

Prescribing Antibiotics after Tooth Extraction by dentists in Bandung City, Indonesia: A Cross-Sectional Study

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ABSTRACT

Background: Tooth extraction is one of minor oral surgical procedure and antibiotics are commonly prescribed before or after the tooth extraction procedure. Antibiotic is used as therapy or to prevent infections after tooth extractions. Recent studies discovered that misuse of antibiotics by dentists has been an issue nowadays. The purpose of this study is to investigate the frequency and varieties of antibiotics post tooth extraction used by dentists in Bandung City.

Method: This study uses a quantitative descriptive method with a cross-sectional approach using a questionnaire. The samples in this study are general dentists and specialists in Bandung. The questionnaire was sent to dentists using proportionate stratified random sampling.

Result: The most frequently used antibiotics in Bandung City are Amoxicillin 500 mg (83,1%) and Clindamycin (24,3%). Most respondents prescribed antibiotics after tooth extractions for 5 days.

Conclusion: A small percentage of Dentists in Bandung City still prescribed antibiotics in conditions that do not always require antibiotics, such as simple post-extraction, irreversible pulpitis, and reversible pulpitis. Broad-spectrum antibiotics are more commonly prescribed to prevent infections. Furthermore, antibiotic usage after simple tooth extraction needs to be done by considering the patient's condition, diagnosis, and difficulty level of extraction.

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INTRODUCTION

The dentists play a role in prescribing antibiotics for 10% of the total use of antibiotics.¹ Tooth extraction is one of the oral surgical procedures that often uses antibiotics in the procedure.^{2,3} Antibiotics are given as a form of therapy or prevention of post-extraction infection.⁴ Tooth extraction procedures are also indicated for teeth that have experienced an infection so the risk of bacterial spreading is higher in tooth extraction procedures.⁵ Antibiotics are usually used in tooth extraction procedures because tooth extraction can cause trauma and damage to surrounding tissues, such as soft tissue and hard tissue that allows bacteria which is normal flora of the oral cavity to enter the blood vessels and can cause infection.^{6,7}

Antibiotics are commonly used drugs but their usage needs to be considered. Indications of antibiotics usage are actually used for patients with impaired immune system conditions, systemic diseases, and showing symptoms of developing infections.⁸ Antibiotics that are used wisely are antibiotics used rationally. The World Health Organization (WHO) states that rational use of antibiotics is when the patient receives the appropriate drug, in a dose that meets the needs, with a period of time that is not excessively given to the patient. Irrational use of antibiotics occurs when one or more of these required conditions are not carried out.⁹ One of irrational use of antibiotics is the excessive use of broad-spectrum antibiotics.¹⁰ Studies conducted by Sidabutar et al and Marra et al showed an increase in the use of Amoxicillin which is a broad-spectrum antibiotic for tooth extraction.^{11,12} Another study conducted by Choi et al showed that the use of broad-spectrum post-extraction antibiotics was given to patients without systemic disease compared to patients with systemic disease. Results of the study found that the use of antibiotics in simple tooth extraction was

44%.¹³ The increase in the use of antibiotics also increases the incidence of unnecessary use of antibiotics and the selection of inappropriate prescriptions which increases the possibility of bacterial resistance.¹⁴ Another study conducted by Lodi et al in 2012 showed that the administration of antibiotics with inappropriate indications can cause adverse effects such as vomiting, diarrhea, abdominal pain, secondary infections, allergic reactions, and bacterial resistance.^{3,15-17}

One of the effects of the use of antibiotics that has a big influence is bacterial resistance to antibiotics. Bacterial resistance to antibiotics is a condition in which bacteria can survive after being given antibiotic treatment.¹⁸ This condition can turn some common infections become more deadly because the infection becomes difficult to treat with the same drug.¹⁹ Bacterial resistance become big concern stated by WHO because it has a fatal impact such as threatening prevention and treatment of infection.¹⁷ Kraker et al also stated that it is estimated that by 2050 the number of bacterial resistance to antibiotics will cause an increase in mortality up to 10 million people.²⁰ This could happen if bacteria are exposed to broad-spectrum antibiotics continuously and affect pathogenic bacteria and they carry genes that have been resistant to antibiotics and give them to non-pathogenic bacteria. Continuous use of broad-spectrum antibiotics can also cause bacterial mutations.¹⁶

