



International Journal of Pharmacology and Clinical Research (IJPCR)

IJPCR | Vol.8 | Issue 2 | Apr - June -2024

www.ijpcr.com

ISSN: 2349-5448

DOI : <https://doi.org/10.61096/ijpcr.v8.iss2.2024.156-167>

Research



Understanding relationship between menstrual irregularities, psychological stress, and anemia

J. Shruthi Reddy^{*1}, J. Mohana², K. Pradeep Goud³, K. Anjana Saraswathi⁴

Marri Laxman Reddy Institute of Pharmacy, Hyderabad, Telangana 500043, India

* Author for Correspondence: J. Shruthi Reddy

Email: shruthi.mar09@gmail.com

	Abstract
Published on:28 May2024	<p>This study examines the relationships between menstrual irregularities, psychological stress, and anemia in women, highlighting significant health impacts and the need for improved diagnostic and management strategies. Our findings indicate that 90% of the women studied experience moderate psychological stress, emphasizing the profound effect of psychosocial factors on reproductive health. Additionally, despite normal hemoglobin levels, around half of these women are undiagnosed with anemia, suggesting deficiencies in current diagnostic protocols and an underestimation of anemia's prevalence.</p> <p>Our analysis also reveals a 20% prevalence of thyroid disorders among participants, often co-occurring with conditions like PCOS and vitamin deficiencies, advocating for a multidisciplinary approach to healthcare. Advanced statistical techniques provide insights into how these health issues are interconnected, guiding the development of targeted interventions and preventive measures.</p> <p>The study underscores the necessity for holistic healthcare that integrates physical, psychological, and social factors, and highlights the importance of education on menstrual health and regular screenings. By addressing these issues comprehensively, the research contributes to efforts aimed at enhancing women's health globally, minimizing disparities, and improving overall well-being.</p>
Published by: DrSriram Publications	
2024 All rights reserved.  Creative Commons Attribution 4.0 International License.	
Keywords: Menstrual irregularities, Psychological stress, Anemia, Polycysticovary syndrome (PCOS), Diagnostic protocols, Healthcare interventions.	

INTRODUCTION

Menstrual irregularities

Menstrual irregularities refer to deviations from the typical menstrual cycle patterns, which include variations in cycle length, duration of flow, and characteristics of menstrual bleeding. Although some level of menstrual cycle variability is normal, irregularities that significantly disrupt the menstrual pattern or cause distress may indicate underlying health issues that require evaluation and management.

Causes and Risk Factors

Hormonal Imbalances: The menstrual cycle is a complex biological process regulated by a delicate balance of

hormones. Fluctuations in the levels of hormones such as estrogen, progesterone, and others can cause disruptions in the cycle. Some of the common hormonal causes for menstrual irregularities include anovulation, which is the lack of ovulation, luteal phase defects, and conditions like polycystic ovary syndrome (PCOS) or hypothalamic amenorrhea.

Endocrine Disorders: Disorders related to the thyroid gland, such as hypothyroidism or hyperthyroidism, have the potential to cause irregularities in menstrual cycles. This happens because these disorders have a direct impact on the production and metabolism of hormones, which are essential for regulating menstruation.

Reproductive Disorders: Several medical conditions, such as endometriosis, uterine fibroids, adenomyosis, and pelvic inflammatory disease (PID), can cause disruptions in the menstrual cycle, leading to unpredictable bleeding patterns and painful periods. These conditions can significantly affect a woman's quality of life, and it is essential to seek proper medical attention if any symptoms arise.

Lifestyle Factors: The delicate balance of hormones in the human body can easily be disturbed by various factors such as stress, excessive exercise, rapid weight loss or gain, poor nutrition, and sleep disturbances.

Medications and Contraceptives: Several medications can have an impact on menstrual bleeding. Anticoagulants, which are used to prevent blood clots, antipsychotics, which are used to treat mental health conditions, and chemotherapy drugs, which are used to treat cancer, are just a few examples.

Age and Reproductive Stage: It is quite common to experience menstrual irregularities during puberty and perimenopause due to the frequent hormonal changes that occur during these life stages.

Health Consequences and Implications

Fertility: Having irregular menstrual cycles, especially those without ovulation, can have a significant impact on fertility. This is because it decreases the chances of successful conception, making it more difficult for individuals who are trying to conceive. It's important to keep track of your menstrual cycles and consult with a healthcare provider if you are experiencing irregularities, as they may be a sign of an underlying medical condition that requires treatment.

Anemia: Excessive or lengthy menstrual bleeding can cause a significant reduction in the body's iron levels, leading to a condition known as iron deficiency anemia. This condition is characterized by several symptoms, including fatigue, weakness, and shortness of breath, due to the insufficient production of red blood cells.

