

Antibiotics Prescription Patterns among Dentists in Lahore, Pakistan

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ABSTRACT

Background: Odontogenic infections are one of the main causes of patients visit to a dental office. Antibiotics are magical drugs that have revolutionized the 20th Century in their ability to treat infectious diseases, increasing the life expectancy of individuals. Antibiotics prescription is a common practice among dental professionals and according to an estimate by Centre for Disease Control (CDC) and American Dental Association (ADA), over prescription of antibiotics is seen in 30-50% of the cases.

Aim: To assess and compare (no comparison) the antibiotic prescription pattern among general dentists and specialty dentists in Lahore, Pakistan.

Methodology: A cross sectional survey was conducted amongst dentists working in the teaching institutions and in the private clinics of Lahore. A pre-piloted questionnaire survey adopted from Jagan et al with slight modifications was used. In this descriptive study 300 practicing dentists were selected using consecutive sampling with a 5% level of significance and margin of error

Results: Total 300 filled questionnaires were collected. Almost 84% of the dentists were less than 30 years old while 13% were between 31-40 years old. Of the participants 65.3% were females and 34.7 percent were males. Dental infections associated with gross swelling or associated with closure of the eye were the most common reasons for prescription of antibiotics. Almost 62% of the dentists would give antibiotic if any delay in treatment is anticipated. Almost 50% of the dentists would prescribe antibiotics for periapical abscess and cellulitis.

Conclusion: There is a trend towards over prescription of antibiotics by dentists without following the standard guidelines. Emphasis on the correct prescription strategies of antibiotics at the undergraduate level and more awareness should be created as continuing dental education programs for practicing dentists.

Keywords: Antibiotics, Dentists, Prescription Pattern.

INTRODUCTION

Odontogenic infections are one of the main causes of patients visit to a dental office.^[1] They can be caused by dental caries, periodontal disease, trauma or can develop as a result of post-operative complications after oral surgery.^[2] Antibiotics are magical drugs that have revolutionized the 20th Century in their ability to treat infectious diseases, increasing the life expectancy of individuals.^[3] These wonder drugs are indicated for use as adjunctive therapy in conjunction with removal of etiological factors when there are systemic signs and symptoms of odontogenic infection characterized by fever, malaise, cellulitis, trismus, involvement of fascial spaces or life-threatening obstruction of the airway¹.

Antibiotics prescription is a common practice among dental professionals and according to an estimate by Centre for Disease Control (CDC) and American Dental Association (ADA), over prescription of antibiotics is seen in 30-50% of the cases^{4,5}. Soon after the discovery of first antibiotic i.e., Penicillin, in 1928, Alexander Fleming warned to over rely on these drugs and the threat to development of resistance³.

Antimicrobial resistance can develop intrinsically but a major factor in the development of resistance lies on the shoulders of clinicians in the form of over prescription by health care providers, self-medication by patients, non-therapeutic use in agriculture and inappropriate disposal of medical waste⁶. To address this concern, World Health Organization (WHO) in 2015 submitted its global action plan for antimicrobial resistance to 68th assembly of world health assembly⁷.

There are no clear guidelines for antibiotic prescription in dentistry therefore, over prescription leads to overuse and the resultant development of resistance is of global concern.^[2] In developing countries drug regulatory authorities fail to restrict easy access to antibiotics and no drug audit of the clinicians leads not only to misuse of these drugs but socio-economic burden as well

as a serious threat to public health.^[8] Various studies done in different parts of the world has shown inappropriate antibiotic prescription by medical as well as dental practitioners^{1,5,6}. Very few studies have been done in Pakistan to assess antibiotic prescription pattern among dentists in our community.^[8,9] Therefore, the aim of this study is to assess antibiotic prescription pattern among dentists in our setting. The findings of this study may contribute to help in developing national guidelines for antibiotics use in dentistry.

The objective of this study is to assess and compare (no comparison) the antibiotic prescription pattern among general dentists and specialty dentists in Lahore, Pakistan.

METHODOLOGY

A cross sectional survey was conducted amongst dentists working in teaching institutions and in private practices across Lahore. After approval from the Institutional Review Board (IRB) of Fatima Memorial Hospital (FMH-03-2019-IRB-586-M), the study was initiated and data collection was completed in 3 months. A sample size of 300 dentists was selected using 5% level of significance, 95% confidence interval and 5% margin of error. Dentists practicing in private practices as well as in teaching institutes of Lahore were included in the inclusion criteria whereas undergraduate dental students, dental hygienists and dental technicians were excluded from the study.

