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ANTIBIOTICS PRESCRIBING PATTERN IN THE UNIVERSITY OF ILORIN TEACHING HOSPITAL, KWARA STATE, NIGERIA

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ABSTRACT

Background: Inappropriate use of antibiotics is a global public health challenge and is commonly associated with antibiotic resistance. Due to this challenge, attempts are being made using the World Health Organization core indicators as models to correct the anomalies. The study therefore evaluates the prescribing patterns of clinicians in the general out-patient Department of the University of Ilorin Teaching Hospital. Ilorin, Kwara State.
Methods: Descriptive retrospective assessment of prescriptions was carried out at the out-patient Department of the University of Ilorin Teaching Hospital. Ilorin, Kwara State. Antibiotic prescriptions were randomly selected and assessed. The data were entered and computed in form of descriptive statistics presented as numbers, bar charts and percentages frequencies using Microsoft Excel Package and Statistical Package for Social Scientists (SPSS) version 20.
Results: Out of the nine hundred and twenty-five (925) prescriptions assessed, 295 (31.9%) contained at least one antibiotic. The total number of antibiotics in these prescriptions were 379. The commonly prescribed antibiotics were Amoxicillin/Clavulanate 85 (22.4%), Metronidazole 72 (22.0%) and Ciprofloxacin 49 (12.9%). The least prescribed antibiotics were Clindamycin, Levofloxacin and Secnidazole. The total expenditure on antibiotics during the study period was N369,110. Pattern of core prescribing indicators were: number of drugs prescribed per encounter 3.20±0.75, drugs in generics 49.80%, drugs in the hospital formulary 99.00%, average cost 973.00±6.51, availability 94%, and most frequent duration 7 days.
Conclusion: The study has shown that the prescribing patterns were within the recommended core indicators. It is therefore recommended that there should be improved practice to achieve satisfactory therapy and prevent occurrence of resistance.

Keywords: Prescription, patterns, antibiotics, prescribing indicators

INTRODUCTION

Antibiotics can be defined as agents derived from microbial sources that act against micro-organisms, while antibacterials are agents whether of synthetic or natural origin, that act against bacteria organisms [1-3]. Inappropriate use of antibiotics is a global public health challenge and has been associated with antibiotic resistance [1-3]. World Health Organization reports showed that efforts to promote rational antibiotic use in developing countries has been on the increase but non-adherence to rational therapy seems to be a common phenomenon [4]. The Centre for Disease Control and Prevention had identified defects in prescription and adherence by physicians and patients respectively [4]. Studies evaluating physicians' prescribing patterns of antibiotics have found be influenced by pattern of disease, severity and co-morbidities [2,5-7]. According to figures gathered by surveys presented to WHO in 2000, about 60% of antibiotics in Nigeria were prescribed un-necessarily [4] and this may have led to the frequently reported resistance in therapy. There has been widespread antimicrobial resistance identified in the categories of antibiotics like penicillins, fluoroquinolones, aminoglycosides, cephalosporins and tetracyclines that have narrow spectrum of activity [1-3,8]. Antimicrobial indicators have been developed as a standard protocol in the prescriptions and utilization of antibiotics [9,10]. This protocol could vary from region to region [11]. Factors such as number of drugs prescribed, generic prescriptions, cost of antibiotics, availability of antibiotics, and adherence to hospital formulary had been identified to vary in some health facilities [4,8,] thus deviating from standard prescribing indicators [10]. This study, therefore, assessed the prescription patterns of antibiotics in the out-patient department of the University of Ilorin Teaching Hospital, Ilorin according to the World Health Organization prescribing indicators [10].

METHODS

Study centre

The study was conducted in the Family Medicine (Out-patient) Department of University of Ilorin Teaching Hospital, a tertiary health facility with over 650 bed space providing healthcare services to citizens of Kwara and other states within the North-central region of Nigeria. The facility provides in-patient, general outpatient and specialist medical care, while also serving as the Teaching Hospital for the Faculties of Medicine and Pharmacy of University of Ilorin, Kwara State. The Family Medicine department is the first point of patient contact with the health facility apart from emergency cases which are attended to at the Accident and Emergency Unit of the hospital. In the Family Medicine department is a Pharmacy unit that handles of the medication needs of the patients. Prior to the commencement of the study, ethical approval (IL/957/074) was obtained from the Ethics Committee of the institution. Sample size calculation for sample size between 1 and 8,000 populations was adapted from Taro Yamane statistical formula [12].

$$\text{Sample Size} = \frac{\text{Total population}}{1+\text{Total Population (TCL - OCL)}} \quad \ldots 1$$

