

RESEARCH ARTICLE

The Impact of Cigarette Consumption and Smoking Duration on the Body Mass Index (BMI) of Students at the Faculty of Agriculture, Methodist University of Indonesia, 2024.

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ABSTRACT

Background : Smoking is a major global health problem, causing more than 8 million deaths each year 7 million from direct tobacco use and 1.3 million from exposure to secondhand smoke. In Indonesia, the prevalence of smokers aged 10-18 years increased from 7.2% (2013) to 9.1% (2018), making it the third country with the highest number of smokers. Data from the Global Youth Tobacco Survey (2019) shows 40.6% of students aged 13-15 years have used tobacco, with 19.2% currently smoking. Body Mass Index (BMI) is used to assess body weight relative to height. Based on the 2018 Riskesdas, in Indonesia 9.3% were underweight, 55.3% were normal, 13.6% were obese, and 25.8% were obese. **Objective:** Knowing the impact of the number of cigarettes, the length of smoking and the BMI of students of the Faculty of Agriculture, Methodist University of Indonesia Medan based on the Brikman index in students of the Faculty of Agriculture, University of Indonesia in 2024.

Research method: This research is an analytic observational study with a research design using a cross-sectional study.

Research results: This study found the most students consuming the number of cigarettes with < 9 cigarettes / day, as many as 37 respondents (46.3%), then smoking duration found 51 respondents (63.7%) with smoking duration < 10 years and Body Mass Index found 28 respondents (35%) with body mass index < 18.5. There is a relationship between the number of cigarettes with Body Mass Index with a p value = 0.045 (p0.05) and there is a relationship between smoking duration with Body Mass Index with a p value of 0.001 (p0.05). The more influential factor is the amount of cigarette consumption with a p value = 0.013 and OR = 2.4.

Conclusion: There is a significant relationship between the number of cigarettes and body mass index with a p value = 0.045 and there is a relationship between smoking duration and body mass index with a p value of 0.001.

Keywords: Number of Cigarettes, Length of Smoking, BMI

INTRODUCTION

Smoking has become a major global health challenge, practiced by a vast number of people worldwide. It represents one of the greatest public health threats the world has ever faced, with an annual mortality rate exceeding 8 million people. Over 7 million of these deaths are attributed to direct tobacco use, while approximately 1.3 million are due to second-hand smoke exposure among non-smokers. Various regulations to reduce smoking habits have been implemented by governments; furthermore, the World Health Organization (WHO) has established World No Tobacco Day, observed every May 31st.

The percentage of active smokers in Indonesia continues to rise. The National Basic Health Research (*Riset Kesehatan Dasar/Riskesdas*) reported that the prevalence of smokers aged 10–18 years increased from 7.2% in 2013 to 9.1% in 2018. This trend places Indonesia as the third-largest country with active smokers globally, following China and India. Data from the 2019 Global Youth Tobacco Survey (GYTS) indicates that 40.6% of Indonesian students (aged 13–15 years)—comprising 2 out of 3 boys and nearly 1 out of 5 girls—have used tobacco products. Currently, 19.2% of students smoke; notably, 60.6% of them were not prevented from purchasing cigarettes despite their age, and two-thirds were able to buy cigarettes individually (single sticks).

Body weight is a fundamental metric required for measuring physical growth. Body Mass Index (BMI) is a ratio that has been utilized since the mid-19th century to identify adults and adolescents whose weight is abnormal relative to their height. Nutritional status is measured using BMI, through which weight is categorized as normal, underweight, or overweight. According to the 2018 Riskesdas data, weight categories in Indonesia were distributed as follows: underweight (9.3%), normal (55.3%), overweight (13.6%), and obese (25.8%). In North Sumatra, the recorded figures were

underweight (6.2%), normal (53.4%), overweight (14.8%), and obese (21.8%).

Research by Anita on the "Relationship between Smoking Behavior and BMI in Adolescent Boys aged 10–15 years" suggests that smokers tend to have lower body weight compared to non-smokers. Univariate results showed that the majority (54.3%) of adolescent boys exhibited smoking behavior, and 56.8% had a poor BMI (24.72%). This occurs because substances contained in cigarettes can suppress appetite and lead to addiction. Smokers also have a 10% higher energy expenditure than non-smokers. This combination of decreased energy intake and increased energy expenditure can lead to undernutrition.

Conversely, research by Devi found no impact of smoking degree on BMI, as an individual's BMI can still be influenced by other factors that vary among smokers, such as physical activity, fruit and vegetable consumption, and alcohol intake. However, a study by Chiolero, Faeh, Paccaud, and Cornuz assumed that smoking degree correlates with body weight; specifically, the greater the number of cigarettes smoked, the lower the smoker's weight. Smoking a single cigarette causes an increase in energy expenditure 30 minutes post-inhalation. Smoking four cigarettes containing 0.8 mg of nicotine can increase resting energy expenditure by 3.3% within 3 hours. In regular smokers whose metabolism was assessed, smoking 24 cigarettes a day can increase total energy expenditure by 2230–2445 kcal per day.

