

Antibiotic prescription trends among dentists for oral infections with respect to their clinical experience and designation

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ABSTRACT

Background: Antibiotics are frequently used by dentists to manage oral infections. This has led to the development of antibiotic resistance. It is important to address this issue by raising awareness in dentists for a judicious use of antibiotics. The aim of this study is to assess the antibiotic prescription trends among dentists for oral infections with respect to their clinical experience and designation.

Material and Methods: A Cross sectional descriptive study was conducted on 100 dentists working in College of Dentistry, Sharif Medical and Dental College, Lahore from January 2023 to January 2024. Dentists working in clinical sciences or those working in clinical settings irrespective of their age and gender were included in the study. Non-practicing dentists, those working in the basic dental sciences and those with a clinical experience of less than 6 months were excluded from the study. Data was collected by means of a pre-validated questionnaire. Statistical package for social sciences 23 was used for statistical analysis.

Results: A statistically significant association between antibiotics prescription trends among dentists in fever due to oral infections ($p=0.01$), localized oral swelling ($p=0.02$), diffuse oral swelling ($p=0.05$), acute pulpitis ($p=0.03$), pericoronitis ($p< 0.001$), periodontal abscess ($p< 0.001$) and cellulitis ($p< 0.001$) and their designation was seen. The association between antibiotic prescription trends for pericoronitis ($p=0.05$) was significant with clinical experience of dentists with prevalence being higher in dentists with a clinical experience of 6-12 months.

Conclusion: Majority of the house officers and dentists with lesser clinical experience were seen to prescribe more antibiotics in various oral infections This can be attributed to limited clinical experience which leads them to resort to antibiotics for resolution of oral infection more often than general dentists.

Keywords: Antibiotic prescription, Dental practitioners, Clinical experience, Oral infections

BACKGROUND

The management of oral infections by dental practitioners as an adjunct to invasive dental procedures has been the standard mode of treatment since years.¹ The overwhelming majority of studies in the last few decades have been on the study of antimicrobial

resistance, identifying new infection-causing bacteria and illness identification since several factors, such as systemic disease conditions and prophylactic measures to combat AMR, influence prescribing on antibiotics.² Infections caused by bacteria occur frequently in ordinary dental care and frequently managed with antibiotics. According to earlier research, dental infections are responsible for over 10% of antibiotic use annually.³ Even while antibiotics are necessary to treat a lot of diseases, oral healthcare providers' unintentional use of them has grown to be a serious worry.⁴ Studies on the administration of antibiotics in the area of dentistry have been done, but they have not thoroughly examined prescription habits in different geographical areas⁵. In dentistry, the most common reasons for prescribing antibiotics are swelling or tooth discomfort, namely reversible and irreversible pulpitis⁶. For a duration of five to seven days, dentists administer antibiotics along

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This article can be cited as: Mirza W, Bhatti FW, Saif R, Karamat A, Basharat A, Butt H. Antibiotic prescription trends among dentists for oral infections with respect to their clinical experience and designation. Infect Dis J Pak. 2024; 33(4): 202-207.

DOI: <https://doi.org/10.61529/idjp.v33i4.379>

Receiving date: 26 Oct 2023 Acceptance Date: 11 Nov 2024

Revision date: 16 Jul 2024 Publication Date: 30 Dec 2024



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with anti-inflammatory medications to treat infection-related pain.⁷ Although penicillin-based antibiotics are most frequently used to treat odontogenic infections, a prior study found that the rise in bacterial types resistant to penicillin has resulted in the usage of alternative antibiotics, including clindamycin.⁸ Antibiotics are most frequently used in dentistry to treat odontogenic as well as non-odontogenic infections, preventative treatment of patients who are at risk of or already have systemic illnesses, treatment for regional infections, and postoperative or extraction procedures.⁹ One-third of the antibiotics utilized in the US are prescribed by dentists with different levels of specialization, according to observations.¹⁰ Furthermore, research over the past three years has revealed that about 30% of antibiotics recommended for oral issues were neither necessary nor advised.¹¹

