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# Antibiotic Prescription Practices among Dental Practitioners For Endodontic Infections in Dakshina Kannada District- A Cross Sectional Study

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## ABSTRACT

The purpose of this study is to assess the antibiotic prescription practices among general dental practitioners and endodontists in Dakshina kannada district .An electronic version of the questionnaire of cross-sectional survey regarding antibiotic use and attitude toward growing antibiotic resistance was constructed using an internet online survey tool that was e-mailed to dental practitioners , post graduates and practicing endodontists in Dakshina Kannada. A reminder e-mail was given after 1 month to recollect the responses from them. A total of 159 dentists completed the questionnaire survey, of which 98 were female and 61 were male. Majority of the respondents (89.9%) chose amoxicillin in nonallergic patients. Average minimum duration of antibiotic therapy was 3-5 days (88.1%).. The drug of first choice for patients with an allergy to penicillin was erythromycin. The prime determinant of antibiotic use was facial swelling (68%). The prime determinant to select a particular brand of antibiotics was affordability of that brand (90.6%). Almost all (98.7%) dental practitioners were aware of antibiotic resistance being a growing concern. As per their views, there was overprescription of antibiotics. There is a need to improve awareness of dentists regarding antibiotic prescribing to patients particularly in the aspects of type of antibiotic and its clinical indications.

**KEYWORDS:** Odontogenic Infections, Antibiotics, Overuse, Resistance.

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## INTRODUCTION

Antibiotics remain one of medicine's most potent weapons against diseases.[1] Dental practitioners prescribe antibiotics regularly for therapeutic or prophylactic purposes to manage oral and dental infections especially of endodontic origin.[2] It has been estimated that dentists prescribe 10% of the antibiotics consumed by humans.[3]

Endodontic infections are polymicrobial involving a combination of Gram-positive, Gram-negative, facultative anaerobes and strict anaerobic bacteria.[4] Root canal infections involve 20-40 species, and it is not feasible to determine which of these species is the "major" pathogen causing infection.[5] So, the use of antibiotics in dental practice is characterized by empirical prescription resulting in the use of a narrow range of broad-spectrum antibiotics for short periods of time. This has led to the development of antimicrobial resistance (AMR) in a wide range of microbes and consequent inefficacy of commonly used antibiotics.[6]

Antibiotic resistance is a global public health concern.[7] This occurs due to the inappropriate overuse of antibiotics which has resulted in a crisis situation due to bacterial mutations developing resistant strains.[2] It is estimated that over 250,000 people per year in the United States are diagnosed with an antibiotic-resistant infection, of which 23,000 will succumb and die.[3]

The World Health Organization (WHO) therefore recommends a rational use of systemic antibiotics and discourages routine prescriptions, which are sometimes even issued for the treatment of viral infections.[4] Dentists can make a difference by the judicious use of prescribing the correct drug, at the standard dosage and appropriate regimen only when systemic spread of infection is evident.[6]

American association of endodontists in their survey in 2016 concluded that antibiotics continue to be prescribed in clinical situations in dental practice for which they are typically not indicated, most commonly because of patient expectations.[3] Few other surveys have been done among endodontists[3] and general dental practitioners[2,4-5,8] which have found similar result.

A survey conducted in 2013 found that oral healthcare providers in India are overprescribing antbiotics, which could be a major contributor to the world problem of antimicrobial resistance.[2] The knowledge and practice of antibiotic prescription practice of general dental practitioners in Dakshina kannada district has not yet been assessed. Hence, this study aims to assess the antibiotic prescription practices among general dental practitioners and endodontists in Dakshina kannada district . Hence this study.

## MATERIAL AND METHODS:

A standard questionnaire based survey containing 18 multiple choice questions about antibiotic prescription pattern, common factors considered before prescribing a drug, frequently used antibiotics, common errors during prescription, antibiotic prescription post-operative to endodontic treatment was distributed by hand and through email among general dental practitioners and specialists in Dakshina Kannada. The questionnaire was in English language and open ended and self-administered.. The data on general information were required mandatory to be filled by participants or response cannot be recorded.. Dental practitioner both general practitioner and specialists were included in the study.

