

Full Length Research Paper

Pattern of antibiotic usage by adult populations in the city of Benin, Nigeria

Yah S. Clarence^{1*}, Yusuf O. Edrin² and Eghafona N. Odeh³

¹Department of Microbiology, College of Science and Technology, Covenant University, Km 10 Idiroko Road, Canaan Land, Ota, Ogun State, Nigeria.

²Department of Medical Microbiology, College of Medicine, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria.

³Department of Microbiology, Faculty of Life Sciences, University of Benin, Benin City, Edo State, Nigeria.

Accepted 13 February, 2008

Inappropriate use of antibiotics may play a major role in the development and spread of antibiotics resistant bacteria. Against this background, questionnaires were administered for utilization of antibiotic usage among some Nigerians in Benin. There were 3435 respondents made up of 743 (21.6%) housewives, 467 (13.6%) taxi drivers, 892 (26.0%) students, 288 (8.4%) teachers, 85 (2.5%) lawyers, 741 (21.5%) traders and 219 (6.4%) others. The questionnaires revealed that 43.1% and 56.9% of the populace took full and incomplete regimens, respectively. The commonly prescribed antibiotics were ampicillin, chloramphenicol, streptomycin, and tetracycline. The least prescribed were cefotaxime, pefloxacin and ciprofloxacin while methicillin and vancomycin were not prescribed at all. There was no significant difference ($p>0.05$) between the mean prevalently used antibiotics. It was also found that lawyers, teachers, students took antibiotics without prescription even for unspecified ailments, which contradicts the WHO guidelines on the usage of antibiotics.

Key words: Antibiotics usage, Nigerian populace.

INTRODUCTION

Antibiotics are drugs prescribed to treat bacterial infections and the call for prudent use of these antibiotics across the globe has been a general failure and threat to public health (HLSCST, 1998). The paradigms appear to be the recent, rapid emergence of several multi-drug-resistant bacteria that were under check during the 1940s (Fleming, 1945). Also the high prevalence of antimicrobial resistant pathogens in health care is part of the problem which has complicated patient management and increased patient morbidity and mortality. The drivers for such resistant organisms include the inappropriate use/misuse of drugs in our communities (Okeke et al., 1999; Guerin et al., 2000).

The need to measure the effectiveness and efficiency of drug to improve the data for antibiotic resistant organisms is very important. In this paper we report through the

use of questionnaires how people tend to use antibiotics in Benin City in relation to why these drugs are taken, the prescribing source and the purpose.

METHODS

The survey was performed through the use of questionnaires and records. The details of the frequently prescribed and most utilized antibiotics were obtained from clinics and hospital's records in Benin City Nigeria. A total of 5000 questionnaires were administered systematically to housewives, Taxi drivers, teachers, traders, lawyers, students and others to evaluate the level of antibiotics utilization by some Nigerians in the City of Benin, Nigeria over a period of 3 years. The antibiotics considered were pefloxacin (Pef), ciprofloxacin (Cip), norfloxacin (Nor), nalidixic acid (Na), penicillin (Pen), ampicillin (Am), cloxacillin (Clo), methicillin (Met), vancomycin (Van), cefotaxime (Cef), gentamicin (Gn), chloramphenicol (Chl), tetracycline (Te), streptomycin (Sxt), erythromycin (E) and cotrimoxazole (Cot). The profession (trader, housewife, taxi driver, student, teacher, lawyer, others) of the respondents was also considered. Other data obtained include the mode by which the antibiotics were taken, source of prescriber and the purpose for which they were taken (Table 1). The following diseases were

*Corresponding author: E-mail: yahclar@yahoo.com. Phone: +2348053336108 or +2348063418265.

Table 1. Prevalence % of antibiotics usage by occupation.

