

Endocarditis Prophylaxis in Cardiac Patients: Knowledge among General Dental Practitioners in Tabriz

Amir Eskandari ^{1*} • Nader Abolfazli ¹ • Ardeshir Lafzi ²

1. Assistant Professor, Department of Periodontics, Faculty of Dentistry, Tabriz University of Medical Sciences, Iran

2. Professor, Department of Periodontics, Faculty of Dentistry, Tabriz University of Medical Sciences, Iran

*Corresponding Author, E-mail: amirr22@yahoo.com

Abstract

Background and aims. Dental procedures injuring oral tissues may induce bacterial release to blood stream that can cause infective endocarditis in susceptible patients. The aim of this study was to determine the level of knowledge of general dental practitioners (GDPs) in Tabriz, Northwest of Iran, regarding endocarditis prophylaxis in cardiac patients receiving dental treatments.

Materials and methods. This was a cross-sectional, descriptive, analytical study that included 150 GDPs. All practitioners were given a self-administered questionnaire which consisted of three parts assessing their knowledge of cardiac diseases requiring prophylaxis, dental procedures requiring prophylaxis, and antibiotic regimen for endocarditis prophylaxis. Statistical analysis of data was carried out using independent *t*-test, one-way ANOVA and chi-square test.

Results. The level of knowledge among GDPs in three areas of cardiac diseases requiring prophylaxis, dental procedures requiring prophylaxis, and antibiotic regimen for endocarditis prophylaxis were 63.7%, 66.8% and 47.7%, respectively. Their overall level of knowledge regarding endocarditis prophylaxis was 59%. Association of the level of knowledge with age and practice period was statistically significant ($P < 0.05$). However, the level of knowledge was not significantly associated with gender or university of graduation in either of three areas evaluated ($P > 0.05$).

Conclusion. According to our results, the knowledge of endocarditis prophylaxis among GDPs in Tabriz was in a moderate level. Regarding the importance of endocarditis prophylaxis in susceptible patients, it should be more emphasized in the curriculum of dental schools and continuing dental education programs.

Key words: Antibiotic prophylaxis, general dental practitioners, infective endocarditis.

Introduction

Bacterial endocarditis is a classic example of metastatic infections which occur at a distant location than the original site of bacterial entry. The oral cavity harbors various microorganisms that can enter the blood circulation

through tissue injury. Dental manipulations including oral surgery, periodontal procedures and root canal therapy may cause bacteria to enter the circulation, resulting in bacteremia.^{1,2} This can lead to infection of sterile vegetations on

cardiac valves in susceptible patients to endocarditis.³ Fiehn et al⁴ showed that in patients with infectious endocarditis, Streptococci strains isolated from the blood sample were similar to bacteria collected from the oral cavity.

Turbulent blood flow leads to formation of vegetations on a dysfunctional cardiac valve. This turbulent flow also destroys the endocardial surface of the valves and results in the exposure of the underlying collagen. Platelets aggregate on the exposed collagen layer, and with the addition of fibrin, form a sterile thrombus called vegetation. The bacteria that gain entry into the vegetation are protected from leukocyte phagocytosis by fibrin layer.¹ There are two forms of endocarditis, acute and subacute, which describe the progression of the disease.⁵ Subacute endocarditis, which is more common, occurs following dental procedures in susceptible patients. Streptococci are the almost exclusive bacterial pathogens responsible for subacute endocarditis. On the other hand, acute endocarditis can inflict healthy cardiac valves. Staphylococci are typically involved in acute endocarditis and tend to be highly invasive. Unlike the subacute variant, the formation of acute endocarditis does not require preexisting platelet-fibrin vegetation or a susceptible host.⁵

