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Socio-Demographics of Patients and Antibiotic Prescription Pattern in a Community Health Facility in Lagos

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Abstract

There is a global concern on the challenge of indiscriminate use of antibiotics in the management of diseases. At the center of this concern is the need to prevent antibiotics resistance which could increase the morbidity and mortality of cases. This is worse off in the Sub-Saharan Africa where guidelines for management of cases are usually not complied with. The study examined socio-demographic characteristics such as age and gender and how they influence antibiotic use within a community health facility's outpatient. Descriptive cross-sectional design was used and 630 prescriptions were examined in the month of April, 2021. All admitted, observed and referred cases were not included in the study. The data was analyzed using Statistical Package for the Social Sciences (SPSS) for descriptive and inferential statistics. The average antibiotics encounter was 37.6% and the differences of antibiotics encounter observed across different ages were statistically significant (X^2=21.985, df=4, p< 0.001). There were differences in antibiotics encounter between being a child and being an adult and these differences were statistically significant (X^2= 13.769, df=1, p<0.001). The odds of antibiotics encounter decreased by 28% per unit increase in age (OR = 0.715; 95%CI: 0.333 - 1.097). This predominance of antibiotic use among younger people could create resistance within this sub-population. This young population is the source of the nation's future human resources and regular training and update courses for health workers in this field should be a priority to avoid increase in morbidity and mortality from antibiotics resistance and treatment failures.

Key Words: Antibiotics; Community health; Prescription; Resistance; Socio-demographic

INTRODUCTION

Health facilities are usually established to take care of the health needs of the community. Within a community there can be differences in antibiotic encounter across ages and gender. The antibiotic encounter may be a reflection of vulnerability within the community. Health workers within the community should ensure that antibiotic use must be appropriate to avoid antibiotic abuse. Ensuring appropriate use becomes more objective if there is established evidence-based protocol to guide prescription pattern. The World Health Organization (WHO) guiding principle stated that for drugs to be used rationally, it must be the right medicine, prescribed for the right patient, administered at the right dose, for the right duration and at the lowest possible cost to the individual or the community (Atif *et al*, 2016). Adhering to this principle in prescription could reduce antibiotic encounter and minimize public health threat of antibiotic resistance (Akpan *et al*, 2016; WHO, 2001; WHO, 2014). Also, this threat can further be minimized by sensitizing health workers to be discrete in antibiotic prescription because, there is a positive relationship between frequent antibiotic prescription and resistance (Goossens, *et al*, 2005). To minimize antibiotic encounter and resistance the World Health Organization since 1990 had encouraged antibiotic stewardship among health workers to enhance good and rational prescription pattern (Hand, 2013; Owens, 2008).

The study, therefore, sought to examine the factors (especially the socio-demographic factors) that influence physicians' decisions to include antibiotics in their prescription. The study, therefore, considered these research questions for interrogation.

Is antibiotics use influenced by patients age?

Is there gender disparity in the use of antibiotics?

Does pill burden influence the prescription of antibiotics?

Prevalence of antibiotics use

The World Health Organization (WHO) in attempt to encourage antibiotics stewardship anticipates that 20.0% to 26.8% of all prescriptions should contain antibiotics (Isah*et al*, 2016). A lot of previous studies did not meet this criterion. The prevalence of antibiotic use from previous regional studies includes 48.4% in

China (Dong, Yan, & Wang, 2011), 53.6% in the Eastern Mediterranean (Holloway *et al*, 2013), 46.8% in Africa (Ofori-Asenso, Brhlikova, & Pollock, 2016) and 54.7% in Sudan (Yousif &Supakankunti, 2016).

Antibiotics Use and Age

In Sub-Saharan Africa, antibiotics use can be higher than the developed countries due to the dominance of infectious diseases in the region. A cross-sectional study involving 600 encounters in six community pharmacies in Asmara, Eritrea found that patients below 15 years of age were three times more likely to receive antibiotics prescriptions than the elderly people aged 65 and above (Adjusted Odds Ratio (AOR): 2.93, 95%CI: 1.71-5) (Amaha*et al*, 2019). This prevalence of antibiotics use towards the younger ones is also corroborated by a retrospective study by Ahiabu*et al* (2016) involving four public and private primary health-care facilities in Ghana. The study analyzed 400 prescriptions per facility between 2010 and 2011. The analysis showed that young people have higher likelihood of receiving antibiotics in their prescriptions. The antibiotics prescriptions for each age category includes 77.5% for below 5years of age, 71.6% for 5-14 years, 53.5% for age category 15-64 years while 65 years and above received 38% of antibiotics in their prescriptions. The odds of having antibiotics in the prescription reduces by 3% for every unit increase in age (OR = 0.97; 95% CI: 0.97, 0.98).

