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Assessment of public knowledge and awareness of antibiotic use and antimicrobial resistance in Gusau, Nigeria

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Abstract

The emergence and spread of antimicrobial resistance (AMR) is largely influenced by our attitudes towards antibiotic use. It has however become a significant threat to the prevention and treatment of bacterial infections globally. The purpose of the present study was to conduct a survey to assess public knowledge and awareness of antibiotic use and antimicrobial resistance in Gusau, Nigeria. Specifically among individuals with less knowledge of medical practice. A questionnaire was distributed to 540 participants in three sampled areas in Gusau town, out of which 510 were used for reporting results and 30 were excluded due to incompleteness. The survey result's showed that there is a large knowledge gap on the knowledge of antibiotic use among the participants, and there is need for awareness on the better attitudes on antibiotic use. Only 36.86% of the participants complete their antibiotic regimen when symptoms of infection subsides. A total of 60.98% keep antibiotics for future use and 52.16% use leftover antibiotics for similar symptoms. Over 50% were reported to be using antibiotics for fever and viral infections. Therefore, there is a need for awareness.

Keywords: Antimicrobial resistance, prevention and treatment, bacterial infections

1. Introduction

Antimicrobial resistance (AMR) has become a significant threat to the prevention and treatment of bacterial infections globally (WHO 2012) [22]. Internationally, there is a growing concern over antimicrobial resistance (AMR) which is currently estimated to account for more than 700,000 deaths per year worldwide (Neill 2016) [17]. According to (Giacomo *et al.*, 2015) [7], the threat of antimicrobial resistance has become a worldwide public health concern, with a substantial economic and clinical burden. The World Health Organization (WHO) estimated that this problem leads to an excess of mortality of 25,000 people every year in the European hospitals, with a cost of about 1,5 billion of Euro (WHO 2012) [22]. Antimicrobial resistance (AMR) jeopardizes the achievements of modern medicine in Europe and worldwide (WHO 2014; Davies *et al.*, 2013; Harbarth *et al.*, 2015) [23, 5, 9]. Antimicrobial resistance (AMR) is currently a hot debate (Poonam *et al.*, 2019) [18]. Its hazards have been underestimated in low- and middle-income countries (LMICs) (Chen *et al.*, 2005) [3] (Levy 1998) [14]. Importantly, in low- and middle-income countries, the potential for AMR to lead to increased morbidity and mortality may be greater given the higher burden of bacterial illness in low-income countries, delayed presentation, weaker access to diagnostics (particularly microbiology) and the reduced availability of second-line antibiotics (WHO 2014) [23].

Antibiotics are the most frequently prescribed drugs, but they are often misused (Chambers 2006) [2]. According to (Goossens *et al.*, 2005) [8] and (Laxminarayan *et al.*, 2013) [12], the consumption of antibiotics is an important driver of AMR. The threat of antimicrobial resistance is rapidly progressing and intensifying (Afzal *et al.*, 2013) [1]. The awareness on its seriousness and significance is the first step towards curtailing its progress (Afzal *et al.*, 2013) [1]. One of the causes for the antimicrobial misuse is linked to a wrong prescribing behavior amongst physicians (Tonkin *et al.*, 2011) [20]. One critical aspect to the global response to AMR is surveillance. However, according to a 2014 report by the World Health Organization (WHO), the WHO Africa region has one of the largest gaps in data on the prevalence of AMR as a consequence of limited laboratory capacity and surveillance networks. An external quality assessment reported several deficits in antimicrobial susceptibility testing in many African countries (Frean *et al.*, 2012) [3]. Limited laboratory capacity and surveillance network in Africa is a contributing factor for bad practices lead to

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Increasing the spread of antimicrobial resistance in the region. In various studies, it has been found that taking an inappropriate dosage of antibiotics can result in the development of resistant bacteria and diminish the ability of the oral flora to resist the colonization of harmful microorganisms, thereby leading to super infections caused by multi-resistant bacteria (Okeke 2009; WHO 2014) [16, 23]. In particular, second- or even third-line antibiotics may be required, which are very expensive, and lead to prolonged hospitalization and more side effects (Sawair *et al.*, 2009; WHO 2014) [19, 23].

1.2 Statement of the Research Problem

Because of the frequent prescription and misuse of antibiotics, and a very little awareness of its consequences, improper use of antibiotics becomes a habit with people in African localities. Self-medication, sharing of antibiotics with family showing similar symptoms, wrong prescription and limited laboratory capacity have exposed many people to multidrug resistant diseases. There is limited evidence regarding antibiotic resistance in Nigeria. The present survey is intended to create awareness on proper use of antibiotics.

