

# Assessment of knowledge and attitude of dental undergraduate students about antibiotic prophylaxis

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## ABSTRACT

**Background:** Antibiotic prophylaxis refers to the administration of antimicrobials in situations where there is no actual infection, but where there is risk of infection is substantially high. The major objective of antibiotic prophylaxis is to prevent the development of systemic and local infection complications. Severe underlying diseases such as diabetes mellitus, hypertension, cancer, and their treatment have been shown to predispose the patient to odontogenic infections. Manipulation of infected oral tissues such as calculus removal and tooth extraction is known to cause bacteremia. **Aim:** This study aims to assess the knowledge among dental students about the antibiotic prophylaxis in dentistry. **Materials and Methods:** A total of 100 questionnaires were distributed among dental undergraduate students and they were made to answer 10 questions regarding knowledge, awareness, attitude, and barriers toward the evidence-based dental practice. The recorded responses were then statistically analyzed. **Results:** All the participants were responded that they are aware of the antibiotic treatment. Over 95% of the participants were aware of the drugs used during antibiotic prophylaxis. About 80% of the part responded that it is necessary for hypertensive patient to undergo antibiotic prophylaxis before undergoing any dental treatment. Among 100 participants, 60% of them answered that amoxicillin is an alternative drug used for patients who are allergic to penicillin. **Conclusion:** Every dental undergraduate student should have enough knowledge of antibiotic prophylaxis to provide effective treatment. Recommendations on antibiotic prescribing are essential to prevent overprescribing of antibiotic. The prescription of antibiotics should be considered adjunctive to the dental treatment.

**KEY WORDS:** Antibiotic prophylaxis, Antibiotic resistance, Bacteremia, Contamination, Diabetes

## INTRODUCTION

Antibiotics are frequently used in dental practice. Clinical, bacteriological, and epidemiological factors determine the indications of antibiotics in dentistry. Antibiotics are used in addition to appropriate treatment to aid the host defenses in the elimination of remaining bacteria. It is indicated when there is evidence of clinical sign involvement and spread of infection. Antibiotics are prescribed in dental practice for treating odontogenic infections and non-odontogenic infections, as prophylaxis against focal and local infection. Special care needs to be addressed to patients with organ transplants,

poorly controlled diabetes, and pregnancy. Antibiotics should be used only as an adjunct to dental treatment and never alone as the first line of care.

Judicious use of antibiotics in conjunction with surgical therapy is the most appropriate method to treat odontogenic infections. Medically compromised patients such as diabetics and organ transplant patients also require the service of antibiotics. Penicillin is the drug of choice in treating dental infections.<sup>[1]</sup> Narrow-spectrum antibiotics should be considered the first choice as it produces less alterations in the gastrointestinal tract. There is often a dilemma among the dental practitioners concerning the use of antibiotics in conjunction with dental procedures. In this review article, the indication of antibiotics in dental practice has been highlighted.

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Immune-compromised patients represent a special division for dental professionals as they are more prone to bacteremia, which may rapidly lead to septicemia;<sup>[2-5]</sup> invasive dental procedure such as dental extraction and deep periodontal scaling should be avoided whenever feasible.<sup>[5,6]</sup> The dental procedures performed for the immune-compromised patients should be carried after interacting with the hematologic, oncologic, and microbiologic consultants. Other indications requiring the need of antibiotic regimen before the commencement of dental procedures include dental implant placement, surgery beyond tooth apex, intraligamentary local anesthetic injections, and subgingival placement of antibiotic fibers. Antibiotic coverage is also mandatory for patients with uncontrolled diabetics who are more prone to invasive dental treatment;<sup>[6,7]</sup> provided the risk factors are under control, patients with periodontal disease and diabetes can undergo implant treatment. The dentists play a key role in treating medically compromised patients who undergo dental treatment.<sup>[8-12]</sup>

Cephalexin 2 g given 1 h preoperatively (dental procedure) is suggested for patients not allergic to penicillin and clindamycin 600 mg, 1 h preoperatively for patients allergic to penicillin. Statistical data collected from the Medicare Beneficiary Survey reported that dental procedures do not pose a risk for patients undergoing prosthetic joint replacements. Antibiotic prophylaxis is not recommended for all dental patients with total joint replacements but advised for patients with an increased risk of hematogenous infections of prosthetic joints.<sup>[12,13]</sup>

It is imperative to know how far the dental undergraduate students know about the antibiotic prophylaxis and to educate them about the importance of knowing about it. The present study aimed to assess the knowledge among dental students about the antibiotic prophylaxis in dentistry.

