Beliefs about the Effects of Smoking on Corona Virus Disease 2019 and its Impact on the Intention to Quit and Smoking Frequencies among University Students Smokers in Jakarta, Indonesia

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Original Article

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Abstract

Introduction: Several scientific evidence showed that smoking can increase the severity and mortality rate of coronavirus disease 2019 (COVID-19). This indicates that the pandemic is the best time to reduce its frequency or stop the habit, but misinformation that smoking prevents infection has an effect on smokers' behavior. Therefore, this study aims to assess the beliefs about the effects of smoking on COVID-19 as well as to determine their relationship with smoking habits among university student smokers in Jakarta, Indonesia. **Methods:** This study was carried out in three Universities in Jakarta with a total of 198 respondents, who were selected conveniently. Furthermore, independent variables were derived from the Health Belief Model theory, while the dependent variables include quit intention and smoking frequency. Chi-square and ordinal regression analyses were carried out to determine the association between the variables. **Results:** The belief that smoking increases the severity of COVID-19 as well as having the determination to stop the habit, had no effect on the respondents' quit intention. Moreover, perceived barriers, such as feeling anxious (adjusted odds ratio [AOR]: 0.34, 95% confidence interval [CI]: 0.19–0.60) and being exposed to information that the habit prevents COVID-19 severity (AOR: 0.45, 95% CI: 0.01–0.71) were protective factors against the decrease in the number of cigarettes smoked daily. **Conclusion:** Improving digital health literacy, campaigns to clarify the risk of cigarettes, and self-efficacy related to cessation are important efforts to prevent smoking behavior during a pandemic.

Keywords: *Health belief model, misinformation, quit intentions, smoking behavior, students*

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Introduction

The world faces one of the most dangerous public health crises triggered by the coronavirus disease 2019 (COVID-19) pandemic. As of early October 2021, more than 250 million people had been infected, with a total of 5.1 million death cases globally.[1] Furthermore, a previous study reported that smoking increased the angiotensin-converting enzyme lung gene expression, which is the receptor of severe acute respiratory syndrome coronavirus 2.[2] Other studies showed that smoking history was associated with COVID-19 hospitalization, increased disease progression, severe or critical condition, need for a mechanical ventilator, and mortality.[3-6] A meta-analysis revealed that it was also related to the increased risk of COVID-19 progression and mortality, specifically among young adults.[4] This indicates that the best period to quit or avoid smoking for nonsmokers was during the COVID-19 pandemic.

Indonesia is a smoking-friendly country, where one-third of adults were active smokers in 2018, and they accounted for 33.8% of the total population.[7] Previous reports revealed that the number of young smokers is increasing annually. Furthermore, the prevalence of smoking among children aged 10–18 increased from 7.2% in 2013 to 9.1% in 2018, while the average age of initiation decreased from 17.2 to 16.8 years.[7] Young smokers are more at risk of experiencing severe levels of addiction and noncommunicable diseases.[8] However, the majority of smokers did not stop smoking during the COVID-19 pandemic. This was indicated by a survey in Indonesia, where there was an increase in the number of cigarettes consumed by 20.1% of them, while 47.6% still had the same amount they had before the pandemic.[9]

Misinformation that smoking has a protective effect against COVID-19 is a major factor preventing decrease in the prevalence of the habit. A previous study in Hongkong showed that exposure to this misinformation was associated with a significant increase in tobacco users.[10] However, the belief that smoking can increase the severity of COVID-19 infection was associated with increased quit intentions.[11] Indonesia was ranked among the top three countries with the highest number of smokers,[12] and similar false information was also spread in the country.[13]

Based on previous reports, there are no studies on the association of misinformation and smoking beliefs with quit intention and frequencies in Indonesia. Therefore, this study aims to determine beliefs about the effects of smoking on COVID-19 as well as its relationship with the intention to quit and smoking behavior among university student smokers in Jakarta, Indonesia. The results are expected to be useful for guiding the designation of health promotion and education programs, particularly in addressing the issue of how smokers' beliefs about the effects of smoking on COVID-19 failed to decrease the number of daily cigarettes smoked during the pandemic.

