

INJUDICIOUS USE OF ANTIBIOTICS IN ENDODONTICS; A CROSS SECTIONAL STUDY

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ABSTRACT

Most endodontic infections can be successfully managed by operative procedures like pulp extirpation and root canal treatment or incision & drainage without the need for local or systemic antibiotics. The antibiotics use in dental practice is characterized by empirical prescription based on clinical and bacteriological factors, resulting in antimicrobial resistance development. The current study is designed to scrutinize the practice of antibiotic prescription for various endodontic pathologies and the results showed that 15.4% endodontists and 65.6% of the non-endodontists admitted to prescribing antibiotics for cases of irreversible pulpitis. In cases of symptomatic apical periodontitis 38.5% endodontists and 56.3% non-endodontists prescribed antibiotics. The tendency towards indiscriminate antibiotic use should be discouraged and dentists should be encouraged to control their prescriptions of antibiotics in order to achieve optimum effect, to avoid the formation of resistant strains and to reduce the exposure of patients to potential toxicity and hypersensitivity reactions.

Key Words: *Injudicious use, Antibiotics, Antibiotic resistance*

This article may be cited as: Mohib Ullah, Yousaf A, Alam M, Ali F, Khan AA, Khan LS. Injudicious use of antibiotics in endodontics; a cross sectional study. Pak Oral Dent J 2020; 40(1):47-50.

INTRODUCTION

Antibiotics are miraculous drugs in managing oro-facial infections but their value is being undermined by the appearance of bacteria that have developed resistance owing to their injudicious and frequent use.¹ This resistance not only endangers the prevention and treatment of infections caused by these microbes; It also increases the chances of patients developing allergic reactions and unwanted side effects. Around 30 % of antibiotics given in primary care centers are considered to be inappropriate.² Dentists are responsible for 10% of all antibiotics prescribed in the community and rank fourth after the family practitioners, pediatricians and internists.² Most endodontic infections are confined within the tooth and can be

successfully managed by operative procedures like pulp extirpation and root canal treatment or incision and drainage without the need for local or systemic antibiotics and the current evidence does not support the use of prophylactic or adjunctive systemic antibiotics for their management.³ However to obtain good results dentists usually prescribe antibiotics preoperatively, perioperatively or postoperatively despite the fact that they use antimicrobial agents locally within root canals in the form of liquids like intra-canal irrigants, medicaments and solid obturating materials⁴ On the other hand the transient bacteremia that develop after endodontic procedures is estimated to be not more than bacteremia occurring as a result of routine oral health activities like brushing the teeth. In addition, misuse of antibiotics can lead to serious adverse drug events which may include allergic reactions ranging from minor skin manifestations to anaphylactic shock and saprophytic flora destruction leading to fungal infections or Clostridium difficile colitis.⁴ Despite the increasing incidence of antimicrobial resistance there are certain conditions that warrant antibiotic therapy and they include oro-facial infections accompanied by increased body temperature and signs of systemic involvement like malaise, generalized body aches, trismus, replantation of avulsed teeth and immunocompromised patients where antibiotics as prophylaxis or in support to dental procedures would benefit the patient in preventing the spread of infections.^{5,6}

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Received for Publication: Oct 23, 2019
First Revision: Nov 2, 2019
Second Revision: Nov 13, 2019
Approved: Dec 7, 2019

Bacteria develop resistance either by undergoing mutations of their genetic material or by exchanging the determinants of resistance so that they can thrive even in the presence of antibiotics.^{7,8} Pallasch has reported at least six different results of antibiotic use, and only one of them could prove to be beneficial for the patients.⁹ The positive effect involves the antibiotic working together with the host's immune system to resolve the infection. The negative effects include the possibility of developing unwanted toxic and allergic reaction, emergence of strains of bacteria resistant to the normal dosage of antibiotic, mutations in the genetic material of bacteria rendering them resistant to conventional antibiotics, and bacteria expressing resistant genes that were previously dormant.¹⁰ A study conducted on Lebanese dentists showed poor knowledge and practice when prescribing antibiotics with overall 81.3% dentists prescribing antibiotics in endodontic cases.¹¹ The current study is designed to find the practice of antibiotic prescription among the endodontic and non-endodontic fraternity in tertiary care hospitals of Rawalpindi and Islamabad.