Quality of Life: Menstrual irregularities can be a source of significant distress for many women. Not only can they cause physical discomfort and pain, but they can also have psychological and social impacts. For instance, irregular periods can lead to anxiety, stress, and disruptions in daily activities or interpersonal relationships. Women may find it difficult to plan their lives around unpredictable periods, and this can affect their ability to work, socialize, and engage in other activities. Additionally, the uncertainty surrounding menstrual irregularities can cause a sense of loss of control, which can further exacerbate the psychological impact.

Underlying Health Conditions: Many women experience menstrual irregularities, which can be a significant source of distress. These irregularities can cause physical discomfort and pain, as well as psychological and social impacts. For example, women may feel anxious, stressed, and unable to carry out daily activities or maintain interpersonal relationships due to unpredictable periods.

Anemia in relation to menstrual irregularities

Menstrual Irregularities as a Cause of Anemia

Heavy Menstrual Bleeding (Menorrhagia): Menstrual irregularities characterized by heavy or prolonged menstrual bleeding can have a significant impact on a woman's health, leading to iron deficiency anemia. When a woman experiences excessive blood loss during menstruation, her body struggles to replace the lost iron at a rate that matches the menstrual blood loss.

Frequent Menstrual Cycles (Polymenorrhagia): Frequent menstrual cycles, which are characterized by cycles occurring more frequently than every 21 days, can have a significant impact on a woman's health. The primary concern is the increased risk of developing anemia due to more frequent blood loss. When a woman experiences frequent bleeding episodes, the cumulative effect can lead to a depletion of iron in the body, ultimately resulting in anemia.

Irregular Menstrual Patterns: Irregular menstrual cycles can be quite a hassle for many women, as they are characterized by variations in cycle length, duration of flow, and timing of menstruation. Such fluctuations can disrupt the normal replenishment of iron stores in the body, leading to a deficiency of this essential nutrient.

Anemia as a Consequence of Menstrual Irregularities

Iron Deficiency Anemia: When a person experiences chronic or recurrent menstrual irregularities, particularly those involving heavy or prolonged bleeding, it can lead to iron deficiency anemia. This occurs because the body loses a significant amount of blood during menstruation, which can lead to an insufficient replacement of iron. As a result, the body's ability to synthesize hemoglobin decreases, leading to depleted iron stores and ultimately resulting in anemia. This condition can be quite debilitating and may require medical attention to correct.

Symptom Exacerbation: Anemia, a condition characterized by a decrease in the number of red blood cells or hemoglobin in the blood, can lead to a worsening of symptoms associated with menstrual irregularities. These symptoms may include fatigue, weakness, and shortness of breath, which can be particularly challenging during menstruation. When anemia is present, there is a reduced delivery of oxygen to the tissues and organs, which can further impact one's quality of life and may impair daily functioning. This can make it challenging to carry out simple tasks during menstruation and can lead to a decrease in overall productivity.

Complications: When anemia is left untreated or not properly managed, it can result in various complications, particularly in the context of menstrual irregularities. These complications may include impaired cognitive function, decreased work productivity, and reduced physical stamina. In severe cases, medical intervention may be required, including blood transfusions, to prevent potentially life-threatening complications. It is important to monitor and manage anemia properly to avoid these negative outcomes.

Psychological stress in relation to menstrual irregularities

The menstrual cycle in women can be substantially affected by psychological stress, leading to the emergence or worsening of menstrual irregularities. The intricate interplay between stress and the hormonal and neuroendocrine systems can disturb the intricate equilibrium that is essential for sustaining regular menstrual cycles. It is essential to comprehend the connection between psychological stress and menstrual irregularities to ensure comprehensive management and treatment of those affected.

Importance of Understanding the Relationship Between Menstrual Irregularities, Anemia, and Psychological Stress

Comprehensive Patient Care: Acquiring a comprehensive comprehension of the intricate interplay between menstrual irregularities, anemia, and psychological stress is of paramount importance in delivering holistic patient care. By acknowledging the multifaceted connections among these variables, healthcare practitioners can devise specific interventions that target the root causes and thus, augment the overall well-being of affected individuals.

Holistic Approach to Women's Health: The interrelatedness of menstrual irregularities, anemia, and psychological stress in women's health is a complex phenomenon that has a significant impact on their quality of life. A comprehensive approach that takes into account the physical, psychological, and social dimensions of health is critical for addressing the multifaceted needs of individuals who experience these conditions. An inclusive and holistic approach to women's health can lead to more effective interventions and treatments for these interconnected aspects.

Early Detection and Intervention: The recognition of the interplay between menstrual irregularities, anemia, and psychological stress holds immense value in terms of early detection and intervention. By identifying individuals who are at risk of developing complications such as iron deficiency anemia or the exacerbation of psychological symptoms, healthcare providers can implement appropriate management strategies to prevent adverse outcomes. This highlights the significance of a proactive approach towards the management of menstrual irregularities, which can contribute towards the optimization of patient outcomes.

