




# Knowledge, Attitude, and Barriers toward Smoking Cessation Counseling: A Cross-Sectional Study among Clinical Dental Students in Indonesia

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## Abstract

**Objectives** The World Health Organization has promoted the integration of smoking cessation programs into normal dental treatment since they have significant positive effects on oral health. However, there are still many barriers including a lack of knowledge about the smoking cessation counseling (SCC). The high incidence of smoking is an important health challenge in Indonesia. This study determined the relationships between sociodemographic factors and knowledge about the effects of smoking on oral health, as well as knowledge of, attitudes about, and barriers to SCC among clinical dental students in Indonesia.

**Materials and Methods** This was a cross-sectional study utilizing a questionnaire involving clinical dental students throughout Indonesia. Clinical dental students from 32 dental schools in Indonesia were invited to participate in the study. Twenty-seven dental schools agreed to participate in the study and the estimated sample size was 416 participants. The questionnaire included sociodemographic data, smoking status, knowledge about the effects of smoking on oral health, and knowledge of, attitudes about, and barriers to SCC.

**Statistical Analysis** Mann–Whitney *U* and Kruskal–Wallis tests were used to determine differences in knowledge about the effects of smoking on oral health and the knowledge of, attitudes about, and barriers to SCC among clinical dental students' sociodemographic factors and smoking status. The Spearman's correlation analysis was used to determine the correlation between knowledge of, attitudes about, and barriers to SCC.

**Results** A total of 614 students participated in the study. Significant differences were found in students' knowledge regarding the effects of smoking based on smoking status, SCC based on educational stages, attitudes based on sex and smoking status,

## Keywords

- ▶ counseling dentistry
- ▶ oral health
- ▶ smoking cessation
- ▶ sociodemographic factor

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and barriers based on sex ( $p < 0.05$ ). Significant relationships were found between students' knowledge of the effects of smoking and of SCC ( $r = 0.226$ ), knowledge of the effects of smoking and attitudes about SCC ( $r = 0.110$ ), knowledge of and attitudes about SCC ( $r = 0.162$ ), knowledge of and barriers to SCC ( $r = -0.17$ ), as well as attitudes about and barriers to SCC ( $r = -0.224$ ).

**Conclusion** Clinical dental students' knowledge regarding SCC are lacking, but they have positive attitude regarding SCC. It is necessary to improve education quality in every dental educational institution related to SCC.

## Introduction

In comparison to the findings of the two previous National Basic Health Research, the 2018 results indicate that tobacco consumption in Indonesia is still quite high and growing.<sup>1</sup> Approximately 225,700 people in Indonesia die from smoking or tobacco-related diseases per year.<sup>1</sup> Smoking causes many negative effects on the oral cavity specifically, including caries, periodontal disease, oral mucosal lesions (such as smoker's melanosis, smoker's palate, and potentially malignant lesions), and oral cancer.<sup>2-6</sup> Studies have demonstrated the benefits of smoking cessation in reducing the smoking's effect on the oral cavity.<sup>7</sup> The World Health Organization recommends integrating smoking cessation services into the primary health care system, with a focus on oral health providers as they have the most ability to encourage tobacco use reduction.<sup>8,9</sup> Dentists play a key role in providing smoking cessation counseling (SCC) because they are often the first health professionals to encounter smoking's oral manifestations and have frequent contact with patients during regular visits.<sup>5-11</sup> Therefore, dental students at their clinical stage must demonstrate competence in managing tobacco dependence with supervision from educational institutions.<sup>11</sup>

Several studies have explored dentists' and dental students' knowledge of, attitudes about, and barriers to SCC. Liu et al concluded that 93% of clinical dental students at the University of Hong Kong agreed that dentists should deliver SCC, but only 30% knew about the protocol.<sup>12</sup> They also noted various perceived barriers but did not examine students' knowledge about smoking's effects on oral health.<sup>12</sup> A study in Croatia showed that first-year students had less knowledge about the effects of smoking on oral health than did sixth-year students and dentists.<sup>5</sup> However, the students' attitudes toward smoking prevention were more positive than those of dentists.<sup>5</sup> Asmaon and Heah concluded that most dental students in Malaysia increase their SCC knowledge by reading and attending lectures, courses, and training, but only 42.8% were involved in counseling.<sup>13</sup>