Antibiotics given with appropriate indications, such as in immunocompromised patients or with a history of post-extraction complications will be more beneficial because they can prevent further complications.³ A study conducted by Akinbami et al states that giving antibiotics after tooth extraction is not always necessary.²¹ The level of difficulty during extraction,

the patient's oral hygiene status, age, condition of the patient and the patient's adherence to postoperative instructions should be reconsidered before prescribing a patient.^{21,22} Therefore, prescribing antibiotics after tooth extraction needs more attention and reconsideration. Descriptive study of the use of antibiotics after tooth extraction has also been carried out in various countries, such as in Korea, England, the Philippines and also South Africa.^{2,13,23,24} Similar studies have not been found in Indonesia, especially in Bandung. Based on Riskesdas data in 2018 it was also found that tooth extraction in Bandung region accounted for 10.61% of the total tooth treatment.²⁵ Therefore, this study aims to see an overview of the use of antibiotics after tooth extraction by dentists and the variations of antibiotics used after tooth extraction by dentists in Bandung City.

MATERIALS AND METHODS

This is a cross-sectional study with quantitative descriptive method. The instrument used in this study was a questionnaire in the form of a google form. The population used in this study were general dentists and specialists who practice in Bandung City, amounting to 1119 people which consisted of data from PDGI Bandung as of October 2020. A total of 286 respondents were obtained as the minimum sample size from the sampling frame based on Isaac and Michael's formula with error rate of 5% using proportionate stratified random sampling method or stratified random where respondents are selected using a randomizer. Respondents have met the criteria, namely general dentists and specialists who practice in Bandung and are willing to participate in this study. Respondents who did not fill out the questionnaire completely and well were excluded from this study. The study was carried out from March to May 2021. This research was carried out after obtaining

approval from the Health Research Ethics Commission of Padjadjaran University with number 205/UN6.KEP/EC/2021.

Primary data was obtained through a research instrument in the form of a questionnaire using a google form consisting of 14 questions outside the respondent's characteristic data. The questionnaire begins with an explanatory narration and informed consent. The questionnaire contains questions about the frequency of extraction, cases and conditions given with antibiotics, types of antibiotics, duration of administration, dentist's knowledge about the use of simple post-extraction antibiotics, consideration of the impact of using antibiotics, and providing post-extraction education. The results of the data obtained were analyzed descriptively and presented using tables.

RESULTS

This study was conducted on 296 dentists who practice in Bandung. The following characteristics of respondents in this study are described in Table 1.

Table 1. Characteristics of Respondents

Characteristics of Respondents	Frequency (n)	Percentage (%)
Gender		
Man	81	27,4%
Woman	215	72,6%
Age		
≤ 30 years old	114	38,5%
31-40 years old	94	31,8%
41-50 years old	41	13,8%
Over 50 years old	47	15,9%
Qualification		
General dentist	220	74,3%
Specialist dentist	76	25,7%
Length of practice		

≤ 10 years old	178	60,1%
11-20 years old	62	20,9%
21- 30 years old	34	11,5%
31-40 years old	20	6,8%
> 40 years old	2	0,7%

Types of

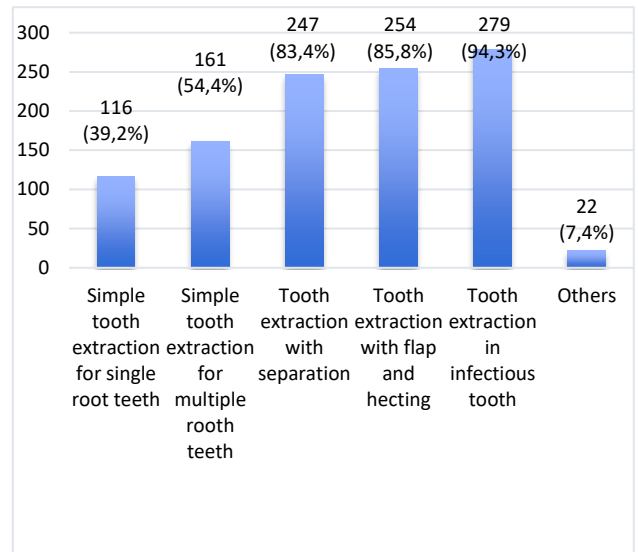
practice places

Personal Practice	115	38,9%
Joint Practices	117	39,5%
Main Clinic	95	32,1%
Public Health Clinic	43	14,5%
Hospital	95	30,1%

