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SERVICES FOR SCIENCE AND EDUCATION

Knowledge of Antimicrobial Drugs among Outpatients in a Specialist Hospital in Abuja, Federal Capital Territory, Nigeria

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ABSTRACT

Background: Globally antimicrobials are a key tool in our fight against infectious diseases. Antimicrobial knowledge entails being familiar with the many classes of antimicrobials available and the infections they can treat. Assessing the knowledge of Antimicrobial is necessary among patients to avoid its misuse and development of antimicrobial resistance. It will aid in decision making and improving health seeking behaviour of patients. This study seeks to assess the knowledge of antimicrobial drugs among patients in a specialist hospital in Abuja Muncipal Area council, FCT, Abuja. Methods: This was descriptive, cross-sectional study done in September, 2022 among clients attending outpatient clinic at a District Hospital Abuja's. it involved a sample size of sample size 423 with 400 responding. A multistage sampling technique was adopted for this study. The data was analyzed using the IBM SPSS 28 (Statistical Package for the Social Sciences) computer software (IBM SPSS Inc. 2021). The data was summarized using descriptive statistics which include the percentages, frequencies. Test of association was done using, the chi-square test (χ 2), and p-value less than 0.05 was considered statistically significant. Ethical approval was granted by Bingham University Teaching Hospital, Jos, Plateau State. Results: One hundred and fifty respondents (37.5%) had good knowledge of antimicrobials, 141 (35.25%) had fair knowledge of antimicrobials, and 109 (27.25%) had poor knowledge (gave unsatisfactory answers to questions regarding knowledge about antimicrobials). Between male and female respondents. 22% of female respondents had good knowledge, 18.25% had fair knowledge and 16.75% had poor knowledge. Of all the male respondents, 15.5% had good knowledge, 17% had fair knowledge and 10.5% had poor knowledge. There was a statistically significant association between knowledge of antimicrobials with Marital Status (χ^2 (2, N=400) = 54.92, p < 0.001) where more singles had poor knowledge of antimicrobial than married people, Education (χ^2 (2, N=400) = 87.16, p < 0.001), where more of those with tertiary education had good knowledge of antimicrobials than those with no education or only primary

education. and Age (χ^2 (2, N=400) = 56.84, p < 0.001) as more younger people (18 - 29 years) had good knowledge of antimicrobials than older people (40- 59 years). Conclusion: Over a third of clients had good knowledge of antimicrobials, a third also had fair knowledge while about a quarter had poor knowledge. The government and health care workers should support efforts towards improving the knowledge of communities on the basics of antimicrobials, in order to guide its use and improve antimicrobial stewardship.

Keywords: Knowledge, Antimicrobials, Antibiotics, Antifungals, Antivirals and Antiparasitic medications

INTRODUCTION

Antimicrobials are a key tool in our fight against infectious diseases. They typically work by enteringan organism binding to specific target sites and blocking important processes in the organism that either kill them or stop them from multiplying[1,2]. They have been used in various forms such as herbaltreatments for thousands of years, but in the modern era, antimicrobials began in the early 1900s with the creation of a compound called salvarsan and later in 1928 with the discovery of penicillin by Alexander Fleming[2,3] .Since then, many different antimicrobials have been developed with relative success. However, likemany times in our human history, our pros have been exhausted to the point where they turn into cons. The issue of antimicrobial resistance (AMR) is one such classic example where extensive misuse of drugs is leading to the spread of a human-induced disaster[4] .

Antimicrobials, which include antibiotics, antifungals, antivirals, and antiparasitic medications, are aclass of medicines that are effective against microorganisms[5]. Antimicrobial knowledge entails being familiar with the many classes of antimicrobials available andthe infections they can treat. For Instance, Antibacterial, often known as antibiotics, are used to treatbacterial infections such as whooping cough/pertussis, diarrhea, urinary tract infection, gonorrhea, and others. Based on their antimicrobial spectra, pharmacodynamics, and chemical makeup, antibiotics are often categorized as beta-lactams, macrolides, quinolones, tetracyclines, or aminoglycosides [6,7].Antifungals either eradicate or stop the growth of fungi. they treat infections like ringworm, thrush, and athlete's foot. In particular, viral illnesses including the common cold, influenza, chickenpox, andcold sores are treated with antiviral medicines. While Leishmaniasis, malaria, and Chagas disease areexamples of infectious disorders that can be treated with antiparasitics. These illnesses are brought on by parasites such nematodes, cestodes, trematodes, and infectious protozoa. [6,8] According to Nigeria's legislation[9,10], antimicrobials and other antibacterial should only be dispensed with prescription. People know these drugs via informal arrangement as some antimicrobials are "peddled" all over the streets of the country, some are prescribed by a doctor, pharmacists and patent medicine store owner[7,8,9,10]. There are quite a few research on public awareness and knowledge of antimicrobials in Nigeria, thus, it is critical to determine knowledge of antimicrobial in Abuja, in order to determine what kind of intervention the public might require.