In Nasarawa state, North-Central Nigeria, a descriptive retrospective cross-sectional study involving 2800 cases between 2008 and 2018 showed that antibiotics prescription was highest in the 10 years and below age category (67%) and lowest for those greater than 50 years (Ngwai*et al*, 2020).However, a cross-sectional study of 802 National Health Insurance Scheme (NHIS) prescriptions from University of Nigeria Teaching Hospital showed that patients less than 5years has highest risks of antibiotic exposure (Okoro, Nmeka, &Erah, 2019).

Antibiotics and Gender

In the United States of America (USA) analysis of the prescriptions from the IMS Health Xponent Database which captures more than 70% of USA outpatient prescriptions showed females being at higher risk of antibiotics exposure than males, especially for people equal or more than 20 years. Female patients encountered antibiotics in 990 prescriptions per 1000 persons as opposed to males' encounter of 596 prescriptions per 1000 persons (p-value<0.001) (Hicks *et al*, 2015). A systemic review and meta-analysis of 576 articles by Schröder*et al* (2016) indicated that the likelihood of antibiotics encounter in a lifetime for females is 27% higher than that of males. The females' antibiotics encounter was also 36% greater than that of males in the age category of 16-34 years and the difference increases to 40% in the 35-54 age group. However, a cross-sectional study involving 600 encounters in six community pharmacies in Asmara, Eritrea found that males were one and half times more likely to encounter antibiotics exposure than females (AOR: 1.57, 95%CI: 1.10-2.24) (Amaha*et al*, 2019). Study from the tertiary health institution South-East Nigeria, that interrogated 802 NHIS prescriptions found that females (57.3%) encountered more antibiotics than males (Okoro, Nmeka, &Erah, 2019).

Antibiotics and Pill burden

The pill burden which is the number of medications per prescription can increase the likelihood of antibiotic encounter. The World Health Organization had recommended an average standard value of number of medications per prescription to within 1.6-1.8 (Isah*et al*, 2016). Many previous studies struggle to come near this standard. The different national average for number of medications per prescription include 2.2 for Ethiopia (Bilal, Osman &Mulugeta, 2016), 2.36 for China (Dong, Yan & Wang, 2011) and 2.5 for Egypt (Akl*et al*, 2014).

Amaha*et al* (2019) in a cross-sectional study with a total of 600 encounters in Asmara, Eritrea showed an average of 1.76 per encounter, however, antibiotics encounter was 53%. Patients with three to four medications in a prescription have two times the likelihood to encounter antibiotic prescription than when the prescription contain two medications or less (AOR: 2.17, 95%CI: 1.35-3.5). A retrospective antibiotics audit in primary health care facilities in Eastern Region of Ghana had 4.01 as average number of medications per prescription while antibiotics encounter was 59.9%. For every unit increase in the number of medications, the odds of an antibiotic encounter increased by 85% (OR: 1.85; 95% CI: 1.63- 2.1) (Ahiabu*et al*, 2016).

In Nigeria, retrospective cross-sectional study involving data from 660 case notes in Nigerian Army hospitals between 2006 and 2007 showed average number of medications per prescription to be 2.8 with 28.1% encountering antibiotics (Adebayo & Hussain, 2010). Another study in South West Nigeria that involved outpatient clinic in a tertiary health facility showed average number of medications encountered as 3.2 (Enwere, Falade&Salako, 2007).

METHODOLOGY

The study employed a cross-sectional design to generate quantitative data. The outpatient clinic of Medical Centre of the University of Lagos was the research setting. Only four items were noted from the prescriptions generated from the doctor after consultation, namely the age, gender, number of medications on the prescription and the presence or absence of antibiotics in the prescription. The data was generated in the month of April, 2021 and excluded those for observations in the clinic or referred to other hospitals.

A total of 630 prescriptions were encountered, and according to the World Health Organization a minimum of 600 encounters must be involved for study on prescription patterns in a facility (World Health Organization, 1993). Data generated was analyzed using International Business Machines Corporation (IBM), Statistical Package for the Social Sciences (SPSS version 23). Both descriptive and inferential statistics were derived from the data.

