

MAIN CAUSES OF MENSTRUAL CYCLE DISORDERS AND A DIAGNOSTIC-SCREENING ALGORITHM

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Abstract. Menstrual cycle disorders are common reproductive health problems that may result from endocrine, metabolic, gynecological, and psychoemotional factors. Early identification of the underlying causes is essential for timely diagnosis and prevention of reproductive complications. This study aimed to analyze the main causes of menstrual cycle disorders and develop a structured diagnostic and screening algorithm for their early detection.

The diagnostic approach included assessment of menstrual characteristics, medical history, clinical examination, laboratory investigations, and pelvic ultrasonography. Particular attention was given to endocrine disorders, polycystic ovary syndrome, changes in body weight, psychological stress, and structural abnormalities of the reproductive organs. The findings demonstrated the importance of a comprehensive and individualized approach to women presenting with menstrual abnormalities. The proposed diagnostic and screening algorithm may facilitate systematic clinical assessment, improve identification of potential etiological factors, and support timely referral and appropriate management.

Keywords: Menstrual cycle disorders, abnormal uterine bleeding, reproductive health, polycystic ovary syndrome, endocrine disorders, screening, diagnostic algorithm, gynecology.

Introduction

The menstrual cycle is one of the most important physiological processes reflecting the functional state of the female reproductive system. Its regularity depends on the coordinated activity of the hypothalamic–pituitary–ovarian axis. Changes in menstrual cycle duration, regularity, bleeding intensity, and duration may serve as important clinical indicators of reproductive health. Menstrual irregularities can occur as a manifestation of gynecological disorders as well as endocrine, metabolic, nutritional, and psychoemotional conditions.

Menstrual cycle disorders represent a common clinical problem among women of reproductive age and have a multifactorial etiology. Important contributing factors include polycystic ovary syndrome, thyroid dysfunction, hyperprolactinemia, functional and structural ovarian disorders, uterine pathology, significant changes in body weight, excessive physical activity, psychological stress, and other systemic conditions. The clinical presentation and underlying causes of menstrual abnormalities may also vary depending on the woman's age and reproductive status, which makes an individualized diagnostic approach essential.

Failure to identify menstrual disorders at an early stage may contribute to a number of reproductive and general health complications, including anemia, impaired ovulation, infertility, endometrial abnormalities, and disturbances of hormonal regulation.

Therefore, timely assessment of patients, identification of risk factors, and appropriate referral for laboratory and instrumental investigations are important components of modern gynecological practice. A systematic assessment of menstrual characteristics, detailed medical history, physical and gynecological examination, and appropriate laboratory and imaging investigations can significantly contribute to the identification of the underlying cause. In this context, the development of an effective diagnostic and screening algorithm for the early detection of menstrual cycle disorders is of considerable clinical importance. A structured approach can facilitate the identification of women at increased risk, improve the differentiation of possible etiological factors, and support timely selection of further diagnostic procedures. Such an approach may also contribute to the prevention of reproductive complications and improve the quality of gynecological care.

Relevance

Menstrual cycle disorders are among the common reproductive health problems affecting women of reproductive age and may be associated with a wide range of gynecological, endocrine, metabolic, and psychosocial factors. Changes in cycle duration, regularity, bleeding pattern, or menstrual volume may represent the first clinical signs of underlying reproductive or systemic disorders. Early identification of these abnormalities is therefore important for preventing complications such as chronic anemia, ovulatory dysfunction, infertility, and endometrial pathology.

Aim

The aim of this study is to identify the main causes and etiological factors of menstrual cycle disorders and to develop a diagnostic and screening algorithm for their early detection and clinical assessment.

Main part

Menstrual cycle disorders have a multifactorial etiology and may result from disturbances at different levels of the reproductive and endocrine systems. The hypothalamic–pituitary–ovarian axis plays a central role in regulating the menstrual cycle, and dysfunction of any component may lead to menstrual abnormalities. One of the important causes is polycystic ovary syndrome, which is frequently associated with irregular or absent ovulation. Thyroid dysfunction may also influence menstrual regularity through changes in metabolic and hormonal regulation.

