ANTIBIOTIC PRESCRIPTION PRACTICE IN DENTISTRY – A SURVEY STUDY

Vishal kumar Arora[1], Mankirat Grewal [2], Neha Rani [3], Jashandeep Kaur Gaddu [4], Harpreet Kaur [5]
Professor[1], Assistant professor[2], Tutor[3 4 5] SKSS dental college, Sarabha, Ludhiana

Abstract

Aims: The aims of study were: 1. To analyze the most commonly prescribed antibiotics 2. Conditions in which antibiotics are being prescribed 3.. Awareness of antibiotic resistance among the dental practitioners of Punjab

Methodology: It was an observational cross-sectional study. Dental practitioners of Punjab were selected for the study. A total sample of 200 was taken for study. A questionnaire was prepared containing questions such as the most commonly prescribed antibiotics, conditions where antibiotics are indicated, antibiotic resistance and reasons for prescribing antibiotics etc.

Results: It was found that most of dentists were aware of antibiotic resistance. Most common conditions for prescribing antibiotics were localized intraoral swelling, pericoronitis, irreversible pulpitis etc. Most common prescribed drug was amoxicillin clavulanic acid and second was amoxicillin

Conclusion: Dental practioners should have thorough knowledge about antibiotic prescription, their side effects, antibiotic resistance, and exact condition for use of antibiotics. Dentists should prescribe antibiotics to the patients only according to the latest guidelines of antibiotic prescription, where it is indicated. It should not be a first-line treatment modality.

Introduction

Most human oro-facial infections originate from odontogenic infections and prescribing antibiotics has become a ubiquitous phenomenon.[1-5] Antibiotics are commonly prescribed by dentists in their practice. This is leading to antibiotic resistance in our population and other health issues occurring related to the over-prescription of antibiotics.[6] The World Health Organization (WHO) has noted the inaccurate and irrational use of antibiotics which leads to antibiotic resistance that becomes a global problem.[7-8]. Dental practioners are prescribing antibiotics between 7% and 11% of all common antibiotics. According to the National Center for Disease Control and Prevention, one-third of antibiotic prescriptions to the patients are unnecessary.[5]

Antibiotics have emerged as a boon to humanity and this advancement has led to a better quality of life along with an overall reduction in morbidity and mortality. Antibiotics are basically chemical substances having capability of destroying and inhibiting the growth of specific microorganisms. Dental infections are polymicrobial that is caused by variety of microorganisms. Most of the infections of orofacial region require both systemic and local treatment.[9-12] Systemic management is mostly by antibiotics, and hence, these antibiotics are pharmacotherapeutic adjuncts prescribed by dentists.[13-15]

Antibiotics resistance has developed due to their inappropriate and excess use. Even more alarming is the rates at which bacteria develop resistance.[16-18] Microorganisms exhibiting resistance to new drugs often are isolated soon after the drugs have been introduced. The main reason behind antibiotic resistance is due to over-prescription by the health-care workers, inappropriate use by patients, and resistance also developed by the bacteria.[19-20] There is a significant relationship between the increase of antibiotic resistance and utilization, higher resistance to antibiotics in bacteria was seen in areas where antibiotic utilization is more. Dentistry's contribution to antibiotic resistance is unknown. Increased use of antibiotics and development of bacterial resistance, leads to introduction of newer drug combinations Therefore, it is needed to assess the knowledge of antibiotic use and practice among dental practitioners. Only few studies observed the knowledge of dentists regarding the antibiotic prescription pattern and development of antibiotics resistance among in India.

It was observed that the greatest threat to future human health is Antimicrobial resistance with increased microbial resistance reported each year across in both developed and developing countries.

