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PATTERN OF PRESCRIPTION OF ANTIBIOTICS AMONG THE DENTAL PRACTITIONERS OF PESHAWAR, PAKISTAN

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ABSTRACT

Objectives: *To determine pattern of prescription of antibiotics among the dental practitioners of Peshawar, Pakistan.*

Materials and Methods: *A cross-sectional online study was conducted in Peshawar over a period of 2 months using a convenient sampling technique. A total of 320 dental practitioners were included in the study. Data was collected through a reliable and validated questionnaire. Association between the variables was determined using the Chi-square test.*

Results: *The mean age of study participants was 34.15±11.79years. Of the total 320, 183(57.2%) were female with a mean age of Most dentists prescribe a prophylactic antibiotic for root canal therapy i.e., 64(20.00%), and infiltration injection with 31(9.68%), whereas for therapeutic purposes, the prescription of antibiotics was high in the case of acute peripheral abscesses with 157(49.06%) and chronic peripheral abscesses with 153(47.81%). Preferred antibiotics for different dental procedures were Metronidazole with 185 (57.8%) and Amoxicillin with 134(42%). A statistically significant association was observed between the use of different antibiotics in anaphylactic and systematic situations with age, gender, and Higher-Qualification ($p<0.05$).*

Conclusion: *Lack of uniformity is observed in the rational use of antibiotics among study participants. Concrete measures should be undertaken to prevent the irrational use of antibiotics in dental practice and to curb resistance.*

Key words: *Dental Practitioners; Dentists; Antibiotics; Antibacterial agent*

INTRODUCTION

In the present era, various health organizations are giving special attention to the appropriate use of antibiotics in healthcare settings. A dramatic increase is observed in the prescription of antibiotics among medical professionals including dental practitioners[1]. From 2000 to 2015, an increasing trend of about 65% is observed in global antibiotic consumption mainly in low and middle-income countries[2].

Several guidelines are available for the rational use of antibiotics but due to conflicts in the recommendations, there is evidence of misuse of antibiotics among the general dental practitioners[3,4]. About 7%to 11%of all the common antibiotics such as b-lactams, macrolides, tetracycline, clindamycin, and metronidazole are prescribed by dentists[5]. Although most dental infections can be managed by surgical measures and by maintaining dental hygiene the prescription of antibiotics for various oral infections is prevalent all around the world. This inappropriate prescription of antibiotics is responsible for the growing bacterial resistance[6].

A survey was conducted in the United Kingdom, according to which 15% of dentists prescribe antibiotics on a daily basis while 40% recommend it for 3 cases per week[7]. A Canadian study reports that dental practitioners and general recent graduates tend to prescribe antibiotics at a lower rate than senior practitioners[8]. Antibiotic therapy can achieve a satisfactory result in a majority of oral infections but it should not be the primary option unless there

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is obvious evidence[9].

A major differentiation between medical and dental conditions is that most dental infections can be cured successfully by eliminating the source of infection[10]. National Center for disease control and prevention has evaluated that about one-third of all outpatient prescriptions are unnecessary[11,12,13].

Performing an extensive literature search it was found that fewer studies are conducted in Pakistan on the pattern of prescription of antibiotics among dental practitioners. This study has estimated the prescribing pattern of antibiotics in different prophylactic and systematic situations.

MATERIALS AND METHODS

This cross-sectional study was conducted among the dental practitioners of district Peshawar, Khyber Pakhtunkhwa, Pakistan from December 2020 to February 2021. The anticipated sample size for the study was 320 calculated by using the OpenEpi, an online sample size calculator[14]. Non-probability convenience sampling technique was used. Any dentist with a minimum qualification of a Bachelor of Dental Surgery (BDS) degree was included in the study with the exclusion of those who did not fill out the questionnaire.

Ethical approval was taken from the Ethical review committee of Peshawar Medical College, Peshawar, Pakistan. (Reference No. 25, Date 18thJan, 2021). Online informed written consent (e-signature) was obtained from the study participants and confidentiality was maintained.

Data was taken through a web-based valid and reliable questionnaire adopted from a previously published study[15]. It consists of four sections. The first section included the demographic data in which questions were asked regarding age, gender, and higher qualification. The second and third sections involved some clinical signs and conditions which required antibiotics for both prophylactic and therapeutic purposes. Lastly, in the fourth section, respondents provided information on their preferred choice of antibiotics. The collected data will be interpreted by two independent examiners and kappa-coefficient will be applied for any inter-examiner bias. SPSS (Statistical Package for Social Sciences) version 20 was used for the data analysis. Mean, standard deviation, and frequencies along with percentages were calculated using descriptive statistics. Associations between the nominal and ordinal variables were calculated through Chi ($\chi 2$) statistics using a p-value of <0.05 level of significance.

