Knowledge and Practices of Dentists Regarding Antibiotic Prescription In Medically Compromised Patients Undergoing Dental Treatment

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ABSTRACT

To find the association of level of knowledge and practice of dentists regarding antibiotic prescription in medically compromised patients undergoing dental treatment. A Cross sectional descriptive study was conducted on dental practitioners of Sharif Medical and Dental College, SMDC, Lahore, Pakistan from June 2019 to June 2020. Data was collected from 150 dental practitioners using a validated questionnaire after obtaining informed consent. A statistically significant association between level of knowledge of dentists and trend of antibiotic prescription in extraction (p=0.003) and root canal treatment (p=0.050) in hypertensive patients, extraction in patients with Myocardial Infarction (p=0.017), extraction (p=0.023) and root canal treatment (p=0.015) in patients with Infective endocarditis and scaling (p≤0.001), extraction (p=0.036) and root canal treatment (p=0.017) in liver failure patients. The association between level of practice and antibiotic prescription trends for root canal treatment in patients with Infective Endocarditis was found to be significant (p=0.026). Predominantly dentists with good level of knowledge as well as practices reported that antibiotics should be prescribed to patients undergoing extraction of teeth among which most recommended prescription in patients with Infective endocarditis followed by diabetes then Myocardial infarction and prosthetic heart valves, kidney transplant patients, hypertensive patients while the least recommended them for live failure patients.

Keywords

Dentists, antibiotic prescription, medically compromised patients, dental treatment

Introduction

Antibiotics are chemical substances that inhibit the growth or destroy microorganisms, including bacteria and Protozoa. Emergence of antibiotics led to a better quality of life, reduction of morbidity and mortality. Various modes of administration of antibiotics include oral, intravenous, and topical. Antibiotics can be used for both prophylactic and therapeutic purposes (Teoh, Marino, Stewart, & McCullough, 2019). Prophylactic antibiotics are administered to patients for prevention of infection during surgeries and for the prevention of infective Endocarditis (Javed et al., 2019). Therapeutic antibiotics are administered if local debridement is not effective for the treatment of hard and soft tissues. The most recurrently prescribed antibiotics include Amoxicillin, Penicillin and Metronidazole. These prove to be effective against most common microorganisms associated with oral infections such as Cocci, Bacilli, Gram Positive/Negative organisms, Aerobes and Anaerobes (Yu et al., 2020).

There are three phases for the management of Odontogenic infections namely: Diagnosis, Infection control and Re-habilitation. Antibiotics are effective during infection control phase in conjunction with surgical debridement (Leekha, Terrell, & Edson, 2011). Trends of antibiotic prescription are influenced by numerous factors, such as disease stages, incidence of antimicrobial resistance (Thompson et al., 2019), history of surgical procedures, organ failure & transplant, pregnancy and other chronic diseases along with contraindications caused by medications among medically compromised patients.

Immune compromised patients are prone to Bacteremia, which may rapidly lead to Septicemia (Smith et al., 2020). Deep Periodontal scaling, extractions and other invasive dental procedures are performed with extreme precautions in medically compromised patients. Patients with a history of uncontrolled diabetes are susceptible to catch infections that is why antibiotic coverage is mandatory (Miller & Ouanounou, 2020). There is a strong correlation between prosthetic joint infection and dental procedure. LaPorte et al have

1391

justified the late onset infection in hip replacement patients who had a coincidence with the dental procedures. Antibiotic prophylaxis is recommended for patients with an increased risk of Haematogenous infections of prosthetic joint (Skaar, Park, Swiontkowski, Kuntz, & Research, 2019). Patients who are not allergic to Penicillin are given Cephalexin 2g, 1 hour before the dental procedure and for penicillin allergic patients Clindamycin 600mg is administered 1 hour preoperatively.

Pregnant patients, patients with organ failures, such as kidney and liver failure, need special attention. In patients with kidney failure, dose adjustments are required in order to avoid increased plasma drug concentration. Penicillin, Clindamycin and Cephalosporin are the preferred antibiotics for such patients (Costantinides et al., 2018). Gudapati et al have suggested that in advanced stages of renal failure, doses of Indomethacin, Ibuprofen, Naproxen and sodium diclofenac should be reduced (Graham et al., 2021). Patients on Corticosteroids need an additional dose of Corticosteroids to prevent adrenal crisis. In organ transplant and pregnant patients, special caution is needed and consultation with physician is also mandatory before any dental treatment. Transplant patients are more susceptible to infection so antibiotic prophylaxis is advisable before the invasive dental procedures are performed. The initial six months, after kidney transplant, are considered unfavorable for any elective treatment (Coussement et al., 2021). Various surgical procedures that are routinely covered by systemic antimicrobials include impacted third molars, orthogenetic surgery, implant surgery, periapical surgery and benign tumor surgery (Chen, Gilpin, & Walsh, 2020). The aim of this study was to find the association of level of knowledge and practice of dentists regarding antibiotic prescription in medically compromised patients undergoing dental treatment.

