SAR Journal of Medicine

Abbreviated Key Title: *SAR J Med*
Home page: https://sarpublication.com/journal/sarjm/home
DOI: https://doi.org/10.36346/sarjm.2025.v06i05.004

OPEN ACCESS

ISSN 2707-773X (P)
ISSN 2709-6920 (O)

Original Research Article

Stress as a Predictor of Menstrual Delay among Students in Tertiary Institutions in South-South Nigeria

Gbaranor K. B.[1]*, Ekeng O. B.[2], Oreh Adaeze C.[3], John E. E.[4], Barinua-Gbaranor N. P.[5], Mube A. W.[6], Etuk M. S.[4], Okoiseh O. S.[7], Monday S. N.[8], Timi-Oladipo A.[8], Bohr L. E.[1], Owhorji B. I.[1], Osoma S. C.[9]

[1]Department of Human Physiology, College of Medical Sciences, Rivers State University, Port Harcourt, Rivers State, Nigeria
[2]Department of Anaesthesia, Nile University, Abuja, Nigeria
[3]Ministry of Health, Rivers State, South-South, Nigeria
[4]Akwa Ibom State Ministry of Health, Uyo, Akwa Ibom State, Nigeria
[5]Department of Office and Information Management, Faculty of Administration and Management, Rivers State University, Rivers State, South-South, Nigeria
[6]Department of Obstetrics and Gynaecology, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria
[7]Department of Obstetrics and Gynaecology, University of Uyo Teaching Hospital, Uyo, Akwa Ibom State, Nigeria
[8]Cardinal Care Hospital and Maternity, Abuja, Nigeria
[9]Department of Obstetrics and Gynaecology, Rivers State University Teaching Hospital, Port Harcourt, Rivers State, South-South, Nigeria

***Corresponding Author:** Gbaranor K. B.
Department of Human Physiology, College of Medical Sciences, Rivers State University, Port Harcourt, Rivers State, Nigeria

Article History: | Received: 27.09.2025 | Accepted: 24.11.2025 | Published: 16.12.2025 |

Abstract: The menstrual cycle is a vital indicator of a woman's reproductive health. A typical cycle ranges between 21–35 days and is regulated by the Hypothalamic–Pituitary–Ovarian (HPO) axis. However, several internal and external factors can disrupt this cycle, leading to irregularities such as delayed menstruation. One of the most common causes of menstrual irregularities is stress. Stress is the body's response to emotional, physical, or environmental pressures. It triggers physiological reactions such as increased cortisol production, elevated heart rate, and hormonal imbalance. Stress is one of the most common psychological and physiological challenges faced by university students. Academic pressure, financial constraints, relationship issues, inadequate sleep, and environmental changes can significantly affect students' health, including their menstrual cycle. Delayed menstruation (also called oligomenorrhea) is a common menstrual disorder characterized by cycles longer than the usual 21–35 days. Stress is the body's response to any demand or challenge. It triggers the release of stress hormones such as cortisol and adrenaline, which can disturb normal bodily functions. A normal menstrual cycle is regulated by the Hypothalamic–Pituitary–Ovarian (HPO) Axis. Any disturbance in this axis especially hormonal imbalance may lead to delayed menstruation, missed periods and irregular cycles. This study is aim to evaluate the Stress as a Predictor of Menstrual Delay Among Students in Tertiary Institutions In South-South Nigeria. This was a cross-sectional study involving 250 women. A well-structured questionnaire was administered to participants. The study lasted for a period of 2 months. Statistical analysis was done using SPSS version 25.0 and $p < 0.05$ was significant. The results revealed that 75% of the participants had high academic workload, 64% are facing overcrowding living conditions, 72% are facing financial constraints, 68% are having environmental and security concerns and 86% are facing noise and distractions around campus. These factors increase psychological stress, potentially affecting menstrual health.

Keywords: Stress, Predictor, Menstrual, Delay, Students.

