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RISEARCH ARTICLES

The Difference In Blood Pressure Increase In Coffee Drinkers Versus Smokers In Medan City

Muhammad Osama Arifin[1], Rini Syahrani Harahap[2]

[1]Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Jalan Gedung Arca Nomor 53 Medan, North Sumatra,20217, Indonesia

[2]Departement of Pathology Anatomy, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Jalan Gedung Arca Nomor 53 Medan, North Sumatra,20217, Indonesia

Corresponding Author: arifinosama10@gmail.com
rinisyahrani@umsu.ac.id

Abstract: Coffee affects Blood pressure via polyphenols, potassium, and caffeine. Polyphenols and potassium work to lower blood pressure. Nicotine causes addiction by stimulating dopamine growth in the brain and activating the *rewards pathway*. Research Method: Quantitative descriptive research with a cross-sectional study approach aimed at the community of Jalan Halat, Medan City, with the measurement of respondents' blood pressure 1-2 hours after drinking coffee or smoking. Results: The results of the study showed an increase in blood pressure, both systolic and diastolic, in the smoking and coffee drinking groups. Through the Mann-Whitney test, *p*-value for systolic blood pressure of 0.000 < 0.05 was obtained, which means there is a significant difference in the increase in systolic blood pressure between the smoking and coffee drinking groups. Meanwhile, for diastolic blood pressure, *p*-value of 0.000 < 0.05 was obtained, which means there is a significant difference in the increase in diastolic blood pressure between the smoking and coffee drinking groups. Conclusion: There is a significant difference in the increase of both systolic and diastolic blood pressure in the smoking and coffee drinking groups on Jalan Halat, Medan City.

Keywords: Blood pressure, coffee drinkers, smokers.

INTRODUCTION

Blood pressure (BP) increase factors are divided into uncontrollable (age, gender, genetics) and controllable (salt, cholesterol, obesity, stress, smoking, alcohol, lack of exercise, coffee consumption). Adult smokers in Indonesia increased by 8.8 million between 2011 (60.3 million) and 2021 (69.1 million), based on the 2021 Global Adult Tobacco Survey (GATS).[4]

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Coffee consumption in Indonesia is on the rise, increasing from 4.6 million to 4.7 million 60kg bags between 2016/2017 and 2017/2018 (making it the sixth largest consumer globally after Russia).[5] National consumption consistently rose from 302 to 309 tons between 2014 and 2020.[6]

Smoking is a global issue, causing approximately **7** million annual deaths among active smokers and 890,000 deaths in passive smokers. Smoking behavior is known for its negative health effects and tendency to cause addiction.[7]

Nicotine causes addiction by stimulating dopamine growth in the brain and activating the *rewards pathway*.

Cigarettes contain over 7,000 chemicals and compounds, with 70 identified as *carcinogens*. Harmful substances in smoke; including nicotine, carbon monoxide (CO), arsenic, and nitrosamines; cause cancer, heart disease, lung disease, and other health issues.

Coffee is highly popular in Indonesia; consumption rose from 250,000 tons (2016) to 276,000 tons (2017), with a projected annual growth of 8.22%. The national prevalence of coffee drinkers is 45.6%. Previous studies suggest a link between coffee drinking habits and hypertension, influenced by the duration, type, and frequency of consumption.

Coffee affects BP via polyphenols, potassium, and caffeine. Polyphenols and potassium work to lower BP (e.g., *potassium inhibits renin, reducing plasma volume*). However, caffeine has an antagonistic effect on adenosine receptors, leading to BP increase.

Given Indonesia's status as a high producer and consumer of both coffee and cigarettes, researchers aim to assess whether there is a difference in blood pressure increase caused by these two factors.

METHOD

The type of research used in this study is a *cross-sectional study*. The dependent variable is blood pressure, and the independent variables are coffee consumption and smoking history. The study took place on Jalan Halat, Medan City, with a research period from October to December 2023. The population used in the study was the community of Jalan Halat, Medan City, with the sample being individuals who met the inclusion and exclusion criteria.

The inclusion criteria were black coffee drinkers who did not smoke and active smokers who did not drink coffee. Meanwhile, the exclusion criteria were patients suffering from diseases such as diabetes mellitus, hypertension, kidney disease, and other conditions related to blood pressure, as well as patients suffering from obesity.