In Indonesia, Maharani et al conducted a study to determine dental students' willingness to deliver SCC and this willingness's relationship to the theory of planned behavior. The results showed that students with positive attitudes toward SCC and who are confident in providing it are willing to provide SCC.<sup>14</sup> Another study about dentists in West Java, Indonesia, showed that they have little knowledge and poor

perceptions of efforts to reduce the dangers of tobacco.<sup>15</sup> Based on the results of the previous studies, data related to clinical dental students who are future dentists regarding SCC in Indonesia is still lacking. This study aimed to determine the relationship between Indonesian clinical dental students' knowledge about the effects of smoking on oral health and their knowledge of, attitudes about, and barriers to SCC. Therefore, the hypotheses were that Indonesian clinical dental students have good knowledge of the effect of smoking and SCC, have positive attitude toward SCC, and have no barriers to SCC. Data from clinical dental students will enrich the basis of evaluation of dental curriculum that prepare these future dentists to perform SCC to their patients.

## Materials and Methods

This cross-sectional study invited 32 dental schools across Indonesia. The minimum sample size was calculated as 416 participants. The data were collected from May to June 2023. The study protocol was approved by the Research Ethics Committee, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia (No. 113/Ethical Approval/FKGUI/XI/2022). The questionnaire was developed by combining the original questionnaires by previous studies by Liu et al, Komar et al, Ramadhani et al, Khalaf et al, and Maharani et al.<sup>5,10,12,14,15</sup> It was translated into Bahasa Indonesia using the cross-cultural adaptation process and then tested for face validity to ensure the wording clarity and comprehensiveness.<sup>16,17</sup> The reliability result for interclass coefficient is 0.779 (substantial agreement) and Cronbach's  $\alpha$  coefficient is 0.854 (good category).<sup>17</sup>

There were 6 domains of the questionnaire (4 questions for sociodemography, 1 question on smoking status, 17 questions on the knowledge of the effect of smoking, 12 questions on the knowledge about SCC, 15 questions on the attitude of SCC, and 10 questions on the barriers toward SCC). Each question in knowledge will be scored as 1 for correct answer and 0 for incorrect answer, so that the maximum total score of the knowledge about smoking effects that can be obtained was 17. The highest score of the knowledge about SCC was 12. While for the attitudes and barriers domain Likert scale was used. Thus, the total score for attitudes ranged from 15 to 75 while the total score for barriers ranged from 10 to 50. We used total score of knowledge for the data analysis to know the average total score of all participants. For the attitudes and

barriers domain we used the mean score to know the average scale of attitudes and barriers of all participants. The higher the attitudes scale the higher the positivity toward SCC, while the higher the scale of barriers the higher the barriers toward SCC.

The questionnaire was implemented using Google Forms and distributed to clinical dental students of 27 dental schools who agreed to participate. The coordinators of each faculty or study program of dentistry in Indonesia helped to distribute the form to the students. Students at any year of their clinical study were included in the study. Sample size calculation was 416 participants. A minimum quota of 10 participants in every dental school was aimed to ensure equal participation from each school. Informed consent to participate in the study was included at the beginning of the Google Form. The information about the study was explained. Participation to the study was voluntary and the participants were ensured that the confidentiality of the data will be maintained by the researchers and the data was only used for the study. Descriptive analysis was conducted to observe the distribution of sociodemographic data, smoking status, and respondents' answers regarding knowledge, attitudes, and barriers to SCC. The data were processed using SPSS Statistics for Windows, version 29.0 (IBM, Chicago, Illinois, United States). The data analysis used the Kruskal–Wallis and Mann–Whitney *U* tests for comparative analysis and the Spearman's test for correlative analysis.

### Results

From a total of 32 dental schools in Indonesia, 27 (84.4%) participated in this study. The participants represented five big islands in Indonesia. The mechanism of data collection is described in ►Fig. 1. There were a total of 614 participants exceeding the minimum sample size for the study with mean age of 23.45 years. The majority of the participants came from dental schools in Java island (51.3%). The least participants came from Kalimantan island (3.3%). Most participants were from public dental schools (55.5%), were female (77.2%), and came from batch 2022 (37.6%). Of the participants, 19.22% had a history of smoking, including current or former smokers. ►Table 1 shows the respondents' descriptive data.

►Table 2 shows the distribution of responses regarding the knowledge about the effects of smoking on oral health. Every correct answer from 17 questions received a score of 1. In general, 76.47% of all questions were answered correctly, which can be seen from the mean of  $12.94 \pm 1.73$ .

The distribution of number of respondents with correct answers regarding knowledge about SCC can be seen in ►Fig. 2. Most of the students had correct answers on two questions, which were about the importance of keeping the patient's tobacco usage and about the teaching of the effect of tobacco smoking. However, the mean score of this domain was  $6.48 \pm 2.36$ , which was only approximately 50% of the total score of 12. This result showed that the knowledge of SCC among students was still lacking.