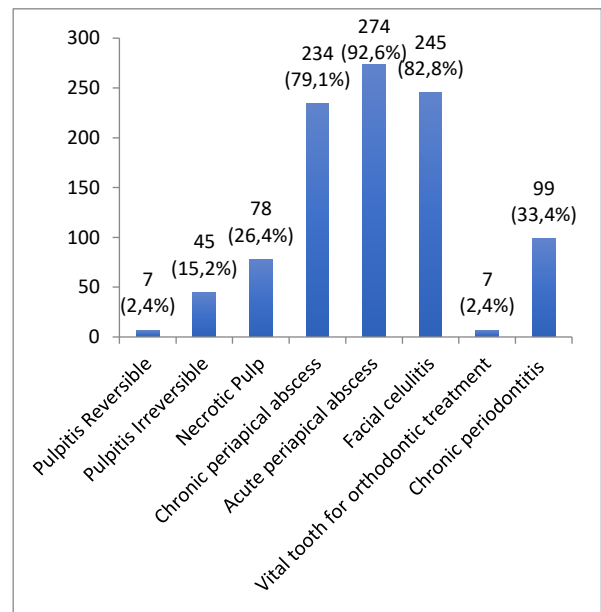
Table 2 . The average dentist performs dental extraction per week

State ment	Length of Practice					Total
	≤ 1 year	1-2 years	21-30 years	31-40 years	> 40 years	
1-5x/week	13	16	7	0	72	(58,1%)
6-10x/week	27	4	4	1	42	(14,2%)
10-15x/week	13	3	1	0	25	(8,4%)
≥15x/week	17	5	4	1	30	(10,1%)
Ne ver again	8	6	4	0	21	(9,1%)
Total	17	62	34	20	2	2
	8	(20,9%)	(1,1%)	(6,8%)	(0,7%)	9
	6	0,5%				6
	1					

Graph 1. Prescribing antibiotics after tooth extraction



Graph 2. Conditions that need to be prescribed antibiotics



Graph 3. Types of antibiotics prescribed in patients after simple tooth extraction

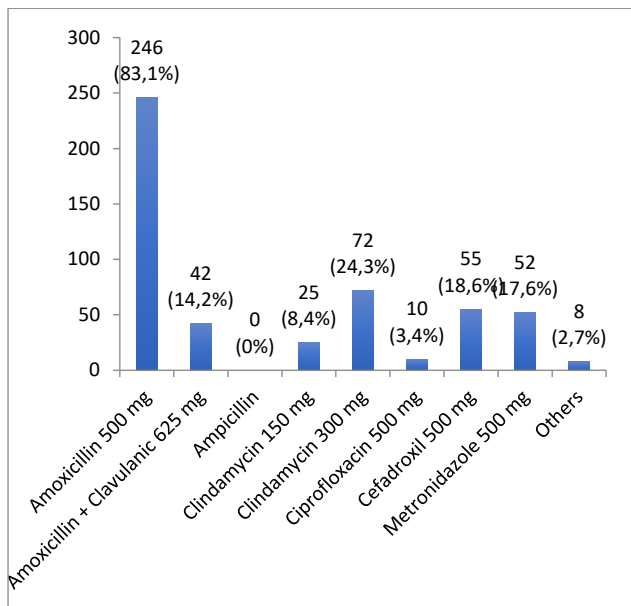


Table 3. Duration of antibiotics administration in patients after simple tooth extraction

Duration of antibiotics administration (days)	Total (n)	Percentage (%)
Three	136	45,9%
Five	137	46,2%
Seven	7	2,4%
Ten	0	0,0%
Others	16	5,5%
Total	296	100%

