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RELATIONSHIP BETWEEN THE HABIT OF USING ELECTRONIC CIGARETTES (VAPES) AND LUNG FUNCTION VALUES

Lalu M. Panji Azali*, Diyanah Syolihan Rinjani Putri, Wahyuningsih, Muhamad Nur Rahmad
Faculty of Health Sciences, Universitas Kusuma Husada Surakarta, Jl. Jaya Wijaya No. 11, Kadipiro, Surakarta, Central Java 57136, Indonesia
*azalipanji@gmail.com

ABSTRACT
The contemporary phenomenon of e-cigarette usage has gained traction in society, particularly as a means of transitioning away from traditional tobacco cigarettes. While e-cigarettes are generally perceived as having less detrimental effects on the body, their contents have been linked to various diseases and potential organ dysfunction. Nicotine, a key component of e-cigarettes, can induce addiction and negatively impact the respiratory system, cardiovascular health, and neurological function. The objective of this research was to investigate the potential correlation between electric cigarette usage and pulmonary function in the Pasovati Vape Community in Solo.The research employed quantitative methodology utilizing a cross-sectional design. The study sample consisted of 60 individuals who use vape products, selected through purposive sampling. Data was gathered by administering the PS-ECDI questionnaire and conducting physical examinations using a Peak Flow Meter. The findings revealed that all participants were male, with an average age of 26. Only 32 respondents reported infrequent exercise, and the average duration of vape usage was 4 years. A total of 25 individuals (41%) were identified as heavy users, while 26 (43%) exhibited compromised pulmonary function. Statistical analysis using the Gamma Test yielded a p-value of 0.000 ($p < 0.05$). Therefore, there was a significant association between e-cigarette or vaporizer usage and diminished lung function among members of the Pasovati Vape Community in Solo.

Keywords: habitual use of vape; pulmonary function values

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INTRODUCTION

The transition from the use of tobacco cigarettes to electronic cigarettes has become commonplace in society. Vapes are often used as tools for smoking cessation therapy. Some studies suggest that the contents of vapes have fewer harmful effects compared to tobacco cigarettes. According to the Global Adults Tobacco Survey (GATS) in 2011, the use of electronic cigarettes was prevalent among individuals aged 15–24 years. Research conducted in various countries, such as Italy, Russia, and Germany, showed an increase in usage rates from 0.9% to 1.7% in 2013 (Elsa et. al., 2019). according to Badan Penelitian dan Pengembangan Kesehatan RI (2018) In Central Java, vape use among adolescents reached 2.9%,Electronic cigarettes were first modernized and introduced globally by a Chinese pharmacist, Hon Lik, in 2006–2007 (Caponnetto et al., 2014). Vape usage can be influenced by environmental factors, personal preferences, and advertising. The use of electronic cigarettes has both positive and negative effects. On the positive side, they are perceived as more fashionable. On the negative side, the substances contained in vapes can have harmful effects on users' organs (Febriana, 2023).

The substances found in vapes may cause nausea and vomiting, which are particularly concerning for pregnant women. Other adverse effects include headaches, oral and gastrointestinal disturbances, and respiratory issues due to vapor exposure, which can lead to

lung function impairments (Kuntic et al., 2020)Prohibitions and regulations on vape sales have been widely implemented. The presence of toxic substances that may cause cancer has led to restrictions in the United States and various other countries. Electronic cigarettes are considered more harmful than tobacco cigarettes and have been deemed illegal by the Indonesian Food and Drug Authority. Furthermore, the sale of vapes to individuals under 18 years old is prohibited, emphasizing the dangers of electronic cigarette use (Kaur et al., 2018) This study aims to examine the relationship between the habit of using electronic cigarettes and lung function values. The specific aims are to identify the characteristics of respondents, such as age, gender, activities, duration of use, vaping habits, and lung function values, and to analyze the correlation between vaping habits and users' lung function values.