Assessing the knowledge of Antimicrobial is necessary among patients to avoid its misuse and development of antimicrobial resistance. It will aid in decision making and improving health seeking behaviour of patients[9,10]. Knowledge studies create a baseline for assessment of use

and abuse of antimicrobials. This study seeks to assess the knowledge of antimicrobial drugs among patients in a specialist hospital in Abuja Muncipal Area council, FCT, Abuja.

METHODS

This study was carried out in September, 2022 the AMAC Local government area of Abuja-FCT in September, 2022. Abuja is a city in central Nigeria that serves as the country's capital and is located within the Federal Capital Territory (FCT). FCT-Abuja has a total population of 2,702,443 [11,12] FCT hastwo weather seasons each year: a warm, humid rainy season and a dry season. There is a brief period of harmattan between the two seasons, usually from early December until the end of January[12, 13] . Other area councils being Abaji, Bwari, Gwagwalada, Kuje, and Kwali. It is divided into five districts namely Asokoro, Garki, Karu, Maitama, and Wuse Districts and twelve Wards: City Centre, Garki, GUI, Gwagwa, Gwarimpa, Jiwa, Karshi, Kabusa, Karo, Nyanya, Orozo, and Wuse. The area council is a home to a number of indigenous peoples including the Habe, Gbagyi, Gwandara, Gade, Basa, Hausa, and Fulani [14,15]. These were heterogeneous groups thatoriginally inhabit the present-day F.C.T and majority of the residents in AMAC are civil servants, low-middle-income earners, primarily small traders and low-ranking civil officials who reside in remote areas. Those with a higher socioeconomic position, on the other hand, live in the urban settlement. Some work in NGOs and private sectors while others engage in commercial activities liketrading and transportation[14,15]

This research was carried out at Maitama District Hospital, one of the largest government-owned hospitals in Abuja. Outpatient services, as well as Surgical, Medial, Pediatrics, Obstetrics, and Gynecology services, are available at the two-story, 101-bed hospital. Laboratory, X-ray services andAccident & Emergency service are also available. All in-patients, including children, adult males and females, and VIP wards, are housed on the first floor of the hospital. The inpatient pharmacy, surgery theatre, labor, post-natal, and surgical wards are also on the first level. Administrative officesand record archives predominantly occupy the second floor. It also provides full- scale clinical and diagnostic services in various areas of specialties to patients from all the districts within AMAC as well as other area councils within the FCT.[16]

A descriptive, cross-sectional design was employed for this study and the target population for this study were adults who reside in Abuja, and attend Maitama District Hospital Abuja's General Out-Patient Clinic for care, assistance, and treatment. Patients aged 18 andabove who fulfill the inclusion criteria and give informed consent were enrolled in the study. Sample Size was determined using the Cochran's formula[17] $\mathbf{n = Z^2pq/e^2}$ (Formula for population greater than 10,000) we hypothesized that at a 95% confidence level, the assumed prevalence of residents (18 and above) being aware of antimicrobial use and resistance was 50% (0.5)of the community with a marginal error (absolute precision) value of 0.05. The sample size was 384 adults and 10% was added to the sample size to take care of attrition for residents who refused to participate or incompletely answered the interview, thus making the sample size 423.

A multistage sampling technique was adopted for this study.

- **Stage 1:** Selection of districts in the Federal Capital Territory. AMAC was selected using simple random sampling technique.The district selection was done using simple random sampling by balloting without replacement from the list of five districts in AMAC LGA

namely Asokoro, Garki, Karu, Maitama, and Wuse Districts and Maitama district was selected.

