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The Relationship Between E-Cigarette Use and Propylene Glycol Content in Males Aged 17–25 Years with the FEV1 and FVC Ratios in Relation to COPD in South Jakarta and its Analysis from an Islamic Perspective

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KEYWORDS
e-cigarettes; propylene glycol; lung function; FEV1/FVC ratio; Islam; BMI.

ABSTRACT
E-cigarettes are widely used among young adults, with propylene glycol (PG) as a common component. While PG has been associated with potential respiratory risks, its impact on lung function—particularly the FEV1/FVC ratio—remains unclear in young male populations. This study also examines the Islamic perspective on e-cigarette use, considering health preservation (hifz al-nafs) and harm avoidance (darar). To investigate the relationship between e-cigarette use and PG exposure on lung function, and to analyze the findings from an Islamic ethical standpoint, a cross-sectional study was conducted with 40 male e-cigarette users aged 17–25. Data were collected through spirometry to measure FEV1/FVC ratios, along with structured interviews on e-cigarette use habits, respiratory symptoms, and demographic variables. Statistical analysis was performed to assess correlations. All participants had normal FEV1/FVC ratios (>75%), with no significant association found between e-cigarette use, duration, or PG exposure and impaired lung function. However, 47.5% reported subjective respiratory symptoms, and 7.5% noted libido changes. BMI varied widely, with 72.5% of respondents classified as overweight or obese. E-cigarette use in young males was not associated with measurable declines in lung function based on FEV1/FVC ratios, despite reported respiratory complaints. Long-term effects remain uncertain. From an Islamic perspective, e-cigarette use is debated; most scholars consider it makruh (discouraged) due to potential harm and wasteful expenditure, though explicit religious rulings remain contextual.

INTRODUCTION

E-cigarettes are electronic devices that have a similar function to conventional cigarettes, but without wearing and burning tobacco leaves. E-cigarettes use liquid to produce vapor that will be inhaled and enter the lungs (Setiawan Lilik, 2023). An e-cigarette, or better known as an electronic cigarette, is a device that converts chemical substances into vapor. Electronic cigarettes were initially used as a tool for programs that want to quit conventional smoking (Penny K. Lukito, 2017). E-cigarettes generally consist of 3 parts, namely the battery (the part that contains the battery), the atomizer (the part that will heat and vaporize the nicotine solution) and the catridge (the part that contains the nicotine solution) (Kurniawan Tanuwihardja, 2012).

E-cigarettes first came to Indonesia in 2010. However, the development of e-cigarettes at the beginning of its arrival was not immediately famous because at that time many Indonesians

still did not know about e-cigarettes, in 2013-2014 the development of e-cigarettes in Indonesia began to increase (Febrina et al., 2021). With rapid globalization and Indonesia now a developed country, there is an increase in the presence of e-cigarettes in the market. These e-cigarettes have found a place in the hearts of cigarette users, especially among teenagers, since the beginning of their appearance. In 2018, according to the results of basic research, it was proven that the ratio of e-cigarette use in people aged less than 10 years in 2018 was 2.8%, ages starting from 10-14 years old were 10.6%, and ages starting from 15-19 years old were 10.5%, and ages 20-24 years were 7% (Tristanto et al., 2022). According to the Central Statistics Agency (BPS) in the results of a survey in 2021, there are 10,605,437 residents in DKI Jakarta, as many as 5.9% (625,721 people) of whom are users of e-cigarettes. According to the Central Statistics Agency (BPS) in the results of a survey in 2021, there are 2,232,442 people in South Jakarta, as many as 5.9% of e-cigarette users (131,714 people) (BPS, 2022). According to the Central Statistics Agency (BPS), in the results of the 2023 survey, there are 175,884 residents in South Jakarta with an age group of 20-24 years. With this, we assume that there are 50% men and 50% women with 87,942 people each male and female (BPS, 2023). In the South Jakarta area, there are 10 sub-districts and we estimate that there are 8,794 people in each sub-district. To find out the minimum sample to be taken by the researcher, calculations were made based on the population data using the Slovin formula (BPS, 2023). Despite the health risks associated with e-cigarettes, there are still many people who consume them. The liquid content in e-cigarettes includes ingredients that are harmful to health, including liquid nicotine, propylene glycol (PG) solvents, diethyl glycol, and glycerin (Marisa and Lestari, 2021).

In general, e-cigarettes require deeper puffs, especially after 10 puffs. Nicotine vapor levels will decrease after 10 puffs, while the nicotine levels of tobacco cigarettes remain stable. Nicotine levels measured after smoking were lower in e-cigarette users than in tobacco smokers. Therefore, e-cigarettes are considered safer than conventional cigarettes. The average smoker consumes 14 cigarettes per day with a nicotine content of 1-1.5 mg per conventional cigarette. So the average daily nicotine intake is 14-21 mg. The nicotine level in e-cigarettes is usually between 0 and 16 mg per stick if used to the point of exhaustion (300 puffs). The average puff of e-cigarettes is 62,8 times. The average nicotine intake from e-cigarettes is 3.36 mg per day which is lower than tobacco cigarettes (Kurniawan Tanuwihardja, 2012).

E-cigarettes are often considered a safer alternative to conventional cigarettes, posing significant health risks, especially for men. New studies show that e-cigarettes contain harmful substances, including endocrine disruptors, that can disrupt hormonal balance and affect the functioning of the male reproductive organs (Szumilas et al., 2020; Montjean et al., 2023). In addition, one study found that e-cigarette use was associated with decreased semen quality in young men, specifically fewer sperm counts. These findings suggest that e-cigarettes are not a completely safe alternative to smoking and can pose a variety of health risks for male users (Holmboe et al., 2020).

