

Self-Reported Changes in Appetite, Mood, Sleep, and Food Craving Across Menstrual Cycle Phases Among Femele University Students

Yuli Dwi Setyowati¹, Debby Endayani Safitri^{2*}

Program Studi Gizi, FIKES, Universitas Muhammadiyah Prof. DR. Hamka^{1,2}

Correspondence email: *debby_endayani@uhamka.ac.id

ABSTRACT

Hormonal fluctuations throughout the menstrual cycle may influence appetite, mood, sleep quality, and eating behavior among women of reproductive age. However, prospective observational studies exploring subjective experiences across menstrual phases remain limited, particularly among Indonesian female university students. This study aimed to explore self-reported changes in appetite, food craving, mood, sleep quality, and physical symptoms across menstrual cycle phases among female university students. This exploratory prospective observational study involved female university students who conducted self-observation throughout one menstrual cycle. Participants recorded subjective experiences during menstrual, follicular, ovulatory, and luteal phases, including appetite changes, food craving, mood, sleep quality, activity level, and physical symptoms. Descriptive and thematic approaches were used to identify recurring patterns across phases. Distinct behavioral and subjective patterns were observed across menstrual phases. Menstrual and luteal phases were frequently associated with decreased energy, fatigue, sleep disturbance, emotional instability, and physical discomfort. Increased appetite and food craving, particularly for savory and spicy foods, were predominantly reported during the luteal phase. In contrast, the follicular phase was commonly associated with more stable mood, improved energy, and lower fatigue. Several participants also reported fluctuations in activity level and emotional state throughout the cycle. Self-reported appetite, mood, sleep, and food-related behaviors appeared to fluctuate across menstrual cycle phases. The luteal phase was characterized by increased appetite and emotional changes, while the follicular phase was associated with improved wellbeing and energy. These findings provide preliminary insights into menstrual phase-related behavioral changes among young women.

Keywords: menstrual cycle, appetite, food craving, mood, sleep quality, female university

INTRODUCTION

The menstrual cycle is characterized by cyclical hormonal fluctuations that may influence various physiological and behavioral responses among women. Menstrual physiology involves four main hormones, which consist of estrogen, progesterone, luteinizing hormone [LH], and follicle stimulating hormone [FSH]. Changes in estrogen and progesterone levels throughout the menstrual cycle have been associated with appetite regulation, emotional state, sleep quality, and food preferences (Li, 2024; Matsuura et al., 2020; Rugvedh et al., 2023). Previous studies have suggested that women may experience increased appetite and food craving during the luteal phase, while the follicular phase is often associated with more stable mood and energy levels (Matsuura et al., 2020; Sundström Poromaa & Gingnell, 2014). In addition, menstrual-related symptoms such as fatigue, abdominal discomfort, and sleep disturbance may affect daily activities and eating behavior (Weon & Son, 2023).

Proceeding books:

The 3rd International Conference and Innovation Exhibiti on Global Education (ICEGE)

Appetite-related changes during the menstrual cycle have gained increasing attention due to their potential relationship with eating behavior, emotional eating, and long-term metabolic health. Hormonal fluctuation may contribute to changes in hunger perception, food preference, and energy intake, particularly during the premenstrual period (Hirschberg, 2012). Women may also experience subjective changes in emotional condition and physical wellbeing across menstrual phases (Handy et al., 2022). Most previous studies examining menstrual cycle-related behavioral changes have used cross-sectional or retrospective approaches. Prospective self-observation studies exploring subjective experiences across different menstrual phases remain limited, particularly among Indonesian female university students.

Understanding how women perceive changes in appetite, mood, sleep, and eating behavior across menstrual phases may provide insight into behavioral adaptations associated with hormonal fluctuation. Therefore, this study aimed to explore self-reported changes in appetite, food craving, mood, sleep quality, and physical symptoms across menstrual cycle phases among female university students.

RESEARCH METHOD

This study used an exploratory prospective observational design. Participants were 13 female university students of reproductive age who voluntarily completed self-observation assignments during one menstrual cycle. Data collected in October-December 2024. Inclusion criteria including female university students of reproductive age, experienced regular menstruation with 26-35 days menstrual cycle, and completed self-observation records for all menstrual phases in one menstrual cycle. Participants conducted self-observation throughout four menstrual cycle phases: menstrual phase, follicular phase, ovulatory phase, luteal phase. Participants recorded subjective experiences related to appetite changes, food craving, mood, sleep quality, physical symptoms, activity level, and eating behavior.