- **Stage 2**: Selection of General hospital from Maitama District. Maitama district hospital was selected as it was the only general hospital in this district.
- **Stage 3:** Selection of Participants. Systematic Sampling method was used. One in every two patients who came seeking care at the Maitama District Hospital general outpatient clinic was systematically recruited into the study from all eligible adult patients found in the waiting area of the outpatient clinic before the commencement of consultation. 800 patients were expected based on the average weekly attendance at out patient department (OPD), so 20 people were interviewed daily giving a sampling interval of 2 (i.e., formula K= N/n was used,whereby N=the total number of patients attending OPD per week and n=the estimated sample size. K = 800/423, K = 1.89 which was approximated to 2). The systematic sampling technique was carried out as follows:

Simple random sampling was done for the first two patients in the waiting room to get the startingpoint.Thereafter, every 2nd patient was selected and recruited into the study if consent was given until the required sample size was obtained.

Inclusion Criteria:
The criteria for eligibility for the study included (1.) Adults (18 years and above) visiting the OPD as patients (2.) both males and females who were medically stable and willing to participate.

Exclusion Criteria:
Clients who were very sick and could not understand the study, mentally impaired clients, and those not willing to participate were excluded from the study.

Informed consent was obtained from all of the eligible participants. The purpose of the study was carefully explained to each participant who completed the consent form.

Data was collected from consenting participants through a questionnaire structuredin an open-ended manner and self-administered. The first domain consisted of the demographic details of the participant; the second domain was related to the respondent's knowledge of antimicrobials. The participant's level of knowledge was determined according to the outcome criteria highlighted below.The independent variables included in this study are the socioeconomic status of the respondent (age,location, gender, ethnicity, education, marital status, and occupation) while the dependent/outcome variables include the knowledge of antimicrobials.

Definition of Outcome Variables:
***Knowledge of Antimicrobials*:** Antimicrobials – including antibiotics, antivirals, antifungals and antiparasitics – are medicines used to prevent and treat infections in humans, animals, and plants.

Good Knowledge*:* those who state that antibiotics can cure bacterial infection, and indicate somecommon antibiotics.

Poor Knowledge*:* those who state that antibiotics can treat all infections including viral infections,identify paracetamol as an antibiotic, and state that antibiotics can relieve body pains and fever.

Average Knowledge*:* those who can identify to an extent what antibiotics is/ and or is not, and what they can cure or cannot cure.

Measurement of Outcome Variables: To compute these outcome variables, respondents' responses to questions asked were scored as "correct" or "incorrect" and transformed as "1" or "0", respectively. The correct responses to questions in each category were added to give the general knowledge score for each of the outcome variables. Respondents scoring above the cut-offs in each thematic area assessed were regarded as satisfactory while those with scores below were considered to have an unsatisfactory knowledge level.

A total of seven (7) questionnaire items with True/False answers were used to assess knowledge of Antimicrobials i.e., antibiotics, and the respondents' knowledge was graded with a score of one for correct answer and zero for incorrect answer. As there were seven items in this section, the total knowledge score can be between zero to seven points, based on this the total knowledge score was categorized into "Sufficient Knowledge i.e., ≥ 5 correct answers", "Moderate" (3-4 correct answers),and "Poor Knowledge" (< 3 correct answers) Responses of "Do not know" were counted as incorrect,and no points were given. The total knowledge score was the sum of all the correct answers providedby the respondent. Mean knowledge score (%) was calculated and divided into three categories: poor(<60%), average (60-80%), and good (>80%) level.

The data generated in this study was analyzed using the IBM SPSS 28 (Statistical Package for the Social Sciences) computer software (IBM SPSS Inc. 2021). The data was summarized using descriptive statistics which include the percentages, frequencies. Inferential statisticsprovided an opportunity to assess differences between groups based on certain demographic variablesas well as, determine the factors that are associated with antimicrobial knowledge. For bi-variate analysis, the chi-square test (χ 2) was used to assess associations between independentand dependent variables at 95% Confidence Intervals (95% CIs). At this point, any p-value less than 0.05 was considered statistically significant. Ethical approval, the study protocol as well as other study materials were reviewed and approved by the Bingham University Teaching Hospital (BHUTH) Ethical Research Committee. Approval and Permission from Maitama district hospital, Abuja was granted before the commencement of this study.