A pre-piloted questionnaire survey adopted from Jagan et al with slight modifications was used⁸. In order to maintain anonymity, the respondents were not asked to identify themselves. The survey included questions concerning antibiotics prescription in various clinical and non-clinical parameters, antibiotics prescription in various clinical and medical conditions, prescription of antibiotics in patients with co-morbid medical conditions and the last section of the questionnaire is related to type of antibiotics being prescribed for different dental infections. Informed consent was obtained from all subjects prior to data collection. Data was collected using an online and paper-based identical questionnaire, focusing on

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important clinical areas. Other information regarding the practitioners, including demographic and practice information were also collected without any identifying information. The questionnaire was filled by general dentists, post-graduate residents and consultants. The anonymity of the respondents was maintained. The responses were analyzed in SPSS Version 23 to calculate frequencies and percentages.

RESULTS

Table-1 Demographic Characteristics of Dentists

| Demographics | Frequency | %age |
|--------------------------|-----------|------|
| Age | | |
| <30 years | 253 | 84.3 |
| 31-40 years | 40 | 13.3 |
| 41-50 years | 6 | 2.0 |
| >51 years | 1 | 0.3 |
| Gender | | |
| Male | 104 | 34.7 |
| Female | 196 | 65.3 |
| Experience | | |
| <5 years | 244 | 81.3 |
| 5- 10 years | 43 | 14.3 |
| 10-15 years | 7 | 2.3 |
| >15 years | 6 | 2.0 |
| Designation | | |
| Consultant | 19 | 6.3 |
| General dentist | 62 | 20.7 |
| Post graduate residents | 72 | 24.0 |
| House officers | 147 | 49.0 |
| Qualification | | |
| BDS | 245 | 81.7 |
| M.PHIL | 11 | 3.7 |
| FCPS/MDS | 44 | 14.7 |
| Working sectors | | |
| Government | 52 | 17.3 |
| Private | 234 | 78.0 |
| Both | 14 | 4.7 |
| CDE on antibiotic | | |
| Yes | 180 | 60.0 |
| No | 120 | 40.0 |

In total 300 filled questionnaires were collected. The demographic data are represented in Table-1. Almost 84% of the dentists were less than 30 years old while 13% were between 31-40 years old. Of the participants 65.3% were females and 34.7 percent were males. As most of the dentists were young, 81.3% had less than 5 years of clinical experience 14.3% had 5-10 years of experience. Majority of the participants 49% were house officers, 24% were post graduate residents.

Table-4 Types of antibiotics prescribed for different dental infections

| Clinical condition | No prescription | Amoxicillin (%) | Amoxicillin with clavulanic acid % | Metronidazole (%) |
|---|-----------------|-----------------|------------------------------------|-------------------|
| Irreversible Pulpitis | 157 | 52.3 | 48 | 16.0 |
| Periapical abscess before/ after drainage | 64 | 21.3 | 54 | 18.0 |
| Pericoronitis | 57 | 19.0 | 73 | 24.3 |
| Cellulitis | 37 | 12.3 | 56 | 18.7 |
| Chronic Periodontitis | 106 | 35.3 | 51 | 17.0 |
| Trismus | 182 | 60.7 | 25 | 8.3 |
| Re-implantation of tooth | 99 | 33.0 | 53 | 17.7 |

Table-5 Antibiotics prescription different medical conditions

| Prescription of antibiotics for different medical conditions | Frequency | %age |
|--|-----------|------|
| Uncontrolled diabetes | 235 | 78.3 |
| Controlled diabetes | 84 | 28.0 |
| Hypertension | 76 | 25.3 |
| Liver Disease Hepatitis B/C | 102 | 34.0 |
| Prosthetic cardiac valve | 246 | 82.0 |
| Immunocompromised patients | 252 | 84.0 |
| History of infective endocarditis | 263 | 87.7 |
| Hemodialysis | 150 | 50.0 |
| Undergoing radiotherapy | 168 | 56.0 |
| Prosthetic joints | 182 | 60.7 |

Table-2 Antibiotics prescription in clinical parameters

| Antibiotics prescription in the following clinical parameters | Frequency | %age |
|---|-----------|------|
| Dental infections associated with body temperature >38°C | 251 | 83.7 |
| Dental infections associated with localized swelling | 217 | 72.3 |
| Dental infections associated with diffuse, gross swelling | 264 | 88 |
| Dental infections associated with restricted mouth opening | 225 | 75 |
| Dental infections associated with difficulty in swallowing | 209 | 69.7 |
| Dental infections associated with closure of closure of eye because of swelling | 259 | 86.3 |

Table-3 Antibiotics prescription in non-clinical parameters

| Antibiotics prescription in the following non-clinical parameters | Frequency | %age |
|---|-----------|------|
| Patient expectation of antibiotic | 73 | 24.3 |
| Pressure of time & workload | 66 | 22.0 |
| Uncertainty of diagnosis | 100 | 33.3 |
| Treatment has to be delayed | 185 | 61.7 |

Approximately 81% of the respondents were simple BDS graduates with 78% of the respondents working in private institutions. Almost 60% of the respondents acknowledged attending continuing dental education program on antibiotics.

