

# Knowledge, awareness, and perception among dental students about antibiotic prophylaxis in infective endocarditis – A survey

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## ABSTRACT

**Aim:** The aim of this study is to evaluate the awareness, knowledge, and perception among dentist regarding antibiotic prophylaxis in infective endocarditis (IE). **Background:** IE is a chronic infection of the heart endocardium caused by bacteria or fungi. It is a serious disease which carries a high risk of morbidity and mortality. Patients at risk of developing this disease include those with prosthetic heart valves, congenital heart defects, or a recent history of IE. Bacterial endocarditis can occur following bacteremia in patients with predisposing cardiac lesions. **Materials and Methods:** The study has adopted a cross-sectional study design with a sample size of 100 dental students and interns. The students belonged to the third, fourth, and internship, which are the clinical years of the course. All participants answered a questionnaire to determine their knowledge and awareness regarding the antibiotic prophylaxis in IE. **Results:** From the survey conducted, 92% of the students are aware of the antibiotic prophylaxis regimen for IE and about 50% of the students have encountered an IE patient in their practice. **Conclusion:** From the survey conducted, it can be concluded that awareness among dental students about antibiotic prophylaxis is fair and there is the need for continuous education and for formal inclusion of the guidelines in the students' curriculum, as well as for strategic placement of the guidelines in locations throughout dental clinics.

**KEY WORDS:** Antibiotics, Bacteremia, Dental procedures, Heart disease, Streptococci

## INTRODUCTION

Infective endocarditis (IE) is a chronic infection of the heart endocardium caused by bacteria or fungi. It is a serious disease which carries a high risk of morbidity and mortality.<sup>[1]</sup> Patients at risk of developing this disease include those with prosthetic heart valves, congenital heart defects, or a recent history of IE.<sup>[2]</sup> Bacterial endocarditis can occur following bacteremia in patients with predisposing cardiac lesions.

The causative organism for IE has been found to be viridans streptococci, which is involved in approximately 60% of cases of IE and dental

manipulation in surgical procedures such as extraction of teeth or scaling, and periodontal therapy such as root planning has been considered as a source of transient bacteremia that leads to endocarditis.<sup>[3]</sup>

Fever is the most common symptom in IE, but may be absent in patients with severe debility or elderly patients, and in the case of the previous antibiotic treatment. Fever is frequently intermittent in IE and may be associated with weight loss, fatigue, and anorexia. Cardiac manifestations include congestive heart failure, new heart murmur, and atrioventricular block. Severe heart failure in the context of IE is generally the consequence of severe valvar lesions.<sup>[18]</sup>

Injection drug users (IDUs) are at greater risk of IE, which is an important cause of morbidity.<sup>[19]</sup> It is estimated that 60% of hospital admissions among

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IDUs are for acute infection and that ~5–15% of these admissions are for IE.<sup>[20]</sup>

The 2007 guidelines state that bacteremia can occur following daily routines such as eating and toothbrushing may be a greater risk factor for the development of IE than the transient bacteremia that follows an invasive dental procedure, and antibiotic administration is reasonable before all dental procedures which involve manipulation of the gingival tissue or the periapical area of teeth or the oral mucosa for patients at risk.

Dental procedures during which one should consider the use of antibiotic prophylaxis are as follows: Local periapical treatment of the tooth, tooth extraction, gum treatments, dental implantation and resection of the apex of the tooth, setting up thread retraction, treatments affecting the oral mucosa, and root canal therapy. Antibiotic prophylaxis is not recommended for local anesthesia, removing stitches, introducing orthodontic appliances during healing after shedding of a milk tooth, and treating lip and non-infected mucosa injury.<sup>[4,5]</sup>

The first-line antibiotic for IE prophylaxis is currently amoxicillin, and the second-line antibiotic is clindamycin.<sup>[6]</sup> Recommendations in many publications emphasize the importance of daily oral cavity hygiene. It is believed that brushing teeth, or cleaning them with dental floss, can result in the introduction of transient streptococcal bacteremia, which causes a much greater threat than a single-tooth extraction.<sup>[7]</sup> It has been proved that the quantitative bacteremia during teeth brushing is increased to 13% and in the case of full-mouth ultrasonic scaling up to 23%.<sup>[10,11]</sup>

Hence, the rationale of this study is to assess the level of awareness and knowledge of IE prophylaxis among undergraduate dental students of our institution. Knowledge of dental students about the newest guidelines for antibiotic prophylaxis for high-risk patients in dentistry and the correct application of these guidelines in different aspects are very important for a safe dental practice.

## MATERIALS AND METHODS

The study has adopted a cross-sectional study design with a sample size of 100 dental students and interns. The students belonged to the third, fourth, and internship, which are the clinical years of the course.

All participants answered a questionnaire to determine their knowledge and awareness regarding the biomarkers used in caries detection. A structured questionnaire was designed and developed on the basis of thorough literature review. It included various

sections such as, age, gender, level of education, and necessity of prescribing antibiotics for different cardiac conditions; participants' awareness of dental procedures that need antibiotic prophylaxis; and knowledge of the type and dose of antibiotic to be prescribed.