RESULTS

Table 1: Knowledge About Antimicrobial s (Antibiotics) among respondents

Knowledge assessment item	Response option	Gender	Correct response *n* (%)	Incorrect response *n* (%)	Total N=400
Antibiotics are medicines that can cure bacterial infections	***True***	**Female**	***201 (50.25%)***	27 (6.75%)	228 (57%)
		Male	***148 (37%)***	24 (6%)	172 (43%)
Antibiotics can be used to treat viral infections	***False***	**Female**	***66 (16.5%)***	162 (40.5%)	228 (57%)
		Male	***53 (13.25%)***	119 (29.75%)	172 (43%)
Antibiotics can cure all infections	***False***	**Female**	***133 (33.25%)***	95 (23.75%)	228 (57%)
		Male	***94 (23.5%)***	78 (19.5%)	172 (43%)
Antibiotics are used to relieve body pain	***False***	**Female**	***145 (36.25%)***	83 (20.75%)	228 (57%)
		Male	***111 (27.75%)***	61 (15.25%)	172 (43%)
Antibiotics are used to stop Fever	***False***	**Female**	***130 (32.5%)***	98 (24.5%)	228 (57%)
		Male	***99 (24.75%)***	73 (18.25%)	172 (43%)
Paracetamol (acetaminophen) is an antibiotic	***False***	**Female**	***158 (39.5%)***	70 (17.5%)	228 (57%)
		Male	***125 (31.25%)***	47 (11.75%)	172 (43%)
Note: Only correct responses are indicated in Bold and Itallics.					

Knowledge About Antimicrobial s (Antibiotics) Among Out-Patients, Abuja

For the Knowledge assessment of antimicrobials, 87.25% of respondents (50.25% Female, and 37% Male) correctly believe that antibiotics cure bacterial infections while 12.75 % either believe this statement was false or had no idea how to answer.

29.75% of respondents (16.5% female and 13.25% male) correctly responded to the statement ''Antibiotics can be used to treat viral infections while 51.75% failed to answer this statement correctly or had no idea of the correct answer.

56.75% of respondents (33.25% female and 23.5% male) correctly responded to the statement ''Antibiotics can cure all Infections'', while 43.25% failed to answer this statement correctly or had no idea of the correct answer.

64% of respondents (36.25% female and 27.75% male) correctly responded to the statement ''Antibiotics are used to relieve body pain'', while 36% failed to answer this statement correctly or had no idea of the correct answer

57.25% of respondents (32.5% female and 24.75% male) correctly responded to the statement ''Antibiotics are used to stop fever'', while 42.75% failed to answer this statement correctly or had no idea of the correct answer

70.75% of respondents (39.5% female and 31.25% male) correctly responded to the statement 'Paracetamol (acetaminophen) is an antibiotic'', while 29.25% failed to answer this statement correctly or had no idea of the correct answer

