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PHYSICAL ACTIVITY AND PREMENSTRUAL SYNDROME IN TEENAGERS

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ABSTRACT

Background: *Pre-Menstrual Syndrome (PMS) is a health problem commonly encountered by millions of productive age women prior to menstruation. Etiologically, Pre-Menstrual Syndrome that can disrupt quality of life of teenagers either physiologically or educationally is still unknown. One suspected as a trigger factor for the incidence of Pre- Menstrual Syndrome is physical activity. This is the reason why the researcher wants to further study the low physical activity Whether brings risk for the incidence of Pre- Menstrual Syndrome.*

Objective: *To identify association between physical a ctivity and the incidence of Pre- Menstrual Syndrome.*

Method: *The study was observational with case control design. Subject of the study were femal e students of grade X and XI at Public High School 1 (SMAN 1) and Vocational High School (SMK 3) Purwokerto totally 148 students. The subject was identified in two phases, screening and observation of cases and control. Primary data were obtained through questionnaire and recall a 7x24 hours checklist. Data analysis used univariate with frequency distribution, bivariate with chi square and multivariate with logistic regression model.*

Result: *The research result of bivariate analysis there was a significant association Showed either statistically or practically between physical activity and Pre- Menstrual Syndrome. Teenagers with low physical activity had 2.8 times greater risk for having Pre- Menstrual Syndrome than Reviews those with high physical activity (OR: 2.8; CI 1:27 to 6:08). Another variable associated with Pre- Menstrual Syndrome was stress.*

Conclusion: *Low physical activity increased risk for the incidence of Pre-Menstrual Syndrome.*

Keywords: *premenstrual syndrome, teenagers, physical activity*

1. PRELIMINARY

Premenstrual syndrome (PMS) is a health problem experienced by millions of women of productive age before menstruation (Dickerson, et al., 2003). Symptoms of the peak lasts 4-7 days before menstruation consistently is a phenomenon that must be felt by the female for 4-10 years during his long life, mostly affects the mental health condition (Stoddard, et al., 2007).

Research conducted at the Academy students Midwifery Holy District in Central Java (Puspitorini,MD,.2006) is the prevalence of STDs (45.8%). Based on the etiology, the exact triggering factor premenstrual syndrome can not be concluded until now (Myint,et al.,2006). Factors that allegedly associated with the incidence of STDs is biological, behavioral and social. Biological factors include age, race, body mass index (BMI), reproductive history such as age of *menarche* and menstrual duration. Behavior associated with Pre-Menstruation Syndrome is the level of stress, drinking alcohol and coffee, smoking habits, diet and physical activity, Eventhough social factors that also influence the education and income levels(Masho, et al., 2005).

Mechanisms of physical exercise can markedly affect the release of *endorphins* which is a substance produced in the brain. Adding physical exercise for 6 months on respondents can reduce the severity of Pre-Menstruation System(Prior, et al.,1987). Low endorphin levels in the body allows as one of the factors that can contribute to the incidence of STDs. Physical activity has shown increased levels of *beta-endorphin*, which can affect the mood is not Directly reduce emotional-related symptoms as a result of STDs.

The purpose of this study was to determine the prevalence of premenstrual syndrome in adolescents and physical activity influence the incidence of premenstrual syndrome.