Efforts have been practiced over many years to regulate the 'rational use of drugs', for example through the WHO's International Network on the Rational Use of Drugs program (INRUD), the antibiotic use is increasing day by day. [15-17] An increase in antibiotic resistance (ABR) worldwide, specifically in developing countries, so attention should be given to antibiotics prescription knowledge and also to make the dental practitioners aware of Antibiotic Resistance.[1-2] In May 2015, the World Health Assembly made an agreement to handle the increased Antibiotic Resistance globally, and the first objective of it, was to increase Antibiotic Resistance awareness and understanding among the health care workers.[3] In developing countries, antibiotics can be readily purchased without any control, such countries usually experience more cases of antibiotic resistance, in contrast to what occurs in western countries where strict guidelines of antibiotic use are practiced[4-7]

Hence, the study was conducted with the objective to assess dental practitioner's knowledge and practices regarding antibiotic prescription and development of resistance.[7-10]

Methodology

The study that conducted among dental practitioners of Punjab. A sample of 200 dental practioners was selected. Both BDS and MDS practioners were included in the study. A questionnaire was prepared and given to each dentist included in the study. Ethical clearance was taken for the study from college the ethical committee. Consent was also taken from each dentist to include them in the study survey. All practiners were registered with state Dental council. They were practicing since 5-10 years. Both male and female dentists were included in study with no specific proportion.

Results

Awareness about antibiotic resistance is adequate.

Table-1 showed percentage of dentists who prescribe antibiotics and in which conditions they prescribe antibiotics. Most common condition where antibiotics prescribed was localized intraoral swelling (78.74%), next is pericoronitis (72.85%) and then is apical periodontitis (68.89%).

Table 2 showed awareness among dentists regarding antibiotic use, antibiotic resistance and other factors related to antibiotic prescription. 73% practioners were aware of antibiotic resistance, 52% about side effects of antibiotics and 65 % about contraindications to use of antibiotics. Only 56% dentists took allergic history to medicines before prescribing antibiotics and 61% advised the patient to complete the course of antibiotic.

Graph 1 showed percentage of different antibiotics used by dentists. The most commonly prescribed antibiotic is amoxicillin and clavulanic acid combination (52%) which is a second line drug. Whereas first-line drug amoxicillin was prescribed less (18%). Cephalosporins were prescribed least (1%) in dentistry as found in our study.

Graph 2 showed the reasons, why dentists prescribed antibiotics. The most common was that the patient wants only medicine for his/her problem (50%). Next reason found was long waiting appointments and last is to sustain the patient till the specialist availability to treat the patient.

Conditions	Dentists prescribing the antibiotics	
	Yes	No
Localized intra oral swelling	78.74%	20.26%
Pericornitis	72.85%	27.15%
Simple extractions	60.53%	39.47%
Irreversible pulpitis	65.89%	33.11%
Apical periodontitis	68.89%	31.11%
Revesible pulpitis	60.77%	39.23%
Dry socket	25.15%	73.85%

Table 1: Conditions where antibiotics are prescribed

No.	Questions	Yes	No
1	Are you aware of the term antibiotic resistance?	73%	27%
2	Are you aware of major side effects of antibiotic prescribed	52%	48%
3	Do you take allergic history before prescribing antibiotics?	56%	44%
4	Do you advise your patient to complete antibiotic course.	61%	39%
5	Do you know self medication cause drug resistance.	55%	45%
6	Are you aware of the contraindications of the antibiotics prescribed	65%	35%

