

THERAPEUTIC PRACTICE PREFERENCE IN DENTISTRY: ANTIBIOTICS, ANALGESICS AND ANTISEPTICS

ORIGINAL ARTICLE, Vol-4 No.4

Asian Journal of Medical Science, Volume-4(2013)

<http://nepjol.info/index.php/AJMS>

¹Paudel KR, ²Pokhrel P, ¹Shrestha A, ³Raghubanshi BR, ¹Raut B. ¹ Department of Pharmacology, Kathmandu Medical College and Teaching Hospital ²Department of Oral Surgery, Kantipur Dental College ³ Department of Microbiology, Kist Medical College

ABSTRACT

CORRESPONDENCE:

Dr Keshab Raj Paudel,
Department of Pharmacology,
Kathmandu Medical College
and Teaching Hospital,
E-mail-
keshabpaudel@gmail.com;
Phone: +977-9751024853

*"Amoxicillin, ibuprofen
and chlorhexidine have
the higher prescription
rates in dentistry."*

Objective: Present study was aimed to find out the commonest medicines used in dentistry as preferred by dental practitioners in Nepal.

Materials and Methods: Seventy pre-structured questionnaires were distributed to the dental practitioners. Questionnaire was designed to evaluate the use of the antimicrobial, analgesic and antiseptic agents. A total of three open ended questions were included in each questionnaire to know the preference of dental practitioners for different medicines used in dentistry. Yates corrected Chi square test was used wherever applicable and level of significance was set at 5%.

Results: Amoxicillin (89.4%, $P < 0.05$), metronidazole (57.8%), amoxicillin with clavulanic acid (21%) and doxycycline (26.2%) were the most frequently preferred antibiotics of first, second, third and fourth choice respectively. Similarly, among analgesics, ibuprofen (52.6%), diclofenac (31.5%), paracetamol (47.3%) and nimesulide (24.5%) had the highest predilection for first, second, third and fourth choice respectively among the dental practitioners. Chlorhexidine (77.2%, $P < 0.05$) was the most selected antiseptic for the first choice followed by listerine for the second (31.5%) and third (43.8%) choice.

Conclusion: First choice antibiotic, analgesic and antiseptic are amoxicillin, ibuprofen and chlorhexidine respectively among the majority of dental practitioners.

Keywords: Analgesic, Antibiotic, Antiseptic, Dentistry, Nepal

INTRODUCTION

Pharmacotherapy is an indispensable part of dental treatment which is associated with drug's efficacy, patient's safety and drug toxicity in dental patients.¹⁻⁵ Most commonly prescribed medicines in dentistry are the antimicrobial agents and analgesic agents.^{2,6,7} Drug prescription is a dental/medical practitioner's written order to the pharmacist to dispense a medicine or medicines to be administered or taken by the patient in a proper dosage from, dose, frequency and the duration for the treatment. It is an individualized and vibrant clinical process which may be influenced by social, cultural, economic, and/or promotional factors.⁶ Therefore, for the rational prescribing, the World Health Organization (WHO) guide to good prescribing should be followed strictly which involves six steps as follows; 1. Define the patient's problem 2. Specify the therapeutic objective 3. Consider the alternatives and verify the suitability of personal drug (P-drug) in terms of efficacy, safety and affordability 4. Write a prescription 5. Give information, instruction and warning related to the medicine, and 6. Monitor or stop the treatment. So in this process, if the clinical problem persists, each step should be re-considered from the beginning.⁸ Usually, dental prescriptions offer short duration treatment or treatment for surgical procedures. However, every clinical practitioner needs knowledge about medicines and must follow the international rules for prescribing⁶ since there are reports of lack of pharmacotherapeutic knowledge which resulted in prescription errors in different countries, and hence, questionable efficacy and safety in the data reported in the literature. Also, allergic conditions, antimicrobial susceptibility patterns and availability of the medicines may affect the selection pattern of the drugs⁹⁻¹². However, there is lack of clear-cut official guidelines for the use of antibiotics, analgesics and anti-septics in Nepal. Though this study was not aimed to formulate the guidelines for the dentists,

it would be helpful to know the preferred medicines in dental practice. As there is plethora of pharmacotherapeutic agents available to the clinical practitioners, this study aimed to find out the commonest medicines used in dentistry as preferred by dental practitioners and their first, second, third and fourth choices for antibiotics and analgesics, and up to third choices for antiseptics in Kathmandu valley, Nepal.