Occupation	Number that takes antibiotics			Prescriber					Regimen	
	Total	Rarely	Frequently	Doctors	Drug retailers	Pharmacists	Friends and relatives	Self prescribers	Full	Incomplete
House wife	743	85	15	5.7	60.8	4.7	10.1	18.7	45.1	54.9
Taxi Drivers	467	67.5	32.5	7.1	59.5	12.2	4.9	16.3	31.7	68.3
Students	892	96	4	5.9	54.8	8.3	5.1	25.9	47.8	42.2
Teachers	288	98.6	1.4	60.4	17.0	17.7	2.8	2.1	78.8	21.2
Lawyers	85	96.5	3.5	65.9	12.9	20.0	00	1.2	83.5	16.5
Traders	741	85.6	14.4	7.4	59.2	19.8	3.6	10	25.9	74.1
Others	219	94.5	5.5	11.9	62.6	10.0	10.9	4.6	36.5	63.5
Total	3435	87.6	12.4	12.8	54.0	11.7	5.9	15.6	43.1	56.9

Taken into consideration; diarrhea, sore throat, typhoid, dysentery, malaria, body pain and others.

Statistic analysis

The Chi-square test and the student two-tailed t test were used for the analysis. A difference of significant was considered when P-value was less than 0.05 ($P < 0.05$) using the Instat Computer package.

RESULTS AND DISCUSSION

The results show that 3435 respondents made up of 743 (21.6%) housewives, 467(13.6%) Taxi drivers, 892 (26.0%) students, 288(8.4%) teachers, 85 (2.5%) lawyers, 741(21.5%) traders and 219 (6.4%) others responded to the questionnaires. The results which served for the evaluation of antibiotics usage, showed that 1855 (54.0%) of the respondents preferred the patronage of drug retailers, followed by self prescribers 537 (15.6%), friends and relatives 201 (5.9%) rather than the services of qualified health personnel such as doctors 439 (12.8%) and pharmacists 403 (11.7%) as shown in Table 1. The prevalence of the common diseases treated without proper antibiotics prescription by health officials varied among the occupation as shown in Table 2. It was found that lawyers, teachers, students take antibiotics without prescription even for unspecified ailments such as body pain (Table 2). The results indicated a significant association between the prescribers and the occupation ($p < 0.05$) in Benin City.

The results also showed that ampicillin, erythromycin, gentamicin, penicillin, tetracycline, were the most commonly prescribed antibiotics while the pefloxacin, and ciprofloxacin and cefotaxime were the least prescribed. The methicillin and vancomycin were not prescribed at all

as shown in Figure 1. There was no significant different ($p > 0.05$) between the mean prevalently used antibiotics. Developing countries however have a great need for drug utilization research as a tool for monitoring the effectiveness and efficiency of drugs. Besides, the inappropriate use of antibiotics may also play a major role in the development and spread of antibiotic resistant bacteria. Against this background, questionnaires served on participants in this survey revealed that over 50% preferred the patronage of drug retailers rather than the services of qualified health personnel such as doctors and pharmacists. This result however, vary from those earlier reported by Consuelo and Milton (1998) in Mexico where they found that doctors recommended 60% of medicinal drugs and were followed by self-medication (19.4%), neighbours and relatives (30.7%), pharmacist (4.9%), nurses (3.9%) and others (1.4%). Misuse of antibiotics by physicians, patients and health personnel in clinical practice in developing countries however, can also provide selective pressure favoring resistant bacterial strains. Inappropriate use of antibiotics increases the risk for selection and dissemination of antibiotic-resistant bacteria, which are often placed at a competitive advantage (Okeke et al., 1999; Levy, 2001). Other results earlier reported by Levy (2001) showed that antibiotic abuse and selection for resistant bacteria was due to poor patient compliance. Although in Mexico, poor patient-physician communication was partially responsible for the non-compliance of patients with antibiotic regimens (Consuelo and Milton, 1998).

The results also showed that 56.9% of the populace took incomplete regimens when prescribed by doctors or health officials while 43.1% take full regimens. These findings therefore suggest that there was a gross misuse of antibiotics in this community which could result in the development of resistant strains (WHO, 1992; Wolff,