Table 2: Awareness about antibiotics among dentists

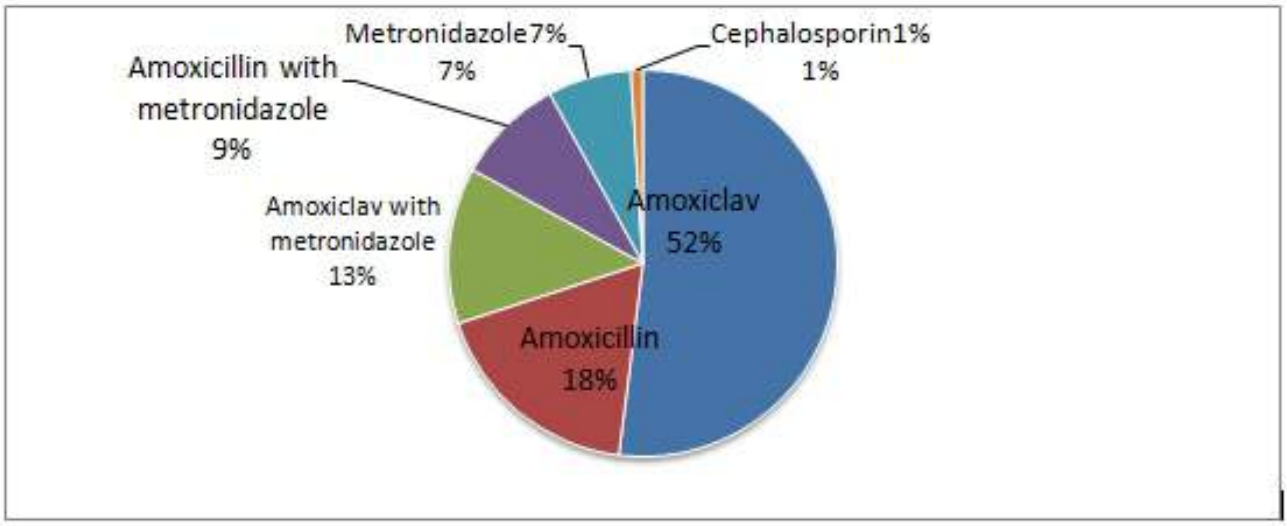

Figure 1: Most commonly prescribed antibiotics

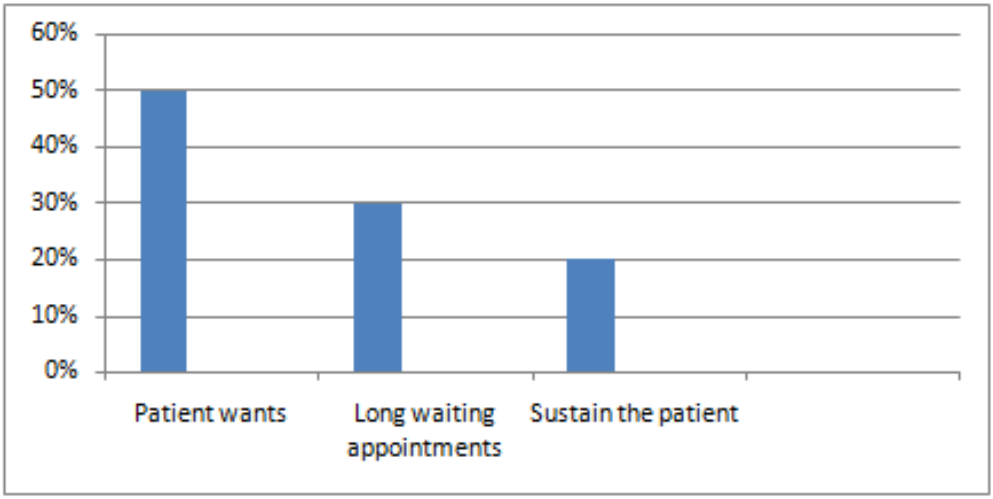

Figure 2: Reasons for antibiotics prescription

Discussion

In our study most commonly prescribed antibiotics was Amoxicillin and clavulanic acid combination (52%). Sapna Konde et al conducted a study in the sample of 100 BDS and 100 MDS practioners, and they observed that amoxicillin was the regularly used antibiotic, 86% of BDS practioners and 70% of MDS practioners prescribed Amoxicillin in their daily practice.5 Thornhill et al also found that amoxicillin is the most frequently prescribed antibiotic.[21] Yu el el[22] observed that in common dental conditions such as acute pulpitis, diffuse swelling, acute apical abscess, Amoxicillin is widely used drug. Amoxicillin has a wider spectrum against Gram-negative bacteria and it is easily digested and can be taken with food. It is the principal antibiotics prescribed in dentistry in USA.[23]

