

## **Research Article**

### **Antibiotic Use In Common Endodontic Practice**

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**Abstract:** Appropriate and correct use of antibiotics is essential to ensure effective and safe treatment and to avoid microbial resistance. The purpose of the survey was to assess the prescribing habits of the dental practitioners of Rajasthan State regarding antibiotic. A one-page, double sided questionnaire was sent to 300 dental practitioners. The responses obtained were statistically analyzed. Out of 300 surveys mailed, response rate was 53.3%. Mean age of the practitioners was  $37.4 \pm 6.37$  years. 71.9% of them were male & 83.1% had MDS degree. Mean duration of prescribing antibiotic was  $5.2 \pm 1.59$  days. 76.6% chose amoxicillin in patients with no medical allergies alone (40.5%) or with clavulanic acid (36.1%) followed by ofloxacin and ornidazole combination (22.5%). Antibiotic preferred in patients with history of penicillin allergy was ofloxacin and ornidazole combination (52.5%) followed by clindamycin (16.9%). No of practitioners prescribing antibiotics for various indications ranged from 8.8% to 31.9%. Antibiotics are used widely in dentistry, often unnecessarily. Dental practitioners must become better educated about the prudent use of antibiotics, the dangers and cost of their overuse and misuse.

**Keywords:** Antibiotics, dentistry, resistance

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#### **INTRODUCTION**

Over the past 80 years, antibiotic therapy has played a major role in the treatment of bacterial infectious diseases. Since the discovery of penicillin by Fleming in 1928 and sulfanilamide in 1934 by Domagk, the entire world has benefited from one of the greatest medical advancements in history [1]. Antibiotics are frequently prescribed in dental practice for treating odontogenic infections, non-odontogenic infections, as prophylaxis against focal and local infection [2]. The use of antibiotics in dental practice is characterized by empirical prescription based on clinical and bacteriological epidemiological factors, with the use of broad spectrum antibiotics for short periods of time, and the application of a very narrow range of antibiotics [3].

Dentists prescribe between 7% and 11% of all common antibiotics (beta-lactams, macrolides, tetracyclines, clindamycin, metronidazole). [4] In the UK, for instance, dentists accounted for 7% of all community prescriptions of antimicrobials. [5] Antibiotic prescribing may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock and

development of resistance. Antibiotic resistance is the ability of a microorganism to withstand the effects of antibiotics. The increasing resistance problems of recent years are probably related to over- or mis-use of broad-spectrum agents such as cephalosporins and fluoroquinolones. [6] Common dental infections present in the form of pulpitis and periapical periodontitis, which require only operative measures like fillings, root canal therapy, or extraction if the tooth is not restorable. Unfortunately, dentists still prescribe antibiotics for this condition [7-11]. Another aspect of antibiotic over-prescribing is prescribing based on non-clinical factors. Patient's expectation of an antibiotic prescription, convenience, and demand necessitated by the social background of the patients are considered unscientific reasons for antibiotic prescription [12].

Several surveys have been done in the United States, Spain; Canada determined the prescribing habits of Endodontists with regard to antibiotics. However, in Rajasthan, no study has analyzed the prescribing habits with regard to antibiotics between endodontists. The purpose of this study was to investigate the antibiotic-prescribing habits of the endodontists.

**MATERIAL AND METHODS**

A one-page, double sided questionnaire was prepared and sent to 300 dental practitioner. The target population was practicing endodontics. The responses obtained were analysed by using descriptive statistics.

**OBSERVATIONS**

Out of 300 surveys mailed, 160 surveys were returned, giving a response rate of 53.3%. Demographic characteristics of the dental practitioners are described in table 1. Out of 160 dental practitioners, majority of them (52.5%) were between 35 to 45 years of age, 36.9% were between 25 to 35 years of age and only 10.6% were above 45 years of age. Age of the doctors ranged from 18 to 47 years of age and mean age was  $37.4 \pm 6.37$  years. 71.9% of the practitioners were male and only 28.1% were females. 83.1% of the practitioners had MDS degree, 10% were pursuing MDS degree and 6.9% had BDS degree and practicing endodontics.