The likelihood of clinical improvement in patients suffering from endocarditis is approximately 70%. However, repeated attacks of endocarditis reduce the 5-year survival of patients to 60%.⁵ The eradication of bacteria from vegetations that lack adequate blood flow is extremely difficult due to the inability of the host immune system in reaching these sites. Therefore, adequate treatment of infectious endocarditis requires prolonged treatment with high dose bactericidal antibiotics.⁶ It should be noted that this disease is difficult to treat and has a poor prognosis. Thus, an understanding of the various preventative and prophylactic measures is of utmost importance in dealing with this disease.⁵ In 1960, the American Heart Association (AHA) made its first recommendations about preventative measures before dental procedures.¹ The aims of these prophylactic measures are to reduce the bacteremia, aid the reticuloendothelial system in destroying bacteria, and reduce bacterial contact with injured valves and vegetations.⁷

In this study, a self-administered questionnaire which focused on the latest recommendations of AHA with regards to endocarditis prophylaxis in patients with cardiac disease undergoing dental procedures was given to general dental practitio-

ners (GDPs) in Tabriz, Iran. The aim of this study was to determine the level of knowledge endocarditis prophylaxis among these dentists and to decide whether further measures should be taken to improve awareness.

Materials and Methods

This cross-sectional, descriptive, analytical study analyzed the knowledge of GDPs in Tabriz, Iran, regarding endocarditis prophylaxis in cardiac patients undergoing dental procedures in 2007. There are approximately 270 general dental practitioners in Tabriz, of which 150 were randomly selected for this study as recommended by the statistical consultant. A questionnaire consisting of 37 closed questions in three sections was devised. The first section contained 14 questions pertaining to various cardiac diseases and whether endocarditis prophylaxis was necessary. The second section contained 15 questions focusing on dental procedures that did or did not require endocarditis prophylaxis. Eight questions were included in the third section regarding the latest endocarditis prophylaxis regimens recommended by the AHA in 1997.⁸ The questionnaire also collected demographic information including gender, age, work experience, and the university from which dentists had graduated. In the first and second sections, the questions had two choices, and in the third section, they had four choices. The questionnaires were given to the dentists with appropriate amount of explanation. The level of knowledge of the dentists was determined based on the number of correct answers per each section.

The association between age and work experience of general dental practitioners with their level of knowledge was assessed using chi-square test. The differences between males and females were evaluated using independent *t*-test. One-way ANOVA was used to assess level of knowledge of practitioners graduated from different universities. Statistical analysis was performed using SPSS 11.5 computer software.

Results

One hundred and fifty GDPs from Tabriz participated in this study, of which 58.7% were men and 41.3% were women. Of all participants, 57.3% had graduated from Tabriz University of Medical Sciences Faculty of Dentistry and 27.3% were graduated from dental schools in

Tehran, Iran. The remaining 13.3% had graduated from other Iranian dental schools.

The mean level of knowledge among studied population regarding cardiac conditions that require endocarditis prophylaxis was 63.7%. In the sections pertaining to dental procedures requiring prophylaxis and the proper antibiotic regimen, the mean level of knowledge was 66.8% and 47.7 %, respectively. The level of knowledge in antibiotic regimens used in endocarditis prophylaxis was significantly lower than the other two areas ($P < 0.05$). The overall knowledge of endocarditis prophylaxis among dentists in Tabriz was of an average level (59%). Among female dentists, the mean level of knowledge of endocarditis prophylaxis was 56.7% compared to 60.9% among male dentists; the difference was not statistically significant (Table 1).

In general and in each three sections the association between age and the level of knowledge was significant, suggesting that the knowledge decreases as age increases.

There was a significant association between the practice period and the level of knowledge in general and in each of three sections ($P < 0.05$); as the work experience of general practitioner increased, their level of knowledge decreased (Table 2).

Participants in the study were further divided into three groups based on their university of graduation: (1) graduates of Tabriz University of Medical Sciences; (2) graduates of dental

schools of Tehran; and (3) graduates of other universities. The comparison of these subdivisions showed a higher level of knowledge in graduates of Tabriz Dental School; however, the difference was not significant.

