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Research Article

Effect of Coffee on Pulse Rate Rise

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Abstract:
The purpose of this study was to determine the effect of coffee on pulse rate. In this research method using experimental methods, the sample is Sports Coaching Education Students Class of 2021 totaling 16 (sixteen) people consisting of 5 (five) women and 11 (eleven) men which was held on May 29, 2023 at 15:30 WIB in the Sports Coaching Education Student Association room (HIMA PKO). It is known that the comparison of 60 pulse beats per second in students who drink hot coffee and cold coffee measures it in a standing position. The coffee used is ground village coffee with a dose of 1 teaspoon without sugar, using a dose of 220 ml of water, where there are 8 (eight) students drinking coffee using hot water and 8 (eight) students drinking coffee using cold water / ice water. The results using descriptive analysis and inferential analysis using data from IBM SPSS Statistics 22, the pulse rate of drinking hot coffee scored from the lowest was 60 pulse/second and the highest was 116 pulse/second, while the pulse rate of drinking cold coffee had the lowest pulse rate with a score of 63 pulse/second and the highest score was 100 pulse/second. So it can be concluded that drinking hot coffee makes the pulse rate increase the same as drinking cold coffee.
Keywords: Caffeine, Coffee, Hydration, Pulse

1. INTRODUCTION

Coffee is a source of livelihood for them in agriculture, from year to year the development of coffee continues to increase although there are several years that have experienced a setback (Puspita et al., 2020). The first coffee pioneer was a Dutchman named Veenhuyzen in the Gayo Highlands in 1908, but coffee plants were not sold directly because the quantity was very limited. In 1918, the Wilhelmina Blang Gele coffee plantation became a commercial coffee factory managed by Dutch or private workers, who were recruited through Javanese contact workers called Contract Javanese and Colonized Javanese, as the workers were from Java Island. Javanese, they are connected by a contract system that refers to the Staatsblad of 1911 and Staatsblad of 1915 (Iswanto et al., 2020).

The pulse rate can also be caused by systolic (when the heart pumps blood / when contracting) and diastolic (when the heart relaxes) blood pressure (Giddings et al., 2024). If using a compression base layer can speed up the recovery time of pulse and body temperature and increase comfort during exercise (Craig-Jones et al., 2024). Sport massage can also restore systole, diatole and pulse blood pressure to normal (Saputro, 2022). In addition, the trainer can also use a Pulse Rate Monitoring Tool (MDN) designed to display pulse data in real time and continuously on a smartphone with a pulse sensor attached to the fingertip that manages it using an Arduino Uno microcontroller. This system uses Bluetooth to operate and display a person's pulse data (Pakutharivu et al., 2024).

Coffee has many fans, but it also contains caffeine which has been proven to cure headaches, flu, and allergies (Santana et al., 2024), but if you drink too much it makes the pulse rate maximum, therefore a lot of fluid comes out of the body during activities and which affects kidney function which works faster than usual (Narindra et al., 2020). Be careful if you want to eat and drink caffeine, we can consume caffeine every day, but not more than 150mg / day, the more we consume caffeine, the more damage it does to the kidney organs (Sayekti & Saputra, 2021). Caffeine can also make our pulse faster than the usual pulse, many students or people from elementary school children and even grandparents must consume caffeine, although there have been many years researching whether there is an effect of caffeine on cardiovascular health in the human body which is still unclear (Maulina et al., 2020).

The use of caffeine in sports to increase alertness, reaction time and excessive consumption increases glycogen mobilization in fat and muscle. The

mechanism of action of caffeine is based on inhibiting the phosphodiesterase enzyme that activates cAMP and works directly as an adenosine receptor antagonist. And it has side effects from mild to more severe if the mild effects can cause irritability, insomnia, and indigestion, while the more severe side effects can cause peptic ulcers, delirium, coma, and supraventricular arrhythmia. In addition, excessive intake can cause dependence, nausea, or vomiting (Naughton et al., 2024).