Table 2 shows beliefs and habits of the practitioners regarding prescribing antibiotics. 31.9 % believed that changing antibiotics increases the risk of bacterial resistance while 68.1% did not believe that changing antibiotics increases the risk of bacterial resistance. 66.3% preferred to use single antibiotic while 33.7% preferred to use more than 1 antibiotic. Only 35.6% preferred to initiate antibiotic therapy with loading dose while 64.6% were not in the habit of initiating antibiotic therapy with loading dose and. 67.5 % prescribed antibiotics by brand names. 73.8% preferred to use bacteriocidal antibiotics.

Most of the dental practitioners (76.6%) chose amoxicillin in patients with no medical allergies (Table

3), alone (40.5%) or with clavulanic acid (36.1%). 22.5% preferred to use ofloxacin and ornidazole combination. Other antibiotics preferred as first choice were metronidazole (10%), clindamycin (3.8%) and azithromycin (2.5%). The first antibiotic preferred in patients with history of penicillin allergy was ofloxacin and ornidazole combination (52.5%), clindamycin (16.9%) followed by erythromycin (11.8%).(Table 4)

Regarding duration of antibiotic therapy, majority of the dental practitioners (75.7%) prescribed antibiotics for 5 to 7 days. Duration of antibiotic therapy ranged from 3 to 10 days. Mean duration of prescribing antibiotic was  $5.2 \pm 1.59$  days. (Table-5)

Table 6 lists various indications for which antibiotic were prescribed by the dental practitioners. For non-treatable pulpitis with moderate/severe symptoms and non-treatable pulpitis with acute apical periodontitis with moderate/severe preop symptoms 18.1% & 23.8% of the respondents prescribed antibiotics respectively. In cases of necrotic pulp with chronic apical periodontitis with no swelling and no or mild symptoms antibiotics was prescribed by 8.8% of the practitioners. In cases of necrotic pulp with acute apical periodontitis with mod/severe preop symptoms and no swelling 16.9% of the practitioners prescribed antibiotics and in presence of swelling 28.1% prescribed antibiotics. In cases of necrotic pulp with chronic apical periodontitis with sinus tract and no or mild preop symptoms 22.5% respondents prescribed antibiotics. 31.9% of the practitioners prescribed antibiotics for orofacial trauma cases. Out of 160 respondents only 3.8 % did not respond to the questions.

**Table-1: Profile of dental practitioners**

Profile	Number	Percentage
Age (years)		
25 - 35	59	36.9
35 - 45	84	52.5
≥ 45	17	10.6
Gender		
Male	115	71.9
Female	45	28.1
Academic Degree		
BDS	11	6.9
MDS	133	83.1
Pursuing MDS	16	10.0

**Table-2: Beliefs and habits of the practitioners regarding antibiotic prescription**

Beliefs and habits of the practitioners regarding antibiotic prescription	Number	Percentage
Changing antibiotic increase the risk of bacterial resistance		
Yes	51	31.9
No	109	68.1
Preference of using		
Single antibiotics	106	66.3
More than 1 antibiotics	54	33.7
Initiate antibiotic therapy with loading dose		
Yes	57	35.6
No	103	64.4
Type of drug prescribed		
Generic	52	32.5
Branded	108	67.5
Type of drug preferred		
Bacteriostatic Drugs	42	26.2
Bacteriocidal Drugs	118	73.8

**Table-3: Antibiotics preferred in patients with no medical allergies**

Antibiotic prescribing preference	Number	Percentage
Amoxicillin	71	44.0
Amoxicillin + Clavulanic acid	61	38.1
Ofloxacin (200mg) + Ornidazole (500mg)	36	22.5
Clindamycin	6	3.8
Azithromycin	4	2.5
Metronidazole	16	10
Penicillin G	0	0
Others (Amoxicillin + Tinidaole)	3	1.9

**Table-4: Antibiotics preferred in patients with medical allergies**

Antibiotic prescribed for adult patients allergic to penicillin	Number	Percentage
Ofloxacin (200mg) + Ornidazole (500mg)	84	52.5
Clindamycin	27	16.9
Azithromycin	15	9.4
Metronidazole	15	9.4
Erythromycin	19	11.8
Lincomycin	0	0

