IRON INTAKE AND STRESS LEVEL WITH PRIMARY DYSMENORRHEA IN HIGH SCHOOL STUDENTS

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ABSTRACT

One of the signs of puberty experienced by young women is menstruation, some young women experience pain known as dysmenorrhea during menstruation. Iron is one of the essential nutrients for adolescent reproduction, and its deficiency can increase the risk of dysmenorrhea. Stress can also affect Dysmenorrhea, as stress can lead to hormonal imbalances and the secretion of prostaglandin hormones produced by stress. The purpose of this study was to analyze the relationship between iron intake and stress levels with the incidence of primary dysmenorrhea in adolescent girls at PB Soedirman Islamic High School Bekasi. This study uses an observational analytic method with a cross-sectional design, and data collection using consecutive sampling techniques with 100 respondents. Data were collected through semi-quantitative food frequency questionnaires (SQ-FFQ) and Perceived Stress Scale (PSS) and determining the incidence of dysmenorrhea using dysmenorrhea questionnaires. The results measured by Chi-square test, showed p-values for iron intake (0.010) and stress levels (0.002). This study found a significant correlation between stress levels and iron intake in adolescent girls in PB Soedirman Islamic High School Bekasi.

Keywords *— adolescent girls, iron intake, primary dysmenorrhea, stress level*

INTRODUCTION

According to the World Health Organization (WHO), adolescents are individuals aged between 10 and 19 years who experience rapid physical, mental, and reproductive organ growth. This stage of an individual's reproductive development is known as puberty. Menstruation is one of the signs experienced by adolescent girls when entering puberty (Nuzula dan Maulida, 2019).

During menstruation, many teenage girls experience pain caused by uterine muscle contractions that disrupt blood flow to the uterus, resulting in menstrual pain called dysmenorrhea. Severe pain or pain in the lower abdomen experienced by a woman during her menstrual cycle is also referred to as dysmenorrhea. This pain usually occurs from a few days before menstruation until menstruation itself (Ratnawati, 2018).

Primary dysmenorrhea is menstrual pain not caused by abnormalities in reproductive organs. This pain typically arises at the age of 20 or younger after a normal ovulatory cycle, and the highest incidence rates occur in late adolescence to early adulthood, between the ages of 15-25 (Tsamara et al., 2020). Primary dysmenorrhea is a condition related to increased uterine contractions due to heightened production of prostaglandins (Agustina, 2019).

Cramps, diarrhea, vomiting, nausea, and headache can all accompany menstrual pain (Sulaeman, 2019). According to Setyowati (2018), dysmenorrhea can affect daily life and have negative impacts such as decreased concentration in class, inability to exercise, decreased performance during school, disruption in social interactions, lower grades, and significant influence related to absenteeism. This is because individuals experiencing dysmenorrhea usually request permission to be absent from school, campus, or the workplace.

According to 2017 data from the World Health Organization (WHO), approximately 1,769,425 individuals, or around 90% of women, experience dysmenorrhea, with 10% to 15% experiencing severe dysmenorrhea. Worldwide, 90% of teenage girls face menstrual problems, and half of them suffer from primary dysmenorrhea (Idayanti

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et al., 2018). In Indonesia, the prevalence of dysmenorrhea is 64.25%, of which 60-75% are adolescent girls with primary dysmenorrhea (Hamdiyah, 2020). According to Andriyani (2016), the prevalence of primary dysmenorrhea in West Java was 72.89% in 2015, while secondary dysmenorrhea was 27.11%.

Nutritional intake is a leading cause of dysmenorrhea. Iron deficiency, a vital nutrient for adolescent reproduction, increases the risk of dysmenorrhea (Bajalan et al., 2019). Dietary patterns significantly impact an individual's nutritional status as the amount and quality of consumed foods and beverages can affect nutrient intake, ultimately influencing one's overall health status (Sirajuddin, 2018). This is supported by research findings by Masruroh & Nur (2019) indicating a significant correlation between the prevalence of dysmenorrhea in adolescent females and iron intake (Fe) with a p-value of 0.014, determined by Spearman Rank test.

In addition, stress is a significant factor that can cause dysmenorrhea. Severe stress can potentially lead to disturbances. If not promptly addressed, excessive stress can endanger one's health. Moreover, stress can cause hormonal imbalances. The secretion of prostaglandin hormones, induced by stress, can cause dysmenorrhea (Fasha, 2017). This is further supported by another study by Sari et al. (2015) that found that participants with mild stress experienced mild dysmenorrhea in 54% of cases, while those with severe stress experienced dysmenorrhea most often (82%). This is consistent with the results of a cross-sectional study conducted by Ilmi et al. (2017), which found a p-value correlation of 0.037 indicating that stress or psychological factors may increase the likelihood of dysmenorrhea among female teenage students at Kanaan Christian High School in Banjarmasin.

Based on the information provided above, researchers are interested in conducting a study on the relationship between iron intake and stress levels with the incidence of primary dysmenorrhea in female adolescents at PB Soedirman Islamic High School Bekasi City. Researchers chose PB Soedirman Islamic High School as the research location because of its strategic location, close to places to eat, and diverse socio-economic backgrounds and lifestyles.

