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ORIGINAL ARTICLE

CORRELATION BETWEEN COFFEE CONSUMPTION AND SLEEP QUALITY WITH PREHYPERTENSION IN FINAL YEAR UNIVERSITAS AIRLANGGA STUDENTS

Hubungan Konsumsi Kopi dan Kualitas Tidur dengan Kejadian Prehipertensi pada Mahasiswa Universitas Airlangga Tingkat Akhir

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ABSTRACT

Background: The number of prehypertension patients will always be higher than hypertension patients; this is supported by the prevalence of prehypertension being 48.40% according to JNC 7, and hypertension being 34.10% according to Basic Health Research in 2018. Coffee consumption and sleep quality were risk factors that are closely related to the lifestyle of students, this is also reinforced by the number of 24-hour coffee outlets that are open around Universitas Airlangga. **Purpose:** This aim of this study is to analyze the relationship between coffee consumption and sleep quality on the incidence of prehypertension in final year Universitas Airlangga students. **Methods:** This type of research is a quantitative study with a cross-sectional study design and uses the Chi-square test. The samples consisted of 146 people, which were taken using a simple random sampling method. Data collection was carried out through an online questionnaire. This study involved coffee consumption and sleep quality as independent variables and the incidence of prehypertension in final year Universitas Airlangga students as the dependent variable. **Results:** There is a correlation between coffee consumption (p=0.00) and sleep quality (p=0.01) with prehypertension in final year Universitas Airlangga students. Coffee consumption has a 2,47 times greater risk and sleep quality has a 2,09 times greater risk of prehypertension in final year Universitas Airlangga students. **Conclusion:** Poor coffee consumption and sleep quality are related with prehypertension in final year Universitas Airlangga students.

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ABSTRAK

Latar Belakang: *Jumlah penderita prehipertensi selalu lebih tinggi daripada hipertensi, hal ini diperkuat oleh prevalensi prehipertensi menurut JNC 7 tahun 2013 sebesar 48,40%, sedangkan menurut Riset Kesehatan Dasar (Riskesdas), prevalensi hipertensi pada tahun 2018 adalah 34,11%. Konsumsi kopi dan kualitas tidur merupakan faktor risiko yang erat hubungannya dengan pola hidup mahasiswa, hal ini juga diperkuat dengan banyaknya gerai kopi 24 jam yang buka di sekitar Universitas Airlangga.* ***Tujuan:*** *Tujuan penelitian ini adalah menganalisis hubungan konsumsi kopi dan kualitas tidur terhadap kejadian prehipertensi pada mahasiswa tingkat akhir Universitas Airlangga.* ***Metode:*** *Jenis penelitian ini adalah penelitian kuantitatif dengan desain penelitian cross sectional dan menggunakan uji chi-square. Sampel berjumlah 146 orang, yang diambil dengan menggunakan simple random sampling. Pengumpulan data dilakukan melalui kuesioner secara online. Penelitian ini melibatkan konsumsi kopi dan kualitas tidur sebagai variabel bebas dan kejadian prehipertensi pada mahasiswa Universitas Airlangga tingkat akhir sebagai variabel dependen.* ***Hasil:*** *Terdapat korelasi antara konsumsi kopi (p=0,00) dan kualitas tidur (p=0,01) dengan prehipertensi pada mahasiswa tingkat akhir Universitas Airlangga. Konsumsi kopi berisiko 2,47 kali lebih besar dan kualitas tidur berisiko 2,09 kali lebih besar terhadap prehipertensi pada mahasiswa Universitas Airlangga tingkat akhir.* ***Simpulan:*** *Konsumsi kopi dan kualitas tidur yang buruk berhubungan dengan kejadian prehipertensi pada mahasiswa Universitas Airlangga tingkat akhir.*

INTRODUCTION

Prehypertension, also referred to as a condition before hypertension, is when blood pressure is elevated but not enough to be classified as hypertension (1). Prehypertension can also be defined as an abnormality in the blood circulation system that can cause blood pressure to increase. According to the WHO and CDC, prehypertension is also defined as a condition where the systolic blood pressure is between 120 and 139 mmHg and the diastolic blood pressure is between 80 and 89 mmHg (2).

Prehypertension is a sign of the onset of hypertension as a degenerative disease caused by decreased function and damage to body structures due to age. As explained in a study of prehypertension in adolescents, prehypertension among adolescents can lead to the risk of hypertension and cardiovascular disease in the future (3). An unhealthy lifestyle is closely related to the incidence of prehypertension that leads to hypertension.