### Questionnaire

1. Are you aware of the antibiotic prophylaxis regimen for IE? (Y/N)
2. Against which organism is the antibiotic prophylaxis directed toward? 1. *Streptococcus viridans* 2. *Streptococcus mutans* 3. *Staphylococcus aureus*
3. Have you encountered any patients with IE in your practice? (Y/N)
4. In case of emergency dental treatment, would you prescribe antibiotics and start treatment immediately? (Y/N)
5. Do you think patients with mitral valve prolapse require antibiotic prophylaxis? (Y/N)
6. Would you recommend antibiotic prophylaxis in patients with prosthetic cardiac valves? (Y/N)
7. Is antibiotic prophylaxis important in patients with intravascular cardiac pacemaker? (Y/N)
8. Do you consider prophylaxis in IE patients before tooth extraction? (Y/N)
9. Do you consider prophylaxis in IE patients before periodontal surgery? (Y/N)
10. Do you consider prophylaxis in IE patients before endodontic treatment? (Y/N)
11. Do you think prophylactic antibiotics can be given with local anesthetic infiltration? (Y/N)
12. What is the drug of choice in non-allergic adult patients? 1. Amoxicillin 2. Clindamycin 3. Erythromycin
13. Which is the commonly prescribed drug in case of patient allergic to penicillin? 1. Doxycycline 2. Clindamycin 3. Gentamicin
14. Is it necessary to consider prophylaxis in IE patients during intraoral radiographs? (Y/N)
15. Which of the following are considered as high-risk diseases? 1. Prosthetic cardiac valves 2. Hypertrophic cardiomyopathy 3. Acquired valvular dysfunction.

## RESULTS

From the survey conducted, 92% of the students are aware of the antibiotic prophylaxis regimen for IE and about 50% of the students have encountered IE patient in their practice. About 88% of the students opted for prophylaxis before tooth extraction. About 64% of the participants are aware of the drug of choice (amoxicillin) in non-allergic patients and 60% opted for clindamycin in case of allergic to amoxicillin. About 44% of the participants opted *S. mutans* as the causative agent of IE. About 80% of the participants agree to give antibiotic regimen before a periodontal

therapy and 76% recommend antibiotic prophylaxis before endodontic treatment.

## DISCUSSION

The frequency of risk of IE has increased in the past two decades, due to increasing age of the population, rising number of patients with prosthetic heart valves, and frequent usage of intravascular devices.<sup>[8,9]</sup>

From the present study, it is evident that the awareness among dental students on antibiotic prophylaxis for IE is good.

From the research conducted by Afnan *et al.*, it is seen that the total knowledge level regarding antibiotic prophylaxis among all of the participants was 52.2%. Nearly all of the participants indicated the need for prophylaxis for invasive procedures such as periodontal surgery, tooth extraction, and scaling, but not for non-invasive procedures such as intraoral radiography and the placement of non-banded orthodontic appliances. Amoxicillin was the first choice prophylactic antimicrobial agent for non-allergic adult patients (63.9%), which coincides with the present study. Patient who is allergic to penicillin and clindamycin was the first choice for 59.3% which also coincides with the present study participants.<sup>[12]</sup>

In a survey conducted by Sneha and Kumar, 73% of the students were very much aware of IE prophylaxis. About 56% of the students were aware that the first line of antibiotic for IE prophylaxis is amoxicillin which is in contrary to our study which states that about 92% of the students are aware of antibiotic prophylaxis for IE. Moreover, 36% were aware that erythromycin is no longer recommended by the American Heart Association for IE prophylaxis and 50% of students preferred clindamycin as an alternative drug in penicillin-allergic patients in the study conducted by Sneha and Kumar.<sup>[5]</sup>

In another survey on the method of antibiotic prophylaxis against Bacterial Endocarditis by dentists conducted by Bennis *et al.* found that only 21% of the dentists used the recommended dose of amoxicillin.<sup>[13]</sup>

Tomas Carmona *et al.*'s study from Spain showed that 45.5% of the 400 participating dentists did not prefer to administer any antibiotic prophylaxis before a tooth extraction in a susceptible patient and 68.2% of the participants in this survey opted erythromycin first drug of choice in penicillin-allergic patients.<sup>[14]</sup>

van der Meer believed that post-operative bacteremia may have no relation to dental treatment, and the reasons for their occurrence may include seeding of bacteria from odontogenic inflammatory foci, everyday oral hygiene procedures, and chewing food.<sup>[15,16]</sup>

From the clinical study conducted by Mohammed *et al.*, it is seen that native valve endocarditis was found in 34 patients (68%). Blood cultures were positive in 27 patients (54%). Staphylococci were the prevalent microorganisms (52%). In-hospital events included heart failure in 29 patients (58%), systemic embolization in 13 patients (26%), paravalvular abscess in 8 patients (16%), septic pulmonary emboli in 7 patients (14%), dehiscence of prosthetic valves in 5 patients (10%), and renal failure in 2 patients (4%). Surgical intervention was indicated in 41 patients (82%). Only 16 patients (39%) had early surgical intervention. In-hospital mortality was 22%. However, the mortality rate improved in the patients who had undergone early surgical intervention (18.75% vs. 32%).<sup>[17]</sup>

## CONCLUSION

From the survey conducted, it can be concluded that awareness among dental students about antibiotic prophylaxis is fair and there is the need for continuous education and for formal inclusion of the guidelines in the students' curriculum, as well as for strategic placement of the guidelines in locations throughout dental clinics. A standard protocol regarding the training as well as preventive measures for IE should be formulated for the dental students and the knowledge acquired must be taken into the practice.

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