

ORIGINAL ARTICLE

Nicotine Dependence and Perceived Stress during the Pandemic

Ketergantungan Nikotin dan hubungannya dengan Perceive Stres selama Pandemi

Irgie Catur Ryansyah¹, Dyah Ayu Woro Setyaningrum²

¹Undergraduate Program Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

²Department of Anatomical Pathology Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

 dyahayu94@trisakti.ac.id

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ABSTRACT

Background

The development of COVID-19, which continues to increase in Indonesia, impacts the Indonesian people and causes stress due to the impact of the COVID-19 pandemic. Prior studies in several countries have shown that stress affects smokers during the COVID-19 pandemic. It affects smokers in two different ways, either they increase smoking or decrease smoking. This study aimed to determine the effect of Nicotine, smoking history, and changes in smoking habits during the COVID-19 pandemic on stress in smokers.

Methods

We conducted an online survey among active smokers in one of the villages in the South Lampung district, Indonesia November 2020 (n = 150). The survey includes sex, marital status, age of smoking initiation, duration as a smoker, changes in smoking frequency, questionnaire for nicotine dependence (*the Fagerstrom Test for Nicotine Dependence questionnaire*) and The Perceived Stress Scale (PSS). Data were analyzed with Chi-square<0.05).

Results

The results showed that the PSS score had a significant association with changes in smoking frequency (p=0.004) and nicotine dependence (p=0.001).

Conclusions

The study concluded that variations in nicotine dependence and changing smoking habits impacted perceived stress in smokers during the pandemic. There is a significant relationship between age at starting to smoke, number of cigarettes per day, duration of smoking habits, degree of smoking habits, and changes in smoking habits with stress levels in smokers in the COVID-19 pandemic era, and there is no relationship between types of cigarettes consumed, and stress levels in smokers in COVID-19 pandemic era.

Keywords: COVID-19; nicotine dependence; perceived stress; smoking habits; stress

ABSTRAK

Latar Belakang

Perkembangan kasus COVID-19 yang terus meningkat di Indonesia mempengaruhi masyarakat dan menimbulkan stress sebagai akibat dari efek pandemi COVID-19. Penelitian-penelitian sebelumnya di beberapa negara menunjukkan bahwa stres mempengaruhi perilaku perokok selama pandemi COVID-19 dalam dua cara berbeda, yaitu meningkatkan atau sebaliknya mengurangi perilaku merokok. Tujuan penelitian ini adalah untuk mengetahui pengaruh nikotin, riwayat merokok, dan perubahan kebiasaan merokok selama pandemi COVID-19 terhadap stres pada perokok.

Metode

Pengambilan data dilakukan dengan survei online di kalangan perokok aktif di salah satu desa di Kabupaten Lampung Selatan, Indonesia pada November 2020 ($n = 150$). Survei meliputi usia, jenis kelamin, status perkawinan, usia mulai merokok, lama menjadi perokok, perubahan frekuensi merokok, ketergantungan nikotin dengan kuesioner Fagerstrom Test for Nicotine Dependence, dan tingkat stress menggunakan *The Perceived Stress Scale* (PSS). Data dianalisis dengan uji *Chi-square* ($p < 0.05$).

Hasil

Hasil penelitian menunjukkan bahwa skor PSS memiliki hubungan yang bermakna dengan perubahan frekuensi merokok ($p = 0.004$) dan ketergantungan nikotin ($p = 0.001$).

Kesimpulan

Kesimpulan dari penelitian ini menunjukkan bahwa variasi ketergantungan nikotin dan perubahan kebiasaan merokok berdampak pada tingkat stres (*perceived stress*) pada perokok di masa Pandemi. Adanya hubungan yang bermakna antara umur mulai merokok, jumlah batang rokok per hari, lama kebiasaan merokok, derajat kebiasaan merokok, dan perubahan kebiasaan merokok dengan tingkat stres pada perokok di era pandemi COVID-19, namun tidak ada hubungan antara jenis rokok yang dikonsumsi dengan tingkat stres pada perokok di era pandemi COVID-19.

