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Coffee and blood pressure

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ABSTRACT

Coffee has a characteristic taste, aroma and color that attracts its fans. Coffee is one of the drinks most consumed after mineral water. Annual coffee consumption is estimated at around 500 billion cups/year. Coffee contains a lot of caffeine and other chemical compounds. Coffee having a positive impact on health, also has a negative impact on health. The negative impact of coffee on health is that coffee affects blood pressure (BP) and the risk of hypertension. This research aims to determine the effect of coffee on blood pressure according to existing research. This research method uses the Literature Review (LR) research type. The article inclusion criteria used for this research were articles published in 2020-2023 with the keywords coffee, blood pressure, the relationship between coffee and blood pressure, the effect of coffee and blood pressure. This research found three articles that met the inclusion criteria for this research. The results of this research explain that three articles, there are two articles which prove that coffee consumption has no effect on blood pressure, but there is one article which shows that the duration of coffee consumption has an effect on systolic blood pressure. The conclusion of this literature study from these three articles can be concluded that on average coffee consumption has no effect on blood pressure. Coffee that is good for health is pure coffee that is brewed without a sugar.

Key words: Correlation; Caffeine; Literature Review.

1 INTRODUCTION

Coffee has a characteristic taste, aroma and color that attracts its fans. Coffee is one of the drinks most consumed after mineral water (Santos, 2021). Every day around 3.5 billion cups are drunk throughout the world (Blinová, 2017) (Murthy, 2012). Annual coffee consumption is estimated at around 500 billion cups/year (Santos, 2021). The largest coffee producing and exporting country in the world is Brazil. Vietnam, Colombia and Indonesia are among the large coffee producing and exporting countries (ICO, 2020). There are various types of coffee, on the world market the three major types of coffee that are popular are Coffea arabica L. (arabica) and Coffea canephora species Pierre (robusta) (Heeger, 2017) Coffee contains a lot of caffeine and other chemical compounds. Chemical compounds in coffee such as trigoneline, chlorogenic acid, vitamin B3, volatile compounds (Alves, 2017). This compound is responsible for its biological activities as antioxidant, anti-inflammatory, antimicrobial, antiviral, anti-aging, anticancer, anti-cellulite and sunscreen (Marto et al., 2016).

According to health benefits, if coffee is consumed regularly, there are advantages and disadvantages. Previous research explains that regular coffee consumption can be beneficial for the nervous system, cardiovascular (CV), and digestive, kidney function (Romualdo, 2019; (Surma, 2022; Surma; Oparil, 2020; Pereira, 2020; (Surma et al., 2020; Surma; Oparil, 2021) In addition, regular consumption of 2–3 cups of coffee a day reduces the risk of nonfatal and fatal CV disease, type 2 diabetes, endometrial cancer, and melanoma and nonmelanoma skin cancer in United States citizens (Di Maso, 2021). Based on research, coffee, apart from having a positive impact on health, also has a negative impact on health. The negative impact of coffee on health is that coffee affects blood pressure (BP) and the risk of arterial hypertension is controversial (Mills et al., 2020).

Blood pressure is the pressure produced when the blood exerts force against the walls of the arteries (Prasetyanigrum, 2014). Factors that can influence blood pressure include age, gender, race, physical activity, emotional stress, socioeconomics, lifestyle, habits smoking, drinks containing alcohol and coffee (Chandra; Halim, 2020). Blood pressure consists of two types, namely low blood pressure and high blood pressure or hypertension. High blood pressure or hypertension is a non-communicable disease that is a global health problem with a high prevalence. high and the impact on disability and premature death throughout the world (Nurvita, 2022). This research aims to determine the effect of coffee on blood pressure according to existing research.

2 MATERIAL AND METHODS

This research uses the Literature Review (LR) research type. Literature Review is a method designed to provide descriptions, summaries and critical evaluations of researchers' published works. The Literature Review method aims to provide advice to readers about relevant scientific topics (Perdani et al., 2021). The literature study in this research uses articles sourced from Google Scholar, eBooks, Garuda, Science Direct. The article inclusion criteria used for this research were articles published in 2020-2023 with the

keywords coffee, blood pressure, the relationship between coffee and blood pressure, the effect of coffee and blood pressure. The exclusion criteria for articles in this study were the keywords low blood pressure, articles from 2000-2019. This research found three articles that met the inclusion criteria for this research (Table 1).