Graph 4. Causes of Giving Antibiotics to Patients After Simple Tooth Extraction

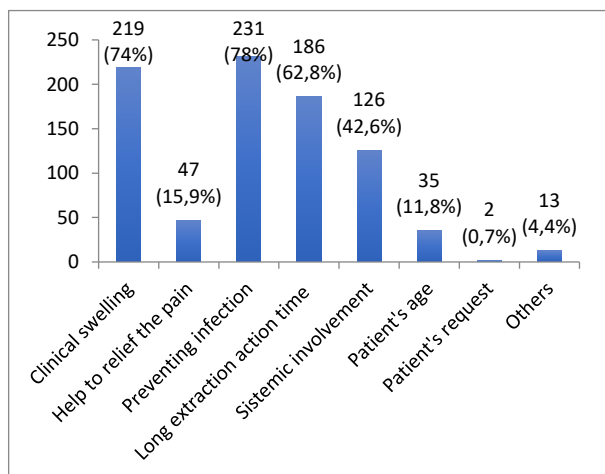
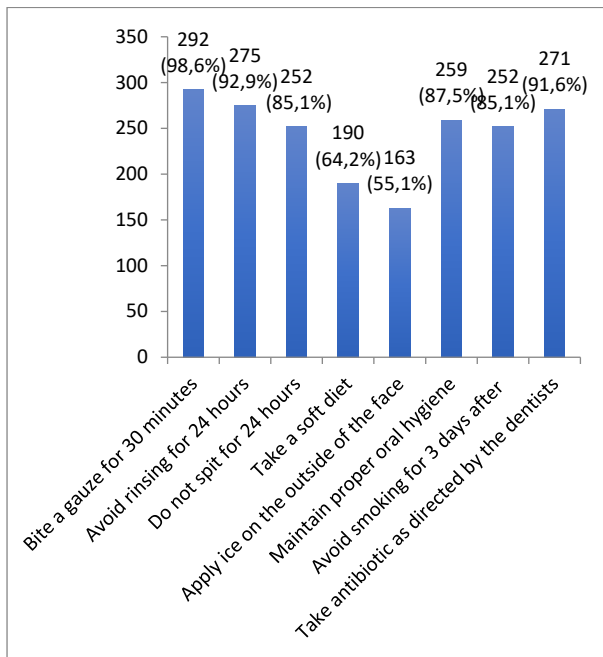


Table 4. Dentist's opinion on antibiotic administration after simple tooth extraction

Length of Practice	Statement : Administration of antibiotics after simple tooth extraction is a must		Total
	Yes	No	
≤10 years	41	137	178
11-20 years	10	52	62
21-30 years	2	32	34
31-40 years	2	18	20
> 40 years	0	2	2
Total	55 (18,6%)	241 (81,4%)	296

Table 5. Dentist's opinion on the impact of antibiotic administration

Length of Practice	Statement: Considering the adverse effects of antibiotic administration		Total
	Yes, always	No	
≤10 years	175	3	178
11-20 years	60	2	62
21-30 years	33	1	34
31-40 years	20	0	20
> 40 years	2	0	2
Total	290 (98%)	6 (2%)	296

Graph 5. Education given to patients after tooth extraction

Respondents could answer more than one answers as showed in Graphic 1,2,3,4, and 5.

DISCUSSION

The results showed that 54.4% of dentists in Bandung City prescribed antibiotics for simple extraction of multiple root teeth and 39.2% for simple extraction of single root teeth. A similar study was also conducted by Choi et al in Korea in 2020 which also found the prescribing of antibiotics for simple extractions of multiple and single root teeth.¹³ Antibiotics given to patients after simple tooth extraction are usually intended to prevent infection, as was found in this study.¹⁵ However, studies conducted by Yousuf et al, Prasad et al, and Vettori et al showed that antibiotics given after simple tooth extraction were not always necessary. Antibiotics given to patients after simple tooth extraction were found have no significant effect if the patient did not have systemic disease.^{15,26,27}

