CAFFEINE AND JUNK FOOD CONSUMPTION AFFECT THE LEVEL OF DYSMENORRHEA PAIN IN MIDWIFERY STUDENTS

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ABSTRACT

Dysmenorrhea is the most common gynecological problem among adolescents and can be influenced by various factors such as unhealthy food. Many female students consume junk food and caffeine today. The purpose of this study was to determine whether there is a relationship between caffeine consumption and junk food consumption on the level of dysmenorrhea pain. This was observational analytic research with a cross-sectional design and used a questionnaire as the measuring tool. The population in this study was all midwifery students at the Sultan Agung Islamic University, Semarang. The sample in the study was 77 female students taken using a simple random sampling technique. The prevalence of dysmenorrhea is 96% in this study. The correlation test showed a p-value of 0.009 for caffeine consumption with a coefficient correlation of 0.294 and a P-value of 0.022 for junk food consumption with a coefficient correlation of 0.261 on the level of dysmenorrhea pain. Most students suffer from dysmenorrhea. There is a significant relationship between caffeine consumption and junk food consumption on the level of dysmenorrhea pain. Increasing awareness of consuming healthy food is needed.

Keywords: Caffeine, Dysmenorrhea, Junk Food

INTRODUCTION

Dysmenorrhea is menstrual pain that includes lower abdominal cramps, groin pain, back pain, low back pain, and thigh pain that occurs just before and/or during the menstrual period. Dysmenorrhea is a common gynecological problem for teenagers. The incidence of dysmenorrhea reported from some research, such as a study in Poland reported the prevalence of dysmenorrhea is 94% (Barcikowska et al., 2020). A study in Kuwait reports 85.6% of adolescents to suffer from dysmenorrheal (Alrahal et al., 2020), in Iran 84.1% (Habibi et al., 2015), in India 64.6% (Verma & Baniya, 2022), in Turkey 72.7% (Molla et al., 2022), in Ethiopia 64.7% (Azagew et al., 2020), and in China 41.7% (Hu et al., 2020).

In Indonesia, some previous studies found that dysmenorrhea prevalence is high enough. A study in senior high school 1 Makasar found that the prevalence of dysmenorrhea is 87.6% (Pratiwi, 2017). Another study in the Medicine Faculty of Jendral Sudirman University showed the prevalence of dysmenorrhea is 61.7% (Pundati et al., 2016) and a study in Medan showed the prevalence of dysmenorrhea in senior high school students is 73.7%. Studies in Central Java showed the prevalence of dysmenorrhea varied from 68% to 83.6% (Wibowo, 2023) (Rejeki, 2019) (Ardhana & Hastuti, 2018) (Rohmawati & Wulandari, 2020).

The cause of dysmenorrhea is a hormonal imbalance in the body, one of which is prostaglandin. Increased prostaglandin levels will stimulate an increase in the frequency and amplitude of uterine smooth muscle
contractions, which then causes menstrual pain (dysmenorrhea) (Alrahal et al., 2020). Factors that influence dysmenorrhea are family history of dysmenorrhea (Molla et al., 2022), body mass index (Niloh et al., 2020), menstrual cycle (Azagew et al., 2020), the onset of menarche and physical activity (Barcikowska et al., 2020), alcohol (Yesuf et al., 2018), high fatty food consumption (Mesele et al., 2022), caffeine (Alrahal et al., 2020), diet (Bajalan et al., 2019), excessive consumption of sugar and menstrual flow (Muluneh et al., 2018), living at home (Habibi et al., 2015), and minority in a region (Hu et al., 2020).