METHODS

The study utilized an analytical observational method with a cross-sectional design. The population for the study comprised female high school students at PB Soedirman Islamic High School Bekasi. The subjects were teenagers aged between 16-18 years, and the total number of respondents was 100. Data collection was conducted in March 2023, employing the Non-Probability Sampling technique using a consecutive sampling method. Abbreviations for technical terms will be clarified upon first use. Data collection was conducted in March 2023, employing the Non-Probability Sampling technique using a consecutive sampling method. This research study has received ethical clearance from the Ethics Committee for Health Research of Muhammadiyah University Prof. Dr. Hamka (KEPKK-UHAMKA) under the number: 03/23.03/02355.

Subjects were selected based on the inclusion criteria in the class so the total research subjects were 100 people. The inclusion criteria included female students who were currently enrolled in PB Soedirman Islamic High School, aged between 16 and 18 years, female students who were willing to participate, and had experienced menstruation. Exclusion criteria encompass students who were absent during the study and those with a history of reproductive disorders such as adenomyosis, uterine fibroids, endometriosis, cervical stenosis, pelvic inflammatory disease, or pelvic adhesions.

The independent variables in this study were iron intake and stress levels. The dependent variable was primary dysmenorrhea. This study was conducted through direct interaction with participants who gave their consent before completing the questionnaire and becoming research subjects. Iron intake data were collected using the Semi Quantity Food Frequency Questionnaire (SQ FFQ) which was conducted for reliability in schools that had similar characteristics to the research location. At the same time, stress levels were assessed through the Perceived Stress Scale-10 (PSS-10) questionnaire with a Cronbach's alpha of 0.669 (Kusumowati and Noerfitri, 2023). Primary dysmenorrhea data were obtained through a questionnaire tested for validity and reliability and produced a Cronbach alpha value of 0.761. Data was analyzed using univariate proportions

and bivariate statistical analysis utilizing the Chi-square test in the SPSS software program.

RESULTS AND DISCUSSION

Based on Table 1, the sample size consisted of 100 individuals. A normality test was performed on the age variable from all input data, where the test result showed a p-value > 0.05, indicating a non-normal distribution. Therefore, the age variable was analyzed using the median and interquartile range indicators. The median age for adolescents was 16 years, with an interquartile range variation of 1 from 16 to 17.

According to Table 2, out of 100 participants, data was collected from classes X and XI. Class X had more respondents with 54 students (54.0%). Moreover, 94 students (94.0%) had high allowance.

Based on Table 3 above, it is evident that out of the 100 female student respondents, 51 (51.0%) had insufficient iron intake. Furthermore, the distribution results show that 58 (58.0%) female students experienced high levels of stress in this study. Meanwhile, the distribution of primary dysmenorrhea incidence in this study revealed that more female students experienced dysmenorrhea complaints, a total of 54 individuals (54.0%).

Based on the Chi-Square statistical test result, a p-value of 0.010 was obtained, indicating a significant relationship between iron intake and the incidence of primary dysmenorrhea in female adolescents at PB Soedirman Islamic High School in Bekasi.

According to the Chi-Square statistical test results, with a p-value of 0.002, a significant relationship between stress levels and the incidence

Table 1. Age Overview of Adolescents

Variable	n	Median	IQR
Age	100	16.00	17-16

Table 2. Characteristic of Respondents

Characteristic of Respondents	n	%
Class		
Class X	54	54.0
Class XI	46	46.0
Allowance		
High ≥20.000	94	94.0
Low <20.000	6	6. 0
TOTAL	**100**	**100,0**

Table 3. Overview of Iron Intake, Stress Level, and Primary Dysmenorrhea

Variable	n	%
Intake of Iron		
Less	51	51.0
Simply	49	49.0
TOTAL	**100**	**100.0**
Stress Level		
Major Stress	58	58.0
Mild Stress	42	42.0
TOTAL	**100**	**100.0**
Primary Dysmenorrhea		
Dysmenorrhea	54	54.0
No Dysmenorrhea	46	46.0
TOTAL	**100**	**100.0**

Table 4. Relationship between Iron Intake and Primary Dysmenorrhea in Adolescent Girls.

Intake of Iron	Primary Dysmenorrhea				Total		p-value
	Dysmenorrhea		No Dysmenorrhea				
	n	%	n	%	n	%	
Less	34	66.7	17	33.3	51	100.0	0.010
Simply	20	40.8	29	59.2	49	100.0	

Table 5. Relationship between Stress Levels and Primary Dysmenorrhea in Adolescent Girls.

Stress Level	Primary Dysmenorrhea				Total		p-value
	Dysmenorrhea		No Dysmenorrhea				
	n	%	n	%	n	%	
Major Stress	39	67.2	19	32.8	58	100.0	0.002
Mild Stress	15	35.7	27	64.3	42	100.0	

of primary dysmenorrhea exists in adolescent girls at PB Soedirman Bekasi Islamic High School.