Methods

This study used a cross-sectional design method, and the sample population consists of registered students from three different Universities in Jakarta, Indonesia. Furthermore, Jakarta was selected as the study location because it was considered the epicenter of the virus in the country. Previous reports showed that it had the highest number of cases among other provinces, namely 800 thousand, as of January 1, 2022.[14] Universities were selected because the majority of smokers were within the age range of 15–19 and 20–24 years, thereby accounting for 48.2% and 26.5% of the total population, respectively.[7] At this age, they have not become lifetime smokers, which indicates that there is still a high possibility for them to have quit intentions. This is consistent with the Global Adult Tobacco Survey carried out in Indonesia, where the 15–24 years age group had higher intentions to quit smoking than others, and they accounted for 36.5% of the total population.[15]

A total of 198 students were selected using a nonprobability method with a convenience sampling technique. The inclusion criteria were: (1) Active university students, (2) active cigarette smokers who had started smoking before the pandemic or ex-smokers who resumed smoking before the pandemic and stopped during the outbreak. The smokers used in this study were people who smoked hand-rolled and clove (kretek) cigarettes within the past 30 days.[15,16] A total of 406 students previously participated in this study, but this was reduced to 198 after 208 respondents (2 respondents were not willing to participate, 37 were not active students, 131 never smoked, and 38 started smoking before the pandemic started) were excluded. Data collection was carried out from August to September 2021 by filling out online questionnaires, which were distributed by four trained study assistants. The data were collected through an online method due to the mobility restriction policy, which was implemented in several regions of Indonesia. The assistants explained the information about the study procedure to the respondents before data collection and those who agreed to participate approved a consent form. There was neither forced consent nor sanctions against those who declined to participate during the data collection. Phone credit or electronic money in the amount of IDR 15,000/USD 1.05 was given to the respondents as an appreciation for their participation in this study. Anonymity and confidentiality were ensured during the study process. Ethical clearance was obtained before data collection from the Ethics Committee of the Faculty of Health Sciences of Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia, with the number Un. 01/F.10/KP. 01.1/KE.SP/08.08.087/2021.

This study was designed with the health belief model (HBM) theory, which is one of the most common frameworks used to assess prevention behavior.[17] The HBM theory shows that health-related behavior is influenced by people's perception of the threat of health problems (susceptibility and severity), the benefits of preventing the threat, and factors determining the choice to act (barriers, cues to action, and self-efficacy).[18] The respondents were asked to fill in a self-administered questionnaire containing 26 questions, which was developed from a rigorous literature review. Furthermore, the items in the HBM models were measured on a 1–6 scales (1 – strongly agree, 6 – strongly disagree), while the negative items were scored in reverse. The respondents were asked about the average number of cigarettes smoked daily, and this was compared to the number before the pandemic to determine the smoking frequency. The quit intention was measured by asking whether they have an intention to stop smoking during the pandemic or not.

Statistical analysis

The SPSS 22 (IBM Corp., Armonk, N.Y, USA) software was used for data analysis, while the reliability of HBM items was measured using Cronbach's alpha test. Descriptive statistics, such as frequencies and percentages, were used for describing the variables in this study. The dependent variables include having an intention to quit smoking and not having an intention, as well as smoking frequency, which was categorized as decreased, increased, and not changed. The association between the independent and dependent variables was determined using Chi-square and ordinal regression tests. A bivariate test was also carried out to determine the inclusion of both of them in the multivariate analysis, where independent variables with a $P < 0.25$ were included.[19] In the multivariate analysis, logistic and ordinal binary regressions were used for the quit intention and smoking frequency, respectively. Furthermore, this analysis was carried out to determine the potential factors associated with the two variables. Backward elimination in the multivariable binary logistic

regression was performed to reveal the best predictors of quitting smoking intention. Adjusted odds ratios (AORs) and 95% Confidence interval (CI) were calculated to measure the strength of the statistical association. In binary logistic regression analysis, the odds ratio (OR) was set from the exponential value of beta. In the ordinal logistic regression analysis, the AOR was obtained by calculating the exponential value of the estimate. $P < 0.05$ were considered statistically significant.