Based on the background above, the researcher intends to investigate the impact of cigarette consumption and smoking duration on the BMI of students at the Faculty of Agriculture, Methodist University of Indonesia. This study is prompted by the lack of existing research regarding the relationship between the quantity and duration of smoking and BMI among students at the Faculty of Agriculture, Methodist University of Indonesia, both in Medan and within North Sumatra.

MATERIALS AND METHODS

This study employs a cross-sectional approach, in which measurements are conducted at a single point in time. The variables investigated in this research include the impact of cigarette consumption (quantity) and smoking duration on the Body Mass Index (BMI) of students at the Faculty of Agriculture, Methodist University of Indonesia.

The research instrument utilized is the Brinkman Index questionnaire, which has been previously validated and tested for reliability by Artyaningrum. The validity test results showed that the calculated r-value (0.731) was greater than the r-table value (0.361), confirming the instrument's validity. The reliability test yielded a Cronbach's Alpha of 0.729, which exceeds the constant threshold of 0.6, indicating that the instrument is reliable. Data were processed through several stages, including editing, coding, entry, and analysis using SPSS software. Bivariate analysis was conducted using the Kolmogorov-Smirnov statistical test to determine the association between the independent and dependent variables.

RESULTS AND DISCUSSION

Table 1. Frequency Distribution Based on Cigarette Consumption (Brinkman Index)

Jumlah Konsumsi Rokok	Erekuensi	Presentase %
< 9 batang / hari	37	46.3
10 – 19 batang / hari	24	30
> 20 batang / hari	19	23.7
Total	80	100

Table 1 demonstrates that 37 respondents (46.3%) consumed < 9 cigarettes per day, 24 respondents (30%) consumed between 10–19 cigarettes per day, and 19 respondents (23.7%) consumed > 20 cigarettes per day. Consequently, the majority of students at the Faculty of Agriculture, Methodist University of Indonesia,

have a daily cigarette consumption of fewer than 9 cigarettes.

Table 2. Frequency Distribution Based on Smoking Duration

Durasi merokok	Erekuensi	Persentase %
< 10 Tahun	51	63.7
> 10 Tahun	29	36.3
Total	80	100

Table 2 shows that 51 respondents (63.7%) had a smoking duration of < 10 years, while 29 respondents (36.3%) had a smoking duration of > 10 years. Thus, the majority of students at the Faculty of Agriculture, Methodist University of Indonesia, have been smoking for less than 10 years.

Table 3. Frequency Distribution Based on Body Mass Index (BMI)

Indeks Massa Tubuh	Erekuensi	%
< 18.5	28	35
18.5 – 22.5	25	31.2
23 – 24.9	27	33.8
Total	80	100

Table 3 indicates that 28 respondents (35%) had a Body Mass Index (BMI) of < 18.5, 25 respondents (31.2%) had a BMI between 18.5 – 22.9, and 27 respondents (33.8%) had a BMI between 23 – 24.9. Consequently, the majority of students at the Faculty of Agriculture, Methodist University of Indonesia, are categorized as underweight with a BMI of < 18.5.

Table 4. Association Between Daily Cigarette Consumption and Body Mass Index (BMI)

Jumlah Konsumsi Rokok	Indeks Massa Tubuh						Total	P value
	< 18.5		18.5 – 22.9		23 – 24.5			
	F	%	F	%	F	%	F	%
< 9 batang/hari	17	21.3	7	8.7	13	16.3	37	46.3
10-19 batang/hari	10	12.5	8	10	6	7.5	24	30
> 20 batang/hari	1	1.2	10	12.5	8	10	19	23.7
Total	28	35	25	31.2	27	33.8	80	100

Table 4 shows that among the 28 respondents (35%) categorized as underweight (BMI < 18.5), 17 respondents (21.3%) consumed < 9 cigarettes per day, 10 respondents (12.5%) consumed 10–19 cigarettes per day, and 1 respondent (1.2%) consumed > 20 cigarettes per day. Of the 25

respondents (31.2%) with a normal BMI (18.5–22.9), 7 respondents (8.7%) consumed < 9 cigarettes per day, 8 respondents (10%) consumed 10–19 cigarettes per day, and 10 respondents (12.5%) consumed > 20 cigarettes per day. Meanwhile, among the 27 respondents (33.8%) categorized as overweight (BMI 23–24.9), 13 respondents (16.3%) consumed < 9 cigarettes per day, 6 respondents (7.5%) consumed 10–19 cigarettes per day, and 8 respondents (10%) consumed > 20 cigarettes per day.