MATERIALS AND METHODS

Seventy pre-structured questionnaires were distributed to the dental practitioners in Kathmandu valley, Nepal in 2012 after obtaining institutional ethical clearance and informed verbal consent from the participants. Questionnaires were distributed in person by visiting different dental institutions and clinics and were collected after 2 days. Sample size was calculated by using the formula $4pq/L^2$ where 'p' is the prevalence of medicine use in dentistry, 'q' is '1-p' and 'L' is the allowable error (10 or 20% of p) and sample selection was done by simple random sampling (lottery method). Fifty seven completely filled questionnaires were returned and evaluated for the study. Questionnaire was designed to evaluate the use of the antimicrobial, analgesic and antiseptic agents. Each questionnaire included three open ended questions- for antibiotics, analgesics and antiseptics each. Respondents were requested to write the order of preference for antibiotics and analgesics up to four drugs and up to three for antiseptics in odontogenic infection, pain and/or procedure, and in poor oral hygiene along with dental procedure. Age, sex and years of dental practice were also recorded in the questionnaire. Antibiotics were asked in odontogenic infections whereas analgesics were asked for odontogenic pain and/or post-dental procedure if required. Similarly, antiseptics were asked for gingivitis, periodontitis and poor oral

hygiene along with dental procedure. Data were compiled, entered and analyzed using Microsoft Excel 2007 and Epi Info 2000. Yates corrected Chi square test was used wherever applicable and level of significance was set at 5%.

RESULTS

The mean age of respondents was 28.7 years (Mean±SD=28.7±2.2) with 30 (52.6%) females and 27 (47.4%) males (M:F::0.9:1) with average of five years in dental practice. Amoxicillin (89.4%, P<0.05), metronidazole (57.8%), amoxicillin with clavulanic acid (21%) and doxycycline (26.2%) were the most frequently preferred antibiotics of first, second, third and fourth choice respectively (Table-1). Similarly, among analgesics, ibuprofen (52.6%), diclofenac (31.5%), paracetamol (47.3%) and nimesulide (24.5%) had the highest predilection for first, second, third and fourth choice respectively among the dental practitioners (table-2). Chlorhexidine (77.2%, P<0.05) was the most selected antiseptic for the first choice followed by listerine for the second (31.5%) and third (43.8%) choice (fig-1). Other antimicrobials, analgesics and antiseptics with their selection numbers and percentages have been shown in table1, table 2 and figure 1 respectively. Table 3 shows the different pharmacotherapeutic groups of antibiotics, analgesics and antiseptics used in dentistry. As per the results obtained, penicillin group of antimicrobial agents comprised of 47.8 % selections followed by imidazoles (21%), cephalosporins (10.6%) and tetracyclines (doxycycline) (10.6%). Nonsteroidal anti-inflammatory drugs (NSAIDs) were the most selected analgesics (89.5%, P<0.05) followed by opioid (8.4%) analgesic agents. Among NSAIDs, nonselective cyclo-oxygenase (COX) inhibitors had the highest preference (44.7%) followed by NSAID with poor anti-inflammatory property (paracetamol, 20.2%) and preferential COX-2

inhibitor (nimesulide, 14%). Sixty two percent of antiseptics included bisdiaguinides (chlorhexidine) and phenolic compounds (listerine) followed by povidone iodine (22.3%) and benzydamine (11.1%) (table-3).