Several participants additionally completed simple food records; however, quantitative dietary data were not consistently available across all participants. Therefore, food intake data were used descriptively as supporting information. Self-reported responses were extracted and categorized into predefined variables, including appetite changes (increased, stable, decreased), sleep quality (good or disturbed), mood changes, fatigue, bloating, pain, and food craving type. Descriptive analysis was conducted to summarize recurring patterns across menstrual phases. Subjective responses were categorized into several themes, including appetite changes, emotional fluctuation, sleep disturbance, fatigue, and food craving. A thematic approach was used to identify recurring subjective experiences reported by participants during each menstrual phase.

RESULTS AND DISCUSSION

A total of 13 female university students were included in the analysis. Most participants completed observations across menstrual, follicular, ovulatory, and luteal phases. The majority of participants reported noticeable subjective changes throughout the menstrual cycle, particularly regarding appetite, emotional condition, sleep quality, and physical symptoms. All respondents had a body mass index (BMI) in the normal category and were aged 19-20 years. Self-reported appetite changes, food craving, mood fluctuation, sleep disturbance, and fatigue across menstrual phases presented in Table 1.

Table 1: Self-Reported Changes Across Menstrual Phases

Variable	Menstrual	Follicular	Ovulatory	Luteal
	n (%)	n (%)	n (%)	n (%)
Increased appetite	3 (23)	1 (7,7)	1 (7,7)	11 (84,6)
Decreased appetite	8 (61,5)	0 (0,0)	0 (0,0)	0 (0,0)
Food craving	3 (23)	2 (15,4)	3 (23)	9 (69,2)
Mood fluctuation	12 (92,3)	1 (7,7)	0 (0,0)	12 (92,3)
Sleep disturbance	6 (46,1)	0 (0,0)	0 (0,0)	4 (30,7)
Fatigue	11 (84,6)	0 (0,0)	0 (0,0)	7 (53,8)

Appetite Changes Across Menstrual Phases

Distinct appetite patterns were observed across menstrual phases. Reduced appetite was commonly reported during the menstrual phase, frequently accompanied by abdominal discomfort, fatigue, and decreased activity level. In contrast, increased appetite was predominantly reported during the luteal phase. Several participants described stronger desire to consume specific foods and increased frequency of eating. The follicular phase was generally associated with more stable appetite patterns and fewer food cravings. Several participants who completed food records showed higher estimated energy intake during the ovulatory and luteal phases compared with the menstrual phase. One participant reported an increase from approximately 1200 kcal/day during menstruation to 1600 kcal/day luteal phases.

Food Craving Patterns

Food craving appeared to vary across menstrual phases. Craving for savory and spicy foods was more frequently reported during the luteal phase. Some participants also reported increased desire for comfort foods and energy-dense foods during this phase. Several participants described subjective experiences such as:

- “wanting certain foods continuously,”
- “increased desire for spicy foods,”
- and “difficulty controlling food cravings.”

In contrast, participants in the follicular phase generally described appetite as more stable and less emotionally driven.

Mood and Emotional Changes

Mood fluctuation was commonly reported during menstrual and luteal phases. Participants described irritability, emotional sensitivity, sadness, and mood swings during these phases. The follicular phase was frequently associated with improved mood, emotional stability, and increased motivation. Some participants also reported feeling more energetic and emotionally positive during the ovulatory phase.

Sleep and Physical Symptoms

Sleep disturbance and fatigue were commonly reported during menstrual and luteal phases. Participants frequently described excessive sleepiness, reduced physical energy, and poor sleep quality. Physical symptoms such as abdominal pain, bloating, headache, breast tenderness, muscle discomfort, and reduced concentration were also frequently reported.

Qualitative Themes Related to Menstrual Phase Experiences

Theme 1. Increased Appetite and Food Craving During the Luteal Phase

Several participants reported increased appetite and stronger food cravings during the luteal phase. Cravings were commonly directed toward savory, spicy, and sweet foods. Some participants also described increased frequency of eating and difficulty controlling the desire to eat certain foods. One participant stated that she experienced “lebih ingin makanan pedas dan ngemil terus,” while another participant described that “ada keinginan kuat untuk beberapa makanan tertentu.” These findings suggest that the luteal phase may be associated with stronger food-related impulses and emotional eating tendencies.

