



## Knowledge Related to Self-medication with Antibiotics in Patients Indicated for Extraction or Impacted Third Molar Surgery

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### Abstract

The inappropriate use and overuse of antibiotics are two of the factors contributing to antibiotic resistance which affects the world's health. Self-medication with antibiotics increases the development of antibiotic resistance. In Thailand, antibiotics are freely accessible and this may cause inappropriate self-medication. Using antibiotics is the responsibility of not only the doctor but also the dentist. To inform or educate dental patients about antibiotic abuse in order to prevent antibiotic resistance, the information of patients' knowledge is needed. Despite the fact that numerous studies have examined knowledge of patients toward antibiotic use in general or medical terms, to the best of our knowledge, no research has been conducted in dental terms. The aim of this research is to determine knowledge of patients related to self-medication with antibiotics when extraction or impacted third molar surgery is indicated. A cross-sectional survey with a self-administered structured questionnaire was conducted in patients indicated for extraction or impacted third molar surgery at the Faculty of Dentistry, Chulalongkorn University. A 5-point Likert scale was used to evaluate the respondents' responses. The chi-square test was used to explore the association between demographic data, knowledge and decision on self-medication. Independent variables with a p-value < 0.2 were entered into the multiple logistic regression models. The results showed that respondents who decided to self-medicate with antibiotics showed their misunderstanding of the mechanism of action of antibiotics in terms of pain and inflammation reduction. Moreover, their concept of antibiotic dosage was inappropriate. In conclusion, the patients' knowledge of antibiotics affects their decision to self-medicate with antibiotics.

**Keywords:** antibiotics, self-medication, knowledge

### 1. Introduction

Antibiotics are essential medication for treating infections (Hulscher, van der Meer, & Grol, 2010). Postoperative antibiotics remain a controversial issue (Synan & Stein, 2020). Lodi et al. (2021) reported that antibiotics may reduce the risk of postsurgical infectious complications. On the other hand, other studies have shown that antibiotic prophylaxis is not necessary for most dentoalveolar surgeries in healthy patients (Lawler et al. (2005); Synan & Stein (2020)). The scientific evidence regarding the benefits of antibiotic prophylaxis in oral surgery remains in debate. Antibiotic prophylaxis should only be prescribed when indicated (Sancho-Puchades, Herráez-Vilas, Berini-Aytés, & Gay-Escoda, 2009). Moreover, studies have indicated that less than 1% of third molar extractions result in postoperative infections, while 6% to 7% of patients experience negative side effects from antibiotics. Therefore, the adverse effects of antibiotics and potential hazards from antibiotic resistance must be taken into account (Rodrigues et al., 2015).

Nowadays antibiotic resistance is one of the main issues facing the world's health. Antibiotic resistance makes infections more difficult to treat, increases healthcare expenditures, and raises fatality rates (WHO, 2020). Inappropriate use and overuse of antibiotics are two of the factors contributing to antibiotic resistance (Reygaert, 2018).

Self-medication is described as the choosing and use of medications by an individual to cure self-recognized or self-diagnosed diseases or symptoms (Ruiz, 2010). Self-medication with antibiotics increases the severity due to inappropriate usage, which puts patients at risk for drug interactions, masking symptoms



of underlying diseases, and the development of antibiotic resistance (Baracaldo-Santamaría et al. (2022); WHO (2008)).

Inappropriate self-medication with antibiotics is common in Southeast Asian countries such as Thailand, where antibiotics are easily accessible. Many patients self-medicate without a formal prescription from a health provider due to their previous experience of antibiotic usage, which further contributes to antibiotic resistance (Nepal & Bhatta, 2018). According to the Thailand National Strategic Plan on Antimicrobial Resistance 2017–2021, there is a significant knowledge gap among the general people regarding the usage of antibiotics, and healthcare professionals serve as the primary communication channel for this information (Sumpradit et al., 2021).

Many studies have reported that individuals lack understanding of antibiotics and tend to self-medicate with antibiotics (Awad & Aboud (2015); Bogale et al. (2019); Lv et al. (2014)). Dentists worldwide prescribe 10% of all human antibiotics. Therefore, using antibiotics is the responsibility of not only doctors but also dentists (Thompson et al., 2021).

To inform or educate dental patients about antibiotic abuse to prevent antibiotic resistance, we need information of knowledge of patients toward antibiotic use or self-medication with antibiotics. Despite several studies examining knowledge of patients toward antibiotic use or self-medication with antibiotics in general or medical terms, to the best of our knowledge, no research has been conducted in dental terms. Thus, this study was designed to determine knowledge of patients related to self-medication with antibiotics after extraction or impacted third molar surgery is indicated.