Tailored Treatment Plans: An in-depth comprehension of the fundamental mechanisms and causative factors involved in menstrual irregularities, anemia, and psychological stress is imperative for healthcare providers to develop individualized treatment plans that cater to the specific needs of each patient. By taking into account the multifaceted nature of these conditions, treatment modalities can be tailored to target specific etiological factors, which in turn can optimize therapeutic outcomes.

Prevention of Long-Term Complications: Untreated menstrual irregularities, anemia, and psychological stress can have serious long-term health implications and can negatively impact an individual's quality of life. By taking

a comprehensive and proactive approach to addressing these issues, healthcare providers can effectively prevent the progression of complications and promote optimal health and well-being for those affected. It is crucial for healthcare professionals to prioritize the management of these conditions to ensure the best possible outcomes for their patients.

Improved Patient Education and Empowerment: Untreated menstrual irregularities, anemia, and psychological stress can have serious long-term health implications and can negatively impact an individual's quality of life. By taking a comprehensive and proactive approach to addressing these issues, healthcare providers can effectively prevent the progression of complications and promote optimal health and well-being for those affected. Healthcare professionals must prioritize the management of these conditions to ensure the best possible outcomes for their patients.

Reduced Healthcare Costs: Addressing the underlying causes of menstrual irregularities, anemia, and psychological stress can significantly alleviate the economic burden associated with managing these conditions. By taking preventive measures, reducing hospitalizations, and improving treatment outcomes, healthcare providers can achieve cost savings for healthcare systems while simultaneously enhancing resource allocation for other healthcare requirements. Such an approach can lead to optimal health outcomes and provide a solid foundation for future academic research in this field.

Methodology

Participant Recruitment

Recruitment Sites

In collaboration with local gynaecology clinics and community health centres, recruitment efforts will target areas where women seeking reproductive healthcare services are likely to be found. Establishing partnerships with these institutions will facilitate access to potential participants and enhance the credibility of the study.

Inclusion Criteria

- The age range of 18-45 years is selected to encompass women in their reproductive years, where menstrual irregularities are common.
- By including women experiencing variations in cycle length, duration, or intensity, the study aims to capture a spectrum of menstrual irregularities. Providing clear definitions and examples of menstrual irregularities during the recruitment process will ensure consistency in participant selection.

Exclusion Criteria

- Excluding pregnant or postpartum women eliminates confounding factors related to physiological changes during pregnancy and childbirth.
- Excluding women with known underlying medical conditions affecting menstrual cycles ensures that the study focuses on primary menstrual irregularities rather than secondary causes.
- Similarly, excluding women using hormonal contraceptives or medications known to affect menstrual patterns helps isolate the impact of menstrual irregularities on other health outcomes.

Sample Size Determination

- Power analysis will be conducted to determine the minimum sample size required to detect significant correlations with appropriate statistical power.
- Factors such as the expected effect size, significance level, and desired power will be considered in sample size calculation. By ensuring an adequate sample size, the study aims to enhance the reliability and generalizability of its findings.

Data Collection

Structured Interviews

- Face-to-face interviews have been conducted by us to collect detailed information on demographic characteristics, menstrual history, lifestyle factors, and perceived stressors.
- Standardized interview protocols will be developed to ensure consistency in data collection across participants. Building rapport with participants is crucial to encourage open and honest communication, particularly when discussing sensitive topics related to menstrual health and psychological stress.

Questionnaire Assessments

- Participants will complete validated questionnaires, such as the Perceived Stress Scale (PSS) to assess psychological stress levels.

- Additional questionnaires may address dietary habits, physical activity levels, and sleep quality to explore potential confounding factors.
- Careful selection of validated instruments will ensure the reliability and validity of self-reported data collected through questionnaires.

Case sheets

NAME
AGE
SEX
WEIGHT
CHIEF COMPLAINTS
LABORATORY REPORTS
PERSIVED STRESS SCALE
TREATMENT
ADVERSE DRUG REACTIONS

PSS questionnaire

The Perceived Stress Scale (PSS) is a widely used psychological instrument designed to measure the perception of stress in individuals. It assesses the degree to which situations in one's life are appraised as stressful. The questionnaire consists of several statements that participants rate based on their experiences over a defined period, typically within the past month. Here's an example of the Perceived Stress Scale questionnaire:

Perceived Stress Scale (PSS)

1. In the last month, how often have you been upset because of something that happened unexpectedly?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
2. In the last month, how often have you felt that you were unable to control the important things in your life?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
3. In the last month, how often have you felt nervous and "stressed"?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
5. In the last month, how often have you felt that things were going your way?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often

7. In the last month, how often have you been able to control irritations in your life?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
8. In the last month, how often have you felt that you were on top of things?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
9. In the last month, how often have you been angered because of things that were outside of your control?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
(0) Never (1) Almost never (2) Sometimes (3) Fairly often (4) Very often

Scoring

Reverse Scoring

Before summing the scores, it's important to note that four of the items in the PSS require reversescoring. These items are typically iteming 4, 5, 7, and 8. Reverse scoring means that the scoring scale is reversed for these items. For example, if a participant selects "4" for item 4, it's scored as a "0"; if they select "3", it's scored as a "1", and so on. This reverse scoring is necessary because these items are phrased in a way that indicates lower stress levels when participants respond with higher numbers.