DISCUSSION

This study was set to explore the commonest choice of antimicrobial agents, analgesics and antiseptics amongst the dental practitioners in Nepal. Amoxicillin was the most preferred antibiotic followed by metronidazole in dental practice. Similar prescription audit studies in the past have shown that amoxicillin is the most frequently prescribed antimicrobial agent.^{1,2,6} Additionally, use of amoxicillin alone or in combination with clavulanate is justifiable as bacteriological epidemiology in odontogenic infections include gram positive facultative anaerobes (68%), gram negative strict anaerobes (30%) and gram positive facultative anaerobes (2%).¹³ Moreover, amoxicillin alone or with clavulanate has shown best results in terms of less resistance and more sensitivity than other antimicrobial agents against oral bacterial pathogens.¹⁴ Similarly, in another study, amoxicillin has shown 91% sensitivity, and amoxicillin and clavulanate has shown 100% sensitivity against the bacteria in odontogenic infections. Metronidazole has only 45% sensitivity, however, when it is combined with penicillin group of antibiotic, either with penicillin V or amoxicillin, the sensitivity increased up to 93% to 99% in endodontic abscesses.¹⁵ Besides above mentioned antibiotics, tetracycline, azithromycin cephalosporins, clindamycin and tinidazole are also effective against oral bacterial pathogens with varying rates of sensitivity patterns.¹³⁻¹⁶ Regarding fluoroquinolones, data in the literature from comparative studies are minimal. However, some studies have reported that sitafloxacin is effective in odontogenic infections as it has shown broad

Table 1: Preference for antibiotics in odontogenic infections

Antimicrobial agent	1 st choice N (%)	2 nd choice N (%)	3 rd choice N (%)	4 th choice N (%)
Amoxicillin	51 (89.4) ^a		3 (5.3)	
Ampicillin+cloxacillin		12 (21.0)	3 (5.3)	
Amoxicillin+clavulanic acid		3 (5.3)	12 (21.0)	13 (22.8)
Ciprofloxacin			3 (5.3)	9 (15.7)
Metronidazole	3 (5.3)	33 (57.8)	9 (15.7)	
Cefixime	3 (5.3)	3 (5.3)	6 (10.6)	
Azithromycin		6 (10.6)	3 (5.3)	
Doxycycline			9 (15.7)	15 (26.2)
Penicillin V			6 (10.5)	6 (10.6)
Cephalosporins*			3 (5.3)	6 (10.6)
Cefadroxil				3 (5.3)
Tinidazole				3 (5.3)
Clindamycin				1 (1.8)
No response				1 (1.8)

*as per the response in the questionnaire, ^a P<0.05

Table 2: Preference for analgesics in dental pain

Analgesic agent	1 st choice N (%)	2 nd choice N (%)	3 rd choice N (%)	4 th choice N (%)
Ibuprofen	30 (52.6)	6 (10.6)	3 (5.3)	6 (10.6)
Ibuprofen+paracetamol	15 (26.2)	6 (10.6)	3 (5.3)	
Diclofenac	6 (10.6)	18 (31.5)	18 (31.5)	6 (10.6)
Paracetamol	3 (5.3)	12 (21.0)	27 (47.3)	4 (7.0)
Tramadol	3 (5.3)	3 (5.3)		10 (17.5)
Nimesulide		12 (21.0)	6 (10.6)	14 (24.5)
Codeine				3 (5.3)
Codeine + paracetamol				3 (5.3)
Ketorolac				6 (10.6)
Acelofenac				3 (5.3)
Other (hyoscine)*				1 (1.8)
No response				1 (1.8)

*hyoscine was considered as an analgesic agent by one respondent

spectrum of antibacterial *in vitro* activity including *Prevotella spp.*, *Porphyromonas spp.*, *Fusobacterium spp.*, etc, which may be involved in periodontitis.¹⁷ Similarly, moxifloxacin and levofloxacin showed 98% susceptibility against viridians group of *Streptococci* and *Prevotella* species isolated from odontogenic abscesses.¹⁸ So except for sitafloxacin, moxifloxacin and levofloxacin, use of other fluoroquinolones in

odontogenic infections is scientifically questionable based in the data in literature till date. In this study, 89.4% (P<0.05) of respondents chose amoxicillin as their first choice which is rational as it is the first choice antibiotic in dentistry.^{10,19} Twenty one percent of respondents have mentioned combination of ampicillin and cloxacillin as their second antibiotic choice which is wrong and irrational as this combination doesn't provide any