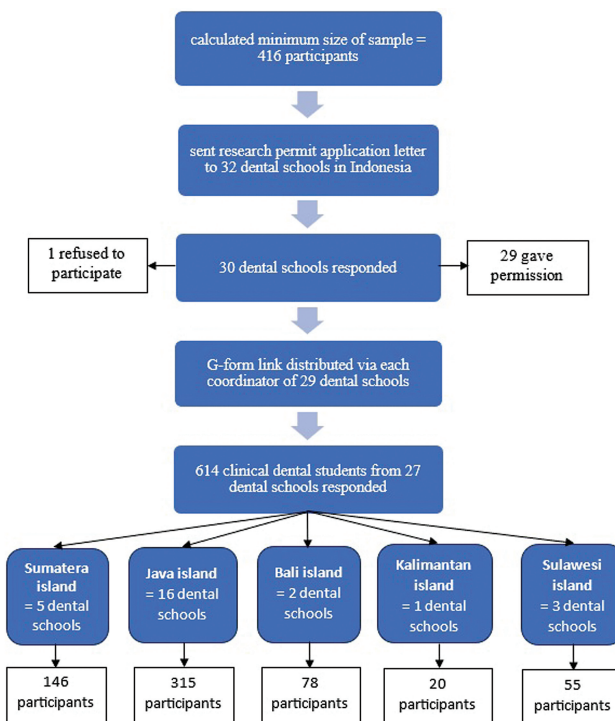


Fig. 1 Mechanism of data collection during the study.

Table 1 Sociodemographic and smoking status of respondents (N = 614)

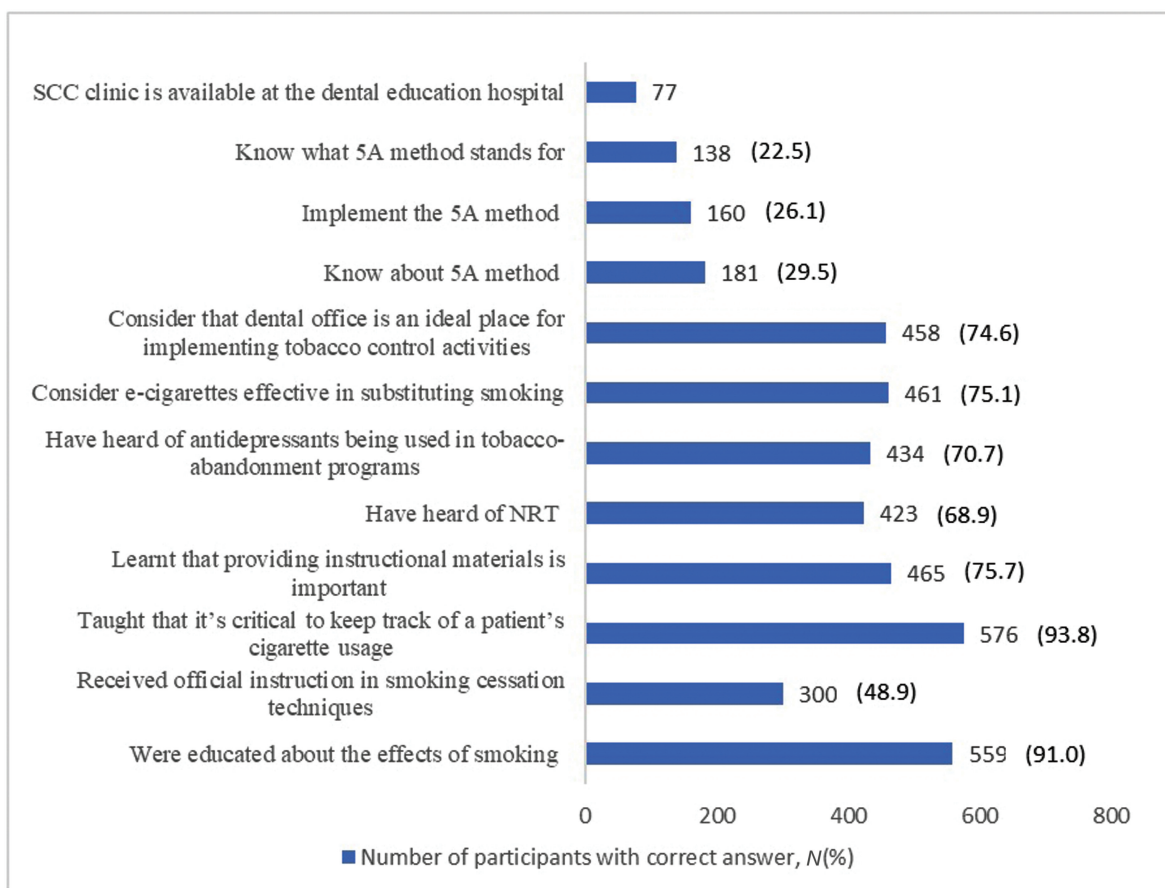
Characteristics		n (%)
Dental school type	Public	341 (55.5)
	Private	273 (44.5)
Region	Sumatera	146 (19.38)
	Java	315 (51.3)
	Bali	78 (12.7)
	Kalimantan	20 (3.3)
	Sulawesi	55 (8.9)
Age	20–24	481 (78.3)
	25–29	128 (20.8)
	30–34	5 (0.8)
Sex	Male	140 (22.8)
	Female	474 (77.2)
Entry year	Before 2020	62 (10.1)
	2020	93 (15.1)
	2021	151 (24.6)
	2022	231 (37.6)
	2023	77 (12.5)
Smoking status	Current/former smoker	118 (19.22)
	Nonsmoker	496 (80.78)