## MATERIALS AND METHODS

A total of 100 questionnaires were distributed among dental undergraduate students and they were made to answer 10 questions regarding knowledge, awareness, attitude, and barriers toward the evidence-based dental practice. A copy of the questionnaire is attached [Table 1]. Results were statistically analyzed.

## RESULTS

All the participants were responded that they are aware of the antibiotic treatment. Over 95% of the participants were aware of the drugs used during antibiotic prophylaxis and 5% of them were unaware of the antibiotics used for antibiotic prophylaxis. About 80% of the part responded that it is necessary for hypertensive patient to undergo antibiotic

prophylaxis before undergoing any dental treatment and 20% of them think that it is not necessary. Among 100 participants, 60% of them answered that amoxicillin is alternative drug used for patients who are allergic to penicillin. Over 50% of them answered that patients with prosthetic valves are not at high risk. About 75% of the participants responded that suture removal does not require any antibiotic prophylaxis. According to 60% of the participants, AHA protocol was the most commonly followed and 100% of them responded that intracanal endodontic treatment requires antibiotic prophylaxis. Overall, only 78% of the dental undergraduate students had good knowledge of antibiotic prophylaxis, whereas others knowledge of antibiotic prophylaxis is not satisfactory [Table 2].

**Table 1: Questionnaire for the study**

1. Do you think antibiotic prophylaxis is necessary before any surgical procedure?	a. Yes b. No
2. Are you aware of the drugs used in antibiotic prophylaxis?	a. Yes b. No
3. Name any two drugs used for antibiotic prophylaxis?	
4. Which drug is used in patients who are allergic to penicillin?	a. Amoxicillin b. Clindamycin c. Cephalexin
5. Do you think antibiotic prophylaxis is important for an hypertensive patient to undergo any dental treatment?	a. Yes b. No
6. Patient at high-risk category are, except,	a. Hypertrophic cardiomyopathy b. Infective endocarditis c. Prosthetics valves
7. Which drug is given to patients who are allergic to penicillin and cannot take oral medication?	a. Cefazolin b. Azithromycin c. Ampicillin
8. Antibiotic prophylaxis is not indicated for which of the following treatment?	a. Extraction b. Suture removal c. Scaling
9. Which protocol is usually followed	a. AHA b. ADA c. AAP
10. Does intracanal endodontic treatment require antibiotic prophylaxis?	a. Yes b. No

**Table 2: Responses of the participants**

Responses of the participants	%
Antibiotic prophylaxis necessity before any surgical procedure	100
Awareness of the drugs used in antibiotic prophylaxis	95
Amoxicillin usage in patients who are allergic to penicillin	60
Importance of antibiotic prophylaxis is important for an hypertensive patient to undergo dental treatment	80
Prosthetics valve patient at high-risk category	50
Antibiotic prophylaxis is not indicated for suture removal	60
AHA protocol is usually followed	60
Intracanal endodontic treatments requiring antibiotic prophylaxis?	100

## DISCUSSION

The use of antibiotic regimen during implant placement is controversial. As the surgical site of the periodontal surgery is contaminated with microorganisms, the use of antibiotics is quite necessary. Paluzzi has emphasized the need of antibiotic prophylaxis for implant surgery. Studies reveal that 2 g of amoxicillin given orally 1 h preoperatively significantly reduce failures of dental implants.<sup>[9]</sup> Rizzo *et al.* analyzed 521 endosseous implants placed under antibiotic coverage and reported efficient reduction in post-operative infections.<sup>[11,14]</sup> Larsen mentioned that most surgeons have prescribed antibiotics preoperatively and postoperatively; still, the incidence of infection is less in implant surgery infections.<sup>[12]</sup> Further, literature review performed by Sharaf *et al.* also substantiates that single dose of pre-operative antibiotic coverage may slightly reduce the failure rate of dental implants.<sup>[15]</sup> Ahmad and Saad conducted literature review on the effect of antibiotics in 11,406 implants. Fairly no advantage was evident from the use of antibiotic regimen.<sup>[14,16]</sup>