Caffeine will increase fatty acid oxidation and reduce carbohydrate oxidation so that coffee consumption after exercise can help cure fatigue. But it does not apply to those who are inexperienced in sports / untrained after physical exercise there is no effect of decreasing or increasing blood lactate levels and influencing blood glucose levels (Zulfahmi, 2021). True there is an effect of coffee consumption on cholesterol levels, the effect of coffee consumption on LDL levels, and there is an effect of coffee consumption on total cholesterol levels (Krispila et al., 2022). Coffee contains chlorogenic-potassium-caffeine compounds that help lower blood pressure. If coffee is poured with boiling water into coffee, the coffee contains terpenes that can increase cholesterol levels in the body, because filtering coffee before consumption can remove terpene content (Pane & Liza Mutia, 2022).

Coffee consumption can also risk causing primary dysmenorrhea that occurs during menstruation which disrupts daily activities and habits to women (Çelik et al., 2024). If women experience the menstrual phase if consuming coffee also accelerates their reaction time (Bougrine et al., 2024). if you continue to drink coffee, you will experience Menopause will exacerbate vasomotor symptoms, there are also those who are against consuming coffee must be balanced with a healthy life (Miranda et al., 2024).

According to (Luijten et al., 2024), use coffee with the smallest dose (250 mg or about 3.0-3.5 mg per kg) do not consume excessive amounts of caffeine (6-9 mg per kg). if consuming doses of about 250 to 500 mg (3 cups of coffee or 6 to 8 sodas) also includes Ergogenic substances that can cause anxiety, nervousness, sleeplessness, tremors, hyperethsia and diuresis. There is also according to (Farmani et al., 2024). Coffee also has different caffeine content, do not think in coffee has the same caffeine content, arabica coffee caffeine content between 0.8 to 1.4 and robusta coffee caffeine content between 1.7 to 4.0, therefore it is recommended to consume coffee not to excess. Coffee also has other contents such as cellulose, minerals (potassium, magnesium, calcium, sodium, iron, manganese), sugar (sucrose, glucose, fructose, arabinose, galactose, and mannose components), fat, tannin, polyphenols, amino acids and vitamin B complex. Coffee also contains chlorogenic acid around 7-12, so if the coffee reaches 3-5 times the caffeine content. It turns out that hypertension in men aged 18-65 years has nothing to do with coffee, but the cause is excessive sugar.

2. MATERIAL AND METHOD

The research method uses experiments. Implementation on May 29, 2023 at 15: 30 was carried out in the HIMA PKO room with students of the Class of 2021, who participated 16 (sixteen) people consisting of 5 (five) women and 11 (eleven) men. The implementation uses village ground coffee with a dose of 1 teaspoon without sugar using a dose of 220 ml of water, there are 8 (eight) hot coffee people using hot water and 8 (eight) cold coffee people using cold water / ice water. pulse ratio 60 beats/second on hot coffee with cold coffee standing position. How to measure the pulse by palpating the radial artery (Muttaqin et al., 2024). Can see that the child has a history of heart disease by means of an oximeter (Wang et al., 2024).

3. RESULT AND DISCUSSION

1.1 Result

The sample taken in this study were 2021 sports coaching education students. After conducting the experimental test the mean median mode of the two groups. The samples used amounted to 8 (eight) people who drank cold coffee and 8 (eight) people who drank hot coffee in a standing position. Calculations are obtained as table 1:

Table 1. Cold Coffee and Hot Coffee

Pulse of Cold Coffee	Pulse of Hot Coffee
65	60
70	87
75	97
86	85
100	116
63	112
84	92
85	90

From the results of table 1 there are several samples who drink cold coffee and hot coffee with different pulse rates. For cold coffee from the lowest pulse rate with a score of 63 beats/second and the highest score is 100 beats/second, which for cold coffee the lowest pulse rate with a score of 60 beats/second and the highest score is 116 beats/second. It turns out that drinking hot coffee makes the pulse faster than drinking cold coffee.