Methodology

A Cross sectional descriptive study was conducted on dental practitioners of Sharif Medical and Dental College, SMDC, Lahore, Pakistan from June 2019 to June 2020. Data was collected from 150 dental practitioners using a validated questionnaire with a Cronbach alpha value of 0.914 after taking informed consent. Keeping the prevalence of antibiotic prescription in dentists 11.3% with 5 % precision and 95% confidence level the sample size was calculated to be 155 (Marra, George, Chong, Sutherland, & Patrick, 2016). The sampling technique used was non probability convenient sampling. Ethical approval was obtained from Sharif Medical Research Center (SMRC). The questionnaire comprised of three sections. Section 1 had questions regarding the demographics of the participants (name, age, gender, and years of experience, designation and department). Section 2 had four questions to assess the practice. For practice a score of 0 was given to "no," a score of 1 was given to "don`t know," and a score of 2 was given to "yes." There were two negatively-framed statements for which reverse scoring was done which means a score of 0 was given to "yes," 1 to "don't know," and 2 to "no (Sharma, Jain, & Sharma, 2015). This way, a respondent could score a maximum of 8 and a minimum of 0 in the practice section. On the basis of these scores, the practices were classified as poor (0-2), bad (3-5) and good (6-8). Section 3 had eleven questions to assess knowledge. The same scoring system was used as for practice questions. A respondent could score a maximum of 22 and a minimum of 0 in this section. Based on these scores the knowledge of the participants was classified as poor (0-7), bad (8-14) and good (15-22) (Sharma et al., 2015). All participants irrespective of their age and gender and dental practitioners with a clinical experience of more than 6 months were included in the study. Dentists working in the basic dental sciences will be excluded from the study. Recorded data will be coded and entered using SPSS statistical package version 23.0. P value of 0.05 or less will be considered significant. Numerical data was reported as mean and standard deviation. Nominal data was recorded as frequency and/or percentages. Fisher exact test was used to find the statistical association between level of practice of antibiotic prescription among dentists for extraction, scaling and root canal treatment in medically compromised patients (Infective endocarditis patients, diabetics, myocardial infarction patients, patients with prosthetic heart

valves, kidney transplant patients, hypertensive patients and liver failure patients). Fisher exact was to find the statistical association of level of knowledge of antibiotic prescription with extraction in myocardial infarction patients, infective endocarditis patients and prosthetic heart valve patients. Chi square test was used to find the association of level of knowledge and antibiotic prescription in medically compromised patients for scaling, extraction and root canal treatment in diabetic patients, hypertensive patients and kidney transplant patients and liver failure patient. Chi square test was used to find association between level of knowledge and antibiotic prescription for scaling and root canal treatment in myocardial infarction patients, infective endocarditis patients and prosthetic heart valve patients.

Results

A study based on data collected from 150 dental practitioners of Sharif College of Dentistry(SMDC) was conducted. The mean age of the participants was 25.07±4.582 with 37% males and 63% females. The participants had a mean clinical experience of 1.90±2.801.

It was seen that majority of the participants had a mean knowledge score of 18.29 ± 2.834. Majority of the respondents (86.7%) had a good level of knowledge regarding antibiotic prescription while 13.3 % were found to have bad level of knowledge. None of the respondents had a poor level of knowledge. There was found to be a statistically significant association between level of knowledge of dentists and trend of antibiotic prescription in extraction (p=0.003) and root canal treatment (p=0.050) in hypertensive patients, extraction in patients with myocardial infarction (p=0.017), extraction (p=0.023) and root canal treatment (p=0.015) in patients with Infective endocarditis and scaling (p≤0.001), extraction (p=0.036) and root canal treatment (p=0.017) in liver failure patients. The antibiotic prescription trends in medically compromised patients and their association with the level of knowledge regarding antibiotic prescription in dental practitioners is shown in table 1.