METHOD

This study uses a quantitative method with a cross-sectional approach. The cross-sectional approach involves conducting measurements at a single point in time. The study was conducted in angkringan (small street-side eateries) located in the Manahan area, with a total of 60 respondents. The sampling technique used was purposive sampling, targeting respondents who were members of the Vape Pasovati Solo community. The inclusion criteria for this study were: Respondents who had been using vapes for more than 3 months. Respondents who were active members of the community. The exclusion criteria included: Respondents with a history of asthma or other pulmonary function disorders. Respondents who were unexpectedly unable to attend. Respondents who were uncooperative. The research instruments included the PS-ECDI electronic cigarette usage habit questionnaire with validity value 0.85 and reliability value 0,81 and a peak flow meter for pulmonary function measurement With feasibility and approval for distribution valid until February 21, 2025, granted by the Ministry of Health of the Republic of Indonesia (KEMENKES RI) under AKL 20401810427 on September 23, 2020. Data analysis was performed using univariate and bivariate analysis methods.

RESULT

Table 1.
Respondent characteristics (n= 60)

Characteristic	f		%
Gender			
Male	60		100
Female	0		0
Activity			
Exercise	28		46,7
Nothing	32		53,3
Variabel	Mean	Median	Std
Age	26,13	25	4,367
duration of electronic cigarette use	4	4	1,823

Table 2.
Distribution Habit of Electronic Cigarette Use Among Vape Pasovati Solo Members (n=60)

Variabel Habit of Electronic Cigarette Use	f	%
Not Dependent	1	1,6
Low	12	20,0
Moderate	22	36,7
High	25	41,7

Table 3.
Distribution of lung function values based on electronic cigarette use among Vape Pasovati Solo members (n=60):

Variabel Lung Function Values	f	%
Normal	8	13,4
Mild	26	43,3
Severe	26	43,3

Table 4.
Relationship Between The Habit of Using Electronic Cigarettes (Vapes) And Lung Function Values (n=60)

		Lung Function Values			Koefisien Korrelation (r)	p value
		Normal	Mild	Severe		
Habit Of Using Electronic Cigarettes (Vapes)	Not Dependent	1	0	0	0,613	0,000
	Low	6	3	3		
	Moderate	0	15	7		
	High	1	8	16		
Total		8	26	26		

DISCUSSION

Respondent Characteristics

Based on Table, it was found that the average age of electronic cigarette users is 26 years, which falls within the young adult category, as this is the age allowed to use electronic cigarettes (above 18 years). The use of vapes can be influenced by peers, the environment, and advertisements (Martinasek et al., 2021). According to Ariyani (2018), vape users are typically aged between 20 and 30, as this age group tends to be curious. Young adulthood is also considered a period of maturation, where individuals search for their identity and make decisions. The analysis by the researcher indicates that young adulthood is an age when individuals are capable of making decisions, understanding the associated risks. Among the respondents, the majority of vape users were male. The use of vapes is based on enjoyment and curiosity. The prevalence of vape use is also higher in men, with 63% compared to women, according to WHO.The results of this study show that electronic cigarette users rarely engage in regular exercise. It was found that 28 respondents exercised, while 32 respondents did not engage in exercise in their daily routine. Regular exercise is difficult for some people to adopt. Many people are lazy to establish a good exercise habit, and some are even confused about how to start exercising regularly. Additionally, the knowledge about the health benefits of exercise is still difficult to obtain (Rini et al., 2021). There are several reasons why some individuals rarely exercise.

Electronic cigarette users tend to be inactive. This inactivity is explained by their tendency to rarely engage in physical activities and prefer to rest or sleep. This is supported by the fact that some respondents do not have a permanent job and spend their time at home. Lack of physical activity can also affect the health of the users. Low levels of knowledge can influence respondents' awareness of the health risks involved (Heydari et al., 2015). Exercise is part of an activity that is planned and done repeatedly. Regular exercise habits can trigger health benefits in a person. A routine exercise activity for 3-4 weeks, consistently done for 15-60 minutes, will improve fitness and health in the body’s organs. As people age, their bodies find it harder to maintain health. Therefore, if a person rarely exercises, their health will decline (Rahmi, 2018).