1.2 Justification for the Research

A number of recent reviews summarized AMR data in Africa. The authors found a high level of resistance to the commonly used antibiotics in sub-Saharan African region. For example, 90% of Gram negatives were resistant to chloramphenicol, a commonly used antibiotic. In contrast, resistance to third-generation cephalosporins (like ceftriaxone) was less common, recommending this group for use (Leopold *et al.*, 2014) [13]. In another study, (Kerlly and Richard 2017) [10] found that in the West Africa region among common bloodstream pathogens, including *Klebsiella spp.*, *E. coli*, *Salmonella Typhi* and NTS, moderate rates of AMR to commonly used antibiotics, including ampicillin, SXT, gentamicin and AMC, were present. Current guidelines, including the WHO's 'Pocket book of hospital care for children', recommend ampicillin and gentamicin as empirical treatment for sepsis (WHO 2013) [24]. These data, combined with the potential growth of methicillin-resistant *S. aureus* (MRSA) in the region, give reason to be concerned that ampicillin and gentamicin may no longer be optimal therapy in this region for sepsis/suspected BSIs. (Kerlly and Richard 2017) [10] also found that urinary tract pathogens in this region were associated with a moderate to high level of resistance to commonly used antibiotics. Studies from West Africa revealed moderate to high rates of AMR among *E. coli* and *Klebsiella spp.* to ampicillin, AMC and SXT both among inpatients and outpatients. In addition, AMR was unexpectedly observed among inpatients with UTIs to third-generation cephalosporins, suggesting that extended-spectrum β -lactamase (ESBL)-producing organisms may be important pathogens in this clinical context. Of note, current recommendations for the treatment of hospitalized children in the WHO's 'Pocket book of hospital care for children' include SXT, ampicillin or amoxicillin (WHO 2013) [24]. Thus, there is need for intervention, and in order to design suitable local and global interventions, it is important to understand the current status of AMR and identify

Knowledge gaps.

The Aim of the research is to assess public knowledge and awareness of antibiotic use and antimicrobial resistance (AMR), to identify knowledge gaps and highlight diagnostic needs.

2.0 Materials and Method

2.1 Study Area

The survey was carried out in Gusau Nigeria, Coordinates: 12°09'N 6°40'E / 12.150°N 6.667°E (Wikipedia 2020). Three areas were chosen for the study, namely; Gada biyu, Samaru and Damba. A total of 180 questionnaires were distributed in each of the selected areas totaling 540.

2.2 Survey Tool Development

The questionnaire was constructed using a survey carried out to assess public knowledge and behaviors regarding antibiotic use (Khalil *et al.*, 2017) [11]. The information was adjusted to suit the population under study. The questionnaire consisted of three sections. The first section secures the demographic merits of the participants. The second section of the questionnaire is on the attitude toward antibiotic use. The variables in this section are: I always complete antibiotics even I feel better?, I keep antibiotics at home for emergency need, I use leftover antibiotics for the same case, the last section is on the knowledge on antibiotic use among participants. The variables under it are: Different antibiotics are used to cure various diseases, antibiotics are effective against bacteria, antibiotics are effective against viruses, antibiotics can be used to stop the fever, unnecessary use of antibiotics causes bacterial resistance, antibiotics do not cause side effects, and antibiotics may cause allergic reactions.

2.3 Data Collection

The survey was carried out from 5th April to 25th June 2020. Self-administered questionnaires were distributed to participants which included all members of the general public except medical doctors, pharmacists and other health personnel. Participation in the survey was fully voluntary and written consent was obtained from each of the participants. The objectives of the study, confidentiality of individual information, and other ethical considerations mentioned in the survey guidelines were explained to the participants prior to data collection. They were asked to answer as many of the questions as they could. However, if they were not sure about the answer, they could just leave it blank. A total of 540 questionnaires were used for the study.

2.4 Data Presentation

Some participants were excluded from the sample because all the answers given were the same. Precisely, a total of 30 reports were excluded in the results. Descriptive statistics were employed to summarize the data. The results were reported in percentages.

3.0 Results

The results of this survey are presented in tables 1 to 3, table 1 presents the demographic characteristics of the participants, table 2 presents the participants' attitude toward antibiotic use and table 3 presents the knowledge on antibiotic use among the participants.