The respondents' answers regarding the attitudes toward SCC and barriers toward SCC were measured by a Likert scale (►Table 3). The higher the score on the attitude toward SCC

**Table 2** Responses regarding knowledge about the effects of smoking (N = 614)

Statements	Yes n (%)	No n (%)	Do not know n (%)
• Smoking is associated with development of oral cavity cancer	<b>609 (99.2)</b>	1 (0.2)	2 (0.3)
• Quitting smoking reduces the risk of developing oral cancer	<b>580 (94.5)</b>	25 (4.1)	9 (1.5)
• Smoking endangers passive smokers' health	<b>611 (99.5)</b>	1 (0.2)	2 (0.3)
• It is possible to detect cancerous and precancerous lesions at the earliest stage by quick inspection	<b>570 (92.8)</b>	13 (2.1)	31 (5.0)
• Any suspicious oral precancerous lesion should be sent for biopsy	<b>558 (90.9)</b>	30 (4.9)	26 (4.2)
• Oral cancer is most commonly discovered in advanced stage	<b>535 (87.1)</b>	79 (12.9)	0 (0)
• Smoking causes psychological but not physical dependence	464(75.6)	<b>72 (11.7)</b>	78 (12.7)
• Alcohol combined with smoking increases the possibility of developing oral cancer	<b>548 (89.3)</b>	8 (1.3)	58 (9.4)
• Oral cancer is asymptomatic in the early stages	<b>499 (81.3)</b>	30 (4.9)	85 (13.8)
• Precancerous lesions in a small number of cases malignantly alter	<b>491 (80.0)</b>	53 (8.6)	70 (11.4)
• Smoking is a risk factor for developing acute ulcerative necrotizing gingivitis	<b>526 (85.7)</b>	42 (6.8)	46 (7.5)
• Smoking is a risk factor for dental caries	<b>413 (67.3)</b>	166 (27.0)	35 (5.7)
• Smoking is a risk factor for nicotine stomatitis	<b>581 (94.6)</b>	3 (0.5)	30 (4.9)
• Smoking is a risk factor for periodontitis	<b>583 (95.0)</b>	21 (3.4)	10 (1.6)
• Smoker's melanosis is a precancerous condition	338 (55.0)	<b>276 (44.9)</b>	81 (13.19)
• Biopsy is required for black hairy tongue diagnosis	319 (51.9)	<b>295 (48.0)</b>	89 (14.5)
• Leukoplakia patients are advised to have biopsy once a year	<b>369 (60.1)</b>	68 (11.1)	177 (28.8)

Note: Bold indicates correct answers.



