Original Article

Antibiotic Prescribing Knowledge, Awareness, and Attitude of Dental Surgeons Practicing in the Urban Indian Population

Rathi Rela[1], Aarti Vidyasindhu Sejao[2], Ankita Singh[3], Prabhat Kumar Singh[4], Mukesh Kumar[5], Shweta Kirti Gupta[6], Priyadarshini Rangari[7]

[1]Department of Oral Medicine and Radiology, Nalanda Medical College And Hospital, Patna, Bihar, [2]Department of Community Medicine, Dr. N.Y. Tasgaonkar Institute of Medical Science, Karjat, Raigad, Maharashtra, [3]Unit of Prosthodontics, Faculty of Dental Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, [4]Department of Periodontics,Buddha Institute of dental sciences and hospital, Patna, Bihar, [5]Department of Dentistry, Sri Krishna Medical College and Hospital. Muzaffarpur, Bihar, [6]Dept of Pedodontics and Preventive Dentistry, Senior Lecturer, Kalka Dental College and Hospital, Meerut, Uttar Pradesh, [7]Department of Dentistry, Sri Shankaracharya Medical College, Bhilai, Durg Chhattisgarh.

Submitted: 15-May-2021
Revised: 12-Jun-2021
Accepted: 14-Jun-2021
Published: 10-Nov-2021

ABSTRACT

Background: Studies have reported that dental procedures may serve as a portal of entry for bacteria into the blood circulation, commonly termed as bacteremia which may inhabitate the heart and joints subjected to repair and replacement by prosthesis and may lead to complications in immunocompromised patients. Dental procedure may play a pivotal role in the development of infective endocarditis and infection around the prosthetic joint. Antibiotic use is suggested for all dental procedures requiring gingival manipulation or of the periapical region of teeth or mucosal incision in these patients. **Objective:** The present study has been conducted to inspect the antibiotic prescribing practices of general dentists among 250 dental practitioners. **Methods:** The study was conducted on 250 dental surgeons practicing in the urban Indian population of various parts of the country. A validated questionnaire was developed by a multidisciplinary dental and medical team and was circulated on the subject of the basic knowledge and awareness about antibiotic prophylaxis in susceptible patients. The data from the participants were collected, collated, and statistically analyzed. **Results:** The present study comprised 250 dental surgeons; 178 out of 250 were male, whereas 72 were female. Antibiotic prophylaxis guidelines were followed by 169 practitioners (67.60%), whereas 81 (32.40%) dentists did not follow any guidelines. Out of 169, 67 followed the American Academy of Orthopaedic Surgeons (AAOS) guidelines (39.64%), 58 followed American Heart Association (AHA) guidelines (34.30%), whereas 44 followed general physician's guidelines (26.03%). On screening the underlying conditions for which antibiotic cover was prescribed, it was shown that majority of the dental surgeons did the same for patients with cardiac valve repair or replacement (230; 92%), followed by infective endocarditis (212; 84.80%); organ transplant (212; 84.405); diabetes (189; 75.60%); prosthetic joint replacement (150; 60%); and congenital heart defect (110; 44%). **Conclusion:** Patients should then be trained to perform meticulous oral hygiene and advised to schedule regular dental checkups to maintain optimal dental health. Dentists should use antibiotic prophylaxis in only conditions associated with a valid scientific basis and should follow the standard protocols recommended by the American Dental Association, AHA, or AAOS.

KEYWORDS: *Antibiotic prophylaxis, antibiotic resistance, cardiac valve, congenital heart disease, immunocompromised patients, infective endocarditis, prosthetic joint*

INTRODUCTION

The use of antibiotics to combat infections has been known to mankind since the discovery of penicillin by a Scottish bacteriologist Alexander Fleming in 1928.

Access this article online

Quick Response Code:

Website: www.jpbsonline.org

DOI: 10.4103/jpbs.jpbs_394_21

Address for correspondence: Dr. Mukesh Kumar, Assistant Professor of Dentistry, Sri Krishna Medical College and Hospital. Muzaffarpur, Bihar.
E-mail: drmukesh.mds@gmail.com

How to cite this article: Rela R, Sejao AV, Singh A, Singh PK, Kumar M, Gupta SK, *et al*. Antibiotic prescribing knowledge, awareness, and attitude of dental surgeons practicing in the urban Indian population. J Pharm Bioall Sci 2021;13:S1637-41.

