

Research Paper: Assessing the Knowledge of General Dentists regarding Antibiotic Prophylaxis for the Prevention of Infective Endocarditis before Dental procedures in Guilan Province, Iran in 2020



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ABSTRACT

Introduction: Infective endocarditis is a rare disease of the heart valves and endocardium, which can be developed after invasive dental procedures. To prevent this event, antibiotic prophylaxis is recommended for patients with predisposing cardiac conditions. The purpose of this study was to assess the knowledge of general dentists working in Guilan province regarding antibiotic prophylaxis for the prevention of infective endocarditis.

Materials and Methods: This descriptive cross-sectional study was conducted on 264 general dentists in Guilan province using a validated questionnaire. There were 157 males and 107 females. The questionnaire included 25 questions. The total score ranges from 0 to 25 with this classification: [0-12: low level, 13-17: moderate level and 18-25: high level]. Age, gender, clinical experience, place of work and participation in retraining programs of participants were also recorded. Data analysis was performed using T-test and Pearson's Correlation Coefficient with the SPSS version 24.

Results: The mean knowledge score of the dentists was 14.43 and 53.2% of participants had moderate level of knowledge. 28.1% and 18.7% of dentists had a low and high level of knowledge, respectively. No significant differences were noted in the knowledge scores between the two genders and regarding age, clinical experience and participation in retraining programs (p-value >0.05).

Conclusion: The knowledge level of general dentists working in Guilan province was at a moderate level. Therefore, it is better to take actions to improve the dentist's knowledge regarding this topic.

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Introduction

Infective Endocarditis (IE) is a life-threatening infection of the endocardium or heart valves secondary to damage to the cardiac endothelium (1,2). Micro-organisms such as bacteria, fungi and less commonly rickettsiae, chlamydiae, mycoplasmas, and possibly virus invade the platelet/ fibrin that is formed secondary to the damage. This structure impedes the penetration of phagocytic cells, resulting in a high count of microorganisms and infective endocarditis (3-5).

Different dental procedures and manipulation of the periodontal tissues lead to bacteremia with a broad variation in the frequency, duration, and magnitude. There is a dilemma about which dental treatments and what heart conditions increase the risk of IE. Recommendations of the American Heart Association (AHA) are revised from time to time on the management of heart related conditions requiring prophylactic antibiotics (6,7). There is a discrepancy between the United Kingdom (and recently Sweden) and the rest of the world about IE antibiotic prophylaxis. In the United Kingdom, the National Institute for Health and Care Excellence (NICE) restricts antibiotic prophylaxis to individuals with high risk of IE and when the patients express a preference for it. The rest of the world recommends antibiotic prophylaxis for patients with predisposing cardiac conditions and undergoing the most invasive procedures (8-11).

Unnecessary consumption of antibiotic could lead to drug resistance and additional costs to patients. So, dentists should prescribe prophylactic antibiotics, if the benefits of prophylaxis are superior to side effects (5).

As cardiac surgery for repair or replacement of the cardiac valve is increasing, an excellent knowledge of the condition among dentists is necessary for a safe dental practice (5). This study aimed to assess the knowledge of general dentists working in Guilan province, regarding antibiotic prophylaxis for the prevention of IE in dental practice.

Materials and Methods

This descriptive cross-sectional study was approved by the Faculty of Dentistry Research and Ethics Committee at Guilan University of Medical Sciences (IR.GUMS.REC.1399.106).

All dentists were informed about the aim of this study and those who did not consent to participate in the study, were replaced.

The questionnaire was evaluated by 10 specialist dentists (Guilan University faculty); and additionally a cardiologist to assess content validity. Then, after changes according to their comments, it was given to 10 general dentists and the reliability was acceptable (CVR=0.98, CVI=0.99). Prepared questionnaires distributed among 264 general dentists working in Guilan province. This questionnaire containing demographic information (Age, gender, clinical experience, place of work and participation in retraining programs of participants), questions evaluating the knowledge of participants about which dental procedures and what heart conditions need antibiotic prophylaxis and questions related to the proper oral or parenteral antibiotic regimens for prophylaxis in adults and children according to the current AHA guidelines.

The questionnaire included 25 questions. The total score ranges from 0 to 25 with this classification: (0-12: low level, 13-17: moderate level and 18-25: high level).

After completion of questionnaires, indications of prophylaxis and the proper way of prescription of prophylactic antibiotic were explained to each participant to update their previous information about infective endocarditis.