Results

Table 1 shows that 95.5% of respondents in this study were male, while 80.3% were above 20 years. Furthermore, 42.9% stated that the number of cigarettes they smoked before and during the pandemic has not changed, while 30.3% observed an increase. Respondents who did not live with their families experienced an increase in smoking during the pandemic compared to those who lived with their families, namely 35.3% and 29.4%, respectively. A total of 42.0% who were infected with COVID-19 decreased the daily number of cigarettes they smoked during the pandemic.

Table 2 shows that for those who believing that smoking increased COVID-19 infection, severity, detriments to health, and dangerous during the pandemic, did not get information that smoking can prevent COVID-19, confident to terminate cigarette smoking had significantly higher ORs for having the intention to quit smoking during the pandemic. The results of the multivariate logistic regression analysis are presented in Table 3. The Hosmer–Lemeshow test was higher than the significance value of 0.05 (0.71), and this indicates that the model established is fit. The Nagelkerke R^2 obtained in this study was 0.207, which was considerably low. This was due to various factors that affect the intention to quit smoking, such as external factors were not examined. Believing that smoking detriments health were 4.0 times to have an intention to quit smoking, while those who were confident to quit during the pandemic had 4.9 times more prone to have an intention to quit.

Smokers who believed that smoking during the pandemic can increase the severity of COVID-19 were likely to reduce the number of cigarettes consumed. Furthermore,

Table 1: Smoking behavior based on respondents' characteristics

Characteristics	Total	Cigarette smoking number		
		Decreased	Not changed	Increased
Total	198 (100)	53 (26.8)	85 (42.9)	60 (30.3)
Sex				
Male	189 (95.5)	48 (25.4)	84 (44.4)	57 (30.2)
Female	9 (4.5)	5 (55.6)	1 (11.1)	3 (33.3)
Age (years)				
≤20	39 (19.7)	7 (18.0)	23 (59.0)	9 (23.0)
>20	159 (80.3)	46 (29.0)	62 (39.0)	51 (32.0)
Science cluster				
Medical and health	61 (30.8)	18 (29.5)	22 (36.1)	21 (34.4)
Science and technology	33 (16.7)	12 (36.4)	10 (30.3)	11 (33.3)
Social humanities	104 (52.5)	23 (22.1)	53 (51.0)	28 (26.9)
Domicile				
Jakarta	167 (84.3)	48 (28.7)	70 (41.9)	49 (29.4)
Non-Jakarta	31 (15.7)	5 (16.1)	15 (48.4)	11 (35.5)
Place of living (residence)				
House with family	164 (82.8)	47 (28.6)	69 (42.1)	48 (29.3)
Boarding house	34 (17.2)	6 (17.6)	16 (47.1)	12 (35.3)
Job characteristics				
Full-time worker	6 (3.0)	0 (0.0)	4 (66.7)	2 (33.3)
Part-time worker	57 (28.8)	10 (17.5)	29 (50.9)	18 (31.6)
Not working	135 (68.2)	43 (31.9)	52 (38.5)	40 (29.6)
Family income (million IDR)				
≥5	97 (49.0)	26 (26.8)	39 (40.2)	32 (33.0)
<5	101 (51.0)	27 (26.7)	46 (45.6)	28 (27.7)
Have been infected with COVID-19				
No	148 (74.7)	32 (21.6)	68 (45.9)	48 (32.4)
Yes	50 (25.3)	21 (42)	17 (34)	12 (24)
Have an intention to stop smoking				
Yes	136 (68.7)	47 (88.7)	51 (37.5)	38 (27.9)
No	62 (31.3)	6 (9.7)	34 (54.8)	22 (35.5)

Table 2: Bivariate analysis of determinants of intention to quit smoking among respondents