Prescription pattern for antibiotic for clinical signs is given in Table-2. Almost 84% of the respondents said that they prescribed antibiotics in dental infections associated with fever greater than 38°C. Dental infections associated with gross swelling or associated with closure of the eye were the most common reasons for prescription of antibiotics (88% and 86% respectively).

Antibiotic prescription for non-clinical parameters is given in Table-3. Almost 62% of the dentists would give antibiotic if any delay in treatment is anticipated. Majority of the dentists would not prescribe antibiotics for other non-clinical parameters.

Types of antibiotics prescribed in different dental infections are given in Table-4. Almost 50% of the dentists would prescribe antibiotics for periapical abscess and cellulitis. The most commonly prescribed antibiotic was amoxicillin with clavulanic acid.

More than 78% of the respondents would prescribe antibiotics to a patient with uncontrolled diabetes. Patients with a prosthetic cardiac valve, immune-compromised patients and patients with a history of infective endocarditis would likely get antibiotic prescription by 82%, 84%, and 87% of the dentists respectively.

DISCUSSION

Antibiotics are essential medications for the treatment of bacterial infections. It is crucial that they should be used judiciously for them to continue to be effective. The WHO, antimicrobial resistance: global report on surveillance gives a clear indication that there is an alarming increase in the resistance to common bacteria in many parts of the world.^[3] One more significant outcomes of the report is that there are numerous gaps in the surveillance of antibacterial resistance which is a key public health fear.

This survey was conducted in the teaching dental institutions of Lahore. This study was done to assess the trend in antibiotic prescription by dentists in the dental colleges of Lahore. The

findings of this study show that there is a high percentage of cases in which antibiotics are being prescribed which is not in accordance with the latest guidelines. Most of the respondents i.e., 84% comprised of young dentists, less than 30 years of age.

Almost 84% of the respondents said that they prescribed antibiotics in dental infections associated with fever greater than 38°C. These findings are similar to a study conducted by Baskaradoss et al in which the frequency was 67%⁶. While in a study conducted by Fahad et al, 57% of the respondents chose to prescribe an antibiotic in patients with fever. In a study conducted in Karachi by Usman 53.6% of the respondents opted to prescribe antibiotic in similar cases^{10,11}.

Upto 20% of the respondents said that they prescribe antibiotic for cases of irreversible pulpitis which is considerably less than study by Ahmad where frequency was upto 63% and comparable to Anirudha Agnihotry where the prescription percentage was 39.3% in symptomatic irreversible pulpitis without systemic involvement^{8,12}. This decline in the trend to prescribe antibiotics in our study may be due to the recent awareness campaigns for antibiotic resistance in Lahore. A similar study done in Saudi Arabia in 2017 showed this frequency to be 24.5% which is similar to our study. A survey in 2016 by the American Association of Endodontics found that 8.1% of its members would prescribe antibiotics for irreversible pulpitis¹³. These findings demonstrate a distinct tendency of antibiotic over-prescription for irreversible pulpitis at the developing as well as developed nations.

The frequency of antibiotic prescription for periapical abscess before or after drainage was upto 50% in our study which is similar to a study conducted in Saudi Arabia with a frequency of 45-48%. The frequency was very high almost 80% in a similar study done by Ahmad et al in Karachi.^[6,8] The survey conducted by AAE showed the frequency of antibiotic prescription in teeth with necrotic pulp with symptomatic apical periodontitis (43.59%), chronic apical abscess without (10.50%) or with symptoms (29.74%), acute apical abscess (95.92%)¹³. However, antibiotics should not be prescribed for these clinical presentations unless they are accompanied with evidence of systemic involvement. Current evidence suggests that antibiotic therapy is not required in the management of pulpitis, apical periodontitis, alveolar osteitis (dry socket), or pericoronitis in the absence of signs of spreading infection³.

Almost 88% of the respondents opted for prescribing single or combination antibiotics for cellulitis. This finding is similar to the study by Baskaradoss et al in which 85% dentists gave a similar response⁶. A study done by Fahad reported 70% of the respondents prescribing antibiotics for extensive facial swelling¹⁰.