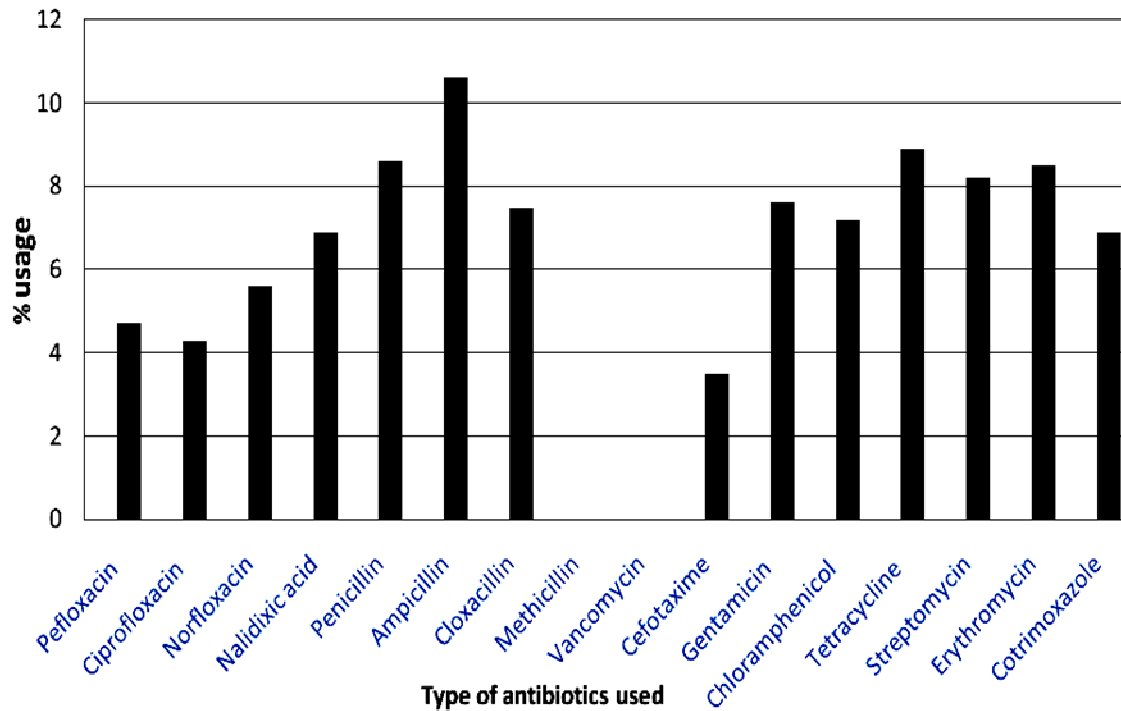


Figure 1. Prevalence % of anti biotic use. Pefloxacin (Pef), ciprofloxacin (Cip), norfloxacin (Nor), nalidixic acid (Na), penincilin (Pen), amplicin (Am), cloxacillin (Clo), mathicillin (Met), vancomycin (Van), cefotaxime (Cef), gentamicin (Gn), chloremphenicol (Chl), tetracycline (Te), sreptomycin (Sxt), erythromycin (E) and coltrimoxazole (Cot).

Table 2. Prevalence (%) by occupation to some common diseases treated without proper antibiotics prescription.

Occupation of respondent	No. of respondents	Common diseases treated with antibiotics without prescription					
		Malaria	Typhoid fever	Urine	Sore throat	Body pain	No reason
House wife	673	5.1	32	21.7	4.8	27.6	3.3
Taxi Drivers	315	27	39	43.8	10.8	29.8	4.8
Students	596	-	21.1	7.9	1	1	-
Teachers	208	-	16.8	22.1	22.1	22.1	-
Lawyers	85	-	31.8	25.9	2.3	2.4	-
Traders	432	-	29.4	54.2	3.9	23.6	3.2
Others	172	2.3	25.6	31.4	4.1	23.3	5.2

1993; Okeke and Lamikanra, 1985; Yah et al., 2006). Other reports by Lansang et al. (1990) had shown that incomplete regimens compliance in developing countries at times among patients often depends on long distances travelled and large expenses incurred for medical care; they are unlikely to return for follow-up visits. In addition, the patient may be unable to read antibiotic labels. (Esezobo, 1986 and Ali et al., 1988) Also, some of the drugs are usually expensive and patients may purchase incomplete regimens whenever possible and discontinue treatment when the symptoms and signs disappear therefore treating the symptoms of the disease rather than the pathogen (Lansang et al., 1990, and Agom et al

1990).

The prevalence of common diseases treated without proper antibiotics prescription by health officials varied among the occupation. It was found that lawyers, teachers, students take antibiotics without prescription even for unspecified ailments such as body pain. This therefore contradicts the World Health Organization guidelines for the use of antibiotics, which states that there must be the establishment of cause of a disease before antibiotics prescription can be made. This phenomenon in developing countries can often be traced to complex socio-economic and behavioral factors, which contribute to the escalating problem of antibiotic resistance worldwide

(Okeke et al., 1999; Levy, 2001).