In earlier published studies, researchers have measured the quantity of antibiotic prescriptions written in the US outpatient context and observed regional and provider specialty-specific variations.¹² Primary care physicians like pediatricians (12%, 32.4 million prescriptions), medical professionals (24%, 64.1 million scripts) and dental professionals recommended 10% (24.5 million medications) of all prescriptions in the general population.¹² Little is known about the specifics of prescription antibiotic procedures in dentistry, despite the fact that dental prescriptions account for a significant portion of all antibiotic prescriptions in outpatient facilities.¹³ The Dental Professionals Guidelines restricts general dentists' medications in the United Kingdom. Data from 1997 shows that more than 3.5 million antibiotic prescriptions were written by general dentists, accounting for almost 7% of the overall prescriptions for antibiotics written in England.¹⁴ There is no protocol for dentists to adhere to in Pakistan for antibiotic prescription.¹⁵ In contrast to research on dental professionals in Australia and Fiji that revealed a typical moderate to high level of correct understanding between dental professionals about usage of antibiotics, another study revealed that two thirds of the people who participated (61%) have below-average expertise when looked at through produced mimicked case conditions.^{16,17} While the knowledge and practices of dentists regarding the prescription of antibiotics has been discussed and debated about extensively in literature, the association of prescription trends with level of

seniority and clinical experience has not been explored. The aim of this study is to assess the antibiotic prescription trends among dentists for oral infections with respect to their clinical experience and designation.

MATERIAL AND METHODS

A Cross sectional descriptive study was conducted on 100 dentists working in College of Dentistry, Sharif Medical and Dental College, Lahore. dental practitioners of Sharif Medical and Dental College, SMDC, Lahore. The study was conducted for a period of 1 year from January 2023 to January 2024. Informed consent was taken from the participants before data collection. Ethical approval was obtained from the ethical committee of Sharif Medical Research Centre (SMRC) (Ref.No. SMDC/SMRC/168-21). Sample size was calculated using an online sample size calculator, Scalex Sp. 1.0.01. Sample technique employed was convenient sampling. The sample size was calculated to be 100 by keeping the precision of 5%, confidence level 95% and antibiotic prescription trends in dentists to be 7%(18). Dental practitioners working in clinical sciences or those working in clinical settings irrespective of their age and gender were included in the study. Non-practicing dentists, those working in the basic dental sciences and those with a clinical experience of less than 6 months were excluded from the study. Data was collected by means of a pre-validated questionnaire with a Cronbach alpha value of 0.914(19). This proforma had two parts. The first part collected information on the demographic aspects as well as the designation and years of clinical experience of the dentists. The second part recorded information on the different oral infections and the antibiotic prescription trends of dentists in these conditions.

Statistical package for social sciences 23 was used for statistical analysis. P value less than equal to 0.05 was taken significant. Chi square test was used to find the association of antibiotic prescription trends of dentists in oral infections with designation. Fisher exact test was used to find the association between antibiotic prescription trends of dentists for oral infections with clinical experience.

RESULTS

The study included a total of 100 dentists with a mean age of 25.25 ± 5.086 years. Among them 40% were males

and 60% were females. Half of the dentists were general dentists and half were house officers. Dentists with a clinical experience of 6-12 months were 61%, 32% had an experience of 2-3 years while those with a clinical experience of more than 3 years was 7%.

Table-I shows a statistically significant association between antibiotics prescription trends among dentists in fever due to oral infections, localized oral swelling, diffuse oral swelling, acute pulpitis, pericoronitis, periodontal abscess and cellulitis and their designation. It was seen that the percentage of house officers prescribing antibiotics in fever due to oral infection, localized oral swelling, diffuse oral swelling, acute pulpitis, pericoronitis, periodontal abscess and cellulitis was generally higher than the general dentists.

Table-II shows the association between antibiotic prescription trends among dentists in fever due to pericoronitis was significant with their clinical experience with the trend being more prevalent in dentists with a clinical experience of 6-12 months. Although non-significant a relatively higher percentage of dentists with the least clinical experience (6-12 months) reported prescribing antibiotics in fever due to oral infection, localized and diffuse oral swelling, trismus, acute pulpitis, pericoronitis, periodontal abscess and cellulitis as compared to those with more clinical experience (2-3 years and > 3 years). Two exceptions to this were acute periapical conditions and chronic periodontitis where dentists with 2-3 years of experience prescribed more antibiotics.

