

Are we eliminating cures with antibiotic abuse? A study among dentists

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Abstract

Context: The theme of "World Health Day 2011" is "combat drug resistance- No action today, No cure tomorrow" which is very pertinent. The present study emphatically demonstrates the current issues related to the overwhelming concerns regarding indiscriminate use of antibiotics, leading to a bleak tomorrow where cures may be few. Aim: To know the prescription pattern of antibiotics for various dental procedures by dental practitioners.

Materials and Methods: A pretested questionnaire was used which contained two sections pertaining to prescription of antibiotics for healthy and medically compromised patients during various dental procedures, with therapeutic and prophylactic considerations.

Results: Questionnaire response rate of 66.6% was observed. Amoxicillin emerged as the most preferred antibiotic for dental procedures both as a therapeutic and a prophylactic drug. 50% of the endodontists and 40% of the general dentists opted to prescribe antibiotics during root canal therapy where ideally operative intervention would have sufficed. Overuse of antibiotics for routine scaling and extraction was observed.

Conclusion: The dental profession as a whole needs to acquire a deeper understanding of the global effects of superfluous antibiotic prescription. Antibiotics when judiciously used are precise life-saving drugs.

Key words: Amoxicillin, antibiotics, dental practice, drug prescription, drug resistance

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Introduction

During the past few decades, various medical professions including dental profession have experienced a rapid and dramatic increase in the therapeutic use of antibiotics required for the treatment of different infections. The cost of this development has been the introduction and spread of antibiotic-resistant bacteria to man and his environment.^[1]

Dentistry's contribution to the development of antimicrobial resistance is not well known.^[2] In dentistry most often antibiotic prescription envelops prophylactic use for life-threatening diseases and prevention of postoperative infections. Some dispute may exist in the area of antibiotic prophylaxis for healthy patients, but it is an important criterion medicolegally for medically compromised

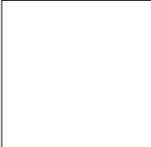
patients.^[3] The benefits of antibiotic prophylaxis have to be evaluated considering the risks of allergic reactions, side effects, and escalating problems of antimicrobial resistance.^[4,5]

Even though many guidelines for the rational use of antibiotics have been published, recommendations often conflict.^[6] From this perspective, it is not surprising that evidence of overuse has been found in other studies on antibiotic prophylaxis administered by general dental practitioners.^[6,7] The theme of "World Health Day 2011" is "combat drug resistance-No action today, No cure

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tomorrow". This is very applicable at this juncture, as the present study emphatically demonstrates the current issues related to the overwhelming concerns regarding indiscriminate use of antibiotics, leading to a bleak tomorrow where cures may be few.

Extensive search of the literature has not revealed studies pertaining to the antibiotic prescription pattern and contribution of dentists to the development of antimicrobial resistance in India. Thus, an investigation was conducted to determine the antibiotic prescribing practices among the large dental population in a suburban city of India.

Materials and Methods

This study is a cross-sectional survey conducted to determine the antibiotic prescribing practices among dentists in Davangere city. All the dentists working in Davangere city were invited to participate and 120 dentists accepted to take part in this study. Voluntary, written informed consent was obtained from each dentist who participated in this study. The proposed study was reviewed by the ethical committee of the institution and clearance was obtained.

A specially prepared format exclusively designed for recording all the required relevant general information and information related to antibiotic prescribing patterns was used as a tool for data collection. No identification of the person completing the proforma was made. The questionnaire was pilot tested on a small group of dentists to check the feasibility and applicability. After the pilot study, necessary corrections were made and the questionnaire was finalized.

The sampling methodology adopted was the convenience sampling. All dentists actively engaged in treating patients in Davangere city were involved in this study. A self-administered, pretested questionnaire was used. The questionnaire consisted of two sections. First section: Questions related to antibiotics use in certain dental clinical procedures and conditions in apparently healthy people. Second section: Questions related to antibiotics use for certain dental clinical procedures in medically compromised cases. The questionnaire was distributed to all the 120 dentists in the sample and 80 usable replies were received. The anonymous data were numerically coded and entered into Statistical Package for Social Science database and analyzed.