Variables	Frequency	Intention to quit		OR	*P*
		Intent to quit	Not intent to quit		
Perceived susceptibility (I believe that…)					
Smoking increased the chances to get COVID-19	83 (41.9)	66 (79.5)	17 (20.5)	2.50 (1.30-4.89)	0.008
COVID-19 spreads widely in my living area	151 (76.3)	108 (71.5)	43 (28.5)	1.70 (0.86-3.37)	0.173
Perceived severity (I believe that …)					
Smoking detriments health	161 (81.3)	120 (74.5)	41 (25.5)	3.84 (1.83-8.06)	<0.001
Smoking is dangerous during the pandemic	163 (82.3)	122 (74.8)	41 (25.2)	4.46 (2.08-9.58)	<.001
Cigarette smoking increases the severity of COVID-19 when infected	138 (69.7)	103 (74.6)	35 (25.4)	2.41 (1.27-4.55)	0.010
Perceived benefits (I believe that…)					
Smoking cigarette could prevent COVID-19	154 (77.8)	108 (70.1)	46 (29.9)	0.75 (0.37-1.67)	0.526
Smoking cigarette could prevent severity when infected with COVID-19	145 (73.2)	101 (69.7)	44 (30.3)	0.85 (0.43-1.67)	0.754
Perceived barrier (I feel … if do not smoke)					
Anxious	104 (52.5)	69 (66.3)	35 (33.7)	0.79 (0.43-1.45)	0.553
Hard to concentrate	113 (57.1)	72 (63.7)	41 (36.3)	0.58 (0.31-1.08)	0.113
Uncomfortable	116 (58.6)	76 (65.5)	40 (34.5)	0.79 (0.38-1.30)	0.323
Cues to action					
Did not obtain information that smoking can prevent COVID-19	150 (76.1)	109 (72.7)	41 (27.3)	2.15 (1.09-4.23)	0.040
Did not obtain information that smoking prevent severity during COVID-19 infection	154 (78.2)	109 (70.8)	45 (29.2)	1.58 (0.78-3.2)	0.270
My friend did not promote me to smoke	158 (79.8)	110 (69.6)	48 (30.4)	1.23 (0.59-2.57)	0.710
My family did not let me smoke	120 (60.6)	86 (71.7)	34 (28.3)	1.42 (0.77-2.61)	0.335
My family sanctioned me when I smoked	43 (21.7)	30 (69.8)	13 (30.2)	1.07 (0.51-2.22)	0.863
My lecturer reminded me not to smoke	86 (43.4)	64 (74.4)	22 (25.6)	1.62 (0.87-3.00)	0.171
Self-efficacy					
I am confident to terminate cigarette smoking	154 (77.8)	118 (76.6)	36 (23.4)	4.74 (2.33-9.61)	<0.001

OR: Odds ratio

Table 3: Multivariate analysis of determinants of intention to quit smoking among respondents

Variables	Estimate	SE	Wald	*P*	AOR (95% CI)
I believe that smoking detriments health	1.40	0.40	12.23	0.000	4.06 (1.85-8.90)
I am confident to terminate cigarette smoking during the pandemic	2.60	0.38	18.06	0.000	4.94 (2.37-10.32)

OR: Odds ratio, SE: Standard error, AOR: Adjusted OR, CI: Confidence interval

respondents who believed in the benefit of not smoking had significantly higher ORs to a decrease in the daily number of cigarettes (OR: 2.28, 95% CI: 1.21–4.31). Several perceived barriers, such as feeling anxious, difficulty to concentrate, feeling uncomfortable when not smoking, and receiving information that smoking can prevent COVID-19, were protective factors against the decrease in the number of daily smoked cigarettes. Moreover, having self-confidence in quitting the habit during the pandemic had significantly higher ORs, as shown in Table 4. Table 5 shows the multivariate ordinal regression analysis results, where the widely spread of COVID-19 in the living area and being reminded by lecturers not to smoke decreased the daily number of cigarettes smoked during the pandemic with AOR of 1.92 and 2.36, respectively. The results also showed that feeling anxious when not smoking and obtaining information that it prevents COVID-19 severity were protective factors against the decrease in the daily number of cigarettes.