According to (Mesele et al., 2022) consuming fatty foods is 2.03 times more likely to cause dysmenorrhea. It can increase the hormone prostaglandin which causes pain in the lower abdomen or dysmenorrhoea (Oktorika et al., 2020). Irregular eating, including dieting, is also something that influences the incidence of dysmenorrhea because lack of nutrition can cause changes in hormone levels due to reduced energy intake in the body (Bajalan et al., 2019). In addition, sugar and caffeine cannot be separated from teenagers, especially students. Previous research regarding the influence of diet on dysmenorrhea stated that excessive sugar consumption can cause obesity, and BMI above the normal limit influences the incidence of dysmenorrhea (Muluneh et al., 2018). Excessive caffeine consumption increases prostaglandin synthesis, the effect of which apart from causing ischemia, also stimulates an increase in the frequency and amplitude of uterine smooth muscle contractions, which then causes primary dysmenorrhea (Alrahal et al., 2020). Junk food consumption is also a factor that influences the incidence of dysmenorrhea. Prostaglandins will help the uterus contract and shed the lining of the uterus during menstruation. In women with dysmenorrhea, there is a buildup of too much prostaglandin or the uterus is very sensitive to prostaglandin. As a result, the uterus will contract harder. If the body consumes more and more junk food, the amount of prostaglandin in the body will increase, causing dysmenorrhea (Sundari et al., 2020).

Although dysmenorrhea is a common complaint among adolescents, it can affect women of all reproductive ages and has a major impact on quality of life, work productivity, and health service utilization. About 10%–15% of women experience severe menstrual pain, which threatens to hinder normal daily activities at work, home, or school. Generally, dysmenorrhea affects a large number of adolescent girls, including the social, academic, and even psychological aspects of life. Failure to overcome the problem of dysmenorrhea can cause social and financial burdens for families, neighbors, society, and the world in general (Molla et al., 2022).

Dysmenorrhea during menstruation affects the daily activities of up to 61.2% of respondents (Ameade et al., 2018). Meanwhile, a study by (Söderman et al., 2019) on 1580 women who experienced dysmenorrhea had an impact on fatigue in 83%, headaches in 82%, dyschezia in 37%, and dysuria in 35% of women. This study also reported that 59% refrained from social activities due to dysmenorrhea, 14% of absences from school occurred every month and 45% occurred several times a year.

Dysmenorrhea or menstrual pain is a normal condition, but sometimes the pain becomes very disturbing. Therefore, treatment is needed to help relieve it. Efforts to deal with dysmenorrhea include rest, avoiding foods that contain caffeine and salt, avoiding tobacco and alcohol, massaging the lower back and stomach, consuming food supplements, managing stress, acupuncture, or acupressure. Regular exercise is also considered capable of reducing menstrual pain. If all of those efforts can not help, it is recommended to visit a physician (Kementrian Kesehatan Direktorat Jendral Pelayanan Kesehatan, 2022).

A preliminary study of Sultan Agung Islamic University (Unissula) midwifery students showed that most of the students from the class of 2022 experienced primary dysmenorrhea on days 1-3 of menstruation. The results of interviews regarding caffeine and junk food consumption revealed that on average female students consume drinks containing caffeine such as tea and coffee every day and consume
junk food. The rise of sweet drink shops and coffee shops among young people is a contributing factor to the high consumption of caffeine and sugar among these groups. Besides that, the consumption of junk food among female students is also very widespread, especially fried food. This study aimed to analyze the correlation between junk food and caffeine consumption with dysmenorrhea in midwifery students of Unissula.

METHOD

This cross-sectional study was conducted with a survey of female students at the Midwifery Study Program at Sultan Agung Islamic University. We used the Slovin formula to calculate the minimum sample need with a population of 340 students and a critical value of 10%. A minimum sample of 77 was obtained. Sample selection used simple random sampling with inclusion and exclusion criteria.

The inclusion criteria in this study were female students who were willing to become research respondents, while the exclusion criteria in this study were: female students who experienced non-primary dysmenorrhea or female students who experienced menstrual pain accompanied by pelvic pathology or other diseases, female students who had been the subject of a preliminary study, and female students with non-normal body mass index (BMI), menarche <12 years, irregular menstrual cycle, and family history of dysmenorrhea from both mother and older sibling.

Prospective respondents have explained the research and filled out a questionnaire after agreeing to informed consent. This research has received ethical approval from the Ethics Committee of the Faculty of Medicine, Unissula with number 394/ XI/ 2023/ Bioethics Commission.