Discussion

Infective endocarditis is a rare illness. However, it must be noted that once affected with this disease the prognosis is poor.⁵ Research has shown that even with the use of prophylactic antibiotic regimens in all susceptible patients, the rate of infective endocarditis is only reduced by 3.5%.⁹ However, the risk of developing infective endocarditis following dental procedures in a high risk population is minimal (1 in 95000).¹⁰ Therefore, possible side-effects and high cost of treatment must be considered when using prophylactic antibiotics. While taking the high cost and side-effects into consideration, the use of prophylactic antibiotics in susceptible patients is still valid.¹¹ The decision whether to use prophylactic antibiotics must be made by both the dentist and the physician. Dentists must have updated knowledge of dental pharmacology to improve the health care especially in patients susceptible to bacterial endocarditis.¹²

This study evaluated the knowledge of dentists in Tabriz regarding endocarditis prophylaxis. The overall level of knowledge among dentists in three sections was approximately 59%. The

Table 1. The level of knowledge of GDPs in three sections included in the questionnaire regarding age

	Age	Knowledge level (%)	P-value
Section 1	25-30	66.9 ± 15	.011
	30-35	63.4 ± 11	
	35-40	64.2 ± 18.3	
	Over 40	57.1 ± 15	
Section 2	25-30	77.4 ± 9.8	.000
	30-35	67.7 ± 13.7	
	35-40	63.1 ± 13.3	
	Over 40	58.1 ± 13	
Section 3	25-30	69.5 ± 21.4	.000
	30-35	45 ± 19.7	
	35-40	41 ± 19	
	Over 40	40.2 ± 18.7	

Table 2. The level of knowledge of GDPs in three sections included in the questionnaire regarding practice period

	Practice period (years)	Knowledge level (%)	P-value
Section 1	1-5	68.8 ± 15.2	0.001
	5-10	65.3 ± 16.5	
	10-15	62.7 ± 14.1	
	Over 15	51.7 ± 11.7	
Section 2	1-5	75.2 ± 9.6	0.000
	5-10	63.6 ± 11.6	
	10-15	66.1 ± 17.1	
	Over 15	56.4 ± 10.7	
Section 3	1-5	61.2 ± 20.7	0.000
	5-10	45.8 ± 18	
	10-15	39 ± 21.3	
	Over 15	40.7 ± 17.5	

level of knowledge of cardiac diseases requiring endocarditis prophylaxis was 63.7%. Considering dental procedures requiring prophylaxis, the level of knowledge was 66.8%, which is lower than the results obtained in 2002 by Chitsazi & Pourabbas¹³ (76.2%). The lower level of knowledge in our study may be a result of a more comprehensive questionnaire with more difficult questions or an actual decrease in the level of knowledge of dentists. The level of knowledge of the latest recommended prophylaxis regimen was approximately 47.2%. This was higher than the results achieved in 2002 (32.2%);¹³ however, this level of knowledge is still low and not acceptable. The latter improvement is probably because the guidelines on prophylaxis regimen did not change in the past decade. Boyle et al¹⁴ in 2006 demonstrated that 56% of GDPs in Ireland were aware of the latest prophylaxis regimen which is similar to the results of this study.

The results indicated that gender had no effect on the level of knowledge among GDPs regarding cardiac diseases, dental procedures, and prophylaxis regimen ($P < 0.05$), which coincides with the results of a previous study.¹³ On the other hand, the study of Fakhrai et al¹⁵ showed that female dental students had a higher knowledge of cardiac diseases, dental procedures, and prophylaxis regimen than males. According to the results of this study, the association between age and level of knowledge was statistically sig-

nificant ($P < 0.05$), showing that as age increased, level of knowledge decreased, particularly in age group of 40 years old and above compared to other age groups. This also may be due to a lack of interest or motivation in taking continuing education courses or reviewing previously studied sources.

Chitsazi & Pourabbas¹³ in 2002 found no significant association between age and knowledge in dental procedures requiring prophylaxis; however, there was a significant association between age and knowledge of the latest prophylaxis regimen. In the present study, there was a significant association between the level of knowledge of GDPs and their practice period ($P < 0.05$). Similar to age, practice periods of over 15 years had resulted in a significantly lower level of knowledge of endocarditis prophylaxis among dentists. This could be attributed to aging, time past graduation, and lack of adequate motives for reviewing previously studied sources. This finding is similar to the results of Lauber et al⁹ which indicated that general dentists and physicians with a practice record of over 20 years had a significantly lower knowledge of endocarditis prophylaxis compared to those in practice for less than 20 years.

