

Dentists' knowledge and practice regarding prevention of infective endocarditis

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ABSTRACT

Objectives: The objective of this study is to assess the knowledge and practice of dentists from Jordan, regarding prevention of infective endocarditis (IE) in dental practice. **Materials and Methods:** A sample of Jordanian dentists was interviewed regarding their IE knowledge and practice using a validated and pretested survey instrument. **Results:** Most of the dentists have encountered a patient with IE who needed prophylactic antibiotic (PA) and have prescribed antibiotics to prevent IE. Jordanian dentists' approach to patients in need for PA varied between the National Institute for Health and Clinical Excellence recommendations and the American Heart Association to a lesser degree, but still a relatively high percent (39%) did not know any guidelines to follow although 74% have encountered patients who needed endocarditis prophylaxis. Patients with prosthetic heart valve were ranked on top of medical conditions that required PA (87.4%), and most dentists (94.5%) thought that dental extractions need PA followed by periodontal surgery (88.2%). **Conclusion:** There is a lack of consistency in the knowledge and practice of Jordanian dentists with regard to IE. There is a need to take actions to improve dentist's knowledge regarding this topic.

Key words: Antibiotic choice, antibiotic prophylaxis, dental procedures, dentist's knowledge, infective endocarditis

INTRODUCTION

Infective endocarditis (IE), which is a life-threatening infection of the endocardium or heart valves, is usually associated with cardiac defects, congenital, or acquired.^[1] Oral cavity, with more than 600 microbiological species have been recorded in the human mouth, is also home to microbial communities with multiple effects in human health and disease.^[2] Various dental procedures have been linked to the occurrence of IE. Nevertheless, there seems to be a dilemma about which dental procedures and under what circumstances significant risk occurs.^[3] Several guidelines regarding IE prevention

are available globally including, British Society for Antimicrobial Chemotherapy guidelines (BSAC) on 2006, National Institute for Health and Clinical Excellence guidelines (NICE) on 2008, European Society of Cardiology guidelines on 2009, the Australian guidelines, and the American Heart Association guidelines (AHA) on 2007; most of these guidelines recommended a more restrictive use of prophylaxis for IE.^[4-7] The BSAC guidelines reduced cardiac conditions in which prophylaxis indicated to the presence of prosthetic valves, a history of IE, and some congenital

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heart diseases.^[8] AHA guidelines added another indication, valvulopathy in cardiac transplant recipients.^[9] NICE guidelines did not recommend any prophylaxis to patients for IE prevention regardless their risk.^[10]

The data about epidemiology of IE in Jordan are scarce, mostly due to the absence of nationwide studies in this regard. Similarly, little is known about the practice of general dental practitioners in Jordan, regarding prevention of IE and their compliance with international guidelines of IE prophylaxis.

The aim of this study was to assess the knowledge and practice of dentists from Jordan, regarding prevention of IE in dental practice.

MATERIALS AND METHODS

This cross-sectional study was approved by the Faculty of Dentistry Research and Ethics Committee in accordance with the World Medical Declaration of Helsinki. Ethical protocol number (12/2015).

A total of 210 dentists were approached to participate in the study, and 127 agreed to participate. A survey instrument was used to interview participants. The survey instrument included questions about demographic data, knowledge about risk factors of IE, and predisposing dental procedures and their current practice of prescribing antibiotics to at-risk patients [Appendix 1].

Statistical analysis performed using SPSS 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics used to describe our study sample. To examine differences between groups, Chi-square test, one-way ANOVA, Student's *t*-test, and Spearman's rho test were used. Results with $P < 0.05$ considered statistically significant.

RESULTS

The sample was composed of 52.8% males and 47.2% females. Mean age was 33.5 years (range 22–65 years) with 1–40 years of experience (mean 9 years) [Table 1].

As shown in Table 1, most of the respondents were working in private clinics and graduated from Jordanian universities.

Most of the dentists have encountered a patient with IE who needed prophylactic antibiotic (PA) and have prescribed PA to prevent IE, 37% were following the NICE guidelines, and 23.6% were following AHA guidelines. Majority of the respondents (51%) have

prescribed PA when encountering suspected patient to prevent IE, 44% have referred, and only 4.7% have refused to treat these patients [Table 2].