Table 2. Cold and Hot Coffee Pulse Central Tension Measures

	Pulse of Cold Coffee	Pulse of Hot Coffee
Mean	92.38	78.50
Median	91.00	79.50
Modus	60[a]	63[a]

Based on Table 2, the pulse rate of students who drink cold coffee with Mean 92.38, Median 91.00, Mode 60, and the pulse rate of students who drink hot coffee with Mean 78.50, Median 79.50, Mode 63.

Figure 1. Bar Chart of Multistage Fitness Test Results

Category	Cold Coffee	Hot Coffee
Low (60-78)	4	1
Medium (79-97)	3	5
High (98-116)	1	2
Total	8	8

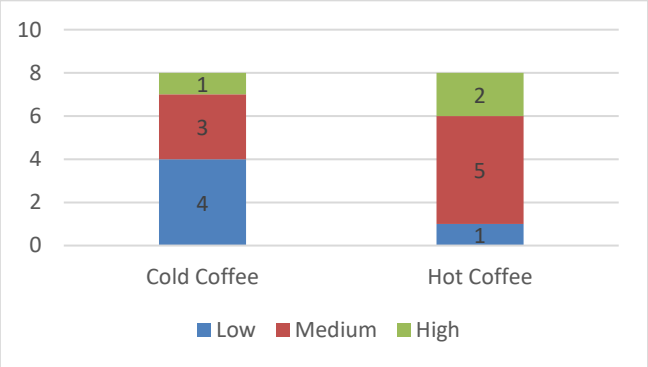

Figure 1. Coffee Category

Based on Figure 1 and Table 3 above, it is known that students who drink hot coffee have a higher pulse rate than those who drink cold coffee. For the low category (60-78) there are 4 (four) students who drink cold coffee, while there is only 1 (one) student who drinks hot coffee. For the medium category (79-97) there are 3 (three) students who drink cold coffee, while there are 5 (five) students who drink hot coffee. For the high category (98-116) there is 1 (one) student, while there are 2 (two) students who drink hot coffee.

Table 4. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Cold Coffee	.170	8	.200*	.942	8	.633
Hot Coffee	.210	8	.200*	.933	8	.545

The results of the table above Kolmogorov-Smirnov cold coffee is 0.200 > 0.05 so it can be said if the normality data is normally distributed, while hot coffee is 0.200 > 0.05 so it can be said if the normality data is normally distributed.

Table 5. t Test

							95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Pulse Rate	Equal variances assumed	.136	.717	-1.836	14	.088	-13.875	-30.088	2.338
	Equal variances not assumed			-1.836	12.746	.090	-13.875	-30.239	2.489

Based on the output above, it is known that the Sig (2-tailed) value. Levene's Test for Equality of Variances is 0.088 > 0.05, it can be interpreted that the variance of data between cold coffee and hot coffee is homogeneous or the same. So it can be concluded that the pulse rate of students who drink cold coffee and those who drink hot coffee is the same (not significantly different).

Table 6. Statistical Description

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
a	8	78.50	12.524	4.428	68.03	88.97	63	100
b	8	92.38	17.328	6.126	77.89	106.86	60	116
Total	16	85.44	16.268	4.067	76.77	94.11	60	116

Based on the SPSS output above, it can be seen the difference in the average pulse rate of cold coffee (group a) and hot coffee (group b) with the following details, namely with

The average pulse rate of cold coffee was 78.50, and the average pulse rate of hot coffee was 92.38.

1.2 Discussion

Coffee is also a doping that has caffeine content in it which makes the pulse faster especially if you consume hot coffee the pulse is faster than consuming cold coffee. The pulse rate of students who drink hot coffee with Mean 78.50, Median 79.50, Mode 63, Minimum 60, Maximum 116, while the pulse rate of students who drink cold coffee with Mean 92.38, Median 91.00, Mode 60, Minimum 63, Maximum 100.