There was no significant difference between GDPs concerning the university from which they graduated ($P > 0.05$). In a study carried out in 2002, the level of knowledge in procedures re-

quiring prophylaxis in graduates of Ghazvin, Mashhad, and Hamadan universities was significantly higher than graduates of other dental schools. But there was no significant difference regarding the knowledge in prophylaxis regimen.¹³ Inconsistency between the results of this study and another study in Tabriz may be attributed to the point that participants were divided into different number of categories according to the university they were graduated from, namely 3 in ours and 16 in the study of Chitsazi & Pourabbas.¹³

Revisions in the dental curriculum to cover antibiotic prophylaxis for bacterial endocarditis as well as additional educational programs in the form of posters, brochures, and continuing education programs should be introduced to improve

the knowledge of GDPs regarding dental considerations of medically-compromised patients.

Conclusions

The results of the current study revealed a moderate level of knowledge among GDPs in Tabriz regarding endocarditis prophylaxis. More than half of all questions were answered correctly. The level of knowledge in dentists older than forty and those with a practice record over 15 years was lower than the mean level. The highest knowledge was seen in the section pertaining to dental procedures requiring prophylaxis and the lowest knowledge was seen in prophylaxis regimen.

References

- Peterson LJ, Happ JR, Ellis E, Tucker MR. *Textbook of Oral and Maxillofacial Surgery*, 6th ed. St. Louis: Mosby; 2002:412-16.
- Newman MG, Carranza FA, Takei H. *Clinical Periodontology*, 9th ed. Philadelphia: WB Saunders; 2002: 531-533.
- Jowett NI, Cabot LB. Patient with cardiac disease: considerations for the dental practitioners. *Br Dent J* 2000; 189:297-302.
- Fiehn NE, Gutschik E, Larsen T, Bangsberg JM. Identity of streptococcal blood isolates and oral isolates from two patients with infective endocarditis. *J Clin Microbiol* 1995; 33:1399-1401.
- Goldman L, Ausiello D. *Cecil Textbook of Medicine*, 22nd ed. Philadelphia: WB Saunders; 2004:958-967.
- Kumar V, Kortan R, Robbins S. *Textbook of Basic Pathology*, 8th ed. Philadelphia: WB Saunders; 2007: 156-162.
- Karchmer AW. *Infective Endocarditis*, 15th ed. New York: McGraw-Hill; 2001:809-810.
- Little J. The American Heart Association's guidelines for the prevention of bacterial endocarditis: a critical review. *Gen Dent* 1998; 46:508-15.
- Lauber C, Compton S, Lalh SS, Grace M, Smith MH, West MH. Antibiotic prophylaxis practices in dentistry: a survey of dentists and physicians. *J Can Dent Assoc* 2007; 73:263-9.
- Pallasch TJ. Antibiotic prophylaxis: problem in paradise. *Den Clin N Am* 2003; 47:665-79.
- Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *J Am Dent Assoc* 2007; 138:739-45, 747-60.
- Tomás Carmona I, Diz Dios P, Limeres Posse J, Outumuro Rial M, Caamaño Durán F, Fernández Feijoo J, et al. Chemoprophylaxis of bacterial endocarditis recommended by general dental practitioners in Spain. *Med Oral* 2004; 9:56-62.
- Chitsazi MT, Pourabbas R. Knowledge of dentists who practice in Tabriz regarding the latest prophylaxis regimens for prevention of infective endocarditis. *Medical Journal of Tabriz University of Medical Sciences* 2005; 64:40-44.
- Boyle N, Callaghan C, Sleaman D. Antibiotic prophylaxis for bacterial endocarditis: a study of knowledge and application of guidelines among dentists and cardiologists. *J Ir Dent Assoc* 2006; 51:232-7.
- Fakhrayi AH, Eslami M, Hoseyni A. The evaluation of the knowledge level of Tehran's senior dental students on endocarditis prophylaxis in cardiac patient receiving dental treatments. *Dentistry Journal of Tehran University of Medical Sciences* 2004; 16:69-77.