**Fig. 2** Respondents' responses regarding knowledge about smoking cessation counseling (SCC) (N = 614).

**Table 3** Respondents' answers regarding attitudes and barriers toward SCC (N = 614)

Statements	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)	Mean (SD)
Attitude						
1. I find smoking cigarettes extremely harmful to health	8 (1.3)	1 (0.2)	24 (0.3)	84 (13.7)	497 (80.9)	4.73 (0.67)
2. The dentist's duty is to educate the patient about the dangers of tobacco smoke and suggest smoking cessation	7 (1.1)	3 (0.5)	48 (7.8)	207 (33.7)	349 (56.8)	4.45 (0.75)
3. The dentist should serve as a role model for patients by their nonsmoking behavior	7 (1.1)	5 (0.8)	97 (15.8)	169 (27.5)	336 (54.7)	4.34 (0.85)
4. The dentist's suggestion of smoking cessation will affect the patient's decision to stop smoking	8 (1.3)	32 (5.2)	159 (25.9)	219 (35.7)	196 (31.9)	3.92 (0.95)
5. Smoking is a matter of personal choice, and the dentist has no right to interfere	90 (14.7)	166 (27.0)	239 (38.9)	67 (10.9)	52 (8.5)	3.29 (1.1)
6. The dentist should be educated about the impact of smoking on health	6 (1.0)	3 (0.5)	59 (9.6)	220 (35.8)	326 (53.1)	4.4 (0.76)
7. My current knowledge is sufficient for SCC	25 (4.1)	110 (17.9)	261 (42.5)	150 (24.4)	68 (11.1)	3.21 (0.99)
8. I would have attended a specific course about harmful effects of smoking and SCC	8 (1.3)	6 (1.0)	103 (16.8)	268 (43.6)	229 (37.3)	4.15 (0.82)
9. Smoking bans in all areas of health care institutions have a major role in promoting a healthy environment	9 (1.5)	4 (0.7)	47 (7.7)	174 (28.3)	380 (61.9)	4.49 (0.79)
10. Smoking bans in public spaces contribute to public awareness of tobacco smoke harm	9 (1.5)	13 (2.1)	57 (9.3)	194 (31.6)	341 (55.5)	4.38 (0.85)
11. Smoking bans in public spaces violate smokers' rights	238 (38.8)	147 (23.9)	104 (16.9)	58 (9.4)	67 (10.9)	3.7 (1.35)
12. Giving SCC is not part of my role as a dental student	173 (28.2)	203 (33.1)	115 (18.7)	64 (10.4)	59 (9.6)	3.6 (1.2)
13. I will advise patients to quit tobacco use in my future career	13 (2.1)	16 (2.6)	100 (16.3)	238 (38.8)	247 (40.2)	4.12 (0.92)
14. I believe SCC by dentists could assist patients to quit smoking	8 (1.3)	12 (2.0)	104 (16.9)	272 (44.3)	218 (35.5)	4.11 (0.84)
15. I believe nicotine replacement therapy (NRT) helps patients to quit tobacco use	9 (1.5)	16 (2.6)	145 (23.6)	237 (38.6)	207 (33.7)	4.00 (0.9)
Barriers						
1. Patients do not expect SCC from a dental student	8 (1.3)	1 (0.2)	24 (0.3)	84 (13.7)	497 (80.9)	3.00 (0.93)
2. SCC is ineffective unless the patient has a related health problem	7 (1.1)	3 (0.5)	48 (7.8)	207 (33.7)	349 (56.8)	3.2 (1.1)
3. Many patients do not have the motivation to quit	7 (1.1)	5 (0.8)	97 (15.8)	169 (27.5)	336 (54.7)	3.97 (0.94)
4. Patients do not listen to dental students during SCC	8 (1.3)	32 (5.2)	159 (25.9)	219 (35.7)	196 (31.9)	3.4 (0.93)

(Continued)

**Table 3** (Continued)

Statements	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)	Mean (SD)
5. I do not have sufficient skills in SCC at the current stage of my study	90 (14.7)	166 (27.0)	239 (38.9)	67 (10.9)	52 (8.5)	3.17 (1.03)
6. I cannot determine a patient's smoking history without being intrusive	6 (1.0)	3 (0.5)	59 (9.6)	220 (35.8)	326 (53.1)	2.92 (0.99)
7. I am concerned that the message of SCC may alienate patients	25 (4.1)	110 (17.9)	261 (42.5)	150 (24.4)	68 (11.1)	2.67 (1.03)
8. Giving unwanted SCC may upset the dentist-patient relationship	8 (1.3)	6 (1.0)	103 (16.8)	268 (43.6)	229 (37.3)	2.75 (1.07)
9. Clinical time is too limited, so I would focus on dental treatments than counseling.	9 (1.5)	4 (0.7)	47 (7.7)	174 (28.3)	380 (61.9)	3.09 (1.06)
10. No referral pathway for tobacco-using patients	9 (1.5)	13 (2.1)	57 (9.3)	194 (31.6)	341 (55.5)	3.16 (1.08)

Abbreviations: SCC, smoking cessation counseling; SD, standard deviation.

means the more positive attitude. On the other hand, barriers toward SCC scores were reversed, the higher the score means more barriers toward SCC that the student faced. The mean score of total score of the attitude toward SCC was  $4.05 \pm 0.51$  and the mean score of the students' barrier toward SCC was  $3.13 \pm 0.64$ . It showed that students have positive attitude toward SCC, but still have neutral or not sure about the barriers they have toward SCC.