TCL: Total Confidence Limit, OCL: Observed Confidence Level

All the prescriptions received at the outpatient pharmacy within the study period of six months was 925. These prescriptions were randomly selected. The study was a descriptive retrospective drug use review using the WHO prescribing indicators [10,13]. Any out-patient prescription containing at least one antibiotic was included in the study. Incomplete

prescription and prescriptions that do not contain antibiotics were excluded from the study. The study measured some selected prescribing indicators namely (i) average number of drugs prescribed per patient encounter (ANDPPE), (ii) percentage of encounters with an antibiotic prescribed (PEAP), (iii) percentage of antibiotics prescribed by generic name (PAPG), (iv) average cost of antibiotics (ACA), (v) percentage of antibiotics prescribed from essential drugs list formulary (PAPEDL). Study Instrument was the antibiotics use data collection form recommended by WHO. A data collection form was designed and used to record the basic demographic data and information on all prescribed drugs. Data collected on antibiotics included type, route of administration, dose and dosing frequency, length of therapy, availability and cost.

Some of the following prescribing indicators [10,13] determined from the data collected were:

Average number of medicines per prescription (ANMP) =
Total number of medicines prescribed…….2
Number of prescriptions reviewed

Average number of antibiotics per prescription (ANAP) =
Total number of antibiotics prescribed……..3
Total number of prescriptions reviewed

Percentage of prescriptions with antibiotics prescribed (PPAP) =
{Number of prescriptions containing}
{one or more antibiotics } x 100…….4
Total number of prescriptions reviewed

Percentage of antibiotics prescribed (PAP) =
Total number of antibiotics prescribed x 100……5
Total number of medicines prescribed

Average cost of medicines per prescription (ACMP =
Total cost of medicines prescribed x 100 ……..6
Number of prescriptions reviewed

Percentage cost of antibiotics (PCA) =
Total cost of antibiotics prescribed x 100 ……7
Total cost of all medicines prescribed

Percentage of antibiotics prescribed in generic names (PAPG) =
Number of encounters of antibiotics x 100 ……8
Total number of antibiotics prescribed
in generic names

Percentage of antibiotics prescribed from the Hospital Drug Formulary (PAPHDF) =
Number of antibiotics prescribed x 100 ……..9
Total number of antibiotics prescribed
in generic

Percentage of drugs available for dispensing (PDAD) =
Total number of antibiotics prescribed x 100 10
Total number dispensed

Data analysis

The pattern of prescription was categorized according to WHO indicators. They were summarized in Microsoft Excel 2013 spread sheet and further transferred into Statistical Package for the Social Sciences (SPSS) software version 20 of the year 2000 for analysis. They were presented in tables, percentages, mean and charts as descriptive statistics.

RESULTS

Out of the nine hundred and twenty-five (925) prescriptions assessed, 295 (31.9%) contained at least one antibiotic. The total number of antibiotics in these prescriptions were 379(100.0%) as in Table 1. The commonly prescribed antibiotics were Amoxicillin/Clavulanate 85 (22.4%), Metronidazole 72 (22.0%) and Ciprofloxacin 49 (12.9%). The least prescribed antibiotics were Clindamycin, Levofloxacin and Secnidazole as in Figure 1. The total expenditure on antibiotics during the study period was N369,110. Pattern of core prescribing indicators as recommended by WHO were: number of drugs prescribed per

encounter 3.20±0.75, drugs in generics 49.80%, drugs in the Hospital formulary 99.00%, average cost 973.00±6.51, availability 94%, most frequent duration 7 days as in Table 2. Higher duration of usage of antibiotics prescribed was within 5 to 7 days and maximum duration was 30 days.

Table 1: Frequency of antibiotics prescription

Name of Antibiotics	Frequency	Percent
Amoxicillin	46	12.1
Amoxicillin/Clavulanate	85	22.4
Azithromycin	10	2.6
Cefixime	6	1.6
Cefixime/Clavulanate	15	4.0
Cefuroxime	31	8.2
Chloramphenicol	5	1.3
Ciprofloxacin	49	12.9
Ciprofloxacin/Tinidazole	2	0.5
Clarithromycin	3	0.8
Clindamycin	1	0.3
Clotrimazole	1	0.3
Doxycycline	8	1.3
Erythromycin	20	5.3
Fluconazole	3	0.8
Levofloxacin	1	0.3
Metronidazole	72	20.0
Moxifloxacin	3	0.8
Nitrofurantoin	3	0.8
Ofloxacin	9	1.8
Ofloxacin/Ornidazole	5	1.3
Secnidazole	1	0.3
Total	**379**	**100.0**

Table 2: Core prescribing indicators at out-patient department UITH, Ilorin. Nigeria

