

Original Article

The association between age at menarche and the incidence of primary dysmenorrhea among female students of Citra Bangsa Mandiri Christian Senior High School, Kupang

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ABSTRACT

Primary dysmenorrhea is defined as menstrual pain occurring in the absence of identifiable pelvic pathology. Primary dysmenorrhea is associated with various risk factors, one of which is the age at menarche, defined as the age at which a female experiences her first menstruation. This study aimed to determine the association between age at menarche and the incidence of primary dysmenorrhea among female students of Citra Bangsa Mandiri Christian Senior High School, Kupang. This research employed an analytical observational design with a cross-sectional approach. Findings indicate that respondents with early menarche did not experience dysmenorrhea or experienced only mild-to-moderate symptoms, while respondents with normal-age menarche tended to exhibit mild-to-severe dysmenorrhea. There is no significant association was identified between age at menarche and the incidence of primary dysmenorrhea ($P = 0.102$) among female students at Citra Bangsa Mandiri Christian Senior High School, Kupang.

Keywords: Age at menarche, Primary dysmenorrhea, WaLIDD score

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INTRODUCTION

Adolescence is a crucial stage of human development characterized by physical, psychological, and social changes toward maturity.^[1] During this period, maturation of the reproductive organs occurs, marked by menarche, which is the first menstruation experienced by adolescent females. Menstruation may be accompanied by pain, referred to as dysmenorrhea.^[2]

Primary dysmenorrhea is defined as menstrual pain that occurs in the absence of underlying pelvic pathology.^[3] According to data from the World Health Organization (WHO) in 2015, approximately 8.8–94% of females aged 10–20 years experience dysmenorrhea during their menstrual cycles.^[4] In Indonesia, the prevalence of

dysmenorrhea is remarkably high, affecting more than 90% of adolescent girls.^[5]

The pain experienced may range from mild-to-severe and often interferes with daily activities, particularly among adolescents who have recently begun to experience regular menstrual cycles.^[6] This condition not only causes physical discomfort but also negatively impacts academic performance, including decreased concentration, increased school absenteeism, reduced productivity, and lower academic achievement.^[7]

One of the factors associated with the incidence of primary dysmenorrhea is the age at menarche.^[8] Data from the World Population Review (2025) reported that the global average age of menarche is 13.2 years.^[9] According to the Indonesia Health Survey (2023), 34.1% of adolescent girls

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in Indonesia experience menarche between the ages of 11 and 12 years. Meanwhile, in East Nusa Tenggara, 27.7% of adolescent girls experience menarche at 13–14 years, which represents the highest proportion compared to other age groups.^[10]

Research conducted by Kosim *et al.* demonstrated an association between age at menarche and primary dysmenorrhea among students of SMAN 19 Surabaya.^[11] Early menarche occurring before the age of 12 is associated with a higher risk of primary dysmenorrhea due to immature reproductive system development, resulting in stronger and irregular uterine contractions. In addition, earlier exposure to estrogen and prostaglandins may increase uterine sensitivity to pain stimuli.^[12]

The findings of Juwita also indicated that age at menarche was not associated with primary dysmenorrhea among students of SMA Pembangunan Jaya 2 Sidoarjo.^[13] This study reported that primary dysmenorrhea is more strongly influenced by increased prostaglandin levels, which trigger myometrial contractions and vasoconstriction of blood vessels, ultimately causing pain.^[12,13]

Preliminary observations at Citra Bangsa Mandiri Christian Senior High School showed that 100% of female students experienced primary dysmenorrhea with varying degrees of pain intensity. This finding indicates that primary dysmenorrhea remains a common problem among adolescents and warrants further investigation regarding its risk factors.

Based on this background, the researchers were motivated to examine the association between age at menarche and the incidence of primary dysmenorrhea among students at Citra Bangsa Mandiri Christian Senior High School in Kupang. The results of this study are expected to provide scientific insight regarding the correlation between age at menarche and primary dysmenorrhea and serve as a foundation for future intervention efforts to manage primary dysmenorrhea within the school environment.