Theme 2. Emotional Fluctuation Across Menstrual Phases

Mood-related changes were frequently reported during menstrual and luteal phases. Participants commonly described irritability, emotional sensitivity, sadness, and rapid mood changes during these periods. Several participants expressed that they became “saya jadi mudah marah tanpa alasan” while others described feeling emotionally unstable and more easily overwhelmed during the premenstrual period. In contrast, the follicular phase was often associated with emotional stability, improved mood, and increased motivation. These findings indicate that emotional fluctuation was perceived as an important part of menstrual phase experiences among participants.

Theme 3. Fatigue and Reduced Physical Energy

Participants frequently reported fatigue, sleepiness, and reduced motivation for daily activities during menstrual and luteal phases. Several participants described feeling physically exhausted and preferring rest or sleep during these phases. One participant reported “ingin tidur terus” while another described “sulit tidur di malam hari.” Sleep disturbance and poor sleep quality were also frequently mentioned. These findings suggest that menstrual phase-related physical discomfort may influence perceived energy level and daily functioning.

Theme 4. Physical Discomfort and Body-Related Symptoms

Physical symptoms such as abdominal pain, bloating, breast tenderness, headache, and muscle discomfort were commonly reported during menstrual and luteal phases. Participants frequently described experiencing bloating, abdominal cramps, and generalized body discomfort that affected their wellbeing and daily activities. Some participants also reported reduced concentration and discomfort during academic activities. These findings highlight the broad range of subjective physical experiences associated with menstrual cycle phases.

Table 2: Main Qualitative Themes

Theme	Description	Representative Quote
Increased appetite during luteal phase	Participants reported stronger desire to eat and increased craving	“lebih ingin makanan pedas dan ngemil terus”
Emotional fluctuation	Mood swings and irritability were frequently reported	“mudah marah tanpa alasan”
Reduced physical energy	Fatigue and sleepiness increased during menstruation and luteal phase	“ingin tidur terus”
Physical discomfort	Bloating, pain, headache	“saya merasakan sakit perut, sakit pinggang, dan nyeri badan yang membuat tubuh kurang nyaman dan mudah lelah”

DISCUSSION

This study demonstrated that self-reported appetite, mood, sleep quality, and food-related behaviors varied across menstrual cycle phases among female university students. The luteal phase was characterized by increased appetite and food craving, particularly for savory and spicy foods. These findings are consistent with previous literature suggesting that progesterone-related hormonal changes may influence appetite regulation and emotional eating behavior (Vigil et al., 2022).

The luteal phase disrupts the pattern and intensity of appetite, as well as increasing macronutrient intake (Meneghesso et al., 2022). Consistently, various studies report that energy intake tends to increase during the luteal phase compared to the follicular phase. Meta-analyses have shown a statistically significant increase in energy intake during the luteal phase, with an average difference of 168 kcal per day (Tucker et al., 2024).

Mood fluctuation and fatigue were also more frequently reported during menstrual and luteal phases. Hormonal fluctuation, menstrual discomfort, and sleep disturbance may contribute to these subjective experiences. Previous studies have demonstrated that declining estrogen levels and increased progesterone dominance during the late luteal phase may influence neurotransmitter regulation, emotional processing, and perceived fatigue (Baker & Driver, 2007). In addition, menstrual-related symptoms such as abdominal pain, bloating, and sleep disruption may further exacerbate emotional instability and reduced energy levels (de Zambotti et al., 2015). Conversely, the follicular phase is often associated with rising estrogen concentrations, which have been linked to improved mood, enhanced cognitive function, and increased vitality (Sundström Poromaa & Gingnell, 2014).

These physiological changes may partially explain why participants in the present study commonly reported more stable emotional conditions, improved motivation, and lower fatigue during the follicular phase. The findings of this study support previous evidence indicating that menstrual cycle phases may influence eating behavior and psychological wellbeing. However, this study additionally highlights how these changes are subjectively experienced by female university students in their daily lives. The prospective self-observation approach used in this study may provide a more naturalistic understanding of behavioral fluctuation across menstrual phases compared with retrospective surveys.

Several limitations should be acknowledged. This study relied on self-reported observations and subjective interpretation by participants. Quantitative dietary data were incomplete and not consistently available across all participants. In addition, menstrual phases were self-identified and not hormonally confirmed. Despite these limitations, this study provides preliminary insight into menstrual phase-related behavioral changes among young women and may contribute to future research in women's health, nutrition behavior, and menstrual health.