Prescribing indicators	Values of indicators
Average number of drugs prescribed per encounter	3.20±0.75
Encounter with antibiotics prescribed (%)	1.30±0.51
Drugs prescribed by generic names (%)	49.80%
Drugs prescribed from the hospital formulary (%)	99.00%
Average antibiotics cost (Naira)	973.00±6.51
Antibiotics availability at the point of dispensing (%)	94.00%
Encounter with injection (%)	0.00%
Most frequent duration of treatment with antibiotics (days)	7.00 days

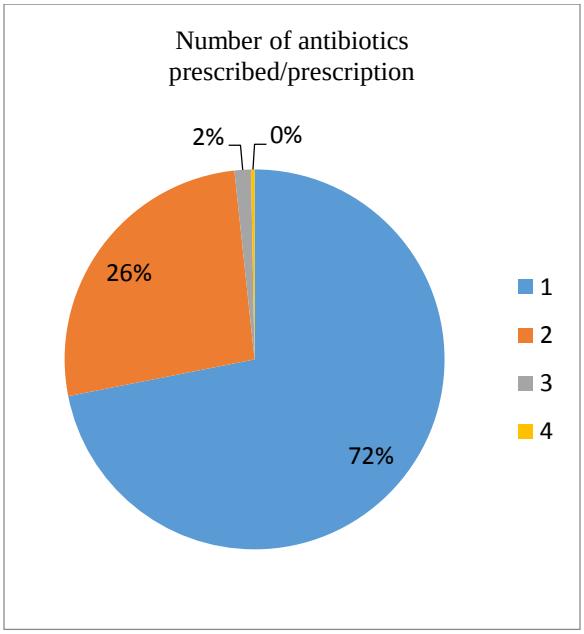

Figure 2: Distribution of number of antibiotics prescribed per encounter

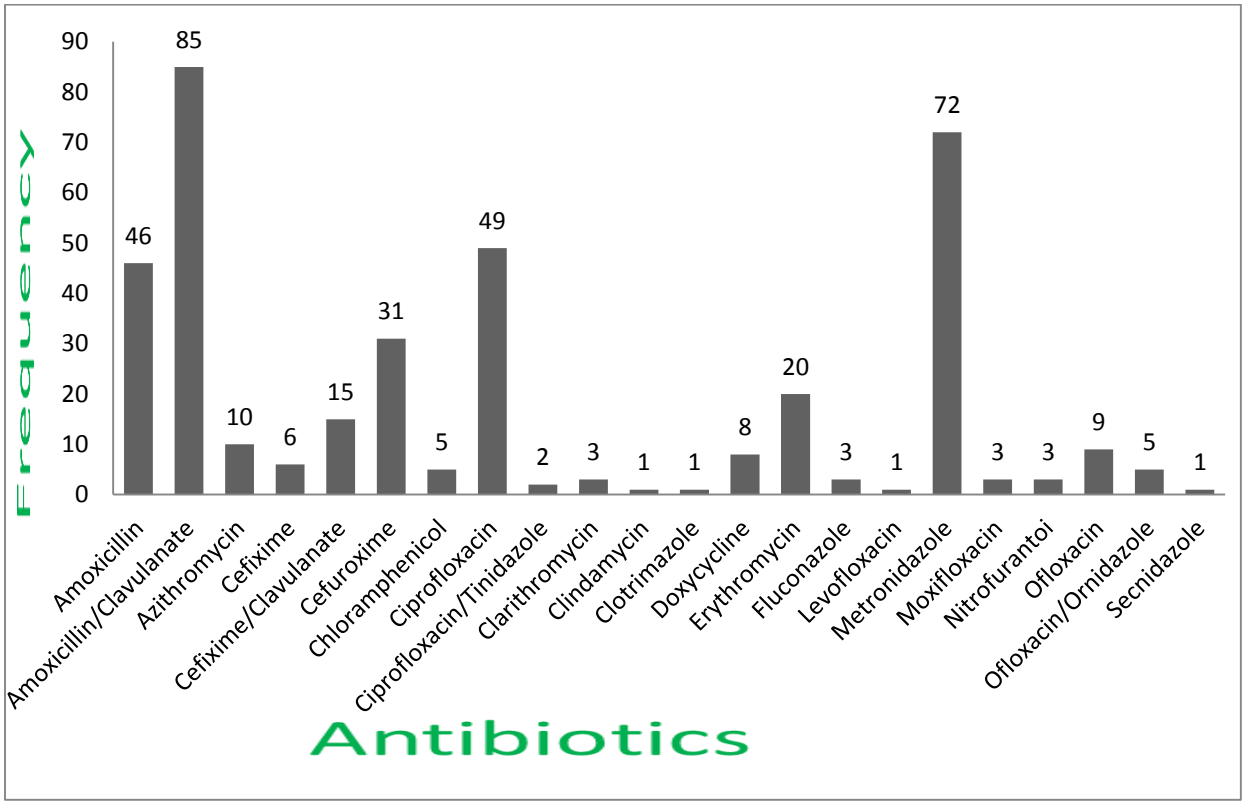

Figure 1: Frequency of antibiotics prescribed

DISCUSSION

This study assessed the rate and patterns of antibiotics prescribing pattern using both in-patient and out-patient facilities. The study provides a better understanding of the prescribing practices by the clinicians in the facility and showed the areas that need to be improved upon to achieve rational and effective use of antibiotics in the centre of study. Findings in this study, have shown the commonly prescribed antibiotics reflected WHO prescribing indicators [10] and also agree with reports in other studies [5-7].