INTRODUCTION

Menstrual period is a natural process that occur monthly in a female after the attainment of puberty and it is the pride of a woman. This natural process is stimulated and aided by hypothamo-pituitary- gonadal axis (HPGA) and any disruption in this pathway will interfere with the normal menstrual flow and if this happened then, it becomes a problem with the lady in question (Gbaranor, *et al*., 2024). The hypothalamus

produces the gonadotropin releasing hormone that function to stimulate the anterior pituitary gland to produce the gonadotropic hormones (Folliclestimulating hormone (FSH) and Luteinizing hormone (LH) which enhance the follicular growth and then lead to ovulation (Gbaranor, *et al*., 2024). However, delayed in having this normal process every monthly is a concern (Gbaranor, *et al*., 2024). Several factors may be responsible for delayed menstrual period experienced by females (Gbaranor, *et al*., 2024). Every healthy woman who has attained the age of puberty must experience monthly menstrual period. Regular monthly flow with no abnormality is the pride of a woman. Certain environmental, social and medical factors may hinder or interfere with the regular monthly flow, thereby causing delayed or cessation of the menstrual period. However, when a woman-experiences delayed or cessation of her menstrual period at a point when she was not expecting, she becomes worried or psychologically destabilized, Disruption in the gonadotropic hormones may lead to anovulation and this may induce delay in menstrual period. However, students in tertiary institutions are facing delayed in their monthly menstrual period and this call for concern among them and their peers. This delayed could be attributed to certain factors that may not be known to the students unless certain radiological or laboratory investigations are carry out to ascertain the cause of the delay (Gbaranor, *et al*., 2024). This cycle varies in individual in duration of flow, length of cycle, pattern of flow (scanty, moderate or heavy with or without clot). Virtually every woman who have attained puberty and she has started menstrual period will experience certain physiological changes in her body. These changes may occur before or during the menstrual cycle (Gbaranor, *et al*., 2022). The length and regularity of menstrual cycles reflect changes in ovarian steroid production (Kato *et al*., 1999; Harlow SD and Ephross SA, 1995). If an undetected pregnancy and loss occurs, menstrual cycle length may be misclassified if selfreported information is used alone (Harlow SD and Matanoski GM, 1991). Physical activity of many hours per week has been shown to be associated with an increased cycle length, which could be due to a dampening of FSH pulses during the luteal follicular transition, leading to delayed maturation of the next cohort of follicles (Akaike H. A, 1974; De Souza, *et al*., 1997). The major cause of menstrual cycle irregularity is functional hypothalamic amenorrhea linked with reduced gonadotropin-releasing hormone secretion and hypothalamic–pituitary– adrenal (HPA) axis dysregulation (Reindollar, *et al*., 1986; Loucks AB and Thuma JR, 2014; Liu JH, 1990). Previous study by Gbaranor *et al*., (2023) revealed that delayed in menstrual period affected majority (96.00%) of the participants' academic performance. In the study participants were students and they were confused why they were not seeing their period and this alone could affect their level of intelligence (Gbaranor *et al*., (2023). Also, in previous study by Gbaranor *et al*., 2023) shows that 97.20% of them were worried due to delayed in their menstrual period. The participants were female students who might not know the cause of delay in menstrual period and because they do not know the cause of the delayed, that could be the reason why the participants experienced psychological effects like depression, isolation, ashamed, thinking, worried and poor academic performance (Gbaranor *et al*., 2023) The moment you are psychologically affected due to certain factors, it's also affect virtually every part of your body and this could have severe consequences such as drug abuse and drop-out of school. When you are facing psychological problem due to unwanted issue, it could lead to several social vices such as suicide, alcohol consumption, substance abuse, and isolation (Gbaranor *et al*., (2023).

Higher stress levels have consistently been linked to reproductive health consequences such as anovulation, oligomenorrhea, infertility, and adverse pregnancy outcomes (Jain *et al*., 2023; Meczekalski *et al*., 2022; Schliep *et al*., 2015; 2022). Stress is recognized as a behavioral factor or antecedent of functional hypothalamic amenorrhea (FHA), a form of chronic anovulation (Saadedine *et al*., 2023).

