

Antibiotic use pattern at dental clinic: a cross-sectional, retrospective study

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Abstract

Aim: Irrational use of antibiotics leads to the development of antibiotic resistance. Hence, the objective of this study was to assess antibiotic use pattern at Dental Clinic in Nekemte Referral Hospital.

Materials and Methods: A cross-sectional retrospective study was conducted by reviewing prescription cards of dental patients from February to January, 2016. The sampling frame of the study was the list of prescription cards at the dental clinic during the last one year period (from January 1 to December 31, 2015).

Results: Within 386 prescriptions /medical record cards reviewed, a total of 634 medications were prescribed for patients of which 61.04% drugs were antibiotics. Amoxicillin (69.25%) was the most commonly used antibiotics. All drugs were prescribed by generic name. The average number of antibiotics per prescription and the percentage of encounters with an injection prescribed were 1.64% and 0.04%, respectively. The analysis of antibiotic prescriptions showed that a total of 85 prescription errors were detected and the majority of errors were identified to be omission errors.

Conclusion: All the antibiotics were prescribed by generic names, but there were a significant number of prescribing errors of antibiotics. Therefore, prescribers should regularly check completeness of prescription and pharmacists should provide continuous drug information on rational use of antibiotics and of course should work in a team spirit with prescribers.

Keywords: Antibiotic; Dental Clinic; Prescription Analysis; Prescribing Error.

INTRODUCTION

Bacterial infections are common in dental clinical practice (1). Consequently, antibiotics have been used extensively in dentistry for therapeutic or prophylactic purposes to manage oral and dental infections (1, 2). However, no benefit is seen from the use of antibiotic prophylaxis in low and moderate risk dental implant patients. Hence, antibiotics should be indicated when clinical signs of involvement are evident (3).

Antibiotic prescription may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock (4-6). Moreover, inappropriate, indiscriminate and irrational use of antibiotics leads to the development of antibiotic resistance (7-9). The rationale for the antibiotic choice could have been its wide spectrum, low incidence of resistance, pharmacokinetic profile, tolerance and dosage (10). Antibacterial resistance is a global clinical and public health problem that has emerged with alarming rapidity in recent years and undoubtedly will increase in the near

future (11). With the emergence of bacterial species resistant to antibiotics, there is a need to become vigilant about their prescription and with this, an urgent requirement for both professional and public understanding of the appropriate use of this life-saving component of treatment (8, 9, 12). Consequently, surveillance of antibiotic resistance, monitoring of antibiotic usage and attempts to improve prescribing attitudes have become crucial (12, 13). Therefore, the present study aimed to determine the prescription pattern of antibiotics at Dental clinic in Nekemte Referral Hospital.

MATERIALS and METHODS

The study was conducted in Nekemte Referral Hospital, which is located in Nekemte town, Oromia region, South West Ethiopia. The hospital has several departments which provide different services to the community such as medical, surgical, pediatrics, obstetrics, gynecology, ophthalmology, dentistry, pharmacy, psychiatry, chronic illness, TB clinic and HIV/AIDS clinic. A cross sectional retrospective study was conducted to assess the pattern of antibiotic drug prescriptions in Dental clinic from February-January, 2016. Prescription cards were referred and pre-tested check lists were used to fill the data.

The source population of the study was all documented antibiotic dental prescription cards while the sampling

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frame of the study was the list of prescription cards at the dental clinic during the specified period of time (January 1 to December 31, 2015). The sample size was determined after selecting patient record cards which contain at least one antibiotic within study period using the statistical formula.

$$n_i = (Z\alpha/2)^2 * P(1-P)/d^2$$

Where, $Z\alpha/2$ is probability coefficient for desired interval [CI = 95%], n_i : minimum sample size determined, P: proportion of population possessing characteristics of interest (50% prevalence), d = margin of sampling error tolerated (5%), 1-p = proportion of population that do not possess the character of interest.

$$n_i = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2}$$

$$n_i = \frac{(1.96)^2 * 0.5(0.5)}{(0.05)^2} = 384.16 \sim 384$$

Since the population was less than 10,000 which was about 4056, the correction formula was used to adjust the sample size.

$$n_f = \frac{n_i}{1+n_i/N}$$

$$n_f = \frac{384}{1+384/4056}$$

$$n_f = 384/1.095 = 350.52 \sim 351$$

n_i = initial sample size

n_f = final sample size

N = total number of population

Hence, with 10% contingency, the total sample size was 386.