As the requirements for the Chi-Square test were not met, the Kolmogorov-Smirnov test was used as an alternative, yielding a p-value of 0.024 ($p < 0.05$). This indicates a statistically significant association between the amount of cigarette consumption and Body Mass Index (BMI) among students at the Faculty of Agriculture, Methodist University of Indonesia.

Table 5. Association Between Smoking Duration and Body Mass Index (BMI)

Lama Merokok	Indeks Massa Tubuh						Total		P value
	< 18.5		18.5 – 22.9		23 – 24.5		F	%	
< 10 tahun	26	32.5	13	16.2	12	15	51	63.7	0.002
> 10 tahun	2	2.5	12	15	15	18.8	29	36.3	
Total	28	35	25	31.2	27	33.8	80	100	

Table 5 shows that among the 28 respondents (35%) categorized as underweight (BMI < 18.5), 26 respondents (32.5%) had a smoking duration of < 10 years, and 2 respondents (2.5%) had a smoking duration of > 10 years. Of the 25 respondents (31.2%) with a normal BMI (18.5–22.9), 13 respondents (16.2%) had a smoking duration of < 10 years, while 12 respondents (15%) had a smoking duration of > 10 years. Meanwhile, among the 27 respondents (33.8%) categorized as overweight (BMI 23–24.9), 12 respondents (15%) had a smoking duration of < 10 years, and 15 respondents (18.8%) had a smoking duration of > 10 years.

Since the requirements for the Chi-Square test were not met, the Kolmogorov-Smirnov test was performed as an alternative. The results yielded a p-value of 0.002 ($p < 0.05$), indicating a

statistically significant association between the duration of smoking and Body Mass Index (BMI) among students at the Faculty of Agriculture, Methodist University of Indonesia.

Table 6. Factors Affecting the Body Mass Index (BMI) of Students at the Faculty of Agriculture, Methodist University of Indonesia

Variabel	B	Nilai p	95% C.I for EXP(B)	
			Lower	Upper
Jumlah Rokok	2.855	0.013	1.807	2.433
Lama Merokok	1.855	0.001	1.388	1.723

Table 6 demonstrates that the most influential variable affecting the Body Mass Index (BMI) of students at the Faculty of Agriculture, Methodist University of Indonesia, is the daily cigarette consumption, with a p-value of 0.013 and an Odds Ratio (OR) of 2.855. This indicates that the quantity of cigarettes consumed can impact an individual's BMI by 2.8 times. Meanwhile, for smoking duration, the results showed a p-value of 0.001 and an OR of 1.8, suggesting it contributes a 1.8-fold effect on the BMI of the students.

CONCLUSION

1. Based on the frequency distribution of daily cigarette consumption, it was found that 37 respondents (46.3%) consumed < 9 cigarettes/day, 24 respondents (30%) consumed 10–19 cigarettes/day, and 19 respondents (23.7%) consumed > 20 cigarettes/day among students of the Faculty of Agriculture, Methodist University of Indonesia.
2. Based on the frequency distribution of smoking duration, 51 respondents (63.7%) had a smoking duration of < 10 years, while 29 respondents (36.3%) had a smoking duration of > 10 years.
3. Based on the frequency distribution of Body Mass Index (BMI), 28 respondents (35%) were categorized as underweight (BMI < 18.5), 25 respondents (31.2%)

had a normal BMI (18.5–22.9), and 27 respondents (33.8%) were overweight (BMI 23–24.9).

4. Bivariate analysis of the association between cigarette consumption and BMI showed that of the 28 underweight respondents, 17 (21.3%) consumed < 9 cigarettes/day. Of the 25 respondents with a normal BMI, 10 (12.5%) consumed > 20 cigarettes/day, and among the 27 overweight respondents, 13 (16.3%) consumed < 9 cigarettes/day. The Kolmogorov-Smirnov statistical test yielded a p -value < 0.05, indicating a significant association between cigarette consumption and BMI.
5. Bivariate analysis of the association between smoking duration and BMI revealed that of the 28 underweight respondents, 26 (32.5%) had a smoking duration of < 10 years. Among the 25 respondents with a normal BMI, 13 (16.2%) had smoked for < 10 years, and of the 27 overweight respondents, 15 (18.8%) had smoked for > 10 years. The Kolmogorov-Smirnov test yielded a p -value < 0.05, indicating a significant association between smoking duration and BMI.
6. The multivariate analysis identified daily cigarette consumption as the most influential factor affecting BMI among smokers, with an Odds Ratio (OR) of 2.8. This signifies that the quantity of cigarettes consumed can impact the BMI of students at the Faculty of Agriculture, Methodist University of Indonesia, by a factor of 2.8.

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