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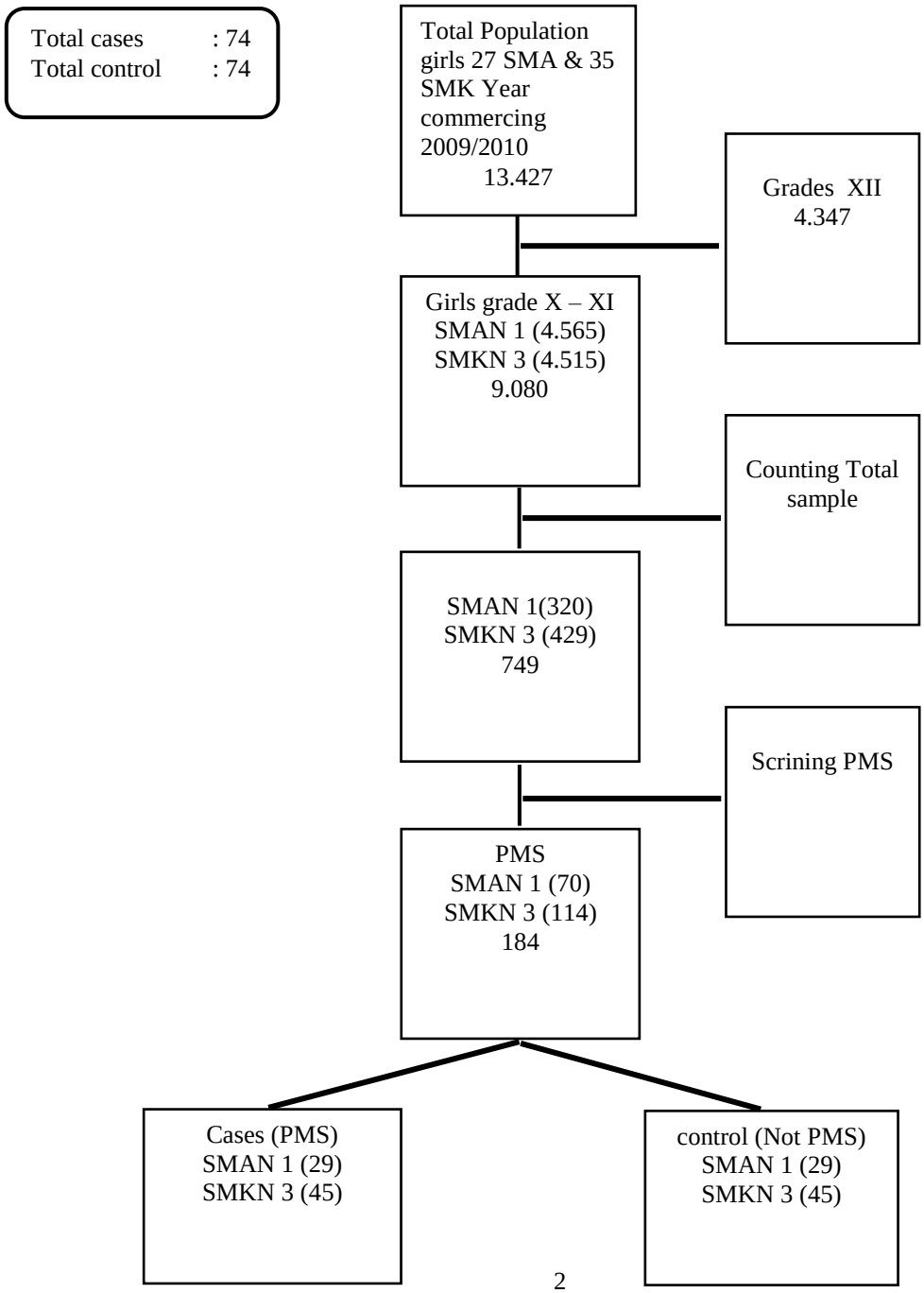
2. RESEARCH METHOD

This study uses a case-control design with a quantitative method that uses primary data. Cases that all subjects with premenstrual syndrome while the control is s ubjek who did not experience premenstrual syndrome. The subject of research, amounting to 148 obtained through 2 stages research can be seen in the amber G1. Some of the instruments used to collect the necessary data so that: *The shortened Premenstrual Assessment Form* (SPAF) (Daugherty,1987) to measure premenstrual syndrome, questionnaire *IPAQ* (IPAQ,2009) and threaded form *Recall* to measure physical activity, *Cohen Perceived Stress Scale* (IPAQ,2009) to measure stress levels, economic status questionnaire (quesioner IDHS 2002-2003), t counterweight stampede (seca) to measure weight and height to gauge *microtoice*. The variables of this research is physical activity (independent variable) and syndrome Pre-Menstrual (PMS) (the dependent variable). Age *of menarche*, menstrual old, Body Mass Index (BMI), stress level, mother's education and economic social status family as external variables.