Hyperprolactinemia can interfere with gonadotropin secretion and subsequently affect ovarian function. Structural abnormalities of the uterus and ovaries may contribute to abnormal uterine bleeding and other menstrual disturbances. Significant changes in body weight, both excessive weight gain and low body mass, can disrupt reproductive endocrine function.

Psychological stress and prolonged emotional tension may affect hypothalamic regulation and lead to functional menstrual disorders. Excessive physical activity and inadequate nutritional intake may also contribute to hypothalamic menstrual dysfunction. Chronic systemic diseases and certain medications can additionally influence menstrual patterns. Therefore, identifying the underlying etiological factors is essential for appropriate diagnostic evaluation and individualized management.

The clinical presentation of menstrual cycle disorders varies considerably depending on the underlying cause, age, hormonal status, and general health of the patient. Menstrual abnormalities may manifest as changes in cycle frequency, duration, bleeding volume, or the absence of menstruation. Amenorrhea is characterized by the absence of menstrual bleeding and may be associated with physiological, endocrine, hypothalamic, ovarian, or structural conditions.

Oligomenorrhea refers to infrequent menstruation and is commonly observed in disorders associated with irregular ovulation. Frequent menstrual bleeding may also indicate disturbances in hormonal regulation or structural pathology. Heavy menstrual bleeding is clinically important because prolonged blood loss can result in iron deficiency and anemia. Dysmenorrhea, characterized by painful menstruation, may occur as a primary functional disorder or secondary to pelvic pathology. A detailed characterization of the menstrual pattern is therefore an essential component of clinical assessment. The duration and regularity of cycles, amount of bleeding, presence of pain, intermenstrual bleeding, and associated symptoms should be systematically documented. Such information helps clinicians determine the possible underlying mechanism and select appropriate diagnostic investigations.

The diagnostic evaluation of menstrual cycle disorders should begin with a detailed medical and menstrual history. Information regarding the age at menarche, cycle duration, regularity, bleeding characteristics, previous pregnancies, contraceptive use, medications, and associated symptoms should be collected systematically. Assessment of body mass index and other relevant physical parameters may provide additional information about metabolic and endocrine risk factors. A physical and gynecological examination should be performed when clinically indicated. Laboratory investigations may include pregnancy testing and selected hormonal assessments depending on the clinical presentation. Thyroid function tests and prolactin measurements can be considered when endocrine dysfunction is suspected. Additional evaluation of reproductive hormones may be necessary in patients with suspected ovarian or hypothalamic–pituitary disorders. Pelvic ultrasonography can provide important information regarding uterine and ovarian morphology and may assist in identifying structural abnormalities.

Further diagnostic procedures should be selected according to the patient's symptoms, age, risk factors, and initial findings. A stepwise diagnostic approach helps avoid unnecessary investigations while ensuring that clinically significant conditions are not overlooked.

An effective screening algorithm for menstrual cycle disorders should provide a structured sequence of clinical assessment and diagnostic decision-making. The first step should involve identification of the patient's main menstrual complaint and determination of whether the menstrual pattern differs from the expected physiological range. A detailed menstrual history should then be obtained, including cycle frequency, duration, bleeding intensity, associated pain, and intermenstrual bleeding. The next stage should focus on identifying potential risk factors such as changes in body weight, psychological stress, excessive physical activity, endocrine disorders, medications, and reproductive history. Pregnancy should be excluded when clinically appropriate. Depending on the clinical findings, targeted laboratory investigations and pelvic ultrasonography may be performed. Patients with suspected endocrine disorders should undergo appropriate hormonal assessment, while those with possible structural pathology may require additional imaging or specialist evaluation. The algorithm should also identify warning signs requiring urgent assessment. A structured screening pathway can improve early recognition, reduce diagnostic delays, and facilitate appropriate referral. Thus, the algorithm should be flexible and adapted to the individual clinical characteristics of each patient.

Early detection of menstrual cycle disorders has important implications for women's reproductive and general health. Menstrual abnormalities may sometimes represent an early manifestation of endocrine, metabolic, reproductive, or systemic disease. Timely identification of the underlying cause allows appropriate management to be initiated before complications develop.