DISCUSSION

Iron is essential for the formation of hemoglobin (Hb), which can be found in the body in the form of hemoglobin, myoglobin, or chromium and plays a crucial role in the transport, storage, and utilization of oxygen. The majority of iron produced from the breakdown of red blood cells will be reused to produce hemoglobin, so iron deficiency must be supplemented with food (Adriani, 2016).

According to research findings, there is a correlation between iron intake and primary dysmenorrhea. Female students with low iron intake are more likely to experience menstrual pain. The lack of iron in female students could be attributed to poor eating habits, which may be assessed depending on the cafeteria's offerings such as instant noodles, seblak, burgers, kebabs, fried foods, meatballs, chicken noodles, chicken dishes, and fried rice. High-energy and high-fat snacks, such as nasi uduk and ketoprak, are deficient in vitamins and minerals. According to ELMoslemany (2019), malnutrition in teenage girls may result from poor eating habits and consumption of high-fat, high-sodium, and high-energy fast food with insufficient vitamins and minerals. Another contributing factor to nutrient deficiency is the common belief that one has met their recommended nutritional intake when feeling full. However, when someone feels full, it does not necessarily mean they have received all the necessary nutrients they need (Mokoginta et al., 2016).

Poor nutritional intake among teenagers could be due to their body image concerns. Additionally, most teenagers in modern times tend to control their food intake, and a fear of gaining weight is one of the reasons why young women may not have a proper diet. Sometimes changes can have negative consequences and can lead adolescents to behave inappropriately in pursuit of their ideal body shape, such as consuming imbalanced meals (Astini et al, 2021). Dieny (2014) suggests that irregular eating habits among adolescent girls may lead to low iron intake. Fear of weight gain is one factor contributing to poor eating behavior in teenage girls. Irregular eating behaviors among teens, such as skipping meals, intentionally vomiting, excessive snacking, or following a special diet, can be linked to physical dissatisfaction among females.

If the hemoglobin level in the body is low, it can impede the oxygen flow throughout the body, including to the uterus. This constriction of blood vessels causes pain in reproductive organs. Hemoglobin deficiency may cause ischemia which can further result in the synthesis of phospholipids, arachidonic acid, prostaglandins, and vasopressin. This increase in prostaglandins and vasopressin results in arterial vasoconstriction and uterine ischemia, which can ultimately result in greater prostaglandin production, leading to menstrual pain (Kusumawardani and Cholifah, 2018).

Stress is a subjective experience that someone has in response to a situation that does not meet their expectations or is stressful. Demands can be influenced by internal or external factors (Shofiyah and Mutiah, 2022). The results showed that there was a correlation between stress level and the incidence of dysmenorrhea: the higher the level of stress experienced by female students, the more likely they were to experience menstrual pain. Different factors cause stress, which is divided into internal and external factors according to Gamayanti et al (2018), Stress arises from internal factors, including physical ailments, motivational influences, and distinct personality traits. A person's cognitive reaction and interpretation of events in life depend on cognitive appraisal, which discerns whether they deem these events as perilous or threatening. Conversely, external stressors emerge from an individual's surroundings, such as family, work, facilities, neighborhood, and school (Sutjiato & Tucunan, 2015). Stress levels experienced by respondents may vary depending on the cause of the stressor and the duration of exposure. The longer the respondents are exposed to the stressor, the more severe the stress they experience (Oken et al., 2015).

During a stress response, the neuroendocrine system, specifically corticotropin-releasing hormone (CRH) in the hypothalamus, stimulates the release of adrenocorticotropic hormone (ACTH) by the anterior pituitary, leading to

an increase in the release of glucocorticoids, mainly cortisol and adrenal, from the gland. Increased levels of glucocorticoids inhibit GnRH secretion in the hypothalamus and suppress the release of FSH and LH, causing disruptions in follicle development and leading to reduced progesterone release. This in turn increases the synthesis of prostaglandin F2a and prostaglandin E2. Excessive production of prostaglandins can cause uterine hypercontraction, reducing blood flow to the uterus and leading to ischemia. This heightened sensitivity of nerve fibers can result in dysmenorrhea. The formation of prostaglandins is additionally influenced by the adrenaline and cortisol hormones, which are associated with stress. This indicates that stress affects the levels of prostaglandins in the myometrium, both directly and indirectly (Whirledge and Cidlowski, 2010; Whirledge and Cidlowski, 2013).

CONCLUSIONS

There is a significant correlation between iron intake and the incidence of primary dysmenorrhea in female students of PB Soedirman Islamic High School. In addition, there is also a significant correlation between stress levels and the incidence of primary dysmenorrhea in female students of PB Soedirman Islamic High School. It is recommended for further researchers to consider additional factors, such as nutritional status, exercise habits, micro-nutrients (besides iron), and other variables related to the research variable while being supported by proper instruments. If researchers wish to use SQ-FFQ as an instrument, it is recommended that they conduct direct interviews with the participants to obtain optimal results.

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