The data obtained were analyzed using *chi-square* test, *logistic regression* and *multiple logistic regression* to see the risk of using the value of *the odds ratio* (OR) and 95% *CIs.*



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Picture 1. Flow Sampling

3. RESEARCH RESULT

A. Prevalence of STDs

Scrining based on the first phase of research obtained by the prevalence of STDs by 24.6%. Figure 2 below showed that of the 10 symptoms of PMS, third the most severe symptoms are felt by respondents respectively were abdominal pain (17.6%), irritable (10.8%) and muscle pain / joint (9.1%).

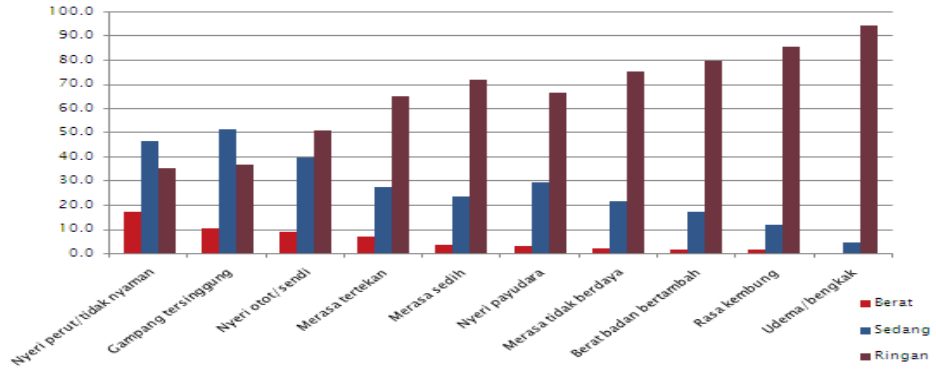

Figure 2. See the percentation symptoms of PMS symptoms by categories mild, moderate and severe at the time of screening (N = 749).

B. Univariate Analysis

Characteristics of research subjects at stage II (case control study) as a whole can be seen in Table 1 and Table 2. Average PMS score is 24.7.

This result is not much different from the research Deuster *et al.* (1999) of 26.0. *Mean* score is 7976 METs physical activity.

Table 1. Characteristics of Research Subjects

Variables	± SD (min - max)
Premenstrual syndrome (score)	24.7 ± 7.96 (10 - 41)
Physical activity (score)	7,976 ± 6,015 (933-29,028)
Lama Menstruation (day)	6.4 ± 1.31 (3 - 11)
Menarche age (years)	12.8 ± 0.90 (11 - 15)
Body mass index (BMI) (kg / m $^{2)}$	20.4 ± 2.99 (14.6 - 33.2)
Stress level (score)	21.0 ± 4.75 (11 - 34)
Family economic status (N,%)	
Less	(80; 54,05)
Capable	(68; 45,95)

Table 2. Frequency Distribution of Research Subjects by Case and Control Group.

Variables	Group				TOTAL	
	Case PMS		Control No PMS			
	N	(%)	N	(%)	N	%
Physical activity						
• High	42	56	58	78	100	68
• Low	32	43	16	22	48	32
Age *of menarche*						
• ≤ 12 years	25	34	26	35	51	35
• > 12 years	49	66	48	65	97	65
Long period						
• > 6 days	34	46	38	51	72	49

• ≤ 6 days	40	54	36	49	76	51
The body mass index						
• Obesity	6	8	5	7	11	7
• *Overweight*	9	12	4	5	13	9
• Normal	41	55	46	62	87	59
• *Underweight*	18	24	19	26	37	25
Level of stress						
• Weight	40	54	6	8	46	31
• Medium	15	20	29	39	44	30
• Light	19	26	39	53	58	39
Education Mother						
• High	31	42	35	47	66	45
• Low	43	58	39	53	82	55
Family Economic Status						
• Capable	31	42	37	50	68	46
• Less	43	58	37	50	80	54

C. Bivariate Analysis

The bivariate analysis was conducted to see the effect of independent variables (physical activity) against truasi premens syndrome as the dependent variable (Table 3). The magnitude of the risk of physical activity seen from the *odds ratio* (OR) and *CI* 95% as well as the significance level *of p <0.05.*

Table 3. Analysis of Physical Activity Relationships and PMS

Variables	Case		Control		*OR*	95% CI
	PMS		No PMS			
	N	%	N	%		
Physical Activity	32	43.24	16	21.62	2.76	1.27 to 6.08 *
Low	42	56.76	58	78.38		
High *(Chorus)*						

Description: *reff = refference; * Significant;* CI = *confidence interval*

At Table 3, we can see the results of the analysis of physical activity with PMS statistically significant with ≈ 2.8 OR = 2.76 (95% CI = 1.27 to 6.08). Low physical activity was 2.8 times more likely in the STD group compared with the non-STD group. It can be concluded that the lower physical activity, the higher the risk of bush in Pre-Menstrual Syndrome.