A similar finding was reported in Turkish study with amoxicillin/clavulanate accounting for about 18.1 % prescribing rate [14,15]. It was observed that amoxicillin alone was the most commonly prescribed antibiotic in studies conducted at health facilities in Somalia Regional State and at hospital in Southern Ethiopia [10]. However, amoxicillin/clavulanic acid was the most frequently prescribed antibiotic in our study thus corroborating a shift from monotherapy to combination therapy [1-3], thus preventing the potential of causing resistance. It is interesting to note that the average number of drugs per prescription does not necessarily represent a better therapeutic outcome [10] but such prescription should conform with the standard of rational drug use [14,16]. One antibiotic per prescription was common in some cases which justifies that such antibiotic may have broad spectrum of activity [1-3].

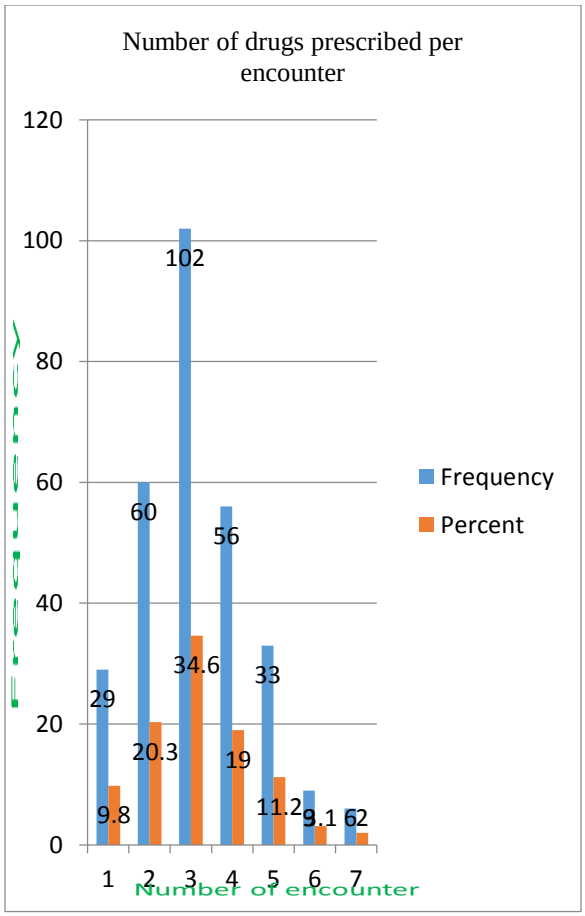

Figure 3: Frequency of number of drugs prescribed per encounter

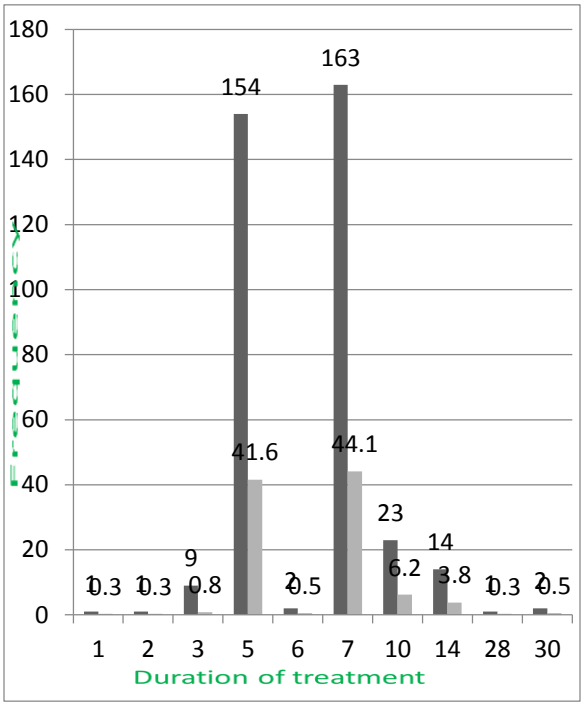

Figure 4: Frequency and duration of antibiotics treatment.