Electronic cigarettes typically contain humectants such as glycerin and propylene glycol (>75%), water (<20%), nicotine (2%), and flavorings (<10%) (Tayyarah and Long, 2014). The nicotine content in e-liquids ranges between 6 and 22 mg/L, and the actual concentration is often not the same as what is written on the label (Peace et al., 2016). This device emits vapors containing PG, glycerol, nicotine, and aerosols. The highest concentration for PG is 2200 g/m3;

for glycerol, the highest concentration is 136 g/m3; in indoor studies, this concentration has been observed (Geiss et al., 2015). A study showed that e-liquids have an average nicotine content of 11 mg/ml (Hahn et al., 2014). E-cigarettes deliver lower levels of nicotine than conventional cigarettes, ranging from 2 mg to 15 mg per 300 puffs. Although nicotine has the highest risk among the elements of electronic cigarettes, other compounds such as ethylene glycol and 1,2-propanediol are also of concern (Hahn et al., 2014). Recent research investigated the effects of PG, a common component in e-cigarette liquids, on lung function (Boulay et al., 2017). PG e-cigarette aerosols can damage human airway epithelial cells, inhibit proliferation, and induce DNA damage and apoptosis (Kim et al., 2023). This effect is more clearly seen in the cells of patients with chronic obstructive pulmonary disease (COPD) (Kim et al., 2023).

COPD is the leading cause of global death rates. COPD can cause oxygen deprivation in sufferers. COPD is a chronic disease characterized by restriction of airflow in the respiratory tract. The classification of COPD with FEV1 measurements based on GOLD (Global Intiative For Chronic Obstructive Lung Disease) is GOLD 1 (mild) FEV1 >80%, GOLD 2 (moderate) FEV1 50-79%, GOLD 3 (severe) FEV1 30-49%, GOLD 4 (very severe) FEV1 <30% (Agusti Alvar, 2020).

One of the advantages of electronic cigarettes is the wide range of flavors and aromas offered, such as fruits, beverages, mint, and menthol. Because of this, people's interest in the use of e-cigarettes is increasing for daily life (Nurma Hidayati, 2017). Factors of the social environment, family, and friends have a great influence on the people who use e-cigarettes. Although a lot of health information about the dangers of e-cigarettes is available through the internet or from friends, the use of e-cigarettes still occurs a lot (Indriyawati and Martha, 2024). Negative symptoms of e-cigarette use will appear gradually, such as shortness of breath, chest pain, and other respiratory disorders (Ayuningtyas Kusumastuti and Marsepa, 2023). Shortness of breath is usually assessed by measuring lung function using a spirometer. Examination with a spirometer device can show limited airflow with decreased FEV1 and FEV1/FVC ratio (Rosyadah et al., 2021).

In this study, only the value of the ratio of FEV1 and FVC was measured. The FEV1/FVC ratio is an important measure in assessing respiratory function and diagnosing obstructive pulmonary disease. FEV1 is the volume of air that is expressed in one second (Website et al., 2019). Spirometry examination can assess static lung faal and dynamic pulmonary faal. Static pulmonary faal is the volume of air in a static state that is not related to the time dialect. Meanwhile, dynamic pulmonary faal consists of: Forced expiratory volume (FEVT) (Bakhtiar et al., 2017). Forced Vital Capacity (FVC) is a primary spirometry measure that represents the maximum volume of air exhaled after a deep breath (Devi, 2022). It is often paired with a forced expiratory volume in one second (FEV1) to assess lung function (Devi, 2022).

Previous research has explored various dimensions of e-cigarette use and its health implications. For example, Kim et al. (2023) demonstrated that PG in e-cigarette aerosols damages airway epithelial cells and impairs mucociliary clearance. Similarly, Komura et al. (2022) reported that PG exposure induces inflammatory responses and cellular injury in human small airways. In the context of male reproductive health, Holmboe et al. (2020) found an association between e-cigarette use and reduced sperm counts among young men. Despite these findings, few studies have specifically examined the relationship between e-cigarette use, PG

exposure, and lung function parameters such as the FEV1/FVC ratio in young male populations, particularly in urban Indonesian settings. Additionally, the integration of Islamic ethical perspectives on e-cigarette use—considering principles such as the preservation of health (hifz al-nafs) and the prohibition of harm (*darar*)—remains underexplored in the existing literature.

Based on the background that has been described, the use of e-cigarettes can cause respiratory problems, such as shortness of breath (dyspnea), and one of the diseases that can arise as a result is COPD. To find out the function of the lungs in people with respiratory disorders, one of the methods that can be used is the spirometer test. Therefore, this study aims to determine the relationship between the use of e-cigarettes and lung function. The general purpose of this study is to obtain information about the relationship between e-cigarette use and lung function. In particular, this study aims to determine the relationship between the use of e-cigarettes and propylene glycol content in men over 17 years old and the FEV1/FVC ratio in the South Jakarta Area.

The benefits of this research are divided into theoretical and applicable benefits. Theoretically, it is hoped that this study can provide an understanding of the relationship between e-cigarette use and the FEV1/FVC ratio in the male community aged 17–25 years. From the applicability side, this research has several benefits, both for researchers, the community, and universities. For researchers, this research can add knowledge and insight and provide opportunities to practice the knowledge gained while studying at YARSI University. Researchers can also apply the medical science that has been studied. For the public, this study provides information about the influence of e-cigarettes, the relationship between e-cigarette use and lung function, and the side effects of e-cigarette use in men, especially regarding the effect of propylene glycol on lung function. For YARSI University, the results of this research can be a reference material for the Faculty of Medicine and can also increase cooperation and communication between the academic community of YARSI University.

METHOD

This study used an analytical research design with a cross sectional design to analyze the relationship between e-cigarette use and lung function, which was measured using a spirometer test (Abduh et al., 2022). The researcher will collect data from the male population aged 17-25 years around South Jakarta who use e-cigarettes, using purposive sampling techniques and a sample of 40 respondents (Campbell et al., 2020). Data measurement was carried out with a spirometer to determine the FEV1/FVC value in respondents, as well as through questionnaire surveys to collect demographic data and e-cigarette use habits. The sample was calculated using the Slovin formula, resulting in a sample size of at least 15 respondents with a margin of error of 20% (Santoso, 2023).

This study uses primary data obtained through interviews and measurements of FEV1/FVC using a spirometer. The data obtained were then analyzed bivariously to find out the relationship between e-cigarette use and lung function (Mustafidah, 2021). The data collection instrument consisted of a spirometer device that measured the lung capacity of the respondents, with a procedure of use involving taking inspiration and exhalation as strongly as possible through the device's mouthpiece. This research also has a schedule that includes

proposal preparation, data collection, data analysis, as well as writing and publishing research results, with the activity plan to take place from October 2024 to July 2025.