The T-test and Pearson's Correlation Coefficient with the SPSS 24 program (SPSS Inc, Chicago, IL, USA) were used in the data analysis. Results with $P < 0.05$ were considered statistically significant.

Results

The sample was composed of 59.4 % males and 40.6 % females. Mean age was 30.85 years (range 25–52 years) with 0.5–26 years of experience (mean 4.02 years). Most of the par-

ticipants were working in public clinics with no history of training course about infective endocarditis after graduation (Table 1). 57.8% of the dentists have encountered a patient who needed prophylactic antibiotic against IE and 54.7% have administered prophylactic antibiotic, 50% were following the AHA guidelines, and 1.6% were following NICE guidelines. 46.9% of dentists have administered prophylactic antibiotic when encountering patient who needs, 43.8% have referred the patients for consultation, and only 9.4 % have refused to treat these patients (Table2) 52.6% and 74.2% of participants responded correctly to the questions related to dental procedures and heart conditions respectively. The most common procedures in which the antibiotic prophylaxis was distinguished to be necessary were gingival surgery (85.9 %) and tooth extraction (67.2%).

Table 1. Demographic Characteristics of Dentists

Variable	Total (n)%
Gender	
Male	157 (59.4)
Female	107 (40.6)
Age(years)	
Mean	30.85
Range	25-52
SD	6.06
Experience(years)	
Mean	4.02
Range	0.5-26
SD	0.53
Place of work	
Private clinic	103 (39.1)
Public sector clinic	161 (60.9)
Training history	
Yes	74 (28.1)
No	190 (71.9)

History of IE was ranked on top of the medical conditions that required antibiotic prophylaxis (79.7%). The distributions of the correct responses to the questions on dental procedures and heart conditions requiring antibiotic prophylaxis are shown in Table 3. The mean knowledge score of the dentists was 14.43. 28.1%, 53.2% and 18.7% of dentists had low, moderate and high level of knowledge, respectively.

Table 2. Experience with infective endocarditis

Experience	n(%)
Encountered a patient who needed prophylaxis against IE	
Yes	152(57.8)
No	112(42.2)
Ever administered prophylactic antibiotic against IE	
Yes	144(54.7)
No	120(45.3)
Encountered a patient who developed IE following dental treatment	
Yes	62(23.4)
No	202(76.6)
Followed guidelines to prevent IE	
AHA*	132(50)
NICE**	4(1.6)
Others	128(48.4)
What they do when encountering a patient who needs antibiotic prophylaxis against IE	
Administer prophylactic antibiotic	124(46.9)
Refer the patient to his physician for consultation	116(43.8)
Refuse treating the patient and refer to another colleague	24(9.4)

* AHA: American Heart Association, ** NICE: National Institute for Health and Clinical Excellence

Table 3. Distribution of correct answer to questions regarding dental procedures and heart conditions requiring antibiotic prophylaxis

	n (%)
Dental Procedures	
Requiring antibiotic prophylaxis	
Tooth extraction +	177(67.2)
Root canal treatment +	173(65.6)
Suture removal +	50(18.8)
Scaling and root planing +	91(34.4)
Gingival surgery +	227(85.9)
Gingival probing +	103(39.1)
Placement of subgingival cord +	132(50)
Placement of orthodontic bands +	53(20.3)
PDL injection +	116(43.8)
Manipulation of gingival tissue or the periapical region of teeth +	198(75)
Reimplantation of avulsed tooth +	124(46.9)
Not requiring antibiotic prophylaxis	
Placement of orthodontic brackets -	243(92.2)
Impression taking -	29(10.9)
Infiltration anesthesia -	194(73.4)
Heart Conditions	
Requiring antibiotic prophylaxis	
Presence of prosthetic valve	202(76.6)
History of IE	210(79.7)
Not requiring antibiotic prophylaxis	
Patients with pacemaker	215(81.3)
Valvular heart disease associated with rheumatic fever	132(50)
Mitral valve prolapsed with regurgitation	149(56.3)
Mitral valve prolapsed without regurgitation	231(87.5)
Cardiac bypass	198(75)
Tetralogy of Fallot	231(87.5)

The frequency of participants' correct answers to questions on dentist's practice regarding antibiotic regimen for prophylaxis such as *What are the proper oral and parenteral antibiotic regimens for prophylaxis, *Which antibiotic is the first choice, when the patient is allergic to penicillin? are shown in table 4.