## RESULTS

A total of 159 dentists completed the questionnaire survey, of which 98 were female and 61 were male. 134 (84.3%) participants were <30 years of age, 25 (15.7%) were between 30 and 50 years of age. Maximum respondents (58.5%) were postgraduates, followed by Practicing endodontists (26.4%) and General Dental Practitioners (15.1%). 81.1% has <5years of experience and 18.2% 5-10 years.

**Table : 1 Demographic Data**

| Sample Characteristics | Frequency n (%) |
|---|---|
| **GENDER** | |
| Male | 61 (38.4%) |
| Female | 98 (61.6%) |
| **AGE GROUP** | |
| <30 Years | 134(84.3%) |
| 30-50 Years | 25(15.7%) |
| >50 Years | - |
| **WORK STATUS** | |
| Postgraduate | 93(58.5%) |
| Practicing endodontists | 42(26.4%) |
| General Dental Practitioners | 24(15.1%) |
| **YEARS OF EXPERIENCE** | |
| <5 years | 129(81.1%) |
| 5-10 years | 29(18.2%) |
| >10 years | 1(0.6%) |

## ANTIBIOTICS SELECTION

The most common factors considered before prescribing a drug were history of drug intake (93.1%), allergies (92.5%), systemic disease (90.6%) and pregnancy (84.9%) .

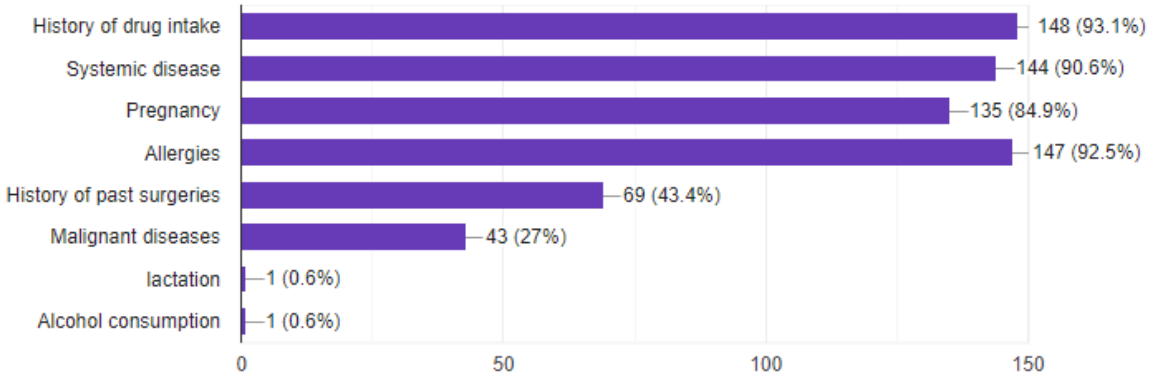


**Figure 1 : Common factors considered before prescribing a drug**

90.6% dentists considered facial swelling as indication for prescribing antibiotic whereas 25.2% considered pain relief and (24.5%) considered unavailable appointment for several weeks as indications for antibiotic prescription.