We used questionnaires to record the data needed. WallID Score questionnaire was used to determine the level of dysmenorrhea pain, which contains four questions, including activity limitations, location of pain, frequency of pain, and duration of menstrual pain with the measurement results being no dysmenorrhea, mild dysmenorrhea, moderate dysmenorrhea, and severe dysmenorrhea. Caffeine consumption was measured using the Beverages Score Questionnaire which contains questions related to the consumption of caffeinated drinks, namely, carbonated drinks, tea, coffee, and energy drinks. Junk food consumption was measured using a standard questionnaire with one question covering various types of junk food such as instant noodles, biscuits, cookies, chips, chocolate, cakes, donuts, ice cream, and all types of fast food (fried chicken, French fries, burgers, pizza). The result described the respondent’s frequency of junk food consumption, namely never, rarely, often, and very often (Bohara et al., 2021).

The data collection in this study was done online and offline. Students who attend an offline lecture schedule fill out the questionnaire offline, while female students with online lectures fill out the questionnaire via Google Forms. The data that has been collected is processed and analyzed by using a computer program. Characteristics of respondents such as age, place of residence, eating habits, levels of dysmenorrhea, junk food consumption, and caffeine consumption calculated using the percentages formula. Bivariate analysis used the Spearman rank test with a significance of 0.05.

Table 1. Respondent characteristic

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-20</td>
<td>52</td>
<td>67.5%</td>
</tr>
<tr>
<td>21-25</td>
<td>25</td>
<td>32.5%</td>
</tr>
<tr>
<td>Living in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitory</td>
<td>52</td>
<td>67.5%</td>
</tr>
<tr>
<td>House</td>
<td>25</td>
<td>32.5%</td>
</tr>
<tr>
<td>Daily Eating habit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy food</td>
<td>38</td>
<td>49.4%</td>
</tr>
<tr>
<td>Cook</td>
<td>39</td>
<td>50.6%</td>
</tr>
</tbody>
</table>

Table 1 displays the frequency distribution of respondent characteristics, which in this study consisted of age, residence, and daily eating habits. The largest proportion was aged 16-20 years (67.5%). Then for residence, the majority of respondents live in boarding houses (67.5%)
and only 32.5% of respondents live at home. Meanwhile, for the daily eating habits of respondents, 49.4% of students cook, and 39 female students (50.6%) buy food.

Table 2. Frequency distribution of Level of Dysmenorrhea Pain

<table>
<thead>
<tr>
<th>Level of Menstrual Pain</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pain</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Mild</td>
<td>43</td>
<td>57.3%</td>
</tr>
<tr>
<td>Moderate</td>
<td>26</td>
<td>33.3%</td>
</tr>
<tr>
<td>Severe</td>
<td>5</td>
<td>5.3%</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 shows the frequency of dysmenorrhea pain levels experienced by respondents in the study. The research results showed that 96% of respondents experienced dysmenorrhea and only 3 out of 77 respondents did not experience dysmenorrhea. The 72 respondents who experienced dysmenorrhea consisted of 43 female students with mild dysmenorrhea, 26 female students with moderate dysmenorrhea, and 5 female students with severe dysmenorrhea.

In this study, caffeine consumption is categorized into 2 categories, which are <180 mg and >180 mg. This cut-off point is taken from the maximum caffeine consumption recommendation per day. The highest proportion of caffeine consumption among respondents in this study was <180 mg (57.1% or 44 respondents), while the other 42.9% had a frequency of caffeine consumption >180 mg.

Table 3. Junk food consumption among respondents

<table>
<thead>
<tr>
<th>Junk Food Consumption</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>3</td>
<td>3.9%</td>
</tr>
<tr>
<td>Rare</td>
<td>28</td>
<td>36.4%</td>
</tr>
<tr>
<td>Frequent</td>
<td>32</td>
<td>41.6%</td>
</tr>
<tr>
<td>Very frequent</td>
<td>14</td>
<td>18.2%</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3 shows the frequency of junk food consumption among students. 74 of the 77 respondents consume junk food in their daily lives, and most of them consume junk food often (41.6%). It was found that only 3 respondents never consumed junk food.