Researchers have reported that dental procedures may serve as a portal of entry for bacteria into the blood circulation, commonly termed as bacteremia which may inhabitate the heart and joints subjected to repair and replacement by prosthesis and may lead to complications in immunocompromised patients.[1]

Dental procedure may play a pivotal role in the development of infective endocarditis and infection around the prosthetic joint. Antibiotics are extensively indicated in dental interventions which involve bleeding in the oral cavity and for immunocompromised patients prone to develop infection owing to suppressed host-defense mechanism.[2] The use is suggested for all dental procedures requiring gingival manipulation or of the periapical region of teeth or mucosal incision. One of the most common reasons for prescribing antibiotics is odontogenic pain which results from the inflammation set in due to microbial irritation. Various procedures and systemic ailments routinely covered by antimicrobials include disimpactions, orthognathic surgery, implant surgery, periapical surgery, and removal of tumors and cysts.[3]

The patients under the following category have been recognized as potential candidates to receive antibiotic prophylaxis during the frame of dental treatment:

- Cardiac deformities and/or prosthetic devices
- Immunocompromised patients like HIV/AIDS and organ transplants
- Patients with a history of total joint repair or replacement.[4]

Infective endocarditis also referred as acute or subacute bacterial endocarditis may be described as the inflammatory or exudative proliferation of the endocardium, characterized by vegetative growth on the walls or the surface of the endocardium.[5] *Staphylococcus aureus* and *Enterococcus* species play a chief role in development of the same. Studies have reported that invasive dental procedures like tooth extraction or poor periodontal status may act as eliciting factors. Antibiotic prophylaxis is recommended in patients with underlying cardiac disorders as it not only destroys bacterial colonization but also inhibits bacterial adherence.[6]

Individuals with compound systemic ailments and disabilities exhibit shoddier oral health and oral health-care outcomes. The use of antibiotics is warranted in conditions where chances of infection cannot be alleviated or may convey grave oral or systemic health hazards to patients. It may also be advised to reduce postoperative complications. The dental procedures should only be performed after obtaining consent from the treating physician.[7]

Antibiotic prophylaxis preceding any of the dental procedures in joint repair or replacement subjects is usually not suggested, exception being the ones who have experienced earlier complication associated with joint replacement/repair surgery. It is said that the risk of developing an infection is far-flung important to a surgeon than the risk of antibiotic resistance.[8]

The use of antibiotics in above-mentioned cases has been a debatable topic as it has been reported with a likelihood for an increase in the number of undesirable effects such as anaphylaxis, antibiotic sensitivity, and development of multidrug-resistant bacterial infections. Antibiotic resistance is considered as one of the major somber health intimidations facing the world. Nearly 30% of antibiotic prescriptions are considered redundant. Dentists prescribe 10% of all antibiotics followed by family practitioners, pediatricians, and internists.[9]

The present study was conducted to inspect the antibiotic prescribing practices of general dentists among 250 dental practitioners working in the urban Indian population.

Methods

The study was conducted on 250 dental surgeons. A validated questionnaire was developed by a multidisciplinary dental and medical team and was circulated on the subject of the basic knowledge and awareness about antibiotic prophylaxis in susceptible patients, i.e., patients with underlying cardiac disorders, immunocompromised patients, and patients with a history of joint repair/replacement. All the subjects voluntarily completed the questionnaire.

The subjects were questioned regarding their age, years of experience, and area of specialization. Knowledge and awareness of antibiotic prophylaxis was evaluated using key indicators like whether the antibiotic prophylaxis protocol was being followed by the dentist or not; the type of guideline/protocol followed (if followed); conditions for which antibiotic cover was prescribed like diabetes, prosthetic joint replacement, infective endocarditis, heart valve repair/replacement, congenital heart defect, and organ transplant; dental procedure for which cover was prescribed, i.e. periodontal therapy, endodontic therapy or surgery, surgical or nonsurgical extraction, implant surgery, and orthodontic treatment and their thoughts on the concept of antibiotic resistance were also discussed.

The study was approved by the Research Ethics Committee and signed consent was obtained from every participant. The data from the participants were collected, collated, and statistically analyzed. The statistical

analysis was performed using the statistical software SPSS version 24.0 (2012, Armonk, New York, USA).

Results

In the present study, 178 out of 250 (71.20%) were male, whereas 72 (28.80%) were female.

Experience in years, general dentist, and different dental specialists are mentioned in Table 1. Table 2 mentions about the follow-up of antibiotic prophylaxis guidelines. Out of 169, 67 followed the American Academy of Orthopaedic Surgeons (AAOS) guidelines (39.64%), 58 followed American Heart Association (AHA) guidelines (34.30%), whereas 44 followed general physician's guidelines (26.03%). On screening, the underlying conditions for which antibiotics were prescribed are mentioned in Table 3. Antibiotic cover was prescribed for the dental procedures that are explained in Table 4.

