

AWARENESS AND KNOWLEDGE OF THE EFFECTS OF SMOKING ON ORAL HEALTH, AND SMOKING CESSATION MOTIVATION AMONG HIGH SCHOOL STUDENTS IN JAKARTA

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ABSTRACT

INTRODUCTION: The number of adolescent smokers is rising in Indonesia. Awareness and knowledge about the negative effects of smoking could prevent adolescents from smoking. Motivation to stop smoking might predict the likelihood of smoking cessation.

OBJECTIVES: The aim of this study was to discover the level of Jakarta adolescents' awareness and knowledge of the effects of smoking on oral health, and smoking cessation motivation.

MATERIAL AND METHODS: An online questionnaire-based cross-sectional study was conducted in Jakarta using convenient sampling methods among 552 high school students. The relationship between the variables was investigated using simple logistic regression and Spearman's rho correlation.

RESULTS: Most of the participants ($n = 493$, 89.3%) were aware that smoking jeopardizes oral health. About 324 (65.72%) participants had little knowledge about the specific effects of smoking on oral health. Female participants, never smoking participants, smoking for a short period, or those having the intention to quit smoking were all more likely to be aware than their counterparts. With respect to knowledge, participants who never smoked displayed higher knowledge levels than their peers. The level of smoking cessation motivation was insufficient, with 22 (43.1%) respondents reporting the motivation to quit. No statistically significant difference was found between motivation scores with awareness and knowledge. There were linear correlations between the motivation scores and cessation duration, smoking period, and the intention to quit smoking.

CONCLUSIONS: Incorporating oral health education in smoking prevention program among adolescents is recommended. However, more tailored approach is required to help this group of population, who already is nicotine-addicted, to stop smoking.

KEY WORDS: oral health knowledge, awareness, smoking cessation, adolescents.

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INTRODUCTION

As stated in 2018 Indonesia's basic health research (RISKESDAS), there were approximately 77 million smokers aged above 15 years in Indonesia. In addition, the

report recorded a rise in the number of teenage smokers from 7.2% in 2013 to 9.2% in 2018 [1]. The capital city of Indonesia, Jakarta, reports 2.37% of its' adolescents aged 10 to 18 years as smokers, with an average adolescent smoking seven cigarettes a day [2].

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Smoking is known to be the most preventable cause of death worldwide [3]. Regarding oral health, smoking habits are responsible for the development of periodontitis, leukoplakia, nicotine stomatitis, melanosis, and mouth cancer [4, 5]. Based on these negative outcomes, the habit must be prevented and stopped as soon as possible [6]. In Indonesia, majority of individuals begin to smoke at the age of 15-19 years, which is categorized as 'adolescence' by the World Health Organization (WHO) [7]. Adolescents are susceptible to smoking initiation and nicotine addiction due to several factors, including peer and parental influence, which can affect their perception of the habit [1, 8, 9].

Many strategies are proven to be effective for preventing smoking and promoting smoking cessation among adolescents, one of them is strengthening the motivation to quit smoking. Intrinsic types of motivation, such as health-related reasons, have been found to be more prominent in adolescents who responded positively to smoking cessation treatment [10-12]. Furthermore, an awareness of the negative effects of smoking on one's oral health has also proven to increase adolescents' willingness to stop smoking [13].

OBJECTIVES

This study aimed to evaluate Jakarta adolescents' awareness and knowledge level of the effects of smoking on their oral health, their smoking cessation motivation, and relationship amongst them as well as socio-demographic characteristic and smoking status.

MATERIAL AND METHODS

A descriptive-analytic study using a cross-sectional approach was conducted in Jakarta from November to December 2020. The study was approved by the Dental Research Ethics Committee of the Faculty of Dentistry, University of Indonesia (protocol number: 010560920, issued in November 2, 2020). Slovin's formula was selected, as it is preferable when a study involves the determination of a population proportion at a confidence level of 95%; it is optimal when the proportion is suspected to be close to 0.5 [14]. Based on the formula, the study required at least 400 students to participate out of the total 153,466 students in Jakarta, as reported by Jakarta's government.