► **Table 4** presents a comparative analysis of knowledge about the effects of smoking and knowledge, attitude, and barriers toward SCC based on sociodemographic factors and smoking status. The bolded *p*-value showed there is statistically significant difference between sociodemographic characteristics (*p*-value < 0.05). For instance, there were statistically significant differences in the knowledge of smoking effects between current or former smoker and nonsmoker. There were also significant differences in the knowledge of SCC between students' year of entry and between their smoking status. Another statistically significant difference was also found in the attitudes of SCC between dental students' age, between sex, and between smoking status. There is also a significant difference in the barriers toward SCC between dental students' sex. This study showed that several sociodemographic characteristics of the students related to age, sex, smoking status, and clinical stage may have influenced students' overall concept about SCC.

The correlation between knowledge about the effects of smoking and knowledge, attitude, and barriers toward SCC can be seen in ► **Table 5**. It shows that there is a one-way correlation between knowledge about the effects of smoking with knowledge ( $r = 0.226$ ) and attitude toward SCC ( $r = 0.110$ ), as well as knowledge about SCC with attitude toward SCC ( $r = 0.162$ ). Both knowledge ( $r = -0.17$ ) and attitude toward SCC ( $r = -0.224$ ) have an opposite correlation with barriers toward SCC. The strength of the correlation in

this study is very weak ( $r < 0.25$ ), therefore it showed that there were no correlations among domains of the study.

## Discussion

This is the first nationwide study in Indonesia that explores about clinical dental students' knowledge about SCC, attitude, and barriers toward SCC. Previous study about SCC was conducted in preclinical dental students and only exploring about their willingness to perform SCC.<sup>14</sup> In this study, we analyzed variables in previous studies to have a comprehensive discussion regarding the relationship between factors related to the practice of SCC dental students perceived in the dental settings. The result of the current study might reflect the condition of dental students' education and training of SCC in Indonesia. There are limitations related to the study. The respondents of the study were not randomized and there may have been a response bias. Although the students were strongly encouraged to take part in this study, their participation remained voluntary. There may be only students who have positive opinion about SCC responded to the study. However, the study has successfully received responses from students of 27 out of 32 dental schools in Indonesia.

This study showed that the students correctly answered most of the questions about the effects of smoking. However, some items showed a lack of respondents' knowledge. For instance, there were still approximately 10% of respondents who did not know that alcohol combined with smoking will increase the likelihood of developing oral cancer. As many as 20% of respondents also did not know that precancerous lesions could turn malignant; based on previous studies, the most common precancerous lesion is leukoplakia, which has a 3% chance of malignant malformation.<sup>18</sup> More than half of respondents also mistakenly thought that smoker's melanosis and black hairy tongue are a precancerous lesion. Knowledge regarding the treatment of precancerous lesions

**Table 4** Comparison of the knowledge, attitude, and barriers toward SCC based on sociodemographic factors and smoking status (N = 614)