The data analysis used in the study employed a parametric method approach consisting of several tests: the normality test, the univariate test, and the bivariate test. The results of the *Kolmogorov Smirnov* normality test showed that the increase in blood pressure before and after the

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intervention was not normally distributed. Thus, the difference test for blood pressure increase in coffee drinkers versus smokers used the *Mann Whitney Test.*

RESULT

This research has obtained approval from the Health Research Ethics Committee (KEPK) of the Faculty of Medicine at Muhammadiyah University of Sumatra with No: 1055/KEPK/FKUMSU/2023. This study involved 90 research subjects. All research subjects underwent anamnesis and blood pressure measurement.

Table 1. Respondent Age Characteristics

Descriptive	Age	
	Smokers	Coffee Drinkers
Min	20	21
Max	45	37
Median	26	27
Mean	27.69	27.53

For the smoker group, the lowest age recorded was 20 years, while the highest age reached 45 years. The median age for smokers was 26 years, indicating that half of the smoker respondents were below this age. The mean age for smokers was approximately 27.69 years.

Meanwhile, in the coffee drinker group, the lowest age recorded was 21 years, while the highest age was 37 years. The median age for coffee drinkers was 27 years, indicating that half of the coffee drinker respondents were below this age. The mean age for coffee drinkers was approximately 27.53 years.

Table 2. Descriptive Analysis of Systolic Blood Pressure

Descriptive	Systolic			
	Smokers		Coffee Drinkers	
	Before	After	Before	After
Min	100	100	100	108
Max	120	140	130	138
Median	110	123	120	126

For the smoker group, systolic blood pressure before the intervention ranged from 100 to 120 mmHg, with minimum and maximum values of 100 and 120 mmHg, respectively. After the intervention, the systolic blood pressure of the smoker group increased, with values ranging from 100 to 140 mmHg. The median systolic blood pressure for the smoker group also increased from 110 mmHg to 123 mmHg after the intervention.

Meanwhile, for the coffee drinker group, systolic blood pressure before the intervention ranged from 100 to 130 mmHg, with minimum and maximum values of 100 and 130 mmHg, respectively. After the intervention, the systolic blood pressure of the coffee drinker group increased, with values ranging from 108 to 138 mmHg. The median systolic blood pressure for the coffee drinker group also increased from 120 mmHg to 126 mmHg after the intervention.

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Table 3. Descriptive Analysis of Diastolic Blood Pressure

Descriptive	Diastolic			
	Smokers		Coffee Drinkers	
	Before	Afer	Before	After
Min	60	60	60	70
Max	80	90	90	95
Median	70	80	80	80

In the coffee drinker group, diastolic blood pressure before the intervention ranged from 60 to 90 mmHg, with minimum and maximum values of 60 and 90 mmHg, respectively. After the intervention, the diastolic blood pressure of the coffee drinker group also showed an increase, with values ranging from 70 to 95 mmHg. The median diastolic blood pressure for the coffee drinker group remained at 80 mmHg after the intervention.

Table 4. Descriptive Analysis of Blood Pressure Increase

Descriptive	Increase In Blood Pressure			
	Smokers		Coffee Drinkers	
	Systolic	Diastolic	Systolic	Diastolic
Min	0	0	0	0
Max	28	20	16	20
Median	10	6	8	5

In the coffee drinker group, the increase in systolic blood pressure ranged from 0 to 16 mmHg, with minimum and maximum values of 0 and 16 mmHg, respectively. The median increase in systolic blood pressure for the coffee drinker group was approximately 8 mmHg. The increase in diastolic blood pressure for the coffee drinker group ranged from 0 to 20 mmHg, with minimum and maximum values of 0 and 20 mmHg, respectively. The median increase in diastolic blood pressure for the coffee drinker group was approximately 5 mmHg.