Kata Kunci: COVID-19; ketergantungan nikotin; perceived stress; perilaku merokok; stress

INTRODUCTION

After the first reported case in Wuhan in November 2019, the SARS Cov-2 infection finally spread and caused a world crisis on an enormous scale, gradually becoming the COVID-19 pandemic. To date, in early May 2021, WHO has recorded 154.6 million confirmed cases of COVID-19 and 3.2 million deaths worldwide.¹ After the announcement of the first confirmed case of COVID-19 in Indonesia in early March 2020, as in many other countries, wearing masks, washing hands, social distancing, travel bans, online schools, and banning activities with large crowds both inside and outside were mandated, which resulted in dramatic changes in daily activities known as the new normal of daily living. This condition also dramatically impacted various sectors, including the economy and increased the unemployment rate.² The COVID-19 pandemic has significantly disrupted psychosocial health, resulting in massive job losses due to lockdowns.³ A prior study in Mexico showed emotional indicators such as anxiety, depression and stress during the COVID-19 pandemic in nearly half of the study population.⁴ Investigation in parents of school-age children in the UK showed that the COVID-19 lockdown had increased feelings of isolation and loneliness. Factors associated with isolation were female, parenting a child with special needs, low level of physical activity, changes in sleep patterns, and lack of space and facilities for distance learning.⁵

This pandemic is a physical disease that affects the patients and the people around them, either socially or psychologically. The general public feels fear, stress, anxiety, and stigma during this COVID-19 pandemic. People's habits can greatly influence pandemic dynamics by changing disease severity, transmission, flow, and consequences.^{6,7} An online survey of 366 respondents in the US in April 2020 suggests that participants had varying reactions to COVID-19. Although nearly half reported no change, COVID-19 prompted about a quarter of respondents to reduce their use of cigarettes, and more than a third increased their motivation to quit. Greater risk perception was associated with increased motivation to stop using cigarettes, and more than 20% of respondents reported quitting smoking to reduce the risk of harm from COVID-19. Thus, the reduced risk of harm from the pandemic may motivate some dual users to quit. On the other hand, about 30% of respondents increased their use, and about 15% decreased their motivation to quit. Given the association between negative affect and smoking, one possibility is that some smokers are responding to pandemic pressures by increasing their use of cigarettes.⁴

Significantly more ex-smokers were hospitalized and died of COVID-19 than were smokers or those who never smoked. This effect is mediated through age and comorbidities in former smokers.⁸ However, research also states that smokers are less likely to experience COVID-19.⁹ Previous studies in Australia at the beginning of the COVID-19 pandemic in April 2020 showed an association between negative changes in physical activity and higher levels of depression, anxiety and stress. Likewise, those who experienced changes in negative habits of smoking and alcohol use were more likely to experience higher levels of depression, anxiety and stress.¹⁰ Although the association between smoking status and COVID-19 disease is still controversial, this pandemic is changing smokers' habits.

From the facts shown by several studies in various countries above, stress affected the smoking habits of smokers, or vice versa, smoking habits affected stress. Therefore, this study aims to determine the stress level in smokers, including the age at which they started smoking, duration, type and number of cigarettes, changes in smoking habits, and the level of nicotine dependence during the COVID-19 pandemic, especially in rural areas in Indonesia.

METHODS

This study used a cross-sectional approach to find the relationship between variables. This study's population were inhabitants of the village in the South Lampung district who had high smoking habits even before the COVID-19 pandemic. Ethical approval (number 91/KER-FK/10/2020) was received from the Medical Ethics Committee of Universitas Trisakti. The population used in this study were Dusun II C Lampung Selatan residents who had smoking habits. Data was collected in November 2020 by a simple random sampling method with a total sample of 150 people. Recruitment of subjects was carried out with the cooperation of the neighborhood head, who assisted the research team and requested to join their WhatsApp group of village residents because physical distancing was one of the required protocols during the pandemic. A video tutorial was uploaded to guide the respondents in filling out the questionnaire form.