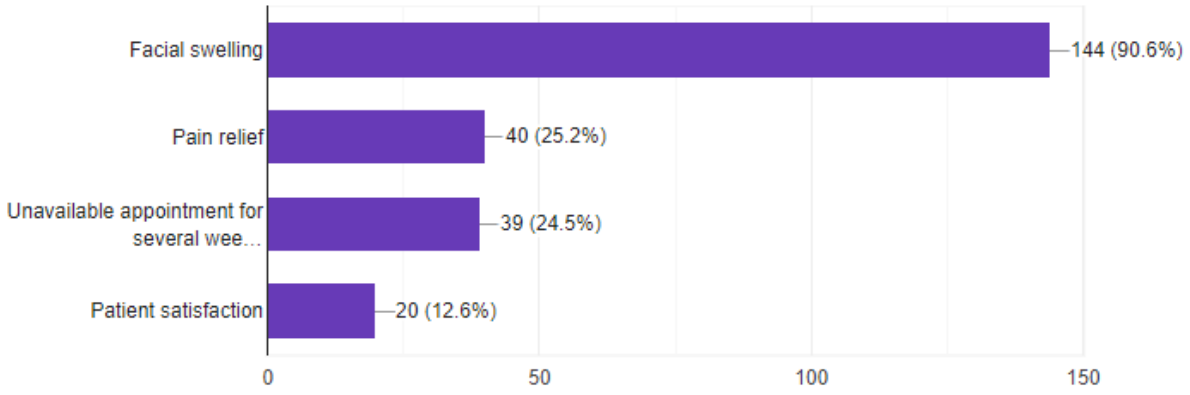


**Figure 2: Most common determinant for prescribing antibiotics**

Most( 94.3%) preferred route for drug administration was oral route.

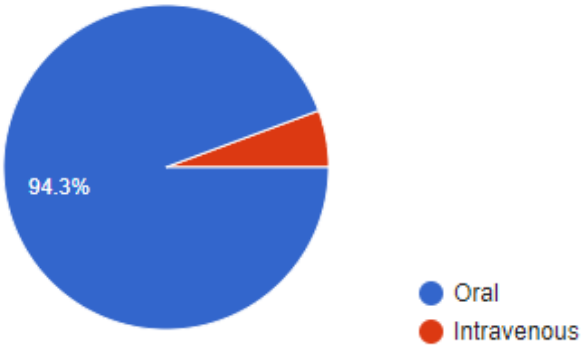


**Figure :3 Most preferred route of antibiotic administration**

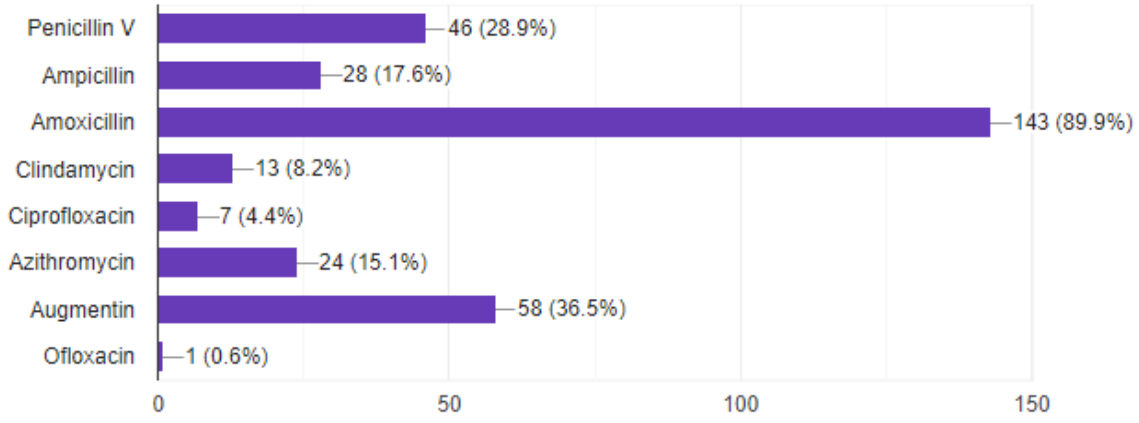


**Figure:4 Antibiotic prescribed in an adult patient with no previous history of allergies**

Most of respondents chose amoxicillin (89.9%) as the first choice antibiotics for non-penicillin allergic-patients, followed by augmentin (36.5%) and penicillin v (28.9%) .

Erythromycin (50.9%) followed by azithromycin (47.8%) was cited as the choice of antibiotic by respondents for penicillin allergic-patients.