RESULTS AND DISCUSSIONS

Respondent Characteristics

This research was carried out from September to November 2025 in South Jakarta, with 40 male respondents as the subject of the study. The characteristics of the respondents studied included age, weight, height, body mass index (BMI), as well as pulmonary function parameters such as FEV1, FVC, and FEV1/FVC ratio. In addition, supporting data on disease history and smoking habits were also collected to obtain a comprehensive picture of the respondents' health conditions. Data collection is carried out in accordance with the procedures that have been described, paying attention to the accuracy in recording and checking data. Each data obtained through measurements and interviews is then re-examined to ensure its validity and consistency, so that the analyzed data can accurately describe the characteristics of the respondents and can be scientifically accounted for.

Age Distribution of Respondents

The majority of respondents were in the age group of 20-22 years, namely 25 people with a percentage of 62.5. The age group of 23-25 years amounted to 11 oranges with a percentage of 27.5%, while the age group of 17-19 years was the smallest group with 4 respondents with a percentage of 5%. This is in accordance with the target population of researchers in male e-cigarette users aged 17-25 years. This distribution shows that the majority of e-cigarette users in this study are in the young adult age range (20-22 years).

Respondent BMI Distribution

Based on the Body Mass Index (BMI) category, as many as 9 respondents (22.5%) felt in the normal category, while 13 respondents (32.5%) were included in the overweight category. The majority of respondents were in the obesity group I, namely 16 people (40%), and 2 respondents (5%) were in the obesity category II. There were no respondents with underweight status (0%).

a. Respondent's Age Relationship with Respondent's Body Mass Index (BMI)

Based on most of the respondents, they are in the category of overweight and obesity. At the age of 17 all respondents were obese I, while at the age of 19 years the respondents were in the overweight and obese I categories. At the age of 20, the variation in BMI appeared to be the widest, ranging from normal to obesity II, while at the age of 21 years the majority of respondents were in the obesity category I. At the age of 23–24 years, BMI ranged from normal to obesity I, and at the age of 25 all respondents were in the overweight category. This pattern is in line with Figure 1 which uses BMI boundaries of 18.5 and 22.9, where most points are above the value of 22.9. This shows that overweight and obesity are quite dominant in respondents.

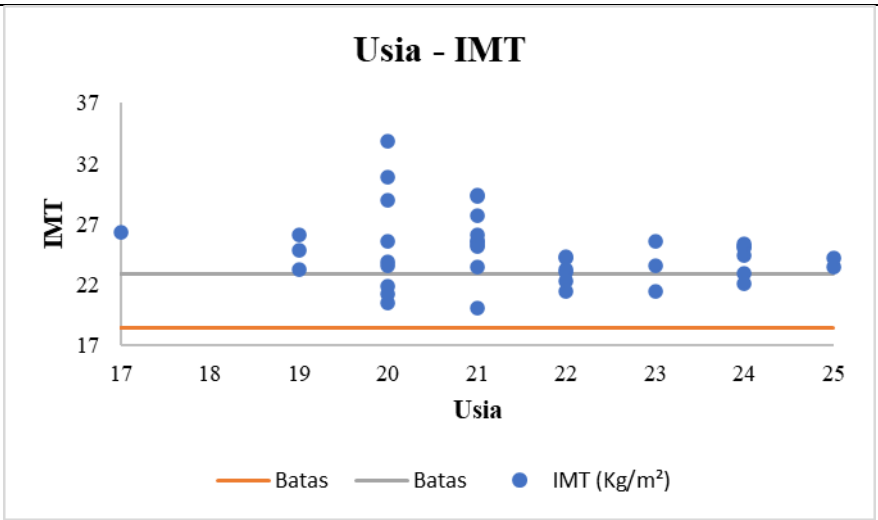

Figure 1. Respondents' Age Relationship with BMI
Source: Primary Research Data, 2025

b. Relationship between Respondents' E-cigarette Time and Body Mass Index (BMI)

Figure 2 shows the distribution of Body Mass Index (BMI) values based on the length of e-cigarette use in a month. Using BMI limits of 18.5 and 22.9, it can be seen that most of the respondents have BMI above 22.9 at various lengths of use. Both in respondents who used e-cigarettes for less than 12 months or more than 30 months, most remained in the overweight to obese category. There is no clear trend that the longer the use of e-cigarettes (in months) will be followed by an increase in BMI. The distribution of BMI values in each duration group is relatively variable. Thus, the relationship between the duration of e-cigarette use and BMI in the respondents in this study has not shown a specific pattern.

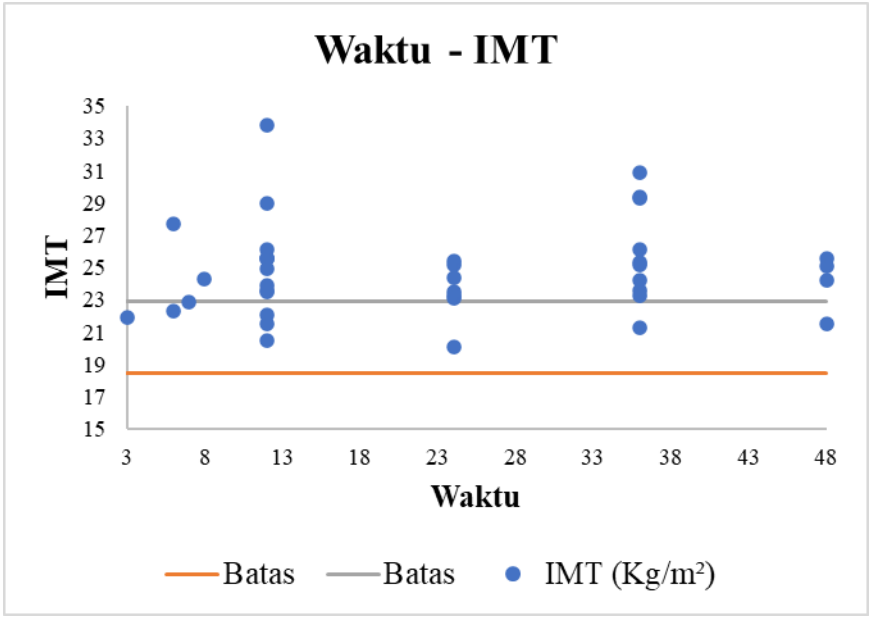

Figure 2. Relationship of E-cigarette Time to BMI
Source: Primary Research Data, 2025

Distribution n/day (Number of Liquid Drops per Day)

Based on Most of the respondents were in the category of 3 – 11 drops per day with a percentage of 62.5% that was included in light use. Only 12.5% of respondents consumed 12 - 20 drops per day in the weight category.

a. Respondent's Age Relationship with n/day (number of liquid drops per day) Respondent

The number of liquid drops per day (n/day) in respondents showed variation in each age group. This variation is more evident in Figure 3, where there are three boundary lines, namely 3, 12, and 20 drops per day. The line divides n/day into three categories, namely mild (<3 drops/day), moderate (3–11 drops/day), and severe (>20 drops/day). Most of the respondents were in the medium category, while only a small number were in the heavy category. The distribution of points does not show the existence of a specific pattern by age, so n/day tends to vary between individuals.