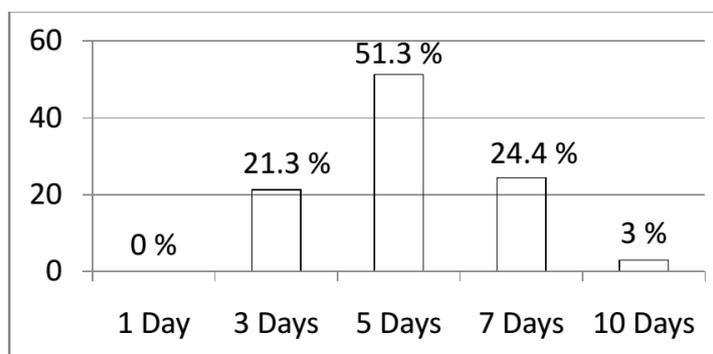
**Table-5: Duration of Antibiotic therapy**

Duration of Antibiotic therapy	Number	Percentage
1 Day	0	0
3 Day	34	21.3
5 Day	82	51.3
7 Day	39	24.4
10 Day	5	3.0

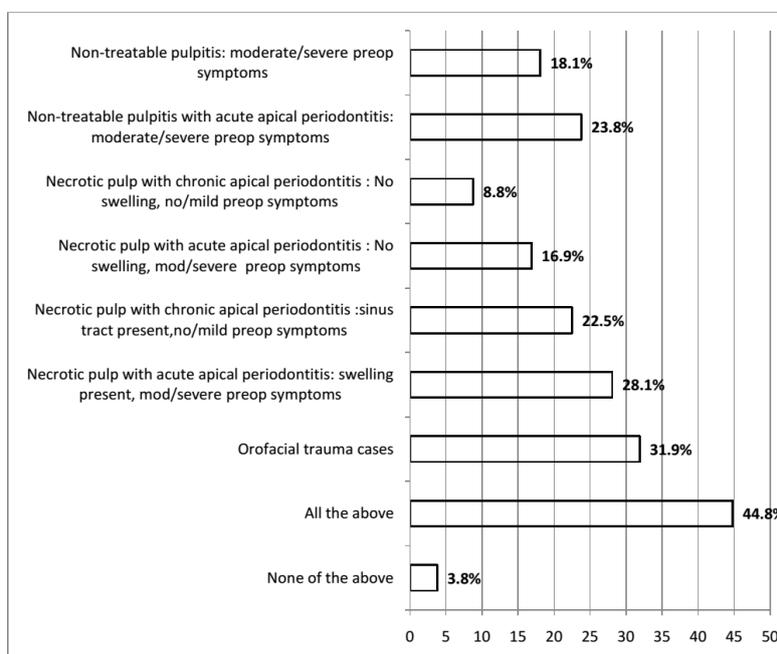
**Table-6: Indications for prescribing antibiotic**

Indications for prescribing antibiotic	Number	Percentage
Non-treatable pulpitis: moderate/severe preop symptoms	29	18.1
Non-treatable pulpitis with acute apical periodontitis: moderate/severe preop symptoms	38	23.8
Necrotic pulp with chronic apical periodontitis : No swelling, no/mild preop symptoms	14	8.8
Necrotic pulp with acute apical periodontitis : No swelling, mod/severe preop symptoms	27	16.9
Necrotic pulp with chronic apical periodontitis :sinus tract present,no/mild preop symptoms	36	22.5
Necrotic pulp with acute apical periodontitis: swelling present, mod/severe preop symptoms	134	83.8
Orofacial trauma cases	51	31.9
All the above	71	44.8
None of the above	6	3.8

\*One or More than one response



**Fig-1: Duration of antibiotic therapy**



**Fig-2: Indications for prescribing antibiotic**

**DISCUSSION**

In our survey the response rate was 53.3%, similar response rate was seen in the study done by Yingling et

al 2002[9] while other surveys published recently have reported response rates in the range of 31% to 46%. [10,13-15], therefore the overall response rate was

considered an acceptable rate of return for the surveys. The questionnaire design in this study included variety of information about practitioners knowledge and behavior in antibiotic prescription in relation with their experience.

35.6% of the practitioners in our study initiate antibiotic therapy with loading dose while 85.14% of the practitioner used loading dose in the survey done by Yingling et al [9]. An antibiotic loading dose should be used whenever the half-life of the antibiotic is longer than 3 hours or whenever a delay of 12 hours or more is unacceptable to achieve therapeutic blood levels. [16]. Endodontic infections typically have a rapid onset and short duration, 2 to 7 days or less, particularly if the cause is treated or eliminated [17]. The average duration of antibiotic therapy in our study was 5.9 days with a range of 3 to 10 days. Other studies had reported a longer average duration of antibiotic therapy [9, 10, 18, 19].