CONCLUSION

Self-reported appetite, mood, sleep quality, and food craving appeared to fluctuate across menstrual cycle phases among female university students. The luteal phase was predominantly associated with increased appetite, food craving, emotional fluctuation, and fatigue, whereas the follicular phase was generally associated with improved wellbeing and emotional stability.

These findings provide exploratory evidence regarding behavioral changes across menstrual phases and may contribute to future research on women's health and eating behavior.

REFERENCES

- Baker, F. C., & Driver, H. S. (2007). Circadian rhythms, sleep, and the menstrual cycle. *Sleep Medicine*, 8(6), 613–622. [https://doi.org/https://doi.org/10.1016/j.sleep.2006.09.011](https://doi.org/10.1016/j.sleep.2006.09.011)
- de Zambotti, M., Willoughby, A. R., Sassoon, S. A., Colrain, I. M., & Baker, F. C. (2015). Menstrual Cycle-Related Variation in Physiological Sleep in Women in the Early Menopausal Transition. *The Journal of Clinical Endocrinology and Metabolism*, 100(8), 2918–2926. <https://doi.org/10.1210/jc.2015-1844>
- Handy, A. B., Greenfield, S. F., Yonkers, K. A., & Payne, L. A. (2022). Psychiatric Symptoms Across the Menstrual Cycle in Adult Women: A Comprehensive Review. *Harvard Review of Psychiatry*, 30(2), 100–117. <https://doi.org/10.1097/HRP.0000000000000329>
- Hirschberg, A. L. (2012). Sex hormones, appetite and eating behaviour in women. *Maturitas*, 71(3), 248–256. <https://doi.org/10.1016/j.maturitas.2011.12.016>
- Li, S. (2024). Impact of Estrogen in Menstrual Cycle on Food Intake, Appetite, Energy Expenditure.

Proceeding books:

The 3rd International Conference and Innovation Exhibiti on Global Education (ICEGE)

- Highlights in Science, Engineering and Technology*, 91, 371–376.
<https://doi.org/10.54097/e40vt903>
- Matsuura, Y., Inoue, A., Kidani, M., & Yasui, T. (2020). Change in appetite and food craving during menstrual cycle in young students. *Int. J. Nutr. Metab.*, 12(September), 25–30.
<https://doi.org/10.5897/IJNAM2019.0264>
- Meneghesso, B. R., Constâncio, G. R., Rinaldi, M. M., Ferreira e Silva, N., Dalmaso, P. T., Marcello, V. Z., Avance, A. D. de, Ribas Filho, D., & Costa, T. (2022). Evaluation of premenstrual syndrome and its relationship with changes in food consumption during the luteal phase in a university center in northwest paulista: a prospective observational cross-sectional study. *International Journal of Nutrology*, 15(3), 1–8. <https://doi.org/10.54448/ijn2236>
- Rugvedh, P., Gundreddy, P., & Wandile, B. (2023). The Menstrual Cycle's Influence on Sleep Duration and Cardiovascular Health: A Comprehensive Review. *Cureus*, 15(10), e47292.
<https://doi.org/10.7759/cureus.47292>
- Sundström Poromaa, I., & Gingnell, M. (2014). Menstrual cycle influence on cognitive function and emotion processing-from a reproductive perspective. *Frontiers in Neuroscience*, 8, 380.
<https://doi.org/10.3389/fnins.2014.00380>
- Tucker, J. A. L., McCarthy, S. F., Bornath, D. P. D., Khoja, J. S., & Hazell, T. J. (2024). The Effect of the Menstrual Cycle on Energy Intake: A Systematic Review and Meta-analysis. *Nutrition Reviews*, 83(3), e866–e876. <https://doi.org/10.1093/nutrit/nuae093>
- Vigil, P., Meléndez, J., Petkovic, G., & Del Río, J. P. (2022). The importance of estradiol for body weight regulation in women. *Frontiers in Endocrinology*, 13(November), 1–16.
<https://doi.org/10.3389/fendo.2022.951186>
- Weon, H. W., & Son, H. K. (2023). An Analysis of Menstrual Symptoms, Menstrual Attitudes, Physical Stress and Psychological Stress According to the Menstrual Cycle Phase. *Iranian Journal of Public Health*, 52(6), 1161–1169. <https://doi.org/10.18502/ijph.v52i6.12958>