THE RISK FACTORS OF PRIMARY DYSMENORRHEA AMONG FEMALE MEDICAL STUDENTS IN UNIVERSITAS KRISTEN DUTA WACANA, YOGYAKARTA

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ABSTRACT

Background: Primary dysmenorrhea is menstrual pain which occurs without any underlying pelvic organ diseases. There are several risk factors of dysmenorrhea, which are BMI, age at menarche, smoking habit, and family history. Female medical students are one population with a high risk of having dysmenorrhea with debilitating effect.

Objective: To test the association between several risk factors with primary dysmenorrhea in female medical students in Universitas Kristen Duta Wacana (UKDW).

Method: This is a cross-sectional study, gathering data from 207 female medical students enrolled in UKDW between September 2018 and January 2019. Further bivariate analyses were performed to test the association between dysmenorrhea prevalence and some risk factors using Chi-square test or Fischer exact test.

Results: Out of 207 participants, 158 (76.33%) are diagnosed with primary dysmenorrhea. 31.88 % of the samples are categorised into the underweight, overweight and obese group. The prevalence ratio of underweight and overweight group compared to the normal group resembles U-shape relationship, but not statistically significant (PR = 1.095; p = .486, and PR 1.055; p = 0.826, respectively). Younger age at menarche (PR = 1.251, p = 0.014) and family history if dysmenorrhea (PR = 1.317; p = 0.002) show a higher prevalence rate compared to normal age group and no family history of dysmenorrhea.

Conclusion: Younger age at menarche and family history of dysmenorrhea should be considered as important risk factors, although they are not modifiable. The relationship between body mass index and dysmenorrhea need further investigation with a prospective approach.

Keywords: dysmenorrhea, body mass index, medical students, menarche, family medical history

INTRODUCTION

Dysmenorrhea is defined as pain during menstruation period, which is categorised into primary and secondary dysmenorrhea. Primary dysmenorrhea occurs when there is no underlying condition of the female reproductive organ, while secondary dysmenorrhea usually manifests as symptoms of any diseases in the pelvic cavity.¹ Worldwide, the prevalence of dysmenorrhea ranges from 60.4% to 91% in reproductive age women.² There is no recent nationwide study or review on dysmenorrhea prevalence or incidence.

Several risk factors may elicit dysmenorrhea such as early age at menarche, prolonged menstruation period, body mass index (BMI), family history of dysmenorrhea, nullipara, and smoking habit.³ Abnormal BMI, both underweight or overweight, has been discussed with controversial results as dysmenorrhea risk factors.^{4,5} Furthermore, Ju et al discovered a U-shaped relationship between BMI and dysmenorrhea, which support the higher risk of dysmenorrhea for both underweight and overweight girls.⁶ Female students at the Faculty of Medicine Universitas Kristen Duta Wacana, as well as other university students, might be exposed to the abnormal BMI related to an unhealthy lifestyle. Therefore, this study is conducted to measure the relationship between BMI and primary dysmenorrhea, to provide precise health promotion among female medical students.

METHODS

This study used a cross-sectional design to gather clinical information on dysmenorrhea symptoms and risk factors measurement from female medical students at Universitas Kristen Duta Wacana. During the sampling period (September 2018 to January 2019), we collected information from 207 students who fulfilled the eligibility criteria. The baseline characteristics are described with table and graph. Primary dysmenorrhea is assessed by a validated questionnaire. All continuous data are recoded into categorical data for further bivariate analysis (using Chi-square test or Fischer exact test with $p < 0.05$ as the limit of significance) on the association between the risk factors and dysmenorrhea symptoms. The BMI variable is specifically categorised according to the modified cut-off for Asian population.⁷ This study has been approved by the Ethical Committee of the Faculty of Medicine Universitas Kristen Duta Wacana.

RESULTS

Baseline Characteristics

There are 207 female students involved in this study, distributed from the first year to the fourth year. Based on the questionnaire, there are 158 (76.33%) participants experienced symptoms which classified as primary dysmenorrhea. Table 1 described the baseline characteristics of the participants.