The results also showed that ampicillin, gentamicin, tetracycline, penicillin erythromycin, chloramphenicol were the most commonly prescribed antibiotics while pefloxacin, ciprofloxacin and cefotaxime were the least prescribed. The methicillin and vancomycin were not prescribed at all (Figure 1). There was also no significant difference ($p>0.05$) between the mean prevalently used antibiotics. The antibiotics used in this study showed that ampicillin, chloramphenicol, penicillin, erythromycin tetracycline, nalidixic acid, norfloxacin are older, common, cheaper and available than the more expensive, scarce, potent and generic antibiotics; pefloxacin, ciprofloxacin, cefotaxime, methicillin and vancomycin. Therefore, one would expect that drugs more commonly affected by bacterial resistance in developing countries are generally inexpensive and popular broad-spectrum agents (Calva et al., 1996). However, the relationship between antibiotic use and the emergence and spread of resistance is a complex one. Resistance of pathogens to these available, cheap, older and commonly abused drugs would definitely result in high cost of treatment, longer hospital stay and therapeutic failure, which might lead to life-threatening diseases and more deaths (Lau et al., 2004). In many African, Asian, and Latin American countries, common antibiotics readily available on demand from hospitals, pharmacies, patent medicine stalls, roadside stalls and hawkers are cheaper and old generic antibiotics (Lansang et al., 1990; Wolff, 1993; Okeke et al., 1999). Ye et al. (2002) and Bell and Turnidge (2003) have also observed that in the Peoples Republic of China and Asia Pacific-South Africa, respectively, that indiscriminate use of antibiotics led to very high levels of antimicrobial resistance among bacterial isolates from patients with nosocomial infections.

We observed a significant association between the prescriber and the occupation of subjects ($p<0.05$) in the City of Benin. Most subjects in the study preferred the patronage of drug retailers than authorized agents such as doctors and pharmacist. Hossain et al. (1982) reported that in rural Bangladesh, for example, 95% of drugs consumed for one month by more than 2,000 study participants came from local pharmacies while physicians prescribed only 5%. These people are encouraged to buy from unofficial distributors because drugs often are not available in government hospitals (Goel et al., 1996). According to reports of Kafle et al. (1992), in Nepal, retail drug outlets are four times as numerous as government health posts and hospitals. Alternate sources offer the option of purchasing small quantities antibiotic regimens (Bojalil et al., 1994; Dua et al., 1994; of medicines, while Lansang et al., 1990). At times drug vendors who have little or no knowledge of the required dosage regimens, indications, or contraindications are prescribers (Dua et al., 1984; Goel et al., 1996). Also in markets and public transport cars in West African countries and Nigeria (Okeke and Lamikanra, 1985.), the vendor usually tries to

convince potential buyers to purchase the drug. These sub-inhibitory antibiotic regimens predispose for selection of resistant bacterial strains (Levy, 2001). Also in many developing countries, well-trained health personnel are scarce and cannot serve the entire population, especially in rural areas. Therefore, unskilled personnel are less aware of the deleterious effects of inappropriate use of antibiotics. In Thailand for example, pharmacy technicians prescribed rifampicin for urethritis and tetracycline for young children (Thamlikitkul, 1988). Also in developing countries, antibiotics can be purchased without prescription, even when the practice is not legal.

ACKNOWLEDGEMENTS

We are grateful to the support given to us by the staff of the University of Benin Teaching Hospital, St Philomena Hospital Benin City, Lahor Health and Research Laboratories Benin City and other Clinics used in this study. Also, we are grateful to our numerous participants who kindly responded to the questionnaires.

