



The relationship of fast food, consumption habits, hemoglobin levels, and sleep quality to menstrual cycle

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ABSTRAK

Latar Belakang: Masalah kesehatan yang sering terjadi pada remaja putri adalah gangguan siklus menstruasi. Prevalensi gangguan siklus menstruasi mengalami peningkatan dari tahun 2012 sebesar 45% menjadi 80% pada tahun 2018.

Tujuan: Penelitian ini bertujuan untuk mengidentifikasi karakteristik responden, mengetahui hubungan antara kebiasaan konsumsi fast food, kadar hemoglobin dan kualitas tidur terhadap siklus menstruasi. Menganalisis variabel independent yang memberikan pengaruh paling dominan terhadap variabel dependen.

Metode: Desain penelitian menggunakan metode kuantitatif observasional analitik dengan pendekatan case control. Teknik pengambilan sampel yang digunakan adalah purposive sampling. Pengambilan data siklus menstruasi menggunakan kuesioner dan kalender menstruasi, data kebiasaan konsumsi fast food diperoleh dengan wawancara menggunakan FFQ, data kadar hemoglobin berdasarkan pemeriksaan menggunakan alat Easy Touch GC-Hb, sedangkan data kualitas tidur diperoleh menggunakan kuesioner PSQI. Analisis data menggunakan Chi-square, kemudian dilanjutkan dengan analisis multivariat regresi logistic.

Hasil: Karakteristik responden pada penelitian ini berdasarkan usia sebagian besar adalah berusia 19 tahun, dengan 49% pada kelompok kasus, dan 44% pada kelompok kontrol. Mayoritas responden memiliki uang saku sebesar Rp.500.000-1.000.000 dengan persentase pada kelompok kasus dan kelompok kontrol adalah 51%. Usia menarce responden dalam penelitian ini sebagian besar adalah 12 tahun dengan persentase sebesar 37%. Karakteristik responden pada kelompok kasus dan kontrol mayoritas memiliki distribusi karakter yang sama berdasar usia 19 tahun, uang saku sebesar Rp.500.000-1.000.000 dan usia menarce 12 tahun. Hasil analisis menunjukkan terdapat hubungan antara kebiasaan konsumsi fast food terhadap siklus menstruasi (p -value= 0,002, OR= 4,359), terdapat hubungan antara kadar hemoglobin terhadap siklus menstruasi (p -value= 0,003, OR= 4,308), dan terdapat hubungan antara kualitas tidur terhadap siklus menstruasi (p -value= 0,000, OR= 18,519).

Kesimpulan: Terdapat hubungan antara kebiasaan konsumsi fast food, kadar hemoglobin dan kualitas tidur terhadap siklus menstruasi. Kadar hemoglobin berisiko lebih tinggi terhadap siklus menstruasi dibandingkan dengan kebiasaan konsumsi fast food, dan kualitas tidur (p -value= 0,042).

KATA KUNCI: fast food; kadar hemoglobin; kualitas tidur; siklus menstruasi



ABSTRACT

Background: A health problem that often occurs in adolescent girls is disrupting the menstrual cycle. The prevalence of menstrual cycle disorders has increased from 2012 by 45% to 80% in 2018.

Objectives: This study aims to identifying respondent characteristics, determine the relationship between fast food consumption habits, hemoglobin levels and sleep quality on the menstrual cycle. Analyzing which independent variable exerts the most dominant influence on the dependent variable.

Methods: This research design used analytical observational quantitative methods with a case-control approach. The sampling technique used uses purposive sampling. Data collection for menstrual cycles using questionnaires and calendars, data on fast food consumption habits were obtained by interviews using FFQ, and hemoglobin level data were obtained by examination using the Easy Touch GC-Hb tool. In contrast, sleep quality data were obtained using PSQI questionnaires. Data were analyzed by Chi-square then continued with multivariate logistic regression analysis.