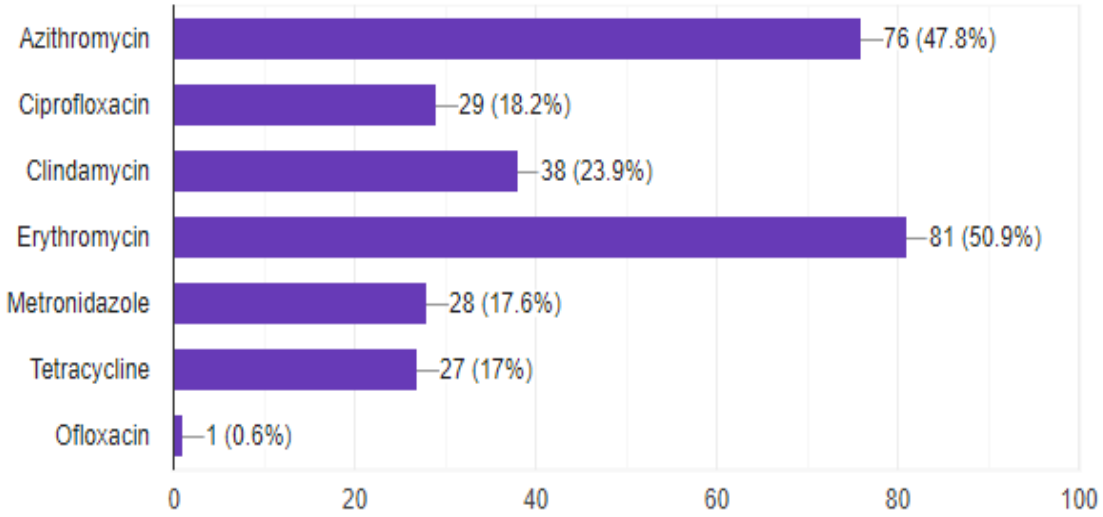


**Figure:5 Choice of antibiotics for an adult patient who gives history of allergy to penicillin**

86.2% agreed oral anticoagulants-like warfarin and barbiturates (78.6%) shows drug interactions with metronidazole.

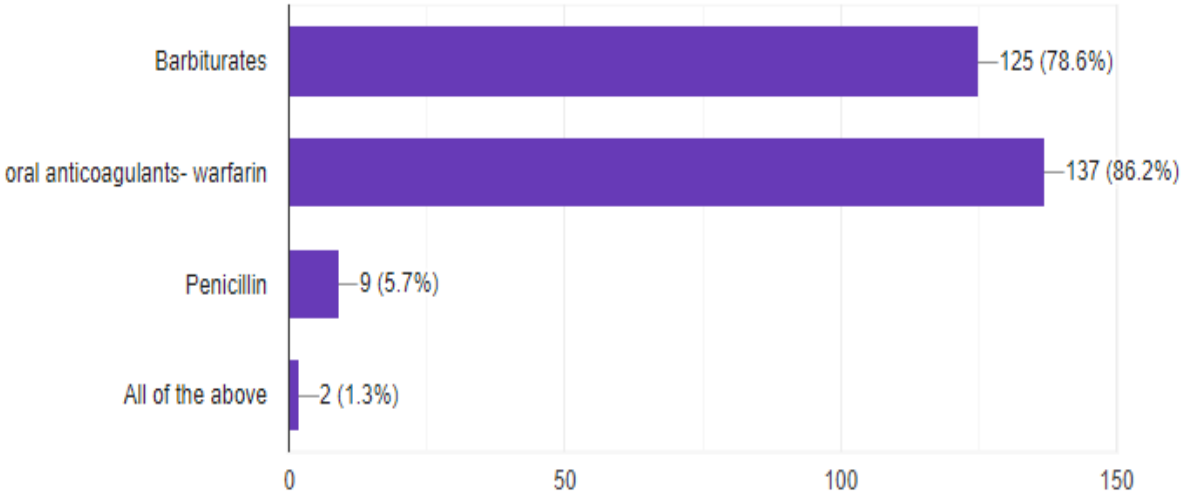


**Figure:6 Medications that shows drug interactions with metronidazole**

59.1% prescribed cephalosporins for a pregnant women and 54.1% considered penicillin in such cases.