The online questionnaire used for the survey is a Google Form by Google, available online in November 2020, containing questions covering demographic data, including gender, age, occupation, and marital status. Smoking history included age of smoking initiation, duration,

smoking habits, types of cigarettes consumed, and number of cigarettes per day. The Fagers from Test for Nicotine Dependence (FTND)¹¹ was used to assess the degree of nicotine dependence, and The Perceived Stress Scale (PSS) to determine current stress levels during the study.¹²

IBM SPSS Statistical software version 25.0 was used for analysis. Descriptive statistics included frequencies and percentages to describe the characteristics of the respondents. Analysis was conducted to find the relationship between smoking habits and nicotine dependence with stress levels. Statistical tests used the Chi-square test with a Confidence Interval of 95%, and all p-values were considered significant if less than 0.05.

RESULTS

Respondent Characteristics

Respondent characteristics are presented in Table 1 in the form of frequency percentages. 150 out of 160 participants responded to the questionnaire that met the inclusion criteria. All respondents were male, with an age range of 13-60 years old. There were no female respondents in this study, as widely known that cigarette smoking rates among adult women in Asian countries were found to be very low; for example, in Indonesia, there are 76% of male smokers while only 3% of female smokers.¹³ One of the reasons for the low number of female smokers in Indonesia is the stereotype that smoking habits in women are inappropriate.¹⁴ The age group in this study was divided into two major groups: adolescents aged 10-19 years old and adults aged 20 years old and over. In this study, 38 out of 150 respondents (25.3%) were adolescents (age range 13-19 years old) who were students or unemployed, and 112 respondents were older with an age range of 20-60 years and marital status where 93 (62.0%) respondents were married and 57 (38.0%) respondents not married.

Table 1. Respondent characteristics

Variables	Frequency	%
Gender		
Male	150	100
Female	0	0
Age (y.o)		
Adolescent (10-19 years old)	38	25.3
Adult (≥ 20 years old)	112	74.7
Marital Status		
Married	93	62
Not Married	57	38
Age of smoking initiation		
10 – 19 years old	68	45.3
20 – 29 years old	75	50
≥ 30 years old	7	4.7
Number of cigarettes per day		
≤ 10	96	94
11-20	44	29.3
21-30	9	6
> 30	1	0.7
Duration of smoking habits (years)		
< 10	89	59.3
10-20	42	28
> 20	19	12.7
Cigarettes type		
Filtered	118	78.7
Non filtered	32	21.3
Changes in smoking habits during the Covid-19 pandemic		
Increased	38	25.3
Decreased	91	60.7
No changes	21	14
Nicotine Dependence (FTND)		
Mild	97	64.7
Moderate	40	26.7
Severe	13	8.6
Perceived Stress Scale (PSS)		
Mild	40	26.7
Moderate	89	59.3
Severe	21	14

Analysis of the smoking history, such as the association between age of smoking initiation, the number of cigarettes per day, smoking duration, types of cigarettes consumed, nicotine dependence, and changes in smoking habits, were cross-tabulated to respondents' perceived stress in Table 2.

Table 2. Association between smoking habits and perceived stress

Variables	Perceived stress scale						P Value
	Mild		Moderate		Severe		
	N	%	N	%	N	%	
Age of smoking initiation							
10 – 19 years old	25	36.8	27	39.7	16	23.5	<0.001 ^{ε*}
≥ 20 years old	15	18.3	62	75.6	5	6.1	
Number of cigarettes per day							
≤ 10	28	29.2	52	54.2	16	16.7	<0.204 ^{ε*NS}
> 10	12	22.2	37	68.5	5	9.3	
Duration of smoking habits (years)							
< 10	28	31.5	45	50.6	16	18.0	<0.027 ^{ε*}
≥ 10	12	19.7	44	72.1	5	8.2	
Cigarettes type							
Filtered	32	27.1	75	63.6	11	5.2	<0.006 ^{ε*}
Non filtered	8	25.0	14	43.8	10	31.3	
Nicotine Dependence (FTND)							
Mild	24	24.7	67	69.1	6	6.2	<0.001 ^{ε*}
Moderate-Severe	16	30.2	22	41.5	15	28.3	
Changes in smoking habits during the Covid-19 pandemic							
Increased	16	42.1	16	42.1	6	15.8	<0.004 ^{ε*}
Decreased	16	17.6	65	71.4	10	11.0	
No changes	8	38.1	8	38.1	5	23.8	

^ε = Chi square test; * = p<0.05 significant; NS = non significant

All the variables examined were significantly associated with perceived stress (p<0.005), except the number of cigarettes consumed per day showed nonsignificant results with p = 0.204 (p>0.005).