Amoxicillin with clavulanic acid is a broad-spectrum antibiotic that is considered to be the second most prescribed antibiotic in dentistry. But in the case of amoxicillin resistance, the administration of Amoxicillin with clavulanic acid or metronidazole is prescribed. [24,25] Metronidazole is the second number drug prescribed by dentists. It is highly active against anaerobes but it has no activity against aerobes.[22]

Amoxicillin and clavulanic acid combination is a second line Antibiotic according to the current guidelines[7-9], A large number of dentists are prescribing it in Punjab. Dentists practicing in the public health care system of Valencian Community prescribed a total of 43,490 containers of antibiotic in year 2005, with a total antibiotics cost of 274,439.82 euros. This counts 0.94% part of the total antibiotic containers and it costs 0.51% of total expenditure of the public health care system. Amoxicillin and amoxicillin clavulanic acid accounted for 67.8% of all prescriptions and 59.4% of the global cost26. Similar to this study, our study also found that amoxicillin clavulanic acid was most commonly prescribed. But in contrast to present study, Mainjot A et al found that the most common antibiotic that is prescribed in dental practice is Amoxicillin followed by Amoxicillin and clavulanic acid.[27]

Present study showed that dentists are prescribing antibiotics most commonly in dental conditions such as localized intra oral swelling, pericornitis, extractions, apical periodontitis, irreversible and reversible pulpitis. Salako et al. in Kuwait studied a sample of 200 dentists and observed that 78.57% of dentists are prescribing antibiotics in conditions such as dry socket, pericoronitis, simple extraction and localized intraoral swelling.16 In 51.9% cases of periodontal abscess, antibiotics were given in Belgium27. In Spain, for irreversible pulpitis, 40% of endodontists have habit to gave antibiotic prescription to patients.[28]

In present study only 73% dentists were aware of antibiotics resistance issue and 52% know about side effects of antibiotics. Similarly Segura et al found over prescription of antibiotics and lack of knowledge of side effects of antibiotics.28 In France and Scotland, D.Nathwani found that 63% of junior doctors and 95% of senior doctors are aware of Antibiotic Resistance and considering it while prescribing antibiotics.[19-20]

The findings of study conducted by Abdullah Ali et al revealed that antibiotics were prescribed in various conditions for which they are not recommended, including gingivitis, chronic apical abscess, preapical cysts, caries, periodontitis, pulpal necrosis, reversible and irreversible pulpitis.[29] These results were consistent with survey study on American endodontists and survey study conducted in Brazil.[30,31] Present study also observed that dentists are prescribing antibiotics in some of the above said dental conditions without justifying its use, just for some reasons such as patient's request for medication, long waiting appointments, more workload so as to sustain patients. Yu et al found that endodontist with experience from 1 to 5 years overprescribed analgesics and antibiotics as compared to endodontist with experience of more than 10 years. These results were supported by a similar study conducted by Marra et al.[32] Analgesics and antibiotics were overly prescribed by the most of the dentists and only 1/4th of the dentists are prescribing antibiotics and analgesics appropriately. To regulate overuse of analgesics and antibiotics, the dentist must aware of endodontic and other dental conditions very well, so as not to contribute the global issue of antibiotic resistance.[22,33]

Conclusion

Antibiotic prescription is an integral part of medicine and dental practice. In patients with infective endocarditis, immunocompromised conditions, dental procedures may produce bacteremias. An antibiotic prophylaxis should be given in such patients before performing Invasive

dental procedures. Special consideration should also be given before any dental treatment is carried out and prescribing any medication in organ transplant and pregnant patients. Special caution needs to be addressed in such patients to provide the required antibiotic or any other medicine and its dose adjustments to prevent the complications. Recommendations on antibiotic prescribing are essential to prevent over prescribing of antibiotics.The correct information of odontogenic infections, causative micro organisms and the pharmacokinetics of antibiotics, decreases the risk of incorrect antibiotic use in dental practice.There should be Antibiotic awareness programs. Also there should be strict rules about purchasing the Antibiotics in pharmacy. Antibiotics shouldn't be over the counter sold the drug. Compliance towards the guidelines should be monitor via policy.