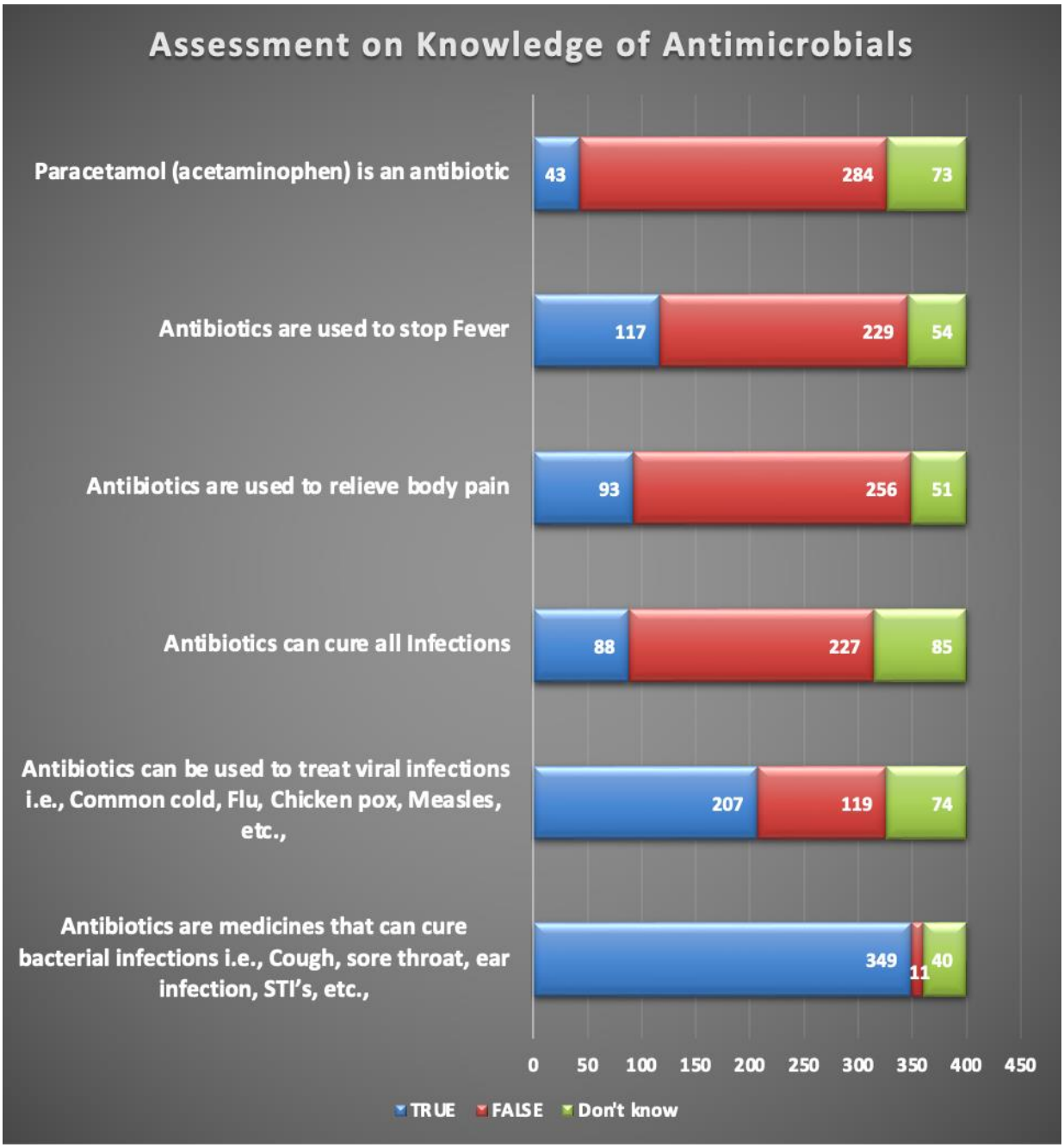

Figure 1: A Stacked-bar chart showing the Proportion of participants with correct identification of true and false statements on knowledge of Antimicrobials i.e., Antibiotics among in Abuja.

Table 2: Distribution of Respondents by the level of knowledge on Antimicrobials among outpatients, Abuja

Level of knowledge of antimicrobials	Total score	% score	No of respondents (%) Male	No of respondents (%) Female	Total N (%)
Good Knowledge	**≥ 5**	**>80%**	62 (15.5%)	88 (22%)	150 (37.5%)
Fair Knowledge	**3-4**	**60-80**	68 (17%)	73 (18.25%)	141 (35.25%)
Poor Knowledge	**< 3**	**<60%**	42 (10.5%)	67 (16.75%)	109 (27.25%)
Total			**172 (43%)**	**288 (57%)**	**400 (100%)**

Source: Field survey, 2022

Respondents by the Level of Knowledge on Antimicrobials Among Outpatients, Abuja

Information in Table 2 shows the level of knowledge of antimicrobials, between male and female respondents. 22% of female respondents had good knowledge, 18.25% had fair knowledge and 16.75% had poor knowledge. Of all the male respondents, 15.5% had good knowledge, 17% had fair knowledge and 10.5% had poor knowledge.

Their scores were accumulated by adding the total of correct answers (1) and wrong answers (0) to the questions in the survey. Figure. 1 and 2 above gives a visual representation on the assessment on levelof knowledge about Antimicrobials.