Results: The characteristics of respondents in this study based on age mainly were 19 years old, with 49% in the case group and 44% in the control group. Most respondents have an allowance of Rp.500,000-1,000,000, with the percentage in the case group and control group 51%. The menarche age of respondents in this study was mainly 12 years, with a rate of 37%. The characteristics of respondents in the case and control groups mostly have the same distribution of characteristics based on age 19 years, allowance/month of Rp.500,000-1,000,000 and age of menstruation 12 years. The study results showed a relationship between fast food consumption habits on the menstrual cycle (p -value= 0.002, OR= 4.359) and there was a relationship between hemoglobin levels on the menstrual cycle (p -value= 0.003, OR= 4.308). There was a relationship between sleep quality on the menstrual cycle (p -value= 0.000, OR= 18.519).

Conclusions: There was a relationship between fast food consumption habits, hemoglobin levels and sleep quality on the menstrual cycle. Hemoglobin levels are at higher risk of menstrual cycles than fast food consumption habits and sleep quality (p -value= 0.042).

KEYWORD: fast food; hemoglobin levels; menstrual cycle; sleep quality

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INTRODUCTION

Globally adolescents' health is becoming a priority since the health state of the following decade's population will be influenced by the current health status of adolescents (1). Menstrual cycle disruption is one of adolescent girls' most common health issues (2). According to the WHO, the prevalence of menstrual cycle disorders grew from 45% in 2012 to 80% in 2018(3). In Indonesia, most menstrual cycle disorders increased from 13.7% in 2013 to 14.5% in 2018 (4).

Menstrual cycle disturbances can signify a woman's fertility and a risk factor for various reproductive illnesses (5). A hormone system regulates the menstrual cycle, with fat in the body

playing a crucial part in generating these hormones (6). Unbalanced nutritional content in meals can alter the balance of hormones in the body (7). According to UNICEF (2020), the prevalence of unhealthy eating practices among adolescents aged 15 to 19 has increased (8). 69% of fast food consumers are adolescents. Fast food is harmful because its nutritional content is unbalanced (9).

According to studies conducted by Lubis (10) and Rahma (3), there was a relationship between fast food consumption and the menstrual cycle. As stated in Al-Qur'an surah Ar-Rahman: 7-9 addressing the balance of justice, consuming food

with a balanced nutritional value requires attention. Allah SWT created the heavens and the earth according to justice and fairness so everything functions properly. As Allah's word is also mentioned in QS. Al-Hadid: 25 and QS. Al-Isra: 35, humans are commanded to uphold and balance the scales of justice (11). Therefore, humans should consume food with a balanced nutritional content without exceeding or decreasing the recommended intake (12).

At the Universitas Darussalam Gontor dormitory life has been supervised, and structured. Fitrieningtyas et al (13) observations revealed that adolescents living in dorms have poor health behaviors. This occurs in part due to the absence of direct parental supervision, as parents are a factor in the attitude and behavior of adolescents (14). Based on the preceding explanation of the problem's context, the researchers wished to determine whether or not there is a relationship between fast food consumption, hemoglobin levels, and sleep quality on the menstrual cycle in late adolescents living at dormitories. This study differs from previous studies in independent variables and the place. The update of this study is on fast food consumption habits, hemoglobin levels, and sleep quality, design of the study uses observational analytics with a case-control approach, and the subject of the study is late adolescents living at dormitories.

MATERIALS AND METHODS

This research used quantitative methods with the type of analytical observational research, design was case-control with backward observation related to risk factors associated with the menstrual cycle. This research was conducted at the Universitas Darussalam Gontor from November 2022 to February 2023. The population in this study was female students of the Universitas of Darussalam Gontor who were classified as late adolescents with an age range of 17-20 years. The sample size in this study used the Purposive sampling technique with Lemeshow's formula (1997), the minimum sample size was 39 samples calculated using the hypothesis test for odds ratio calculation. The sample size was increased by 10% to 43 to prevent dropout. The comparison for case and

control groups was 1:1, then the total of samples needed in this research was 86 samples.