Table 5. *Mann Whitney Test*

Blood Pressure	Group	Median (Increase)	*P-Value*	Conclusion
Systolic	Smokers	10	0.000	Significantly Different
	Coffee Drinkers	8		
Diastolic	Smokers	6	0.000	Significantly Different
	Coffee Drinkers	5		

For systolic blood pressure, the median increase in the smoker group was 10, while in the coffee drinker group it was 8. The p-value obtained from the Mann-Whitney statistical test was 0.000. This very low p-value indicates a significant difference between the two groups regarding the increase in systolic blood pressure. Therefore, the conclusion is that there is a significant difference in the increase in systolic blood pressure between the smoker and coffee drinker groups.

Meanwhile, for diastolic blood pressure, the median increase in the smoker group was 6, while in the coffee drinker group it was 5. The p-value from the Mann-Whitney test was 0.000. Although the p-value is very low, the conclusion reached is

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that there is a significant difference in the increase in diastolic blood pressure between the smoker and coffee drinker groups.

Overall, these results show that the intervention given to the smoker and coffee drinker groups had a significant impact on the increase in systolic blood pressure, but did not have a significant difference in the increase in diastolic blood pressure between the two groups.

DISCUSSION

The difference in blood pressure (BP) increase between coffee drinkers and smokers in Medan City is an important research topic to study. The results of the conducted research indicate that there is a significant difference in blood pressure increase between these two groups.

From the research findings, it was discovered that the smoker group experienced a more significant increase in blood pressure compared to the coffee drinker group. This is evidenced by the higher median increases in both systolic and diastolic blood pressure among smokers. Smokers showed a systolic BP increase of 10 mmHg and a diastolic BP increase of 6 mmHg, while coffee drinkers showed a systolic BP increase of 8 mmHg and a diastolic BP increase of 5 mmHg. The statistical test results also indicated a significant difference in the increase in systolic blood pressure between the smoker group and the coffee drinker group.

The difference in blood pressure increase between coffee drinkers and smokers in Medan City is an interesting topic to examine in the health field. The research results indicate that there is a significant difference between the two groups. The smoker group tends to experience a higher increase in blood pressure compared to the coffee drinker group. This study provides an overview of the negative impact of coffee consumption and smoking on an individual's blood pressure.

Similar research supporting these findings includes the study conducted by Jee SH et al., who found that high coffee consumption can be associated with an increase in blood pressure.[27] Likewise, research conducted by AlGhatrif M et al. demonstrated that smoking significantly increases blood pressure in individuals.[28]

Stamler et al. stated in a health journal that nicotine in cigarettes can cause blood vessel constriction and an increase in heart rate, which ultimately raises both systolic and diastolic blood pressure.[29] In addition, chemical substances in cigarette smoke can also damage the blood vessel walls, leading to an increase in blood pressure in the long term.

However, the increase caused by coffee tends to be more moderate compared to the effect of smoking. Furthermore, moderate coffee consumption has also been associated with health benefits, such as a reduced risk of heart disease and stroke.[30]

From these studies, it can be concluded that the increase in blood pressure is greater in smokers compared to coffee

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drinkers. This is consistent with the findings in our research, where the smoker group experienced a significant increase in systolic and diastolic blood pressure compared to the coffee drinker group. Therefore, the results of this study can serve as a basis for community outreach and education regarding the effects of smoking and coffee consumption on blood pressure. This contrasts with the results of research conducted by Kurniati in 2012, which showed no relationship between the type of cigarette and blood pressure increase. People smoke for nicotine, but the cause of death from smoking is tar. This is due to the accumulation of harmful substances in the blood, which can cause various diseases, including cardiovascular issues and other complications, as nicotine and tar entering the bloodstream can damage the lining of the arterial walls, leading to the process of atherosclerosis and hypertension.

CONCLUSION

Based on the research findings concerning the difference in blood pressure (BP) increase between coffee drinkers and smokers in Medan City, it can be concluded that the mean age for smokers was approximately 27.69 years, while the mean age for coffee drinkers was around 27.53 years. Furthermore, the median increase in systolic BP for smokers was 10 mmHg and for diastolic BP was 6 mmHg. In contrast, the median increase in systolic BP for coffee drinkers was 8 mmHg and for diastolic BP was 5 mmHg. Crucially, the data analysis demonstrated a significant difference in the increase of both systolic and diastolic blood pressure between the smoker group and the coffee drinker group in Medan City.

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