Results bivariable analysis to see the effect of external variables which include age *of menarche*, menstrual old, Body Mass Index (BMI), stress level, maternal education and family economic status against STDs variables shown in Table 4.

Table 4. Relationship Analysis of Outer Variables With Pre-Menstrual Syndrome

Variables	**Case**		**Control**		***OR***	**95% *CI***
	PMS		**No PMS**			
	(N=74)	**%**	**(N=74)**	**%**		
Age *of menarche*						
• ≤ 12 years	25	49	26	51	0.86	0.45 - 1.96
• > 12 years *(chorus)*	49	51	48	49	1	
Duration of menstruation						
• > 6 days	34	46	38	51	0.80	0.40 - 1.61
• ≤ 6 day *(Chorus)*	40	54	36	49	1	
Body mass index						
• Obesity	6	8	5	7	1.34	0.31 - 6.00

• Overweight	9	12	4	5	2.52	0.63 - 11.97
• Normal *(chorus)*	41	56	46	62	1	
• Underweight	18	24	19	26	1.06	0.45 - 2.46
Level of stress						
• Weight	40	54	6	8	13.68	4.57 to 45.24
• Medium	15	20	29	39	1.06	*
• Lightweight *(chorus)*	19	26	39	53	1	0.42 - 2.63
Education Mother						
• Low	43	58	39	53	1.24	0.62 - 2.51
• Height *(chorus)*	31	42	35	47	1	
Family Economic Status						
• Less	43	58	37	50	1.38	0.69 - 2.79
• Able *(chorus)*	31	42	37	50	1	

* = significant, *p-value* <0.01; r*eff = refference*

Bivariate analysis further to see the relationship between external variables with independent variables, aimed at identifying the presence of confounding variables *(confounding)* and interaction (Table 5).

Table 5. Analysis of Variable Foreign Relations With A Physical activity

Variables	Physical activity					*P value*
	High		Low			
	(N=74)	%	(N=74)	%	*(Df)*	
Age of *menarche*						
• ≤ 12 years	40	40	11	23	4.2 (1)	0.04 *
• > 12 years *(chorus)*	60	60	37	77		
Old Mens						
• > 6 days	56	56	16	33	6.7 (1)	0.01 *
• ≤ 6 day *(Chorus)*	44	44	32	67		
IMT						
• Obesity	6	6	5	10	1.25	0.74
• Overweight	9	9	4	8	(3)	
• Normal *(chorus)*	61	61	26	54		
• Underweigh	24	24	13	27		
Level of stress						
• Weight	33	72	13	28	0.7 (2)	0.71
• Medium	39	67	19	33		
• Light *(Chorus)*	28	64	16	36		
Education Mother						
• Low	57	57	25	52	0.3 (1)	0.57
• Height *(chorus)*	43	43	23	48		
Family Economic Status						
• Less	51	51	29	60	1.1 (1)	0.28
• Able *(chorus)*	49	51	19	40		

* = significant, *p-value* <0.05; *reff = refference*

Multivariate analysis is used to examine the relationship of independent variables with the dependent variable with external variables. This analysis is used to analyze the relationship between Pre-Menstrual syndrome (PMS) and physical activity to control external variables (age *of menarche*, long menstruation, stress level and body mass index (BMI)). Multivariate analysis modeling

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with the intention of controlling the other variables corresponding to the characteristics you want to see (Table 6). Model 1 was performed to see the relationship between premenstrual syndrome variables and physical activity. Value OR 2.8 (95% *CI* = 1.34 to 5.76), which means there is a significant relationship with the occurrence of premenstrual syndrome odds of 2.8 times. This model also produces the R^2 of 0.04, which means physical activity accounted for 4% and 96% are caused by other factors. Model 2 was built with the aim to determine the contribution of age *of menarche* premenstrual syndrome relationship with physical activity. These variables are included in the model because of the results of previous analysis showed that the age *of menarche* provide a greater risk to the premenstrual syndrome if the first menstruation less than 12 years (*p* <0.01). When the age *of menarche* factors included in the model, we can see a slight decline from the OR value of 2.81 to 0.43.The analysis proves that the old model 3 m e nstruasi associated with physical activity. Further results of analysis showed that the age *of menarche* remained significant variables are statisti k against STDs to see 0,18- 95% *CI* 0.82, does not exceed 1.

