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The Knowledge of Antibiotic Prescription in Endodontic Practice among Newly Graduated General Practitioner Dentists in Riyadh City, Saudi Arabia

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Introduction

Endodontic pain is caused by inflammatory process, which is most commonly related to microbial, mechanical or chemical factors. When the infection spreads the inflammation will occur, in such a case the host responses do not appear to be capable of controlling these microbial factors. Therefore, prescription of antibiotic in addition to the local treatment is used to augment host response mechanisms (Ashraf. 2002).

Antibiotics are common drugs used either for prophylaxis or as a part of the management of orofacial infection (Longmana et al. 2000, Kakoei et al . 2006). Several studies have shown that the knowledge of general practitioner dentist toward the prescription of antibiotic for prophylactic and therapeutic needs is inadequate (Palmer et al. 2000,Kakoei et al. 2006, Nabavizadeh et al .2011). This will effect the bacteria by progressive loss of there sensitivity to these drugs and the spreading of resistant strains of bacteria, which will have more of a risk to the patient than the infection being treated or prevented. (Azevedo et al. 2009).

Various adverse effects can be occur duo to Antibiotics consumption, including drug interactions, overgrowth of resistant microorganisms, nausea, gastrointestinal upsets, potentially fatal allergic reactions and antibiotic associated colitis (Longmana et al . 2000). Antibiotics may become resistant by Bacteria, which is a serious public health problem. Evidence exists that the resistance of oral micro flora to antibiotics has increased during the past decades (Palmer et al. 2000,Epstein et al. 2000, Azevedo et al. 2009, Segura-Egea et al. 2010,Suaifan et al. 2012). The aim of this study was to evaluate the current knowledge of antibiotic prescription in endodontic practice among general practitioner dentists in Riyadh city, Saudi Arabia.

Materials and Methods

The Study-Target Population

The target study objects were general dental practitioners who are practicing in the dental field not more than 5 years in Riyadh, Saudi Arabia.

After evaluating the validity and reliability of the questionnaire, one-page questionnaire was distributed manually among 372 active general dentists in both private and governmental sectors to investigate their behavior of prescribing antibiotics therapeutically and prophylactically, participant were asked to give some answers to some clinical signs and conditions required antibiotics and their choice of medicine. Other electronic questionnaire (developed on Survey Monkey Website) was mailed to 11,284 dentist (4500 were sent to all general dental practitioners attended conferences in Riyadh Colleges of Dentistry and Pharmacy and Members in Suadi

Dental Society, 6744 were sent to dental general practitioners on their social network accounts and 40 were sent to all dental general practitioners working at King Abdulaziz Medical City).

The Study Tool: The Questionnaire

A structured English written questionnaire was developed and modified from a previous study (Nabavizadeh, 2011). The participant consent was the first choice to be selected in the questioner. The questionnaire consists of 26 questions divided into three sections.

The first section covered the demographic characteristics; Gender, qualification source (Saudi Arabia or other countries), Employee (Governmental sector or Privet sector) and Working experience since graduation (1yr, 2yrs, 3yrs, 4yrs, 5yrs).

The second section of the questionnaire composed of thirteen questions that investigate the practitioners' knowledge of the indications for prescribing antibiotics to an adult patient with no allergies, in a number of systemic clinical signs that may be associated with a dental infection. The clinical signs chosen were; fever, malaise, diffused swelling, and difficulty on swallowing. GDPs were also asked about the preferred antibiotic of choice if they were to use it in clinical conditions that require the use. These clinical conditions were (Symptomatic Irreversible Pulpitis, Symptomatic Apical Periodontitis, Acute Apical Abscess, Chronic Apical Abscess with Sinus Tract, Chronic Apical Periodontitis). Also investigated practitioners' knowledge of prescribing suitable antibiotics on two session's root canal treatment, one long session root canal treatment, after all root canal treatment, if

the patients insist and in retreatment cases.

The third section composed of nine questions assessed knowledge of the medical conditions and dental procedures that may require antibiotics as prophylactic treatment. The dental procedures were (before all root canal treatments and only before endodontic surgeries), the medical conditions included (HIV+, HBS+, non-controlled Diabetes, Congenital Heart diseases, Mitral valve prolapse and prosthetic joint in the past 2 years and those with a history of cancer and Radiotherapy). Antibiotic choices were (Penicillin Vk, Clindamycin, Amoxicillin, Amoxicillin with clavulanic acid and one of the choices was others).

Data analysis

Data were analyzed and tabulated using IBM SPSS Statics version 21.