Scoring Each Item

Each item in the PSS is scored based on the response options provided. Participants are asked to indicate how often they felt or thought a certain way in the past month, with response options ranging from "0" to "4":

- 0: Never
- 1: Almost never
- 2: Sometimes
- 3: Fairly often
- 4: Very often

Summing the Scores

Once all responses have been scored, sum the scores for all items to obtain a total score. The total score can range from 0 to 40.

Interpreting the Total Score

The total score on the PSS provides an overall measure of perceived stress. Higher scores indicate higher levels of perceived stress, while lower scores indicate lower levels of perceived stress. The interpretation of the total score can vary depending on the context and the population being assessed.

Example Interpretation

- A total score of 0-13 is typically interpreted as low perceived stress.
- A total score of 14-26 suggests moderate perceived stress.
- A total score of 27-40 indicates high perceived stress.

Questions Related to Anemia

1. Have you experienced any of the following symptoms recently?
 - Fatigue
 - Weakness
 - Shortness of breath
 - Pale skin
 - Dizziness or light-headedness

- Cold hands and feet
 - Chest pain
 - Irregular heartbeat
 - Other (please specify):
2. Do you experience irregularities in your menstrual cycle?
 3. How long have you experienced irregular menstrual cycles?
 4. Have you been diagnosed with any menstrual disorders (e.g., polycystic ovary syndrome, endometriosis)?
 5. Have you experienced heavy menstrual bleeding (menorrhagia)?
 6. Do you frequently experience menstrual cramps (dysmenorrhea)?
 7. Have you ever been diagnosed with iron-deficiency anemia?
 8. Have you been advised by a healthcare provider to take iron supplements due to menstrual related issues?

3. Medical Records Review

- Relevant clinical data has been obtained from participants' medical records, including past medical history, laboratory results (e.g., complete blood count, iron studies), and medication use.
- This objective information will provide valuable context and complement self-reported data obtained through interviews and questionnaires.
- Reviewing medical records allows for a comprehensive assessment of participants' health status and identification of potential confounding factors.

4. Laboratory Analysis

a. Haematological Tests

Blood samples will be collected using standardized procedures to assess haemoglobin levels, haematocrit, mean corpuscular volume (MCV), and ferritin levels. These haematological parameters are key indicators of anaemia and iron status. Quality control measures will be implemented to ensure the accuracy and reliability of laboratory analyses. Established criteria, such as those defined by the World Health Organization (WHO), will be used to define anaemia, and interpret laboratory results.

b. Psychological Assessments

Scores from validated psychological assessment tools will be analysed to quantify participants' perceived stress levels. These assessments provide standardized measures of psychological distress and help identify individuals at risk of mental health disorders. Statistical analyses will explore correlations between psychological stress scores, menstrual irregularities, and anaemia markers to elucidate potential relationships and underlying mechanisms.

STATISTICAL ANALYSIS

Descriptive statistics

Descriptive statistics, including means, standard deviations, medians, and interquartile ranges, will be calculated to summarize participant demographics, menstrual characteristics, anaemia markers, and psychological stress scores. Data visualization techniques, such as histograms and box plots, may be employed to illustrate the distribution of key variables and identify potential trends or outliers.

Correlation analyses

Pearson correlation coefficient or Spearman's rank correlation coefficient will be used to assess the strength and direction of associations between menstrual irregularities, anaemia markers, and psychological stress scores. These correlation analyses will provide insights into the relationships between variables and help identify potential predictors or risk factors for adverse health outcomes. Additionally, regression analyses may be performed to examine the independent contributions of each variable to the outcomes of interest.

Subgroup analyses

Stratified analyses based on participant characteristics (e.g., age, BMI) or specific menstrual irregularities will be conducted to explore potential effect modifiers or subgroup differences. By examining subgroups within the study

population, the research aims to identify sources of variability and heterogeneity that may influence the observed associations. Subgroup analyses enhance the granularity of the findings and facilitate targeted interventions tailored to specific populations.