Table 1: Demographic Characteristics of the participants

Characteristics	Number (n=510)	Percentage %	
Age	18-27	230	45.10
	28-37	198	38.82
	38-47	67	13.14
	>47	15	2.94
Gender	Males	262	51.37
	Females	248	48.63
Marital Status	Single	119	37.43
	Married	391	62.55
Educational Level	School	46	9.02
	Diploma	74	14.51
	Bachelor degree	362	70.98
	Postgraduate	28	5.49

Table 2: Attitude toward antibiotic use

Variables	Number (n=510)	Percentage %	
I always complete antibiotics even I feel better	Yes	188	36.86
	No	322	73.14
I keep antibiotics at home for emergency need	Yes	191	39.02
	No	319	60.98
I use leftover antibiotics for the same cases	Yes	266	52.16
	No	244	47.84
I follow the instructions on the label	Yes	383	75.10
	No	127	24.90
I frequently check the expiry date of antibiotics	Yes	429	84.12
	No	81	15.88

Table 3: Knowledge on antibiotic use among participants

Variables	Number (n=510)	Percentage %	
Different antibiotics are used to cure various disease	Agree	379	74.31
	Disagree	92	18.04
	No answer	39	7.65
Antibiotics are effective against bacteria	Agree	264	81.56
	Disagree	200	6.66
	No answer	46	11.78
Antibiotics are effective against viruses	Agree	264	51.76
	Disagree	200	39.21
	No answer	46	9.03
Antibiotics can be used to stop the fever	Agree	261	51.98
	Disagree	111	21.76
	No answer	138	27.08
Unnecessary use of antibiotics causes bacterial resistance	Agree	338	66.27
	Disagree	29	5.69
	No answer	148	28.04
Antibiotics do not cause side effects	Agree	92	18.04
	Disagree	111	21.76
	No answer	307	60.20
Antibiotics may cause allergic reactions	Agree	255	50.00
	Disagree	29	5.69
	No answer	226	44.31

4. Discussion

According to the results of the present survey, most of the respondents (73.14%) believe that no need to complete the full course of antibiotic treatment if they feel better which is higher than a study done by (Khalil *et al.*, 2017)^[11] to assess the public knowledge and awareness regarding antibiotic use, and also higher than the findings of a study carried out in Malaysia where 59.8% admitted that they would complete the antibiotic treatment course even they have the sensation of feeling better (King *et al.*, 2010). According to (Daniel *et al.*, 2017)^[4], (32.1%) of respondents discontinued the use of antibiotics once their symptoms

were gone. In contrast, respondents of other studies had a knowledge of the need to finish the full course of antibiotics even signs of infection are subsiding; such studies were conducted in Hong Kong (58%) (You *et al.*, 2008)^[25] and Taiwan (50.1%) (Chen *et al.*, 2005)^[3]. This indicated that the participants might not know the significance of the necessity to complete the full course of the antibiotic regimen. Also, 60.98% of the respondents keep antibiotics for future use with 52.16% using leftover antibiotics when they have cases similar to the ones they used the antibiotics for initially. According to (Ong *et al.*, 2007), unnecessary use of leftover antibiotics and using them at need without advice from a clinician may increase antibiotic resistance of normal flora by carrying out a selective pressure in the gut and upper respiratory tract.

A high number, (75.10%) of the respondents in this study, follow the instructions on the label on how antibiotics should be used. A high percentage (84.12%) also frequently check expiry date before starting their antibiotic regimen. However, the participants in this survey has less knowledge about the significance of antibiotics in the treatment of viral infections as (51.76%) believed that antibiotic are effective against viral infections. According to (Khalil *et al.*, 2017)^[11], 60.5% of respondents from a study to assess the public knowledge and awareness regarding antibiotic use, believed that antibiotics are effective for viral infections. Similarly, another survey conducted in Malaysia showed a higher finding of (67.2%) using antibiotics for viral infections (Ling, *et al.* 2010)^[15].

A total number of 255 partisans, (50%), don't know that antibiotics can cause allergies and (28.04%) believed that antibiotics do not produce side effects. This is similar to the findings of (Poonam *et al.*, 2019)^[18] with 25.20% believing that antibiotics do not produce side effects and 75.80% believed antibiotics can produce side effects.

Conclusion

The findings of the present survey shows that there is a large gap in knowledge, on antibiotic use among people in Gusau town. There is need for awareness to inform the population about the proper use of antibiotics and the consequences of antibiotics resistance.

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