

The Association between Smoking Cigarettes and Anxiety among High School Students

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Abstract

Introduction: Cigarette use and nicotine dependence in adolescents are increasing. Nicotine dependence can cause anxiety. This study aimed to investigate the relationship between smoking and anxiety in high school students.

Methods: This was a cross-sectional study with a case-control design. 160 male students (80 with anxiety, 80 without anxiety) participated in the study. Active smokers were students who smoke, and non-smokers were students who did not smoke at the time of data acquisition. Anxiety was evaluated using the Hamilton Anxiety Rating Scale (HAM-A) instrument. Chi-square was applied to analyze the association between smoking habits and anxiety. Significance was set at $p < 0.05$.

Results: The number of smokers and non-smokers were 75 (47%) and 85 (53%). Most students had mild-moderate anxiety (76/95%). Among students with anxiety, 48 (60%) were smokers, while in students without anxiety, only 27 (33.7%) were smokers. Anxiety was associated with smoking habits (OR 2.94, 95%CI 1.55 – 5.61, $p=0.001$).

Conclusion: Smokers have a 2.9 possibility of experiencing anxiety compared to non-smokers in high school students.

Keywords: nicotine dependency - cigarette use - anxiety - high school students - negative outcome.

INTRODUCTION

Exposure to nicotine through cigarettes among adolescents is a global concern. The brain in adolescents is still experiencing rapid development. Nicotine can interfere with the brain's reward system and brain areas involved in emotional and cognitive functions.¹ Previous study showed that the influence of nicotine in these areas in adolescents could

influence smoking habits in adulthood.² These changes can also contribute to the abuse of other substances, known as the 'gateway effect'.^{1,3}

Several factors can contribute the smoking habit. The smoking habits of peers and social groups are significant factors for smoking in adolescents, known as 'social smoking'.⁴ Mental health, perceptions of smoking, and abuse of

other addictive substances are factors that cause teenagers to become dependent on tobacco and nicotine.⁵ Parental smoking habits can also cause smoking habits in teenagers due to genetic, epigenetic, and environmental factors.^{5,6} Parental education, marital status, household conditions, and parenting patterns are also factors that influence teenagers' smoking habits.

Cigarette smoking can cause health problems, especially in the lungs, heart, and blood vessels. In the lungs, apart from cancer, smoking can cause chronic bronchitis, emphysema, asthma attacks, and chronic obstructive pulmonary disease (COPD).^{7,8} In the heart and blood vessels, smoking can cause heart attacks, vascular disease, coronary heart disease, stroke, and aneurysms.^{9,10} Smoking is also linked to major health disorders, for example, rheumatoid arthritis, inflammation, and impaired immune function.¹¹

Apart from disease and physical disorders, smoking can also cause problems with mental and emotional health. One of the mental disorders that is often found in smokers is anxiety. Although dealing with anxiety is the reason teenagers smoke cigarettes, studies show that smoking can cause and even increase anxiety. A longitudinal study over six years reported that smoking increases the risk of experiencing anxiety.¹² A study in Brazil showed that smoking was associated with

symptoms of anxiety, in addition to symptoms of depression, poor academic performance, and suicidal tendencies in adolescents.¹³ Although studies on smoking behavior in adolescents have been widely carried out in Indonesia, information about the influence of smoking on anxiety in adolescents is lacking. This study aimed to investigate the association between smoking habits and anxiety levels in adolescents.

METHODS

This study was a cross-sectional study with a case-control design. The sample size was determined using proportional stratified random sampling. The sampling stage begins by distributing questionnaires to all school students. From the sampling procedure, a sample of 160 was obtained, consisting of 80 students with and 80 without anxiety. Participants were active high school students. Students with existing mental and psychological disorders other than anxiety were excluded. The HAM-A test is carried out by filling out the Google Form questionnaire in the morning before starting lessons and not during the exam preparation period to get accurate results. Filling out the Google Form takes around five to ten minutes. Permission was obtained from the school principal, while written informed consent was obtained from the students. All aspects of this study were approved by the Research Ethics Committee of

the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia (Number 07/11/KEP-FKIKUA)/2023).

Smoking habit

Participants' smoking habits were obtained through a questionnaire using Google Forms. Smokers were those who had consumed at least 100 cigarettes for total and had been still smoking at the time of the study, either every day or not every day. In the smoker group, the period of smoking among respondents was quite varied, ranging from several months to approximately two years with an average of having smoked for around one year. Non-smokers were those who had never smoked at all or had smoked but had stopped for at least one month at the time of the study.

Hamilton Anxiety Rating Scale (HAM-A)

HAM-A is an instrument for assessing the degree of emotional and somatic symptoms related to anxiety. Emotional symptoms include anxious mood, tension, and fears, while somatic symptoms consist of muscle, sensory, and gastrointestinal. HAM-A consists of 14 questions with a scale of 0-4 for each question. Zero indicates not present, 1 mild, 2 moderate, 3 severe, and 4 very severe. HAM-A has a score range of 0-56.¹⁴ HAM-A score is classified as follows: 0-7, normal; 8-14, mild; 15-23, moderate; and ≥ 24 , severe. The Indonesian version of HAM-A used in this study was translated and validated with a Cronbach's alpha score of 0.76.¹⁵

Statistical analysis

Numerical data was presented as mean \pm standard deviation (SD), while categorical data was presented as frequency (percentage). The association between categorical variables was analyzed using Chi-square. Significance was set at $p < 0.05$. Data and statistic tests were processed using SPSS version 21.

