Other studies have reported similar misconceptions[29, 30]. In contrast, antibiotic sharing was reported to be 0.4% in Germany, over 95% of respondents took their antibiotic medication as prescribed, and only 2.0% had leftover antibiotics at home [31]. Other studies have noted a high tendency for sharing prescription medications when they are leftovers at home[28, 32]. This raises the question of the

Table 3: Logistic regression analysis of sociodemographic predictors of antibiotic sharing

Variable	OR	Lower, upper 95% CI	p value
Marital status			
Married	1(Ref)		
Single	0.80	0.47, 1.36	0.41
Divorced	0.72	0.24, 2,16	0.56
Widowed	1.13	0.56, 2.29	0.74
Level of education			
None	1(Ref)		
Primary	0.70	0.26, 1.81	0.46
Secondary	0.56	0.22, 1.47	0.24
Tertiary	1.07	0.39, 2.89	0.90
Vocational	3.16	0.79, 12.71	0.10
Average monthly income			
No income	1(Ref)		
<5,000	0.71	0.38,1.33	0.28
5000 -24,999	1.33	0.79, 2.27	0.29
25,000 – 49,999	2.41	1.02, 5.70	0.05
>50,000	2.08	1.02, 5.70	0.03*
Age group			
≤20	1 (Ref)		
20 – 29	0.46	0.19, 1.07	0.07
30-39	0.66	0.24,1.79	0.41
40 -49	0.54	0.19, 1.52	0.24
50-59	0.39	0.13, 1.14	0.09
60-69	0.41	0.13. 1.30	0.13
≥70	0.11	0.02, 0.58	0.00*
Occupational skills level			
Unclassified	1(Ref)		
Skill level 1	1.62	0.66, 3.99	0.29
Skill level 2	1.38	0.55, 3.47	0.50
Skill level 3	1.13	0.39, 3.24	0.82
Skill level 4	0.69	0.16, 3.07	0.63
Employment status			
Employed private	1(Ref)		
Employed govt	0.82	0.38, 1.80	0.63
Self-employed	1.06	0.47, 2.36	0.89
Unemployed	1.03	0.35, 3.01	0.96
Retired	1.30	0.36, 4.69	0.69

relevance and adequacy of patient counselling at the time of prescribing antibiotics, especially communicating to patients that unwanted leftover antibiotics should be disposed of safely, and not through sharing with family members. This discussion should also follow when there is a need to change a patient's antibiotic medication regimens [13].

The study found older respondents had a lower prevalence of ever sharing antibiotics in tandem with other studies[8]. Logically, antibiotic sharing would be expected to increase with increasing age of respondents as the proportion that would report the practice would be higher, having had more years to carry out the behaviour. On the contrary, respondents in this study within the age bracket 30 – 50 years had a higher proportion sharing antibiotics than other age groups. It is possible that the older age group may not have had as much health literacy and access to antibiotic when they were younger, compared to contemporary times, and therefore have a lower prevalence of the practice [8]. Older respondents are also more likely to be compliant with their medications and therefore not have leftovers [33]. Those younger than 30 years may self-medicate more frequently with incomplete regimens, and therefore also have more leftover to share. Respondents in the middle age group may have growing families and share antibiotics among children. Other studies have documented medication sharing as prevalent among the middle aged [6, 8].

The study demonstrated that rising income levels were associated with antibiotics medication sharing. This may be explained by the tendency of people with higher income to self-medicate and have poor adherence to medication. Further studies are required to investigate this relationship. No significant relationship was observed with other sociodemographic variables as has been similarly reported in other studies[14]. Thus, public targeted interventions should address both sexes, all occupational groups, educational backgrounds, marital and religious categories.

The study has a few limitations. The use of a hospital population may limit generalization of findings to the wider public. The one-year recall period for antibiotic sharing may introduce information bias, as only those who shared recently are likely to recall. The study did not distinguish between antibiotic borrowing, lending or giving.

Conclusion

Antibiotic medication sharing is prevalent in the study area and particularly among younger persons, those with high income levels, persons who have negative attitudes towards self-medication and practice self-medication. Thus, public health interventions should be directed towards behaviour change communication among these identified risk groups so that the right attitude towards antibiotics can be developed. The intervention of clinicians and pharmacists is also required in the area of counselling patients and clients against medication sharing and the enforcement of regulations to prohibit the sale of antibiotics across the counter to limit the practice of self-medication.

List of abbreviations

CDR: cup-to-disc ratio, IOP: intraocular pressure, mmHg: millimeter of mercury, SD: standard deviation

Declarations

Ethics approval and consent to participate

Not provided

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

No conflict of interest associated with this work

Funding

The study is part of larger study on antibiotic resistance in Nigeria. The study was funded by the researchers

Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. ET conceived the study, ET and MO developed the protocol. All authors were involved in data collection, analysis and writing the manuscript. All authors read and approved the final manuscript.

Acknowledgements

The authors are grateful to all persons who contributed to data collection. The authors are also grateful to Miss Amen Anabue for proofreading the manuscript.

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