3 RESULT

The literature study in table 1 shows that of the three articles there are two articles which prove that coffee consumption has no effect on blood pressure, but there is one article which shows that the duration of coffee consumption has an effect on systolic blood pressure.

3 DISCUSSION

Amin et al. (2023) found no influence between types of coffee on blood pressure. Amin's research is in line with this research in line with research conducted by (Nurlatifah; Ummu, 2018) using a cross-sectional analytical observational method with a sample size of 96 people aged 20-40 years. Statistical results using the Kolmogrov Smirnov test for the effect of type of coffee on increasing blood pressure obtained a value (p value 1.000). It can be concluded that there is no significant relationship between type of coffee and blood pressure (Amin et al., 2023). Another study conducted by (Mullo et al., 2018) used a cross-sectional design with a sample size of 73 respondents. It was found that the majority of respondents (57.5%) consumed 6 or more glasses of coffee a week, the type of coffee consumed was mainly impure (mixed with sugar, milk, etc.) with a value (p value 0.335) so it can be concluded that there is no relationship meaningful regarding the influence of coffee drinking habits on the incidence of hypertension. (Melizza, 2021; Mullo et al., 2018).

Chandra and Halim (2020) suggests that coffee consumption can increase diastolic and systolic blood pressure. Chandra and Halim (2020) study is in line with the study by Green PJ (2018) which was carried out experimentally and found that caffeine produces an acute increase in systolic and diastolic blood pressure and has minimal effects in chronic conditions due to caffeine tolerance and emotional stress. Coffee is bad for sufferers hypertension because it can increase heart rate and increase blood pressure. Giving 300 mg caffeine or 2-3 cups of coffee will increase systolic blood pressure by 5-15 mmHg and diastolic blood pressure by 5-10 mmHg within 15 minutes. The caffeine dose permitted by the FDA (Food and Drug Administration) is 100-200 mg/day, while the maximum limit for caffeine in food and drinks is 150 mg/day and 50 mg/serving (Chandra; Halim, 2020).

Research on coffee consumption and the level of coffee consumption has no effect on blood pressure, but according to Kurnia's research, the duration of coffee consumption can significantly influence blood pressure (Kurnia; Malinti, 2020). This research is in accordance with research conducted by (Bistara; Kartini, 2018) which states that there is no significant relationship between drinking coffee and blood pressure. Meanwhile, research conducted by (Köksal et al., 2017) found that there was a positive relationship between daily coffee consumption and systolic blood pressure. The increase in systolic blood pressure in individuals who consume coffee is associated with the caffeine content in the coffee itself. This mechanism occurs through activation of sympathetic nerves which results in vasoconstriction of blood vessels and increased peripheral resistance (Kurniawaty; Insan, 2016).

Caffeine in coffee can cause vasoconstriction in blood vessels. Caffeine also works by causing the release of calcium from the sarcoplasmic reticulum. This can then increase the strength and duration of contractions in skeletal muscle and heart muscle. Apart from that, caffeine also stimulates the release of norepinephrine which can cause vasoconstriction and increase heart rate and strength of heart contractions. Through these mechanisms caffeine can cause an increase in blood pressure (Amin et al., 2023).

Substances found in coffee besides caffeine are chlorogenic acid, polyphenols and potassium. Chlorogenic acid can lower blood pressure, coffee also contains polyphenols and potassium. Polyphenols can improve blood vessel function, while potassium can reduce systolic and diastolic blood pressure and inhibit the release of renin. The interaction of various substances that can lower blood pressure balances the effect of caffeine in increasing blood pressure (Lestari; Wirandoko; Sanif, 2020).

Coffee can be classified as a psychostimulant drink because it can create a feeling of comfort, reduce fatigue and depression, and cause changes in mood and sleep patterns. It is estimated that there are more than 1000 chemical compounds in coffee. The most common chemical compound in coffee is caffeine. Lesser compounds found in coffee include mannose, galactose polysaccharide chains, melanoidins, flavonoids, catechins, anthocyanins, ferulic acid, caffeic acid, p-coumaric acid, and tocopherols. Consuming 2-3 cups of coffee every day does not change the risk factors for hypertension for anyone, especially women and people who don't smoke. Coffee that is good for health is pure coffee brewed with hot water without sugar mixed in. Examples of how to drink coffee like this are espresso, Americano, brewed coffee.

Table 1: Researchs on Coffee and Blood Pressure.