Table 1: Demographic characteristics of participating dentists

Variable	Total, n (%)
Gender	
Male	67 (52.8)
Female	60 (47.2)
Age (years)	
Mean	33.5
Range	22-65
SD	10.3
Experience (years)	
Mean	9.2
Range	1-40
SD	9.1
Place of work	
Private clinic	83 (65.4)
Hospital-based clinic	31 (24.4)
Public sector clinic	13 (10.2)
Country of graduation	
Jordan	59 (46.5)
Arab countries	45 (35.4)
Eastern Europe	17 (13.4)
Western Europe	6 (4.7)

SD: Standard deviation

Table 2: Experience with infective endocarditis

Experience	n (%)
Encountered a patient who needed PA for IE	
No	33 (26)
Yes	94 (74)
Ever prescribed PA to prevent IE	
No	45 (35.4)
Yes	82 (64.6)
Encountered a patient who developed IE following dental treatment	
No	104 (81.9)
Yes	23 (18.1)
Followed guidelines to prevent IE	
AHA	30 (23.6)
NICE	47 (37)
Others	4 (3.1)
Do not know	46 (36.2)
What they do when encountering a patient who needs PA to prevent IE**	
prescribe PA	65 (51.2)
Refer the patient to his physician for consultation	56 (44.1)
Refuse treating the patient and refer to another colleague	6 (4.7)

**The decision was not significantly affected by gender, age, experience, country of graduation, or place of work. IE: Infective endocarditis, PA: Prophylactic antibiotic, AHA: American Heart Association, NICE: National Institute for Health and Clinical Excellence

Patients with prosthetic heart valve were ranked on top of medical conditions that required PA (87.4%), and then patients with the previous history of IE, followed by patients with rheumatic heart disease (57.5), the least record was for patients having physiologic murmurs [Table 3].

Regarding dental procedures which needed PA [Table 4], most dentists (87.4%) thought that dental extractions need PA, followed by periodontal surgery (88.2%); however, only 17.3% thought that PA is needed for simple tooth restorations.

Amoxicillin was the antibiotic of choice for 57.5% of dentists to prevent IE, 17.3% prescribed clindamycin; a minority have prescribed lincomycin, metronidazole, gentamicin, and clarithromycin. Around 19% of dentists did not know which antibiotic to prescribe [Table 5].

DISCUSSION

Dental procedures, especially the invasive ones, are being blamed for causing IE.^[1,3,4] We aimed in this study to assess the knowledge and practice of dentists in Jordan, regarding prevention of IE in dental practice.

Although the NICE recommended the restriction of antibiotic prophylaxis (AP) use to very few predefined circumstances,^[8] more than 50% of Jordanian dentists still prescribe PA widely to prevent IE.

Jordanian dentists' approach patients in need for PA varied between the NICE recommendations and the AHA to a lesser degree, but still a relatively high

percent (39%) did not know any guidelines to follow although 74% have encountered patients who needed PA to prevent IE.

Only 37% of the respondents followed the NICE guidelines compared with a similar study in London, in which 95% of participants were aware of the NICE guidelines and 77% of them were compliant with those guidelines.^[11]

This controversy, over the PA prescription for the different dental procedure, is a critical issue among dentists worldwide, which is affected by both the new guidelines and the IE incidence.^[12]

Prosthetic heart valves and preexisting structural abnormality of the heart are major risk factors for IE,^[13] a fact which is well appreciated by 87% of Jordanian dentists; comparable results were reported by an Iranian study.^[11] While 14.2% of Jordanian dentists prescribe PA for cases of physiologic murmurs, 87.2% of their Iranian counterparts prescribe PA for this condition. This might be due to the variations of the universal recommendations or due to lack of knowledge regarding the clinical condition.

Dental procedures that needed PA, due to invasive nature and the risk of bacteremia were extractions and periodontal surgery; majority of Jordanian dentists agree with this fact.^[12,14,15]

While Amoxicillin was the drug of choice as PA for 57.5% of respondents in this study, it was the drug of choice for 89% of Nigerian dentists.^[16] In contrast, most

Table 3: Patients who need prophylactic antibiotics to prevent infective endocarditis

Rank	Patient type	Dentists' thought the patient needs PA to prevent IE n (%)
1	Patients with prosthetic valve	111 (87.4)
2	Patients with previous history of infective endocarditis	81 (63.8)
3	Patients with rheumatic heart disease	73 (57.5)
4	Patients with history of open heart surgery	64 (50.4)
5	Patients with stints	62 (48.8)
6	Patients with cyanotic congenital heart disease	55 (43.3)
7	Mitral valve prolapsed or regurgitation	53 (41.7)
8	Cardiac transplantation	50 (39.4)
9	Patients with pacemaker	47 (37)
10	Cardiac bypass	41 (32.3)
11	Patients with ventricular septal defect	38 (29.9)
11	Patients with a cyanotic congenital heart disease	38 (29.9)
12	Patients with atrial septal defects	35 (27.6)
13	Patients with ischemic heart disease	31 (24.4)
14	Any patient with history of cardiac disease	29 (22.8)
15	Physiologic murmur	18 (14.2)
	Do not know	6 (4.7)

IE: Infective endocarditis, PA: Prophylactic antibiotic

Table 4: Procedures that require the administration of prophylactic antibiotics to prevent infective endocarditis