The study was conducted twice. First survey was accomplished using a total sampling technique for grade 10 and 11 students in one public school in central Jakarta. To obtain the required sample number and involve more schools, a second survey was performed using a convenient sampling technique of all high school students in Jakarta, regardless of the grade, gender, or school category (public or private school). The questionnaire used to assess the level of awareness and knowl-

edge of smoking effects on oral health and smoking cessation motivation was made available on-line in both first and second surveys, and was distributed through instant messenger either by teachers or students at the schools. Informed consent was presented at the front page of the on-line questionnaire, and was obtained in the beginning of the survey.

Independent variables were adolescents' awareness and knowledge level regarding the effects of smoking on their oral health. The questionnaire adapted from a study of AlAbdullah *et al.* was used to assess these variables. This questionnaire was chosen because it has been proven to increase the willingness of adolescents to stop smoking. The questionnaire consisted of one question assessing awareness ('Does smoking affect the mouth health?'), and 10 questions measuring the knowledge of smoking effects on oral health, particularly addressing bad taste, bad odor, oral ulcers, oral cancers, dental caries, bleeding of the gums, dryness of the mouth, tooth sensitivity, tooth loosening, and painful chewing. Each question assessing knowledge was given 1 score for the right answer, and 0 for the wrong answer. To categorize participants' level of knowledge regarding smoking effects on oral health, the total score achieved by all participants was applied, and scores below median value were considered low knowledge level, and vice versa [13].

Dependent variable was the adolescents' motivation to stop smoking, and it was assessed using Richmond test. This questionnaire was chosen because results of the original study exhibited a 76% accuracy in predicting continuous cessation for up to 12 months among 420 patients in smoking cessation programs administered by general practitioners in Sydney. Motivation level in this questionnaire was categorized as high with a score of 9-10, moderate with a score of 6-8, and insufficient with a score below 5 [15, 16]. The afore-mentioned questionnaire underwent cross-cultural adaptation, and the process included a translation into Indonesian language and validity test. The translation process itself consisted of several steps; the first step was the translation into Indonesian language by two translators, a sworn translator and one with a medical background with the Test of English as a Foreign Language (TOEFL) score above 550. It was then back translated into English with a different sworn translator. The questionnaire was then discussed with a panel of experts to develop its final form. Finally, a validated questionnaire was generated via reliability and validity testing.

The participants' measured covariates were their socio-demographic characteristics and smoking behaviors. Socio-demographic characteristics included age, gender, grade, major (science/social), presence of parents, having a peer who smoked, and parents' educational background. Smoking behaviors included smoking status (non-smoker, current, or former smoker), cessation duration for former smokers, period of smoking, and the intention to quit smoking.

The obtained data was analyzed using IBM SPSS version 23.0 (SPSS Inc., Chicago, USA). The awareness and knowledge of the effects of smoking on oral health and the motivation to stop smoking were analyzed descriptively. Subsequently, for analytic analysis, a χ^2 test and continuity correction test were used for categorical variables to compare both the awareness and knowledge level of smoking effects on oral health with the participants' socio-demographic characteristics and smoking status. In terms of motivation variable, Mann-Whitney *U*-test for non-parametric numerical variables was applied, and χ^2 test was used for comparing the level of motivation to stop smoking and socio-demographic characteristics. However, smoking status revealed that there were expected counts of less than five in more than two cells, therefore, it was considered not accurate.

A simple logistic regression was applied to analyze the relationship between the participants' awareness and knowledge and significant covariates. The relationship between motivation and its' significant covariates was analyzed using Spearman's rho correlation. Finally, the correlation between the participants' awareness and knowledge regarding the effects of smoking on oral health and the motivation to stop smoking was investigated.

RESULTS

The first stage of data collection involved 135 respondents out of the total target of 642 respondents, providing a response rate of 21%. In the second stage, there were 417 respondents from 75 high schools in Jakarta, leading to a total of 552 respondents from both data collection stages. There were 464 students from public schools, and 88 students from private schools.

