

Correlation Between Body Mass Index with Menstrual Cycle on Female Adolescent

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Abstract Menstruation is the primary sexual sign that marks the period of puberty for women. Menstrual cycle disorders often occur in adolescents and are caused by several factors including psychological, hormonal, genetic disorders, organics abnormalities, and nutritional status. The nutritional situation is measured using a body mass index. The purpose of this study is to determine the correlation of body mass index and the menstrual cycle on the female adolescent. This research is an observational analytic study and uses a cross-sectional approach. The population of the study is all female students in Sunan Ampel State Islamic University. Accidental sampling technique is used in this study to obtain 36 respondent. Data collection from respondents was carried out by administering questionnaires and measurement of body weight and height. Data analysis uses the chi-square test. The result of the study is that most of body mass index (BMI) of respondents is standard (77,8%) and had regular menstrual cycles (75%). Chi-square test shows that there is a correlation between body mass index (BMI) and the length of the menstrual cycle ($p=0,030$).

1 INTRODUCTION

The period of puberty on young women is characterized by the onset of menstruation. Menstruation is periodic bleeding that occurs from the uterus which starts periodically about 14 days after ovulation as a result of exuviations of uterine endometrial lining (Felicia et al., 2015). The event is significantly affected by menstrual hormones. Thus, the hormonal imbalance would be cause of menstrual cycle disorders.

The menstrual cycle begins on the first day of last period and ends on the first day of the following period. Even though the average cycle is 28 days long, its cycle from 21 to 35 days is considered normal. While the normal menstrual period is between 3-7 days with the amount of blood is not more than 80 ml (Samsulhadi, 2016). Individual's menstrual cycle shows the development and function of reproduction (Hossam et al., 2016).

Due to a hormonal imbalance, an abnormal menstrual cycle occurs and normalize the FSH and LH levels of estrogen and progesterone (Prawirohardjo, 2008). While the menstrual cycle disorders caused by disorders of the psychological, hormonal, genetic disorders, organics abnormalities

and nutritional status often occurs on women (Samir et al., 2015).

Nutritional status can be assessed from the body mass index (BMI), which refers to a measure to predict percentage body fat through comparing the ratio of actual body weight and height (Sukohar et al., 2017). The hormone estrogen as a dominant factor of menstrual disturbances can be affected by body fat. Consequently, the high or low level of body mass index (BMI) such as an irregular cycle will cause menstrual disorders (Retissu et al., 2010). The purpose of this study is to investigate the association body mass index (BMI) and menstrual cycle on the female adolescent.

2 METHOD

This research is an observational analytic study which uses a cross-sectional approach. The independent variable of the research is body mass index (BMI) whereas the dependent variable is a length of the menstrual cycle.

This Research conducted at the Sunan Ampel State Islamic University in 2018. The respondent of this study is 36 female adolescent college student from all of the woman college students. These respondents are who meet the several inclusion

criteria such as woman college students who have been getting menstrual and have willingness to participate as a respondent.

Data collection from respondents was carried out by administering questionnaires and measurement of body weight and height. Furthermore, Statistic analysis of this research uses chi-square test.

3 RESULT & DISCUSSION

Based on the research results obtained the following data:

a. Univariate Analyze

1) Age Distribution of Respondents

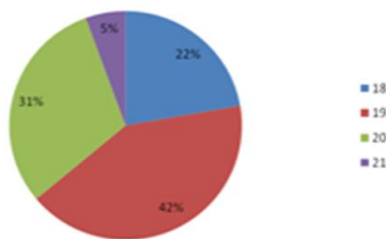


Figure 1. Age Distribution of Respondents (Source: Primary Data, 2018)

Based on figure 1, it indicates that the minimum age of respondents is 18 years old and the maximum age is 21 years old. The most respondents at the age of 19 years old (41%) and the lowest is in the age of 21 years old (9%).

2) Menarche Distribution of Respondents



Figure 2. Menarche Distribution of Respondents (Source: Primary Data, 2018)

From Figure 2 indicates the most of menarche of respondents is the normal category (67 %). The moderate grade is the late category (30 %) and the lowest is the early category (3 %).

Menarche is the onset of spontaneous menstruation and each successive menstrual cycle is the end result of successful team play by a number of endocrine glands (hypothalamus-pituitary-ovary) and end organs (pituitary-ovary follicle-endometrium).

The age at which menarche occurs is affected by genetic and environmental factors. Menarche may be delayed by poor nutrition, high levels of exercise and several medical conditions, such as diabetes mellitus, ulcerative colitis and congenital heart disease.

3) Height Distribution of Respondents

Table 1: Height Distribution of Respondents

Height (cm)	Total	
	N	%
134-143	1	2,8
144-153	10	27,8
154-163	25	69,4
Total	36	100

Source: Primary Data, 2018

Based on table 1, it indicates the most height of respondents is between 154-163 cm (69,4%). There is one respondent who has height 134 cm.

4) Weight Distribution of Respondents

Table 2: Weight Distribution of Respondents

Weight (kg)	Total	
	N	%
35-46	7	19,4
47-58	22	61,1
59-70	7	19,5
Total	36	100

Source: Primary Data, 2018

Based on table 2, it indicates the most height of respondents is between 47-58 kg (61,1%).