Table 3: Pharmacotherapeutic groups of antimicrobials, analgesics and antiseptics

Therapeutic group	N	%
Antimicrobial agents(n=228)		
<i>Penicillins</i>	109	47.8
<i>Imidazoles</i>	48	21.0
<i>Cephalosporins</i>	24	10.6
<i>Tetracyclines</i>	24	10.6
<i>Fluoroquinolones</i>	12	5.3
<i>Macrolides</i>	9	3.9
<i>Clindamycin</i>	1	0.4
<i>No response</i>	1	0.4
Analgesics (n=228)		
<i>Nonselective COX inhibitors</i>	102	44.7
<i>NSAID with poor anti-inflammatory property</i>	46	20.2
<i>Preferential COX-2 inhibitor</i>	32	14.0
<i>Combination of two NSAIDs</i>	24	10.6
<i>Opioids</i>	19	8.4
<i>Combination of opioid with NSAID</i>	3	1.3
<i>Other[#]</i>	1	0.4
<i>No response</i>	1	0.4
Antiseptics (n=171)		
<i>Bisdiaguinides (chlorhexidine)</i>	56	32.7
<i>Phenolic compounds (listerine)</i>	50	29.3
<i>Povidone iodine</i>	38	22.3
<i>Benzydamine</i>	19	11.1
<i>H₂O₂ and normal saline</i>	3	1.7
<i>Triclosan</i>	3	1.7
<i>Normal saline/salt water</i>	1	0.6
<i>No response</i>	1	0.6

COX- cyclo-oxygenase enzyme; [#] one respondent considered hyoscine as analgesic agent; H₂O₂ - hydrogen peroxide

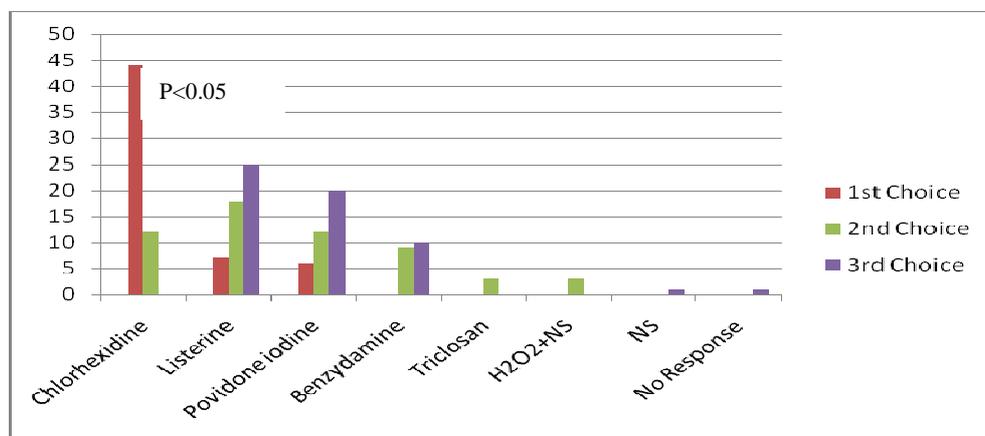


Fig 1: Preference for antiseptic agents. H₂O₂- hydrogen peroxide, NS- normal saline/salt water

superior therapeutic effect either ampicillin or cloxacillin alone and the combination should not be prescribed in dental practice.²⁰