The analyzed sample consisted of cases and controls, with the inclusion criteria for the case sample having experienced menstruation with abnormal cycles. While the inclusion criteria for the control sample having experienced menstruation with abnormal cycles. Exclusion criteria include having an eating disorder, and on diet program while the research was ongoing. Independent variables in this research were fast food consumption habits, hemoglobin levels, and sleep quality. The dependent variable in this research was the menstrual cycle. This research has received approval from Health Research Ethics Commission Universitas Negeri Semarang by the number: 049/KEPK/EC/2023.

Menstrual cycle data was taken from the annual calendar given to respondents and a menstrual cycle questionnaire with 5 questions. The questionnaire given was modified by Pibriyanti et al (15) and Shafira (16). The menstrual cycle questionnaire in this study contained 5 questions with 4 multiple-choice questions and 1 open-ended question. The measured menstrual cycle was carried out by looking at the respondent's menstrual history experienced during the last 3 months on the menstrual calendar before data collection and was categorized normal, if the menstrual cycle is between 21-35 days, with a menstrual duration of 3-7 days and abnormal, if the menstrual cycle is less than 21 days or more than 35 days (5).

Fast food consumption habits were collected using the Food Frequency Questionnaires (FFQ) consumption survey method. Fast food consumption habits are measured by looking at consumption history for the last 1 month using a Likert scale and categorized 3-4x/week get score 2, 1-2x/week get score 1, and never get score 0(10). The highest score is 54, with the lowest score being 0. Fast food consumption is then divided into 2 categories, often if respondents score above the population average of ≥ 17.31 and rarely if respondents score below the population average of < 17.31 .

A hemoglobin level check will be done in the morning. The method used is POCT, with the tools used being digital hemoglobinometers in the form of Easy Touch GC-Hb, lancets, hemoglobin test

strips, alcohol cotton, gauze, handscoop, and masks. Blood collection using capillary blood vessels was carried out on the fingertips of respondents. The results of the hemoglobin level examination that have been obtained are then categorized into normal if score ≥ 12 g/dL – 15,5 g/dL, and abnormal if score < 12 g/dL and $> 15,5$ g/dL (17).

Data collection techniques on sleep quality using the Pittsburgh Sleep Quality Index (PSQI) questionnaire version Indonesian. These questionnaires have been tested for validity and rehabilitation and widely used in sleep quality research. The advantage of using PSQI is that the value of validity and reliability is relatively high. Still, the disadvantage of PSQI is that it is found in filling out questionnaires to reduce the difficulty of respondents when filling out questionnaires, and assistance is needed (18). The PSQI questionnaire consists of 9 questions using an ordinal scale. The overall PSQI score is 0 to 21, obtained from 7 assessment components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, medication use, and daytime

disfunction. The PSQI questionnaire was then categorized into good if score ≤ 5 , and bad if score > 5 .

The data obtained is then analyzed for processing using the SPSS 16.0 for Windows statistical application. The analysis was carried out through 3 stages: univariate, bivariate, and multivariate. The univariate analysis aims to explain the characteristics of each research variable, with results given in the form of percentages. The bivariate analysis used was Chi-Square Test, which aims to determine the relationship between 2 variables, namely the independent variable with the dependent variable. Because all independent variables are related, it is continued with multivariate analysis, which aims to find out the independent variables that most influence the dependent variable. This study used logistic regression analysis because the dependent variable was categorical.

RESULTS AND DISCUSSIONS

Table 1. explains that most of the age of respondents from the case and control groups was 19 years, with a percentage of 47%.

Table 1. Characteristic of respondents

Characteristics	Case		Control		Total	
	n	%	n	%	n	%
Age						
18 years old	16	37	17	40	33	38
19 years old	21	49	19	44	40	47
20 years old	6	14	7	16	13	15
Allowance /month						
IDR <500.000	18	42	15	35	33	38
IDR 500.000-1.000.000	22	51	22	51	44	51
IDR >1.000.000	3	7	6	14	9	11
Menarcho Age						
<12 years old	8	18	3	7	11	13
12 years old	14	33	18	42	32	37
13 years old	8	19	10	23	18	21
14 years old	5	12	8	19	13	15
>14 years old	8	18	4	9	12	14
Fast Food Consumption Habits						
Often	27	63	12	28	39	45
Rarely	16	37	31	72	47	55
Hemoglobin Levels						
Abnormal	28	65	13	30	41	48
Normal	15	35	30	70	45	52
Sleep Quality						
Bad	40	93	18	42	58	67
Good	3	7	25	58	28	33