A systematic sampling technique was used to collect the data. Patient prescription cards were chosen at a defined interval (every 12th patient cards) from the sampling frame which was obtained by dividing the total population (4056) to the sample size (386) of the study to get the exact number of the sample size. The first patient prescription card was selected randomly from the first 12 units. The variables of the study were age, sex, prescriber's specialty, dosage form, route of administration, frequency of administration, pattern of prescription, average number of medicines per encounter, percentage of medicines prescribed by generic, and percentage of encounters with an injection prescribed. The data was collected by hospital pharmacists who are able to extract reliable information from the records. Pre-tested format was used to fill the data. The collected data were cleared, categorized, coded, and analyzed by using statistical package SPSS version 16. Finally, the results were presented using tables and graphs.

Ethical clearance was obtained from ethical clearance committee of Jimma University Health Sciences College. Then, the letter was given to the administrator of

Nekemte Referral Hospital to get permission for data collection. Privacy and confidentiality were given consideration throughout the study.

RESULTS

A total of 386 prescriptions /medical record cards were reviewed. The patients profile indicated that there were 211 (54.66%) males and 175 (45.33%) females. The majority of patients with dental health problem (25.4%) were within the age group of 31-40 years. A total of 634 medications were prescribed for 386 patients. The majority of prescribed drugs were antibiotics (61.04%) followed by analgesics (32.81%), oral antiseptic solutions (5.36%) and local anesthetics (0.79%) (Table1).

Table 1. Total drugs prescribed by generic name in Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Drug types	By generic name	
	Frequency	%
Antibiotic	387	61.04
Analgesics	208	32.81
Antiseptic	34	5.36
Anesthetics	5	0.79
Total	634	100.00

Among antibiotics, amoxicillin was the largest proportion prescribed (69.25%) drug followed by metronidazole (26.87%), erythromycin (3.10%) and cloxacillin (0.78%). As shown in Table 2 some other drugs were also prescribed in combination with antibiotics. Diclofenac and paracetamol were frequently used in combination with antibiotics with respective percentages of 42.11 and 32.39. On the other hand, only few numbers of each lidocain and tramadol was prescribed with antibiotics.

Table 2. Other drugs prescribed in combination with antibiotics in Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Other drugs	Frequency	%
H ₂ O ₂ (3%)	21	8.50
Chlorhexidin (0.12%)	14	5.67
Lidocain	6	2.43
Diclofenac	104	42.11
Paracetamol	80	32.39
Ibuprofen	17	6.88
Tramadol	5	2.02
Total	247	100.00

Peroral is the commonly used route of administration. Amoxicillin and metronidazole, which have been the most frequently prescribed drugs were administered through this route, whereas cloxacillin was the only antibiotic drug given through IV route (Table 3).

Table 3. Commonly used route of administrations in Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Drugs Types antibiotic	Route of administration			
	PO		IV	
	Frequency	%	Frequency	%
Amoxicillin	268	69.25	-	-
Metronidazole	104	26.87	-	-
Cloxacillin	-	-	3	0.78
Erythromycin	12	3.10	-	-

The average number of antibiotics per prescription and percentage of encounters with an injection prescribed

were 1.64% and 0.04%, respectively. All of drugs (100%) were prescribed with their generic name (Table 4).

Table 4. Prescribing pattern indicators with respect to WHO references in Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Indicators	Values		
	Total drugs	Antibiotics	WHO reference
Average number of drugs per prescription	634/386 1.64	387/386 1.003	1.6-1.99
Percentage of encounters with an injection prescribed	28/634 0.04	3/387 0.008	13.4-24.1
Percentage of drugs prescribed by Generic name	687/687 100	387/387 100	100

As shown in Table 5, the percentage of correct prescription was higher than that of incorrect prescription. Moreover, there was variation in the

proportion of correctly prescribed medications by type of drug. Relatively, there was the highest percentage of incorrect prescription of antibiotics (21.96%).