Discussion

This study revealed that approximately 68% of respondents had the intention to quit smoking, but this number is higher than studies in the USA,[11] Jordan,[20] and India,[21] namely 41%, 44%, and 64.6%, respectively. However, it was lower compared to a study in the US during the early stages of COVID-19.[22] The number of smokers who had intention to quit smoking was higher than the number before the pandemic. Data from the Indonesian Global Adult Tobacco Survey and study at KSA University students revealed that only approximately 38% and 65% of smokers have the intention to stop the habit, respectively.[15,23]

A previous study revealed that the most proximate predictor of behavior is the intention or perceived likelihood to change an attitude.[24] Furthermore, another study reported that the goal of abstinence from tobacco is to develop a mindset to stop its usage.[25] The result showed that

Table 4: Bivariate analysis of determinants of smoking behavior among respondents

Variables	Cigarette smoking number			OR	P
	Decrease	Not changed	Increase		
Perceived susceptibility (I believe that…)					
Smoking increased the chances to get COVID-19	29 (34.9)	30 (36.1)	24 (28.9)	1.50 (0.89-2.54)	0.131
COVID-19 spreads widely in my living area	48 (31.8)	58 (38.4)	45 (29.8)	1.69 (0.92-3.12)	0.092
Perceived severity (I believe that …)					
Smoking detriments health	51 (31.7)	65 (40.4)	45 (28.0)	2.45 (1.24-4.85)	0.010
Smoking is dangerous during the pandemic	51 (31.3)	66 (40.5)	46 (28.2)	2.36 (1.18-4.74)	0.015
Cigarette smoking increases the severity of COVID-19 when infected	48 (34.8)	50 (36.2)	40 (29.0)	2.04 (1.15-3.61)	0.015
Perceived benefits (I believe that…)					
Smoking cigarette could prevent COVID-19	47 (30.5)	66 (42.9)	41 (26.6)	0.44 (0.23-0.83)	0.011
Smoking cigarette could prevent COVID-19 severity	43 (29.7)	65 (44.8)	37 (25.5)	0.48 (0.27-0.87)	0.016
Perceived barrier (I feel … if do not smoke)					
Anxious	16 (15.4)	44 (42.3)	44 (42.3)	0.28 (0.16-0.49)	<0.001
Hard to concentrate	19 (16.8)	50 (44.2)	44 (38.9)	0.33 (0.19-0.57)	<0.001
Uncomfortable	21 (18.1)	52 (44.8)	43 (37.1)	0.39 (0.23-0.67)	<0.001
Cues to action					
Obtain information that smoking can prevent COVID-19	8 (17.0)	20 (42.6)	19 (40.4)	0.53 (0.28-0.98)	0.041
Obtain information that smoking prevent the severity during COVID-19 infection	8 (18.6)	17 (39.5)	18 (41.9)	0.53 (0.28-1.01)	0.052
My friend encourages me to smoke	11 (27.5)	12 (30)	17 (42.5)	0.55 (0.29-1.05)	0.068
My family let me smoke	19 (24.4)	28 (35.9)	31 (39.7)	1.65 (0.97-2.81)	0.067
My family sanctioned me when I smoked	17 (39.5)	15 (34.9)	11 (25.6)	1.77 (0.94-3.32)	0.078
My lecturer reminded me not to smoke	36 (41.9)	29 (33.7)	21 (24.4)	2.57 (1.50-4.40)	0.001
Self-efficacy					
I am confident to terminate cigarette smoking	51 (33.1)	58 (37.7)	45 (29.2)	2.11 (1.12-3.98)	0.021

OR: Odds ratio

Table 5: Multivariate analysis of determinants of smoking behavior among respondents

Variables	β	AOR 95% CI	P
COVID-19 spreads widely in my living area	0.654	1.92 (1.01-3.67)	0.047
I feel anxious when do not smoke	1.076	0.34 (0.19-0.60)	0.000
Obtain information that smoking prevents COVID-19 severity	0.799	0.45 (0.01-0.71)	0.020
My lecturer reminded me not to smoke	0.858	2.36 (1.34-4.15)	0.003

OR: Odds ratio, AOR: Adjusted OR, CI: Confidence interval

smokers' quit intention was influenced by the belief that smoking has a harmful effect during the pandemic.