Fifty two and half percent of respondents have mentioned the ibuprofen as their first analgesic choice followed by ibuprofen and paracetamol combination. Among analgesics, 76% drugs are from NSAIDs and their combinations followed by opioids. It shows very good knowledge of analgesics among the respondents. Ibuprofen has both anti-inflammatory and analgesic properties whereas paracetamol has no anti-inflammatory property. Again, paracetamol has different site of action unlike other NSAIDs and it can be combined with either other NSAIDs or opioids to obtain synergistic effect.^{12,21-24} While prescribing analgesics, mainly NSAIDs, individual pharmacokinetic and pharmacodynamic properties are very important and every prescriber should keep these properties in mind primarily in case of dental patients with cardiovascular, hepatic, renal, gastrointestinal and respiratory diseases.^{21,25}

As far as antiseptics are concerned, 77.2% ($P < 0.05$) respondents considered chlorhexidine as their first antiseptic choice followed by listerine and povidone iodine. Previous prescription audit studies have shown prescription rate of chlorhexidine to be 70%² to 83.3%¹ in Nepal. Chlorhexidine may be more effective in gingivitis, periodontitis, plaque and caries prevention than listerine.^{26,27} Similarly, a systematic review of 19 randomized control trials in healthy human volunteers (826 subjects) showed that chlorhexidine was significantly better to reduce plaque formation both in short term (less than 4 weeks) and long term (more than 4 weeks) use. However, Chlorhexidine and listerine were not different for the control of gingival inflammation in long term use and chlorhexidine was associated with more staining and calculus formation.²⁸

Limitation of the present study involves lack of consideration to the different indications, medical conditions, and allergies, severity of pain, and general practitioners and specialists which might have affected the outcomes. However, present study provides the baseline data for the use of antibiotics, analgesics and antiseptics in dental practice.

CONCLUSION

Amoxicillin, ibuprofen and chlorhexidine are the first choice of antimicrobial, analgesic and antiseptic agents among the majority of dental practitioners and these findings suggest the rational prescribing in dental practice though there is lack of the specific prescribing guidelines by the government or dental organization in Nepal.

REFERENCES

1. Paudel KR. Drug therapy in dental out patients. *J Nep Dent Assoc.* 2010; 11(2):126-31.
2. Paudel KR, Sah NK, Jaiswal AK. Prevalence of pharmacotherapy in the department of pediatric dentistry. *Kathmandu Univ Med J (KUMJ).* 2010; 8(30):190-4.
3. Donaldson M, Goodchild JH. Appropriate analgesic prescribing for the general dentist. *Gen Dent.* 2010; 58:291-7.
4. Marek CL. Avoiding prescribing errors: a systematic approach. *J Am Dent Assoc.* 1996; 127:617-23.
5. World Health Organization. Patient Safety Curriculum. Multiprofessional Edition 2011. Available on: Patient Safety Curriculum Guide: Multi-professional Edition.
6. Guzman-Alvarez R, Medeiros M, Reyes-Lagunes LI, Campos-Sepúlveda AE. Knowledge of drug prescription in dentistry students. *Drug, Healthcare and Patient Safety.* 2012; 4:55-9.
7. Poveda-Roda R, Bagán JV, Sanchis-Bielsa JM, Carbonell-Pastor E. Antibiotic use in dental practice. A review. *Med Oral Patol Oral Cir Bucal* 2007; 12:186-92.
8. de Vries TPGM, Henning RH, Hogerzeil HV, Fresle DA. Guide to Good Prescribing. A Practical Manual. Geneva: World Health Organization Action Program on Essential Drugs, 1994: WHO/DAP/94.11. http://whqlibdoc.who.int/hq/1994/WHO_DAP_94.11.pdf. Accessed January 6, 2013.
9. Mendonca JM, Lyra DP Jr, Rabelo JS, et al. Analysis and detection of dental prescribing errors at primary health