Results

Pattern of antibiotics prescribed by dentists in apparently healthy individuals

Table 1 displays the prescription pattern at different clinical

Table 1: Distribution and comparison of antibiotic prescribing pattern among dentists at different clinical situations (expressed as percentage of dentists)

| Disease category | Prefer antibiotics Yes No % % | Amoxicillin % | Amoxicillin & Metronidazole % | Amoxicillin & Cloxacillin % | Amoxicillin & Doxycycline % | Ofloxacin & Ornidazole % | Augmentin % | Ciprofloxacin % | Gentamicin % | Metronidazole % |
|----------------------------------|-------------------------------------|------------------|----------------------------------|--------------------------------|--------------------------------|-----------------------------|----------------|--------------------|-----------------|--------------------|
| Periapical abscess | 88 | 12 | 50 | 24 | 13 | 5 | 3 | 8 | 17 | |
| Fascial space infections | | | | 22 | 11 | 8 | 17 | 3 | | |
| Periodontal abscess | 84 | 12 | 28 | 31 | 3 | 25 | | 3 | | 8 |
| Extraction of tooth with abscess | 67 | 33 | 46 | 31 | 3 | 14 | | 13 | | 3 |
| Periodontal surgery | 77 | 23 | 24 | 3 | 6 | 48 | | 3 | | 15 |
| pericoronitis | 77 | 23 | 48 | 24 | 9 | 9 | | 6 | | 12 |
| Impaction | 76.7 | 23.2 | 51 | 15 | 9 | 3 | | 9 | | 3 |

situations expressed as percentage of dentists preferring to prescribe antibiotics and the type of antibiotic preferred. It clearly shows that amoxicillin was the most preferred drug followed by combination of amoxicillin + metronidazole and amoxicillin + cloxacillin, whereas in periodontal conditions doxycycline was the most preferred drug.

Distribution and comparison of antibiotic preferences among endodontists and other dentists during root canal treatment [Table 2]: Among endodontists, 50% favored performing root canal treatment under antibiotic coverage, among other dentists majority (60%) did not prefer antibiotic coverage during root canal treatment, whereas 40% preferred antibiotic coverage. The difference in choosing the antibiotic varied between two groups and it was statistically significant ($P < 0.05$).

In case of medically compromised cases undergoing dental treatment [Table 3]: Majority of the dentists preferred to prescribe antibiotics for medically compromised cases during scaling, tooth removal, and during root canal treatment. During all these procedures, amoxicillin was the most preferred drug.

For the question: Do you prefer to seek advice from the physician to provide prophylactic antibiotics in case of medically compromised cases, majority of the dentists (91%) said "yes" and only minority of the dentists answered "no."

When the dentists were asked *If the patient is already on antibiotics prescribed by a general physician for some other reasons, what do you do?* Only 33% of the dentists preferred to consult physician and then to prescribe, whereas 67% of the dentists preferred to continue the same drug regimen.

When the dentists were asked *Do you prefer antibiotic sensitivity testing before prescribing antibiotics in case of severe fascial space infections?* Majority of the dentists (55%) said "yes" and the rest (45%) of the dentists answered "no."

Discussion

The results of this survey indicate that there is a wide spectrum of antibiotics prescribed by dentists in Davangere city. This study is the first to evaluate a large dental population in a major Indian city. This study was conducted in Davangere, a renowned educational center with prominent dental schools. The results of this study would have relevance throughout the state and country as it is one of the first to evaluate a large dental community.

This study showed amoxicillin to be the overwhelming choice of antibiotic by most of the respondents. There was a wide spectrum in the preference for prescribing antibiotics with wide variation in the dosage and duration for a similar condition. For the treatment of pericoronitis, 77% of the dentists preferred to use antibiotics. In these situations judicious use of NSAIDs to combat the symptoms of pain and inflammation initially would prevent the inadvertent use of antibiotics.

While dealing with surgical impactions in apparently healthy individuals, 80% of the oral surgeons and 76% of the general dental practitioners prescribed antibiotics to prevent postsurgical infections. Postoperative infections from surgical extractions are low and evidence shows that antibiotics have little or no effect.^[8, 9] Antibiotics should never be used as a substitute for good surgical and aseptic operating techniques.^[10]

Table 2: The distribution and comparison of antibiotic preferences among endodontists and other dentists during root canal treatment

| | Prescribe antibiotics | | Amoxicillin (%) | Ciprofloxacin (%) | Amoxicillin + Metronidazole (%) | Amoxicillin + Cloxacillin (%) |
|--------------------------------|-----------------------|----------------------------------|-----------------|-------------------|---------------------------------|-------------------------------|
| | Yes (%) | No (%) | | | | |
| Endodontists | 50 | 50 | 33 | 0 | 0 | 67 |
| Others | 54 | 60 | 60 | 10 | 30 | 0 |
| Chi-square = 0.1480; P = 0.701 | | Chi-square = 31.9521; P = 0.0002 | | | | |