Amoxicillin was the most frequently administered antibiotic to patients after simple tooth extraction (83.1%). The same thing was also found in the studies from Marra et al and Sidabutar et al

that Amoxicillin is a broad-spectrum beta-lactam antibiotic that is mostly given by dentists.^{11,12,28} This antibiotic becomes drug of choice because it is able to fight most of the bacteria that cause odontogenic infections and has good bioavailability.^{28,29} Amoxicillin is also the most widely available antibiotic, has a relatively affordable price, low toxicity, and good capability to compete with food absorption.^{12,49} Other antibiotic that is widely used by dentists is Clindamycin (24.3%) as was found in the study of Durkin et al and Halling et al.^{1,30} The factors that influence the usage is that Clindamycin is an alternative antibiotic choice that given to patients who are allergic to beta-lactam antibiotics.¹ However, based on this study there were 81.4% of dentists who stated that antibiotics should not be given to patients after simple tooth extraction. The antibiotics which are given need to meet rational drug criteria such as proper assessment of the patient's condition, diagnosis, and drug selection.³¹ Uncontrolled administration of broad-spectrum antibiotics can contribute to antibiotic resistance.¹¹ Therefore, dentists must act selectively in giving antibiotics to patients.¹⁵ Some factors such as the patient's oral hygiene, the difficulty of the tooth extraction procedure, and the variety of tooth extraction procedure need to be considered before giving antibiotics to the patient after tooth extraction.²¹

The minimum duration of antibiotics given by dentists was 5 days (46.2%) and 3 days (45.9%), which was also found in the study of Kaul et al.³² This is because usually odontogenic infections can be cured within 3 to 7 days.⁸ The shortest duration of treatment for infection is the ideal course of antibiotics.⁸ The recommended duration of prescribing antibiotics to treat odontogenic infections is 3 to 5 days.^{33,34} If the patient does not recover after given antibiotics, additional or changes in antibiotic regimens can be given to

patients so the duration of antibiotic use becomes longer.³⁵ Administration of antibiotics that are too long and inappropriately can cause side effects such as hypersensitivity reactions, allergies, gastrointestinal problems, and contribute to antibiotic resistance.³⁶

The study by Kaul et al showed that dentists in India were more likely to prescribe antibiotics to patients with a diagnosis of facial cellulitis (70%).³² In contrast to the results of this study, where dentists were more likely to prescribe antibiotics in cases of acute periapical abscess (92.6%). This difference is possible due to differences in the perception of dentists regarding the administration of antibiotics for periapical abscess conditions.¹² Meanwhile, based on the results of this study, facial cellulitis is the second most frequently prescribed condition with antibiotics, which is 82.8%. Facial cellulitis is a serious disease that needs to be treated with antibiotics because of the possibility of the infection can spread quickly.^{12,37} Furthermore, the third most frequently prescribed condition with antibiotics was chronic periapical abscess (79.1%). Treatment for a periapical abscess can be done by incision and drainage without giving antibiotics.³⁸ Antibiotics can be given if the patient shows signs of spreading infection, like malaise, and has systemic disease.^{39,40}

This study also found that there were 15.2% of dentists prescribing antibiotics to patients with irreversible pulpitis. The same thing was found in the study of Agnihotry et al where 39.3% of dentists also prescribed antibiotics to treat patients with irreversible pulpitis.⁴¹ However, the use of antibiotics to treat irreversible pulpitis is actually not always necessary because it has been shown to have no significant effect on patients who do not have systemic disease.^{22,41} The damage that

occurs in irreversible pulpitis is still in the pulp chamber so the use of systemic antibiotics is not necessary.⁴² The use of antibiotics to treat reversible pulpitis and asymptomatic tooth extraction such as tooth extraction for orthodontic purposes is also not necessary because it has been proven to have no significant effect in patients without systemic disease.^{22,41,43} However, a small proportion of respondents still prescribe antibiotics in these cases.