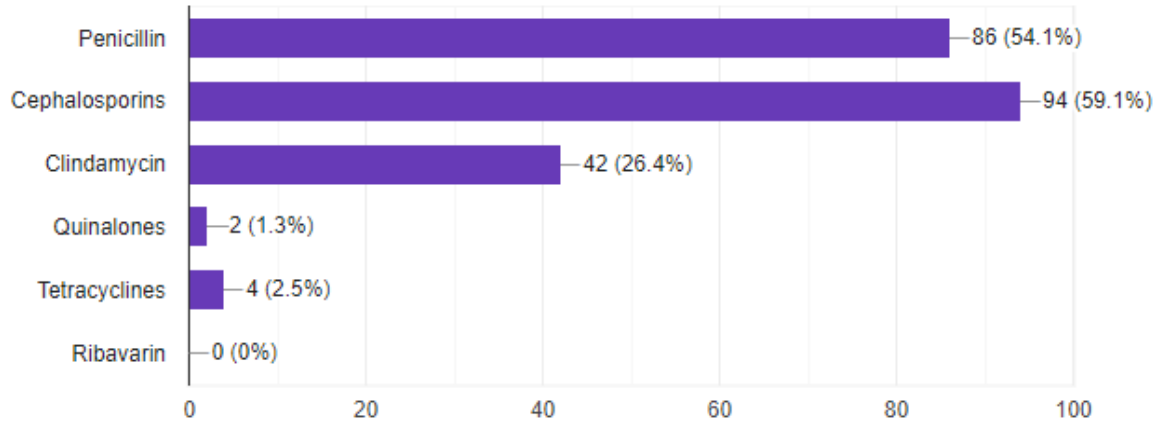


**Figure:7 Drugs prescribed for a pregnant women**

96.2% has knowledge about dose of the drug prescribed.

## ANTIBIOTIC PRESCRIBING PRACTICES

Most dentists confirmed they would prescribe antibiotics for 3-5 days (88.1%).

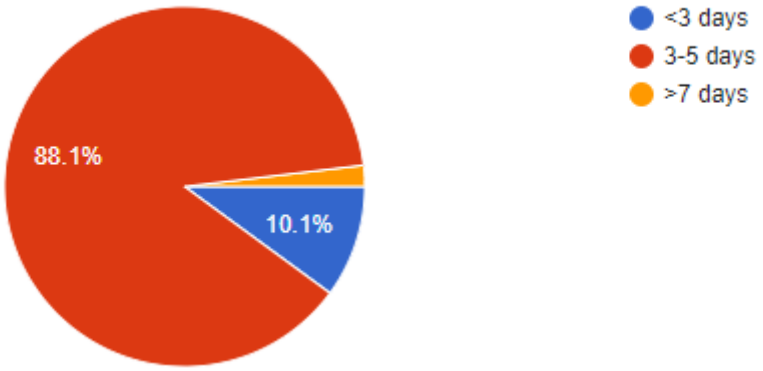


**Figure:8 The average number of days for which antibiotic are prescribed**

The common errors during prescription were not knowing the brand names 67.9% followed by Wrong posology(dosage) 58.5%.The main reasons for prescribing antibiotic were facial cellulitis (93.7%) followed by dentoalveolar abscess (61%).