Table-I: Association of antibiotics prescriptions trends among dentists in oral infections with their designation (n=100) frequency table of study variables.

Antibiotics prescriptions trends among dentists in oral infections		Designation		Total	p value
		General dentists (n=50)	House officers (n=50)		
Fever due to oral infection	Yes	14 (34%)	27 (66%)	41 (100%)	0.01
	No	36 (61%)	23 (39%)	59 (100%)	
Localized oral swelling	Yes	15 (36%)	27 (64%)	42 (100%)	0.02
	No	35 (60%)	23 (40%)	58 (100%)	
Diffuse oral swelling	Yes	19 (40%)	29 (60%)	48 (100%)	0.05
	No	31 (60%)	21 (40%)	52 (100%)	
Trismus	Yes	2 (22%)	7 (78%)	9 (100%)	0.16
	No	48 (53%)	43 (47%)	91 (100%)	
Acute pulpitis	Yes	2 (25%)	6 (75%)	8 (100%)	0.03
	No	48 (52%)	44 (48%)	92 (100%)	
Acute periapical condition	Yes	8 (47%)	9 (53%)	17 (100%)	0.79
	No	42 (51%)	41 (49%)	83 (100%)	
Chronic periodontitis	Yes	4 (36%)	7 (64%)	11 (100%)	0.34
	No	46 (52%)	43 (48%)	89 (100%)	
Pericoronitis	Yes	12 (28%)	31 (72%)	43 (100%)	< 0.001
	No	38 (67%)	19 (33%)	57 (100%)	
Periodontal abscess	Yes	12 (26%)	34 (74%)	46 (100%)	< 0.001
	No	38 (70%)	16 (30%)	54 (100%)	
Cellulitis	Yes	15 (31%)	33 (69%)	48 (100%)	< 0.001
	No	35 (67%)	17 (33%)	52 (100%)	

Table-II: Association of antibiotics prescriptions trends among dentists in oral infections with their clinical experience (n=100).

		Clinical experience			Total	p value
		6-12 months (n=61)	2-3 years (n=32)	>3 years (n=7)		
Fever	Yes	27 (66%)	11 (27%)	3 (7%)	41 (100%)	0.65
	No	34 (58%)	21 (36%)	4 (7%)	59 (100%)	
Localized oral swelling	Yes	24 (57%)	15 (36%)	3 (7%)	42 (100%)	0.81
	No	37 (64%)	17 (29%)	4 (7%)	58 (100%)	
Diffuse oral swelling	Yes	31 (65%)	15 (31%)	2 (4%)	48 (100%)	0.59
	No	30 (58%)	17 (33%)	5 (10%)	52 (100%)	
Trismus	Yes	8 (89%)	1 (11%)	0 (0%)	9 (100%)	0.24
	No	53 (58%)	31 (34%)	7 (8%)	91 (100%)	

Acute pulpitis	Yes	6 (75%)	1 (13%)	1 (13%)	8 (100%)	0.31
	No	55 (60%)	31 (34%)	6 (7%)	92(100%)	
Acute periapical condition	Yes	7 (42%)	8 (47%)	2 (12%)	17(100%)	0.18
	No	54 (65%)	24 (29%)	5 (6%)	83 (100%)	
Chronic periodontitis	Yes	4 (36%)	6 (55%)	1 (9%)	11 (100%)	0.14
	No	57 (64%)	26 (29%)	6 (7%)	89 (100%)	
Pericoronitis	Yes	32 (74%)	10 (23%)	1 (2%)	43 (100%)	0.05
	No	29 (51%)	22 (39%)	6 (11%)	57 (100%)	
Periodontal abscess	Yes	33 (72%)	11 (24%)	2 (4%)	46 (100%)	0.13
	No	28 (52%)	21 (39%)	5 (9%)	54 (100%)	
Cellulitis	Yes	34 (71%)	13 (27%)	1 (2%)	48 (100%)	0.07
	No	27 (52%)	19 (37%)	6 (12%)	52 (100%)	

DISCUSSION

In dentistry, the most common reasons for prescribing antibiotics involve inflammation or tooth discomfort, namely reversible or irreversible pulpitis.²⁰ Dentists advise antibiotics for a duration of five to seven days, along with anti-inflammatory medications to treat infection-related pain.²¹

