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Research article

The effect of robust coffee towards the malondialdehyde level in healthy adults

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ABSTRACT

Coffee contains more than a thousand molecules, including phenolic compounds, vitamins, minerals and alkaloids. Caffeine, cafestol, kahweol and chlorogenic acid are related to lipid metabolism and can affect serum lipid profiles. Clinical studies have reported the effects of caffeine on cardiac arrhythmias, liver function, serum cholesterol and blood pressure. Malondialdehyde (MDA) in the human body is a by-product of free radicals (oxidative stress), which can indicate whether oxidative stress is detrimental. This study aims to analyse the effect of strong coffee on MDA levels in healthy adults. This study used a quasi-experimental design with a nonequivalent control group. This design was divided into two groups: the treatment group and the control group. The treatment group was given the treatment of drinking coffee and not eating foods that can raise cholesterol. In the control group, they did not drink coffee or eat foods that could cause increased malondialdehyde levels. The results showed that coffee increased MDA levels in 91% of the samples. Thus, strong coffee can increase malondialdehyde (MDA) levels in healthy adults.

Keywords: Robust, Coffee, Malondialdehyde, MDA.

INTRODUCTION

Coffee is the most widely consumed hot beverage and has a long tradition in Indonesian culture. This is because coffee is a drink with a distinctive taste. It is also driven by tradition, history, and social and economic interests, making it a unique attraction for the community. According to the Agricultural Data and Information System Center of the Ministry of Agriculture, national coffee consumption reached approximately 250,000 tonnes in 2016, an increase of 10.54% to 276,000 tonnes. Indonesia's coffee consumption will grow by an average of 8.22%/year over the period 2016-2021. In 2021, coffee supply will reach 795 thousand tonnes with consumption of 370 thousand tonnes, resulting in a surplus of 425 thousand tonnes. About 94.5% of Indonesia's coffee production is supplied by smallholder coffee plantation entrepreneurs. Meanwhile, 81.87% of national coffee production is of the Robusta variety, originating from various regions in Indonesia, including East Nusa Tenggara, Indonesia [1,2].

Coffee has good health benefits, including increased stamina, stimulation of the central nervous system and increased alertness. Many people already know that coffee and tea can be used to prevent drowsiness and keep the body alert. Coffee consumed in moderation has enormous health benefits for the body. Research by various experts has shown that the body needs the antioxidants in coffee to prevent the destructive effects of free radicals. People also drink coffee for its distinctive taste, aroma and preferred type of coffee, and another reason for drinking this drink is to socialise with friends and get inspiration. However, when consumed in excess, coffee can have adverse health effects [3].

Coffee contains more than a thousand molecules,

including phenolic compounds, vitamins, minerals and alkaloids. Caffeine, cafestol, kahweol and chlorogenic acid are related to lipid metabolism and can affect serum lipid profiles. Consumption of low doses of caffeine has been shown to be beneficial. However, not all caffeinated products, such as coffee, are labeled as containing caffeine. Caffeine levels in coffee are known to vary between different types. Clinical studies have reported the effects of caffeine on cardiac arrhythmias, liver function, serum cholesterol and blood pressure.3 In addition to caffeine, coffee also contains cafestol. Excessive amounts of cafestol can increase free fatty acids and cholesterol in the blood, which can cause fatty deposits and plaque to build up and clog artery walls. Many studies report that coffee and tea can increase blood cholesterol, serum homocysteine, heart rate and blood pressure, which may be significant risk factors for increased coronary heart disease [4].

Black coffee used in this study results from direct extraction from boiling coffee beans served without adding any flavours. One cup of black coffee contains an average of 85 mg of caffeine. The Robust coffee is grown mainly in the highlands between Inerie Volcano and Abulobo Volcano, with plantation elevations between 1,000 m - 1,550 meters above sea level and an average temperature of 15-25 °C. Thus, this area is very suitable for coffee cultivation. Cultivated using organic farming practices and supported by a suitable microclimate, the Robust coffee has a distinctive and unique taste: intense floral aroma, moderate acidity, medium to solid thickness, and sweet solid flavours [5]

Malondialdehyde (MDA) in the human body is a by-product of free radicals (oxidative stress), which can be an illustration of whether or not oxidative stress is dangerous [6].