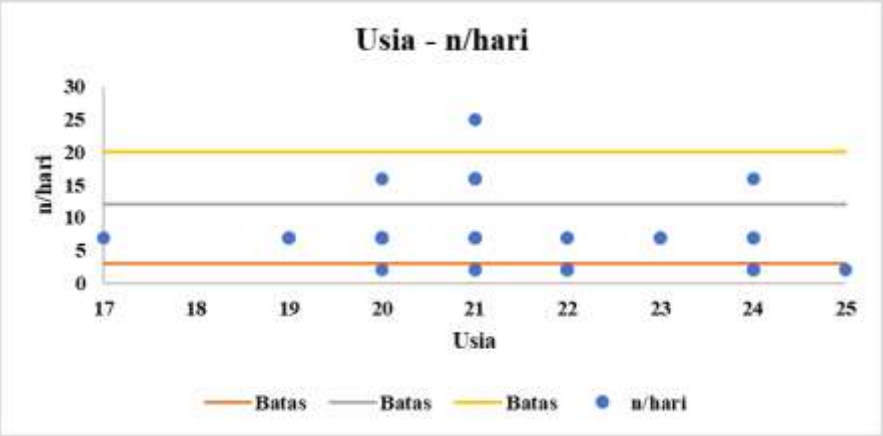

Figure 3. Relationship of Age to n/day
Source: Primary Research Data, 2025

b. The Relationship between Respondents' E-Cigarette Use Time and the Number of Liquid Drops per day (n/day)

The number of drops of liquid per day (n/day) varies for each length of e-cigarette use. The variation is more evident in Figure 4, which shows three boundary lines of 3, 12, and 20 drops per day. The line divides n/day into mild (<3 drops/day), moderate (3–12 drops/day), and severe (>20 drops/day) categories. Most respondents were in the medium category, while a small percentage were in the heavy category at some duration of use, especially at 24 and 36 months. The dot distribution on the graph shows that n/day appears in all three categories at various lengths of use, so there is no consistent pattern of increase as the duration of e-cigarette use increases.

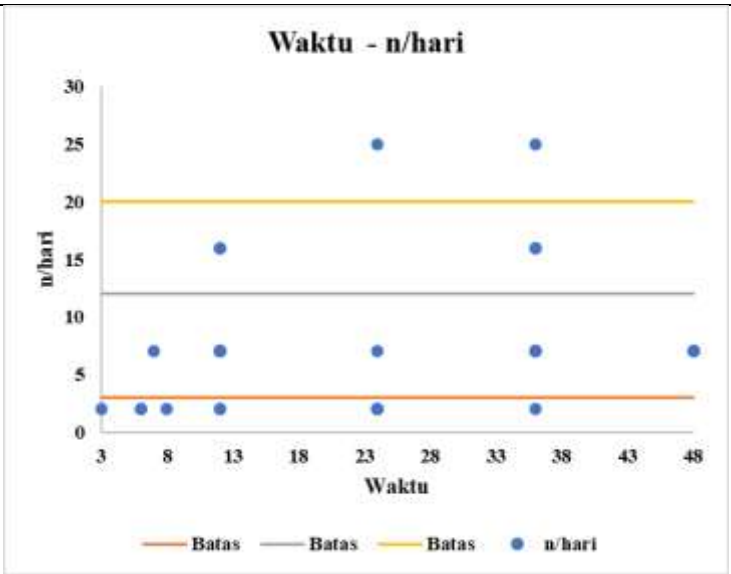

Figure 4. Relationship of E-cigarette use time with n/day
Source: Primary Research Data, 2025

Classification of Respondents' Lung Function Based on FEV1/FVC Ratio

Based on the classification of the FEV1/FVC ratio, all respondents in this study were in the normal category (>75%), which was 40 respondents (100%). No respondents were found with mild obstruction (60-75%), moderate obstruction (40-60%), or severe obstruction (<40%). This shows that at the time of the spirometry examination, all respondents had lung ventilation function that was still within normal limits, without any signs of airflow obstruction.

a. Respondents' Age Relationship with FEV1/FVC MEAS and FEV1/FVC PRED

The measured FEV1/FVC (MEAS) value in the respondents was in the range of around 90.4% to 100%. Meanwhile, the predicted FEV1/FVC value (PRED) was in the range of 84.1% to 87%. In almost all age groups, the MEAS score appears to be higher than the PRED score. This distribution is also seen in Figure 5, where the MEAS point is generally above the PRED point in each age group. These findings show that the FEV1/FVC ratio of respondents is still within the normal range in the age range of 17–25 years.