Research data regarding the prevalence and characteristics of hypertension in the young adult age group in Indonesia show that hypertension is shifting to younger ages, with 7.35% of hypertension occurring in the 18-24 years age range, 10.41% in the 25-34 years age range, and 21.35% in the 35-45 years age range (4). Furthermore, reinforced by Primary Health Research (Riskesdas) data, the incidence of hypertension ≥18 years old was 25.80% in 2013, while in 2018 it was 34.11%. This indicates a spike in hypertension cases in 2018 compared to 2013.

According to JNC-VII, the global prevalence of prehypertension is 36%, while the Asian region has a relatively high prevalence of 48.40% (5). In Indonesia, the number of hypertension cases is proportional to the increase in prehypertension cases, meaning that, when hypertension cases are high, prehypertension cases are also increasing. Prehypertension is often referred to as a multifactorial disease, meaning that the disease is caused by various risk factors. There are two types of risk factors for prehypertension namely unchangeable risk factors such as age, gender, and family history, and changeable risk factors such as smoking, inadequate fruit and vegetable consumption, excessive salt intake, obesity, lack of

exercise, excessive alcohol consumption, dyslipidemia, and hypertensive stress (3). Lifestyle and poor daily habits are closely related to indirect risk factors of prehypertension (6). The incidence of prehypertension is currently increasing along with changes in lifestyle (7).

Students are between 18-24 years old. According to developmental psychology experts, the ages of 18-24 are included in the early adulthood age group (8). Early adulthood is a period where a person sets his life principles. Therefore, students aged 18-24 years are often free and tend to ignore their lifestyle. The current trend or lifestyle of students in provincial capitals, especially Surabaya City, is hedonism, such as fashion competition and hanging out at coffee outlets until late at night which is supported by the increasing number of coffee outlets in Surabaya (9,10). The habit of consuming coffee in Indonesia continues to increase by 20%, this is evidenced by the fact that Indonesia is the largest coffee producing country after Brazil and Vietnam (11). Caffeine contained in coffee can eliminate drowsiness (12). The loss of sleepiness can cause a person to become sleep deprived, thus affecting their sleep quality (13). The Food and Drug Administration (FDA) recommended daily caffeine intake is about 400 mg or the equivalent of four cups of coffee a day (14). A study on the effect of coffee on hypertension revealed that people who usually consume as much as 1-2 cups of coffee daily have a 4.12 times higher risk of developing hypertension than those who do not drink coffee (15,16). Coffee consumption and sleep quality can affect the circulatory system, which can increase blood pressure and increase the risk of prehypertension in college students.

Based on the research that has been conducted and the results of literature reviews from several related journals, it can be concluded that students of Universitas Airlangga are the target market of several coffee outlets along the roads around campus A, campus B, and campus C of Universitas Airlangga. Information related to blood pressure was obtained which showed that out of 10 students of Universitas Airlangga who were randomly met, six of them had prehypertension blood pressure four admitted to consuming coffee and having poor sleep quality. Therefore, researchers want to analyze the relationship between coffee consumption and sleep quality which is often considered a risk factor for prehypertension in students, especially final year students of Universitas Airlangga.

METHODS

The research design used was quantitative, with descriptive analytic method, and cross-sectional study analysis. The population amounted to 6,955 students who came from all active undergraduate and vocational students of Universitas Airlangga class of 2019 Universitas Airlangga with an age range of 18-24 years. In this study, the minimum sample size required was 125 respondents calculated using the Lemeshow formula with previous research and the sample obtained was 146 samples taken through a population that was in accordance with the research objectives, inclusion requirements in the form of undergraduate and vocational students of Universitas Airlangga class of 2019 aged 18-24 years, and exclusion requirements in the form of students with a history of hypertension, aged under 18 years or over 24 years, and students who refused to be respondents, then calculated through the sample size formula and randomization through the simple random sampling method with a known N (population).