DISCUSSION

Age of smoking initiation

Age of smoking initiation was defined as when a subject first smoked any form of tobacco product, including cigarette, electric cigarette, shisha, pipe tobacco and rolling tobacco. But in this study, all of the subjects smoked cigarettes. The majority, 75 out of 150 (50%), initiated smoking in the age group of 20-29 years old. This situation is similar to the results of studies conducted in the United States; the proportion of smokers who starting to smoke are now young adults, showing a shift from adolescence to early adulthood, a population segment that was previously thought to be outside the key risk period for the onset of cigarette smoking. Although historically, most smokers started smoking before the age of 18, in recent years, most smokers started smoking in early adulthood between 20-23 years old.¹⁵ However, in this study, the age of smoking initiation started at the ages of 10-19 years old or beginning early adolescence, experiencing severe stress (23.5%) compared to the age of smoking initiation at a later age of ≥20 years old (6.1%) with a p-value <0.001 (Table 2). A qualitative study conducted on young people in Essex, a non-metropolitan county in England, showed that stress release was the main reason for smoking in young people. Smokers who start smoking at a young age tend to have a more severe nicotine addiction;

dependence will affect mood fluctuations, especially at the time of the withdrawal effects, making it easier to experience stress.¹⁶ Thus, the earlier the age of smoking initiation, the easier it is for a person to perceive stress. The more frequently he smokes, the higher he is dependent on Nicotine greater the risk of stress will be experienced due to the withdrawal effects of smoking submission.¹⁵ Although it cannot be ruled out that other factors could influence or trigger stress in these subjects, such as challenges in the distance learning for students and their parents and also situations where they had difficulty in finding jobs or being temporarily jobless in declining economic conditions due to COVID-19 pandemic that demands further exploration.

Number of cigarettes per day

The number of cigarettes per day is the average number of cigarettes inhaled per day. Table 2 showed no association between the number of daily cigarettes and perceived stress. However, previous studies suggest a negative association between the number of cigarettes per day with perceived stress and the stress in smokers due to smoking withdrawal.¹⁸ It means that the more cigarettes that are inhaled, the lower the perceived stress because there is no nicotine deprivation. A different study in the US in 2019 suggested that those individuals who were socially disadvantaged in terms of education and racial background experienced more daily stress. Those who experienced higher stress in everyday life due to indirect effects of discrimination in education and racial background, in turn, smoked more cigarettes. However, although African American smokers are more affected by daily stress experiences stated above, the direct effect showed that they smoked less overall than smokers from other racial backgrounds.¹⁸ Another research suggested that the differences in the numbers of cigarettes per day between African American and other racial smokers could be explained by a biological mechanism due to nicotine metabolism as African American smokers have a slower rate than other racial smokers such as Caucasian¹⁷ and that smokers who have a faster rate of nicotine metabolism tend to smoke more cigarettes per day.^{18,19}

Duration of smoking habits

In this study, the duration of smoking habits of <10 years tended to be found in those experiencing severe stress more than those with smoking habits ≥10 years. The duration of smoking habits is the period of a smoker, which is calculated from the first time he smokes a cigarette of any kind until the present. The long duration of the smoking habit will cause nicotine dependence.¹⁵ Two studies conducted in the US on adult subjects showed similar results that constant daily stress influences smoking habits to become severe and persistent. Psychological stress may influence smoking habits (e.g., initiation, maintenance, and relapse) through various mechanisms. Specifically, smoking may function as a coping mechanism, whereby nicotine as self-medication in response to stress.¹⁸ Nicotine exposure triggers not only the release of dopamine and epinephrine but also a glutamatergic tool that is responsible for craving nicotine habits.¹⁹ A study in Korea showed that smokers who tried to stop smoking experienced higher stress than those who never attempted to quit.²⁰ There is indirect evidence of a nicotine withdrawal effect on smokers' cessation that can cause more stress in life. It can also be assumed that such efforts can encourage smokers to refrain from smoking and become persistent smokers. That evidence align with this study that the longer duration of smoking leads to lesser stress experienced by smokers.¹⁸