Ethical Consideration

The data used for the research was de-identified on extraction to ensure protection of privacy. Consent was sought and granted by management and information needed included the age of the patient, gender, number of medications on the prescription and whether there was antibiotic encounter in the prescription or not. There was no physical contact with the patients. Confidentiality of data was ensured in the study.

Conflict of Interest

No conflict of interest.

Descriptive statistic

Variables	Age	Pill burden	% Antibiotics per prescription
	630	630	630
Mean	30.186	3.065	14.327
Median	25	3	0
Std. Deviation	17.905	1.301	22.46
Minimum	0.5	1	0
Maximum	81	8	100

The table on descriptive statistic shows that the mean age is 30 years with the age range stretching from six months to 81 years. The mean of the pill burden or the average number of medications per prescription is 3.07 with the number of medications per prescription ranging from 1 to 8 items.

Frequency of the variables

Variables	Frequency (n= 630)	Percentage (%)
Antibiotics	393	62.4
Non-use	237	37.6
Use		
Gender		
Female	381	60.5
Male	249	39.5
Age (years)		
<13	110	17.5
13-19	60	9.5
20-26	172	27.3
27-33	35	5.6
34 and above	253	40.1
Age classification		
Child (<18)	139	22.1
Adult (=>18)	491	77.9
Number of medications per prescription (pill burden)		
<3	228	36.2
>=3	402	63.8

The frequency table shows that antibiotics encounter was 37.6%, the frequency of females among the respondents was 60.5% and the respondents with age 34 and above has the highest frequency of 40.2%. The frequency for adult was 77.9% and the number of medications per prescription was higher for medications equal and greater than 3 at 63.8%.

Chi-Square analysis of Antibiotics

Variable	Frequency (%) Antibiotics use				
	Use (n=237)	Non-use (n=393)	X^2	df	p-value
Gender					
Female	139 (36.5)	242 (63.5)	0.53	1	0.467
Male	98 (39.4)	151 (60.6)			
Age (years)					
<13	61 (55.5)	49 (44.5)	21.985	4	<0.001**
13-19	20 (33.3)	40 (66.6)			
20-26	65 (37.8)	107 (62.2)			
27-33	15 (42.9)	20 (57.1)			
34 and above	76 (30.0)	177 (70.0)			
Age classification					
Child (<18)	71 (51.1)	68 (48.9)	13.769	1	<0.001**
Adult (>=18)	166 (33.8)	325 (66.2)			
Medications per prescription					
<3	48 (21.1)	180 (78.9)	41.788	1	<0.001**
>=3	189 (47.0)	213 (53.0)			

Chi-square shows that the differences between gender with respect to antibiotics encounter is not statistically significant. The antibiotics encounter across different ages varies from 30% to 55.5% and these differences are statistically significant (X^2 =21.985, df= 4, p<0.001). The variations of antibiotics encounter between being a child and being an adult is statistically significant (X^2= 13.769, df=1, p<0.001). The odds of encountering antibiotics per prescription reduces by 28% for every unit increase in age (OR = 0.715; 95%CI: 0.333 - 1.097) (see Log odds ratio table). The antibiotic encounter for number of medications per prescription differ between having less than 3 medications, and equal or more than 3 medications per prescription and this difference is statistically significant (X^2=41.788, df=1, p<0.001). More so, for every unit increase in the number of medications per prescription, the odds of antibiotic encounter were increased by 20% (OR: 1.202; 95%CI: 0.828-1.576) (see Log Odds Ratio table below).

Log Odds Ratio

	Log Odds Ratio	95% Confidence Interval		P-value
		Lower	Upper	
Log Odds Ratio for age classification and antibiotic encounter				
Odds Ratio	0.715	0.333	1.097	<.001
Fisher's exact test	0.714	0.315	1.114	
Log Odds Ratio for medications per prescription and antibiotic encounter				
Odds Ratio	1.202	0.828	1.576	<.001
Fisher's exact test	1.200	0.815	1.598	

DISCUSSION

The descriptive statistics shows that antibiotics were encountered in 37.6% of outpatient consultations. This value falls outside the World Health Organization (WHO) recommendation of 20.0% to 26.8% (Isah et al, 2016). However, the higher value of antibiotic encounter could be due to the timing of the study that occurred during the second wave of COVID-19 pandemic. COVID-19 symptoms include dry cough, fever, sore throat and sneezing and this presentation could warrant increased antibiotic encounter. There might,therefore, be increased representation of this patients for symptoms that would have otherwise been managed without hospital visitation in the pre-COVID-19 era. However, the value, 37.6% is by far better than regional averages of China 48.4% (Dong, Yan, & Wang, 2011), and Africa 46.8% (Ofori-Asenso, Brhlikova, & Pollock, 2016). The mean of number of medications per prescription (pill burden) was 3.07 while the WHO range is within 1.6-1.8 (Isah et al, 2016).