RESULT

Among 320 dental practitioners, the mean age in years was34.15±11.79, of which 137 (42.80%) were males and 183 (57.20%) were females, and 76(23.75%) had higher academic qualifications as shown in table 1 and figur1. Prophylactic situations for which different antibiotics were prescribed are shown in table 2. Most of the dentists always prescribed antibiotics in root canal therapy 64(20.00%) and a statistically significant association was observed between age (p=<0.001), gender (p=0.027), and higher qualification (p=0.001). Infiltration injection was the second prophylactic condition in which dentists always prescribed antibiotics with 31(9.68%) and here only age (p=0.044) and gender (p=0.043) showed statistical association with this statement. Furthermore, sub gingival restoration was the condition where dentists always prescribed antibiotics 23(7.18%), and here age (p=0.002) and higher qualification (p=0.023) showed a statistical association. Most of the dentists prescribed antibiotics rarely in scaling 241(75.31%), and a statistically significant association was observed between age (p=0.015), gender (p=0.008), and higher qualification (p=0.023). In supra gingival restoration 285(89.06%) of the dentists prescribed rarely and significant association occurred only with higher qualifications (p=0.022). In fluoride therapy, 273(85.31%) dentists prescribed antibiotics, and statistically, a significant association can be observed among age (p=0.007), gender (p=<0.001), and higher qualification (p=0.009). In matrix band replacement, probing, and falling deciduous 282(88.12%), 275(086.93%), and 261(81.56%) dentists rarely prescribed antibiotics, and gender showed the same statistically significant association with these three conditions (p=<0.001) while age showed significance only with probing (p=0.007). Prescribing antibiotics rarely in conditions like block injection and intraligamentary injections are close to each other with 254(79.37%) and 258(80.62%) and both of these conditions showed significant association with background variables.

The use of antibiotics in systematic situations

is shown in Table 3. In conditions like acute and chronic periapical abscesses i.e., 157(49.06%) and 153(47.81%) of the dentists always prescribed antibiotics, and both of these conditions showed the same statistically significant association with age, gender, and higher qualification (P=<0.001) except gender and chronic abscesses (0.007). Likewise,144(45.00%) and 140(43.75%) dentists always prescribe antibiotics for acute pulpitis and fever, and the same statistical association was observed between age, higher qualification, and these two conditions (p=<0.001). In chronic periodontitis, unexplained trismus, diffuse swelling, and dry socket 144(45.00%), 170(53.12%), 109(34.06%), and 156(48.75%) of the dentists never recommended antibiotics and all these situations showed the same statistical significant association with age and higher qualification (p=<0.001). Similarly, after endodontic therapy and before and after extraction 114 (35.62%), 136 (42.50%), and 85 (26 .56%) never prescribed antibiotics and all these conditions showed the same statistically significant association with age and higher qualification (p=<0.001) except with gender and after endodontic therapy (p=0.007).

The antibiotic prescribing pattern is shown in table 4, where the majority of the dentists always preferred metronidazole 185(57.81%) for most dental conditions followed by Amoxicillin 134(41.87%) and a combination of amoxicillin and Clavulanic acid 117(35.56%). All these three antibiotics showed statistically significant association with age i.e., (p=0.038), (p=0.017), and (p=<0.001). Metronidazole showed a statistically significant association with gender (p=0.029) too while amoxicillin and Clavulanic acid showed higher qualification (p=0.008). Clindamycin 177 (55.31%), clarithromycin 202(63.12%), and doxycycline 155 (48.40%) were never prescribed by dentists and all these antibiotics showed the same statistical association with age and higher qualification (p=<0.001). Azithromycin165(51.6%), erythromycin 205(64.06%), and ciprofloxacin 182 (56.87%) were never recommended by the dental practitioner and all these three antibiotics showed statistically significant association with age (p=0.011, <0.001, and <0.001), gender (p=0.004, 0.002, and 0.008), and higher qualification (p=0.033, 0.002, and 0.001). Cefadroxil 175 (54.68%)and minocycline 200 (62.50%) were never prescribed by the dentists and both of them showed the same statistical association with age (p=<0.001).