Model 4 shows that the level of stress and are having a meaningful relationship with the independent and dependent variables. In this model, an increase in the value of OR of 1.85 from 2.76 in model 1 to 4.61 in 4 models. The value of R^2 on this model is 0.09, which means this model can predict the incidence of STDs by 0.1%. Difference *-2loglikehood* model 4 model 1 is 9.98 with a difference of *degree of freedom* 2.

Model 5 is built to determine the age *of menarche* menstrual history and long periods against the incidence of STDs and the relationship of physical activity. From the value of OR can be seen the same value with OR in model 1 is 2.76. Once incorporated into the model, the addition of these two variables does not change meaning statistically, but practically has no significant relationship. With the OR value that does not change this, it can be ascertained bhwa variable age *of menarche* and menstrual long time together not a confounding variable in this study. Model 6 as the last model to be used to see the involvement of all external variables sebaga suspected confounding variables which include age *of menarche*, menstrual long time, and stress levels. The analysis showed that the overall incorporate these variables into the model gives the value of OR of 4.96 and showed both statistically significance and practical (95% *CI* 2.04 to 12.03). Furthermore, it can be ascertained that these five variables together are not a confounding variable in this study. Based on some of the models above, the most effective in analyzing the relationship premenstrual syndrome premises n physical activity is the model 4. The selection was based on the consideration that by including the variable levels of stress turns the model does not change the statistical significance (OR 4, 59; *CI* 1.9 7 -10, 70).

Tabel 6. *Multiple logistic regression* analysis Effect of Physical Activity In Pre-Menstrual Syndrome With Variable Control Affairs.

Variables	Model					
	1	2	3	4	5	6
Physical activity						
Low	2.76 * (1.34-5.67)	2,81 * (1.35-	2.75 * (1.31-5.73)	4,59 * (1.97-10.70)	2.77 * (1.32-	4.77 * (1,98-11,46)
Height *(reff)*	1	5.85) 1	1	1	5.83) 1	1
age of *menarche*						
≤ 12 years		0.43 (0.19-			0.48 (0.21-	0.47 (0.20-1.11)
> 12 years *(chorus)*		0.96) 1			1.08) 1	1
Old Mens						
> 6 days			0.39 (0.18-0.82)		0.42 (0.20-	0.37 (0.16-0.81)
≤ 6 day *(Chorus)*			1		0.89) 1	1
Level of stress						
Weight				0.36 (0.13-0.96)		0.27 (0.09-0.79)
Medium				1.17 (0.49-2.82)		0.93 (0.34-2.21)

Lightweight *(chorus)*				1		1
R2 (%)	**0.04**	**0, 0 6**	**0.07**	**0.0 8**	**0.09**	**0.1 3**
Deviance	**1 78.49**	**174.07**	**172.15**	**168.51**	**168.85**	**16 2, 01**
N	**148**	**148**	**148**	**148**	**148**	**148**

* = significant; *reff = refference*

4.DISCUSSION

The result of bivariate analysis shows a meaningful relationship both practically and statistically Between Pre-Menstrual Syndrome and physical activity. Teens that low physical activity be 2.8 times the risk of suffering from premenstrual syndrome compared with adolescents of high physical activity.

The menstrual cycle is accompanied by an increase in the severity of premenstrual phase has shown a significant association with increased *estradiol* and progesterone levels decrease also changes in other hormones such as *pregnenolone, pregnonelone sulfate, 3-alpha-THDOC* (Andrej&Diana,2006). As the main hormones in the menstrual cycle, progesterone has long known to be associated with the incidence of STDs. Through controlled studies, women with PMS also failed to prove their consistency progersteron metabolic abnormalities or consistency of the superior hormone (Cohen, S.,1983)

Become mechanism of biological effects of physical activity to decrease or reduction in the incidence of STDs. Some of these include increased levels of endorphins, stability of hormonal levels and their effects on the hypothalamus and pituitary glands as endocrine glands that affect hormone expulsion during the menstrual cycle. Besides the effect of physical activity was also seen in the improvement of the circulation of oxygen in the muscles (Kroll, A.,2010).