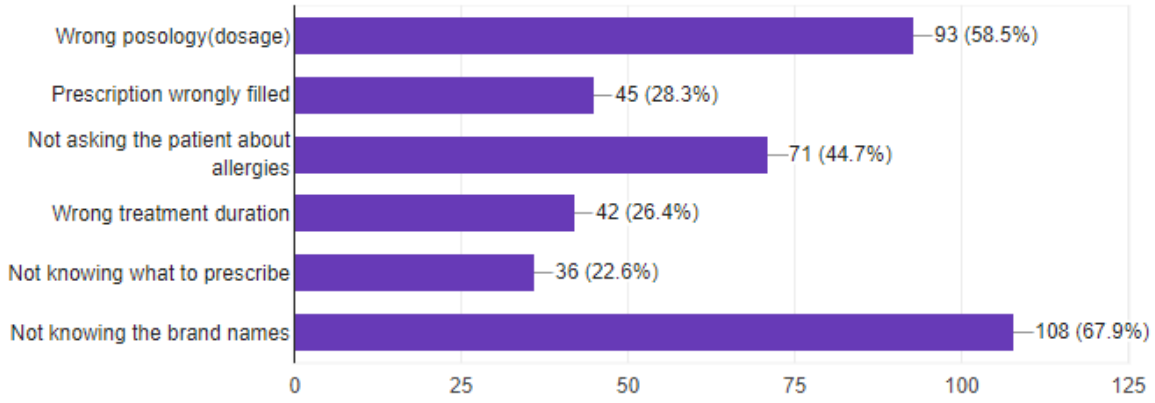


**Figure:9 Common errors during prescription**

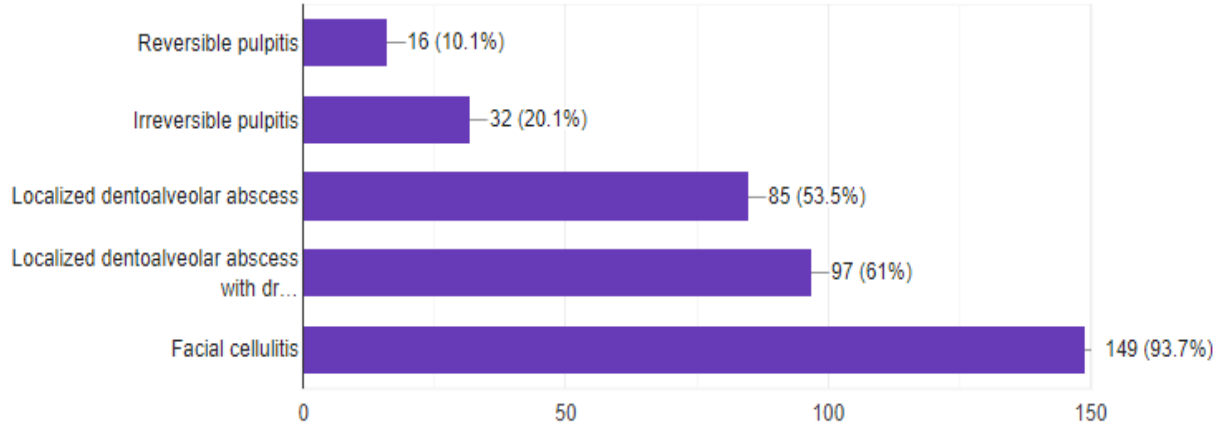


**Figure:10 which of the following pulpal and periradicular conditions antibiotics are prescribed**

About 55.3% recommend not to take antibiotic post operatively for root canal therapy. 73.6% responents preffered to change antibiotics when antibiotic prescription is ineffective after 2-3 days.

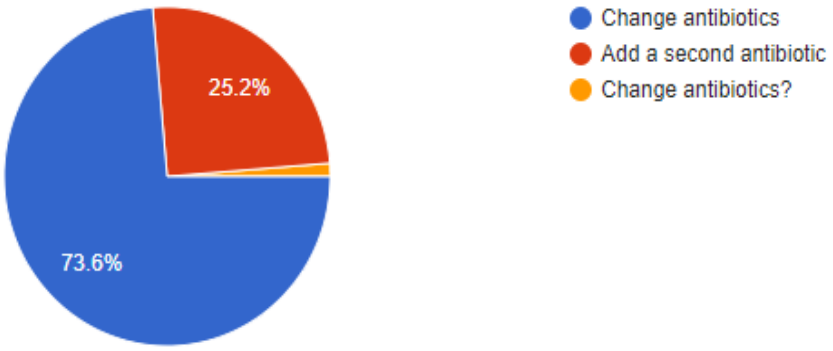


**Figure: 11 If antibiotic prescribed is ineffective after 2-3 days, what is the alternative method?**

98.7% respondents consider overdose of prescription of antibiotics can lead to resistance