Results

A total of 372 paper replies were received, only 222 useable replies fulfilled the acceptance criteria giving a response rate of 59.6%, also a total of 230 replies were received through email, twitter, and facebook only 95 fulfilled the acceptance criteria resulting in an overall total 317 replies. Few GDPs (n=22 ,6.9%) had full knowledge of section 2(correct answers to all 13 questions) of antibiotic prescription protocols. Figure 1 show the breakdown of responses. The maximum possible score for the questionnaire was 22, with respondents achieving a range of 6-21 (mean 13.73, S.D. 4.09). Table 1 shows the range of scores, means and standard deviations for demographic comparison. The total mean scores for gender, place of previous

education, working sector and working experience were compared. T-Tests showed no significant difference between genders (t_ 5.804; P > 0.05). A separate T-test, however, showed a significant difference between GDPs who have taken their bachelor degree in Saudi Arabia from GDPs who studied in other countries. Also a separate T-test revealed a significant difference between private sector and government sector differences were significant at (t_ 6.569;p<0.001). A one-way analysis of variance (ANOVA) using work experience as the grouping variable showed there were significant differences [F_10.338; P < 0.001] between work experience and knowledge. These significant differences were between 2nd, 3rd&4th-year working experience (mean total score 12.61, 11.32, 12.68) and 5-year working experience (mean total score 15.28). Therapeutic and prophylactic antibiotics that were prescribed by GDPs are summarized in Table 4 and 5.

The greatest number of antibiotic prescriptions was written for acute apical abscess (40.10%) and in-patient with diffused swelling (94%). Amoxicillin was the drug of choice in all-correct and incorrect cases for both section 2 (21.86%) and section 3(28%).

Figure :1 Description of Respondents

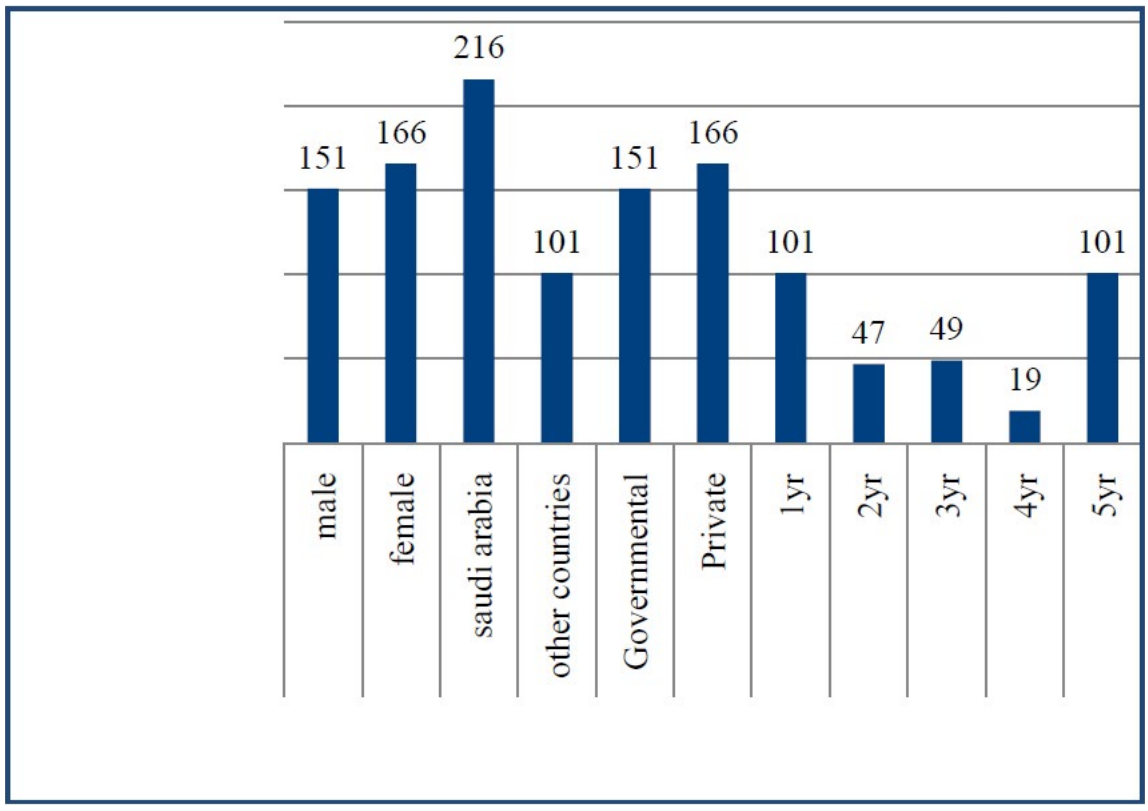

Table :1 Number, Means, Standard Deviations, P value of total score for prescription of antibiotics and prophylaxis antibiotics