## 2. Objectives

To determine knowledge related to self-medication with antibiotics in patients indicated for extraction or surgical removal of third molar impaction.

## 3. Materials and Methods

### 3.1 Questionnaire development

The questionnaire comprised 2 main sections. The first section covered demographic data including gender, age, education level, work or study in medical field, income, health and experience. The second section was a knowledge evaluation form. This section consisted of 11 questions, of which 10 questions were knowledge based and 1 question determined the decision on self-medication with antibiotics. Questions about knowledge were divided into 5 topics, namely “mechanism of action” (Q1-Q5), “side effect” (Q6), “antibiotic resistance” (Q7-Q8), “treatment duration” (Q9) and “patient/doctor relationship” (Q10). A 5-point Likert scale (strongly disagree, disagree, uncertain, agree and strongly agree) was used to evaluate the respondents’ responses. These questions were modified from a study of knowledge, attitudes and practices related to self-medication with antimicrobials in Lilongwe, Malawi (Sambakunsi, Småbrekke, Varga, Solomon, & Mponda, 2019) and a study of knowledge, attitudes and practices toward antibiotic use among the public in Kuwait (Awad & Aboud, 2015). The English version of the questionnaire was translated into Thai and back translated into English by the language expert to ensure the accuracy of the translated text.

### 3.2 Reliability, validity and consistency of the questionnaire

This questionnaire was developed to measure respondents’ knowledge regarding antibiotic use and self-medication with antibiotics based on a thorough literature review of related studies. The content validity of the questionnaire was evaluated by the content expert. To ensure that the respondents grasp the purpose of the questions, the questions were clarified until they were well understood. A test-retest procedure was used to evaluate the reliability of the questionnaire. The questions were reviewed and rephrased if there was any discrepancy in the responses.



### 3.3 Data collection

A cross-sectional survey was conducted at the Faculty of Dentistry, Chulalongkorn University during the period from September to December 2022. Self-administered structured questionnaires were randomly given to patients indicated with extraction or impacted third molar surgery.

### 3.4 Data analysis

Responses from the 5-point Likert scale of the knowledge evaluation form were categorized as either correct or incorrect. Responses categorized as correct include “strongly disagree” or “disagree” for questions 1, 3, 4, and 9 and “strongly agree” or “agree” for questions 2, 5, 6, 7, 8, and 10. The distinctions between “strongly agree” and “agree”, and “strongly disagree” and “disagree” were not taken into account in order to simplify the presentation. It was determined that giving an “uncertain” response was the same as answering the question incorrectly. For each of the knowledge questions (Q1-Q10), the answers were scored with “1” for a correct response and “0” for an incorrect response. A response to Q11 was used to distinguish respondents into 2 groups, self-medication with antibiotics and no self-medication with antibiotics.

### 3.5 Statistical analysis

The data were analyzed using the SPSS software (SPSS version 29, IBM, New York, USA). The significance level was set at 5%. Descriptive statistics were used to analyze demographic variables and responses to the knowledge questions. The bivariate analysis, chi-square testing, was used to explore the association between demographic data, respondents’ knowledge and decision on self-medication with antibiotics. Independent variables with a p-value < 0.2 for their association with dependent variable in the bivariate analysis were entered into the multiple logistic regression models (Wang et al., 2017).

## 4. Results and Discussion

### 4.1 Results

#### 4.1.1 Demographic data

A total of 205 respondents participated in the survey. The demographic data of respondents are summarized in Table 1. In total, 63.4% of respondents were female. Half of the respondents were young adults in 21-30 years old (51.2%). 80% of respondents’ education level was bachelor’s degree or higher. Most of respondents didn’t work or study in the medical field (85.9%). Almost 60% of respondents had income less than 15,000 baht (58.5%). The majority of respondents didn’t have systemic diseases (82.4%). Almost 70% of respondents had experience of extraction or impacted third molar surgery (69.3%).

The chi-square test revealed significant association between demographic data of respondents and respondents’ decision on self-medication with antibiotics, as seen in Table 1. Respondents who received education lower than a bachelor’s degree and didn’t work or study in the medical field were associated with the decision to self-medicate with antibiotics.