Table 3: The preference of antibiotics in medically compromised cases for various routine dental clinical procedures

| Associated systemic disease | Scaling | | Tooth removal | | Root canal treatment | | Most preferred antibiotic (%) |
|-----------------------------|---------|--------|---------------|--------|----------------------|--------|-------------------------------|
| | Yes (%) | No (%) | Yes (%) | No (%) | Yes (%) | No (%) | |
| Type I IDDM | 25 | 75 | 72 | 28 | 51 | 49 | Amoxicillin (43) |
| Type II NIDDM | 23 | 77 | 69 | 31 | 56 | 44 | Amoxicillin (41) |
| Moderate hypertension | 17 | 83 | 43 | 57 | 24 | 62 | Amoxicillin (60) |
| Myocardial infarction | 52 | 48 | 80 | 20 | 67 | 37 | Amoxicillin (67) |
| Kidney transplant | 50 | 50 | 76 | 24 | 76 | 24 | Amoxicillin (55) |
| Heart valve prosthesis | 68 | 32 | 97 | 3 | 93 | 7 | Amoxicillin (48) |
| Hip prosthesis | 21 | 79 | 48 | 52 | 46 | 54 | Amoxicillin (38) |

Endodontic treatment in healthy individuals precludes the use of antibiotics, when good technique is employed in canal preparation and obturation.^[11] Here it was found that 50% of the endodontists and 40% of the general dentists opted to prescribe antibiotics during root canal therapy where operative intervention alone would have sufficed.^{[8];} Unfortunately, dentists still prescribe antibiotics in these conditions.^[12-19]

In treating periodontal conditions, periodontists preferred doxycycline more commonly when compared with other dentists who preferred amoxicillin. Periodontal conditions respond better with doxycycline due to its broad-spectrum action, higher concentration in crevicular fluid,^[20,21] and superior effectiveness against anaerobes. Lack of awareness regarding the efficacy of doxycycline could be a major contributing factor for overuse of amoxicillin in these situations.

This study also investigated the use of prophylactic antibiotics in medically compromised cases such as Type I IDDM, Type II NIDDM, moderate hypertension, myocardial infarction, kidney transplant, heart valve prosthesis, and hip prosthesis. A large proportion of the respondents prescribed prophylactic antibiotics for tooth removal and root canal treatment procedures among these cases. Amoxicillin was the most prescribed antimicrobial for these procedures, in concordance with other studies.^[7] Dentists seem to disregard the ideal recommendation to perform sensitivity tests.

Medical conditions like hip prosthesis, HIV, IDDM, patients who have had a heart attack and undergone cancer therapy do not merit routine antibiotic use. But confusion over prophylactic guidelines may have lead the dentists to err on the side of safety by prescribing antibiotics, showing a lack of awareness regarding the potential impact on the increase in antibiotic resistant infections.^[22-25]

Antibiotic prescription is clearly a complex multifactorial issue. Obviously, health professionals with the right of prescription have a key but not the sole role. Prescribers must have a thorough understanding of the clinical indicators for antibiotic prescription, both therapeutic and prophylactic. They also need an understanding about the risk of adverse reactions and the development of resistant and multiresistant strains.

Conclusions

- Amoxicillin was the overwhelming choice of antibiotic by most of the dentists; both as a therapeutic drug and a prophylactic drug of choice.
- Certain overuse of antibiotics during routine surgical procedures, endodontic, and periodontal procedures was observed. These procedures when performed with

care and under aseptic conditions preclude the use of antibiotics.

- Application of antibiotic sensitivity tests in medically compromised patients and following prescribed guidelines for use of antibiotics needs to be emphasized.

Suggestions

- Appropriate guidelines for antibiotic use in dental situations should be stipulated to combat drug resistance.
- A paucity of studies regarding the prevailing situation in India would suggest a necessity to perform further systematic and extensive research to gain a better understanding of antibiotics, their use, and disuse.
- Emphasis should be placed more on “Outcome research,” to provide evidence for antibiotic preference and selection in dental conditions.

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