According to our study a statistically significant association between antibiotics prescription trends among dentists in fever due to oral infections ($p=0.008$), localized oral swelling ($p=0.015$), diffuse oral swelling ($p=0.045$), acute pulpitis ($p=0.0269$), pericoronitis ($p=0.000$), periodontal abscess ($p=0.000$) and cellulitis ($p=0.000$) and their designation. It was seen that the percentage of house officers prescribing antibiotics in fever due to oral infection (70%), localized oral swelling (64%), diffuse oral swelling (60%), acute pulpitis (75%), pericoronitis (72%), periodontal abscess (74%) and cellulitis (69%) was generally higher than the general dentists. The over-prescription of antibiotics by house officers in comparison to general dentists can be attributed to their lack of clinical experience with a resultant lack of ability to use antibiotics judiciously. Some studies reported results that were in contradiction to our study. One study examining the antibiotic prescription by dentists for acute irreversible pulpitis reported that a greater percentage of endodontists (22%) prescribed antibiotics in this condition as compared to 18% undergraduates.²² Another study reported that among the dentists who primarily practiced dental work and prosthetics/implantology 86% reported prescribing antibiotics daily while 97% said that they prescribed them weekly.²³ Karobari MI et al. conducted a study on trends of antibiotic prescriptions and concluded that out of all the dentists who responded, 60% had less than five years of experience, and 22% had twenty or more years of expertise.²⁴ When asked about their skills, 42% of

those surveyed said they had a bachelor's dentist degree without any further credentials, 34% said they had completed an approved master's program, and 13% said they had an overseas degree as an extra to their basic degree.²⁴ Of all dentists, 20% would administer antibiotics before oral surgery for patients who were not medically challenged; 27% would do so based on the treatment to be performed; and 52% among those surveyed would not recommend antibiotics in non-compromised instances.²⁴

According to our study the association between antibiotic prescription trends among dentists in fever due to pericoronitis ($p=0.047$) was significant with their clinical experience with the trend being more prevalent in dentists with a clinical experience of 6-12 months. Although non-significant a relatively higher percentage of dentists with the least clinical experience (6-12 months) reported prescribing antibiotics in fever due to oral infection, localized and diffuse oral swelling, trismus, acute pulpitis, pericoronitis, periodontal abscess and cellulitis as compared to those with more clinical experience (2-3 years and > 3 years). With respect to clinical experience of dentists a study reported contrasting results to our study where dentists with more than 20 years of expertise prescribed antibiotics more frequently than dentists with fewer years of expertise.²³ In our study two exceptions to this were acute periapical conditions and chronic periodontitis where dentists with 2-3 years of experience prescribed more antibiotics. A study was conducted to determine whether there was a clear relationship between experiences and prescribing behaviors, the study was conducted with dentists of different experience levels; however, no such relationship was found.²⁵ Another study reported results similar to our study where dentists with a clinical experience of less than 5 years prescribed antibiotics for

pericoronitis (76%), cellulitis (90%) and trismus (47%).

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LIMITATION

The study had a few limitations. Firstly, if the sample size was larger the results of the study could be generalized to a larger group of dentists. Secondly, the use of antibiotics and their prescription is largely different among institutions, clinics and hospital settings. Therefore, a multicentre centre would have helped unravel more findings. Lastly, it was not investigated prior to the study if the undergraduate students undergo proper training for antibiotic use and are familiar with the international prescription protocols and guidelines. Due to this it cannot be deduced if the over-prescription of house officers is due to their negligence or simply because they did not receive adequate training.

CONCLUSION

Majority of the house officers and dentists with lesser clinical experience were seen to prescribe more antibiotics in various oral infections like, localized and diffuse oral swelling, acute pulpitis, pericoronitis, periodontal abscess, trismus, and cellulitis. This can be attributed to limited clinical experience which leads them to resort to antibiotics for resolution of oral infection more often than general dentists. The prevalence of a higher trend of antibiotic prescription of house officers in oral infections highlights a loophole in training dental undergraduate students. Appropriate measures should be taken that ensure that dental students are provided with adequate training regarding antibiotic prescription for oral infections familiarizing them to the international antibiotic prescription guideline.