#### 4.1.2 Knowledge regarding antibiotics

The responses of respondents to knowledge questions are shown in Table 2. The majority of respondents gave the correct response in 4 out of 5 knowledge topics, including side effect, antibiotic resistance, treatment duration and patient/doctor relationship. More than 80% of respondents were aware that if they experience a side effect such as a skin reaction, they should not use the same antibiotic again (86.8%). Most of respondents knew that using antibiotics unnecessarily and excessively can lead to antibiotic resistance (86.3%, 82.9%). Half of the respondents believed they should follow the dentist’s recommendation for the full course of antibiotic treatment (53.2%). 98% of respondents agreed that dentists should spend time explaining how to use antibiotics. The only topic in which respondents gave more incorrect than correct responses was the mechanism of action of antibiotics. One-fourth of respondents were aware that antibiotics do not reduce pain and inflammation (25.9%). Only 20.5% of respondents were aware that antibiotics are ineffective against viruses. Less than 20% of respondents were aware that antibiotics do not speed up the recovery (18.5%). Fortunately, more than half of respondents knew that various antibiotics are required to

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treat different conditions (65.9%). Moreover, 78.5% of respondents were aware that antibiotics are effective against bacteria.

The chi-square test found a significant correlation between knowledge of respondents regarding antibiotics and decision of respondents on self-medication with antibiotics (See Table 2). Self-medication with antibiotics was associated with respondents who gave wrong answers to the following 5 items concerning antibiotics: “Antibiotics reduce pain and inflammation.”, “Antibiotics are effective against viruses.”, “Antibiotics speed up the recovery.”, “Unnecessary use of antibiotics can cause antibiotic resistance.” and “If you feel better during a course of antibiotic treatment, you don’t need to complete the course of treatment”.

#### 4.1.3 The association of demographic data and knowledge of self-medication with antibiotics

The multiple logistic regression models are shown in Table 3. The association between demographic data and self-medication with antibiotics was not significant in Model 1. When demographic data and knowledge regarding antibiotics were entered into Model 2, there were 2 knowledge questions that were significant. Respondents who believed that antibiotics do not reduce pain and inflammation were significantly, 0.287-fold (95% CI: 0.100, 0.821), less likely to decide to self-medicate with antibiotics. Respondents who thought that they should follow the dentist's advice to take the complete course of antibiotic treatment were significantly, 0.196-fold (95% CI: 0.098, 0.394), less likely to decide to self-medicate with antibiotics.

**Table 1** Demographic data of respondents (n = 205)

Variables	N (%)	N (%) without self-medication with antibiotics (n = 119)	N (%) with self-medication with antibiotics (n = 86)	X <sup>2</sup> (p = value)
<b>Gender</b>				
Male	75 (36.6%)	42 (56.0%)	33 (44.0%)	0.204
Female	130 (63.4%)	77 (59.2%)	53 (40.8%)	(p = 0.652)
<b>Age (years old)</b>				
Teenage (11-20)	40 (19.5%)	25 (62.5%)	15 (37.5%)	7.799 (p = 0.050)
Young adult (21-30)	105 (51.2%)	67 (63.8%)	38 (36.2%)	
Adult (31-60)	45 (22.0%)	18 (40.0%)	27 (60.0%)	
Elderly (60 up)	15 (7.3%)	9 (60.0%)	6 (40.0%)	
<b>Education level</b>				
Lower than a bachelor’s degree	41 (20.0%)	17 (41.5%)	24 (58.5%)	5.789 (p = 0.016)
Bachelor’s degree or higher	164 (80.0%)	102 (62.2%)	62 (37.8%)	
<b>Work or study in medical field</b>				
Yes	29 (14.1%)	23 (79.3%)	6 (20.7%)	6.270 (p = 0.012)
No	176 (85.9%)	96 (54.5%)	80 (45.5%)	
<b>Income (Baht)</b>				
Low (<15,000)	120 (58.5%)	73 (60.8%)	47 (39.2%)	1.166 (p = 0.558)
Moderate (15,000-30,000)	61 (29.8%)	32 (52.5%)	29 (47.5%)	
High (>30,000)	24 (11.7%)	14 (58.3%)	10 (41.7%)	
<b>Health</b>				
Systemic disease	36 (17.6%)	24 (66.7%)	12 (33.3%)	1.332 (p = 0.248)
No systemic disease	169 (82.4%)	95 (56.2%)	74 (43.8%)	
<b>Experience</b>				
Experience Ext or SR	142 (69.3%)	81 (57.0%)	61 (43.0%)	0.192 (p = 0.661)
No experience Ext or SR	63 (30.7%)	38 (60.3%)	25 (39.7%)	