Characteristics		Knowledge about the effects of smoking		Knowledge about SCC		Attitudes toward SCC		Barriers toward SCC	
		Mean total score (SD)	p-Value	Mean total score (SD)	p-Value	Mean (SD)	p-Value	Mean (SD)	p-Value
Type of dental school	Public	12.91 (1.81)	0.716 <sup>a,c</sup>	6.58 (2.47)	0.281 <sup>a,c</sup>	4.04 (0.54)	0.981 <sup>a,c</sup>	3.14 (0.65)	0.619 <sup>a,c</sup>
	Private	12.97 (1.61)		6.34 (2.21)		4.07 (0.46)		3.12 (0.63)	
Region	Sumatera	12.77 (1.68)	0.501 <sup>b,c</sup>	6.56 (2.44)	0.847 <sup>b,c</sup>	4.07 (0.52)	0.094 <sup>b,c</sup>	3.15 (0.61)	0.455 <sup>b,c</sup>
	Java	13.02 (1.69)		6.42 (2.28)		4.07 (0.48)		3.13 (0.63)	
	Bali	12.86 (2.06)		6.65 (2.65)		3.89 (0.63)		3.15 (0.76)	
	Kalimantan	12.85 (1.75)		6.45 (2.26)		4.13 (0.47)		3.22 (0.72)	
	Sulawesi	13.11 (1.55)		6.36 (2.21)		4.17 (0.46)		3.02 (0.61)	
Age	20–24	12.94 (1.77)	0.958 <sup>b,c</sup>	6.59 (2.39)	0.043 <sup>b,c</sup>	4.09 (0.50)	0.011 <sup>b,c</sup>	3.10 (0.63)	0.145 <sup>b,c</sup>
	25–29	12.95 (1.61)		6.09 (2.13)		3.94 (0.53)		3.23 (0.66)	
	30–34	13.00 (0.71)		5.60 (3.85)		4.11 (0.51)		3.06 (1.22)	
Sex	Male	12.56 (2.31)	0.094 <sup>a,c</sup>	6.26 (2.36)	0.203 <sup>a,c</sup>	3.91 (0.55)	< 0.001 <sup>a,c</sup>	3.24 (0.75)	0.009 <sup>a,c</sup>
	Female	13.05 (1.50)		6.54 (2.36)		4.09 (0.49)		3.10 (0.61)	
Year of entry	Before 2020	12.81 (2.52)	0.794 <sup>b,c</sup>	6.48 (2.29)	< 0.001 <sup>b,c</sup>	3.93 (0.61)	0.062 <sup>b,c</sup>	3.11 (0.71)	0.233 <sup>b,c</sup>
	2020	13.03 (1.58)		5.85 (1.88)		4.04 (0.58)		3.04 (0.63)	
	2021	13.01 (1.65)		5.95 (2.13)		4.04 (0.46)		3.20 (0.61)	
	2022	12.96 (1.62)		6.77 (2.44)		4.06 (0.51)		3.11 (0.65)	
	2023	12.75 (1.59)		7.38 (2.68)		4.21 (0.40)		3.20 (0.64)	
Smoking status	Current/former smoker	12.35 (2.17)	< 0.001 <sup>a,c</sup>	5.93 (2.19)	0.005 <sup>a,c</sup>	3.84 (0.52)	< 0.001 <sup>a,c</sup>	3.17 (0.69)	0.146 <sup>a,c</sup>
	Nonsmoker	13.08 (1.57)		6.61 (2.38)		4.11 (0.49)		3.12 (0.63)	

Abbreviations: SCC, smoking cessation counseling; SD, standard deviation.

<sup>a</sup>Mann–Whitney test.

<sup>b</sup>Kruskal–Wallis test.

<sup>c</sup>Significant at  $p < 0.05$  (bold).

**Table 5** Spearman’s correlation analysis among domains

	Knowledge of the effects of smoking	Knowledge about SCC	Attitudes toward SCC	Barriers toward SCC
Knowledge of the effects of smoking	–	0.226	0.110 <sup>a</sup>	–0.45
Knowledge about SCC	0.226	–	0.162 <sup>a</sup>	–0.170 <sup>a</sup>
Attitude toward SCC	0.113 <sup>a</sup>	0.160	–	–0.224 <sup>a</sup>
Barriers toward SCC	–0.450	–0.165	–0.224	–

Abbreviation: SCC, smoking cessation counseling.

<sup>a</sup> $p$ -value < 0.05.

is important because future dentists need to have the ability to detect precancerous and cancerous lesions and treat them.<sup>19</sup> In general, this study showed a higher results regarding knowledge of the effects of smoking on oral health compared with previous study by Komar et al.<sup>5</sup>

The knowledge of SCC among the students of this study was lacking. There were 50% of the students who answered

that they did not receive the educational materials about smoking cessation techniques. Material for smoking cessation technique is an important aspect of SCC. Educational materials can help start conversations with patients about smoking cessation and remind them that quitting smoking is a commitment to better health.<sup>20</sup> As many as 31.1% of respondents had never heard of nicotine replacement

therapy, and 70.7% of respondents had never heard of antidepressant drugs being used in antismoking programs. Students need to understand the mechanism of addiction caused by smoking and how antidepressant therapy can suppress the withdrawal effect.<sup>21</sup> A quarter of respondents still think that e-cigarettes are effective in replacing conventional cigarettes, although e-cigarettes also contain nicotine, which can cause dependence; they also contain various other dangerous compounds, increasing the risk of various oral lesions, especially oral cancer.<sup>22</sup>

The students' knowledge and practice about the 5A method are lacking; only 30% of them had knowledge and experience about it. The results are in line with the results from a previous study from India, where only 35.5% of respondents knew the 5A technique.<sup>23</sup> The majority of respondents (87.5%) stated that there is no smoking cessation clinic available at their dental education hospital. There is no dental hospital in Indonesia that has a smoking cessation clinic, possibly because the clinics are not included in the regulation as one of the minimum facilities the dental hospital must have.<sup>24</sup>

Despite of having lack of knowledge about SCC, on average, the dental students displayed a positive attitude toward SCC. Most of the respondents stated that they would advise patients to stop smoking in their future careers as dentists (79%) and most of them also agreed that tobacco control services were the duty of a dentist (78.5%). This is similar to previous study by Vashi et al, which found that most dental students also agreed with both statements, although the number is lower.<sup>25</sup> This study showed an average score of barriers toward SCC which could mean that they are neutral or doubtful. Dental education institutions need to improve the quality of education and facilities to minimize the barriers toward SCC and prepare them to be qualified dentists in their future careers.