This percentage of prescription containing antibiotics is a bit higher than the values recommended by the WHO. The average number of drugs per encounter reported in this Ilorin study was higher than that of Kano [16]. In principle, and in practice, the fewer the number of drugs taken by the patients, the lesser the chance for adverse drug interactions [1-3]. Therefore, care must be taken to limit the number of antibiotics prescribed to prevent drug interaction, non-adherence to medication, and the cost of medications [17]. The average cost of antibiotics prescribed per encounter in this study (quote figures) was comparable to the study conducted in other parts of Nigeria [18]. Higher cost of prescribed antibiotics may have necessitated prescription and sale of innovator brands. Innovator brands are emphasized in therapeutics due to better possibility of pharmacokinetic/ pharmacodynamic profiles [1-3] as claimed by most companies. The proportion of antibiotics prescribed as generics was lower compared with WHO recommendation. In practice, generics are observed to be cheaper than branded drugs but the reliability of having an outstanding pharmacokinetic and pharmacodynamics profile may be doubtful. However, in some low-resource /income countries like Nigeria, certain generic prescribing pattern at low cost may be useful. Since the rate of generic prescribing was found to be considerably low, many patients may have benefited from this pattern in terms

of cost-benefit-ratio [17-18]. However, higher rate was reported in Ghana [19]. In addition, if healthcare providers prescribe in generic names instead of brand names, confusion would be avoided in purchasing the same drug bearing different names.

Generally, a larger proportion (99%) of antibiotics prescribed was from the Hospital Drug Formulary. This was comparable to some Nigerian studies [15,16]. Contrariwise, lower values of antibiotics prescription were recorded in Ghana [19]. Drug Formulary lists represent the medicines of choice for a hospital, as defined by the competent medical authority, and represent one way to optimize the use of medicines. Non-adherence to such hospital policy may be caused by prescribers not being aware of or in agreement with the list, listed antimicrobials not available, or prescriptions being listed with brand names while medicines are stocked and dispensed under generic names. Availability of a larger percentage (94%) of antibiotics prescribed at the Ilorin facility for dispensing obviously defines rational prescribing and reduces risk of morbidity and mortality.

With regard to the duration of therapy, seven days was the most frequently recommended according to the standard protocol [10]. Although optimal duration of therapy for many bacterial infections may vary [5-7] due to the drug formulation and severity of illness. The current recommendation is usually 7–10 days of treatment [10,13]. Longer treatment courses are recommended for some diseases such as meningitis, osteomyelitis and prostatitis [1-3]. Some of these diseases may have necessitated the prescription of oral antibiotics as take-home drugs as observed in this study.

Meanwhile, short-course of treatment may worsen morbidity and promote antibiotics resistance [1-3] in patients, except rational therapy is fully adopted. Antibiotic tablets were the most frequently prescribed (Table 1). This has proven that most patients could take-home their drugs after visiting the health care centre. The higher rate of prescription of oral form of antibiotics was similar as in studies reported in Nigeria [18] and Ghana [19]. Although the use of injection would have been higher if the studies were conducted in the in-patient department or Accident and Emergency Department, where critically-ill patients were being treated as in previous studies [5-7]. This has shown prescription pattern variation to depend on study centres and units of specialty. In this study, antibiotics prescribing was found to have significant relationship with patients' ages. This prescribing pattern can vary with centres depending on institutions' drug formulary. In some cases, the correct antibiotics may be prescribed in combination with other medicines leading to drug interactions [2,3] that will ultimately alter therapeutic outcome. This study has proffered periodic assessment of the prescribing practices in a health facility that will certainly help in identifying specific drug problems and sensitize clinicians in rational drug prescription. In addition, policy makers will have access to relevant information that can influence irrational use of antibiotic in any health institution.

CONCLUSION

The study has shown that the prescribing patterns, as exemplified by University of Ilorin Teaching Hospital, was within the core indicators of antibiotic prescription recommended by World Health Organization. It is therefore recommended that there should be improved practice among prescribers in order to achieve satisfactory therapy and prevent occurrence of antibiotic resistance in patients. Policy makers and medical practitioners should also adhere

strictly to the hospital formulary which should be regularly reviewed to accommodate new antibiotics possessing better therapeutic profile.

Conflict of interest: There is no conflict of interest of any kind as regards this study.

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