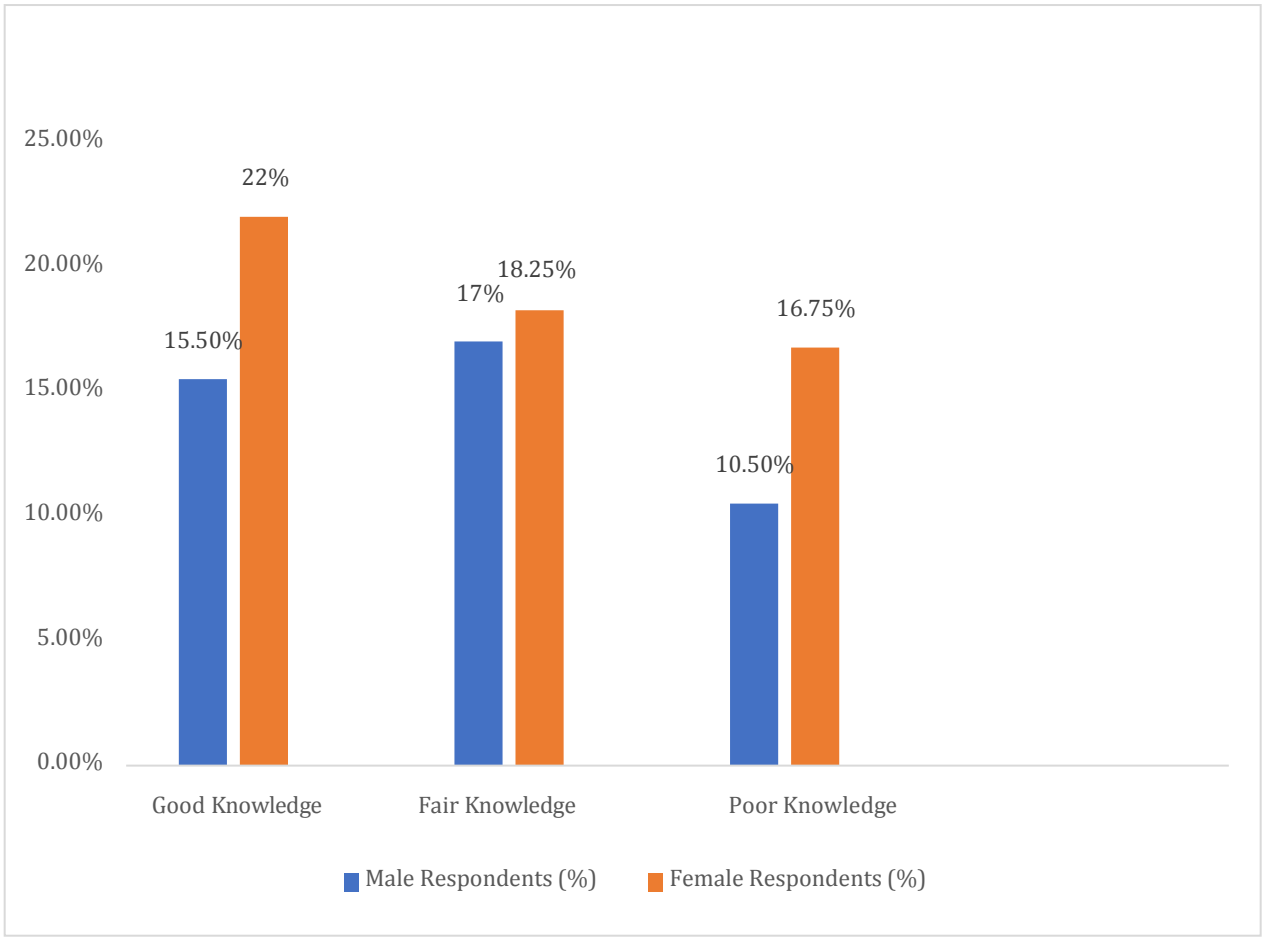

Figure 2: Bar-chart presentation of male and female percentage Knowledge levels About Antimicrobials among patients in a general hospital out-patients, Abuja