METHODOLOGY

The study was conducted between the months of July and September 2019 after obtaining approval

from the Ethical Committee. Interns, residents and faculty members of different dental departments from tertiary care hospitals of Rawalpindi and Islamabad were enrolled in the study. A questionnaire was developed to assess the participants' practice of prescribing antibiotic for various endodontic pathologies. The questionnaire was distributed in the participants. Seventy eight endodontists and 64 non endodontists returned the complete forms. Quantitative data was presented as frequencies and percentages. Chi square test was used to compare the data. A p value of ≤ 0.05 was considered significant. Data was analyzed using SPSS version 19.

RESULTS

In cases of irreversible pulpitis only 15.4% endodontists and 65.6% of the non-endodontists admitted to prescribing antibiotics and for periapical periodontitis without fever and lymphadenopathy, 38.5% endodontists and 56.3% non-endodontists prescribed antibiotics. In cases of cellulitis with fever/lymphadenopathy both endodontists and non-endodontists were in consensus in prescribing antibiotics (100%). The following table shows the different percentages of endodontists and non-endodontists prescribing antibiotics in different clinical cases.

TABLE 1: ANTIBIOTIC PRESCRIPTION BY ENDODONTISTS & NON ENDODONTISTS FOR VARIOUS ENDODONTIC CONDITIONS

Condition	Endodontists Prescribing antibiotics (Total = 78)		Non-endodontists HOs/ General Dentists) prescribing antibiotics (Total = 64)		P value
	No n (%)	Yes n (%)	No n (%)	Yes n (%)	
Irreversible pulpitis	66 (84.6)	12 (15.4)	22 (34.4)	42 (65.6)	≤ 0.001
Periapical periodontitis with fever/ lymphadenopathy	2 (2.6)	76 (97.4)	4 (6.2)	60 (93.8)	0.28
Periapical periodontitis - without fever/ lymphadenopathy	48 (61.5)	30 (38.5)	28 (43.7)	36 (56.3)	0.34
Periapical periodontitis with sinus – with fever/ lymphadenopathy	2 (2.6)	76 (97.4)	2 (3.1)	62 (96.9)	0.84
Periapical periodontitis with sinus - without fever/ lymphadenopathy	44 (56.4)	34 (43.6)	22 (34.4)	42 (65.6)	0.009
Acute abscess – with fever/ lymphadenopathy	0 (0)	78 (100)	0 (0)	64 (100)	-
Acute abscess – without fever/ lymphadenopathy	38 (48.7)	40 (51.3)	10 (15.6)	54 (84.4)	≤ 0.001
Cellulitis - with fever/lymphadenopathy	0 (0)	78 (100)	0 (0)	64 (100)	-
Cellulitis – without fever/ lymphadenopathy	20 (25.6)	58 (74.4)	12 (18.7)	52 (81.3)	0.33

DISCUSSION

The principle which involves managing infections suggests that an antibiotic should only be deployed to help with, and not be used in place of surgical methods. Systemic antibiotics should be used with restraint because of the development of possible allergic reactions, toxic and adverse effects and emergence of strains of bacteria resistant to drugs.⁸ This point should be emphasized that antibiotics should only be used in acute situations which are accompanied by symptoms like pain, fever along with swelling of the soft tissues.⁹ If swellings are encountered they can be treated by drainage through the canal during access cavity preparation or through incision and subsequent drainage. On the other hand, infections that take on a chronic course generally do not require antibiotic use. After the systemic administration of antibiotics, the amount of drug that reaches the infected site (root canal system) is negligible and doesn't seem to affect bacterial growth.^{10,11} So in such cases systemic antibiotic therapy isn't indicated and is unlikely to be beneficial. In teeth with vital pulps that have a normal blood supply, after systemically administering Ampicillin (500mg) the mean concentration was found to be about 5.5 mg/kg which is insufficient to inhibit the commonly reported endodontic bacteria.¹² However patients presenting with painful vital teeth usually do not have infected pulps and the pain is merely due to the underlying inflammation of the pulpal tissues. Therefore administering systemic antibiotics in such conditions is not indicated and would not relieve the patient's systems.^{13,14} The proper treatment plan would be to remove the cause and then plan accordingly whether to undergo vital pulp therapy or pulpectomy.^{15,16}