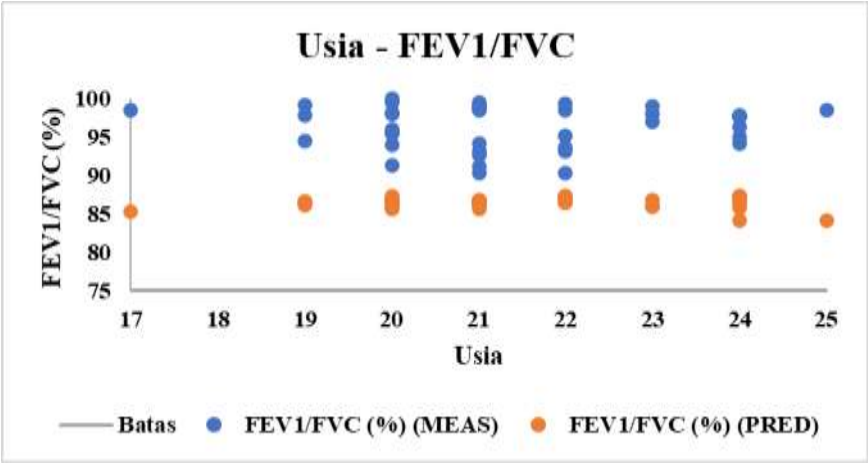

Figure 5. Age Relationship with FEV1/FVC
Source: Primary Research Data, 2025

a. Relationship of Respondents' E-Cigarette Time with FEV1/FVC MEAS and FEV1/FVC PRED

Figure 6 shows the distribution of measured FEV1/FVC (MEAS) and predicted (PRED) values based on the length of e-cigarette use in a month. The FEV1/FVC (MEAS) value appears to be in the range of around 90.4% to 100%, while the FEV1/FVC (PRED) value is in the range of 84.1% to 87%. For almost the entire duration of use, the MEAS point is above the PRED point, so the measured FEV1/FVC value tends to be higher than the predicted value. In addition, there is no consistent pattern of FEV1/FVC decline as the duration of use increases (months). In general, the respondents' FEV1/FVC ratio was still in the normal range at various lengths of e-cigarette use.

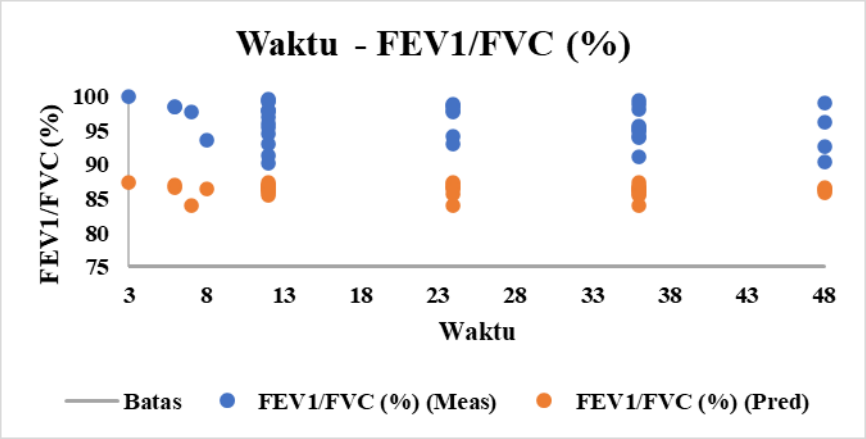

Figure 6. Time Relationship with FEV1/FVC
Source: Primary Research Data, 2025

Breathing Changes

A total of 19 respondents with a percentage of 47.5% reported changes in breathing after regularly using e-cigarettes. Meanwhile, 21 respondents with a percentage of 52.5% did not feel any changes in breathing. These results show that almost half of the e-cigarette users in this study began to experience respiratory disorders, such as shortness of breath and rapid fatigue.

a. Relationship of Respondents' Age with Respondents' Respiratory Changes

Respiratory changes in respondents varied in each age group. The number 0 indicates no change in breathing, while 1 indicates any change in breathing. At age 17 , all respondents reported changes in breathing. At the age of 19 to 24 years, there were respondents who did not experience respiratory changes (0) and some reported changes (1). Meanwhile, at the age of 25, all respondents were recorded to experience breathing changes. This pattern is also seen in Figure 7, where the distribution of values 0 and 1 appears in almost all age groups, so there is no particular tendency based on age.

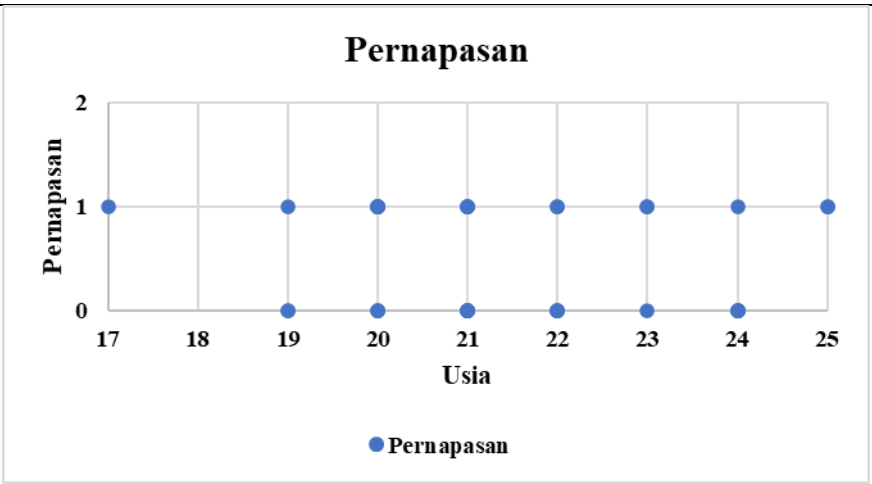

Figure 7. The Relationship of Age to Respiratory Changes
Source: Primary Research Data, 2025

b. The Relationship between Respondents' E-cigarette Use Time and Respondents' Respiratory Changes

Respiratory changes (value 1) did not appear evenly over the entire duration of e-cigarette use. At 3 months of use, respondents with breathing changes have been found. At 6, 12, 24, 36, and 48 months, there was a combination of respondents who did not change (0) and those who experienced changes (1). On the other hand, at the duration of 7 and 8 months, all respondents did not report any changes in breathing. This distribution is also seen in Figure 8, where dots with values of 0 and 1 appear at various lengths of use without showing any particular bias. Thus, breathing changes can occur at different durations of e-cigarette use, but they do not show a consistent pattern.