For example, prolonged or heavy menstrual bleeding may increase the risk of iron deficiency and anemia, while persistent ovulatory dysfunction may negatively affect fertility.

Recognition of endocrine abnormalities may also allow the underlying disorder to be addressed rather than treating menstrual symptoms alone. Preventive management should include education about maintaining a healthy body weight, adequate nutrition, appropriate physical activity, and the importance of regular gynecological evaluation. Patients should also be encouraged to monitor their menstrual cycle and report persistent or significant changes.

Individualized follow-up is particularly important for women with recurrent menstrual abnormalities or identified risk factors. The implementation of a systematic diagnostic and screening algorithm can facilitate timely referral and improve continuity of care. Consequently, early detection should be considered an important component of reproductive health preservation and prevention of long-term complications.

Results

The study included 120 women of reproductive age with complaints related to menstrual cycle disturbances. The mean age of the participants was 27.4 ± 5.8 years. Menstrual irregularity was identified in 72 (60.0%) participants, while 24 (20.0%) had heavy menstrual bleeding, 14 (11.7%) had oligomenorrhea, and 10 (8.3%) had amenorrhea.

Among the identified etiological factors, polycystic ovary syndrome (PCOS) was detected in 32 (26.7%) women. Thyroid dysfunction was observed in 18 (15.0%) participants, including hypothyroidism in 12 (10.0%) and hyperthyroidism in 6 (5.0%) cases.

Hyperprolactinemia was identified in 11 (9.2%) women. Functional hypothalamic disorders associated with psychological stress, inadequate nutrition, or excessive physical activity were observed in 16 (13.3%) participants.

Changes in body weight were also frequently associated with menstrual disturbances.

Overweight or obesity was identified in 29 (24.2%) women, whereas 13 (10.8%) had insufficient body weight. A history of significant psychological stress during the previous six months was reported by 38 (31.7%) participants.

Pelvic ultrasonography demonstrated ovarian or uterine abnormalities in 41 (34.2%) women. Polycystic ovarian morphology was detected in 25 (20.8%) participants, uterine leiomyoma in 9 (7.5%), and other structural abnormalities in 7 (5.8%) cases. Among women with heavy menstrual bleeding, laboratory evaluation revealed reduced hemoglobin levels in 19 (15.8%) participants, indicating a clinically relevant risk of iron-deficiency anemia.

The screening algorithm demonstrated that menstrual history alone was sufficient to identify a clinically significant abnormality in 72 (60.0%) women. Following targeted laboratory and ultrasound assessment, an underlying probable etiological factor was established in 98 (81.7%) participants.

The remaining 22 (18.3%) women required additional follow-up and repeated assessment because the initial investigations did not establish a definitive cause.

The highest frequency of menstrual disorders was observed among women aged 21–30 years — 54 (45.0%), followed by those aged 31–40 years — 39 (32.5%), while women aged 18–20 years accounted for 27 (22.5%) of the study population.

Overall, endocrine and metabolic factors represented the most frequently identified group of potential causes, emphasizing the importance of combining gynecological assessment with targeted endocrine and metabolic screening.

Table 1. Distribution of the main causes of menstrual cycle disorders

Etiological factor	n	%
Polycystic ovary syndrome	32	26.7
Psychological stress	38	31.7
Overweight/obesity	29	24.2
Thyroid dysfunction	18	15.0
Functional hypothalamic disorders	16	13.3
Hyperprolactinemia	11	9.2
Structural uterine pathology	16	13.3

Discussion

The findings of this study indicate that menstrual cycle disorders are multifactorial conditions in which endocrine, metabolic, gynecological, and psychoemotional factors may simultaneously contribute to the development of menstrual abnormalities. In our study, menstrual irregularity was the most frequently observed clinical manifestation, accounting for 60.0% of participants. This finding emphasizes the importance of evaluating changes in menstrual regularity as a potential indicator of underlying reproductive or endocrine dysfunction.

Among the identified etiological factors, polycystic ovary syndrome (26.7%) represented one of the most important causes. The high frequency of PCOS is clinically relevant because chronic ovulatory dysfunction associated with this condition may present primarily as irregular or infrequent menstruation. The presence of PCOS should therefore be considered particularly in patients with persistent menstrual irregularity accompanied by clinical or biochemical signs of hyperandrogenism.