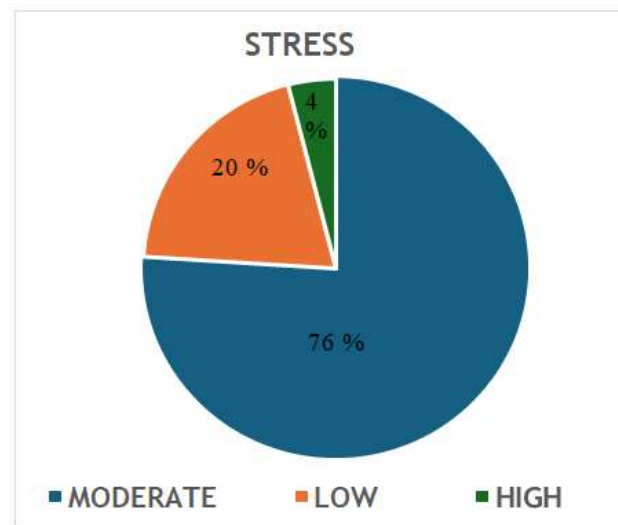
RESULTS

Sample composition

Stress levels

27% out of 35 participants (76%) reported experiencing moderate levels of stress, indicating a prevalent trend within the sample. This suggests that moderate stress is a common factor among individuals experiencing menstrual irregularities. One participant (4%) reported high levels of stress, while seven participants (20%) reported low stress levels.

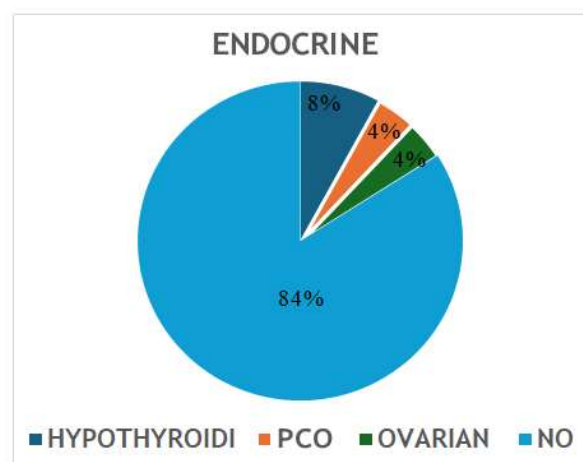
S.NO	STRESS LEVEL	PERCENTAGE
1.	LOW	20%
2.	MODERATE	76%
3.	HIGH	4%



Endocrine disorders

PCOD (Polycystic Ovary Syndrome) was diagnosed in one participant (4%), highlighting its presence within the sample. PCOD is known to disrupt hormonal balance and can lead to menstrual irregularities such as oligomenorrhea or amenorrhea. Three participants (8%) were identified with hypothyroidism. Hypothyroidism can influence menstrual regularity by affecting thyroid hormone levels, leading to alterations in the menstrual cycle. Additionally, one participant (4%) had an ovarian cyst, which can disrupt the menstrual cycle by interfering with ovulation and hormonal regulation.

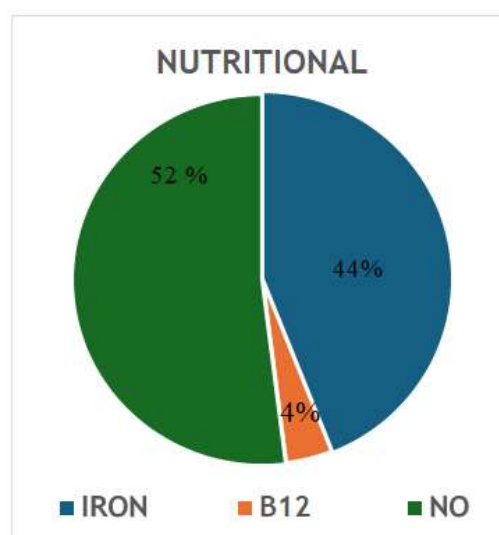
S.NO	ENDOCRINE PROBLEM	PERCENTAGE
1	PCOD	4%
2	HYPOTHYROIDISM	8%
3	OVARIAN CYST	4%
4	NO PROBLEM	84%



Nutritional deficiencies

Iron deficiency was prevalent, with 15 participants (44%) exhibiting this condition. Iron deficiency can lead to anemia, which in turn can cause irregular menstruation due to impaired oxygen transport to the reproductive organs. One participant (4%) presented with both iron and B12 deficiencies. These deficiencies can compound the effects on menstrual health, as both iron and B12 are essential for red blood cell production and overall physiological function.

S.no	DEFICIENCY	PERCENTAGE
1	IRON DEFICIENCY	44%
2	B12 DEFICIENCY	4%
3	NO DEFICIENCY	52%



DISCUSSIONS

Stress and menstrual irregularities

Potential Correlation: The high prevalence of moderate stress levels indicates a significant trend among individuals with menstrual irregularities. Chronic stress, known to disrupt the hypothalamic-pituitary-adrenal (HPA) axis, may lead to dysregulation of reproductive hormones, such as estrogen and progesterone, resulting in disturbances in the menstrual cycle.

Impact of Chronic Stress: Prolonged exposure to stressors can trigger the release of cortisol, a stress hormone, which can interfere with the normal functioning of the HPA axis. This disruption may affect the secretion of

gonadotropin-releasing hormone (GnRH), luteinizing hormone (LH), and follicle-stimulating hormone (FSH), ultimately affecting ovulation and menstrual regularity.