MATERIALS AND METHODS

This study used a quasi-experimental design with a nonequivalent control group. This design was divided into two groups: the treatment group and the control group. The treatment group was given the treatment of drinking coffee and not eating foods that can raise cholesterol. In the control group, they did not drink coffee or eat foods that could cause increased malondialdehyde levels.

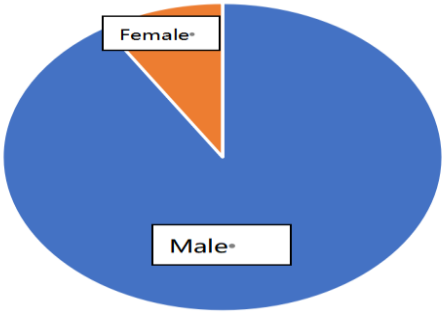
The sample for this study was healthy adults working at Nusa Cendana University who met the inclusion criteria. Sampling used a consecutive non-random sampling technique, in which respondents were systematically selected according to the inclusion criteria until they met the required sample. To avoid dropout, the sample is increased by 10% of the total sample, which is calculated as 25 + (10% x 25) = 28 respondents. Therefore, the minimum number of respondents in a group is 28.

Respondents who did not consume coffee were included in the control group, and respondents who frequently consumed coffee and tea were included in the case group. All respondents had their cholesterol measured by nurses using a spectrophotometer. Each respondent in the case and control groups received an intervention in which the case group was the respondent who consumed coffee and the control group did not consume coffee at all, provided that both groups did not consume foods that cause cholesterol levels to rise. The intervention for this case group was carried out within one week in the first week, and the intervention for the control group was carried out within one week in the following week. For one week, the researcher will follow up on the type of food consumed. After one week, a second check of the cholesterol level was carried out for each respondent in the two groups according to the measurement steps described above, and the results were written on the test result sheet, and the data from the measurement results of the case group and the control group were retrieved and processed.

The processed data were analysed using statistical tests using the SPSS statistical program. The Shapiro-Wilk test was used to find out whether the data were normally distributed or not, as the number of respondents per group was 28. Furthermore, the hypothesis test uses an unpaired t-test if the data is normally distributed. If the data are not normally distributed, the Mann-Whitney test is used. Differences before and after treatment are tested using paired t-test or Wilcoxon test if the data are not normally distributed. Data were analysed using the SSPS programme.

RESULTS AND DISCUSSION

Figure 1: The Distribution of Sample Gender Characteristics



As shown in Figure 1 and Figure 2, the sample characteristics in terms of gender showed that males were in the majority. Meanwhile, Figure 3 shows the frequency of coffee consumption based on the questionnaires. Figure 4 also shows that coffee increased MDA levels in 91% of the samples.