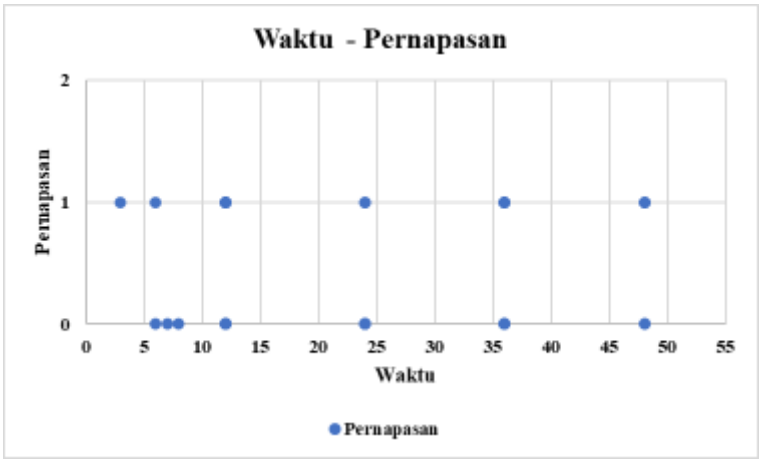

Figure 8. The Relationship of Time to Respiratory Changes
Source: Primary Research Data, 2025

Libido Changes

Most of the respondents did not experience any changes in libido (92.5%) after using e-cigarettes. Only 3 respondents (7.5%) reported changes in libido.

a. The Relationship between Respondents' Age and Time of E-Cigarette Use with Libido Changes

Based on Figure 9 and Figure 10, most of the respondents were at a value of 0, indicating no change in libido. A small percentage of respondents showed a mild decrease in libido (value 1: < 50%) and some others experienced a greater decrease (value 2: 50–99%). The decrease in libido appears in several age groups, especially around the age of 20 and 25 years, as well as in the duration of use of about 10–20 months. However, the distribution of values of 0, 1, and 2 does not form a clear pattern either by age or length of e-cigarette use. Thus, in this study, the decrease in libido did not appear to be consistently related to age or duration of e-cigarette use.

Figure 9. The Relationship of Age to Changes in Libido
Source: Primary Research Data, 2025

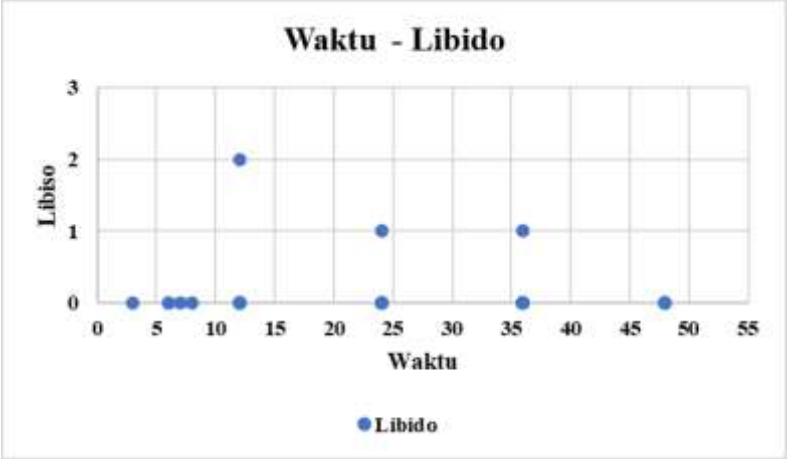

Figure 9. The Relationship of Time to Libido Changes
Source: Primary Research Data, 2025

Data Results and Interpretation of Results

This study was carried out from October to November in several locations in the South Jakarta area, involving 40 male respondents aged 17-25 years who were active users of e-cigarettes. The selection of respondents followed the inclusion criteria described in Chapter 3, so that all research participants were active users of e-cigarettes at the time of data collection, and information related to e-cigarette use was obtained through a structured with respondents. Respondents' participation is obtained through consent given voluntarily

The data collected in this study included the basic characteristics of the respondents, such as age, weight (BB), height (TB), and the calculation of body mass index (BMI) as an indicator

of nutritional status. In addition, the frequency and intensity of e-cigarette use were also recorded, including the number of liquid drops per day (n/day), the number of puffs per day (N/day). Pulmonary function parameters were obtained through spirometry examination, namely the measurement of FEV1, FVC values, and the calculation of FEV1/FVC ratio (%). The examination was carried out using the researcher's spirometer device and followed the standard steps of forced expiratory maneuvers. Each respondent was asked to repeat the maneuver until consistent results were obtained to ensure the accuracy of the lung function data.

To maintain the quality of the data obtained, all information is provided directly by respondents through the Google Form which has been prepared according to the data collection procedure in Chapter 3. Data from Google Form and spirometry examination results are then collected and analyzed as they are according to the results obtained in the field. This approach is carried out so that the results of the study can objectively describe the condition of the respondents based on the data collected during the research process.

All data collection results that have gone through this verification process, which include respondent characteristics, nutritional status (BMI), frequency and intensity of e-cigarette use, and the results of lung function examinations. This data is the basis for the analysis of the relationship between e-cigarette use and the FEV1/FVC ratio (%) as an indicator of possible lung function disorders

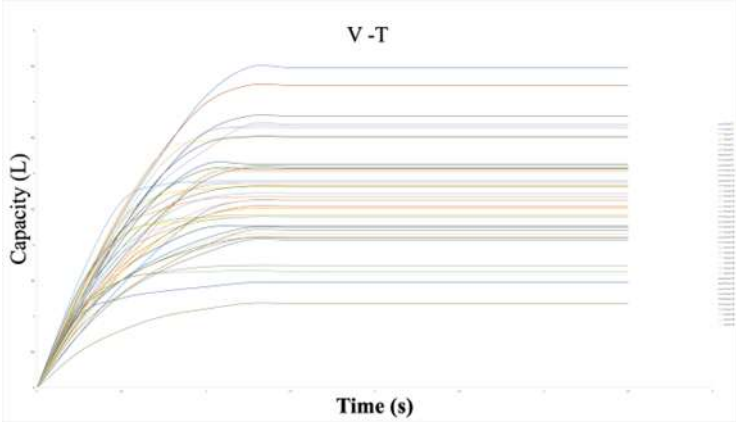

Figure 10. Graph of 40 respondents
Source: Primary Research Data, 2025

Figure 10 shows the Volume-Time (V-T) curve which illustrates the relationship between forced expiratory time (horizontal axis) and the volume of air expelled (vertical axis) in all 40 respondents in the study. Each line on the graph represents the results of one respondent's spirometry during maximum expiration.