Pittsburgh Sleep Quality Index (PSQI) is an assessment instrument to assess the sleep quality of the samples. In the sleep quality questionnaire, there are seven components consisting of nine questions so that a score interval of 0-21 will be obtained with a score for the good sleep quality category being ≤5 and a score for the poor sleep quality category being >5. To assess the risk of prehypertension and coffee consumption a questionnaire made by the researcher was used. In the blood pressure questionnaire, there were ten questions consisting of one blood pressure question (both systolic and diastolic) and nine other prehypertension risk factor questions. Information on the respondent's blood pressure was obtained based on the latest examination at the clinic visited by the respondent in the past month. In the risk factor section, a score interval of 0-9 will be obtained with a low prehypertension risk factor category having a score of 0-4 and a high prehypertension risk factor having a score of 5-9, while the coffee consumption questionnaire consists of 16 questions so that a score interval of 0-16 will be obtained with a good coffee consumption category if it has a score of 0-7 and a bad coffee category if the score interval obtained is 8-16.

Primary data were obtained through online questionnaire distribution. Secondary data came from national and international journal literature, books, and Ministry of Health profiles and basic

health research. Data will be processed and analyzed using Excel for Windows and SPSS using a cross-sectional study design and statistical analysis of the Chi-square test. The Health Research Ethics Commission of the Faculty of Dentistry, Universitas Airlangga has issued an ethical merit certificate for this study (number: 091/HRECC.FODM/II/2023).

RESULTS

The analysis showed that the majority of respondents (68 out of 146, or 46.58%) were 22 years old, that the majority (115 out of 146, or 78.77%) were female, and most (37%) were from the Faculty of Public Health (Table 1).

Table 1
Frequency Distribution of Respondent Characteristics

Characteristics	n	%
Gender		
Men	31	21.23
Women	115	78.77
Age (Years)		
20	3	2.05
21	65	44.52
22	68	46.58
23	8	5.48
24	2	1.37
Faculty		
Faculty of Medicine	3	2.05
Faculty of Dentistry	2	1.37
Faculty of Law	3	2.05
Faculty of Economics and Business	9	6.16
Faculty of Pharmacy	6	4.11
Faculty of Veterinary	3	2.05
Faculty of Social and Political Science	17	11.64
Faculty of Science and Technology	17	11.64
Faculty of Public Health	54	37
Faculty of Psychology	4	3.42
Faculty of Humanities	10	6.85
Faculty of Nursing	7	4.79
Faculty of Fisheries and Marine	6	4.11
Faculty of Vocational Studies	42.05	2.74

Based on Table 2, 59 respondents (40.41%) had prehypertension blood pressure status with 27 (18.49%) of them having high prehypertension risk. This is evidenced by respondents who scored on the prehypertension risk questionnaire of 5-9 points. In the sleep quality category, the majority of respondents (106 out of 146, or 72.60%) had poor sleep quality, while in the coffee consumption category, 26.71% had poor coffee consumption.

Table 2
Frequency Distribution of Measured Variables

Variables	n	%
Blood Pressure		
Normal (<120/80mmHg)	87	59.59
Prehypertension	59	40.41
Prehypertension Risk		
Low Risk	119	81.51
High Risk	27	18.49
Sleep Quality		
Good Sleep Quality	40	27.40
Poor Sleep Quality	106	72.60
Coffee Consumption		
Good Coffee Consumption	107	73.29
Bad Coffee Consumption	39	26.71

Relationship between Coffee Consumption and Prehypertension

Based on Table 3, out of 39 respondents (26.71%) with poor coffee consumption, 28 respondents (71.80%) had poor coffee consumption with blood pressure at the prehypertension level, while 31 respondents (28.97%) had good coffee consumption with blood pressure at the prehypertension level. The results of calculations with the Chi-square test showed a value of $p = 0.00$, meaning $p < 0.05$, so it can be concluded that coffee consumption has a relationship with prehypertension in final year students of Universitas Airlangga. The risk of coffee consumption on the incidence of prehypertension is significant with 95% CI which is 2.47.

Relationship between Sleep Quality and Prehypertension

Based on Table 4, out of 106 respondents (72.60%) who have poor sleep quality, 50 respondents (47.20%) have poor sleep quality with blood pressure at the prehypertension level, while nine respondents (22.50%) have good sleep quality with blood pressure at the prehypertension level. According to the results of statistical tests it obtained p value of 0.01 which means $p < 0.05$, so it can be concluded there is a relationship between sleep quality and prehypertension in final year students of Universitas Airlangga. The risk of sleep quality on prehypertension is significant with 95% CI is which 2.09.

DISCUSSION

Prehypertension is rarely felt by university students. That is why, most of them rarely check their blood pressure. This makes prehypertension in students more difficult to detect. The higher the case of hypertension, the higher the case of prehypertension. There are many factors that affect students' blood pressure, including coffee consumption and sleep quality, which are often associated with prehypertension, especially in final year students (17).