References

1. Davies J, Davies D. Origins and evolution of antibiotic resistance. Microbiol Mole Biol reviews. 2010;74:417-33.
2. http://www.sdcep.org.uk/wp-content/uploads/2016/03/SDCEPDrug-Prescribing-for-Dentistry-3rd-edition.pdf
3. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychologi Medi.2013;35:121
4. Jain A, Bhaskar DJ, Gupta D, Yadav P, Dalai DR, Jhingala V, Garg Y, Kalra M. Drug prescription awareness among the 3 rd year and final year dental students: A cross-sectional survey. J Indian Soci Pedodont Prevent Denti.2016;34:145.
5. Salako NO, Rotimi VO, Adib SM, Al-Mutawa S. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. J denti. 2004;32:503-09.
6. Pulcini C, Williams F, Molinari N, Davey P, Nathwani D. Junior doctors' knowledge and perceptions of antibiotic resistance and prescribing: a survey in France and Scotland. Clinical Microbiol infecti. 2011;17:80-7.
7. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, Kenny DJ, Sigurdsson A, Bourguignon C, Flores MT, Hicks ML. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2012;28:88-96.
8. Huang Y, Gu J, Zhang M, Ren Z, Yang W, Chen Y, Fu Y, Chen X, Cals JW, Zhang F. Knowledge, attitude and practice of antibiotics: a questionnaire study among 2500 Chinese students. BMC Medi Educ. 2013;13:163.
9. Segura-Egea JJ, Velasco-Ortega E, Torres-Lagares D, VelascoPonferrada MC, Monsalve-Guil L, Llamas-Carreras JM. Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons. Inter Endod J.2010;43:342-50.
10. Baskaradoss JK, Alrumaih A, Alshebel A, Alfaqih A, Aleesa M, Alkhashan S, Altuwaijri M. Pattern of antibiotic prescription among dentists in Riyadh, Saudi Arabia. J Investigat Clini Denti. 2018:e12339.
11. El-Kholey KE, Wali O, Elkomy A, Almozayen A. Pattern of Antibiotic Prescription for Oral Implant Treatment Among Dentists in Saudi Arabia. Implant denti. 2018;27:317.
12. Marra F, George D, Chong M, Sutherland S, Patrick DM. Antibiotic prescribing by dentists has increased: Why? J Am Dent Assoc. 2016;147:320-27.
13. Prior M, Elouafkaoui P, Elders A, Young L, Duncan EM, Newlands R, Clarkson JE, Ramsay CR. Evaluating an audit and feedback intervention for reducing antibiotic prescribing behaviour in general dental practice (the RAPiD trial): a partial factorial cluster randomised trial protocol. Implementa Sci. 2014;9:50.
14. Dana R, Azarpazhooh A, Laghapour N, Suda KJ, Okunseri C. Role of Dentists in Prescribing Opioid Analgesics and Antibiotics: An Overview. Dent Clini North Am.2018;62:279-94.
15. Anu V, Harshamol S, Helena T, Hannah PD, Gokila R, Manomani H. Paediatricians Cognizance About The Deleterious Effect Of Antibiotics And Dental Caries-A Preliminary Study. Int J Pharmaceutical Sci Res. 2018;9:708-11.
16. Roberts RM, Bartoces M, Thompson SE, Hicks LA. Antibiotic prescribing by general dentists in the United States, 2013. J Am Dent Assoc. 2017;148:172-8.
17. Zhuo A, Labbate M, Norris JM, Gilbert GL, Ward MP, Bajorek BV, Degeling C, Rowbotham SJ, Dawson A, Nguyen KA, HillCawthorne GA. Opportunities and challenges to improving antibiotic prescribing practices through a One Health approach: results of a comparative survey of doctors, dentists and veterinarians in Australia.
18. Stein K, Farmer J, Singhal S, Marra F, Sutherland S, Quiñonez C. The use and misuse of antibiotics in dentistry: A scoping review. The J Am Dent Assoc. 2018;149:869-84
19. Koppen L, Suda KJ, Rowan S, McGregor J, Evans CT. Dentists' prescribing of antibiotics and opioids to Medicare Part D beneficiaries: medications of high impact to public health. J Am Dent Assoc. 2018;149:721-30.
20. Suda KJ, Henschel H, Patel U, Fitzpatrick MA, Evans CT. Use of antibiotic prophylaxis for tooth extractions, dental implants, and periodontal surgical procedures. InOpen forum infectious diseases 2018 (Vol. 5, No. 1, p. ofx250).
21. M. H. Thornhill, M. J. Dayer, M. J. Durkin, P. B. Lockhart, and L. M. Baddour, "Oral antibiotic prescribing by NHS dentists in England 2010–2017," British Dental Journal, vol. 227, no. 12, pp. 1044–1050, 2019.
22. Yu J, Nie EM, Jiang R, Zhang CY, Li X. Analgesic and antibiotics prescription pattern among dentists in Guangzhou: A cross- sectional study. Pain Research and managrment.2020.
23. K. Y. Grady, N. Shively, C. J. Clancy, and B. K. Decker, "Antibiotic prescribing and stewardship opportunities within a veterans affairs dental care practice," Open Forum Infectious Diseases, vol. 4, no. suppl_1, Oxford University Press, 2017.
24. F. Halling, A. Neff, P. Heymann, and T. Ziebart, "Trends in antibiotic prescribing by dental practitioners in Germany," Journal of Cranio-Maxillofacial Surgery, vol. 45, no. 11, pp. 1854–1859, 2017
25. D. Robertson and A. J. Smith, "The microbiology of the