Table 5. Drugs prescribed correctly and incorrectly in Dental clinics, Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Types of drugs	Drug prescribed correctly per prescribing guideline		Drugs prescribed incorrectly per prescribing guideline	
	Frequency	%	Frequency	%
Antibiotics	302(n=387)	78.04	85(n=387)	21.96
Analgesics	201(n=208)	96.63	7(n=208)	3.37
Antiseptics	32(n=34)	94.12	2(n=34)	5.88

The analysis of the antibiotic prescribing errors showed that a total of 85 errors were detected. All of the detected errors except the frequency of administration were identified to be omission errors. The most commonly omitted information were quantities of

medications (35.29%), physician signatures (27.06%) and dosage forms (20.00%). On the other hand the analysis of the analgesic and antiseptic prescribing errors demonstrated that a total of 9 errors were identified (Table 6).

Table 6. Prescription errors identified in Dental clinics in Nekemte Referral Hospital, Southwest Ethiopia, 2016.

Prescription errors	Antibiotics		Analgesics		Antiseptics	
	Frequency (n=85)	%	Frequency (n=7)	%	Frequency (n=2)	%
Physician signatures	23	27.06	4	54.14	1	50.00
Dosage forms	17	20.00	2	28.57	1	50.00
Quantity of drugs	30	35.29	1	14.29	-	-
Frequency of drug use	15	17.65	-	-	-	-

DISCUSSION

Dental diseases were the most commonly encountered problems in the age group of 31-40, which accounts for 25.4% of the study population. This might be related to the feature of this age group which include excessive use of 'khat' and consumption of alcohol for recreation purposes. Lack of tooth hygiene after diet also explains dental problem among this and other age groups. Likewise, about 13% of the population in the age group 41-50 has a dental problem. This could be due to lack of awareness about oral hygiene.

Antibiotics were prescribed in the study area either as monotherapy or/and in combination with other drugs. This finding is inconsistent with the study conducted in one of health districts in Malaysia (14). Amoxicillin was the most frequently used among antibiotics, which is in agreement with previous similar studies (15-18). Metronidazole was the most secondly prescribed drugs as it is considered the first choice treatment for infections, as frequently encountered in perioronitis and gingivitis (19).

The average number of drugs per prescription, 1.64, at Nekemete Referral Hospital dental clinic was in the acceptable range of standard value set by WHO (1.6-1.8) (20). In a similar study performed at the Jimma Referral Teaching Hospital, the average number of drugs per encounter was 1.59 which was within the standard value. Similarly, in a study on prescription patterns in three hospitals in northern Ethiopia, the average numbers of drugs per prescription were 0.98 at Gondar Hospital, 1.8 at Bahirdar Hospital and 2.2 at Debre Tabor Hospital (21). The average value of injectable per prescription was 0.04 which is relatively greater than the value reported in other similar studies (17).

The findings of the analysis of the prescription of antibiotics was found to be rational with regards to generic name prescribing according to WHO standards as the percentage of drugs prescribed by generic name in this study was 100%. Hence, in comparison with other studies (17, 22, 23) the prescribers were well adhered to WHO standards.

Irrational use of drugs is a major problem of medical practices and its consequences might comprise ineffective treatment, development of resistance, adverse effects and economic burden on patients. The effectiveness of treatment of dental problem is influenced by the appropriateness of prescribing. The analysis of the prescription in the present study showed that a total of 85 (21.96%) prescribing errors were identified. All of the detected errors except the frequency of administration were identified to be omission errors. The most commonly omitted information were quantities of medications and physician signatures. However, the magnitude of errors observed in the present study is less compared with our previous study, which was 97.2% of the reviewed prescriptions (24).

CONCLUSION

There was inappropriate prescribing practice of drugs in Dental clinic of Nekemte Referral Hospital. Antibiotics were prescribed without information and/or inappropriate dose and frequency of administration. Thus, prescribers should regularly check completeness of prescription cards and pharmacists should provide continuous drug information on rational use of antibiotics and of course should work in a team spirit with prescribers. Moreover, the establishment of drug information center is also crucial to reduce prescription errors. The establishment of antibiotic policy and treatment guidelines with periodic assessment of the sensitivity pattern of pathogenic organisms is recommended.

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