As many as 98% of respondents consider the adverse effects of giving antibiotics. The adverse effects of giving antibiotics need to be considered because it can affect the choice of antibiotic type, dose, duration, time of administration, and indications.⁴⁴ Irrational administration of antibiotics can cause various adverse effects on patients, such as secondary infection and antibiotic resistance. Bacterial resistance to antibiotics occurs when bacteria remain viable and grow in the presence of concentrations of antibiotics that are usually sufficient to inhibit growth or kill bacteria.¹⁸ This is a matter of concern because infections become difficult to treat with the same drugs, leading to long-term infections, treatment costs are higher, and treatment options are limited.^{18,45,46} Therefore, antibiotics are very important to be given rationally.⁴⁶

Another factor that contributes to the occurrence of antibiotic resistance is if the patient does not take antibiotics as instructed by the dentist. Almost all respondents provide education about the recommended consumption of antibiotics. The purpose of giving post-tooth extraction education is to minimize the occurrence of complications and improve the patient's quality of life.⁴⁷ Based on the results of this study, it can be concluded that the after tooth extraction instructions

or education provided by respondents to patients was good enough but not always complete. Providing incomplete after tooth extraction instructions can be detrimental to the patient. The importance of providing instructions to patients as shown in Graphic 5 can help patients to overcome the risk of bleeding and swelling, maintain the process of forming blood clots so the wound can be closed, and prevent infection. Therefore, it is very important to always provide complete and good education to patients to prevent complications.⁴⁸

Future studies may need to be conducted with a wider number of respondents and a wider area. In addition, further studies can also be carried out on the relationship between post-tooth extraction antibiotics and antibiotic resistance.

CONCLUSION

A small percentage of dentists in Bandung City still prescribed antibiotics in conditions that are not always require antibiotics, such as simple post-extraction, irreversible pulpitis, and reversible pulpitis. Broad-spectrum antibiotics are more commonly prescribed in order to prevent infections. Furthermore, antibiotic usage after simple tooth extraction needs to be done by considering the patient's condition, diagnosis, and the difficulty level of tooth extraction.

REFERENCES

- Halling F, Neff A, Heymann P, Ziebart T. Trends in antibiotic prescribing by dental practitioners in Germany. *J Cranio-Maxillofacial Surg* [Internet]. 2017;45(11):1854–9. Available from: <http://dx.doi.org/10.1016/j.jcms.2017.08.010>
- Laloo R, Solanki G, Ramphoma K, Myburgh NG. Antibiotic-prescribing patterns of South African dental practitioners following tooth extractions. *J Investig Clin Dent*. 2016;8(4):1–6.
- Lodi G, Figini L, Sardella A, Carrassi A, Del Fabbro M, Furness S. Antibiotics to prevent complications following tooth extractions. *Cochrane Database Syst Rev*. 2012;2012(11).
- Stein K, Farmer J, Singhal S, Marra F, Sutherland S, Quiñonez C. The use and misuse of antibiotics in dentistry: A scoping review. *J Am Dent Assoc* [Internet]. 2018;149(10):869-884.e5. Available from: <https://doi.org/10.1016/j.adaj.2018.05.034>
- Isik BK, Gürses G, Menziletoglu D. Acutely infected teeth: to extract or not to extract? *Braz Oral Res*. 2018;32:e124.
- Richardson WL, Hammert WC. Adverse effects of common oral antibiotics. *J Hand Surg Am* [Internet]. 2014;39(5):989–91. Available from: <http://dx.doi.org/10.1016/j.jhsa.2014.01.021>
- Gavazova G, Hristozova E, Kisselov S, Raycheva R, Pechalova P. Bacteremia Following Closed and Open Dental Extraction. *Folia Med (Plovdiv)*. 2019;61(4):600–4.
- Oberoi SS, Dhingra C, Sharma G, Sardana D. Antibiotics in dental practice: How justified are we. *Int Dent J*. 2015;65(1):4–10.
- Organization WH. The world medicines situation: rational use of medicines. *World Med Situati*. 2011;2(2):24–30.
- Setiawan E, Wibowo YI, Setiadi AP, Nurpatria Y, Sosilya H, Wardhani DK, et al. Implementasi Antimicrobial Stewardship Program di Kawasan Asia: Sebuah Kajian Sistematis. *Indones J Clin Pharm*. 2019;8(2):141.
- Marra F, George D, Chong M, Sutherland S, Patrick DM. Antibiotic prescribing by dentists has increased Why? *J Am Dent Assoc* [Internet]. 2016;147(5):320–7. Available from: <http://dx.doi.org/10.1016/j.adaj.2015.12.014>
- Manginar Sidabutar, Friska D Simamora, Faber Sidabutar, Yuliana R Dolo Wain MEM, Department. The Rational Use of Antibiotics by Dentists for Odontogenic Infection Treatment. 2019;50–5.
- Choi YY. Prescription of antibiotics after tooth extraction in adults: A nationwide study in Korea. *J Korean Assoc Oral Maxillofac Surg*. 2020;46(1):49–57.
- Teoh L, Stewart K, Marino R, McCullough M. Antibiotic resistance and relevance to general dental practice in Australia. *Aust Dent J*. 2018;63(4):414–21.
- Yousuf W, Khan M, Mehdi H, Mateen S. Necessity of Antibiotics following Simple Exodontia. *Scientifica (Cairo)*. 2016;2016.
- Melander RJ, Zurawski D V., Melander C. Narrow-spectrum antibacterial agents. *Medchemcomm*. 2018;9(1):12–21.
- Organization WH. Antimicrobial resistance: global report on surveillance [Internet]. World Health Organization. 2014. Available