The average duration of vape use was found to be 4 years, which is consistent with the study by (Heydari et al., 2015), where usage ranged from 14 to 72 months. The use of electronic cigarettes is influenced by family and peers in the environment. Another reason for using electronic cigarettes is the inability to solve problems, leading individuals to use e-cigarettes as an escape. The long-term use of electronic cigarettes is driven by the addictive properties of the substances contained within them. The nicotine content, which stimulates dopamine hormone production, leads to addiction. The perception of using electronic cigarettes as a smoking cessation tool is also a reason for prolonged use of e-cigarettes (Anggraeni et al, 2019). According to Alawiyah (2017), the longest use reported in his study was 20 months. In the study, 73 respondents had used e-cigarettes for more than one month. This is consistent with the research conducted by Choi & Forster (2013), which found that the majority of e-cigarette users had used e-cigarettes for more than 30 days.

The habit of using electronic cigarettes was categorized as high among 25 respondents, with frequent use immediately after waking up increasing dependence on usage (Primaresha, 2021). Continuous use of electronic cigarettes leads to a high level of dependence. The frequency of electronic cigarette use can occur daily, such as immediately after waking up, which also increases dependence on its use (Primaresha, 2021). The use of electronic cigarettes is also driven by the substances it contains. Nicotine in the vape contributes to dependence as the frequency of use increases. As explained, the highest frequency of dependence occurs within five minutes of waking up, compared to other times of the day (Johnson et al., 2018). Electronic cigarette use can exceed 10 times a day. The nicotine content in the liquid of an electronic cigarette is about 10.97 mg. This substance contributes to addiction, making users want to continuously use the electronic cigarette. Users also report that it is very unlikely for them to stop using vapes. The dependence on electronic cigarettes is greater than that of tobacco cigarettes (Abdullah et al., 2021). Electronic cigarette users develop dependence on vaping, motivated by pleasure, habit, stress, and social factors. Users often begin using electronic cigarettes for experimentation or pleasure. However, once addicted, attempting to quit results in symptoms such as restlessness, anxiety, and depression (Abdullah et al., 2021).

The lung function values of users showed that 26 respondents were in the severe category (red zone), indicating a decrease in lung function. Lung function is influenced by the user's activity. Lack of sleep decreases ventilation, causing hypoxia and hypercapnia (Abdullah et al., 2021).. Lung function can be influenced by a person's activity. The lung function of users can also be affected by sleep activity. Respondents with insufficient sleep duration will experience a decrease in lung function. Lack of sleep can reduce the ventilation response to hypoxia and hypercapnia during wakefulness and continue to decrease during NREM sleep, with further decline during REM sleep (Abdullah et al., 2021). Lung function is also influenced by the surrounding environment. A less supportive or less clean environment can affect lung function. Other studies indicate that environmental factors also impact lung function. Particulate matter, such as dust, can enter the respiratory system and interfere with lung condition (Anes et al., 2015). Workers with long working hours (over 8 hours) and heavy smokers tend to have poor lung function. Exposure to dust and smoking habits contribute to lung function impairment (Sakinah, 2019). The analysis from the researcher and the theories mentioned above prove that lung function is in the mild to severe range. Lung function can be affected by activities, the environment, and an individual's lifestyle. Smoking, in particular, is a significant factor influencing lung function, either maintaining it or causing deterioration.