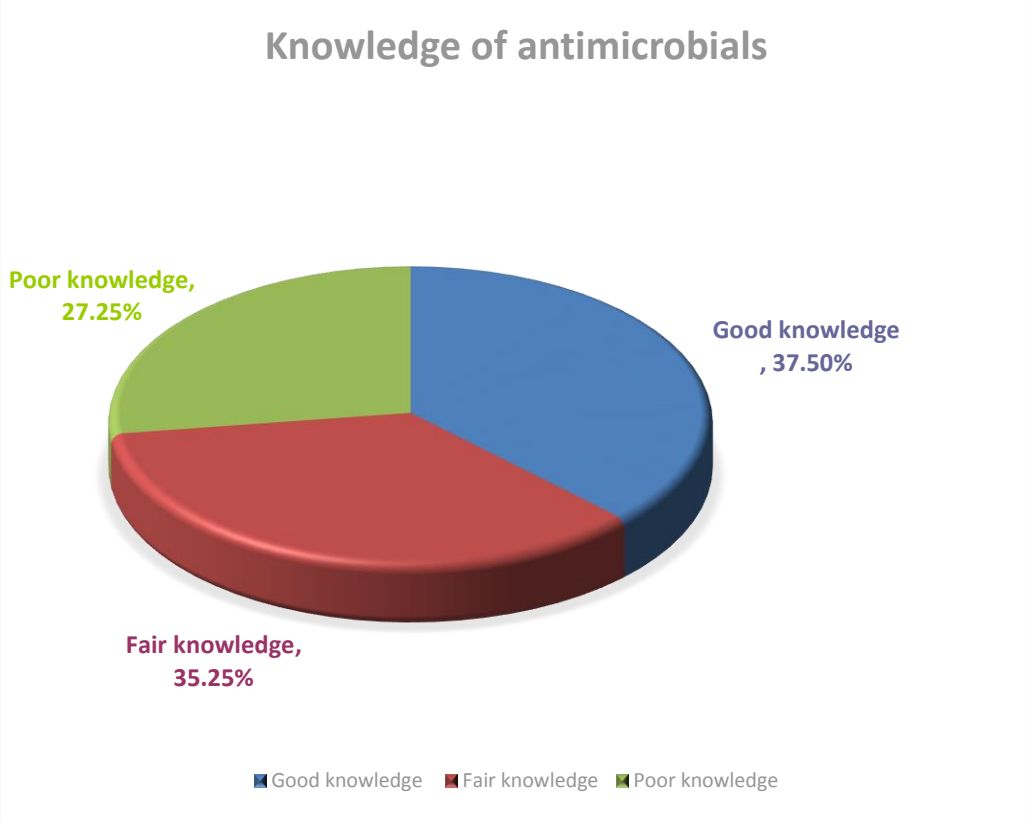

Figure 3: Pie chart presentation of Total percentage Knowledge levels AboutAntimicrobials among Maitama general hospital out-patients, Abuja

Table 3: Bivariate analysis between Age, Marital status, and Education and knowledge of Antimicrobials among out-patients in Abuja.

Variables		Knowledge of Antimicrobials			χ2 Value	P-value
		Good Knowledge	Fair Knowledge	Poor Knowledge		
Age	18- 29	53 (13.25%)	66 (16.5%)	58 (14.5%)	**56.84**	**< 0.001**
	30-39	51(12.75%)	40 (10%)	45(11.25%)		
	40-49	22 (5.5%)	18 (4.5%)	1(0.25%)		
	50-59	13 (3.25%)	13(3.25%)	3 (0.75%)		
	60 and above	10 (2.5%)	4(1%)	3 (0.75%)		
Marital Status	Single	65 (16.25%)	78 (19.5%)	66 (16.5%)	**54.92**	**< 0.001**
	Married	72 (18%)	58 (14.5%)	36 (9%)		
	Divorced	9 (2.25%)	0 (0%)	7(1.75%)		
	Widowed	4 (1%)	5 (1.25%)	0 (0%)		
Education	No schooling	0 (0%)	0 (0%)	0(0%)	**87.16**	**< 0.001**
	Primary	2 (0.5%)	0(0%)	**0(0%)**		
	Secondary	6 (1.5)	21 (5.25%)	25 (6.25%)		
	Tertiary	77 (19.25%)	71(17.75%)	66 (16.5%)		
	Postgraduate	65 (16.25%)	49(12.25%)	18(4.5%)		
Significant at p<0.05, Pearson Chi-square=$\chi 2$						

Bivariate Analysis Between Age, Marital Status, and Education and Knowledge of Antimicrobials Among Out-Patients in Abuja.

A chi-square test conducted to evaluate whether groups (Location, Marital status, Education, Ethnicity, Occupation, Age, and Gender) differed in their knowledge of antimicrobial showed that a significant chi-square was obtained for Marital Status ($\chi^2_{(2,\ N=400)} = 54.92$, $p < 0.001$)where more singles had poor knowledge of antimicrobial than married people, Education ($\chi^2_{(2, N=400)} = 87.16$, $p < 0.001$), where more of those with tertiary education had good knowledge of antimicrobials than those with no education or only primary education. and Age ($\chi^2_{(2, N=400)} = 56.84$, $p < 0.001$) as more younger people (18 - 29 years) had good knowledge of antimicrobials than older people (40- 59 years).

Table 4: Description of scores (outcomes) obtained by respondents (n = 400)

Outcomes	**Maximum Obtainable Score**	**Scores Obtained byRespondents**		**Good *n(%)***	**Fair *n (%)***	**Poor *n(%)***
		Lowest	**Highest**			
Knowledge about antimicrobials i.e., antibiotics	6	0	6	150 (37.5%)	141 (35.25%)	109 (27.25%)

Description of scores (outcomes) obtained by respondents (n = 400)

Table 4 shows a summary of the outcomes obtained by respondents. 150 (37.5%) had good knowledge of antimicrobials, 141 (35.25%) had fair knowledge of antimicrobials, (gave average answers) and 109 (27.25%) had poor knowledge (gave unsatisfactory answers to questions regarding knowledge about antimicrobials).

