Knowledge of antibiotics among dentists in Riyadh private clinics

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Abstract

Introduction: Dentists prescribe antibiotics for both therapeutic and prophylactic reasons to manage oral and dental infections. Antibiotic prescriptions can be associated with unfavorable side effects and the development of resistance.

Aim of the study: A survey was conducted among dental specialists (DSs) and general dental practitioners (GDPs) at private dental clinics in Riyadh, Saudi Arabia to assess their level of knowledge regarding the action of antibiotics, their use and misuse in oral conditions, systemic diseases and prophylaxis.

Subjects and methods: A total of 380 identical surveys that contained 32 questions were completed by DSs and GDPs in a supervised setting. Descriptive statistics were calculated to assess the overall knowledge of both DSs and GDPs, and their knowledge within each category of questions. Independent *t*-tests were used to ascertain whether there were significant differences
1. Introduction

Dentists prescribe antibiotics therapeutically and prophylactically to manage oral and dental infections. Since most human orofacial infections originate from odontogenic infections, the prescribing of antibiotics by dental practitioners has become an important aspect of dental practice (Dar-Odeh et al., 2010). Antibiotics are invaluable adjuncts in the management of orofacial infections. Although they are not a substitute for definitive treatment, their appropriate use can shorten infection periods and minimize associated risks, such as the spread of infection to adjacent anatomical spaces or systemic involvement (Epstein et al., 2000). For this reason, antibiotics account for the vast majority of medicines prescribed by dentists (Lewis, 2008). Dentists prescribe between 7% and 11% of all common antibiotics (beta-lactams, macrolides, tetracyclines, clindamycin, metronidazole) (Dar-Odeh et al., 2010). In the UK, for instance, dentists accounted for 7% of all community prescriptions of antimicrobials (Sweeney et al., 2004). How and what general dental practitioners (GDPs) prescribe is limited by the Dental Practitioners Formulary (DPF). In 1997, GDPs in England issued >3.5 million antibiotic prescriptions, which represent 7% of all the antibiotics prescribed in the community. Inappropriate prescribing by dentists could therefore play a significant part in the emergence of resistant strains (Palmer et al., 2000). Although it has been stated that dentistry’s contribution to the development of antimicrobial resistance is unknown (Haas et al., 1998), increasing microbial resistance to antibiotics, however, is a well-documented and a serious global health concern (Epstein et al., 2000). An alarming finding was that in certain countries, up to 84% of dental practitioners were likely to prescribe an antimicrobial agent when there was no clinical indication (Al-Haroni and Skaug, 2006). On the other hand, the National Center for Disease Control and Prevention estimates that approximately one-third of all outpatient antibiotic prescriptions are unnecessary (Dar-Odeh et al., 2010). Recent survey in Fiji reported that dentists have a tendency toward: over-prescribing, using lower dosage of antibiotics, using broad-spectrum antibiotics, a lack of knowledge of the incidence of adverse reactions, and very poor medical history record taking (Murti and Morse, 2007). Some countries such as Norway show a different pattern of antibiotic prescription among dentists where it was found that dentists prefer to prescribe narrow-spectrum antibiotics and that their prescribing is conservative and relatively low compared with that of physician (Al-Haroni and Skaug, 2007). Furthermore, one survey among dental practitioners conducted in Canada found that recent graduates appeared to prescribe at a lower rate than earlier graduates after dental treatment in general (Epstein et al., 2000). Antibiotic prescribing may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock and development of resistance. The increasing resistance problems of recent years are probably related to over- or misuse of broad-spectrum agents such as cephalosporins and fluoroquinolones (Wise et al., 1998).

The aim of our study was to assess the level of knowledge regarding AB action, use and misuse in oral conditions, systemic diseases and prophylaxis use among dental specialist (DSs) and general dental practitioners (GDPs) at private dental clinics in Riyadh, Saudi Arabia. We found no article in the literature that is similar to our study.

2. Subjects and methods

According to the General Directorate for Health Affairs, there are 1360 licensed DSs & GDPs, in Riyadh private dental clinics. A self-administrated questionnaire written in Arabic and English, to be understood by all participants and printed on paper was developed for this study. The questions have a check of yes or no answers and dealt with three categories: 7 questions about antibiotic action (AB action) with a total of 24 points, 11 questions on oral conditions that may require AB administration with a total of 31 points and 9 questions about patient’s medical condition (pt. medical condition) that mistakenly given AB and includes 25 points and a subcategory on prophylaxis has 5 questions with a total of 24 points. Total number of questions, in the survey, was 32, and total points analyzed equal 104. There were no questions on the consultation aspect because we wanted to assess the knowledge not the management.

The questionnaire was presented to dentists who were not a part of the main study, and was found comprehensive. 380 dentists, randomly chosen from all areas in Riyadh, were visited in their clinics and asked to participate in this survey. For the sake of credibility we sat with them during answering. The participants were asked to write their e-mails, if they would like to receive a copy of the correct answers together with antibiotic booklet references.
The purpose of the study was explained in the beginning of the questionnaire and a verbal consent was taken. The questionnaire started with demographic data including: name (optional), age, gender, year of graduation, university of graduation, specialty, nationality and working place. Data were entered into the computer utilizing Microsoft Excel 2007 and analyzed using a statistical software package SPSS 13.