Table 4. Correlation between caffeine; junk food consumption and Level of Dysmenorrhea Pain

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of dysmenorrhea pain</th>
<th>Total n (%)</th>
<th>R</th>
<th>P value 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Pain</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Caffeine Consumption</td>
<td>&lt;180 mg</td>
<td>3 (6.8%)</td>
<td>28 (63.7%)</td>
<td>12 (27.3%)</td>
</tr>
<tr>
<td></td>
<td>≥180 mg</td>
<td>0 (0%)</td>
<td>15 (45.5%)</td>
<td>14 (42.4%)</td>
</tr>
<tr>
<td>Junk Food Consumption</td>
<td>Never</td>
<td>2 (26.7%)</td>
<td>1 (33.3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Rare</td>
<td>1 (3.6%)</td>
<td>17 (60.7%)</td>
<td>1 (35.7%)</td>
</tr>
<tr>
<td></td>
<td>Frequent</td>
<td>0 (0%)</td>
<td>18 (56.3%)</td>
<td>12 (37.5%)</td>
</tr>
<tr>
<td></td>
<td>Very Frequent</td>
<td>0 (0%)</td>
<td>7 (50%)</td>
<td>4 (28.6%)</td>
</tr>
</tbody>
</table>

63.7% of respondents who consumed <180 mg caffeine and 45.5% who consumed ≥180 mg caffeine were included in the mild dysmenorrhea category. The results of the analysis showed that caffeine consumption had a significant relationship with the level of dysmenorrhea pain, with a p-value of 0.009 < 0.05. It is known that 17 of the 28 respondents with rare junk food consumption experience the mild dysmenorrhea category, 18 of the 32 respondents with frequent consumption of junk food experienced moderate dysmenorrhea while the other had severe dysmenorrhea. The results of the analysis showed that consumption of junk food had a significant relationship with the level of dysmenorrhea pain, with a p-value of 0.022 < 0.05.

DISCUSSION

Generally, the characteristics of respondents in the study were homogeneous through
exclusion criteria. In this study, the age of respondents was dominated by 16-20 years (67.5%). Younger age influences the level of intensity of dysmenorrhea. The intensity of dysmenorrhea will decrease in older age (Habibi et al., 2015).

The study results show that the proportion of respondents who live at home is less than respondents who live in boarding houses. Previous research states that residence was a factor related to daily activities because the fewer activities carried out, the greater the level of pain sensitivity (Beddu et al., 2015). Even though the proportion of where respondents live is quite large, the proportion of eating habits is almost the same, between cooking and buying. It was concluded that there was no relationship between daily eating habits and where the respondent lived.

Based on the research results, it was found that caffeine consumption had a significant relationship with the level of dysmenorrhea pain. The close relationship between these two variables is moderate with a positive relationship direction. Previous research states that coffee consumption is related to the incidence of dysmenorrhea both in terms of intensity and quality of pain (Ananda, 2020). Research (Hashim et al., 2020) also shows that caffeine consumption is significantly associated with dysmenorrhea.

Caffeine is an adenosine analog that blocks adenosine receptors (a vigorous vasodilator). Adenosine receptors blocking affect vasoconstriction of blood vessels which causes decreased blood flow to the uterus. As a result, there is an increase in the degree of menstrual pain (dysmenorrhea) (Alrahal et al., 2020). Moreover, caffeine also increases the estrogen level which causes both vasoconstriction and increases the prostaglandins production which can stimulate uterine contractions (Mesele et al., 2022).

Previous research states that some studies report that consuming caffeine can increase prostaglandin synthesis. Caffeine works to stimulate the release of calcium, thereby increasing the work of the phospholipase A enzyme, which is a calcium-dependent enzyme. This enzyme then stimulates the release of arachidonic acid resulting in increased synthesis and release of prostaglandins. This research was carried out on a guinea pig uterus with the results that caffeine caused an increase in prostaglandin production on days 7 and 15 of the estrous cycle. Apart from causing ischemia due to endometrial vascular vasoconstriction, excessive levels of prostaglandins also stimulate an increase in the frequency and amplitude of uterine smooth muscle contractions, which then causes primary dysmenorrhea (Fathiah, 2022).