Despite the high incidence of teeth-related infections, there are no uniform criteria regarding the use of antibiotics. Treatment should be provided in some acute situations of odontogenic infection of pulp origin as a complement to randomized controlled trial, acute necrotizing ulcerative gingivitis, periapical abscess conditions, aggressive periodontitis, and in severe infections of the fascial and deep tissues of the head and neck region. The non-odontogenic infections require a long-term treatment. Non-odontogenic infections include infections such as tuberculosis, syphilis, leprosy, and non-specific infections of bone. Newer synthetic antibiotics such as fluoroquinolones are the first-line drug of choice for the management of non-odontogenic infections. Fluoroquinolones are indicated for bone and joint infections, genitourinary tract infections, and respiratory tract infections.<sup>[17-21]</sup>

There is a considerable situation that the beta-lactam antibiotic derivatives are the drug of choice for these processes provided there are no allergies or any intolerances. However, there is only less consensus regarding which drug belonging this family should be prescribed. While some authors consider the natural and semisynthetic penicillins, for example, amoxicillin to be the options of the first choice,<sup>[22]</sup> other authors prefer the association amoxicillin and clavulanate, due to the growing number of bacterial resistance, as well as its broad spectrum, pharmacokinetic profile, tolerance, and dosing characteristics.<sup>[23]</sup>

### Precautions with Antibiotic Use

#### *Pregnancy*

The legal and ethical impossibility of conducting clinical trials in humans to evaluate the risks of antibiotic treatment during pregnancy has given rise to

uncertainties as to the use of such drugs in these patients. The United States Food and Drug Administration has established four levels of drug risk during pregnancy: (a) Without demonstrated risk; (b) without effects in animals, though with undemonstrated innocuousness in humans; (c) no studies conducted in either animals or humans, or teratogenic effects recorded in animals without due evaluation in humans; and (d) teratogenic effects on the fetus – use of the drug being conditioned to the obtainment of benefit that outweighs the risks. A final group (X), in turn, contemplates teratogenic effects that outweigh any possible benefit derived from the drug.

No antibiotic corresponds to Group A. On the other hand, Group B (i.e., warranting caution with treatment during pregnancy) contains the following antibiotics: Azithromycin, cephalosporins, erythromycin, metronidazole, and penicillins with or without beta-lactamase inhibitors. Group C, in turn, includes clarithromycin, the fluoroquinolones, and the sulfa drugs (including dapsone). Finally, Group D contains the aminoglycosides and tetracyclines.<sup>[24,25]</sup>

#### *Kidney failure*

Most of the antibiotics are eliminated through the kidneys. The presence of impaired renal function requires reduction in the drug dose to avoid the excessively elevated plasma drug concentrations, which could lead to toxicity. Dose adjustment can be carried out by reducing the amount of drug administration in each dose or by increasing the number of interval between doses, i.e., without modifying the amount of drug. Both of the approaches have been shown to be superior.<sup>[25]</sup>

Antibiotic therapy is mandatory and essential in medicine and dentistry. Penicillin is the drug of choice in treating dental infections. Patients at high risk include those with infective endocarditis, immunocompromised conditions, and dental procedures which may produce bacteremias. Invasive dental procedures if performed in such patients should be preceded with an antibiotic prophylaxis. Consultation with the physicians and specialists is required before any dental treatment is carried out in organ transplant and pregnant patients. Special caution needs to be addressed to the above patients to determine the best outcome of dental procedure and to provide the required dose adjustments and thereby preventing the complications in the dental clinic. Moreover, hence, it is clear that apart from invasive dental procedures in high-risk patients not all dental procedures require the need for antibiotic prophylaxis.

## CONCLUSION

Every dental undergraduate student should have enough knowledge of antibiotic prophylaxis to provide

effective treatment. Recommendations on antibiotic prescribing are essential to prevent overprescribing of antibiotic. The prescription of antibiotics should be considered adjunctive to the dental treatment.

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