FHA occurs when gonadotropin-releasing hormone (GnRH) drive is insufficient to sustain ovarian folliculogenesis to the point of ovulation. Women experiencing FHA commonly express depressive symptoms, feelings of inadequacy, insecurity, and lack of control over their lives compared to those with regular menstrual cycles (Marcus *et al*., 2001). Furthermore, psychosocial stress can indirectly influence the other two triggering factors of FHA: disordered eating and excessive exercise especially in the setting of energy deficit. Studies have demonstrated a correlation between increased stress levels, disordered eating patterns, and unhealthy exercise habits (Barnhart *et al*., Citation2021; Chen et al., Citation2012; Costarelli & Patsai, Citation2012; Flett & Hewitt, Citation2005; Wågan *et al*., Citation2021). Given the rising levels of stress globally and the direct and indirect effects of stress on the hypothalamic-pituitary-ovarian (HPO) axis, it becomes essential to classify the menstrual cycle as a vital sign in premenopausal women of all ages. In this clinical perspective, we aim to describe the increasing levels of stress worldwide and explain potential mechanisms contributing to this stress pandemic. Additionally, we will explore the connection between increased stress levels and FHA, emphasizing the importance of increased research and clinical awareness about this condition. This topic explores how stress influences menstrual irregularities, particularly delayed periods, among female students in Tertiary Institutions in South-South Nigeria.

MATERIALS AND METHOD

This was a cross-sectional study involving 250 females who were within the age of 18 to 47 years. A well-structured questionnaire was administered to participants. Each participant had one questionnaire to

fill appropriately and independently after instructions were given to them by the Research Assistants. Data collection took place over two months. Statistical analysis was done using SPSS version 25.0 and $p < 0.05$ was significant.

RESULTS

The results revealed that 75% of the participants had high academic workload (Table 1), 64% are facing overcrowding living conditions (Table 2), 72% are facing financial constraints (Table 3), 68% are having environmental and security concerns (Table 4), and 86% are facing noise and distractions around campus (Table 5).

Table 1: Participants who had high academic workload

Response	Frequency	Percentage (%)
Participants who had high academic workload	187	75.00
Participants who do not have high academic workload	63	25.00
Total	**250**	**100.0**

Table 2: Participants are facing Overcrowded living conditions

Response	Frequency	Percentage (%)
Participants who are facing overcrowding living conditions	160	64.00
Participants who are not facing overcrowding living conditions	90	26.00
Total	**250**	**100.0**

Table 3: Participants who are facing financial constraints

Response	Frequency	Percentage (%)
Participants who are facing **f**inancial constraints	180	72.00
Participants who are not facing **f**inancial constraints	70	28.00
Total	**250**	**100.0**

Table 4: Participants who are having environmental and security concerns

Response	Frequency	Percentage
Participants who are confused	170	68:00
Participants who are not confused	80	32.00
Total	**250**	**100.0**

Table 5: Participants who facing noise and distractions around campus

Response	Frequency	Percentage (%)
Participants who facing noise and distractions around campus	215	86.00
Participants who not facing noise and distractions around campus	35	14.00
Total	**250**	**100.0**

DISCUSSION

The menstrual cycle is a vital indicator of a woman's reproductive health. A typical cycle ranges between 21–35 days and is regulated by the Hypothalamic–Pituitary–Ovarian (HPO) axis. However, several internal and external factors can disrupt this cycle, leading to irregularities such as delayed menstruation. One of the most common causes of menstrual irregularities is stress. Stress is the body's response to emotional, physical, or environmental pressures. It triggers physiological reactions such as increased cortisol production, elevated heart rate, and hormonal imbalance. Stress is one of the most common psychological and physiological challenges faced by university students. Academic pressure, financial constraints, relationship issues, inadequate sleep, and environmental changes can significantly affect students' health, including their menstrual cycle. Delayed menstruation (also called oligomenorrhea) is a common menstrual disorder characterized by cycles longer than the usual 21–35 days. Stress is the body's response to any demand or challenge. It triggers the release of stress hormones such as cortisol and adrenaline, which can disturb normal bodily functions. A normal menstrual cycle is regulated by the Hypothalamic–Pituitary–Ovarian (HPO) Axis. Any disturbance in this axis especially hormonal imbalance may lead to delayed menstruation, missed periods and irregular cycles. The menstrual cycle is regulated by the HPO axis. Hormones involved include estrogen, progesterone, FSH, LH, and GnRH. Disruptions can delay ovulation, causing longer cycles.