This value was higher than the findings by Adebayo and Hussain (2010) among Nigerian Army hospital with average medications per prescription being 2.8. However, the study's value of 3.07 favourably compares with 3.2 findings in the South West Nigeria involving outpatient clinics in tertiary hospital (Enwere, Falade&Salako, 2007).

The study showed that antibiotic use is influenced by age. Differences in antibiotics encounter across different age groups was statistically significant (X^2 =21.985, df= 4, p<0.001). More so, antibiotic encounter variations between being a child (age <18) and being an adult (age =>18) was statistically significant (X^2= 13.769, df=1, p<0.001) and for every unit increase in age, the odds of encountering antibiotic is reduced by 28% (OR = 0.715; 95%CI: 0.333 - 1.097). This inverse relationship in this study shows that being young was associated with higher antibiotic encounter.

The findings corroborated with Ahiabu*et al* (2016) retrospective study in Ghana where younger ones encountered more antibiotics with antibiotic use reducing by 3% for every unit increase in age (OR = 0.97; 95% CI: 0.97, 0.98). Also, Amaba*et al* (2019) study showed that patients below 15 years have three times more likelihood of antibiotic encounter than patients aged 65 years and above (Adjusted Odds Ratio (AOR): 2.93, 95%CI: 1.71-5). This finding was corroborated by Ngwai*et al*(2020) who found that antibiotic encounter was higher in the 10 years and below age group than among older population. However, Okoro, Nmeka and Erah (2019) finding showed that patients less than 5 years had higher antibiotic encounter than older population.

There is no gender disparity in the use of antibiotics as differences in antibiotics encounter were not statistically significant (X^2= 0.530, df= 1, p>0.05). Sample size could be contributory to the study not showing gender difference as the two previous studies (Hicks et al (2015) and Okoro, Nmeka, &Erah (2019)) which showed females at higher risk of antibiotics encounter had sample size more than 800.

The pill burden (number of medications per prescription) showed a positive relationship with antibiotic encounter. In this study, the average number of medications per prescription is 3.07 and average antibiotic encounter was 37.6%. Differences exists in antibiotic encounter between number of medications less than three, and equal or more than three per prescription and these differences were statistically significant (X^2= 41.788, df= 1, p<0.001). An additional one item in the prescription will influence the odds of antibiotic encounter by 20% (OR: 1.202; 95%CI: 0.828-1.576).Ahiabu*et al* (2016) study in the Eastern Ghana corroborated with the finding of this study which had the average number of medications per prescription to be 4.1, whereas percentage of antibiotic encounter was 59.9. Additional medication increases antibiotic encounter by 85% (OR: 1.85; 95% CI: 1.63- 2.1).

CONCLUSION

The research has examined how patients' demographics influence antibiotic prescription pattern within a community healthcare facility. The study however, identified the positive relationship between younger age and antibiotic use, however, gender has no influence on antibiotics prescription. There is also tendency for antibiotic inclusion with increasing number of medications per prescription. The average rate of antibiotic use and the average number of medications per prescription are more than the World Health Organization reference ranges. There is need, therefore, to engage health workers on rationale antibiotic use to prevent the challenge of antibiotic resistance. Minimizing antibiotics use could take the form of thorough investigations for borderline cases before antibiotic prescriptions. More so, areas of further study could be a retrospective cross-sectional analysis of prescription patterns involving at least one year period to take care of seasonal variations of antibiotic use.

RECOMMENDATIONS

1. Antibiotics stewardship should not just be a slogan, but should be included in the training of health workers to instill evidence-based prescription pattern in antibiotics use.
2. Having established a link between number of medications per encounter and antibiotics use, it is worthwhile to persuade clinicians to prescribe minimum number of medications needed for effective treatment.
3. The higher antibiotics use among younger populations could be minimized by increasing the number of specialists within these demographics and making sure their treatment is evidence-based.

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