MATERIALS AND METHODS

This research was conducted on July 25, 2025–August 1, 2025, at Citra Bangsa Mandiri Christian Senior High School, Kupang, involving 52 respondents. This research employed a quantitative analytical observational design with a cross-sectional approach.^[14] The study population consisted of all active female students from grades X to XII who had experienced menstruation. Sampling was carried out using a purposive sampling technique.^[15]

The study began with the measurement of height and body weight, followed by the completion of respondent

characteristic forms. Informed consent was obtained from potential participants who met the inclusion criteria. Age at menarche was obtained from respondent data and primary dysmenorrhea was assessed using the WaLIDD Score questionnaire (Working ability, Location, Intensity, days of pain, Dysmenorrhea).^[16] The collected data were analyzed univariately to describe the frequency distribution of each variable, and bivariately using the nonparametric Mann–Whitney test to determine the association between age at menarche and primary dysmenorrhea, with the significance level set at $P < 0.001$.^[17]

Ethical clearance was obtained from the Ethics Committee of the Faculty of Medicine and Veterinary Medicine, Universitas Nusa Cendana, Kupang.

RESULTS

In this study, the characteristics observed among respondents included age, entry year (cohort), class level, age at menarche, and primary dysmenorrhea status. Based on Table 1, the

Table 1: Distribution of respondent characteristics ($n=52$)

Variable	Frequency ($n=52$)	Percentage
Age		
14 years	9	17.3
15 years	19	36.5
16 years	11	21.2
17 years	13	25
Batch (year of entry)		
2023	19	36.5
2024	12	23.1
2025	21	40.4
Class		
X	21	40.4
XI science	11	21.2
XI social	1	1.9
XII science	17	32.7
XII social	2	3.8
Age at menarche		
Early	19	36.5
Normal	33	63.5
Primary dysmenorrhea		
None	2	3.8
Mild	16	30.8
Moderate	25	48.1
Severe	9	17.3

respondents' ages ranged from 14 to 17 years, with the majority being 15 years old, totaling 19 respondents (36.5%), followed by respondents aged 17 years amounting to 13 individuals (25%), those aged 16 years totaling 11 individuals (21.2%), and those aged 14 years totaling 9 individuals (17.3%).

The largest cohort was the class of 2025, consisting of 21 respondents (40.4%), followed by the class of 2023 with 19 respondents (36.5%), and the class of 2024 with 12 respondents (23.1%). Respondents came from both the science matematika dan ilmu pengetahuan alam (MIPA) and social science ilmu pengetahuan sosial (IPS) study programs. The distribution by class level was as follows: 21 students (40.4%) in grade X, 11 students (21.2%) in grade XI – Science, 1 student (1.9%) in grade XI – Social Science, 17 students (32.7%) in grade XII – Science, and 2 students (3.8%) in grade XII – Social Science.

The study found that most respondents experienced menarche at a normal age, totaling 33 individuals (63.5%), while 19 respondents (36.5%) experienced early menarche.

Data regarding primary dysmenorrhea showed that 2 respondents (3.8%) did not experience primary dysmenorrhea, whereas 50 respondents (96.2%) reported experiencing primary dysmenorrhea. Of these, 16 respondents (30.8%) experienced mild dysmenorrhea, 25 respondents (48.1%) experienced moderate dysmenorrhea, and 9 respondents (17.3%) experienced severe dysmenorrhea.

Normality testing of the data was performed before statistical analysis to determine whether the distribution was normal or non-normal. The Kolmogorov–Smirnov test was used because the sample size exceeded 50 respondents.^[17] The results indicated that the data were not normally distributed ($P < 0.05$). Therefore, bivariate analysis was conducted using a nonparametric test.^[17]

Based on Table 2, the Mann–Whitney nonparametric test yielded a $P = 0.102$, indicating that there was no statistically significant association between age at menarche and the incidence of primary dysmenorrhea among students of Citra Bangsa Mandiri Christian Senior High School, Kupang.