Students in the current study showed doubtful in identifying the barriers toward SCC. Dental education institutions need to improve the quality of education and facilities to minimize the barriers toward SCC and prepare them to be qualified dentists in their future career. The highest barriers revealed in this study include patients do not expect SCC from dental students, SCC is not effective unless the patient has an associated health problem, many smoker patients have no motivation to quit, students cannot accurately determine patients' smoking history without being offensive, time constraints in the clinic cause students to focus on dental work rather than counseling, and there is no referral pathway for smoker patients.

The students with no history of smoking showed significantly higher knowledge score than those who are current or former smokers. There is no statistically significant difference in the knowledge about the effects of smoking based on years of education, contrary to the study conducted by Komar et al.<sup>5</sup> The difference in attitude based on smoking status is strengthened by previous studies, showing that dentists who do not smoke may believe that dentists should help patients quit smoking, set a good example, and provide smoking cessation services.<sup>26,27</sup>

The attitudes toward SCC showed a significant difference between smoking status. It has been acknowledged in previous studies that dentists who do not smoke believe that dentists should help patients to quit smoking, set a good example, and provide smoking cessation services, whereas dentists who smoke do not record patients' smoking history or provide SCC.<sup>26,27</sup> There is also a significant difference of knowledge related to SCC between sexes. The mean attitude for men is lower than for women, this is probably because the majority of smoker students are male.

A significant difference of SCC barriers was found between sexes. The mean score of barriers for men are greater than for women. According to a previous study, the majority of smokers in Indonesia and the world are male (95%).<sup>28,29</sup> Other study concluded that dental students who smoke will be less willing to provide SCC.<sup>14</sup> Thus, social interaction might have a role in the mindset and attitudes of male dental students.

The statistical analysis revealed that knowledge of smoking effects has a positive relationship with knowledge and attitudes toward SCC. Clinical dental students with a high knowledge of smoking effects will also have a high knowledge and attitudes toward SCC, and vice versa. It is also confirmed by Zaborskis et al that there is a relationship between knowledge about the effects of smoking, attitudes, and willingness of dental students to provide.<sup>30</sup> Unfortunately, the study did not look at the relationship with perceived barriers to SCC.

In our analysis, the barriers to SCC have an opposite relationship with knowledge and attitudes toward SCC. Clinical dental students who have high knowledge of SCC would have a low barrier to SCC, and vice versa. Those with low attitudes toward SCC also lead to high barriers to SCC. It should be noted that the strength of the relationship between the variables in this study is very weak ( $r < 0.25$ ). We also concluded that the clinical dental students' knowledge of smoking effects do not have a relationship with barriers to SCC. To date, many studies have been conducted to determine the description and comparison of knowledge of smoking effects, along with knowledge, attitudes, and barriers to SCC among dental students and medical professionals, but have not examined the relationship between these factors.<sup>5,10,12,14,31-34</sup> Further study might be needed to enrich the causal factors surrounding the phenomenon.

This study could be a preliminary to further research which will be beneficial as a source for the improvement of SCC practice in Indonesia, especially in the dental setting. It would be interesting that more research could reach broader areas of Indonesia, such as in the east with its local smoking experience and SCC practice.

The results of this study showed a need in improvement of dental education quality. Dental education institutions might need to add more content in the curriculum regarding the oral effects of smoking and SCC, emphasizing in training related to SCC techniques. Dental students also need to increase awareness of the role of smoking as a risk factor for oral cancer to become dentists who have a good attitude toward tobacco control.



## Conclusion

The knowledge of dental students in Indonesia regarding the effects of smoking on oral health and SCC is still lacking, marked by quite several students who do not possess fundamental knowledge related to the effects of smoking and do not know SCC techniques. The average attitude of dental students in Indonesia regarding SCC leads to a positive attitude, and they are neutral regarding the barriers toward SCC. Dental education institutions need to improve the quality of education regarding SCC and emphasize practical training.

### Conflict of Interest

None declared.

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