		N	Mean	Std. Deviation	P Value
Gender	Male	151	13.9073	4.34105	P > 0.05
	Female	166	13.5843	3.85834	
Bachelor degree taken in	Saudi Arabia	216	14.6065	3.98926	p<0.001
	Other countries	101	11.8812	3.68588	
Employee in	Governmental	151	15.2252	3.56870	p<0.001
	Private	166	12.3855	4.07753	
*Work experience	1yr	101	14.0792	3.99420	P < 0.001
	2yr	47	12.6170	3.80248	
	3yr	49	11.3265	4.02279	
	4yr	19	12.6842	3.83047	
	5yr	101	15.2871	3.70226	
	Total	317	13.7382	4.09201	

Using one way ANOVA TEST, the rest done by t-test

Table :2 Conditions and total percentages of antibiotics prescription

Conditions	Prescribe AB%	Don't prescribe AB%
Symptomatic irreversible pulpitis	42%	58%
Symptomatic apical periodontitis	49.5%	50.5%
Acute apical abscess	86.8%	13.2%
Chronic apical abscess with sinus tract	59%	41%
Chronic apical periodontitis	40.4%	59.6%
After all root canal treatment	27.8%	72.2%
In patient with fever and malaise	80.8%	19.2%
In patient with diffused swelling	94%	6%
In patient with swelling and difficulty in swallowing	87.7%	12.3%
In two visit root canal treatment	26.8%	73.2%
In retreatment	26.5%	73.5%
If patient insist	25.9%	74.1%
In prolonged root canal treatment	31.2%	68.8%

Table :3 Conditions and total percentages of prophylaxis antibiotic prescription

Condition Situation	Prescribe AB%	Don't prescribe AB%
Always before every root canal treatment	26.5%	73.5%
Only before endodontic surgery	40.7%	59.3%
HIV+ patients	51.1%	48.9%
HBs+ patients	39.1%	60.9%
Non-controlled diabetic patients	64%	36%
Congenital heart disease (AV shunt and cardiac valve replacement)	88%	12%
Mitral valve prolapse	76%	24%
Prosthetic joint in past 2 years	61.8%	38.2%
History of cancer and radiotherapy	58.7%	41.3%

Table :4 Conditions and percentages of antibiotic prescription

Conditions	Penicillin VK	Clindamycin	Amoxicillin	Amoxicillin with clavulanic acid	other
Symptomatic irreversible pulpitis	7.90%	3.80%	23.70%	6.60%	0.00%
Symptomatic apical periodontitis	8.80%	4.10%	22.70%	11.00%	2.80%
Acute apical abscess	10.70%	6.00%	40.10%	26.20%	3.80%
Chronic apical abscess with sinus tract	8.50%	4.70%	23.00%	18.60%	4.10%
Chronic apical periodontitis	5.40%	3.50%	14.50%	13.60%	3.50%
After all root canal treatment	4.10%	3.50%	14.50%	2.80%	2.80%
In patient with fever and malaise	13.90%	5.00%	34.10%	24.30%	3.50%
In patient with diffused swelling	8.20%	8.80%	31.20%	40.10%	5.70%
In patient with swelling and difficulty in swallowing	12.30%	8.80%	27.10%	33.80%	7.30%
In two visit root canal treatment	3.50%	3.80%	13.90%	2.50%	3.20%
In retreatment	3.20%	4.40%	12.00%	3.50%	3.50%
If patient insist	5.70%	1.60%	14.20%	1.60%	2.80%
In prolonged root canal treatment	5.70%	2.50%	13.20%	5.70%	4.10%
Total %	4.76%	4.65%	21.86%	14.00%	3.62%

Table :5 Conditions and percentages of prophylaxis antibiotic

Condition Situation	Penicillin VK	Clindamycin	Amoxicillin	Amoxicillin with clavulanic acid	other
Always before every root canal treatment	6.60%	2.20%	9.80%	2.80%	5.00%
Only before endodontic surgery	6.00%	2.50%	19.20%	8.80%	4.10%
HIV+ patients	9.80%	3.20%	20.20%	12.30%	5.70%
HBs+ patients	6.30%	1.60%	15.50%	11.00%	4.70%
Non-controlled diabetic patients	10.70%	2.50%	33.40%	15.10%	2.20%
Congenital heart disease (AV shunt and cardiac valve replacement)	11.40%	5.40%	54.60%	15.50%	1.30%
Mitral valve prolapse	13.60%	4.10%	43.50%	13.90%	0.90%
Prosthetic joint in past 2 years	9.10%	5.40%	30.90%	13.20%	3.20%
History of cancer and Radiotherapy	10.40%	5.70%	25.60%	12.90%	4.10%
Total%	9.30%	3.62%	28.00%	11.70%	3.40%