- care units in Brazil. *Pharm World Sci.* 2010;32:30-5.
10. Cherry WR, Lee JY, Shugars DA, White RP Jr, Vann WF Jr. Antibiotic use for treating dental infections in children: A survey of dentists' prescribing practices. *J Am Dent Assoc.* 2012; 143:31-8.
 11. Guzman-Alvarez R, Campos-Sepulveda AE, Martinez-Gonzalez AA. Knowledge about local anesthetics in odontology students. *Proc West Pharmacol Soc.* 2009; 52:118-9.
 12. Espinosa-Melendez MT. An evaluation of the pharmacological knowledge of undergraduate and graduate students at UNAM's School of Dentistry. *Proc West Pharmacol Soc.* 2006; 49:173-6.
 13. Jacinto RC, Gomes BP, Ferraz CC, Zaia AA, Filho FJ. Microbiological analysis of infected root canals from symptomatic and asymptomatic teeth with periapical periodontitis and the antimicrobial susceptibility of some isolated anaerobic bacteria. *Oral Microbiol Immunol.* 2003; 18(5):285-92.
 14. Brescó-Salinas M, Costa-Riu N, Berini-Aytés L, Gay-Escoda C. Antibiotic susceptibility of the bacteria causing odontogenic infections. *Med Oral Patol Oral Cir Bucal.* 2006; 11:70-5.
 15. Baumgartner JC, Xia T. Antibiotic susceptibility of bacteria associated with endodontic abscesses. *J Endod.* 2003; 29(1):44-7.
 16. Yoshii T, Yoshikawa T, Furudo S, Yoshioka A, Ohtsuka Y, Komori T. Evaluation of oral antimicrobial agent levels in tooth extraction sites. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2001; 91(6):643-8.
 17. Keating GM. Sifloxacin: in bacterial infections. *Drugs.* 2011;71(6):731-44. doi: 10.2165/11207380-000000000-00000.
 18. Sobottka I, Cachovan G, Stürenburg E, Ahlers MO, Laufs R, Platzer U, Mack D. In vitro activity of moxifloxacin against bacteria isolated from odontogenic abscesses. *Antimicrob Agents Chemother.* 2002; 46(12):4019-21.
 19. Mc-Nulty CA, Francis NA. Optimizing antibiotic prescribing in primary care settings in the UK: findings of a BSAC multi-disciplinary workshop 2009. *J Antimicrob Chemother.* 2010; 65:2278-84.
 20. Tripathi KD. Beta lactam antibiotics. In Tripathi KD, editor. *Essentials of medical pharmacology* (5th ed.). India: Jaypee Brothers Medical Publishers (P) Ltd 2003:653-667.
 21. Hersh EV, Kane WT, O'Neil MG, et al. Prescribing recommendations for the treatment of acute pain in dentistry. *Compend Contin Educ Dent* 2011; 32(22):4-30.
 22. Barkin RL. Acetaminophen, aspirin or ibuprofen in combination analgesic products. *Am J Ther.* 2001; 8:433-42.
 23. Becker DE, Phero JC. Drug therapy in dental practice: nonopioid and opioid analgesics. *Anesth Prog.* 2005; 52:140-9.
 24. World Health Organization. WHO Model List of Essential Medicines 2011. http://whqlibdoc.who.int/hq/2011/a95053_eng.pdf. Accessed on 15 January, 2013
 25. Donaldson M, Goodchild JH. Appropriate analgesic prescribing for the general dentist. *Gen Dent.* 2010; 58:291-7.
 26. Zheng CY, Wang ZH. Effects of chlorhexidine, listerine and fluoride listerine mouth rinses on four putative root-caries pathogens in the biofilm. *Chin J Dent Res.* 2011; 14(2):135-40.
 27. McKenzie WT, Forgas L, Vernino AR, Parker D, Limestall JD. Comparison of a 0.12% chlorhexidine mouth rinse and an essential oil mouthrinse on oral health in institutionalized, mentally handicapped adults: one-year results. *J Periodontol.* 1992; 63(3):187-93.
 28. Neely AL. Essential oil mouthwash (EOMW) may be equivalent to chlorhexidine (CHX) for long-term control of gingival inflammation but CHX appears to perform better than EOMW in plaque control. *J Evid Based Dent Pract.* 2012; 12(3 Suppl):69-72. doi: 10.1016/S1532-3382(12)70017-9.