Table 1. Baseline characteristics of female medical students at Universitas Kristen Duta Wacana, 2018-2019 (n=207)

Characteristics	N (%)
<i>BMI category</i>	
Underweight	38 (18.36%)
Normal weight	141 (68.12%)
Overweight	24 (11.59%)
Obese	4 (1.93%)
<i>Age at Menarche</i>	
Early	55 (26.57%)
Normal	146 (70.53%)
Late	6 (2.90%)
<i>Duration of the menstrual period</i>	
Normal	191 (92.27%)
Abnormal	16 (7.73%)
<i>Smoking history</i>	
Yes	3 (1.45%)
No	204 (98.55%)
<i>Family history of dysmenorrhea</i>	
Yes	38 (18.84%)
No	168 (81.16%)
<i>Primary dysmenorrhea</i>	
Yes	158 (76.33%)
No	49 (23.67%)

The Relationship Between Risk Factors and Dysmenorrhea

Considering the U-shape relationship between BMI and dysmenorrhea (as described by Ju et al.⁶), the association were tested with the normal weight group as the reference. Therefore, the test produced two sets of analysis, one comparing underweight and normal weight, and another comparing overweight and normal weight. This method is also applied to the analysis between age at

menarche and dysmenorrhea, with the assumption that any of early or late-onset will result in a higher prevalence of primary dysmenorrhea. For other risk factors, two by two tables were created to describe their association with primary dysmenorrhea. Table 2 shows the proportion, p-Value, and prevalence ratio with subsequent 95% confidence interval. Please note that some association are tested with the Fischer exact test.

Table 2. The association of risk factors and Primary dysmenorrhea prevalence of female medical students at Universitas Kristen Duta Wacana, 2018-2019 (n=207)

Risk factors	Primary dysmenorrhea		p	PR [†]	95% CI for PR
	Yes (N = 158)	No (N = 49)			
<i>BMI category (N(%))</i>					
Underweight	31 (19.6%)	7 (14.3%)	0.486	1.095	0.916-1.311
Normal weight	105 (66.5%)	36 (73.5%)	Ref.	Ref.	Ref.
Overweight and Obese	22 (13.9%)	6 (12.2%)	0.826	1.055	0.849-1.310
<i>BMI category (N(%))</i>					
Abnormal	53 (33.5%)	13 (26.5%)	0.456	1.078	0.924-1.257
Normal weight	105 (66.5%)	36 (73.5%)			
<i>Age at Menarche</i>					
Early	49 (31.0%)	6 (12.2%)	0.014	1.251	1.089-1.436
Normal	104 (65.8%)	42 (85.7%)	Ref.	Ref.	Ref.
Late	5 (3.2%)	1 (2.0%)	0.909*	1.170	0.806-1.698
<i>Age at Menarche</i>					
Abnormal	54 (31.0%)	7 (12.2%)	0.013	1.243	1.084-1.425
Normal	104 (65.8%)	42 (85.7%)			
<i>Duration of the menstrual period</i>					
Normal	146 (92.4%)	45 (91.8%)	1.000*	0.981	0.732-1.316
Abnormal	12 (7.6%)	4 (8.2%)			
<i>Smoking history</i>					
Yes	2 (1.3%)	1 (2.0%)	1.000*	0.872	0.390–1.948
No	156 (92.4%)	48 (91.8%)			
<i>Family history of dysmenorrhea</i>					
Yes	37 (23.4%)	2 (4.1%)	0.002*	1.317	1.168-1.484
No	121 (76.6%)	47 (95.9%)			

†PR = Prevalence Ratio

*p-value result using Fischer exact test because > 20% cell has expected count less than 5.

DISCUSSION

This study found some interesting results on the prevalence of primary dysmenorrhea and its risk factors, especially within the female medical student population. The prevalence of primary dysmenorrhea in this study (76.33%) is within the prevalent range and similar to previous studies in similar settings (from 72.7% to 99.6%).⁸⁻¹² Most of the participants also have a normal BMI (68.1%), similar to other studies (from 46.8% to 73%).^{8,10,11} The smoking history is very low in this study, compared to general university student⁹, as

medical students tend to have a healthier lifestyle and also avoiding stigma on tobacco consumption.