Various antibiotics used by the dental practitioners were amoxicillin, alone or associated with clavulanic acid, ofloxacin in combination with ornidazole, clindamycin, azithromycin, metronidazole, Penicillin G, lincomycin, and erythromycin. Amoxicillin, 500 mg, alone (44%) or associated with clavulanic acid (38.1%), was the most prescribed antibiotic for patients who were not allergic to penicillin; it was used by 82.1% of respondents (Table 3). Same results were reported by other studies as regards the choice of antibiotic in patient with no history of allergy [10, 17, 20] while in another study penicillin VK was the first choice in patient with no allergy [9, 21]. The first drug of choice for patients with an allergy to penicillins was Ofloxacin (200mg) & Ornidazole (500mg) combination 52.5% followed by clindamycin (16.9%) & Erythromycin (11.8%). Other survey reported clindamycin as first drug of choice for patients with an allergy to penicillins [9, 22, 10, 18]. In the study of Kumar et al the first antibiotic of choice in case of allergy to penicillin was erythromycin [23].

Various indications where antibiotics were prescribed are listed in table 6. The first category was for irreversible pulpitis with moderate/severe symptoms, and the second category was for the same with an acute apical periodontitis component. Combined, 41.9% of the respondents prescribed antibiotics for these cases. These pulps are still vital. There is no infection or signs of systemic involvement. This number is similar to the results found by Rodriguez et al. [10] & Whitten et al. [22]. These findings are almost 40 to 50% more than those found by Dorn et al [24], Gatewood et al. [25], Gutiérrez [26] and Yingling et al. [9]. Antibiotics are not indicated and will not assist cases where the pulp is still vital and there are no signs of local or systemic infection/involvement [27].

The third situation was necrotic pulp, chronic apical periodontitis, no swelling, and no or mild symptoms. Again, in a healthy patient, there is no indication for antibiotic use, and treatment should be limited to nonsurgical root canal therapy. In this survey, 8.8% prescribed antibiotics. Although is a minor percentage, it indicates that an inappropriate usage of antibiotics still exists that must be corrected. In other surveys higher percentages have been reported [9, 20, 22] indicating that this problem is widespread. Necrotic pulp, acute apical periodontitis, no swelling, and moderate/severe symptoms was another indication where antibiotics was used. The proper treatment for this case is debridement of the root canal space and analgesics. In our study 16.9% of the practitioners prescribed antibiotics for this, though the results are lower than reported by Dorn et al. [24], Gatewood et al [25], Rodriguez-Núñez et al. [10], Yingling et al. [9], Garg AK [20] and Whitten et al. [22] studies, which reported 30.0%, 33.1%, 52.9%, 53.9%, 59.1% and 67.3% prescription for antibiotics respectively. This again is overusage of antibiotics. For Necrotic pulp with chronic apical periodontitis: sinus tract present, no/mild preop symptoms 22.5% practitioners prescribed antibiotics. The results are comparable with that of Rodriguez-Núñez et al. [10], approximately twice of 11.9% of Yingling et al. [9] but lower than 29.2% of Whitten et al. [22]. In cases of a necrotic pulp, chronic apical periodontitis with fistula or a chronic periapical lesion in a healthy patient, there is no indication for antibiotic use and treatment should be limited to non-surgical root canal therapy.

The pulpal circulation is compromised in these cases and systemic antibiotic will not reach therapeutic concentrations in the pulp. Removing the source of the infection by performing thorough non-surgical root canal therapy will usually allow healing of periradicular lesion. Analgesics however are indicated for periapical and pulpitis pain [28]

In case of necrotic pulp with acute apical periodontitis: swelling present, mod/severe preop symptoms 83.8% practitioners prescribed antibiotics. The results are comparable with previous studies where prescribing antibiotics ranged from 87.6% to 99.2% [24, 25, 9, 10, 22]. Antibiotics are indicated in conjunction with debridement of the root canal space and an incision and drainage procedure if systemic involvement is present.

## CONCLUSION

Treatment and prophylaxis with antibiotics are normal parts of oral care. However, the indications for antibiotics in dentistry are limited. It is apparent that antibiotics are used widely in dentistry, often unnecessarily. Dental practitioners must become better educated about the prudent use of antibiotics and the dangers and cost of their overuse and misuse.

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