Analysis of the Relationship between the Habit of Using Electronic Cigarettes (Vapes) and Lung Function Values

The gamma test results showed a correlation value of 0.613 with a significance level of 0.000 (p-value < 0.05), meaning there is a significant relationship between electronic cigarette use habits and lung function values. The coefficient of 0.613 indicates a strong correlation. The positive value indicates that the higher the vape usage, the more severe the lung function impairment. This study aligns with Joshi et al., (2021), where inhaling vapor from vapes increases the resistance of airflow in the lungs. Research by Coppeta et al., (2018) shows that decreased lung function is also influenced by body weight and the type of liquid used. The vapor in vapes containing reactive oxygen species causes oxidative stress, damaging cells in the lungs, brain, and cardiovascular system. The inhaled vapor causes inflammation in the heart and increases blood flow (Renata, 2017). Inflammation in the respiratory tract causes fragility and redness, disrupting breathing (Herman et, al., 2020).In Begining electronic cigarettes are used as a therapy to quit smoking tobacco. The vapor or aerosol, which contains reactive oxygen species, causes oxidative stress and can damage cells in the lungs, brain, and cardiovascular system. The vapor produced by electronic cigarettes can be inhaled by individuals, leading to inflammation in various body organs. The vapor enters the respiratory tract and bloodstream, causing inflammation, which increases the risk to heart health. When nicotine is absorbed into the bloodstream, the hormone epinephrine causes an increase in heart rate (Renata, 2017).

The vapor produced by electronic cigarettes is inhaled and enters the respiratory organs. Particles in the vapor attach to the airways, causing inflammation in the respiratory organs. These vapor particles travel through the respiratory tract and accumulate in the bronchioles before air exchange occurs for respiration. The bronchioles play an essential role as a defense barrier in the respiratory process. Lung function can be impaired by electronic cigarette use, leading to narrowing of the bronchioles and consequently disturbing lung function (Rebuli et al., 2023).The epithelial cells lining the airways in the lungs release mucus and cytokines to form a barrier against invading pathogens. This epithelial layer becomes damaged when exposed to the nicotine vapor in electronic cigarettes, causing the loss of its protective function and leading to inflammation. The effects of nicotine exposure also manifest in the airways, where erythema and increased fragility are observed. Frequent exposure to nicotine in the airways promotes addictive behavior and adversely affects lung health (Herman et, al., 2020).

Research by Wills et al., (2021) indicates that electronic cigarette use can affect respiratory function and lung health. The substances present in electronic cigarettes damage the airways. Cells exposed to aerosol for 1 to 48 hours can develop cytotoxic effects, depending on the duration of exposure. Some studies have shown that cytotoxic effects are present in all flavors of electronic cigarettes, such as cinnamon, menthol, vanilla, berry, and other fruit flavors. Oxidative stress is another result of vape liquid or aerosol exposure, which also causes DNA damage in electronic cigarette users.The harmful effects of electronic cigarettes, which contain various toxic substances, can impact brain development. Continuous nicotine intake increases heart rate, and aerosol exposure causes DNA damage, raising long-term risks such as cancer. High exposure to these substances is one of the carcinogens that is more dangerous than conventional tobacco smoking. The vapor from electronic cigarettes increases coughing, wheezing, and can cause asthma. Common symptoms include shortness of breath, chest pain, and other respiratory issues (Nurry et al., 2023).

Both electronic cigarettes and conventional cigarettes have similar negative effects. Therefore, electronic cigarettes are not a good alternative for smoking cessation therapy or for

reducing conventional cigarette use. Reduced airflow leads to blockage in the airways, which is an early sign of potential development of chronic obstructive pulmonary disease (COPD) (Darabseh et al., 2021)Based on the researcher's analysis and the theories mentioned above, this study demonstrates a relationship between the habit of using electronic cigarettes and lung function among members of the Vape Pasovati community in Solo. Users become addicted to electronic cigarettes due to the nicotine content, which creates dependency. Users experience anxiety and even depression when attempting to quit using electronic cigarettes. Furthermore, the substances in electronic cigarettes contribute to impaired lung function, leading to worsening lung health in users.

CONCLUSIONS

Based on the research conducted, it is concluded that have a significant relationship between the habit of using electronic cigarettes and lung function values in the Pasovati Solo vape community. The use of electronic cigarettes in this community is 100% male, with an average age of 26.13 years. There are 32 respondents who do not exercise, and the average duration of use is 4 years. The habit of using electronic cigarettes is predominantly at a high level, with 25 respondents, and the lung function value is mostly in the severe category, with 26 respondents.

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