DISEASE	DENTAL TREATMENT	BAD LEVEL OF KNOWLEDGE n (%)	GOOD LEVEL OF KNOWLEDGE n (%)	p value
DIABETIC	SCALING	7 (4.7%)	60 (40%)	0.350

	EXTRACTION	15 (10%)	113 (75.3%)	0.177
PATIENTS	ROOT CANANL TREATMENT	9 (6%)	85 (56.7%)	0.079
HYPERTENSIVE PATIENTS	SCALING	6 (4%)	42 (28%)	0.837
	EXTRACTION	6 (4%)	84 (56%)	0.003
	ROOT CANANL TREATMENT	5 (3.3%)	63 (42%)	0.050
MYOCARDIAL INFARCTION	SCALING	13 (8.8%)	71 (48.3)	0.445
	EXTRACTION	11 (7.3%)	106 (70.7%)	0.017
	ROOT CANANL TREATMENT	10 (6.7%)	87 (58%)	0.140
INFECTIVE ENDOCARDITIS	SCALING	15 (10%)	93 (62%)	0.748
	EXTRACTION	14 (9.6%)	117 (78%)	0.023
	ROOT CANANL TREATMENT	10 (6.7%)	99 (66%)	0.015
PROSTHETIC HEART VALVES	SCALING	5 (10%)	89 (59.3%)	0.555
	EXTRACTION	14 (9.3%)	106 (70.7%)	0.238
	ROOT CANANL TREATMENT	10 (6.7%)	86 (57.3%)	0.161
KIDNEY TRANSPLANT	SCALING	13 (8.7%)	75 (50%)	0.537
	EXTRACTION	11 (7.3%)	93 (62%)	0.135
	ROOT CANANL TREATMENT	9 (6%)	70 (46.7%)	0.461
LIVER FAILURE	SCALING	10 (6.7%)	16 (10.7%)	≤0.001
	EXTRACTION	10 (6.7%)	35 (23.3%)	0.036
	ROOT CANANL TREATMENT	9 (6%)	24 (16%)	0.017

Table 1: Association between level of knowledge with antibiotic prescription in medically compromised patients

The mean score for practice was found to be 7.08±1.179. It was seen that 93.3% of the dentists demonstrated good practice of antibiotic prescription, 6.7% had bad while none were found to have a poor practice. The association between antibiotic prescription trends in medically compromised patients and the practices of dental practitioners has been given in table 2.

DISEASE	DENTAL TREATMENT	GOOD PRACTICE n (%)	BAD PRACTICE n (%)	p value
DIABETIC PATIENTS	SCALING	63 (42%)	4 (2.7%)	1.000
	EXTRACTION	121 (80.7%)	7 (4.7%)	0.165
	ROOT CANANL TREATMENT	89 (59.3%)	5 (3.3%)	0.502
HYPERTENSIVE PATIENTS	SCALING	45 (30%)	3 (2%)	1.000
	EXTRACTION	87 (58%)	3 (2%)	0.090
	ROOT CANANL TREATMENT	66 (44%)	2 (1.3%)	0.113

MYOCARDIAL INFARCTION	SCALING	78 (53.1%)	6 (4.1%)	1.000
	EXTRACTION	111 (74%)	6 (4%)	0.228
	ROOT CANANL TREATMENT	92 (61.3%)	5 (3.3%)	0.325
INFECTIVE ENDOCARDITIS	SCALING	102 (68%)	6 (4%)	0.467
	EXTRACTION	124 (82.7%)	7 (4.7%)	0.116
	ROOT CANANL TREATMENT	105 (70%)	4 (2.7%)	0.026
PROSTHETIC HEART VALVES	SCALING	98 (65.3%)	6(4%)	0.496
	EXTRACTION	113 (75.3%)	7 (4.7%)	0.419
	ROOT CANANL TREATMENT	92 (61.3%)	4 (2.7%)	0.169
KIDNEY TRANSPLANT	SCALING	82 (54.7%)	6 (4%)	1.000
	EXTRACTION	97 (64.7%)	7 (4.7%)	1.000
	ROOT CANANL TREATMENT	74 (49.3%)	5 (3.3%)	1.000
LIVER FAILURE	SCALING	25 (16.7%)	1 (0.1%)	1.000
	EXTRACTION	44 (29.3%)	1 (0.7%)	0.283
	ROOT CANANL TREATMENT	31 (20.7%)	2 (1.3%)	1.000

Table 2: Association between level of practice and antibiotic prescription in medically compromised patients

Discussion

A cross sectional descriptive study was conducted in College of Dentistry, Sharif Medical and Dental College, Lahore, Pakistan to assess the level of knowledge and practice of dental practitioners regarding antibiotic prescription in medically compromised patients undergoing dental treatment. According to a study conducted discrepancy in therapeutic and prophylactic antibiotic prescription in general dentists and Maxillofacial specialists in Australia, it was seen that for third molar surgical extraction all of the oral surgeons prescribed antibiotics prophylactically in patients with uncontrolled Diabetes as compared to 56% general dentists but for patients with cardiac valve replase 92% general dentists while 83 % oral and maxillofacial surgeons recommended the prophylactic antibiotic use (Chen et al., 2020). It has been seen in the past that the level of knowledge regarding the existing international guideline for antibiotic prescription, majority of the dental practitioners are involved in malpractice with regards to antibiotics (Alkhabuli, Kowash, & Shah, 2016). Prescription of antibiotics for prophylactic as well as therapeutic purposes is done in medically compromised patients including patients with infective

endocarditis, heart disease, prosthetic joints and heart valves opting dental treatment (Segura-Egea et al., 2017).