This study revealed that feeling confident to stop the habit was significantly associated with quit intentions among the respondents. Previous reports stated that more than 80% of smokers in Indonesia express a desire to stop, but many of them do not know how to quit smoking. Global Youth Tobacco Survey data showed that approximately 23.3% had received advice or programs to stop the habit.[26] A previous study also reported that improving self-regulation strategy and emotional intelligence play a pivotal role in increasing the intention and ability to quit smoking.[27]

The number of smokers who reduced the intensity during the pandemic was lower than the rates reported in the general population of Indonesia, namely 32.3%, yet it was higher than those obtained reported in other different countries, such as Australia, Canada, England, and the United States with an average of 15.3%.[9,28] This finding is consistent with a previous report that COVID-19 was more severe among smokers, and it was associated with a reduction in smoking.[28] The respondents also stated that they experienced a decrease in smoking frequency during the pandemic due to a reduction in their pocket money, which reduced the number of cigarettes purchased. The majority of them do not have a job; hence, they receive money from their parents to buy cigarettes. The upkeep received by the students was also lower because due to the study-from-home policies implemented during the pandemic. A previous study in Indonesia showed that having more pocket money increased the likelihood to smoke.[29]

The respondents also revealed that there was a decrease in the time spent with their friends due to the lockdown policy,

which led to a decline in smoking frequency. A previous study in Indonesia showed that smoking was a tool to making friends.[30] During the pandemic, the Indonesian government implemented various policies to limit communities' mobility, such as large-scale social restrictions pembatasan sosial berskala besar (PSBB) and community restriction activities policy pemberlakuan pembatasan kegiatan masyarakat (PPKM); hence, several nonessential activities were restricted.[31]

This study also showed that having received information that smoking can prevent COVID-19 severity was a protective factor for respondents to reduce the frequency during the pandemic. A different study in Hong Kong also reported a similar pattern, where exposure to health misinformation was related to the increase in tobacco use during the outbreak.[10] In the pandemic situation, there was several false and misleading information in the digital and physical environments.[32] This condition was referred to as infodemic by the World Health Organization, and it is characterized by overabundance of information, where some are false. This makes it difficult for people to find trustworthy sources and reliable guidance when they need it.[33]

A systematic review featured tobacco products in the top five categories for health misinformation on social media.[34] However, misinformation is dangerous during the pandemic, and it is often amplified by social media in this technological era.[35] Low literacy level is one of the factors driving the massive spread of fake news or hoaxes.[36] A previous study showed that a lack of knowledge is associated with reduced adoption of protective behaviors, such as nonsmoking behavior.[37] This shows that improving health literacy, including digitally, is very important to enable healthy decisions for COVID-19 preventive measures.[38,39]

Limitations

During the data collection, the Indonesian government implemented a policy called Community Restrictions, where the mobility of people was very restricted. Hence, an online survey was used instead of a face-to-face survey. Consequently, there was a tendency that only people who had access to the Internet participated. This study was also only carried out at three universities in South Jakarta, which might not represent all students in Indonesia. This indicates that further studies are needed to determine the effect of smoking on COVID-19 in a wider youth population.

Conclusion

The evidence showed that smokers were still exposed to misinformation regarding the effects of smoking on COVID-19. Respondents who believed that smoking cigarettes was dangerous during the pandemic and the determination to terminate the cigarette smoking habit significantly associated with the intention to quit smoking during the pandemic. While perceived barrier and exposure to misinformation about smoking were protective factors against the decrease of the daily cigarette smoking numbers. Health Literacy, including digital health literacy of the students should be improved to increase the ability in countermeasures against misinformation and disinformation during the pandemic. Furthermore, increasing Campaigns to clarify the risks of tobacco use during the pandemic, and the benefits of reducing or quit smoking during the pandemic should be intensified. Moreover, helping smokers in overcoming barriers to reducing and quitting smoking and strengthening self-efficacy could be performed by health facilities; by optimizing hotlines for smoking cessation, performing training and disseminating the guidance to quitting the smoking habit.

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Conflicts of interest

There are no conflicts of interest.

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