- from:
<https://www.who.int/drugresistance/documents/surveillancereport/en/>
18. Sabtu N, Enoch DA, Brown NM. Antibiotic resistance: What, why, where, when and how? *Br Med Bull.* 2015;116(1):105–13.
 19. Organization WH. The Evolving Threat of Antimicrobial resistance : options for action [Internet]. Geneva: World Health Organization. 2012. Available from: https://www.researchgate.net/publication/271851729_The_Evolving_Threat_of_Antimicrobial_Resistance_Options_for_Action
 20. de Kraker MEA, Stewardson AJ, Harbarth S. Will 10 Million People Die a Year due to Antimicrobial Resistance by 2050? *PLoS Med.* 2016;13(11):1–6.
 21. Babatunde OA, Babatope BO. Is routine antibiotic prescription following exodontias necessary? A randomized controlled clinical study. *J Dent Oral Hyg.* 2015;7(1):1–8.
 22. Jain KM, Oswal S. Antibiotics in Dentistry - An Art and Science. 2013.
 23. Karki AJ, Holyfield G, Thomas D. Dental prescribing in Wales and associated public health issues. *Br Dent J.* 2011;210(1).
 24. Sarmiento MA, Maglutac Jr MT, Yanga-Mabunga MS. Antibiotic prescribing practices of Filipino Dentists. *Int J Public Heal Sci.* 2019;8(3):332.
 25. Riskesdas. Laporan Provinsi Jawa Barat. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. 2018. 140–151 p.
 26. Prasad N, Visalakshi D, Chaitan SM, Prasad SR, Reddy LVK, Kumar KA. Rationale of Antibiotic Usage in Simple Exodontia – a Prospective Study. *Int J Sci Res Publ.* 2019;9(8):p9238.
 27. Vettori E, Costantinides F, Nicolini V, Rizzo R, Perinetti G, Maglione M, et al. Factors influencing the onset of intra-and post-operative complications following tooth exodontia: Retrospective survey on 1701 patients. *Antibiotics.* 2019;8(4).
 28. Ogle OE. Odontogenic Infections. *Dent Clin North Am* [Internet]. 2017;61(2):235–52. Available from: <http://dx.doi.org/10.1016/j.cden.2016.11.004>
 29. Huttner A, Bielicki J, Clements MN, Fridodt-Møller N, Muller AE, Paccoud JP, et al. Oral amoxicillin and amoxicillin–clavulanic acid: properties, indications and usage. *Clin Microbiol Infect* [Internet]. 2020;26(7):871–9. Available from: <https://doi.org/10.1016/j.cmi.2019.11.028>
 30. Durkin MJ, Hsueh K, Sallah YH, Feng Q, Jafarzadeh SR, Munshi KD, et al. An evaluation of dental antibiotic prescribing practices in the United States. *J Am Dent Assoc* [Internet]. 2017;148(12):878–886.e1. Available from: <http://dx.doi.org/10.1016/j.adaj.2017.07.019>
 31. Kementerian Kesehatan Republik Indonesia. Modul penggunaan obat rasional. Kementeri Kesehatan RI. 2011;1–192.
 32. Kaul R, Angrish P, Saha S, Sengupta A V, Mukherjee S. A Survey on the Use of Antibiotics among the Dentists of Kolkata, West Bengal, India. *Int J Clin Pediatr Dent.* 2018;11(2):122–7.
 33. Yagiela JA, Dowd FJ, Johnson BS, Mariotti AJ, Neidle EA. *Pharmacology and Therapeutics For Dentistry.* Mosby Elsevier; 2011. 957 p.
 34. Nikolaus O Palmer. *Antimicrobial Prescribing in Dentistry: Good Practice Guidelines.* Faculty of General Dental Practice (UK) and Faculty of Dental Surgery. 2020. 49–63 p.
 35. Bassetti M, Montero JG, Paiva JA. When antibiotic treatment fails. *Intensive Care Med.* 2018;44(1):73–5.
 36. Ahmadi H, Ebrahimi A, Ahmadi F. Antibiotic Therapy in Dentistry. *Int J Dent.* 2021;2021.
 37. Dar-Odeh N, Abu-Hammad, Al-Omiri, Khraisat, Shehabi. Antibiotic prescribing practices by dentists: a review. *Ther Clin Risk Manag.* 2010;301.
 38. Perić M, Perković I, Romić M, Simeon P, Matijević J, Mehičić GP rpi., et al. The Pattern of Antibiotic Prescribing by Dental Practitioners in Zagreb, Croatia. *Cent Eur J Public Health* [Internet]. 2015;23(2):83–9. Available from: <https://doi.org/10.21101/cejph.a3981>
 39. Dhanvanth M, Ganapathy D, Jain AR. Choice of antibiotics in the management of dentoalveolar abscess among dental practitioners. *Drug Invent Today.* 2018;10(12):2390–4.
 40. Peedikayil FC. Antibiotics in Odontogenic Infections - An Update. *J Antimicrob Agents.* 2016;2(2).
 41. Agnihotry A, Gill KS, Stevenson RG, Fedorowicz Z, Kumar V, Sprakel J, et al. Irreversible pulpitis – A source of antibiotic over-prescription? *Braz Dent J.* 2019;30(4):374–9.
 42. Agnihotry A, Thompson W, Fedorowicz Z, van Zuuren EJ, Sprakel J. Antibiotic use for irreversible pulpitis. *Cochrane Database Syst Rev.* 2019;2019(5).
 43. Agrawal M, Rahman QB, Akhter M. Extraction of Asymptomatic Tooth With And Without Antibiotic Therapy. *Bangabandhu Sheikh Mujib Med Univ J.* 2012;5(1).
 44. Oei A, Hülsmann M. The acute apical