Ext, Extraction; SR, Surgical removal

**Table 2** Knowledge of respondents regarding antibiotics (n = 205)

Topic	Variables	N (%)	N (%) without self-medication with antibiotics	N (%) with self-medication with antibiotics	$\chi^2$ (p = value)
Mechanism of action	Q1 : Antibiotics reduce pain and inflammation.				
	Correct	53 (25.9%)	45 (84.9%)	8 (15.1%)	21.172
	Incorrect or uncertain	152 (74.1%)	74 (48.7%)	78 (51.3%)	(p < 0.001)
	Q2 : Antibiotics are effective against bacteria.				
	Correct	161 (78.5%)	95 (59.0%)	66 (41.0%)	0.282
	Incorrect or uncertain	44 (21.5%)	24 (54.4%)	20 (45.5%)	(p = 0.595)
	Q3 : Antibiotics are effective against viruses.				
	Correct	42 (20.5%)	34 (81.0%)	8 (19.0%)	11.379
	Incorrect or uncertain	163 (79.5%)	85 (52.1%)	78 (47.9%)	(p < 0.001)
	Q4 : Antibiotics speed up the recovery.				
Correct	38 (18.5%)	30 (78.9%)	8 (21.1%)	8.366	
Incorrect or uncertain	167 (81.5%)	89 (53.3%)	78 (46.7%)	(p = 0.004)	
Side effect	Q5 : Different antibiotics are needed to cure different diseases.				
	Correct	135 (65.9%)	80 (59.3%)	55 (40.7%)	0.238
	Incorrect or uncertain	70 (34.1%)	39 (55.7%)	31 (44.3%)	(p = 0.626)
	Q6 : If you get some kind of skin reaction when using an antibiotic, you should not use the same antibiotic again.				
Correct	178 (86.8%)	106 (59.6%)	72 (40.4%)	1.252	
Incorrect or uncertain	27 (13.2%)	13 (48.1%)	14 (51.9%)	(p = 0.263)	
Antibiotic resistance	Q7 : Unnecessary use of antibiotics can cause antibiotic resistance.				
	Correct	177 (86.3%)	109 (61.6%)	68 (38.4%)	6.643
	Incorrect or uncertain	28 (13.7%)	10 (35.7%)	18 (64.3%)	(p = 0.010)
	Q8 : Overuse of antibiotics can cause antibiotic resistance.				
Correct	170 (82.9%)	101 (59.4%)	96 (40.6%)	0.760	
Incorrect or uncertain	35 (17.1%)	18 (51.4%)	17 (48.6%)	(p = 0.383)	
Treatment duration	Q9 : If you feel better during a course of antibiotic treatment, you don't need to complete the course of treatment.				
	Correct	109 (53.2%)	86 (78.9%)	23 (21.1%)	41.552
	Incorrect or uncertain	96 (46.8%)	33 (34.4%)	63 (65.6%)	(p < 0.001)
Patient/doctor relationship	Q10 : Dentists should take time to inform how antibiotics should be used.				
	Correct	201 (98.0%)	118 (58.7%)	83 (41.3%)	1.830
	Incorrect or uncertain	4 (2.0%)	1 (25.0%)	3 (75.0%)	(p = 0.176)

**Table 3** Multiple logistic regression models for the association of demographic data and knowledge with self-medication with antibiotics (n = 205)

Variables	Self-medication with antibiotics			
	Model 1 (95% CI)	p-value	Model 2 (95% CI)	p-value
Age (years old)				
Teenage (11-20)	1		1	
Young adult (21-30)	1.132 ( 0.501 , 2.557 )	p = 0.200	1.316 ( 0.507 , 3.415 )	p = 0.316
Adult (31-60)	2.219 ( 0.892 , 5.521 )		1.840 ( 0.652 , 5.190 )	
Elderly (60 up)	0.825 ( 0.232 , 2.934 )		0.520 ( 0.123 , 2.192 )	
Education level				
Lower than a bachelor's degree	1	p = 0.052	1	p = 0.054
Bachelor's degree or higher	0.460 ( 0.210 , 1.006 )		0.417 ( 0.171 , 1.016 )	
Work or study in medical field				
Yes	1	p = 0.055	1	p = 0.581
No	2.599 ( 0.981 , 6.889 )		1.382 ( 0.438 , 4.359 )	
Q1 : Antibiotics reduce pain and inflammation.				
Correct			1	p = 0.020
Incorrect or uncertain			0.287 ( 0.100 , 0.821 ) *	
Q3 : Antibiotics are effective against viruses.				
Correct			1	p = 0.627
Incorrect or uncertain			0.761 ( 0.253 , 2.288 )	
Q4 : Antibiotics speed up the recovery.				
Correct			1	p = 0.625
Incorrect or uncertain			1.347 ( 0.408 , 4.452 )	
Q7 : Unnecessary use of antibiotics can cause antibiotic resistance.				
Correct			1	p = 0.287
Incorrect or uncertain			0.605 ( 0.240 , 1.527 )	
Q9 : If you feel better during a course of antibiotic treatment, you don't need to complete the course of treatment.				
Correct			1	p < 0.001
Incorrect or uncertain			0.196 ( 0.098 , 0.394 ) *	
Q10 : Dentists should take time to inform how antibiotics should be used.				
Correct			1	p = 0.674
Incorrect or uncertain			0.596 ( 0.054 , 6.625 )	