Final year students who are in the process of making a thesis have a heavier burden because they have a tendency to daydream, complain, are lazy to socialize, restless, and have decreased concentration, so that it can affect sleep quality and coffee consumption patterns (18,19). Students who have a heavy load tend to experience poor sleep quality. Blood pressure can increase due to poor sleep quality, which triggers changes in the stress hormone cortisol and sympathetic nervous system response (20).

In addition, some people who have a lot on their mind tend to choose to consume coffee as a form of diversion because by consuming coffee, it will cause a feeling of calmness and reduce the burden of stress (21).

Table 3
Relationship between Coffee Consumption and Prehypertension

Coffee Consumption	Blood Pressure				Total		Prevalence Ratio (PR)	CL (95%)
	Prehypertension		Normal					
	n	%	n	%	∑	%		
Bad	28	71.80	11	28.20	39	100	2.47	1.73-3.53
Good	31	28.97	76	71.03	107	100		
Total	59	40.41	87	59.59	146	100		

Table 4
Relationship between Sleep Quality and Prehypertension

Coffee Consumption	Blood Pressure				Total		Prevalence Ratio (PR)	CL (95%)
	Prehypertension		Normal					
	n	%	n	%	∑	%		
Bad	50	47.20	56	52.80	106	100	2.09	1.14-3.85
Good	9	22.50	31	77.50	40	100		
Total	59	40.40	87	59.60	146	100		

Relationship between Coffee Consumption and Prehypertension

Various studies have shown an association between poor coffee consumption and prehypertension, as consuming coffee can increase blood pressure directly. Then, the effect of caffeine consumption will be felt within 5-30 minutes and gradually up to 12 hours after coffee consumption (22). In addition, based on a review of 34 studies, the Indonesian Ministry of Health states that consuming 200-300mg of caffeine from coffee (about two cups of coffee) can increase systolic blood pressure by 8 mmHg and diastolic blood pressure by 6 mmHg (15). Caffeine consumption in coffee is also a risk factor for hypertension (23). According to research on coffee consumption behavior and the risk of hypertension, there is a relationship between coffee consumption and blood pressure in hypertensive patients (24).

In addition, research on risk factors for hypertension shows that people who regularly consume coffee have a 2.234 times risk of developing hypertension (25). According to research on high blood pressure risk factors associated with coffee drinking habits, it is proven that people who regularly consume 1-2 cups of coffee by day are 4.12 times more likely to develop hypertension than those who do not regularly consume coffee (15).

Relationship between Sleep Quality and Prehypertension

Several studies support that there is a correlation between poor sleep quality and prehypertension. Poor sleep quality can cause changes in the stress hormone cortisol and the sympathetic nervous system which can result in increased blood pressure and relapse in people with hypertension (26,27). According to the United States Department of Health and Human Services 2013, lack of sleep can also disrupt hormone production, body metabolism, and increase blood pressure. According to the CDC, hypertension is more common in individuals who sleep less than seven hours a night because during sleep a person's blood pressure tends to decrease and, if a person sleeps less than the normal limit, then his blood pressure will be higher for a longer time, which is the cause of increased blood pressure. Research states that poor sleep quality will increase the occurrence of hypertension by 1.48 times because it will increase the average systolic blood pressure (28,29).

Research Limitations

It is difficult to find respondents who had a blood pressure check within the last month after completing the questionnaire and having a health professional conduct the examination. Furthermore, the fact that blood pressure measurement tools vary and all tools have yet to be calibrated can create bias in each measurement. To minimize bias, researchers can do it in one place with a time limit agreed upon by researchers and respondents, then re-check using the same tool.

CONCLUSIONS

Most of the respondents had prehypertension blood pressure, had a habit of drinking coffee, and had poor sleep quality. There was an association between coffee consumption, sleep quality, and prehypertension incidence. Therefore, it can be concluded that coffee consumption and sleep quality are risk factors associated with prehypertension in final-year students of Universitas Airlangga.

CONFLICT OF INTEREST

There are no conflicts of interest in this paper.

AUTHOR CONTRIBUTIONS

DRNF: Writing. FBL: Writing, Reviewing, and Data Collection. LYH: Writing, review, editing, and supervision. NMGM: Editing and Reviewing.

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