The prevalence of premenstrual syndrome in adolescent girls in Purworejo District was 24.6% obtained through screening. These results are in line with the results of WHO (1981) studies conducted on 14 different cultural groups in 10 countries found prevalence of premenstrual symptoms in culture in lower east (23 ± 34%) countries such as Indonesia. Three of the most severe premenstrual symptoms experienced by adolescents is 17.6% abdominal pain, irritable / irritability 10.8% and sore muscles / joints 9.1% (Figure 2). This study is in accordance with the results of (Nourjah, P.,2008) studies that PMS symptoms are most numerous and most severe is perceived abdominal pain and depression. Symptom most widely perceived PMS cramps or abdominal pain (75.3%).

A form of aerobic physical activities positively correlated to lower the water storage that commonly cause the body feels great, appetite and *autonomic reaction*, circumstances comfortable in the abdomen(Johnson, et al.,1995). According to Figure 8, the most severe symptoms experienced by the subject are abdominal pain. States symptom of pain or can be a discomfort in the abdomen associated with uterine muscles that experienced seizures are also supported by unbalanced prostaglandins. To be able to relax these muscles, therapy is needed. One type of physical activity that can reduce this symptom is physical exercise.

Low levels of endorphins in the body allow as one factor that can contribute to the incidence of PMS. Endorphins generally affect the state of emotional status. One t through home visits this may explain why women with high physical activity were less likely to have PMS. Physical activity has shown increased levels of *beta-endorphin*, which can affect mood by tidaklangsung reduce the symptoms associated with emotional as the effects of PMS.

Research conducted by the physiciant found to be consistent with the results of this research (Lee, et al.,2009). Although different results, but the category of physical activity used almost the same. The category used is how much subject participation in applying physical activity to reduce the impact of Pre-Menstrual Syndrome disorders. Physical activity used include strenuous activity (activity that can make you sweat, and made at least more than 20 minutes) light activity (any kind of activity that is carried out without the sweat and performed at least more than 30 minutes) and there is additional physical exercise such as *push-ups*, *sit-ups* during the survey.

Despite through this research can know the relationship between physical activity and the incidence of STDs, but according to the women with PMS three times more active than women who do not PMS (Deuster et al.,1999). Eventhough researchers were not sure whether it is a high

physical activity which is the strongest factor that causes a decrease in premenstrual symptoms or even some physical activity is a response to symptoms (Rasheed and Soiwelem,2003).

Results of bivariate analysis, age *of menarche* has no significant relationship with the occurrence of PMS. However, the relationship becomes meaningful to the variable of physical activity. Research carried states there is no relationship between age at first had a period with symptoms experienced during *perimenstrual* (Woods,et al,19820. In general, older women suffer from milder STDs compared with those who are younger. 20 to 25% of women ages 18 to 25 report a few symptoms of PMS such as headaches, irritability, depression, severe sleep disorders and dysmenorrhea while for the 31-35 years age group only 7%.

Similarly, the analysis of the relationship between menstrual period and PMS incidence did not find any significant relationship, but with the variable of physical activity is significant. Indications that cause shorter menstrual periods are possible due to hormonal imbalances. This causes a failure at the time of ovulation. Normally, progesterone helps to stop excessive bleeding as a result of uterine lining. While the period is too long or too long can be a sign of systemic irregular basis or gynecological disorder. Findings opposites with this research. The length of menstruation actually affects the occurrence of PMS. Women with longer duration periods will be more frequently reported experiencing cramps, *irritability*, mood swings, and depression.