CI, Confidence Interval

Model 1: adjusted for demographic data; Model 2: further adjusted for knowledge regarding self-medication with antibiotics

\* p &lt; 0.05





#### 4.2 Discussion

Overall, the respondents in this study had relatively good knowledge about antibiotics. However, most of the respondents in this study had poor knowledge in term of mechanism of action of antibiotics.

When respondents believe that antibiotics can lessen pain and inflammation, work effectively against viruses, and accelerate healing, they are more likely to anticipate a prescription for antibiotics. High expectations for an antibiotic prescription increase the possibility of non-prescription usage of antibiotics (Nepal, Hendrie, Robinson, & Selvey, 2019).

Respondents who are unaware that unnecessarily using antibiotics can lead to antibiotic resistance will not be aware of the risks associated with antibiotics. They might believe that taking antibiotics is better than not taking them, and therefore prefer self-medication even if it is not prescribed.

The dose and duration of treatment are the two main concepts of effective antibiotic treatment regimens (Paterson et al., 2016). Dosage of antibiotics depends on their mechanism of action and regimen. On the other hand, patient compliance is required to complete the duration of treatment. Failure to take a proper dosing interval and a course of antibiotics as prescribed by a dentist or healthcare professional indicates that they do not recognize the importance of an antibiotic treatment regimen or have an inappropriate concept of antibiotic dosage, which could result in self-medication with antibiotics. Moreover, the likelihood of using leftover antibiotics may increase if non-compliance with therapy is indicated (Kardas, Devine, Golembesky, & Roberts, 2005).

An association between the level of education and self-medication with antibiotics was reported (Jamhour, El-Kheir, Salameh, Hanna, & Mansour, 2017). The present study found the association between demographic data and self-medication with antibiotics from a chi-square test, but not significant in multiple logistic regression models, possibly due to differences in subject population. In this study, respondents were categorized into two groups, those with bachelor's degrees or higher and those with lower education level. As a result, we can assume that individuals with a lower level of education have basic knowledge of antibiotics. Although there is no significant association between the level of education and self-medication, there is still a tendency that respondents with higher education are more likely to decide not to self-medicate with antibiotics. People who have higher education levels have more knowledge regarding antibiotics (Chanvatik et al., 2019). Appropriate knowledge enables individuals to make wise decisions and avoid self-medicating with antibiotics.

In Thailand, there is a significant knowledge gap among the general public regarding the usage of antibiotics (Sumpradit et al., 2021). Moreover, antibiotics are widely available and easily accessible, unlike in high-income countries where antibiotics are a prescription-only medicine (Chanvatik et al., 2019). Therefore, self-medication with antibiotics is more common.

The limitation of this study was the use of a group of population centered in Bangkok, so the results might not be appropriate as a representative for the population in Thailand. Another possible problem in studies of antibiotic use involving normal people is whether the respondents know exactly what antibiotics are. Antibiotics were not defined in this study since we wanted to assess respondents' understanding, but we did provide an example to help them understand how antibiotics are different from NSAIDs and painkillers.

This study provides an evidence base to develop an education program for the patients about self-medication with antibiotics after extraction or surgical removal. For example, if patients have incorrect information about antibiotics, they may believe that they can self-medicate, which can result in overuse of antibiotics and the development of antibiotic resistance. By educating the patients about the proper use of antibiotics, this risk of self-medication, misuse and overuse can be reduced.

#### 5. Conclusion

The patients' knowledge of antibiotics affects their decision to self-medicate with antibiotics. A misunderstanding of the mechanism of action of antibiotics in terms of pain and inflammation reduction and an inappropriate concept of antibiotic dosage, such as an incomplete course of antibiotics as prescribed by a dentist, affect patients' decision to self-medicate with antibiotics.



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