CONFLICT OF INTEREST

None

GRANT SUPPORT & FINANCIAL DISCLOSURE

Declared none

AUTHOR CONTRIBUTION

Waqas Mirza: Literature review and manuscript write-up, agreement to be accountable for all aspects of the work

Farwa Shabir Bhatti: Literature review, manuscript write-up, agreement to be accountable for all aspects of the work

Rabiya Saif: Critical revisions, final approval, agreement to be accountable for all aspects of the work

Abdullah Karamat: Critical revisions, agreement to be accountable for all aspects of the work

Ayesha Basharat: Literature review, agreement to be accountable for all aspects of the work

Hira Butt: Main conception of study, study design, data analysis, manuscript write-up, literature review, supervision, final approval, agreement to be accountable for all aspects of the work

REFERENCES

1. Abdullah FM, Hatim QY, Oraibi AI, Alsafar TH, Alsandook TA, Lutfi W, et al. Antimicrobial management of dental infections: Updated Rev. 2024; 103(27): e38630. DOI: <https://doi.org/10.1097/MD.0000000000038630>
2. Anton A, Predescu IA, Cristina N, Păcurar M, Dinu Ș. The use of antibiotics in the dental field-the phenomenon of antibiotic resistance. *Romanian J Oral Rehab.* 2024;16(4): 571-80. DOI: <http://dx.doi.org/10.62610/RJOR.2024.4.16.55>
3. Šutej I, Bašić K, Šegović S, Peroš KJA. Antibiotic prescribing trends in dentistry during Ten Years' Period—Croatian National Study. *Antibiotics.* 2024; 13(9): 873. DOI: <https://doi.org/10.3390/antibiotics13090873>
4. Estany-Gestal A, Salgado-Barreira A, Vazquez-Lago JM. Antibiotic use and antimicrobial resistance: A global public health crisis. *Antibiotics.* 2024; 13(9): 900. DOI: <https://doi.org/10.3390/antibiotics13090900>
5. Soleymani F, Pérez-Albacete Martínez C, Makiabadi M, Maté Sánchez de Val JE. Mapping worldwide antibiotic use in dental practices: A scoping review. 2024;13(9):859. DOI: <https://doi.org/10.3390/antibiotics13090859>
6. Deniz-Sungur DE, Aksel H, Karaismailoglu E, Sayin TC. The prescribing of antibiotics for endodontic infections by dentists in Turkey: a comprehensive survey. *International endodontic journal.* 2020 Dec;53(12):1715-27. DOI: <https://doi.org/10.1111/iej.13390>
7. Amato A. Oral microbiota, bacterial infections, antibiotic prescriptions, and antimicrobial resistance in children. *Microorganisms.* 2023; 11 (8): 1927. DOI: <https://doi.org/10.3390/microorganisms11081927>
8. Shukla A, Sharma S, Gangwar M, Sharma G, Rao BA. Association and contribution of dentistry in creating and sharing the burden of antibiotic-resistant microbial world. In book: *Emerging Paradigms for Antibiotic-Resistant Infections: Beyond the Pill.* 2024 (pp.295-311). DOI: http://dx.doi.org/10.1007/978-981-97-5272-0_14
9. Skucaite N, Stundžia L, Veberiene R, Brukiene V, Maciulskiene V. Antibiotic prescription for treatment and prevention of odontogenic infections: A cross-sectional survey of Lithuanian dentists. 2024; 60(11): 1745. DOI: <https://doi.org/10.3390/medicina60111745>
10. Badrov M, Marovic D, Tadin A. Antibiotics knowledge and prescription patterns among dental practitioners in Croatia, Bosnia and Herzegovina, and Serbia: A comparative E-survey with a focus on medically healthy and compromised patients. 2024; 13(11): 1061.