Author/Year	Title	Method	Results
Selamat Amin, Abdul Wahab, Ratih Ayu Atika, 2023	The Effect of Coffee Consumption on Blood Pressure in Street Vendor Visitors	This research uses an analytical observational method, Cross-Sectional Approach. This research aims to determine the effect of coffee consumption on visitors to the Gla Meunasah Village coffee shop. This research was conducted in 2 coffee shops in Gla Meunasah Village, namely MJ coffee shop and Bodin coffee shop. The number of samples required is 55 samples. Data were analyzed using the chi square test	This research was conducted June 10-July 4 2023 at MJ coffee shop and Bodin coffee shop, Gla Meunasah Village. The types of coffee used in this study were instant coffee and black coffee with a frequency of drinking coffee < 3 times and ≥ 3 times. Research to see the effect of coffee on blood pressure was carried out for two days. The first day of intervention, the majority of samples after drinking instant coffee and drinking black coffee had normal blood pressure. The statistical results of the effect of instant coffee and black coffee on blood pressure have a p-value of 0.625, which means there is no effect of the type of coffee on blood pressure. On the second day of the intervention, the samples drank instant coffee and black coffee and then had their blood pressure measured, obtaining a p-value of 0.350, which means that on the second day of the intervention there was no effect of instant or black coffee on blood pressure. This research, apart from measuring the effect of coffee type on blood pressure, also measured the frequency of drinking coffee on blood pressure. The intervention on the influence of frequency of drinking coffee for < 3 days and ≥ 3 times on the first day had a p-value of 0.072 and the intervention on the second day had a p-value of 0.090. On the first and second day of intervention, it was concluded that there was no effect on the frequency of drinking coffee on blood pressure.
Vincent Vandestyo Chandra, Susilodinata Halim, 2020	The effect of coffee on blood pressure and pulse rate of Tarumanagara University students	This study used a cross-sectional design. Samples were taken by consecutive sampling from Tarumanagara University students who drank 100 ml of Americano coffee at a coffee shop located in the Tarumanagara campus area. The initial blood pressure measurement was carried out 15 minutes after the students had rested and again 30 minutes after drinking coffee. The data obtained was then processed using the Kolmogorov-Smirnov test.	This research used 96 respondents involved in this study with an average age of 20 years with an age range of 18-24 years. This research carried out statistical analysis using paired T and Wilcoxon tests. After the intervention, of the 96 respondents, 78 (81.25%) respondents experienced an increase in systolic blood pressure, 73 (76.04%) respondents experienced an increase in diastolic blood pressure, 72 (75%) respondents experienced an increase in systolic and diastolic blood pressure, and 79 (82.3%) respondents experienced an increase in pulse frequency. The increase in systolic, diastolic and pulse blood pressure was statistically significant ($p < 0.0001$), which means that coffee consumption increased systolic and diastolic blood pressure.
Steven Hezkia Tri Kurnia, Evelin Malinti, 2020	The Relationship Between Coffee Consumption and Smoking Habits and Blood Pressure in Adult Men	This data collection was carried out in Mokla Village in October 2019, with an adult male population. Respondents took part in this research voluntarily and without coercion signing a letter of consent to become research subjects. The method used is the Cross Sectional method which uses independent variables and dependent variables. Smoking and coffee drinking habits were classified as independent variables and blood pressure, both systolic and distolic, as dependent variables.	This research is to measure the level of coffee consumption and coffee consumption with blood pressure. The results of this study show that statistical tests in this study concluded that there was no significant relationship between coffee consumption, level of coffee consumption, duration of coffee consumption and blood pressure. This is proven by the significant value (p) of each category such as coffee consumption or not (systolic, p=0.079 and diastolic, p=0.830), level of coffee consumption (systolic, p=0.211 and diastolic, p=0.90). This means that there is no effect of coffee consumption or the level of coffee consumption on blood pressure, but the duration of coffee consumption is influenced by blood pressure as evidenced by the systolic value, namely p=.033

4 CONCLUSION

The literature study from these three articles can be concluded that on average coffee consumption has no effect on blood pressure. Coffee that is good for health is pure coffee that is brewed without a sugar.

5 AUTHORS' CONTRIBUTION

Conceptual idea: Nurvita, S.; Methodology design: Nurvita, S.; Rizkaprilisa, W.; Data collection: Nurvita, S., Data analysis and interpretation: Nurvita, S.; Rizkaprilisa, W., and Writing and editing: Nurvita, S.; Rizkaprilisa, W.

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