Psychosocial Factors: In addition to physiological mechanisms, psychosocial factors associated with chronic stress, such as poor coping strategies, inadequate social support, and lifestyle habits, can contribute to the exacerbation of menstrual irregularities. Understanding these interconnected factors is crucial for developing comprehensive treatment strategies.

Endocrine disorders

PCOD and Menstrual Irregularities: PCOD is characterized by hormonal imbalances, insulin resistance, and ovarian dysfunction, which can lead to menstrual irregularities such as oligomenorrhea, amenorrhea, or dysfunctional uterine bleeding. The presence of anovulatory cycles and hyperandrogenism further complicates the clinical picture.

Hypothyroidism and Menstrual Function: Hypothyroidism, resulting from insufficient thyroid hormone production, can disrupt the menstrual cycle by altering the frequency, duration, and intensity of menstruation. Thyroid hormones play a crucial role in regulating metabolism and reproductive function, and their deficiency can affect the hypothalamic-pituitary-ovarian axis.

Interplay with Stress: Stress can exacerbate the symptoms of PCOD and hypothyroidism by further disrupting hormonal balance. Cortisol, released in response to stress, can inhibit the release of thyroid-stimulating hormone (TSH) and gonadotropins, leading to further hormonal dysregulation and menstrual irregularities.

Nutritional deficiencies

Iron Deficiency and Anemia: Iron deficiency anemia is a common nutritional deficiency associated with menstrual irregularities. Inadequate iron levels impair hemoglobin synthesis, leading to reduced oxygen delivery to tissues, including the endometrium, and subsequent alterations in menstrual flow and duration.

Role of B12: Coexisting deficiencies, such as iron and B12 deficiencies, can compound the impact on menstrual health. Vitamin B12 is essential for erythropoiesis and neurological function, and its deficiency can exacerbate anemia and contribute to fatigue, weakness, and menstrual irregularities.

Importance of Comprehensive Assessment: Assessing multiple nutritional factors is crucial for understanding the complex interplay between diet, nutrient status, and menstrual health. Evaluation of dietary intake, absorption, and utilization of key nutrients can guide targeted interventions aimed at restoring nutritional balance and optimizing menstrual function.

Comorbidity and treatment implications

Holistic Management Approach: The presence of multiple conditions, such as stress, endocrine disorders, and nutritional deficiencies, underscores the need for a holistic management approach. Tailored treatment strategies that address both the underlying causes and symptoms of menstrual irregularities are essential for optimizing outcomes.

Integrated Interventions: Combining interventions aimed at stress reduction, hormonal regulation, and nutritional supplementation may be necessary to effectively manage menstrual irregularities in individuals with comorbid conditions. Collaborative care involving healthcare professionals from various disciplines can ensure comprehensive and coordinated management.

Patient-Centered Care: Recognizing the individualized nature of menstrual health and involving patients in decision-making processes is paramount. Empowering patients with education, support, and self-management strategies can enhance treatment adherence and improve overall well-being.

CONCLUSION

The project findings highlight a significant relationship between stress, nutritional deficiencies, and menstrual irregularities. Moderate stress levels were prevalent among participants, suggesting a potential impact on menstrual health. Notably, iron deficiency, a common nutritional deficiency observed in the sample, may exacerbate irregular menstruation. Holistic management approaches, such as stress reduction techniques and nutritional supplementation, are crucial for effective treatment. However, the small sample size limits the generalizability of the findings, necessitating larger studies for validation. Future research should consider including additional demographic and clinical variables to provide a more comprehensive understanding of menstrual health dynamics.

Overall, tailored interventions and comprehensive care are essential for managing menstrual irregularities and improving outcomes. Further exploration of causal relationships and the development of targeted interventions are necessary to address the complex interplay of factors influencing menstrual health. By focusing on these areas, future studies can contribute to better outcomes for individuals experiencing menstrual health concerns.