The curve shows that most respondents are able to expel large amounts of air in the first second of expiration. This rapid increase in volume in this early phase is a typical pattern of normal lung function, especially in young individuals. After reaching the initial phase of expiration, the line tends to flatten as the respondent reaches full forced vital capacity (FVC).

No curves were found indicating a slow increase in volume or an abnormal expiratory pattern usually seen in cases of airway obstruction. The curved pattern that appears tends to be uniform and consistent with normal lung function. These findings support the results of the FEV1/FVC ratio analysis in this study, where all respondents have a score above 75% and are in the normal category.

The variation between respondents in the amount of air volume expelled is a normal physiological variation between individuals and does not indicate a tendency to disorder or decrease in lung function. Overall, this V-T graph shows that all respondents have an expiratory pattern that matches normal lung characteristics, so there is no indication of obstruction or respiratory disturbance based on the spirometry data obtained.

Based on data from a total of 40 respondents involved in this study, all respondents showed a FEV1/FVC ratio value above 75%, which indicates that their lung function is still in the normal category. No respondents were found with a FEV1/FVC ratio below the normal limit, so in this study no indications of airway obstruction or other lung function disorders were identified. These findings show that in the young age group (17-25 years), the use of e-cigarettes has not shown a direct impact in the form of a decrease in the FEV1/FVC ratio that can be measured through spirometry.

Nonetheless, the distribution of nutritional status based on BMI showed that most respondents were in the overweight to obese category. Of the total respondents, 13 people were in the overweight category, 16 people were in the category of class I obesity, and 2 people were in the category of obesity in class II. Only 9 respondents were in the normal BMI category. Although all FEV1/FVC ratio values are still within normal limits, the presence of excess nutritional status in most respondents is a risk factor that could theoretically affect lung function if it takes place over the long term.

A total of 19 out of 40 respondents in Figure 11 reported breathing changes, such as heavy breathing and rapid tiredness. Interestingly, the complaint was not directly related to the decrease in the FEV1/FVC ratio, because lung function values remained normal. This indicates that subjective symptoms in the airway may appear earlier than objective changes in spirometry results, especially in e-cigarette users with a certain propylene glycol (PG) content.

In addition to respiratory complaints, there were also 3 respondents in Figure 12 who reported changes in libido after using e-cigarettes. These complaints are subjective and are not accompanied by follow-up clinical examinations, so they cannot be directly attributed to normal FEV1/FVC values. However, these findings are still noted as an additional effect that is felt by a small number of e-cigarette users.

Although this study did not directly measure the levels of propylene glycol (PG) in the liquid used by the respondents, PG is known to be one of the main ingredients in e-cigarette liquids that can cause irritation to some users. PG exposure, as described in some studies, can cause coughing, dryness, and airway discomfort. This could be one of the possible factors contributing to the respiratory complaints reported by 19 respondents, although all FEV1/FVC values remained in the normal category.

Overall, the results of this study show that all respondents have lung function values that are within normal limits based on spirometry examinations, including respondents who have used e-cigarettes for up to 4 years, which is the longest duration of use in this study. These findings suggest that in the younger age group, the use of e-cigarettes with a duration of use of up to 4 years has not had a measurable clinical impact on the FEV1/FVC ratio.

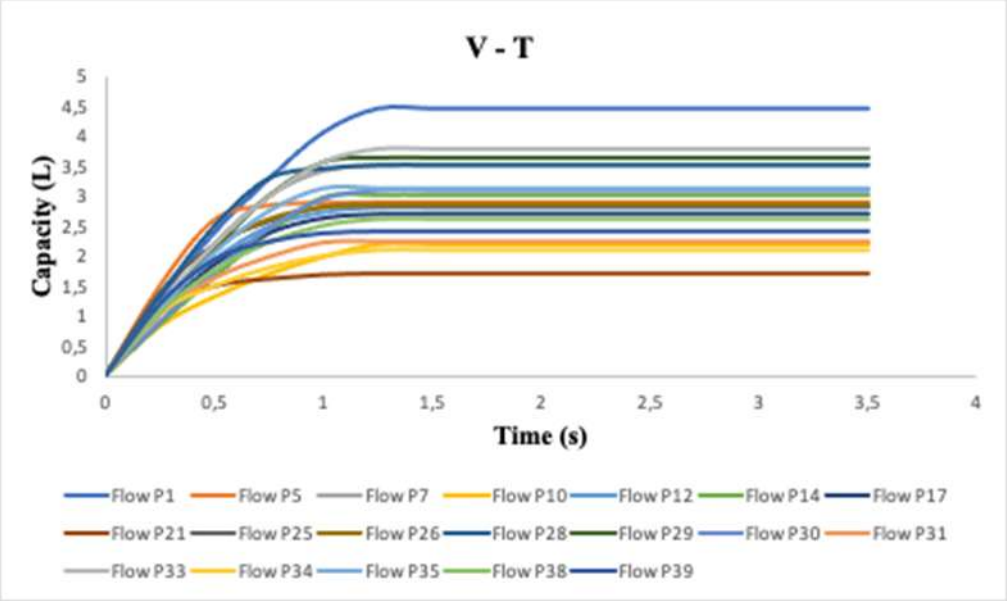

Figure 11. Graph of Respondents Who Have a History of Respiratory Disorders
Source: Primary Research Data, 2025

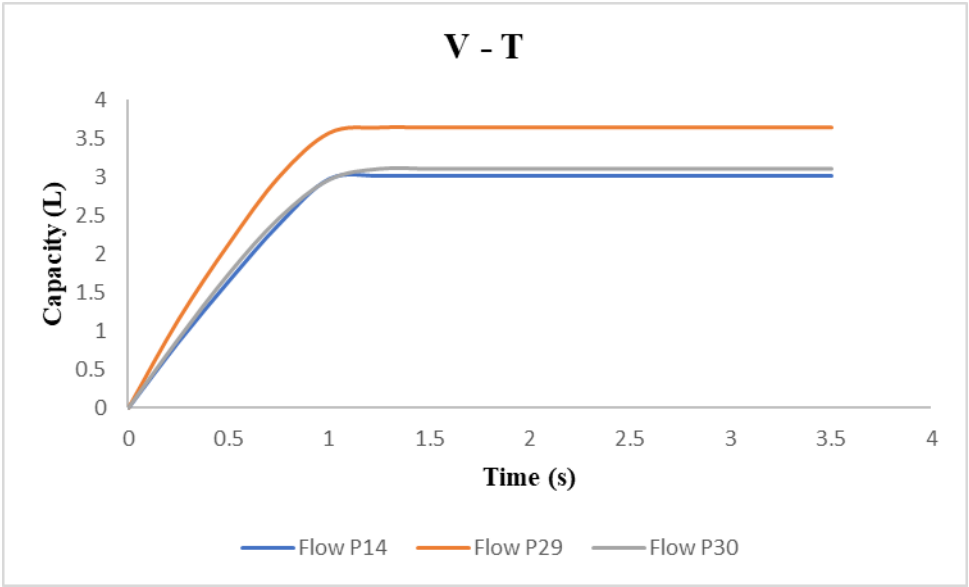

Figure 12. Graph of Respondents Who Have a History of Libido Changes
Source: Primary Research Data, 2025