The bivariate analysis on each risk factors shows that only age at menarche and family history of dysmenorrhea which associated with a higher prevalence of primary dysmenorrhea. Meanwhile, BMI, duration of the menstrual period and smoking history did not result in any significant association. Compared to other studies, the only consistent risk factor is the family history of dysmenorrhea.⁹⁻¹³ This might be explained by hereditary factors such as genetic polymorphisms. Although

the results are quite inconclusive, some studies suggested polymorphism in MIF (Macrophage migratory inhibitory factor) gene, TNF (Tumour necrosis factor) gene and ESR1 (Oestrogen receptor 1) as predisposing factors of primary dysmenorrhea in young girls.^{14,15}

The evidence on the association between BMI and primary dysmenorrhea is debatable. Although the result in this study is not significant, within the sample of 207 students, there is 9.5% increase prevalence rate of dysmenorrhea for underweight group, 5.5% increase for the overweight group, and 7.8% increase when both groups combined, compared to the normal-weight group. This is consistent with Ju et al. who discovered a U-shaped relationship, describing that higher risk of primary dysmenorrhea is associated with both underweight and overweight.⁶ The higher fat mass in overweight and obese students might induce capillary hyperplasia in the pelvic region and increase prostaglandin synthesis which would trigger painful symptoms of dysmenorrhea.⁵ In underweight women, the lack of nutritional provision might alter the hormonal function in the luteal phase, hence producing discomfort during menstrual period.⁴

Interestingly, another study in a university setting showed a significant result with a 43.6% increase prevalence rate of both under and overweight group combined, compared to the normal-weight group.⁸ One study in high school settings with 171 participants even found a dose-response relationship, where the underweight group has the least proportion of dysmenorrhea symptoms compared to the normal weight group and overweight group.¹⁰ However, the later study comprised of 43.4% underweight students, much higher

than other studies, thus the result might be overestimating the risk in the under-represented overweight group. Based on this evidence, the result of this study would add further evidence to the U-shaped relationship between BMI and the primary dysmenorrhea prevalence.

This study shows an increased prevalence rate of dysmenorrhea in the early onset of menarche group (25.1%), later-onset group (17.0%), and both abnormal groups combined (24.3%) compared to the normal age group, with the first and the third comparison have a statistically significant result. This result is interesting and contradicts with current evidence. Previous studies had shown various result on the association between age at menarche and primary dysmenorrhea. Two Indonesian studies reported an insignificantly increased prevalence (0.5% and 2.6%) of dysmenorrhea in younger age at menarche compared to the normal age group, and one reported a significant reduction (58%) of dysmenorrhea prevalence in the later-onset group.^{10,11} The later evidence is supported by Pejčić and Janković¹³ who discovered a significant decrease (24%) of dysmenorrhea prevalence by increasing age. Another study reported conflicting result with the insignificant increased trend of dysmenorrhea prevalence with increasing age.⁸ Theoretically, earlier age at menarche is associated with a shorter menstrual interval with heavier flow due to higher level of oestrogen. Oestrogen would stimulate prostaglandin synthesis which explained the symptoms related to vasoconstriction and muscle contractility effect of prostaglandin.¹⁶

The other risk factors in this study showed insignificant results, which are the duration of the menstrual period and the smoking habit, where both variables show a

decreased prevalence rate of dysmenorrhea with abnormal menstrual duration and positive history of a smoking habit. This result is inconsistent with the previous study where longer menstrual duration (OR 1.53) and smoking habit (OR 3.3) has a higher prevalence rate of dysmenorrhea compared to normal period and healthier habit.¹³ This might be explained mainly by the underrepresentation of abnormal group or students with smoking habit. The abnormal menstrual period is associated with progesterone downregulation, which increases prostaglandin production.¹⁷ As mentioned before, the smoking habit is assumed lower in medical students due to preferred healthier habits and stigma of smoking behaviour. Nevertheless, tobacco consumption would lead to dysmenorrhea through its nicotine content which triggers vasoconstriction in pelvic blood vessels, including vessels surrounding endometrium.¹⁸

Although the cross-sectional approach with the adequate sample is appropriate to describe the prevalence of dysmenorrhea, there are some limitations of this study. There might be bias in self-reported questionnaires, such as social desirability bias and recall bias. Also, this study is quite difficult to extrapolate to the wider population as it is quite specific for female medical students, considering there are variances between institution.

CONCLUSION

This study discovered the prevalence of dysmenorrhea and its risk factors among the female medical student population. Significant risk factors are younger age at menarche and family history of dysmenorrhea, which unfortunately could not be prevented. Although the other risk factors show insignificant results, the

health promotion efforts to achieve healthier habits should be encouraged to all young girls, which are highly predisposed to primary dysmenorrhea.

CONFLICT OF INTERESTS

The author declares no conflicts of interests.

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