Rank	Dental procedure	Dentists' thought the patient needs PA to prevent IE, n (%)
1	Surgical tooth extraction	120 (94.5)
2	Periodontal surgery	112 (88.2)
3	Implants	107 (84.3)
4	Biopsy	83 (65.4)
4	Apicoectomy	83 (65.4)
5	Simple tooth extraction	72 (56.7)
6	Abscess drainage	71 (55.9)
7	Scaling and polishing	70 (55.1)
8	Dentoalveolar trauma	67 (52.8)
9	Reimplantation of avulsed tooth	64 (50.4)
10	Endodontic treatment	58 (45.7)
11	Intraligamentary anesthesia	55 (43.3)
12	Placement of matrix band and wedges	47 (37)
13	Inferior dental nerve block	43 (33.9)
14	Placement of rubber dam	40 (31.5)
15	Tooth preparation and impression taking	28 (22)
16	Placement of fixed orthodontic band	24 (18.9)
17	Simple and complex restorations	22 (17.3)
Do not know		4 (3.1)

IE: Infective endocarditis, PA: Prophylactic antibiotic

Table 5: Antibiotics prescribed for prevention of infective endocarditis before dental procedures

Antibiotic	n (%)
Amoxicillin	73 (57.5)
Clindamycin	22 (17.3)
Erythromycin	2 (1.6)
Metronidazole	1 (0.8)
Clarithromycin	1 (0.8)
Gentamycin	1 (0.8)
Lincomycin	1 (0.8)
No antibiotic	2 (1.6)
Do not know	24 (18.9)

general dentists in Japan prescribe cepham followed by Penicillin.^[17]

Giving PA is not without harm although it is crucial in certain specific circumstances. Antimicrobial resistance is an emerging issue that must be dealt with to decelerate its progression. PA aim only to prevent IE due to viridans streptococci, and in its best case scenario can prevent up to 10% of all cases of IE.^[18] Based on these statistics, it is not feasible to give PA to every cardiac patient, and it is worth to adhere with the guidelines to prevent IE in the specific patients, the PA target, without adding on antimicrobial resistance.

It has been reported that all observational studies such as cross-sectional surveys are prone to limitation and bias.^[19] In this study, the number of participants is limited as a big number of dentists refused to

participate; it may be due to their inadequate knowledge about this issue. Moreover, most dentists still prescribe PA in most cardiac patients although it is not recommended anymore in the majority of them; this discrepancy might be due to lack of update on their knowledge about the guidelines.

CONCLUSION

Although the issue of AP to prevent IE is controversial and no general consensus exists, a large proportion of dentists still do not follow any guidelines. The majority of dentists encountered a patient who needs PA so that the level of knowledge and practice need to be upgraded in Jordan.

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Conflicts of interest

There are no conflicts of interest.

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APPENDIX 1: QUESTIONNAIRE

- Age:
- Gender:
- Country of graduation:
- Years of practice:

Place of practice: Private clinics, hospital-based clinic, public sector clinic

Have you encountered a patient who needed prophylactic antibiotics to prevent infective endocarditis?

Yes no

Have you ever prescribed prophylactic antibiotics to prevent infective endocarditis to your patients?

Yes no

Have you ever encountered a patient who developed infective endocarditis following dental treatment?

Yes no

Which guidelines regarding prevention of infective endocarditis do you follow in your practice?

AHA NICE others I do not know

If you encounter a patient who needs prophylactic antibiotics to prevent infective endocarditis

1. I prescribe the prophylactic antibiotics
2. Refer the patient to his physician for consultation
3. Refuse treating the patient and refer him to another colleague.

Which of the following patients would need prophylactic antibiotics to prevent infective endocarditis?

1. Patients with prosthetic valve
2. Patients with stents
3. Patients with history of open heart surgery
4. Patients with ischemic heart disease
5. Patients with ventricular septal defect
6. Patients with atrial septal defects

7. Patients with rheumatic heart disease
8. Patients with cyanotic congenital heart disease
9. Patients with a cyanotic congenital heart disease
10. Any patient with history of cardiac disease
11. Patients with previous history of infective endocarditis
12. Cardiac bypass
13. Patients with pacemaker
14. Mitral valve prolapsed or regurgitation
15. Physiologic murmur
16. Cardiac transplantation
17. Do not know.

Which of the following procedures would require the administration of prophylactic antibiotics to prevent infective endocarditis?

1. Surgical tooth extraction
2. Periodontal surgery
3. Implants
4. Biopsy
5. Apicoectomy
6. Reimplantation of avulsed tooth
7. Scaling and polishing
8. Simple tooth extraction
9. Endodontic treatment
10. Abscess drainage
11. Dentoalveolar trauma
12. Placement of fixed orthodontic band
13. Simple and complex restorations
14. Tooth preparation and impression taking
15. Placement of rubber dam
16. Placement of matrix band and wedges
17. Intraligamentary anesthesia
18. Inferior dental nerve block
19. Do not know.

Which antibiotics do you prescribe for prevention of infective endocarditis before dental procedures?

- Type
- Dose
- Duration.