DISCUSSION

Antibiotics are commonly used in dentistry for preventive and treatment purposes. The use of antibiotics should be meticulous due to the increasing trend of antibiotic resistance. The findings of this descriptive cross-sectional study showed that the majority of dentists prescribe antibiotics prophylactically in Root canal therapy followed by infiltration injection. Likewise, for systemic purposes, local and chronic periapical abscesses are the two conditions

Table 2: Prophylactic Situations for which antibiotics are prescribed

Prophylactic Situations	Frequency N (%)			Age groups	Gender	Higher Qualification
	Always	Sometime	Rarely	P-value		
Scaling	15(4.68)	64(20.00)	241(75.31)	0.015	0.008	0.023
Supra gingival restoration	16(5.00)	19(5.93)	285(89.06)	0.109	0.386	0.022
Sub gingival restoration	23(7.18)	61(19.06)	236(74.75)	0.002	0.119	0.023
Fluoride therapy	10(3.12)	37(11.56)	273(85.31)	0.007	<0.001	0.009
Matrix band replacement	11(3.43)	27(8.43)	282(88.12)	0.123	<0.001	0.078
Probing	10(3.12)	35(10.93)	275(86.93)	0.007	<0.001	0.099
Root canal therapy	64(20.00)	106(33.12)	150(46.87)	<0.001	0.027	0.001
Raking radiographs	15(4.68)	4(1.25)	301(94.06)	0.115	0.737	0.496
Impression	11(3.43)	11(3.3)	298(93.12)	0.139	0.118	0.166
Falling deciduous	10(3.12)	49(15.31)	261(81.56)	0.110	<0.001	0.200
Block injection	22(6.87)	44(13.7)	254(79.37)	0.001	0.028	0.001
Intraligamentary injection	22(6.87)	40(12.5)	258(80.62)	0.001	0.004	0.044
Infiltration Injection	31(9.68)	40(12.53)	249(77.81)	0.044	0.043	0.304

Table 1: Study Participant's background characteristics

Variable		Frequency (n=320)
Gender	Male	137 (42.80%)
	Female	183 (57.20%)
Age	Range	24-66years
	Mean age	34.15±11.79 years
	Median(IQR)	28.00 (9.00)
Higher qualification	Yes	76 (23.75%)
	No	244 (76.25%)

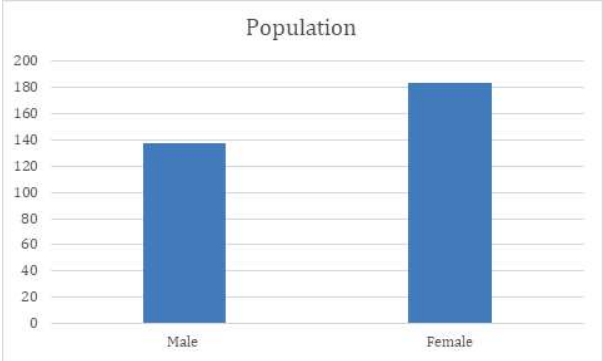

Fig 1: Gender distribution

Table 3: Systematic situations in which antibiotics are prescribed

Systematic conditions	Frequency N (%)			Age groups	Gender	Higher Qualification
	Always	Sometime	Never	P-value		
Fever	140 (43.75)	115 (35.93)	65 (20.31)	<0.001	0.265	<0.001
Acute Pulpitis	144 (45.00)	109 (34.06)	67 (20.93)	<0.001	0.002	<0.001
Acute periapical abscesses	157 (49.06)	82 (25.62)	81 (25.31)	<0.001	<0.001	<0.001
Chronic periapical abscesses	153 (47.81)	77 (24.06)	90 (28.12)	<0.001	0.007	<0.001
Chronic marginal gingivitis	73 (22.81)	70 (21.87)	177 (55.31)	0.346	0.078	0.321
Chronic periodontitis	74 (23.12)	102 (31.87)	144 (45.00)	<0.001	0.636	<0.001
Unexplained trismus	54 (16.87)	96 (30.00)	170 (53.12)	<0.001	0.018	<0.001
Diffuse swelling	106 (33.12)	105 (32.81)	109 (34.06)	<0.001	0.007	<0.001
Dry socket	115 (35.93)	49 (15.31)	156 (48.75)	<0.001	0.877	<0.001
Before Endodontic therapy	36 (11.25)	126 (39.37)	158 (49.37)	0.017	0.001	0.042
After endodontic therapy	65 (20.31)	141 (44.06)	114 (35.62)	<0.001	0.007	<0.001
Before tooth extraction	39 (12.18)	145 (45.31)	136 (42.50)	<0.001	0.961	<0.001
After tooth extraction	136 (42.50)	99 (30.93)	85 (26 .56)	<0.001	0.381	<0.001