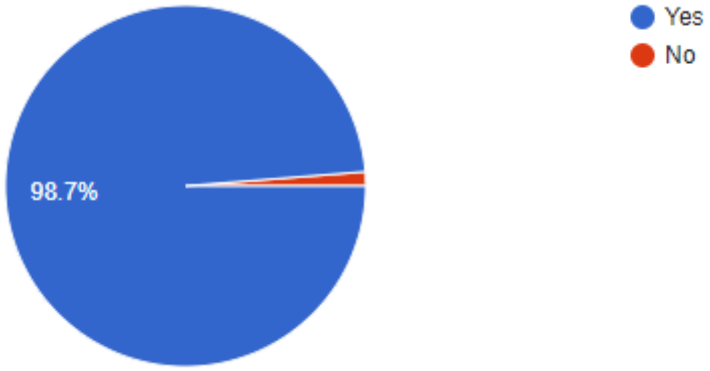


**Figure: 12 Respondents knowledge towards overdose of prescription of antibiotics leading to resistance**

## DISCUSSION

This survey collects data on knowledge and attitude about the antibiotic prescription patterns among dental practitioners and post graduates in Dakshina kannada. In this study,(90.6%) dentists considered facial swelling as indication for prescribing antibiotic. According to the AAE clinical guide, incision and drainage is considered as the primary treatment for pus accumulation within tissues. However, the AAE stated that antibiotics are prescribed in the cases of diffuse swelling or cellulitis, systemic symptoms, or immunocompromised patients. However, if there is evidence of systemic involvement or persistent swelling despite local measures, a three-day antibiotic course is recommended.[2]

The primary antibiotic of choice in patients without allergies was broader spectrum amoxicillin followed by augmentin 58(36.5%) and penicillin v. Advantages of amoxicillin over penicillin include better absorption, longer half-life, and more sustained serum levels which allow dosage regimens of 3 times daily compared with 4 times daily for penicillin V.[3] It should be noted that amoxicillin with clavulanic acid has been associated with a greater incidence of serious adverse reactions (eg, Stevens-Johnson syndrome, purpura, and hepatotoxicity) compared with amoxicillin.[4] It has been recommended that amoxicillin in combination with clavulanic acid should be reserved for immunocompromised patients, refractory cases, and the most severe infections.[5] Llor C et al stated that in Spain, amoxicillin plus clavulanic acid is the leading antibiotic.[6] Amoxicillin is also the principal antibiotic prescribed in dental clinics in other European countries as observed by Tulip DE et al.[7]

Erythromycin (50.9%) followed by azithromycin (47.8%) was prescribed as the choice of antibiotic by respondents for penicillin allergic-patients. Azithromycin does not find any role in oral infection because about 82% of oral streptococci develop resistance to macrolides after a single course.[8] Erythromycin a macrolide has similar activity spectrum to penicillin, so it is also considered an option for patients allergic to penicillin.

In the present survey, more than 88.1% of respondents reported routinely prescribing a 3-5 day course of antibiotics. Usage of sub therapeutic dosage for long duration can lead to the development of mutant strains.[9] A rule of thumb when prescribing is that the antibiotic should last for 3 days after the patient's symptoms have been resolved[10].In addition, this can result in the destruction of normal flora in the gut and oral cavity.[11]

In this study, 55.3% recommend not to take antibiotic post operatively for root canal therapy. Systematic reviews and other studies have documented the need for antibiotics with dental treatment only when there is evidence of systemic spread or a spreading superficial infection and the most effective management of localised infections is with active treatment only.[11]

98.7% respondents consider overdose of prescription of antibiotics can lead to resistance. Therefore, antibiotics must be considered only as an adjunct to conventional root canal therapy or when emergency treatment is not possible[12]

## CONCLUSION

Comparisons with previous studies show significant changes in prescribing patterns for antibiotic prescribing preferences . There has been a significant shift from advising penicillin V to amoxicillin as the endodontist's first choice of antibiotic. Antibiotics are still prescribed in clinical situations for which they are generally not indicated. The type of practice (GDPs/ Endodontists) were significant predictors of increased antibiotic prescription. More than one third of respondents reported prescribing antibiotics that are not necessary, most commonly because of patient expectations.

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