The study outlined the practice of the use of antibiotics for various endodontic pathologies among the endodontic and non endodontic fraternity of tertiary care dental hospitals of Rawalpindi & Islamabad. The study hypothesized that there would be a clear difference in antibiotic prescribing practice between the endodontists and non-endodontists because the endodontists treat endodontic pathologies more frequently and usually have more experience and knowledge compared to non-endodontists. Our results showed that 15.4% endodontists and 65.6% of the non-endodontists admitted to prescribing antibiotics for cases of irreversible pulpitis. In cases of asymptomatic apical periodontitis 38.5% endodontists and 56.3% non-endodontists prescribed antibiotics. A study surveying the use of antibiotics by Spanish dentists¹⁷ receiving postgraduate training in endodontics concluded that for cases of irreversible pulpitis, 22% of respondents prescribed antibiotics For the scenario of a necrotic pulp, symptomatic apical periodontitis and no swelling, 37% prescribed antibiotics. A quarter of dentists pre-

scribed antibiotics for necrotic pulps with asymptomatic apical periodontitis and a sinus tract. It showed that postgraduate training in endodontics provides greater awareness of the correct indications of antibiotics.¹⁰ A study conducted on the antibiotic administration by Brazilian endodontists concluded that 90.1% would prescribe antibiotics for acute apical abscess with oral swelling while 88.1% would prescribe even without any oral swelling and for chronic apical periodontitis 20.5% would prescribe the drugs.¹⁸ While in our study in the case of abscess with fever 100% endodontists prescribed antibiotics and 51.3% prescribed antibiotics for abscess without fever. A study conducted on the Lithuanian endodontists concluded that 83.% of them prescribed antibiotics for symptomatic apical periodontitis while only 2% prescribed antibiotic for irreversible pulpitis.¹⁹ While in our study 97.4% endodontists and 93.8% non-endodontists prescribed antibiotics for apical periodontitis with fever and 15.4% and 65.6% for cases of irreversible pulpitis. A Study conducted on the dental practitioners in Shiraz, Islamic Republic of Iran concluded that 40% dentists would prescribe antibiotics for problems for which antibiotics are not required like in cases of reversible pulpitis and apical periodontitis without fever.²⁰ Various guidelines and recommendations by American Dental Association to prevent misuse of antibiotics have been proposed.¹³

CONCLUSION AND RECOMMENDATIONS

This study found poor practice regarding the indications of antibiotics among the endodontists and especially non-endodontists. Topic of judicious use of antibiotics should be included and stressed at graduation level and through continuous medical education. Proper guidelines should be developed and implemented for prescribing antibiotics in different clinical conditions in dentistry.

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CONTRIBUTIONS BY AUTHORS

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| 1 Mohib Ullah: | Supervised the study, reviewed and done proof reading of the article. |
| 2 Ajmal Yousaf: | Conceived the idea, planned the study and helped in manuscript writing. |
| 3 Mafaza Alam: | Helped in data collection, analysis and interpretation. |
| 4 Fatima Ali: | Substantial contribution to write up, literature review of the article and reference citation. |
| 5 Ali Akhtar Khan: | Helped in data collection & proof reading of the article. |
| 6 Laila Shah Khan: | Helped in data collection. |