TABLE 1. Participants' awareness of the jeopardizing effects of smoking on oral health with significant respondents' characteristics

Characteristic	Odds ratio	95% CI	p-value
Gender	3.330	1.921-5.774*	< 0.001
Male			
Female			
Smoking status			
Have smoked	3.384	1.682-6.807*	0.001
Have never smoked			
Smoking duration	5.312	1.158-24.381*	0.032
> 2 years			
≤ 2 years			
Intention to stop smoking			
No	7.7	1.824-32.501*	0.005
Yes			

The majority of the participants were females (72.1%), aged 14-18 years (mean, min-max), 16 (mean, 14-18 years), 11th graders (*n* = 253, 45.8%), science majors (*n* = 495, 89.7%), did not have a family member who smoked (*n* = 278, 50.4%), had close friends who smoked (*n* = 322, 58.3%), and had parents who were university graduates (father = 335, 64.3%; mother, *n* = 323, 58.5%).

In terms of smoking status, about 501 (90.8%) of the 552 participants reported as never smoked. Among the participants who reported ever smoked (*n* = 51, 9.2%), 10 of them had quit in the past six months, nine had quit in the last one to five months, and 32 were current smokers. As many as 42 participants had smoked for less than two years, and nine had smoked for more than two years. Additionally, 39 participants who smoked had the intention to stop smoking.

With respect to awareness, majority (*n* = 493, 89.3%) of the respondents were aware that smoking affects one's oral health in general. Table 1 summarizes the awareness of the respondents regarding the dangers of smoking in terms of oral health along with the significant variables using a simple logistic regression test. Female participants tended to be three times more aware than their male counterparts; the participants who had never smoked were three times more aware than the participants who smoked; and the participants who smoked for less than two years were five times more aware than the participants who had smoked for more than two years. Lastly, the participants reporting an intention to quit smoking were seven times more aware of the dangers of smoking compared with those with no intention to quit smoking.

The median value of the overall achieved knowledge score of all participants knowledge regarding the specific effects of smoking on oral health was 4 (min-max, 0-10). Out of the 493 participants who were aware of smoking affecting oral health, most (*n* = 324) were considered to have a low level of knowledge regarding the effect of smoking on oral health (with a total score below the median value). Table 2 shows the outcomes of the analyses of the participants' knowledge regarding the negative effects of smoking on oral health along with the significant variables using a simple regression logistic test. The only characteristic that turned out to have a statistically significant relationship with the level of knowledge regarding the effect of smoking on oral health was the smoking status. The participants who had never smoked were 2.4 times more likely to have a higher level of knowledge than those who had smoked.

The majority of the participants who reported smoking (22 out of 51 participants) had insufficient motivation to quit smoking. Based on the results of Mann-Whitney *U*-test, there were statistically significant differences between smoking cessation motivation and smoking status, smoking period, and the intention to quit smoking. A correlation test was conducted to determine the direc-

tion and magnitude of the relationship between the motivation to quit smoking and related variables. Table 3 demonstrates a strong positive linear correlation found between the smoking status and the intention to quit smoking. The longer the cessation duration, the higher the respondents' motivation to stop smoking. Moreover, participants with the intention to quit smoking had a higher motivation level. A moderate negative linear correlation was discovered for the smoking period variable, with longer smoking periods associated with lower motivation scores.

Based on bivariate Mann-Whitney test, there were no statistically significant differences between the motivation to quit smoking scores and the awareness and knowledge of the negative effects of smoking on oral health. These results are presented in Table 4.

DISCUSSION

The majority of adolescents in this study exhibited an awareness of the effects of smoking on oral health. The results of this study are in line with those of the research conducted by Blaggana *et al.* [17] among secondary high school students in India, and Ashraf Nazir *et al.* [18] and AlAbdullah *et al.* [13] on male public high school students in Saudi Arabia. Although most of the participants were aware that smoking affects oral health, many of them still presented low level of knowledge, which was also demonstrated by another study of Lawal *et al.* [19] that studied 1,462 adolescents in Nigeria. This might be due to the awareness-related questions of a questionnaire being more general in nature compared with the knowledge-related questions [20].

A recent study revealed that female participants were more likely to be aware of the effects of smoking on oral health. This finding was also reported in a study conducted by Jebunnahar *et al.* [21]. Additionally, Bidmon *et al.* stated that females were more active in using the Internet to find health-related information [22]. Also, participants with a shorter duration of smoking showed greater awareness compared with those with a longer duration of smoking. The reason why the participants were smoking for a longer time, as explained by cognitive dissonance theory of Leon Festinger, is that the difficulty experienced in changing the behavior (in this context, smoking behavior) can lead to adjust smokers' beliefs to justify their behavior [23].