The results of this study found that the highest proportion of caffeine consumption was <180 mg, namely 42.9%. Besides that, this research also found that the caffeinated drink most consumed by respondents was tea, especially iced tea. Excessive caffeine consumption, apart from increasing dysmenorrhea pain, can also cause other problems, one of which is increasing the risk of high blood sugar. Some types of caffeinated drinks often have added sugar, for example, iced tea and carbonated drinks. Consuming too much sugar is certainly not good and will cause problems in the future. Excessive sugar intake will increase blood sugar levels quickly, causing the pancreas to work harder to secrete large amounts of insulin so that blood sugar levels decrease (Tejasari, 2023).

Based on the results of the study regarding the consumption of junk food and the level of dysmenorrhea pain, show a significant association. The relationship between variables is moderate with a positive relationship direction, meaning that the more often junk food is consumed, the level of dysmenorrhea pain will also increase. The study results show that those who frequently consume junk food have mild levels of dysmenorrhea pain, while those who consume junk food very often have mild and severe levels of dysmenorrhea pain.

The study results show that those who frequently consume junk food experience mild levels of dysmenorrhea pain and those who consume junk food very frequently experience
moderate and severe levels of dysmenorrhea pain. This research is in line with previous research (Nurfadillah et al., 2021) which stated that the consumption of junk food is one of the factors that affect the incidence of dysmenorrhea in adolescents. The results of (Aulya et al., 2021) study also show the same result that fast food consumption influences the incidence of dysmenorrhea which the p-value obtained is 0.032. Besides that, the study (Sari, 2021) also shows a significant relationship (p-value = 0.022) between fast food consumption and the incidence of dysmenorrhea.

Consuming junk food can result in a weakening of the pain threshold if done excessively. Junk food contains high arachidonic acid, a substrate for the enzymes cyclooxinase (COX) and lipooxinase. COX is an enzyme that plays a role in arachidonic acid synthesis into prostaglandins. So, it can be concluded that excessive consumption of foods containing arachidonic acid increases prostaglandin synthesis, while prostaglandin itself is a metabolic product of arachidonic acid which will increase noise receptor sensitivity and initiates pain impulses (Hasnaeni, 2022). Prostaglandins in the body have crucial functions when they are not in excessive production. Prostaglandins influence the smooth muscle, the central nervous system, and blood pressure. Prostaglandins can control and regulate blood pressure and stimulate contractions to aid birth and legal abortion. However, in women of childbearing age, excessive prostaglandin synthesis will cause excessive pain during menstruation (Hasnaeni, 2022).

Fast food contains trans fatty acids, a source of free radicals (Annienda, 2020). One of the effects of these free radicals is damage to cell membranes which destroys phospholipids. Phospholipids are a component of cell membranes that provide arachidonic acid. This arachidonic acid is then synthesized by all cells in the body into prostaglandins which can cause dysmenorrhea. In line with research (Mesele et al., 2022) which states that fatty foods have a significant relationship with dysmenorrhea. This is because a diet high in fats and oils is associated with high estrogen production, increased estrogen levels induce more stimulation of the endometrium and more proliferation of the endometrium by causing higher levels of prostaglandin production which results in pain during menstruation and inflammation of the uterus which causes cramps (Mesele et al., 2022).

A study by (Aulya et al., 2021) also states that consumption of junk food has a significant relationship with dysmenorrhea. The intensity of consuming fast food will influence the occurrence of primary dysmenorrhea. If the habit of consuming fast food with worse content exceeds normal limits, it will take a long time to be absorbed in the body. It will affect several functions of the human body’s organs, one of which has an unfavorable impact on the reproductive organs, especially in women, which directly impacts the incidence of primary dysmenorrhea.

This study still has several limitations, including the researchers not defining the differences in caffeine content in each drink in detail. Researchers used different volumes for the caffeine content considered the same in each drink consumed. Besides that, not all confounding variables can be controlled, including physical activity, alcohol consumption, and stress. We hope future research can improve the study by controlling all other confounding variables.

CONCLUSION

The results of this study show that there is a significant relationship between caffeine consumption and junk food consumption on the level of dysmenorrhea pain in midwifery students at Sultan Agung Islamic University, Semarang. Researchers hope that future research can develop the variables in this research and consider the limitations of this research.

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