DISCUSSION

Characteristics of Respondent

Based on the results of this study, the majority of respondents had a normal age at menarche. This finding indicates that most participants experienced menarche within the typical age range of 12–14 years. These results are consistent with the study conducted by Agustina Silaen *et al.* on students at Saraswati 1 Senior High School Denpasar, which reported that 59.38% of participants experienced menarche at a normal age range of 14–16 years.^[7]

The present study also aligns with the findings of Hadjou *et al.*, which showed that 52% of female high school students had a normal age at menarche.^[18] In addition, a study by Juwita on students at Pembangunan Jaya 2 Senior High School Sidoarjo, further supports this result, reporting that 39.1% of respondents experienced menarche within the normal age range.^[13]

This study also demonstrated that most respondents experienced primary dysmenorrhea, with 50 individuals (96.2%) reporting symptoms. These results are comparable to findings by Rusydi *et al.* on students at SMA Negeri 9 and SMA Negeri 15 Padang, which reported that 83.5% of students experienced primary dysmenorrhea.^[19]

These findings align with a study by Wang *et al.*, which reported that the prevalence of primary dysmenorrhea is highest during adolescence and tends to decrease after the age of 25 years.^[20] This pattern may be attributed to hormonal activity and ovulatory cycles that are not yet fully stable during adolescence, leading to elevated prostaglandin levels in the endometrium and resulting in excessive uterine contractions that trigger primary dysmenorrhea.^[21]

Association between Age at Menarche and the Incidence of Primary Dysmenorrhea

Statistical analysis in this study showed a $P = 0.102$, indicating that age at menarche, whether early or normal, was not associated with primary dysmenorrhea. Respondents with early menarche were reported to experience no dysmenorrhea or only mild-to-moderate dysmenorrhea, whereas respondents

Table 2: Bivariate analysis of age at menarche and primary dysmenorrhea

Age at menarche	Primary dysmenorrhea								Total		P-value
	None		Mild		Moderate		Severe		n	%	
	n	%	n	%	n	%	n	%			
Normal	0	0.0	10	30.3	15	45.5	8	24.2	33	63.5	0.102*
Early	2	10.5	6	31.6	10	52.6	1	5.3	19	36.5	
Total	2	3.8	16	30.8	25	48.1	9	17.3	52	100	

Mann-Whitney * $P > 0.001$

with normal-age menarche experienced mild-to-severe dysmenorrhea.

These findings are consistent with the study by Juwita, which also reported no significant association between age at menarche and primary dysmenorrhea ($P = 0.194$), as well as research by Tina Gustina (2015) at SMK Negeri 4 Surakarta, which demonstrated similar results ($P = 0.05$).^[13,22]

The absence of a significant relationship between the two variables suggests that other factors may play a more dominant role in influencing the incidence of primary dysmenorrhea, particularly prostaglandin levels. Primary dysmenorrhea is triggered by an increase in prostaglandin production before menstruation. Prostaglandin E_2 functions as a vasodilator and a platelet dispersion agent, whereas prostaglandin $F_2\alpha$ acts as a pain mediator and a stimulant for uterine smooth muscle contraction.^[6,12] Elevated levels of these prostaglandins occur under the influence of estrogen and peak at the onset of menstruation. Excessive uterine contractions then lead to vasoconstriction and tissue hypoxia, producing the characteristic pain associated with menstruation.^[23]

However, the results of this study differ from those of Agustina Silaen *et al.*, which found a significant association between age at menarche and primary dysmenorrhea among students at Saraswati 1 Senior High School Denpasar. In that study, adolescents who experienced early menarche (<12 years) had a higher risk of developing primary dysmenorrhea due to incomplete reproductive organ maturity and a narrower cervical lumen, which increases intrauterine pressure during menstruation.^[7]

CONCLUSION

There is no significant association between age at menarche and the incidence of primary dysmenorrhea among female students at Citra Bangsa Mandiri Christian Senior High School, Kupang. The high prevalence of primary dysmenorrhea among respondents highlights the need for targeted interventions within the school environment.

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CONFLICT OF INTEREST

The authors declare that no conflicts of interest were found during this study.

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