As many as 49% of respondents in the case group were 19 years old and 44% in the control group. Most of the allowance respondents own IDR 500,000-1,000,000, with a percentage of 51%. In the case and control group respondents, most had an allowance of IDR 500,000-1,000,000, with the portion of each group being 51%. 37% of respondents experienced menarche, namely at the age of 12, with a percentage of 33% in the case group and 42% in the control group. Based on the results of this study, it can be seen that the normal menstrual cycle mainly occurs in respondents aged 12 years of menarche, which is 42%. This aligns with research conducted by Melati (19) on adolescent girls at SMA X, which states a significant relationship between the age of menarche and the incidence of menstrual cycle disorders.

The age of menarche relates to the time it takes to achieve a more regular ovulation cycle. In women with early menarche, 50% of ovulation cycles occur in the first year after experiencing menarche. While in women who experience late menarche, it takes about 8-12 years to be able to ovulate completely (9). According to Andriana et al (20), the menstrual cycle in adolescent girls will become more regular at 17-18 years or 3-5 years after adolescent girls experience menarche.

Based on the result, it can be seen that the highest percentage of the category of frequent consumption of fast food is in the case group of

63%, and the lowest rate in the control group of 28%. While the highest percentage of the category of rarely consumed fast food was in the control group at 72%, and the lowest rate was found in the case group at 37%. Fast food is practical, inexpensive, can be served quickly, and straightforward. In general, this food is produced by the high-tech food processing industry (34). According to research by UNICEF (2020), fast food consumption among adolescents has increased (35) Adolescents make up approximately 69% of fast food consumers (36). Adolescents are motivated to consume fast food because it has intriguing characteristics.

Respondents' hemoglobin levels in the case group were mainly abnormal, with a percentage of 65%. While in the control group, most respondents had normal hemoglobin levels, which was 70%. Female adolescents at greater risk for anemia than their male counterparts. Young men have a prevalence of 21% for anemia, while young women have a majority of 30% (37).

Most respondents in this study had poor sleep quality, with a percentage of 67%. The highest rate of poor sleep quality was found in the case group at 93%, and the lowest rate of poor sleep quality was found in the control group at 42%. While the highest percentage of good sleep quality was found in the control group at 58%, and the lowest rate of good sleep quality was found in the case group at 7%.

Table 1. The Relationship of fast food consumption habits, hemoglobin levels, and sleep quality to menstrual cycle

Category	Case		Control		OR	95% CI	p-value
	n	%	n	%			
Fast Food Consumption Habits							
Often	27	63	12	28	4.359	1.756-10.820	0.002
Rarely	16	37	31	72			
Hemoglobin Levels							
Abnormal	28	65	13	30	4.308	1.745-10.635	0.003
Normal	15	35	30	70			
Sleep Quality							
Bad	40	93	18	42	18.519	4.945-69.354	0.000
Good	3	7	25	58			

Table 2. shows the results of statistical tests using Chi-Square between fast food consumption habits and menstrual cycles obtained a p-value of 0.002 (<0.05), so it was known that there was a relationship between fast food consumption habits and menstrual cycles. The OR value obtained was

4,359, so it is known that respondents who often consume fast food were at a 4,359 times higher risk of experiencing abnormal menstrual cycles compared to respondents who rarely consume fast food. Based on the results of this study, the p-value of hemoglobin levels with the menstrual

cycle is 0.003 (<0.05), so it was known that there was a relationship between hemoglobin levels and the menstrual cycle. The OR value obtained was 4.308, so it was known that respondents who have abnormal hemoglobin levels were at a 4.308 times higher risk of experiencing abnormal menstrual cycles compared to respondents who have normal hemoglobin levels.