The study shows that majority (75%) of the participants had high academic workload and this may lead to stress. In recent times, students are complaining of work overload due to the introduction of Core Curriculum and Minimum Academic Standards (CCMAS) for Nigerian Universities by the Federal Ministry of Education. Stress may be responsible for the

release of stress hormones that may in turn alter their normal menstrual period. High academic workload can delay the menstrual period in some females because stress and overexertion affect the hormones that regulate the menstrual cycle. When participants experience heavy academic pressure, deadlines, lack of sleep, or anxiety, the body activates the stress response system and this involves hypothalamus which is the brain region that controls hormones related to menstruation, the pituitary gland that sends signals to the ovaries and the adrenal glands that release the stress hormone cortisol. When the participants are stressed, cortisol levels rise. High cortisol can interfere with the hypothalamus, which disrupts the normal release of gonadotropin-releasing hormone, luteinizing hormone and follicle-stimulating hormone. These hormones are necessary for ovulation and if ovulation is delayed or doesn't occur, the menstrual period can also be delayed Again, heavy academic loads often lead to late nights or all-nighters, irregular eating patterns and caffeine overuse. These behaviors disturb the body's natural rhythms, including the sleep–wake cycle, which is linked to hormone regulation. Sleep loss also increases cortisol, making delays more likely.

Again, majority of the participants are facing overcrowding living conditions. In most of the tertiary Institutions, due to increase in the number of students admitted with little hostel accommodations and this resulted to too many students in a room. This overcrowding makes the participants to be uncomfortable and thus exposed them to stress. Overcrowded living conditions can delay menstruation in females because they create chronic stress and lifestyle disruption, both of which interfere with the hormonal system that controls the menstrual cycle. Overcrowded living conditions may cause several factors keep the body in a state of chronic stress, raising levels of the stress hormone cortisol**.** High cortisol disrupts the hypothalamus—the brain region that regulates menstrual hormones—causing irregular or delayed ovulation. Also, living in crowded conditions often causes anxiety, feeling unsafe, constant vigilance and difficulty relaxing. Emotional distress can interrupt the menstrual cycle because the brain prioritizes stress survival over reproduction. Overcrowded living conditions delay menstrual periods mainly because they create continuous stress, sleep disruption, emotional strain, and lifestyle instability and all of which interfere with the hormonal system (hypothalamus–pituitary–ovary axis) that regulates menstruation.

The research revealed that several of the participants encountered financial constraints and financial constraints cause chronic stress and this disrupt hormonal regulation. Hormonal disruption delays menstrauation and this increases anxiety, which in turn worsens stress. Thus, financial constraint or hardship indirectly but significantly influences menstrual health through physiological, nutritional and psychological pathways. Again, financial constraint may limit access to adequate food which may lead to low body fat percentage, alter leptin levels and reduce energy availability. Again, the research revealed that several of the participants were exposed to environmental and security concerns, and noise and distractions around campus. All these may lead to stress and thus may interrupts the hormonal system thus cause delay menstrual period in the participants.

Physiologically, stress affects the menstrual cycle through hormonal disruption. High stress lead to high cortisol and this in turn suppresses reproductive hormones such as gonadotropin releasing hormone (GnRH), luteinizing hormone (LH), and follicle stimulating hormone (FSH). This delays ovulation, causing delayed periods. Stress interferes with the signals between the brain and ovaries, slowing or stopping ovulation. Stress triggers a complex hormonal response in the body known as the Stress Response System. In females, this system interacts closely with the reproductive hormones, influencing the menstrual cycle, ovulation, and overall reproductive health. The two major pathways involved are: The Hypothalamic–Pituitary–Adrenal (HPA) Axis and The Hypothalamic–Pituitary–Ovarian (HPO) Axis When the body is stressed, these systems release specific hormones that help the body cope, but prolonged activation disrupts normal reproductive function. The HPA axis is activated whenever the body perceives stress (physical, emotional, academic, or psychological). Corticotropin-Releasing Hormone (CRH) Secreted by the hypothalamus triggered by stress signals interpreted by the brain. CRH stimulates the pituitary gland to release ACTH. CRH also directly suppresses GnRH, the hormone needed for ovulation. Adrenocorticotropic Hormone (ACTH) produced by the anterior pituitary gland. ACTH travels through the bloodstream to stimulate the adrenal glands. Cortisol (The Primary Stress Hormone) is released by the adrenal cortex which increases blood sugar for energy, **s**uppresses non-essential functions (digestion, immunity, reproduction) and helps the body cope with stress. High cortisol levels for long periods disrupt normal reproductive hormone pathways.