Associated with the Body Mass Index, the results of this study indicate a meaningful association in practice between premenstrual syndrome and BMI. Subjects including obesity had OR 1.34; 2.52 overweight, underweight and normal 1.06 to OR 1. Although not statistically proven their signification between BMI and STDs, but based on theory, in addition to a normal body mass index potentially increase the risk of someone experiencing Pre-Menstrual Syndrome. Findings tendency OR rise at each level of BMI categories. The result also corresponds to. Results gaining at each level increase in BMI from underweight to *overweight.*

Some existing studies suggest a link between body mass in this case adipose tissue with premenstrual syndrome. Obesity, *overweight* and *underweight* affect the ratio of estrogen and progesterone in the body. Circulation androgen metabolism of adipose tissue affects the stability of the estrogen hormone (Masho,et al.,2005).

Access to HPA (Hipothalamus-Pituitary-Adrenal) stimulation is controlled by neurotransmitter reactions. If the levels of serotonin in the body decrease as the higher BMI can cause dysfunction in the HPA axis. Pre-Menstrual Syndrome through certain mechanisms would happen if these imbalances continue. Mechanism through administration of SSRIs *(Selective serotonin Reuptake Inhibitors)* are quite effective in reducing PMS complaints (Dauglas, 2002).

The results of bivariate analysis show a very strong relationship between stress and PMS incidence, where women with severe stress conditions have a risk of experiencing PMS of 13.68 times. Lowland high stress has a significant value with the advent of PMS. Women who are stressed more be the risk of developing PMS than women who were not stressed (Masho,et al.,2005). Woman who stress of being at risk of PMS than women who experience mild stress. Women who have depression experience may have neuroendocrine abnormalities in their menstrual cycles. The most endocrine changes in the premenstrual phase. As a result of this change a lot of manifestations of PMS.

Mechanism of PMS symptoms can also be through the activity of the HPA axis *(hypothalamus, the pituitary-ovarian units)* that affects the hormones epinephrine and *norephineprine.* Releasing this hormone relates to a person's stress level. When a person experiences severe stress will affect the androgenic hormone releasing it which then led to manifestations such as sadness, boredom, wanting to be alone, irritability and anger are all symptoms of PMS (Mortola, et al 1990). The pain that is felt in every menstrual cycle is likely to come from increased contraction of the muscles of the uterus that is under control of the sympathetic nervous system. Stress tends to enhance sympathetic nerve activity and it indirectly affects the pain in the contracting uterine part (Abbaspour, 2006).

Stress that only related to the incidence of STDs in the bivariate analysis remained significant when the multivariate analysis (Table 6) model 5, after controlling stress that physical activity will give a 9% chance of causing PMS. The higher the stress level then the risk of experiencing Pre-Menstrual Syndrome is also increasing.

The education level of the parents, especially the mother, through the study found no significant correlation (Table 4). As many as 45%

of mothers are highly educated, while the other 55% are poorly educated. By looking at the change in OR values in the results of bivariate analysis, it can be seen that a mother's education can have an influence on their daughter to deal with STDs. Mom plays an important source of information. As much as 80% of the 2,422 respondents chose teenage mothers compared with friends, relatives, mass media, teachers and health workers as the first to be found for memproleh answers to questions related to menstruation. Therefore, higher maternal education is expected to have a good effect on her daughter to be better at dealing with menstruation.

The influence of the family's economic status with the incidence of premenstrual syndrome as well as physical activity is completely unrelated (Rizk,etal.,2006) also found no family socioeconomic relations that are not related to the incidence of PMS experienced by respondents. In contrast to the actual, symptoms of STDs that appear influenced by family economic conditions (woods, et al.,1982).

5. CONCLUSION

Based on the analysis and discussion that have been raised, can be concluded as follows: 1) The prevalence of the incidence of premenstrual syndrome in adolescents in Purworejo by 24.6%. 2) Young women whose low physical activity be 2.8 times the risk of symptoms of premenstrual syndrome compared with adolescents of high physical activity.

Based on conclusion delivered, researchers suggest: 1) In practice needs to be done to provide information to students at Public High School (SMAN 1) and Vocational High School (SMK 3) Purworejo about premenstrual syndrome, the benefits of physical activity, and other relevant factors. 2) Increasing the role of teachers and other stakeholders as an effort to increase motivation and awareness of students to always make physical activity as a lifestyle. 3) For further research should be done a more in-depth study with regard to the provision of certain treatments for example aerobic physical activity, swimming to cope with premenstrual syndrome by using higher as *RCT*.

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