DISCUSSION

Responding to the knowledge assessment statements about antimicrobials, majority 87.25% (50.25% female and 37% Male) of respondents believe that antibiotics can cure bacteria which is higher than the percentage (46%) recorded from South Korea [18] but similar to the 84% in research by Cals et al., [19]. This may be due to the level of antimicrobial exposure in the population. South Korea have a restricted antimicrobials as a doctors prescription is required to purchase or use one. This correct knowledge can be helpful among populations in treatment of common illness, but regulation of use is critical in ensuring proper and approved use of antimicrobials, in order to prevet the emergence of community resistance to certain antimicrobial. The proportion of respondents 70.25 % (40.5% female 29.75% male) in this study that incorrectly thought that antibiotics are used in the treatment of viral infections is comparable to that obtained in a survey in New Jersey (70 %) and Malaysia (67.2 %) [20,21] This similar findings may be due to the assumption among populations that antibiotics can cure viral diseases. The similarity in signs and symptoms between viral and bacterial disease may add to this erroneous thought. This incorrect knowledge fuels improper use of antimicrobials in treatment of common ailments.

Half (56.75%) of respondents (33.25% female and 23.5% male) were aware that antibiotics can't cure all Infections, and over two - thirds (64%) of respondents (36.25% female and 27.75% male) indicated correctly that antibiotics are not used to relieve body pain. This finding exposes the fact that another half of the patients believe that antibiotics can cure all infections and can relive pain. This translates to indiscriminate use of antibiotics to treat every body pains and suspected infections. Thus , adding to the burden of antimicrobial resistance.

Over half (57.25%) of respondents (32.5% female and 24.75% male) correctly stated that Antibiotics are not used to stop fever'', while 70.75% of respondents (39.5% female and 31.25% male) correctly indicated that Paracetamol (acetaminophen) is not an antibiotic leaving 29.25% of respondents confused about this statement. Other investigations have found some misconceptions between fever medications, analgesics, and antibiotics[21,22]. The mix-up of these medications could be one explanation for the public's misconception about the use of antibiotics for common colds and other non-bacterial ailments. In the antimicrobial knowledge level assessment, around a third (37.5%) (22% female, 15.5% male) of respondents had good antibiotic knowledge, 35.25% (18.25% female, 17% male) had fair knowledge and over a quarter (27.25%) (16.75% female, 10.5% male) had poor knowledge. Similarly, respondents' educational level was found to be a predictor of good knowledge, as patients with tertiary education had good knowledge of antimicrobials than those with no education. This finding also confirms the findings by McNulty et al., [23] who reported that educational level was the greatest determinant of low antibiotic knowledge. This finding is expected as educated people are more likely to enquire about drugs and treatments from tier health care worker or physician. This is an advantage as this creates an opportunity for enlightenment and control of the use of antimicrobials among the people. More singles had poor knowledge of antimicrobial than married people, this may be explained as it is possible that married people may have been more exposed to antimicrobials than the single respondents.

This study is limited to Abuja residents who attend the out patient department (OPD) a single Government hospital in Abuja therefore, it may not represent the overall scenario of the residents of AMAC, FCT. The knowledge of antimicrobials was self-reported, and so the concern of response or recall bias is of consideration.

CONCLUSION

Over a third (37.5%) had good knowledge of antimicrobials, 141 (35.25%) had fair knowledge of antimicrobials, and 109 (27.25%) had poor knowledge (gave unsatisfactory answers to questions regarding knowledge about antimicrobials). Between male and femalerespondents. 22% of female respondents had good knowledge, 18.25% had fair knowledge and 16.75% had poor knowledge. Of all the male respondents, 15.5% had good knowledge, 17% had fair knowledge and 10.5% had poor knowledge. There was a statistically significant association between knowledge of antimicrobials with Marital status, Education, and Age,

RECOMMENDATIONS

The health authorities and health care workers should deliberately lead campaigns to utilize the existing knowledge of antimicrobials in the community to speak against improper use of antimicrobials.

The government should support efforts towards improving the knowledge of communities on the basics of antimicrobials, in order to guide its use and improve antimicrobial stewardship. Education was found to aid knowledge of antimicrobials, thus, targeted health education programs should be organized in hospitals, religious centers, schools and communities to improve knowledge and stop the abuse of antimicrobials.

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