Results with 62% total correct answers and above, for each dentist, were considered acceptable level of knowledge and any result below 62% was considered non acceptable. Furthermore, points from 93(90%)–104(100%) are referred to as excellent, 83(80%)–92(89%) as good, 72(70%)–82(79%) as fair, 62(60%)–71(69%) as pass, 61(59%) and below considered non acceptable.

3. Results

A total of 380 copies of the questionnaire were distributed during the months of October and November 2010. 303 copies were answered, giving a response rate of 79.7% and 77 dentists declined to participate at a rate of 21.3%.

The sample included 196 (65%) general dental practitioners (GDPs) and 107 (35%) specialist dentists (DSs). 180 (59%) were males and 123(41%) were females as shown in Table 1. 34 (11.22%) were Saudis and 269 (88.78%) were non-Saudis.

The total number of dentist with an acceptable level of knowledge was found to be 259 dentists (85.5%) and the non acceptable level was 44 dentists (14.5%) as shown in Fig. 1.

Years of experience ranged from one year to 39 years with an average of 12.26 and standard deviation 8.09.

The best score recorded was 89(86%) and lowest score recorded was 28(27%). Both DSs and GDPs have general information on AB close to 70%.

The rate according to each category i.e. AB action, oral conditions and patient’s medical condition was measured. It was found that the acceptable level of knowledge on the AB action was 67.7% (205 dentists), oral conditions 89.4% (270 dentists) and on patient’s medical condition was 65.3% (198 dentists) as shown in Fig. 2.

In the subcategory on antibiotic prophylaxis knowledge, the acceptable level was 51% (154 dentists) and non acceptable level was 49% (149 dentists).

Grade score distribution was as follows: 44 dentists (14.5%) scored unacceptable level, 128 dentists (42.2%) obtained passing grade, 110 dentists (36.3%) obtained fair, 21 dentists (6.9%) reached good and no one reached the excellent grade, as shown in Fig. 3.

The average mean of DSs’ knowledge about antibiotics was 70.6% with standard deviation 9.7. The average mean of GDPs’ knowledge about antibiotics was 69.8 with standard deviation 8.2.

We used the independent T-test to test the following hypothesis:

\( H_0 : \mu_{GDP} = \mu_{DS} \)

\( H_a : \mu_{GDP} \neq \mu_{DS} \)

We do not reject the \( H_0 \) because there is no significant difference between specialists and general practitioners at the level of 0.05 (p-value = 0.44 > 0.05). DSs and GDPs both have information about antibiotics close to 70%.

DSs’ knowledge on AB action was found to be 69.2% (74 dentists), on oral conditions was 90.7% (97 dentists), and on patient’s medical condition was 66.4% (71 dentists). GDPs’ knowledge on AB action

![Figure 1](image1.png) Acceptable and non acceptable level of knowledge on antibiotics.

![Figure 2](image2.png) Acceptable and non acceptable level of knowledge in each category.

![Figure 3](image3.png) Distribution of dentists according to grades.
was found to be 66.8% (131 dentists), on oral conditions 88.7% (173 dentists) and patient’s medical condition was 64.8% (127 dentists) as presented in Table 2 and Fig. 4.

There was no relation between the years of experience and knowledge as noticed in Fig. 5. The data scattered support the hypothesis that there is no linear relation between years of experience and antibiotics’ knowledge.

4. Discussion

Antibiotics are commonly used in dental practice for treatment and prevention of infection. We depend on its efficacy as clinicians and as consumers. Conscientious use of antibiotics is imperative for all practitioners, especially when considering the rapid development of antibacterial resistance and the alarming consequences of this trend (Epstein et al., 2000).

Data reported from different countries indicate differences in dentists’ knowledge of clinical situations indicated for antibiotics. Almost half or more of the dentists investigated in England (Palmer et al., 2000), Kuwait (Salako et al., 2004) and Turkey (Ocek et al., 2008), would prescribe AB for dry socket. Another non-indicated condition is localized swelling, which was also among the conditions for which antibiotics were prescribed in Norway (Wise et al., 1998), South Australia (Jaunay et al., 2000), Kuwait (Salako et al., 2004) and England (Palmer et al., 2001). On the other hand, the figures for England show that admissions for ‘drainage of an abscess’ related to tooth has doubled from just under 800 in 1998 to almost 1600 in 2006 (Lewis, 2008).

This survey revealed that 89.4% of participants have appropriate knowledge on indication of AB regarding oral conditions such as dry socket and localized abscesses.