CONCLUSION

Stress plays a major role in delaying menstrual periods among female students at Rivers State University. Academic pressure, financial problems, emotional challenges, and poor sleep patterns were identified as major contributors to stress-induced menstrual irregularities. The physiology of stress hormones in females is a complex interaction between the HPA axis (stress pathway) and the HPO axis (reproductive pathway). Elevated stress hormones—especially cortisol—interfere with normal ovarian function by suppressing GnRH, FSH, and LH. This leads to hormonal imbalance, delayed ovulation, and delayed menstrual periods.

Acknowledgments

We acknowledge Nazor Barinua-Gbaranor, Nuazor Victory Barinua, Kedumle Success Barinua, Tuamene Excellent Barinua and Excellent Support Global Foundation for their moral support, prayers, understanding, and encouragement during the period of this research.

Funding: No funding.

Conflict of Interest: None declared.

Ethical Approval: Not required.

REFERENCES

- Barnhart, W. R., Hamilton, L., Jordan, A. K., Pratt, M., & Musher-Eizenman, D. R. (2021). The interaction of negative psychological well-being and picky eating in relation to disordered eating in undergraduate students. *Eating Behaviors*, *40*, 101476. https://doi.org/10.1016/j.eatbeh.2021.101476
- Chen, J., Wang, Z., Guo, B., Arcelus, J., Zhang, H., Jia, X., Xu, Y., Qiu, J., Xiao, Z., & Yang, M. (2012). Negative affect mediates effects of psychological stress on disordered eating in young Chinese women. *PloS One*, *7*(10), e46878. https://doi.org/10.1371/journal.pone.0046878
- Costarelli, V., & Patsai, A. (2012). Academic examination stress increases disordered eating symptomatology in female university students. *Eating and Weight Disorders: EWD*, *17*(3), e164–e169. https://doi.org/10.1007/BF03325343
- Flett, G. L., & Hewitt, P. L. (2005). The perils of perfectionism in sports and exercise. *Current Directions in Psychological Science*, *14*(1), 14–18. https://doi.org/10.1111/j.0963-7214.2005.00326.x
- Jain, P., Chauhan, A. K., Singh, K., Garg, R., Jain, N., & Singh, R. (2023). Correlation of perceived stress with monthly cyclical changes in the female body. *Journal of Family Medicine and Primary Care*, *12*(11), 2927–2933. https://doi.org/10.4103/jfmpc.jfmpc_874_23
- Marcus, M. D., Loucks, T. L., & Berga, S. L. (2001). Psychological correlates of functional hypothalamic amenorrhea. *Fertility and Sterility*, *76*(2), 310–316. https://doi.org/10.1016/s0015-0282(01)01921-5
- Meczekalski, B., Niwczyk, O., Bala, G., & Szeliga, A. (2022). Stress, kisspeptin, and functional hypothalamic amenorrhea. *Current Opinion in Pharmacology*, *67*, 102288. https://doi.org/10.1016/j.coph.2022.102288
- Saadedine, M., Kapoor, E., & Shufelt, C. (2023). Functional hypothalamic amenorrhea: Recognition and management of a challenging diagnosis. *Mayo Clinic Proceedings*, *98*(9), 1376–1385. https://doi.org/10.1016/j.mayocp.2023.05.027
- Schliep, K. C., Hinkle, S. N., Kim, K., Sjaarda, L. A., Silver, R. M., Stanford, J. B., Purdue-Smithe, A., Plowden, T. C., Schisterman, E. F., & Mumford, S. L. (2022). Prospectively assessed perceived stress associated with early pregnancy losses among women with history of pregnancy loss. *Human Reproduction (Oxford, England)*, *37*(10), 2264–2274. https://doi.org/10.1093/humrep/deac172
- Schliep, K. C., Mumford, S. L., Vladutiu, C. J., Ahrens, K. A., Perkins, N. J., Sjaarda, L. A., Kissell, K. A., Prasad, A., Wactawski-Wende, J., & Schisterman, E. F. (2015). Perceived stress, reproductive hormones, and ovulatory function: A prospective cohort study. *Epidemiology (Cambridge, Mass.)*, *26*(2), 177–184. https://doi.org/10.1097/EDE.0000000000000238
- Wågan, F. A., Darvik, M. D., & Pedersen, A. V. (2021). Associations between self-esteem, psychological stress, and the risk of exercise dependence. *International Journal of Environmental Research and Public Health*, *18*(11), 5577. https://doi.org/10.3390/ijerph18115577.