The data graph shows the results of each respondent's spirometry examination (Respondents 1–40) which include the Flow–Volume (F–V), Volume–Time (V–T) curve, and lung capacity recorded by the device. The graph is used to see the pattern of airflow during inspiration and expiration and verify the quality of the maneuvers performed by the respondents. Most curves show an F–V shape that corresponds to a normal pattern, with a well-achieved expiratory peak and a gradual decreasing expiratory phase. The V–T graph also shows that the expiratory volume has reached a plateau, which indicates that the maximum expiratory maneuver has been adequately performed.

From the graph displayed, it can be seen that each respondent produced a spirometry curve with a relatively good shape. This shows that the respondents are able to perform

maximum exhalation maneuvers according to the examination procedure. The curve formed still followed a normal breathing pattern, so the recorded FEV1, FVC, and FEV1/FVC ratio values were considered to represent the condition of the respondent's lung function at the time of examination. With this graph, researchers can ensure that the data analyzed is not just numbers, but actually comes from a properly conducted examination. Therefore, spirometry graphs serve as supporting evidence that the process of measuring lung function in this study is valid.

Comprehensive Analysis

Based on the results of a study of 40 male respondents aged 17–25 years, the respondents' Body Mass Index (BMI) was in the normal range to obesity, with the majority falling into the obesity category. The distribution of BMI in different age groups and the length of e-cigarette use seemed to vary and did not show a specific pattern of increase, so that BMI in respondents was more likely to be influenced by lifestyle factors such as diet and physical activity than by age or length of e-cigarette use. The number of drops of liquid per day (n/day) also varies and is categorized into light, medium, and heavy based on the limits of 3, 12, and 20 drops per day. Most of the respondents were in the medium category, and only a small percentage were in the heavy category. Either by age or length of use, the n/day distribution did not form a specific trend, suggesting that the intensity of e-cigarette use was more reflective of individual variation in habits.

Lung function assessments based on FEV1/FVC ratios showed that all respondents were in the normal range, with measured FEV1/FVC (MEAS) values generally higher than predictive values (PRED). These findings show that in the young age population in this study, there has been no significant airway obstruction disorder. However, this does not mean that the use of e-cigarettes is safe, as the effects on the lungs are cumulative and can appear in the long term. Subjective variables such as changes in breathing showed that some respondents reported complaints, but these complaints occurred in different age groups and length of use without a consistent pattern. The same is seen in changes in libido, where a small percentage of respondents experienced mild to moderate libido declines, but the distribution did not show a clear relationship with age or duration of use.

Overall, this study shows that in men aged 17–25 years, e-cigarette use has not shown a clear association with changes in BMI, FEV1/FVC ratio, respiratory complaints, and libido. The variations that emerge better illustrate the differences in individual characteristics and lifestyle factors. However, the dominance of respondents with normal BMI to obesity (especially obesity) and the presence of some respondents who reported respiratory complaints remain findings that need to be considered, considering that both have the potential to increase the risk of health problems in the future, especially if the use of e-cigarettes lasts for a long time

This study discusses the law of cigarettes in the Islamic view, where there is no specific postulate that directly regulates cigarettes in the Qur'an or the hadith of the Prophet. Therefore, the debate over the smoking law has become controversial, with some scholars banning, *makruh*, or allowing it. Smoking is considered to be harmful to health, such as causing lung disease, coughing, and even swelling, which is in accordance with the principles in the Qur'an that teach not to harm oneself (Prasetiya, 2016). Some scholars who ban cigarettes argue that cigarettes contain elements that are intoxicating, weakening the body, and harmful to health, as

well as wasting wealth (Rezi & Sasmiarti, 2018). On the other hand, some scholars who allow smoking adhere to the principle that there is no evidence that prohibits cigarettes specifically and that tobacco is originally a mubah thing (Rezi & Sasmiarti, 2018).

In addition, some postulates from the Qur'an and hadith are often used to argue against the laws of smoking, such as verses that prohibit suicide and spending one's possessions on useless things. In QS. Al-Baqarah verse 195, for example, Allah forbids humans to plunge themselves into destruction, which in this context can be likened to smoking which risks damaging the body and causing death (Rezi & Sasmiarti, 2018). The hadith that states "It is not permissible to cause harm to oneself and others" (H.R. Ibn Majah) is also used as a basis for stating that smoking, which has negative effects on health, can be considered *haram* (Kamilia, 2023). However, there is also a view that allows smoking on the condition that it does not cause great harm to the body and mind, because basically everything that does not harm is mubah (Yusuf al-Qardhawi, 2020).

CONCLUSION

This study found no significant impact of e-cigarette use on lung function among males aged 17–25, as FEV1/FVC ratios remained normal without airway obstruction, despite high BMI in most participants and minimal side effects like libido changes—though long-term risks warrant caution. Propylene glycol exposure showed no measurable lung impairment theoretically. From an Islamic viewpoint, lacking explicit *nash*, scholars diverge: some deem e-cigarettes *haram*, others *makruh* due to health risks and waste, or permissible conditionally; the majority favor *makruh*, escalating to *haram* if harm is proven, guided by the principle of avoiding damage to body, soul, and property. For future research, longitudinal studies tracking e-cigarette users over 5–10 years could assess cumulative effects on lung function, BMI-related interactions, and libido, while incorporating diverse demographics beyond South Jakarta to strengthen generalizability and inform Islamic bioethical guidelines.

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