REFERENCES

- Agom, JK, Akanni AO, Dawodu TO (1990). Quality of ampicillin/cloxacillin preparations on the Nigerian market. *Nig. J. Pharmacol.* (21):36-38.
- Ali HM, Homeida MM, Abdeen MA (1988). Drug dumping in donations to Sudan. *Lancet.* (333):538-539.
- Bell J, Turnidge J (2003). SENTRY Antimicrobial surveillance program Asia-Pacific and South Africa. *Commun. Dis. Intell.* (27): 61-66.
- Bojalil R, Calva JJ (1994). Antibiotic misuse in diarrhea. A household survey in a Mexican community. *J. Clin. Epidemiol* (47):147-156.
- Calva JJ, Ceron E, Bojalil R, Holbrook A (1993). Antibiotic consumption in a community of Mexico City. II. Survey of purchases at pharmacies. *Bol. Med. Hosp. Infant. Mex.* (50):145-150.
- Consuelo IC, Milton K (1998). Prevalence of medicinal drug usage among the Mexican general population according to National Health Survey I. *Proc West. Pharmacol. Soc.* (41): 183-186.
- Dua V, Kunin CM, White LV (1994). The use of antimicrobial drugs in Nagpur, India. A window on medical care in a developing country. *Soc. Sci. Med.* (38):717-724.
- Esezobo E, Offiong E (1986). *In vitro* studies on some brands of oxytetracycline capsules available in Nigeria. *Nig. J. Pharmacol.* (17):24-28.
- Fleming A Penicillin; Noble lecture. <http://www.noble.se/medicine/lectures/1945/fleming-lecture.pdf>. 1945
- Goel P, Ross-Degnan D, Berman P, Soumerai S (1996). Retail pharmacies in developing countries: a behavior and intervention framework. *Soc. Sci. Med.* (42):1155-1161.
- Guerin F, Buu-Hoi A, Mainardi JL (2000). Outbreak of methicillin-resistant *Staphylococcus aureus* with reduced susceptibility to glycopeptides in a Parisian hospital. *J. Clin. Microbiol.* (38):2985-2988.
- Hossain MM, Glass RI, Khan MR (1982). Antibiotic use in a rural community in Bangladesh. *Int. J. Epidemiol.* (11):402-405.
- House of Lords Select Committee on Science and Technology (HLSCST 1988). Resistance to antimicrobials and other antimicrobial agents. London: Stationery Office.
- Kafle KK, Gartoulla RP, Pradhan YM, Shrestha AD, Karkee SB, Quick JD (1992). Drug retailer training: experiences from Nepal. *Soc Sci* (35):1015-1025.
- Lansang MA, Lucas-Aquino R, Tupasi TE, Mina VS, Salazar LS, Joban N (1990). Purchase of antibiotics without prescription in Manila, the Philippines. Inappropriate choices and doses. *J. Clin. Epidemiol.* (43):

61-67.

- Lau SM, Peng MY, Chang FY (2004). Resistance rates to commonly used antimicrobials among pathogens of both bacteremic and non-bacteremic community-acquired urinary tract infection. *Microbiol. Immunol. Infect.* 37(3):185-191.
- Levy SB (2001). Antibacterial household products: cause for concern. *Emerg. Infect. Dis.* 7(3): 512-515.
- Okeke I, Lamikanra A (1995). Quality and bioavailability of tetracycline capsules in a Nigerian semi-urban community. *Intern. J Antimicrobial Agents.* (5):245-250.
- Okeke IN, Adebayo L, Edelman R (1999). Socioeconomic and behavioral factors leading to acquire bacterial resistance to antibiotics in developing countries. Center For Disease Control and Prevention. Atlanta. GA USA.
- Thamlikitkul V (1988). Antibiotic dispensing by drug store personnel in Bangkok, Thailand. *J. Antimicro.b Chemother.* (21):125-131.
- WHO (1992). The use of essential drugs: model list of essential drugs: fifth report of the WHO Expert Committee. World Health Organ Tech. Rep. Ser. 825:1-75.
- Wolff MJ (1993). Use and misuse of antibiotics in Latin America. *Clin. Infect. Dis.* 17 (2):S346-S351.
- Yah SC, Eghafona NO, Enabulele IO, Aluyi HAS (2006). Ampicillin usage and ampicillin resistant (Ampr) plasmids mediated *Escherichia coli* isolated from diarrheagenic patients attending some Teaching Hospital in Nigeria. *Shirac. E. Med. J.* 7(4):1-12. <http://semj.sums.ac.ir/vol7/oct2006/ampi.htm>
- Ye HF, Li HY, Chen DM, Yang HI, Xiong JH (2002). Surveillance of the resistance of common pathogenic bacteria in some Teaching hospitals in Guangzhou area from 1998-2000. *Chinese J. Infect. Dis.* (20): 265-269.