REFERENCES

1. Nillni, Y. I., Wesselink, A. K., Hatch, E. E., Mikkelsen, E. M., Gradus, J. L., & Rothman, K. J. (2016). Mental stress and risk of menstrual cycle irregularity: A prospective study among a population of women. *Annals of Epidemiology*, 26(6), 442-447.
2. Choudhury, S. R., & Dilip, A. S. (2019). A study on the impact of stress on menstrual irregularities among adolescent girls in an urban area of Assam, India. *International Journal of Community Medicine and Public Health*, 6(10), 4417-4420.
3. Chung, F. F., Tan, J. Y., Liew, S. M., & Ng, Y. L. (2018). The associations between menstrual dysfunction and psychological stress among female undergraduate students. *International Journal of Environmental Research and Public Health*, 15(4), 677.
4. Atalay, H., Solak, N., & Gür, A. (2020). Evaluation of iron deficiency anemia frequency in women with menstrual irregularity. *The Journal of Maternal-Fetal & Neonatal Medicine*, 1-4.
5. Alizadeh, F., Ghavi, F., & Alizadeh, S. (2019). The relationship between stress and menstrual irregularities among high school students: A cross-sectional study. *Journal of Education and Health Promotion*, 8, 138.
6. Angsubhakorn, S., & Kietpeerakool, C. (2019). Menstrual irregularity and iron-deficiency anemia in adolescent girls with heavy menstrual bleeding: A case-control study. *Journal of Pediatric and Adolescent Gynecology*, 32(6), 648-651.
7. Moos, M. K., & Petersen, R. (2017). Understanding menstrual disorders: A holistic approach. *Nursing for Women's Health*, 21(5), 377-388.
8. Vichnin, M. C., Freeman, E. W., & Lin, H. (2010). Association between body mass index, menstrual irregularity, and menstrual-related symptoms in adolescent girls and young women. *Journal of Pediatric and Adolescent Gynecology*, 23(6), 317-323.
9. Chiofalo, B., Laganà, A. S., Vaiarelli, A., La Rosa, V. L., Rossetti, D., & Palmara, V. (2016). DmiRNAs play a role in fetal growth restriction (FGR)? A fresh look to a busy corner. *The Journal of Maternal-Fetal & Neonatal Medicine*, 29(20), 3345-3351.
10. Al-Salihi, R. A. (2019). Prevalence of anemia among women with abnormal menstrual bleeding attending Ibn Al-Baladi Hospital in Baghdad City. *Iraqi Journal of Market Research and Consumer Protection*, 11(2), 143-150.
11. Sohail, S., Rahman, S., Mubeen, R., Alshahrani, M. S., & Syed, A. (2020). Prevalence of menstrual irregularity and its correlation with BMI and stress among young women. *Journal of Taibah University Medical Sciences*, 15(4), 338-342.
12. Sanghani, K., Naik, G., Pasi, H. R., Patel, V., & Malhotra, P. (2018). Comparative study of various menstrual irregularities and its correlation with body mass index and stress among female medical students. *National Journal of Physiology, Pharmacy and Pharmacology*, 8(11), 1509-1513.
13. Nillni, Y. I., Wesselink, A. K., Gradus, J. L., Hatch, E. E., & Rothman, K. J. (2017). Positive and negative experiences of interpersonal relationships and menstrual cycle characteristics in a prospective cohort of healthy premenopausal women. *Psychosomatic Medicine*, 79(7), 808-815.
14. Szumilas, M., Yurkowski, K., & Fenton, T. R. (2019). Associations among menstrual cycle characteristics, dietary macronutrients, and stress levels in premenopausal women. *Fertility and Sterility*, 112(3), e93.
15. Prasad, S. S., Goud, G. R., & Bhat, S. (2019). Relationship between stress and menstrual irregularities among nursing students in selected colleges at Mangalore. *Asian Journal of Nursing Education and Research*, 9(3), 410-414.
16. Bielak, A., Charzynska-Gula, M., & Wysokinski, A. (2017). Menstrual disorders and dysmenorrhea in the context of stress and depressive symptoms among young women. *Annals of Agricultural and Environmental Medicine*, 24(4), 730-734.
17. George, J. V., Shreevidya, K. R., & Anitha, C. (2019). Effectiveness of stress management on menstrual irregularities among adolescent girls. *International Journal of Nursing Education*, 11(3), 96-100.
18. Surkan, P. J., Radwan, H., Peterson, K. E., Azzam, H., Mohammed, S., & Hasan, T. A. (2017). Menstrual irregularity perceptions and practices of Bedouin women in Israel. *Health Care for Women International*, 38(5), 457-471.
19. Schliep, K. C., Schisterman, E. F., Mumford, S. L., Pollack, A. Z., Zhang, C., & Ye, A. (2015). Menstrual cycle biomarkers of endogenous hormones and reproductive function: The BioCycle Study. *American Journal of Epidemiology*, 183(8), 700-709.
20. Barros, A. J. D., & Hirakata, V. N. (2003). Alternatives for logistic regression in cross-sectional studies: An