RESULTS

Table 1. demonstrates the distribution of smoking habits among participants. The number of non-smokers was greater than smokers (85/53.1% vs 75/46.9%). Most of the participants in the non-smoker group were those who had never smoked (n=70). The number of participants who smoked every day and those who smoked not every day in the smoker group was almost the same (38 vs. 37)

Table 1. Distribution of smoking habit

Smoking habit	n (%)
Smoker (n=75/46.9%)	
Every day	38 (23.8%)
Not every day	37 (23.1%)
Non-smoker (n= 85/53.1%)	
Former	15 (9.4%)
Never	70 (43.8%)
Total	160 (100%)

Table 2 describes the distribution of anxiety levels. Among the 80 participants who had anxiety, most of them had mild and moderate levels of anxiety (n=76) or 95%, and only 4 (2.5%) had severe anxiety.

Table 2. Distribution of anxiety level.

Anxiety status	n (%)
Anxiety (80/50%)	
Mild	38 (23.8%)
Moderate	38 (23.8%)
Severe	4 (2.5%)
No anxiety (80/50%)	
Total	160 (100%)

Table 3. shows the association between smoking habit and anxiety. Most participants

with anxiety had a smoking habit (48 or 60% within the group), whereas the number of participants without anxiety who did not smoke was much greater (53 or 66.3% within the group). The association between smoking habits was significant (OR 2.94, 95%CI 1.55 – 5.61, $p=0.001$). Participants with a smoking habit were 2.94 times more likely to experience anxiety than non-smokers.

Table 3. The association between anxiety and smoking habit

	Anxiety status			<i>p</i>	OR	95%CI
	Anxiety	No anxiety				
Smoker	48 (60%)	27 (33.7%)	75 (46.9%)	0.001	2.94	1.55 – 5.61
Non-smoker	32 (40%)	53 (66.3%)	85 (53.1%)			
	80 (100%)	80 (100%)	160 (100%)			

DISCUSSION

There have been many studies on the relationship between smoking and anxiety. Several previous studies have shown a relationship between smoking and anxiety.^{13,16-18} To our knowledge, there have not been many studies on the relationship between smoking and anxiety in teenagers in Indonesia. This study attempted to reveal the relationship between anxiety and smoking in high school students in Indonesia. The findings of our study support the results of previous studies that adolescents who smoke have a higher risk of experiencing anxiety by 2.94 times compared to adolescents who do not smoke. The possibility of adolescents who smoked

experiencing anxiety was 2.94 times compared to adolescents who did not smoke.

The relationship between smoking behavior and anxiety levels is unique and complex. There may be questions that arise regarding this relationship, whether smoking causes teenagers to experience anxiety or whether anxiety tends to make teenagers smoke. Many literatures explain theories regarding the relationship between smoking behavior and anxiety. The first theory, the 'self-medication' theory, suggests that smoking behavior can relieve the symptoms of anxiety experienced. The higher the level of anxiety, the higher the number of cigarettes consumed.¹⁷ This theory was supported by a survey in 2007 by

McManus et al., which reported that as many as 42% of cigarettes circulating in the UK were consumed by individuals with mental disorders.¹⁹ The scientific basis of this theory is that the release of dopamine as a neurotransmitter of pleasure and motivation could be triggered by nicotine in cigarettes. The second theory regarding the relationship between smoking and anxiety states that smoking can cause anxiety. The scientific basis for this theory is that the neurocircuitry effects of smoking can increase vulnerability to environmental stressors and cause anxiety.¹⁷

The negative impacts of smoking on health are well known. In school students, the impact of smoking on academic performance also needs to be a serious concern. A study on dental students reported that smoking habits did not influence academic performance, but smoking students were more vulnerable to low academic achievement.²⁰ Meanwhile, a study on Management and Science students in Malaysia concluded that smoking was associated with low academic performance.²¹ The latest study conducted on health science students also showed negative results.²² Smoking and nicotine dependence were predictive for diminished academic performance, including grade point average (GPA), increased absenteeism rate, and academic trouble.²² Our research did not record the negative influence of smoking

specifically on the academic performance of school students.

This study is quite simple and has many limitations. First, many risk factors of anxiety in adolescents were not included. Smoking habit is not the sole cause of anxiety in teenagers. Several factors that might cause anxiety in teenagers include anxiety history in the family, presence of other psychological illnesses, social economy, academic pressure, etc.²³ Including these factors for analysis can significantly reduce bias in the results. Second, our study did not record outcomes as a result of smoking and anxiety. By obtaining data regarding negative impacts, early recognition and strategies to overcome smoking habit and nicotine dependence can be implemented as quickly as possible. Third, information about smoking habits among active smokers was less detailed, including the frequency of smoking per day, the number of cigarettes consumed per day, and the type of cigarettes smoked. By obtaining detailed information on smoking habits, risk factors for problems caused by smoking can be determined. Fourth, female students were not included in our study. A systematic review and meta-analysis study reported that the number of women who smoke tends to increase on a national, regional, and global scale.²⁴ Therefore, increasing the number of female students who smoke can provide meaningful information for anti-smoking education and campaigns.

CONCLUSION

Our study showed that students with a smoking habit have a 2.94 possibility of experiencing anxiety compared to non-smoking students. However, this study should be interpreted with caution due to its several limitations. We suggest that future research should include outcomes and information that are our study's limitations.

ACKNOWLEDGMENT

The authors thank the school principal for permission and all students for participation.

CONFLICT OF INTEREST

There is nothing to declare.

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