Figure 2: Figure 2. Sample Characteristics based on age

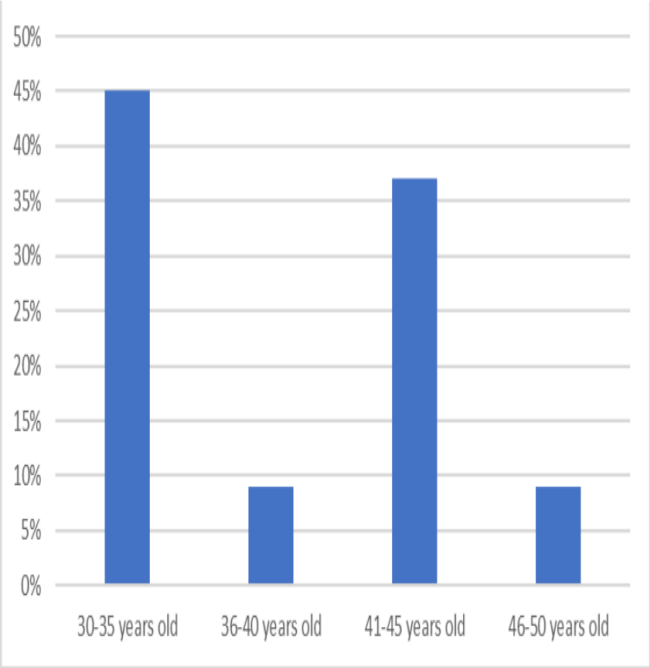


Figure3: Robust Coffee Consumption Frequency

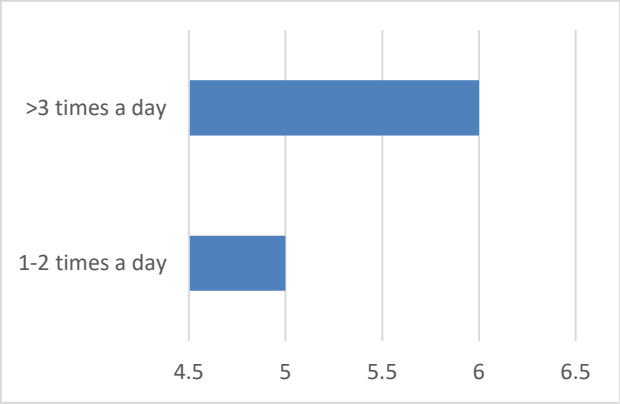
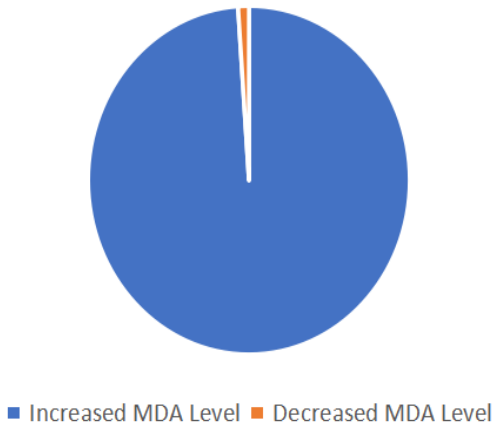


Figure 4. MDA Level after intervention



This study obtained significant data between the differences in post-test values in the two groups when the independent t-test was performed with p = 0.007 (p <0.05). Based on the distribution of pre-test cholesterol levels, the control group had a maximum of 130 and the case group had a maximum of 162, while the control group had a maximum of 298 and the treatment group had a maximum of 283. After treatment, the minimum value in the control group decreased from 130 to 125, whereas the minimum value in the case group increased from 162 to 172. The increase in cholesterol levels in the case group was supported by a study presented by the Institute for Scientific Information on Coffee (ISIC), which showed that although coffee does not contain cholesterol, it does contain the substances cafestol and kahweol, which suppress the production of cholesterol. The body is involved in the breakdown of cholesterol, which causes cholesterol levels to rise. In particular, coffee diterpenes can cause an increase in total and LDL cholesterol levels [7-8]

In the control group, there was a decrease in the average cholesterol level because, apart from not consuming coffee, the most significant effect was that the employees were given an intervention not to consume foods that could raise cholesterol for one week, thus the average cholesterol level in the control group decreased [9-10].

Based on the analysis and discussion above, the frequency of coffee consumption affects the increase in cholesterol levels. On the other hand, people who consume coffee frequently may increase their cholesterol levels. In addition, those who do not consume coffee or consume it infrequently do not experience a significant increase in cholesterol levels.

CONCLUSION

Based on the results of this study, it appears that strong coffee may increase the levels of malondialdehyde (MDA) in healthy adults

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