Smoking status was significant for both the awareness and knowledge variables in the group of respondents who reported never smoked, being more aware and having better knowledge of the effects of smoking on oral health. This finding is supported by a study of Tirtosudiro *et al.* [24], which showed that adolescents who had positive perspectives regarding smoking were 8.8 times more likely to smoke. In the present study, the participants with the intention to quit smoking were

more aware of the effects of smoking on oral health than those who did not wanted to quit smoking. A study of AlAbdullah *et al.* [13] proved that educational intervention regarding the effects of smoking on oral health increases adolescents' intention to quit smoking. Zhang *et al.* [25] study's findings also supported this outcome, and revealed that quit smoking intentions and quit smoking attempts were lower among youth with lower perceptions of harm associated with tobacco use.

In terms of smoking cessation motivation, the motivation scores correlated with the length of time the re-

TABLE 2. Participants' knowledge about the jeopardizing effects of smoking on oral health with significant respondents' characteristics

Variable	Odds ratio	95% CI	p-value
Smoking status			
Have smoked	2.449	1.055-5.685%*	0.037
Have never smoked			

TABLE 3. Correlation between motivation scores and significant variables

Variable	Correlation (r)	p-value
Smoking status		
Current smoker	0.797*	< 0.001
Former smoker for the last 1–5 months		
Former smoker for at least 6-month period		
Smoking duration	-0.420*	0.002
≤ 2 years		
> 2 years		
Intention to stop smoking		
No	0.711*	< 0.001
Yes		

TABLE 4. Bivariate model for the association between the motivation to stop smoking score and the awareness and knowledge of the effects of smoking on oral health

Variable	Motivation score, median (min-max)	p-value
Awareness		
Not aware	5 (0-10)	0.262*
Aware	6 (1-10)	
Knowledge		
Low	6 (1-10)	0.504*
High	6 (5-10)	

spondent had quit smoking. Referring to the trans-theoretical model, a person who quit smoking for more than six months presented an increased motivation level, and was less likely to return to the habit [26]. In addition, the motivation score in this study was also higher in participants with the intention to quit smoking. A research conducted by Kim *et al.* [27] also stated that the intention to quit smoking was one of the determinants of quitting smoking in adolescents.

Differences in the motivation scores were seen in the smoking duration characteristics among the adolescents. The longer the participant reported smoking, the lower the motivation score. A study conducted by Yang *et al.* also revealed the same results [28]. The level of dependency caused by nicotine was responsible for this findings, and adolescents who were highly dependent on smoking would face challenges in stopping smoking [29].

In terms of the relationship between the awareness and knowledge and smoking cessation motivation, there were no statistically significant differences found among these variables. In the individuals who reported having smoked, as previously mentioned, the addictive nature of nicotine could be the factor to prevent them from quitting smoking, because, once one starts to stop smoking, nicotine withdrawal can follow [29]. Therefore, assistance is often needed to help someone quit smoking, as it is difficult to establish a new habit in this situation [30]. A smoking cessation intervention in a study by Müssener *et al.* [31] required 12 weeks to achieve a 4-week point prevalence of smoking abstinence.

The limitations of the current study include the use of a convenience sampling method, as this can lead to an uneven participants' characteristics distribution [32]. The higher number of female versus male respondents in this study could have biased the results. In addition, a cross-sectional design study is not sufficient to determine the relationship between variables; therefore, this finding requires either an experimental or prospective research for further assessment [33, 34].

CONCLUSIONS

Most of the participants in this study were aware that smoking affects oral health. However, their knowledge of the specific effects was still lacking. There was a relationship between awareness and knowledge level and smoking status, which indicated that stating adverse effects of smoking in a smoking prevention program is highly recommended. On the other hand, there was no difference between the awareness and knowledge level and the smoking cessation motivation level. Sporadic health education is inadequate to promote smoking cessation. Therefore, a personalized approach is needed to help adolescences quit smoking.

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CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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