- DOI: <https://doi.org/10.3390/antibiotics13111061>
11. Murphy AM, Patel UC, Wilson GM, Suda KJ. Prevalence of unnecessary antibiotic prescriptions among dental visits, 2019. *Infect Control Hosp Epidemiol.* 2024; 45(7): 890-9. DOI: <https://doi.org/10.1017/ice.2024.13>
 12. Hicks LA, Bartoces MG, Roberts RM, Suda KJ, Hunkler RJ, Taylor Jr TH, et al. US outpatient antibiotic prescribing variation according to geography, patient population, and provider specialty in 2011. 2015; 60(9): 1308-16. DOI: <https://doi.org/10.1093/cid/civ076>
 13. Ramanathan S, Yan CH, Hubbard C, Calip GS, Sharp LK, Evans CT, et al. Changes in antibiotic prescribing by dentists in the United States, 2012–2019. *Infect Control Hosp Epidemiol.* 2023; 44(11): 1725-30. DOI: <https://doi.org/10.1017/ice.2023.151>
 14. Palmer NO, Martin MV, Pealing R, Ireland RS. An analysis of antibiotic prescriptions from general dental practitioners in England. *J Antimicrob Chemother.* 2000 Dec;46(6):1033-5. DOI: <https://doi.org/10.1093/jac/46.6.1033>
 15. Nasir N, Mehmood BK, Awan S, Sattar S, Tajuddin S. Evaluation of hospital antibiotic prescription patterns using WHO AWaRe Classification in Karachi, Pakistan. 2024; 39 (Supplement): 29. DOI: <https://doi.org/10.1016/j.jgar.2024.10.091>
 16. Murti A, Morse Z. Dental antibiotic prescription in Fijian adults. *Int Dent J.* 2007; 57(2): 65-70. DOI: <https://doi.org/10.1111/j.1875-595x.2007.tb00440.x>
 17. Daniel WW, Cross CL. *Biostatistics: A Foundation for Analysis in the Health Sciences*: 10th ed. USA: Wiley; 2018. Available from: https://faculty.ksu.edu.sa/sites/default/files/145_stat_textbook.pdf
 18. Marra F, George D, Chong M, Sutherland S, Patrick DM. Antibiotic prescribing by dentists has increased: Why? *J Am Dent Assoc.* 2016; 147(5): 320-7. DOI: <https://doi.org/10.1016/j.adaj.2015.12.014>
 19. Sharma K, Jain P, Sharma A. Knowledge, attitude and perception of medical and dental undergraduates about antimicrobial stewardship. *Indian J Pharmacol.* 2015; 47(6): 676-9. DOI: <https://doi.org/10.4103/0253-7613.169572>
 20. Săndulescu O, Preoteșcu LL, Streinu-Cercel A, Şahin GÖ, Săndulescu M. Antibiotic Prescribing in Dental Medicine-Best Practices for Successful Implementation. *Trop Med Infect Dis.* 2024; 9(2): 31. DOI: <https://doi.org/10.3390/tropicalmed9020031>
 21. Hirayama K, Kanda N, Hashimoto H, Yoshimoto H, Goda K, Mitsutake N, Hatakeyama S. Antibiotic Prescription Trends in Dentistry: A Descriptive Study Using Japan's National Database. *J Public Health Dent.* 2025. DOI: <https://doi.org/10.1111/jphd.12663>
 22. Khijmatgar S, Bellucci G, Creminelli L, Tartaglia GM, Jr., Tumedei M. Systemic antibiotic use in acute irreversible pulpitis: Evaluating clinical practices and molecular insights. *Int J Mol Sci.* 2024; 25(2).
 23. D'Ambrosio F, Di Spirito F, Amato A, Caggiano M, Lo Giudice R, Martina S. Attitudes towards Antibiotic Prescription and Antimicrobial Resistance Awareness among Italian Dentists: What Are the Milestones? *Healthcare (Basel).* 2022 Aug 21;10(8):1585. DOI: <https://doi.org/10.3390/healthcare10081585>
 24. Karobari MI, Khijmatgar S, Bhandary R, Nayak KU, Del Fabbro M, Horn R, et al. A multicultural demographic study to analyze antibiotic prescription practices and the need for continuing education in dentistry. 2021; 2021(1): 5599724. DOI: <https://doi.org/10.1155/2021/5599724>
 25. Salako N, Rotimi V, Adib S, Al-Mutawa S. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. *J Dent.* 2004; 32(7): 503-9. DOI: <https://doi.org/10.1016/j.jdent.2004.04.001>
 26. Alkhabuli J, Kowash M, Shah A. Knowledge and attitude of Northern Emirates dental practitioners towards antibiotic prescription and its resistance. *Int J Dent Oral Health.* 2015; 2 (2). DOI: <http://dx.doi.org/10.16966/2378-7090.177>