Table 4. Distribution of correct answer to questions regarding antibiotic regimen for prophylaxis

	n (%)
Standard oral prophylactic regimen	128(48.4)
If allergic to penicillin, first choice for oral antibiotic prophylaxis regimen	45(17.2)
Regimen of injectable antibiotic prophylaxis	152(57.8)

There was no significant relationship between knowledge scores and age (P-value = 0.36), gender (P-value =0.36), clinical experience (P-value =0.1), place of work (P-value = 0.9) and history of participation in retraining programs (P-value =0.5).

Discussion

Prescribing prophylactic antibiotic against IE is crucial in certain specific circumstances. It is worth to adhere with the guidelines to give PA to susceptible patients without adding on antimicrobial resistance (2). In this study, we aimed to assess the knowledge of general dentists in Guilan province, Iran regarding prevention of IE in dental practice.

Different guidelines have been followed in different countries , with the most followed the AHA guidelines and international guidelines being the National Institute of Clinical Excellence (NICE) guidelines. In the present study, only 1.6% of the participants followed the NICE guidelines compared with a similar study in London, in which 77% of respondents were compliant with these guidelines (12).The NICE guidelines restrict the use of antibiotic prophylaxis (AP) to very few circumstances

(6). Other guidelines include British Society for Antimicrobial Chemotherapy guidelines (BSAC), European Society of Cardiology guidelines and the Australian guidelines(2).

28.1% of studied subjects had a history of training and others didn't participate in re-training courses. Training courses are held for improving the knowledge of dentists regarding antibiotic prophylaxis guidelines for the prevention of infective endocarditis. In the present study, 57.8% of dentists encountered patients at risk for IE and only 9.4% refused treating these patients with no significant relationship with work experience or work place (p -value >0.05), similar to study in Japan in 2011 by Nakano K et al, in which approximately two-thirds of general dentists encountered these patients and 7.3% of them answered that they did not treat these patients and referred them to another clinic (13).

In the present study in Iran, 43.7% of participants answered incorrectly regarding MVP with regurgitation. Adeyemo WL et al also reported that only 9% of the participants(Nigerian dentists) answered correctly regarding MVP with regurgitation (14). This can be due to the fact that MVP with regurgitation was classified in the moderate-risk group in the 1997 edition of the AHA guidelines, although it is not an indication for antibiotic prophylaxis in current guidelines (6). In the study by Adeyemo WL et al, low level of knowledge regarding antibiotic prophylaxis against IE was found among Nigerian dentists in 2011 (14).

In the study of Jain P et al regarding knowledge and implementation of American Heart Association Guidelines among dentists and dental hygienists in Alberta, Canada in 2015, hygienists were more likely than dentists to incorrectly recommend IE prophylaxis for low-risk lesions including Mitral Valve Prolapsed (MVP) (15).

In the study of Al-fouzan et al in Saudi Arabia in 2014, the total knowledge level regarding antibiotic prophylaxis was 52.2% and surgeons and periodontists had the highest level of knowledge regarding this topic (6).

Presence of prosthetic valve and History of IE are major risk factors for IE, a fact which is well appreciated by most of the participants of the present study which is in agreement with previous findings by Adeyemo et al (14), Zadik Y et al (16) and Ryalat S et al (2).

Similar to study by Basir Shabestari S et al (17) in Qazvin city, no significant differences were noted in the knowledge scores between the two genders and regarding age, clinical experience and participation in retraining programs. Although different results in studies can be due to different characteristics and conditions of the studied dentists, differences in the quantity and quality of teaching in colleges, amount of study after graduation and importance of infective endocarditis in the study population (17).

In the present study, 26.6% of the participants incorrectly recommended prophylactic antibiotics for local anesthetic infiltration. Al-Fouzan AF et al reported that 60.5% of dentists in Saudi Arabia had correct knowledge regarding this topic (6).

Unfortunately, less than half of the participants answered correctly about the standard antibiotic regimen for prophylaxis, similar to study in Japan in 2011, in which 40% of general dentists were aware of current protocols for antibiotic prescription for IE.

Thus, it is important to consider approaches for education of general dentists regarding these protocols, although communication between dentists, medical doctors and cardiologist will be important (13).

Conclusion

The knowledge level of general dentists working in Guilan province, Iran was at moderate level. Considering the importance of good knowledge about antibiotic prophylaxis against IE, more continuous education program should be scheduled.

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None

Conflicts of interest

There are conflicts of interest

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