Discussion

Antibiotic prophylaxis guidelines were followed by 169 practitioners, whereas 81 dentists did not follow any guidelines. Out of 169, 67 followed the AAOS guidelines (39.64%), 58 followed AHA guidelines (34.30%), whereas 44 followed general physician's guidelines (26.03%). AAOS in collaboration with the American Dental Association (ADA) issued the foremost advisory statement on antibiotic prophylaxis for dental patients with prosthetic joints in 1997. The guidelines were revised in 2003 and it was concluded that prophylaxis is not consistently prescribed for dental patients with total joint replacements. It was stated that although bacteremia can cause hematogenous seeding, there is no support connecting dental procedures to prosthetic joint infection.[10] Contrary to the views put forth by the AAOS, AHA advocated that antibiotic prophylaxis before any dental procedure involving the manipulation of the gingival and periapical region of teeth and in cases of laceration of the oral mucosa minimizes the prospect of developing infective endocarditis in vulnerable patients.[11]

As a general guideline, 2 g of amoxicillin is advised 30–60 min preoperatively. Ampicillin, ceftriaxone, or cefazolin is advised for patients allergic to amoxicillin. Patients allergic to penicillin or ampicillin are advised to take cephalexin, cephalosporin, clindamycin, clarithromycin, or azithromycin.[12]

Infective endocarditis is a grave situation despite the preexisting cardiac condition and may result in fatal complications in presence of comorbidities such as diabetes and immunocom promised patients with

Table 1: Distribution of dental practitioners according to gender and specialty

	Frequency (valid percentage)
Gender	
Male	178 (71.20)
Female	72 (28.80)
Area of specialization	
General dentist	196 (78.4)
Oral surgeon	6 (2.4)
Oral pathologist	7 (2.8)
Endodontist	13 (5.2)
Orthodontist	10 (4)
Pendodontis	7 (2.8)
Periodontist	3 (1.2)
Public health dentist	8 (3.2)

Table 2: Antibiotic prophylaxis guidelines

	Frequency (valid percentage)
Antibiotic prophylaxis guidelines followed	
Yes	169 (67.60)
No	81 (32.40)
Antibiotic prophylaxis guidelines	
AHA guidelines	58 (34.30)
AAOS latest guidelines	67 (39.64)
Physician's guidelines	44 (26.03)
No guidelines	81 (32.40)

AHA: American Heart Association, AAOS: American Academy of Orthopaedic Surgeons

Table 3: Systemic conditions for which antibiotic prophylaxis prescribed

Conditions for which AP prescribed	Frequency (valid percentage)
Diabetes	189 (75.60)
Prosthetic joint replacement	150 (60)
History of infective endocarditis	212 (84.80)
History of heart valve repair/replacement	230 (92)
Congenital heart defect	110 (44)
Organ transplant	212 (84.40)

Table 4: Antibiotic prophylaxis for dental procedures

	Frequency (valid percentage)
Dental procedures	
Periodontal therapy	112 (44.80)
Laser periodontal therapy	80 (32)
Endodontic therapy	230 (92)
Endodontic surgery	250 (100)
Nonsurgical extraction	95 (38)
Surgical extraction	248 (99.20)
Implant surgery	250 (100)
Orthodontic treatment	8 (3.2)
Thoughts on antibiotic resistance	
Agree	48 (19.20)
Disagree	202 (80.80)

HIV/AIDS. It has been reported that a damaged cardiac due to infective endocarditis may endure progressive functional descent which may warrant the need for cardiac valve replacement. The AHA advocates the use of antibiotic prophylaxis for dental procedures during the first 6 months after the cardiac manipulation procedure.[13]

In the past, the rate of postoperative infections following prosthetic joint replacement surgery was quite high. These were either elated to wound infection or hematogenous spread of bacteria from one site to another. It was observed that there was a drastic decline in the rate of these infections with the use of antibiotics preoperatively. Despite the situation, many orthopedic surgeons still recommend antibiotic prophylaxis to be prescribed before any dental procedure that may persuade bacteremia.[14]

For the various dental procedures demanding the use of antibiotic prophylaxis, dental implants are the ones with 100% antibiotic coverage as advised by all the subjects. These are reported to demonstrate high success rates; however, failures also occur, which during the early healing phase may be associated with inflammatory breakdown resulting in scarring and meager osseointegration. Many studies including Kim AS et al in 2020 demonstrate lesser records of premature implant failures among the ones placed under antibiotic cover.[15] Escalante *et al.* also shore up the benefits of prophylactic antibiotic cover in surgeries involving implant placements, plummeting the likelihood of developing postoperative infections.[16]