The analysis results of the relationship between sleep quality and the menstrual cycle have a p-value of 0.000 (<0.05), so it is known that there was a relationship between sleep quality and the menstrual cycle. Obtained an OR value of 18,519, it is known that respondents with poor sleep quality have a risk of 18,519 times higher experiencing abnormal menstrual cycles compared to respondents with good sleep quality.

The relationship of fast food consumption habits to the menstrual cycle

This study showed a relationship between fast food consumption habits on the menstrual cycle with a p-value of 0.002 (<0.05), in line with research conducted by Rahma (3) on adolescent girls at SMAN 12 Bekasi City, which states that there was a significant relationship between fast food consumption habits and the menstrual cycle. Research conducted on junior high school students of Yayasan Perguruan Panca Budi Kota Medan in 2018 also stated that there was a relationship between fast food consumption habits and the menstrual cycle (10).

In this research, fast food most frequently consumed by respondent based on FFQ data was fried rice and chicken noodle. According to Faukonuri (12), fast food has unbalanced nutritional value. Consumption of foods with balanced dietary values needs attention because the food's nutritional content can affect the body's balance of hormones (7). The menstrual cycle is controlled by hormones found in the female body (6). When there is a disruption of the menstrual cycle, it is associated with a disorder of hormonal balance in the female body (5). The disrupted balance between the disrupted hormones FSH and LH will trigger estrogen and progesterone levels to be abnormal (21).

Unbalanced nutrient intake can affect the menstrual cycle. Someone with more nutritional status (overweight) tends to experience chronic abnormal menstruation. This is because they tend

to have excess fat cells so that the body will produce excess estrogen. While in someone who has less nutritional status (underweight), fat cells owned by the body are not enough to produce estrogen, resulting in abnormal menstruation(6).

The relationship of hemoglobin levels to the menstrual cycle

Based on the results of this study, it can be seen that there was a significant relationship between hemoglobin levels and menstrual cycles with a p-value of 0.003 (<0.005). In line with research conducted by Barus (22) on adolescents at Khatolik Kabanjahe High School, which states that there was a significant relationship between hemoglobin levels on the menstrual cycle with a p-value of 0.000 (<0.05).

The hemoglobin level in the blood is an indicator used to establish the diagnosis of anemia (23). In a body with low hemoglobin levels, it will result in anemia, which is characterized by symptoms of fatigue, shortness of breath, paleness, and dizziness. While in a body with high hemoglobin levels, which is around 18-19 g / ml, can cause viscosity in the blood that can trigger stroke (24).

Munawaroh and Supriyadi (25) mentioned that the menstrual cycle is a recurring phenomenon of simultaneous complex cooperation in the hypothalamus, pituitary gland, and ovaries. Suppose hemoglobin levels in the body are not balanced. In that case, it will affect the body's metabolism, and nerve cells do not function optimally. It will be decreasing the acceleration of nerve inputs, and disrupt the dopamine receptor system and the oxygen supply to the hypothalamus will be low (26).

Poor hypothalamus performance will affect the production of hormones to stimulate the maturation of the reproductive glands, and the release of sexual hormones will be inhibited (2). The hypothalamus does not provide anterior pituitary stimulation to produce FSH, which plays a role in stimulating follicle growth in the egg, and LH, which plays a role in maturing the egg to be fertilized. Disrupted FSH and LH production will affect the menstrual cycle in women (27). The results of this study contradict the research conducted by Sihotang on Tri Sakti Lubuk Pakam High School students, who obtained the results that there was no significant relationship between

anemia status and menstrual cycle with p-value 0,09 (>0,05) (2).

The relationship of sleep quality to the menstrual cycle

There was a significant relationship between sleep quality and menstrual cycle with a p-value of 0.000 (<0.05). In line with research conducted by Siregar et al (28) on 109 female students of the UISU Faculty of Medicine, which states that there was a relationship between sleep quality and menstrual cycles with a p-value of 0.005 (<0.05). The results of this study are also supported by research conducted by Windiana (29), which states that there was a significant relationship between sleep quality and the menstrual cycle.