- empirical comparison of models that directly estimate the prevalence ratio. *BMC Medical Research Methodology*, 3, 21.
21. Farasati, F., Tavakkol, Z., Tavakol, R., & Ranjbar, H. (2020). The prevalence of anemia and its association with menstrual cycle pattern in high school girls in Mashhad. *Iranian Journal of Reproductive Medicine*, 18(1), 47-52.
22. Tiwari, S. C., Srivastava, S. K., & Tripathi, R. S. (2016). Prevalence and severity of anemia in menstrual disturbances in reproductive-aged women. *Journal of Clinical and Diagnostic Research*, 10(7), QC09-QC12.
23. Casini, M. L., Rossi, F., Agostinetti, R., & Anserini, P. (2006). Psychological stress and menstrual pattern: A clinical study. *Journal of Psychosomatic Obstetrics & Gynecology*, 27(4), 211-215.
24. Treloar, A. E., Boynton, R. E., Behn, B. G., & Brown, B. W. (1967). Variation of the human menstrual cycle through reproductive life. *International Journal of Fertility*, 12(1), 77-126.
25. Chaudhari, A. P., Mazumdar, K., & Mehta, P. D. (2013). Anxiety, depression, and self-esteem in postmenopausal women. *Industrial Psychiatry Journal*, 22(1), 39-44.
26. Hillard, P. J. A. (2014). Menstruation in adolescents: What do we know? And what do we do with the information? *Journal of Pediatric and Adolescent Gynecology*, 27(6), 309-319.
27. Nagma, S., Reddy, N. S., Nagraj, N., Prasad, K. V., Prasad, L., & Reddy, P. P. (2015). A comparative study of the prevalence of stress and its impact on menstrual cycle among medical students. *International Journal of Health Sciences and Research*, 5(3), 58-65.
28. Goyal, M., & Monga, S. (2017). A study of the effect of perceived stress, self-efficacy and coping strategies on menstrual irregularities among women of reproductive age. *Journal of Psychosomatic Research*, 94, 85-92.
29. Navaneetham, K., & Dharmalingam, A. (2002). Utilization of maternal health care services in Southern India. *Social Science & Medicine*, 55(10), 1849-1869.
30. Wirth, J. P., Woodruff, B. A., Engle-Stone, R., Namaste, S. M., Temple, V. J., & Petry, N. (2017). Predictors of anemia in women of reproductive age: Biomarkers reflecting inflammation and nutritional determinants of anemia (BRINDA) project. *The American Journal of Clinical Nutrition*, 106(Suppl 1), 416S-427S.
31. Fujiwara, T., & Nakata, R. (2010). Skipping breakfast is associated with reproductive dysfunction in post-adolescent female college students. *Appetite*, 55(3), 714-717.
32. Wiebe, E., Trussell, J., & Kaunitz, A. M. (2010). The impact of stressful life events on the menstrual cycle. *Journal of Women's Health*, 19(4), 627-631.
33. Tolossa, D., Medhin, G., & Mekonnen, Y. (2014). Prevalence and severity of anemia among schoolchildren in Jimma Town, Southwest Ethiopia. *Ethiopian Journal of Health Sciences*, 24(4), 239-247.
34. Bae, J., Park, S., & Kwon, J. W. (2018). Factors associated with menstrual cycle irregularity and menopause. *BMC Women's Health*, 18(1), 36.
35. ACOG Committee on Practice Bulletins—Gynecology. (2006). ACOG Practice Bulletin No. 72: Endometriosis. *Obstetrics & Gynecology*, 107(4), 873-882.
36. Pillemer, K., & Lüscher, K. (Eds.). (2004). *Intergenerational ambivalences: New perspectives on parent-child relations in later life*. Elsevier.
37. Mirzaei, F., & Shahrak, M. (2017). The relationship between menstrual disorders and mental health status among high school girls. *Iranian Journal of Nursing and Midwifery Research*, 22(6), 487-492.
38. Slade, K., & Andrews, B. (2005). An investigation of the influence of perceived stress on premenstrual symptoms. *Journal of Psychosomatic Research*, 59(4), 255-264.
39. Harlow, S. D., & Matanoski, G. M. (1991). The association between weight, physical activity, and stress and variation in the length of the menstrual cycle. *American Journal of Epidemiology*, 133(1), 38-49.
40. Frick, K. D., & Gallagher, C. M. (2010). Menstrual cycle characteristics and their association with stress in young women. *Women's Health Issues*, 20(6), 413-418.
41. Li, L., Wu, J., Pu, D., Zhao, Y., Wan, C., Sun, L., & Shen, C. (2014). Factors associated with menstrual disturbances in undergraduates: A cross-sectional study in Wuhu, China. *BMC Women's Health*, 14(1), 7.
42. Kalakoti, P., Ahmed, A., Sheikh, A. B., & Qureshi, S. S. (2018). Irregular menstrual cycles and the underlying factors: A cross-sectional study among Pakistani undergraduate students. *Cureus*, 10(9), e3272.
43. Thomas, D., & Ellertson, C. (2000). Nuisance or natural and healthy: Should monthly menstruation be optional for women? *The Lancet*, 355(9211), 922-924.
44. Tsui, K. H., & Chang, J. Y. (2017). Menstrual disorders and uterine health. *Current Medical Research and Opinion*, 33(6), 1085-1092.
45. Bernstein, L., Yuan, J. M., Ross, R. K., & Pike, M. C. (1987). Lifetime recreational exercise activity and breast cancer risk among postmenopausal women. *British Journal of Cancer*, 57(4), 482-487.
46. Matsumoto, T., & Maruo, T. (2000). Physiology and pathology of the menstrual cycle. In *Reproductive Endocrinology and Infertility* (pp. 10-22). *Springer*.