About 19% of the respondents opted to not prescribe an antibiotic for pericoronitis which is in contrast to another study done in Saudi Arabia where 66% of the respondents said they would prescribe an antibiotic in pericoronitis⁶. Almost 35% of the dentists preferred not to prescribe an antibiotic for chronic periodontitis in the present study. In a study conducted by Usman the percentage was 43% which is slightly higher than this study¹¹.

In the present study the frequency of respondents prescribing antibiotic for chronic periodontitis was 65%. These findings are similar to a study carried out in Australia where 79% dentists and a study by Usman in which 57% dentists reported prescription of systemic antibiotics in the treatment of chronic periodontitis^{11,14}.

Regarding evidence-based practice for chronic periodontitis, prescription of antibiotic is usually recommended for patients presenting with progressive periodontal breakdown after conservative mechanical debridement and in cases not showing results to periodontal therapy and patients where there is recurrence of disease therefore this data implicates that there is over prescription.

The most frequently prescribed antibiotic (20-56%) was Amoxicillin plus clavulanic acid, which is a second line drug in various dental infections⁶. While amoxicillin which is a first line drug was less likely to be prescribed by the respondents 24%. This

finding is similar to the study by Ahmad in which amoxicillin was being prescribed 20% of the time. This is in contrast to the study by Usman in which amoxicillin was being prescribed by 53% of the dentists^{8,11}. In another study the first choice antibiotic was amoxicillin (81.5%), followed by amoxicillin+clavulanic acid (30.7%)¹⁵. The most frequently prescribed antibiotics was amoxicillin (60.71%) in a survey conducted by AAE in 2016¹³. The most common antibiotic prescribed was amoxicillin⁶.

Relatively less number of the respondents 22% and 24% were influenced by patient expectation and workload when prescribing antibiotics but when compared to another study done by Baskaradoss et al this frequency is high⁶. The frequency is reported to be high in study by Ahmad in which it was reported to be 70% on patient insistence and 64% on long awaiting appointments⁸. In a study conducted by Mark Germack involving members of AAE 36.89% of respondents reported prescribing antibiotics that are not necessary, most commonly because of patient expectations¹³. This attitude can increase the risk of antibiotic resistance.

According to antibiotic prophylaxis 2017 update the prophylactic prescription of antibiotic is recommended only for diabetic patients with poor glycemic control¹⁶. Almost 78% of the respondents in this study said that they would give prophylactic antibiotic to patients with uncontrolled diabetes which is similar to a study conducted in Saudi Arabia by Baskaradoss in which the frequency was 67%⁶.

The key recommendations of the AAE guidelines were patients with Prosthetic cardiac valves, previous history of Infective Endocarditis, Unrepaired cyanotic congenital heart disease or repaired congenital heart disease, Cardiac transplant with valve regurgitation should be given prophylactic antibiotics¹³. Majority of the respondents 82% and 87% said that they would prescribe antibiotics for prophylaxis in patients with prosthetic cardiac valve and those with a history of infective endocarditis. These are similar to the study done by Baskaradoss in which the findings were 80% and 74%⁶. While in a study done by Fahad the frequency was 73% and 56% respectively¹⁰.

Strong evidence shows negligible association between dental procedures and prosthetic joint implants or any effectiveness for antibiotic prophylaxis. Based on this information in combination with the recognized harm from antibiotic use, the use of antibiotics before dental procedures is not recommended for the prevention of prosthetic joint infections.^[17] In spite of these recommendations almost 60% of the respondents in this study would prescribe a prophylactic antibiotic in patients with prosthetic joint replacement. A study done by Baskaradoss this frequency was also as high as 40%⁶.

CONCLUSION

The results of this study show that there is a trend towards over prescription of antibiotics by dentists without following the standard guidelines. There should be more emphasis on the correct prescription strategies of antibiotics at the undergraduate level and more awareness should be created as continuing dental education programs for practicing dentists. The use of antibiotics should only be as an adjunct therapy in cases with signs of systemic involvement (fever, malaise, cellulitis and/or lymphadenopathies) subsequent to adequate disinfection of the root canals and drainage of abscess in case of a swelling. Additionally, immunocompromised patients or those with predisposing conditions such as previous history of endocarditis should be medicated prophylactically. It is highly significant that antibiotic prescription in the absence of previously discussed reasons has no evidence of therapeutic benefit. In cases where medication is indicated the antibiotic agent prescribed, its dosage and duration should be typically made according to recent guidelines.

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Data collection, revising the manuscript, **AR**: Concept and design of study, Drafting and revising the manuscript for intellectual content

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