More common dental infections present in the form of pulpitis and periapical periodontitis require only operative measures such as restorations, root canal therapy, or extraction if the tooth is not restorable. Unfortunately, dentists still prescribe antibiotics for this condition in England (Palmer et al., 2000), Norway (Demirbas et al., 2006), Kuwait (Salako et al., 2004), Yemen (Al-Haroni and Skaug, 2006), Turkey (Ocek et al., 2008), US (Yingling et al., 2002), Spain (Rodriguez-Nunez et al., 2009) and Belgium (Mainjot et al., 2009). A distressing finding was that a number of dentists in Norway prescribe antibiotics for viral infections like herpes simplex virus-1 infections (Demirbas et al., 2006). On the other hand English and Scottish dentists would not prescribe for non-clinical factors (Palmer et al., 2001). Dentists in the Eastern Mediterranean region have shown a tendency to prescribe on a patient’s demand or social reasons, especially when short of time (Salako et al., 2004) (Al-Haroni and Skaug, 2006).

The most commonly used antibiotic in dental practice, penicillin in general, is also found to be the most commonly prescribed antibiotic by dentists in Saudi Arabia (Al-Mubarak et al., 2004), Yaman (Al-Haroni and Skaug, 2006) and Nigeria (Ogunbodede et al., 2005). The most popular one being amoxicillin in England (Palmer et al., 2000), Saudi Arabia (Al-Mubarak et al., 2004) Nepal (Sarkar et al., 2004) and Fiji Islands (Murti and Morse, 2007).

Recent studies on the attitudes of dentists in the Eastern Mediterranean region showed that dentists preferred to prescribe a lower dosage of antibiotic over a longer period (Salako et al., 2004) (Dar-Odeh et al., 2008). Duration was based on expert opinion.

Most studies on prophylactic antibiotic use were carried out in developed countries (Palmer et al., 2000) (Dar-Odeh et al., 2010) (Demirbas et al., 2006) (Epstein et al., 2000) (Jaunay et al., 2000) and the results generally indicated that dentists have a good knowledge of prescribing. Our survey revealed that only 51% of the sample had acceptable knowledge on prophylactic use of AB which is relatively low.

Table 2 Percentage of acceptable answers between DSs & GDPs.

<table>
<thead>
<tr>
<th>Category</th>
<th>DSs (%)</th>
<th>GDPs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB action</td>
<td>69.2</td>
<td>66.9</td>
</tr>
<tr>
<td>Oral conditions</td>
<td>90.7</td>
<td>88.7</td>
</tr>
<tr>
<td>Pt. medical cond.</td>
<td>66.4</td>
<td>64.8</td>
</tr>
</tbody>
</table>

* No significant difference.
cover either a defect in aseptic clinical technique or improperly sterilized equipment; thus, a ‘just in case’ principle is practiced (Al-Haroni and Skaug, 2006).

The main goal of the present study is to measure antibiotics’ knowledge among dentists in Riyadh private clinics. We found that the highest level of knowledge was on the oral conditions (89.4%). The highest non acceptable knowledge was found on the patient’s medical condition (34.7%) followed by the AB action (32.3%).

There was no relation between the years of experience and knowledge whereas the survey among dental practitioners conducted in Canada found that recent graduates, in general, appeared to prescribe at a lower rate than earlier graduates especially following dental treatment (Epstein et al., 2000).

We attributed result of our survey to the dental background programs. Students are exposed to oral conditions more than the antibiotic pharmacology and its clinical applications with insufficient practice on the management of the patient’s medical condition. In addition, lack of continuing education courses that may give proper up to date information may contribute to these results besides there should be improved relation between pharmacological companies and dental clinics.

Unfortunately most dentists in the current survey were not aware about AB prophylaxis use and not updated on the new prophylaxis guidelines, since the passing rate was only 51%.

Although we had 259 of the dentists (85.5%) in the acceptable level, 128 of them (42.2%) were just in the passing grade, and no one scored excellent grade.

The obstacles we faced include difficulties in approaching dentists. Most of them were busy at their clinic whereas others even refused to participate.

Limitations of our survey include the fact that the survey was long and many questions were on clindamycin, whereas most dentists were not familiar with it. They were mostly dealing with erythromycin.

We did not include any question about consultations because the aim was what do you know rather than how to manage.

5. Conclusion

Our findings suggest that overall dentist’s knowledge about antibiotics is low on antibiotic pharmacological aspects and regarding the patient’s medical conditions and in prescribing prophylaxis antibiotics.

We suggest the following to improve appropriate use of antibiotics in the dental community:

Enhance education about the current antibiotic guidelines, recommendations and indications during both undergraduate and post graduate levels.

Increase evidence-based research to document clinical benefits of antibiotic use, thus justifying or eliminating routine prescription patterns, and to establish clinical practice guidelines.

Continuing education courses about AB to disseminate information to practicing dentists should be a prerequisite to Saudi License Examination.

Further evaluations of antibiotic use and reassessment of prescribing practices over time.

Dentistry should strive to achieve 100 percent compliance with antibiotic prophylaxis recommendation and understanding of the appropriate use of antibiotics in dentistry.

Conflict of interest

All authors have no conflict of interest to declare this article.

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