Cigarettes type

In this study, there was a relationship between the smoking type and the stress smokers feel. Meanwhile, whether consuming kretek or non-filter cigarettes is significantly associated with higher perceived stress than filter cigarettes still needs further investigation. This condition differs from previous studies showing that Nicotine has a calming effect and less stress,^{17,18} considering that clove or non-filtered cigarettes delivered significant quantities of nicotine and presumably other toxic components of tobacco ash.²¹ Taste, smell with aromatics in flavour-changing cigarettes, and innovations may contribute to their appeal to young smokers. This condition has inspired cigarette manufacturers to develop various models of cigarettes, such as e-cigarettes or cigarettes with flavored capsules.²³ Further exploration is needed to explain these different results, as the pharmacological use of nicotine mood enhancement, either directly or through reduction of withdrawal symptoms, and improvement of mental or physical function.²³ This means that certain circumstances disturb nicotine fulfilment in the group of clove cigarette smokers that require more exploration.

Nicotine dependence

As the name implies, nicotine on nicotinic cholinergic receptors triggers neurotransmitter release with pleasant psychoactive effects. Repeated exposure results in tolerance to nicotine's main effects, which are decreased satisfaction and physical dependence (i.e., withdrawal symptoms in the absence of nicotine before more nicotine is needed to reach the same effect). Pharmacological feedback and environmental factors such as smoking cues, smoking friends, stress, and product advertisements influence smoking habits. Furthermore, nicotine levels in the body are influenced by nicotine intake from smoking and are modulated by the metabolic rate of nicotine.^{19,20,23} Nicotine pleases and reduces stress and anxiety. For smokers, smoking improves concentration, reaction time, and performance of specific tasks. Relief from withdrawal symptoms is probably the primary reason for this enhanced performance and heightened mood.^{19,23} In this study, there is a correlation between the level of nicotine dependence and perceived stress in the subject. Whether the correlation is positive or negative still needs further investigation.

Changes in smoking habits during the pandemic

The changes in smoking habits in this study were either an increase in the frequency of cigarettes smoking per day, reducing it, or consistently maintaining existing smoking habits during the pandemic. Various factors associated with the pandemic may have opposing impacts on tobacco addiction. Physical distancing and financial constraints most probably reduced cigarette consumption, which could benefit smoking reduction. In addition, since COVID-19 is a respiratory disease, although there is still controversy, smoking always had harmful effects on breathing and respiratory health. Therefore, people may be more concerned about becoming seriously ill from a coronavirus infection, which may motivate smokers to quit smoking.²³

In this study, 129 of 150 (86%) respondents had changed their smoking habits versus 21 (14%) smokers who did not change their smoking habits. The latter group experienced severe stress compared to those who changed their habits ($p = 0.004$). However, it cannot be concluded that smokers who do not change their smoking habits tend to experience severe stress compared to those who change their smoking habits. Unfortunately, this study did not delve further into the psychosocial dynamics underlining why the respondents changed their smoking habits and which

age groups reduced or increased their smoking, considering that the very young and the very old were most severely affected by coronavirus disease.²⁵ The limitation of this study was that it could not determine whether stress during the COVID-19 pandemic affected the changes in smoking patterns of subjects or vice versa or even that both factors influenced their ultimate decision. Another limitation of this research is that it does not look for other factors that can cause stress to the respondents.

CONCLUSION

A significant association was observed between nicotine dependence and smoking habits with perceived stress in smokers during the COVID-19 pandemic. Regarding changes in smoking habits, the percentage of the heaviest stress occurred in subjects who increased their smoking habits compared to those who reduced it. Meanwhile, heavy smokers with severe nicotine dependence experienced higher perceived stress. This implies that nicotine intake was not fulfilled during this pandemic, so heavy smokers developed nicotine withdrawal syndrome. However, it is still possible that various other problems also influence the high perceived stress during the pandemic. Perhaps this situation could be used for anti-smoking habit modification in health promotion programs.

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AUTHORS CONTRIBUTION

The authors confirm their contribution to the paper as follows: study conception and design: ICR and DAWs; data collection: ICR; analysis and interpretation of results: ICR and DAWs; draft manuscript preparation: ICR and DAWs. All authors reviewed the results and approved the final version of the manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The funders had no role in the study's design; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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