Discussion

This study assessed the knowledge of antibiotics among general dental practitioners who are practicing in the dental field not more than 5 years in Riyadh city; kingdom Saudi Arabia. Up to the researchers knowledge this is the first study of its kind to be performed in Riyadh city.

In case of symptomatic irreversible pulpitis and symptomatic apical periodontitis, (42%) percent and (49.5%) of the participants prescribed antibiotics for the first and second situation, respectively. While the proper treatment in these situations are debridement of the root canal space and non-surgical root canal therapy without antibiotic therapy. (Nabavizadeh et al .2011) .In case of chronic apical periodontitis in a healthy patient, there is no indication for antibiotic use and treatment should be limited to nonsurgical root canal treatment, but, in this study (40.4%) of participants prescribed antibiotics.

Interestingly, (59%) of participants still prescribed antibiotics for chronic apical abscess with sinus tract, management of uncomplicated abscesses is effective drainage and removal of the cause without prescription of antibiotic.

Also for acute apical abscess antibiotics are not indicated. Those who were prescribing antibiotics in the previous studies (Dornet al. 1977, Gatewood et al. 1990, Whitten et al. 1996, Yingling et al. 2002, Rodriguez-Nu´n˜ez et al. 2009) ranged from 87% to 99%. The percentage of dentists who were prescribing antibiotic in this situation was (86.8%). Amoxicillin is the antibiotic of choice for 40, 10% of them. (Segura-Egea et al. 2010)

For these situations about dental infections with systemic signs like fever, malaise, cases of diffused swelling and difficulty in swallowing many of dentists answered these questions correctly. The percentages of these answers were 80.8%, 94% and
87.7 % respectively. Various antibiotics were prescribed in these cases which were similar to reports of other studies (Seltzer et al.1985, Gatewood et al .1990) (Nabavizadeh et al .2011).

After all root canal treatment, two visit root canal treatment, retreatment cases, if patient insist and in prolonged root canal treatment no antibiotic therapy is required. While in this study the percentage of participants who were prescribed antibiotics for these cases were (27.8% 26.8%, 26.5%, 25.9% and 31.2%), respectively.

Before every root canal treatment, HIV patients, HBS patients, non-controlled diabetic patients and in cases of history of cancer and radiotherapy Antibiotics are not indicated prophylactically.

The percentages of participants who were prescribed antibiotic in these situations were (26.5%, 51.1%, 39.1%, 64% and 58.7%), respectively. Prophylactic antibiotic is recommended before endodontic surgery, in cases of mitral valve prolapse, prosthetic joint in past 2years and congenital disease (AV shunt and cardiac valve replacement). 40.7% of dentists prescribed antibiotic before endodontic surgeries, 76% in mitral valve prolapse, 61.8% prescribed antibiotic for patients with prosthetic joint in past 2years and 88% for congenital diseases (AV shunt and cardiac valve replacement) which is the largest percentage for prescribing prophylactic antibiotics in this study, and 54,60% of them prescribed Amoxicillin. (Scott et al. 2005).

There is a significant difference in the percentages of awareness between dentists working in the private sector and others in the governmental sector. In this study we found that dentists working in governmental sector are more knowledgeable about the
appropriate use of antibiotic compared to dentists working in private sector, this might be due to lack of guidelines and regulations in the private management as well as private sector dentists are aiming to make highest possible profit.

Also we found that there is no significant difference between freshly graduated GDPs and those who have been practicing for five years in the awareness of antibiotic prescription. Dentists who have been practicing for one and five years are more knowledgeable compared to dentists with two, three and four years of experience.

GDPs who earned their bachelor degree in Saudi Arabia are considered

to be conservative in antibiotic prescription.

Conclusion

This study supports the conclusion that there is a lack of knowledge about the correct indication and type of antibiotics in dental practice among the GDPs, The prescription of antibiotics in cases of endodontic pathology tended to exceed general indications of their application and in some cases is irrational. There is also a need to improve undergraduate education curriculum and, Mandatory courses about antibiotics. Also, Strict policies must be enforced to regulate procurement of antibiotics and prohibit their purchase without a correct prescription.

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