Table 4: Antibiotics prescribing pattern among the Dentists

Antibiotics	Frequency N (%)			Age groups	Gender	Higher Qualification
	Always	Sometime	Rarely	P-value		
Amoxicillin	134 (41.87)	162 (50.62)	24 (7.50)	0.017	0.153	0.692
Amoxicillin/clavulanic acid	117 (35.56)	156 (48.75)	47 (14.68)	<0.001	0.488	0.008
Metronidazole	185 (57.81)	107(33.43)	28 (8.7)	0.038	0.029	0.134
Clindamycin	39 (12.18)	104 (32.5)	177 (55.31)	<0.001	0.070	<0.001
Azithromycin	33 (10.31)	122 (38.12)	165 (51.6)	0.011	0.004	0.033
Clarithromycin	34 (10.62)	84 (26.25)	202 (63.12)	<0.001	0.428	<0.001
Doxycycline	18 (5.62)	147 (45.93)	155 (48.40)	<0.001	0.100	<0.001
Erythromycin	29 (9.06)	86 (26.87)	205 (64.06)	<0.001	0.002	0.002
Ciprofloxacin	41 (12.81)	97 (30.31)	182 (56.87)	<0.001	0.008	0.001
Cefadroxil	27 (8.43)	118 (36.87)	175 (54.68)	<0.001	0.001	0.153
Minocycline	8 (2.5)	112 (35.00)	200 (62.50)	<0.001	0.130	0.003
Cefuroxime	19 (5.93)	80 (25.00)	221 (69.06)	<0.001	0.701	0.001

where the prescription is high. Metronidazole and amoxicillin are the two preferred forms of antibiotics. Dentists like other medical practitioners are expected to prescribe antibiotics but the prescribing pattern should be rational. Their usage should be restricted to conditions when there is a chance of spreading or systemic involvement. In 2020, a study was conducted in Turkey on the rational use of antibiotics in dentistry, which indicated that amoxicillin and clavulanic acid is the most frequently prescribed antibiotics (90%) which is consistent with our study[16].

According to a study in Kuwait, the antibiotic prescribing pattern of dentists in the management of oral diseases demonstrated that 46% of the dental practitioners prescribe antibiotics for acute periapical infection while our study showed 49%. As far as the choice of antibiotic is concerned, amoxicillin is on top followed by metronidazole which is inconsistent with our study findigs[17]. In another study, the knowledge, attitude, and practice of Lebanese dentists about antibiotic use indicated that the use of these agents in periapical infections is 67% which is quite high than our study, and the majority of these practitioners have prescribed amoxicillin and a combination of amoxicillin/Clavulanic acid[18].In 2009, a study was conducted in Belgium in which the antibiotic prescribing pattern of dentists was determined where Periapical infections (52%) were the most frequent diagnosis for which antibiotics were prescribed and here metronidazole and amoxicillin were the most commonly prescribe antibiotics[19].

A survey was conducted in Kolkata, West Bengal, India regarding the use of antibiotics among dentists, it was determined that the first choice of antibiotics was amoxicillin followed by a combination of amoxicillin. Here facial swelling (68%) was the prime condition for which antibiotics were prescribed for the prophylactic purpose. While in the case of systematic situation dentoalveolar abscess (57%) was on top as compared to our study where periapical abscesses were in the first position with 49%[20]. In France, a nationwide questionnaire-based survey was conducted in 2017, about antibiotic use and resistance among dentists. Here the most frequently prescribed antibiotic was again amoxicillin. For prophylactic purposes, antibiotics were mainly recommended for bone grafts (30%) while for systemic purposes periapical abscess (83%) is on top which is consistent with our study[21].

This study determines the pattern of prescription of antibiotics both in anaphylactic and systemic situations. This study highlighted the need that dentists should be included at the time of formulating and then implementing those guidelines, to arrest the unnecessary use of antibiotics. Moreover, oral infections should have been separated from dental infections as majority of them need antibiotic and antifungal therapy for treatment. The sample size could have been large enough in order to generalize the results on the general dental practitioners of Peshawar. Inconsistency is observed between the professional guidelines and the dentist's antibiotic prescribing pattern.

CONCLUSION

Metronidazole and amoxicillin are the most preferred choice of antibiotics among dentists both for prophylactic and therapeutic purposes. There are certain oral conditions e.g., oral infections caused by viruses like cold sores, fungal infections, and toothache or dental pain resulting from a trauma or injury, which can be easily treated by local management instead of antibiotics.

RECOMMENDATIONS

Awareness programs should be developed regarding the irrational use of antibiotics among dental practitioners on an urgent basis. Professional guidelines should be developed for the rational use of antibiotics in dentistry to tackle the issue of antibiotic resistance. There is also a need of improving and updating the knowledge of dentists about antibiotics by arranging continuing dental education programs for them at regular intervals.

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