Development of antibiotics attested to be a turning point for medical science and has changed modern medicine with immeasurable lives being hoarded by their utility over the years. Antibiotic control of infectious diseases has greatly added to the twofold human lifespan in developed countries over the past years. Antibiotics are still the discretionary preference for management of infectious diseases, for prophylaxis in a bunch of dental and medical sectors. Thakur RK *et al* in 2020; also stated that their injudicious use has been convoyed by the rapid emergence of antibiotic-resistant microorganisms in conglomeration with inducing toxic effects and hypersensitivity reactions.[17]

It is recommended that the health-care worker should only prescribe antibiotics in cases indicated by guidelines, in the prescribed dosage. For this, the ordinary use of antibiotics for the prevention of systemic infections should be avoided in routine surgery for healthy patients.

Conclusion

Patients should then be trained to perform meticulous oral hygiene and advised to schedule regular dental checkups to maintain optimal dental health. Dentists should use antibiotic prophylaxis in only conditions associated with a valid scientific basis and should follow the standard protocols recommended by the ADA, AHA, or AAOS. The risk of injudicious and inapt use of antibiotics and development of antibiotic resistance appear to be far more important than any apparent benefit.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Spittle LS, Muzzin KB, Campbell PR, DeWald JP, Rivera-Hidalgo F. Current prescribing practices for antibiotic prophylaxis: A survey of dental practitioners. J Contemp Dent Pract 2017;18:559-66.
2. Ramu C, Padmanabhan TV. Indications of antibiotic prophylaxis in dental practice-Review. Asian Pac J Trop Biomed 2012;2:749-54.
3. 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;43:342-50.
4. Brondani MA. Health technology assessment fireside: Antibiotic prophylaxis and dental treatment in Canada. J Pharm (Cairo) 2013;2013:365635.
5. Daly CG. Antibiotic prophylaxis for dental procedures. Aust Prescr 2017;40:184-8.
6. Tong DC, Rothwell BR. Antibiotic prophylaxis in dentistry: A review and practice recommendations. J Am Dent Assoc 2000;131:366-74.
7. Squire JD, Gardner PJ, Moutsopoulos NM, Leiding JW. Antibiotic prophylaxis for dental treatment in patients with immunodeficiency. J Allergy Clin Immunol Pract 2019;7:819-23.
8. McNally CM, Visvanathan R, Liberali S, Adams RJ. Antibiotic prophylaxis for dental treatment after prosthetic joint replacement: Exploring the orthopaedic surgeon's opinion. Arthroplast Today 2016;2:123-6.
9. Suda KJ, Henschel H, Patel U, Fitzpatrick MA, Evans CT. Use of antibiotic prophylaxis for tooth extractions, dental implants, and periodontal surgical procedures. Open Forum Infect Dis 2018;5:ofx250.
10. Berbari EF, Osmon DR, Carr A, Hanssen AD, Baddour LM, Greene D, *et al.* Dental procedures as risk factors for prosthetic hip or knee infection: A hospital-based prospective case-control study. Clin Infect Dis 2010;50:8-16.
11. Bakhsh AA, Shabeeh H, Mannocci F, Niazi SA. A review of guidelines for antibiotic prophylaxis before invasive dental treatments. Appl Sci 2021;11:311.
12. Farook SA, Davis AK, Khawaja N, Sheikh AM. NICE guideline and current practice of antibiotic prophylaxis for high risk cardiac patients (HRCP) among dental trainers and trainees in

the United Kingdom (UK). Br Dent J 2012;213:E6.

13. Graham L. AHA releases updated guidelines on the prevention of infective endocarditis. Am Fam Physician 2008;77:538-45.
14. Seymour RA, Whitworth JM, Martin M. Antibiotic prophylaxis for patients with joint prostheses-still a dilemma for dental practitioners. Br Dent J 2003;194:649-53.
15. Kim AS, Abdelhay N, Levin L, Walters JD, Gibson MP. Antibiotic prophylaxis for implant placement: A systematic review of effects on reduction of implant failure. Br Dent J 2020;228:943-51.
16. Escalante MG, Eubank TD, Leblebicioglu B, Walters JD. Comparison of azithromycin and amoxicillin before dental implant placement: An exploratory study of bioavailability and resolution of postoperative inflammation. J Periodontol 2015;86:1190-200.
17. Thakur RK, Yadav BK, Sultana R, Afridi SK, Das D, Sahoo SK. Influence of periodontal infection as a possible risk factor for preterm low birth weight. J Pharm Bioall Sci 2020;12:S613-8.