acute dental abscess," Journal of Medical Microbiology, vol. 58, no. 2, pp. 155–162, 2009.
26.Poveda RR , Bagán JV , Bielsa JM , Pastor EC . Antibiotic use in dental practice. A review. Med Oral Patol Oral Cir Bucal 2007;12:E186-92.
27. A. Mainjot, W. D'Hoore, A. Vanheusden, and J.-P. Van Nieuwenhuysen, "Antibiotic prescribing in dental practice in Belgium," International Endodontic Journal, vol. 42, no. 12, pp. 1112–1117, 2009.
28.Segura-Egea JJ, Velasco-Ortega E, Torres-Lagares D, Velasco-Ponferrada MC, Monsalve-Guil L, Llamas-Carreras JM, "Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons," Int Endod J.2010;43(4):342-50
29. Alzahrani AAH, et al. Inappropriate Dental Antibiotic Prescriptions: Potential Driver of the Antimicrobial Resistance in Albaha Region, Saudi Arabia. Risk management and Health care policy.2020;13:175-182.
30. Germack M, Sedgley CM, Sabbah W, Whitten B. Antibiotic use in 2016 by members of the American Association of Endodontists: report of a national survey. J Endod. 2017;43 (10):1615–1622.
31. Bolfoni MR, Pappen FG, Pereira-cenci T, Jacinto RC. Antibiotic prescription for endodontic infections: a survey of Brazilian Endodontists. Int Endod J. 2018;51(2):148–156.
32. F. Marra, D. George, M. Chong, S. Sutherland, and D. M. Patrick, "Antibiotic prescribing by dentists has increased," The Journal of the American Dental Association, vol. 147, no. 5, pp. 320–327, 2016.
33. J. Slots, "Low-cost periodontal therapy," Periodontology 2000, vol. 60, no. 1:110–137, 2012.