- abscess: aetiology, microbiology, treatment and prognosis. *Endo (l Engl)*. 2018;12(2):75–85.
45. Atif M, Asghar S, Mushtaq I, Malik I, Amin A, Babar ZUD, et al. What drives inappropriate use of antibiotics? A mixed methods study from Bahawalpur, Pakistan. *Infect Drug Resist*. 2019;12:687–99.
46. Cope AL, Chestnutt IG. Inappropriate prescribing of antibiotics in primary dental care: reasons and resolutions. *Prim Dent J*. 2014;3(4):33–7.
47. Alsaleh MK, Alajlan SS, Alateeq NF, Alamer NS, Alshammary F, Alhobeira HA, et al. Alveolar Osteitis: Patient's compliance with post-extraction instructions following permanent teeth extraction. *J Contemp Dent Pract*. 2018;19(12):1518–25.
48. Deliverska EG, Petkova M. Complications After Extraction of Impacted Third Molars - Literature Review. *J IMAB - Annu Proceeding (Scientific Pap)*. 2016;22(3):1202–11.
49. Malinda Yuti, Prisinda Diani. The Antibiotics Sensitivity Test On Staphylococcus and Streptococcus From Chronic Apical Abscess. *Odonto Dental Journal Vol 9 No 1*. July 2022