Frequent coffee consumption at productive age (15-64 years) increases the risk of high blood pressure (Firmansyah et al., 2020). Avoid drinking 3-4 cups of coffee with 200-250 mg of caffeine (Susilawati & Sety, 2020). Increased hypertension occurs when systolic blood pressure increases above 140 mmHg or diastolic blood pressure increases above 90 mmHg (Antza et al., 2024), usually after 30 minutes. We recommend a healthy lifestyle to avoid hypertension by exercising regularly, eating a healthy diet, not smoking, not consuming alcohol, and reducing the portion of coffee. (Guo et al., 2024) stress, irregular diet, obesity, lack of exercise or physical activity, sodium sensitivity, and low potassium levels (Faridah et al., 2022). High blood pressure is found to occur in elderly people regardless of heredity, gender, and race (Agustina et al., 2024).

It turns out that coffee leaves have also proven their benefits for people with hypertension / high blood pressure that occurs by people around, these leaves have tannin and flavonoid levels that increase antioxidants (Hasanah Hsb & Pane, 2021). it turns out that coffee aromatherapy relaxation can also be proven to help reduce the level of pain in pregnant women during childbirth, as well as relieve anxiety, fear, panic, tension and other stress that haunts pregnant women during labor (Risyanti, 2021). If pregnant women still consume alcohol and coffee that contains excessive fat preservatives, this can cause maternal and fetal death (Juniartati & Marsita, 2021).

Coffee consumption apparently has no effect on the quality of a person's sleep (Rizal & Afriandi, 2022), it must be balanced with improving the quality of life through regular exercise, managing stress well, and

consuming nutritious food (Santoso, 2023). If you consume coffee, you also experience discoloration of the teeth (Khasanah et al., 2021). High blood pressure disease is not only caused by coffee consumption but has other factors, namely: obesity, stress, smoking, lack of exercise, excess alcohol consumption and excessive salt intake (Trevano et al., 2024). Coffee consumption has been shown to reduce the risk of diabetes in several countries including America, Europe and Asia. Coffee contains hundreds of active ingredients and several substances that are thought to increase glucose absorption and metabolism (Fauza, 2020).

According to the researcher's opinion from all the sentences above, frequent coffee consumption in productive age (15-64 years) can increase the risk of high blood pressure, so it is recommended to avoid drinking 3-4 cups of coffee with 200-250 mg of caffeine. An increase in hypertension can occur after 30 minutes, and a healthy lifestyle, such as regular exercise, a healthy diet, not smoking, not consuming alcohol, and reducing the portion of coffee, is recommended to prevent it. In addition, factors such as stress, irregular diet, obesity, lack of exercise, sodium sensitivity, and low potassium levels can also contribute to high blood pressure. Nonetheless, coffee leaves have benefits for people with hypertension as they contain tannins and flavonoids that boost antioxidants. Coffee aromatherapy has also been shown to help reduce pain levels in pregnant women during labor, as well as relieve anxiety, fear, panic, tension, and other stress. However, excessive consumption of alcohol and coffee containing fatty preservatives during pregnancy can lead to the risk of death for both mother and fetus. Although coffee consumption has no effect on sleep quality, it should be balanced with a healthy lifestyle, regular exercise, good stress management, and consumption of nutritious food. In addition, coffee consumption can also cause discoloration of the teeth. High blood pressure is not only caused by coffee consumption, but also by other factors such as obesity, stress, smoking, lack of exercise, excess alcohol, and excessive salt intake. In some countries, coffee consumption has been shown to reduce the risk of diabetes due to active ingredients that are thought to improve glucose absorption and metabolism.

4. CONCLUSION

From the results of this study there is an effect of coffee on the pulse. So there is a difference between drinking hot coffee will make the pulse faster than drinking cold coffee. The pulse rate of drinking hot coffee the score of the lowest is 60 pulse/second and the highest is 116 pulse/second, while the pulse rate of drinking cold coffee has the lowest pulse rate with a score of 63 pulse/second and the highest score is 100 pulse/second. The sample is 16 students consisting of 3 categories if drinking hot or cold coffee from the lowest, medium and high categories, namely those who drink hot coffee have a low category of 1 (one) student, a medium category of 5 (five) students, and a high category of 2 (two) students, while those who drink cold coffee have a low category of 4 (four) students, a medium category of 3 (three) students, and a high category of 1 (one) student.

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