5) Body Mass Index Distribution of Respondents

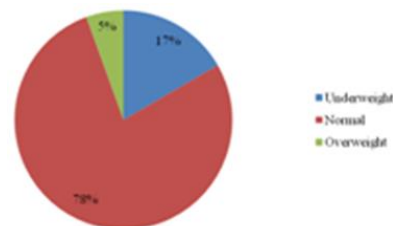


Figure 3. Body Mass Index (Source: Primary Data, 2018)

From Figure 3 indicates the most of body mass index (BMI) of respondents is the normal category (78 %). The moderate grade is the underweight category (17 %) and the lowest is the overweight category (5 %).

category (5 %). The body mass index (BMI) is measured by assessing weight in kilograms and height in meters squared and then compare both of them (Sukohar et al., 2017).

According to Supariasa (2012), body mass index (BMI) is divided into several categories. The underweight category which can be divided into less underweight if <17,00 and light underweight if range of body mass index (BMI) between 17,00-18,5. If range of body mass index (BMI) between 18,5 – 25,0 classified as Normal category. On the other side, the overweight category can be divided into the light overweight of body mass index (BMI) > 25,0-27,0 and overweight in the body mass index (BMI) > 27,0.

The result in figure 3 shows the most respondents in the normal category with average 18,5-25,0 of body mass index (BMI). The lowest of percentages of respondent is overweight category with more than 25,0 of body mass index (BMI).

6) Menstrual Cycle Distribution of Respondents

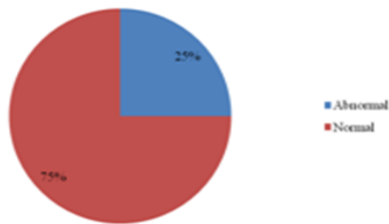


Figure 3. Menstrual Cycle (Source: Primary Data, 2018)

Based on figure 4, it indicates that most respondents have a normal menstrual cycle (75%). Conversely, only 9 respondents (25%) who have abnormal menstrual cycles.

The normal menstrual cycle occurs in the span of 21-35 days and the average of occurrence is in 28 days. Menstrual cycles are counted from the first day of menstruation until the beginning of the following menstrual period (Prawiroharjo,2008).

Due to irregularity ovulation, the menstrual cycle is irregular in early adolescence. According to Wronka et al (2013), irregular menstrual cycle occurs in two years after menarche and became a regular starting 16 years of age and retracts at the age of 30-40 years.

Irregular menstrual cycle indicates that there are a hormonal metabolism and disorders which will impact upon fertility. Different with the normal menstrual cycle, short menstrual cycle leads to an egg that is not sort of overripe whereas the length of menstrual cycle result in difficulties to determine the fertile period date.

b. Bivariate Analyze

Table 3. Body Mass Index And Menstrual Cycle Distribution

IMT	Menstrual Cycle	
	Abnormal	Normal
Underweight	4	2
Normal	5	23
Overweight	0	2
Total	9	27

Source: Primary Data, 2018

The result of Table 3 shows that majority of respondents is in categories normal who having a normal menstrual cycle (23 respondents). While 4 respondents is classified by underweight category have abnormal menstrual cycles.

Respondents in underweight category have an irregular menstrual cycle because decline of androgen on aromatization process into the hormone estrogen. Teenagers require fat approximately 25-30% of the total energy needs (Simbolon, 2018).

Table 4. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.984 ^a	2	.030
Likelihood Ratio	6.574	2	.037
Linear-by-Linear Association	6.176	1	.013
N of Valid Cases	36		

Source: Primary Data, 2018

The results of the test analysis chi-square shows p value = 0.030. The p-value < 0.05 indicates a correlation between body mass index with the menstrual cycle.

Respondents who have a good nutritional intake will have a normal menstrual cycle because normal functioning of hypothalamus hormones in producing reproductive hormones which regulate the normal menstrual cycle.

Teenagers with normal body mass index (BMI) would have a normal body fat. This fat leads to normal level of estrogen in the body as well as normal menstrual cycle. More body fat would increase estrogen levels. Conversely, the slimer in BMI result in decrease of converted fat into estrogen. This occurrence will affect the work mechanism of the hypothalamus and interrupts the menstrual cycle (Felicia et al, 2015).

This study is empirically related to previous study particularly study of Simbolon et al in 2018 in the Faculty of Medicine, University of Lampung. Study of Simbolon et al obtain result of p value = 0,014 (p < 0.05). This result indicates linier relationship

between the body mass index and menstrual cycle period length of students from class of 2016, Faculty of Medicine University of Lampung.

4 CONCLUSIONS

The result show that majority of respondents is in body mass index with normal categories who having a normal menstrual cycle (23 respondents). While 4 respondents is classified by underweight category have abnormal menstrual cycles.

The results of the test analysis chi-square shows p value = 0.030. The p-value < 0.05 indicates a correlation between body mass index with the menstrual cycle on female adolescent in Sunan Ampel State Islamic University.

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