According to our study, it was seen that the greatest percentage of dentists with good level of knowledge reported that antibiotics should be prescribed to medically compromised patients undergoing extraction of teeth with 75.3% recommending it for diabetic patients, 56% for hypertensive patients, 70.7% in patients who have suffered Myocardial Infarction, 78% for patients with Infective endocarditis,70.7% for patients with prosthetic heart valves, 62% for kidney transplant patients and 23.3%for liver failure patients. Mansour et al reported in a study on knowledge, attitude and practices of dentists regarding antibiotic prescription that among scaling, restoration and extraction the prophylactic use of antibiotic was prescribed to high risk patients by 28.2% dentists before scaling, 18% for patients undergoing mandibular and 16 % for those undergoing maxillary extractions while only 3.3% prescribed antibiotics before restorations (Mansour, Feghali, Saleh, & Zeitouny, 2018). Regarding the knowledge of antibiotic prescription in medically compromised patients the study above (Mansour et al., 2018)also reported that 96% dentists said that antibiotics should be prescribed prophylactically in patients with prosthetic cardiac valves, 80.3% reported that they should be prescribed in patients with previous history of infective endocarditis, 76.7% were of the view that antibiotic prescription is necessary for patients with diabetes while 20.8% reported prophylactic antibiotic prescription to be necessary in patients who had suffered myocardial infarction 6 months ago before they undergo dental treatment.

With respect to the level of good practices of antibiotic prescription, it was reported in our study that the dentists with a good level of practice of antibiotic prescription in medically compromised patients also recommended their use predominantly while tooth extraction with 80.7% prescribing them for diabetics, 58% for hypertensive patients, 74% for Myocardial infarction patients, 82.7% for patients with Infective Endocarditis, 75.3% for patients with prosthetic heart valves, 64.7% for kidney transplant patients while 29.3% for liver failure

1394

patients. One study reported that out of a total of 160 dental practitioners 106 prescribed antibiotics for periodontal treatment with surgery, 69 gave it before extraction, 64 recommended prescription before endodontic treatment while 31 reported prescribing them before periodontal treatment before surgery (Gaballah, Bahmani, Salami, & Hassan, 2014). In the same study (Gaballah et al., 2014) it was also reported that among these 160 dental practitioners 134 prescribed antibiotics prophylactically to patients at risk of infective endocarditis, 94 recommended prophylactic antibiotics for diabetes mellitus patients, 59 did so for coronary bypass patients. According to a study conducted on prophylactic antibiotic prescription by dentists in medically compromised patients (Palmer, Pealing, Ireland, & Martin, 2000), it was reported that for diabetic patients undergoing scaling 1.1% denitsts prescribed prophylactic antibiotics, 3.6% prescribed them before root canal treatment while 15.8% did so before extraction. In patients with a history of infective endocarditis 86.2% dentists provided antibiotic prophylaxis before scaling, 71.8% prescribed them before root canal treatment while 88.3% prescribed them before extraction. In case of prosthetic heart valves 84.4% dentists prescribed antibiotics before scaling followed by 67.9% before root canal treatment and 87% before extraction (Palmer et al., 2000).

It is of immense importance that dentists have adequate knowledge and good practices for prescribing antibiotics for therapeutic as well as prophylactic purposes in medically compromised patients as it can impact the prognosis of the dental treatment and can impact the patient in an adverse way.

Conclusion

The highest percentage of dentists with good level of knowledge reported that antibiotics should be prescribed to patients undergoing extraction of teeth among which most recommended prescription in patients with Infective endocarditis followed by diabetes then Myocardial infarction and prosthetic heart valves, kidney transplant patients, hypertensive patients while the least recommended them for live failure patients. The highest percentage of dentists with good level of practices of antibiotic prescription also recommended antibiotic prescription in medically

compromised patients mainly during tooth extraction with the maximum recommending it for patients with infective endocarditis followed by diabetic patients, prosthetic heart valve patients, myocardial infarction patients, kidney transplant patients, hypertensive patients and the least for liver failure patients.

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1395

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