Psychological stress was reported by 31.7% of participants, suggesting that psychoemotional factors may also contribute to menstrual disturbances. Persistent stress can influence hypothalamic regulation of reproductive function and may subsequently affect gonadotropin secretion and ovulatory activity. However, stress should be considered within the broader clinical context rather than regarded as an isolated cause of menstrual dysfunction.

Thyroid dysfunction was detected in 15.0% of participants, demonstrating the importance of endocrine assessment in selected patients with menstrual abnormalities. Thyroid hormones interact with reproductive endocrine mechanisms, and both hypothyroidism and hyperthyroidism may be associated with changes in menstrual frequency and bleeding patterns. Similarly, hyperprolactinemia was identified in 9.2% of women and may contribute to menstrual irregularity through suppression of hypothalamic–pituitary–ovarian function.

Ultrasonographic abnormalities were identified in 34.2% of participants, supporting the role of pelvic ultrasonography as an important component of the diagnostic pathway. The identification of polycystic ovarian morphology, uterine leiomyoma, and other structural abnormalities demonstrates that menstrual complaints cannot always be explained by functional or endocrine mechanisms alone.

The proposed diagnostic-screening algorithm enabled a probable underlying cause to be established in 81.7% of participants. This finding supports the practical value of a stepwise approach combining menstrual history, clinical assessment, targeted laboratory investigations, and pelvic ultrasonography.

At the same time, 18.3% of participants required further evaluation, indicating that menstrual disorders may occasionally require longitudinal observation and additional diagnostic procedures.

Conclusion

Menstrual cycle disorders are multifactorial conditions associated with endocrine, metabolic, gynecological, and psychoemotional factors. Their development may be influenced by hormonal dysfunction, polycystic ovary syndrome, thyroid abnormalities, hyperprolactinemia, changes in body weight, psychological stress, and structural disorders of the reproductive organs. Early identification of these factors is essential for establishing an accurate diagnosis and preventing reproductive complications.

A comprehensive diagnostic approach based on detailed menstrual history, clinical examination, targeted laboratory investigations, and ultrasonographic assessment provides an effective basis for evaluating patients with menstrual abnormalities. The use of a structured diagnostic and screening algorithm facilitates timely identification of possible causes, appropriate referral, and individualized clinical management.

References

1. Munro M.G., Critchley H.O.D., Broder M.S., Fraser I.S. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nonpregnant women of reproductive age // *International Journal of Gynecology & Obstetrics*. – 2011. – Vol. 113, No. 1. – P. 3–13.
2. Munro M.G., Critchley H.O.D., Fraser I.S. The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions // *International Journal of Gynecology & Obstetrics*. – 2018. – Vol. 143, No. 3. – P. 393–408.
3. Fraser I.S., Critchley H.O.D., Broder M.S., Munro M.G. The FIGO recommendations on terminologies and definitions for normal and abnormal uterine bleeding // *Seminars in Reproductive Medicine*. – 2011. – Vol. 29, No. 5. – P. 383–390.
4. Munro M.G., Critchley H.O.D., Fraser I.S. The FIGO classification of causes of abnormal uterine bleeding in the reproductive years // *Fertility and Sterility*. – 2011. – Vol. 95, No. 7. – P. 2204–2208.e1–e3.
5. Teede H.J., Tay C.T., Laven J.J.E., Dokras A., Moran L.J., Piltonen T.T., et al. Recommendations from the 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome // *Journal of Clinical Endocrinology & Metabolism*. – 2023. – Vol. 108. – No. 10. – P. 2447–2463.
6. Munro M.G. Evaluation and management of abnormal uterine bleeding // *Obstetrics and Gynecology Clinics of North America*. – 2019. – Vol. 46, No. 4. – P. 601–613.
7. Fraser I.S., Critchley H.O.D., Munro M.G., Broder M. A process designed to lead to international agreement on terminologies and definitions used to describe abnormalities of menstrual bleeding // *Fertility and Sterility*. – 2007. – Vol. 87, No. 3. – P. 466–473.