This analysis showed that the average respondent had a sleep duration of 5 hours every night. Research conducted by Siregar et al (28) states that sleep duration significantly influences a person's sleep quality, with lifestyle and gadget habits triggering the disorder. This can happen because advances in gadget technology can keep users awake until late, enjoying gadgets' ability.

Poor sleep quality can adolescents various health problems, one of which is the health of the reproductive organs, namely menstrual cycle

disorders, by inhibiting the hormone melatonin (30). The hormone melatonin is a hormone synthesized at night by the pineal gland (31). Melatonin inhibits steroids by decreasing the expression of StAR, P450 SCC, 3β-HSD, and 17β-HSD proteins, which are steroidogenic enzymes. Steroidogenic enzymes have an essential role in the regulation of the hormone estrogen (32). If melatonin production is inhibited and not optimal, then estrogen levels in the body continue to increase. This will trigger menstrual cycle disorders (28).

The results of this study are not in line with research conducted by Deviliawati and Sayati (33), which states that there was no relationship between sleep quality and menstrual cycles with a p-value of 1,000 (>0.05). The difference in the results of this study can be caused by differences in techniques in data collection carried out online in previous studies. In contrast, in this study, data collection was carried out by direct interviews. According to Riyadi and Sari (18), filling out PSQI requires assistance to reduce the difficulty of respondents in the questionnaire filling process. According to researchers, the difference in research results is caused by techniques in data collection.

Table 3. Multivariate Analysis of Logistic Regression

	Koefisien	S.E	Wald	df	Nilai p	OR	IK 95%	
							Min	Max
Fast Food Consumption Habits	-1.443	.575	6.299	1	.012	2.36	0.77	2.79
Hemoglobin levels	-1.139	.560	4.131	1	.042	3.20	1.07	9.60
Sleep Quality	-2.790	.722	14.921	1	.000	0.610	0.150	2.53
Konstanta	3.219	.775	17.234	1	.000	24.999		

Because all independent variables have a relationship with the menstrual cycle, it is continued by conducting a multivariate logistic regression analysis. Multivariate analysis is carried out by combining several independent and dependent variables at the same time to determine the independent variable that has the most dominant influence on the dependent variable. After being analyzed using the Backward LR method, it was found that the most influential variable on the menstrual cycle was hemoglobin levels, with a p-value of 0.042 (<0.05), meaning there was a relationship between hemoglobin levels and the menstrual cycle. Hemoglobin levels

are 0.032 times higher risk of the menstrual cycle than fast food consumption habits and sleep quality.

Because all independent variables have a relationship with the menstrual cycle, and meet the requirements for multivariate testing, it is continued by conducting a multivariate logistic regression analysis. Multivariate analysis was carried out by combining several independent and dependent variables at once to determine the independent variable that has the most dominant influence on the dependent variable using the backward method. Based on coefficient value on fast food consumption habits, it showed that fast

food consumption has experience to menstrual cycle with an OR value = 2.36 indicating that fast food consumption has a risk of 2.36 times experiencing menstrual cycle disorders. The negative hemoglobin level coefficient value showed that abnormal hemoglobin levels has experience to the menstrual cycle with an OR value = 3.20 indicating that abnormal hemoglobin levels have a risk of 3.20 times experiencing menstrual cycle disorders. The negative coefficient value on sleep quality means that bad sleep quality tends to disrupt the menstrual cycle with an OR value = 0.6 meaning that bad sleep quality has a risk of 0.6 times higher experiencing menstrual cycle disorders.

CONCLUSIONS AND RECOMMENDATIONS

There was a relationship between fast food consumption habits and menstrual cycles in late adolescents living at dormitories with a p-value of 0.002 (<0.05). There was a relationship between hemoglobin levels and menstrual cycles in late adolescents living at dormitories, with a p-value of 0.003 (<0.05). There was an association between sleep quality and menstrual cycles in late adolescents living at dormitories with a p-value of 0.000 (<0.05). Hemoglobin levels are 0.032 times greater risk of the menstrual cycle compared to fast food consumption habits and sleep quality. However, further research is needed by adding other variables to get better research results and cover the shortcomings of previous researchers.

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