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Menstruation: the fifth vital sign in women of reproductive age

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Menstruation is a vital sign of women's health; every woman typically experiences 400 to 450 ovulations and 7 years of menstruation over her lifetime. Abnormal uterine bleeding (AUB) affects up to one-third of women during their reproductive years, impacting quality of life, but menstrual complaints are frequently under-reported. Healthy menstruation is determined by non-modifiable factors (age, ethnicity, and genetics) and modifiable factors (smoking, diet and nutrition, exercise, body weight, stress, gynaecological disorders, and systematic disorders). Healthy menstruation encompasses regularity, normal flow and duration, and the absence of dysmenorrhoea. These characteristics are indicators of a healthy reproductive system and overall well-being. AUB is a leading cause of iron deficiency and anaemia, particularly in women of reproductive age. In Hong Kong, 17.5% of women of reproductive age have iron deficiency. Comprehensive evaluation of menstruation is crucial in managing anaemia. Femtech (female technology) facilitates menstrual education and personalised health management. Recognition of menstruation as the fifth vital sign in women of reproductive age is important to overall health assessment. Early detection and management of AUB, along with related complications, namely iron-deficiency anaemia, can optimise women's health outcomes.

Keywords: Anemia, iron deficiency; Menstruation; Metrorrhagia; Women's health

Introduction

Approximately half of the female population worldwide are of reproductive age[1]. Each day, approximately 800 million women aged 15 to 49 years are menstruating[2]. Based on the average menarche age of 12.5 years and the average menopause age of 50.5 years, every woman experiences 400 to 450 ovulations and 7 years of menstruation over her lifetime. Abnormal uterine bleeding (AUB) affects up to one-third of women during their reproductive years, impacting quality of life[3]. Although menstrual abnormalities are increasingly recognised, menstrual complaints remain under-reported[4].

The International Federation of Gynecology and Obstetrics (FIGO) has developed two systems. FIGO AUB System 1 defines the bleeding pattern using four descriptors: frequency, duration, regularity, and flow volume, whereas FIGO AUB System 2 (PALM-COEIN) classifies causes of AUB in terms of structural (polyp, adenomyosis, leiomyoma, malignancy), non-structural (coagulopathy, ovulatory dysfunction, endometrial, iatrogenic), and causes not otherwise specified[5]. AUB symptoms may present at any reproductive age, with certain conditions being more common at particular ages. For instance, müllerian anomalies typically present in early pubertal years, whereas endometrial hyperplasia and malignancy mainly present in mature, perimenopausal, or even postmenopausal women. Clinicians can streamline the investigations and determine the pathogenesis of underlying causes of AUB by applying the FIGO Systems. Although a woman may have one or more causes of AUB, these causes may or may not contribute to the chief menstrual complaint. A woman may also be asymptomatic from structural lesions.

Determinants of healthy menstruation

Healthy menstruation is determined by non-modifiable factors (age, ethnicity, and genetics) and modifiable factors (smoking, diet and nutrition, exercise, body weight, stress, gynaecological disorders, and systematic disorders). Menstrual regularity increases with age and stabilises in the prime reproductive years. AUB caused by ovulatory dysfunction is common in the pubertal and perimenopausal years[6]. Ethnicity is associated with age at menarche and menstrual blood flow[6]. Menstrual patterns may be heritable because the follicle-stimulating hormone β-subunit locus is associated with the length of menstrual cycles and menopause timing[7]. Smoking habit, especially starting at an early age, is associated with more menstrual irregularities[8,9]. Smoking cessation is strongly recommended to enhance menstrual regularity and overall health. The Mediterranean diet is associated with

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a lower likelihood of heavy menstrual bleeding, whereas alcohol consumption is associated with longer cycle lengths[10]. Low-carbohydrate and ketogenic diets have been found to increase menstrual dysfunction, particularly amenorrhoea[11]. Eating disorders (anorexia nervosa, binge eating, and bulimia) can result in significant weight loss and anovulation, which often emerge during adolescence[12-15]. Incorporation of a menstrual review for patients with these conditions facilitates comprehensive care. Physical training and excessive exercise can result in functional hypothalamic amenorrhoea, leading to the classic female athlete triad. Women with a history of eating disorders, significant weight loss, or underweight status have a higher prevalence of anovulation. Low physical activity levels are associated with irregular cycles, particularly in those who are obese (body mass index >35 kg/m^2) and have a sedentary lifestyle[11]. In addition, obesity is associated with longer cycles[16]. Major life changes, high-intensity work environment, depressive moods, and stress increase the risks of irregular menstruation, leading to heavier, prolonged flow[17]. Systemic disorders such as thyroid dysfunction, hyperprolactinaemia, inflammation, infection, and haematological and oncological conditions can trigger disturbance of the hypothalamic-pituitary-ovarian axis, resulting in AUB. In fact, AUB may be the presenting symptom of a major medical illness.

Changes in menstruation and COVID-19 vaccination

Changes in menstruation after COVID-19 vaccination or infection have been reported. Postulated causes include pandemic-associated stress and behavioural changes, as well as increased reporting of menstrual disturbances[18]. Causes of AUB associated with COVID-19 infection or vaccination are more likely to be non-structural. From a pathophysiological perspective, anovulation, coagulopathy, inflammation and tissue hypoxia, and iatrogenic factors have been postulated to cause disruption of endometrial shedding and repair, resulting in AUB. Studies examining the endometrium in women suggest that a direct impact of COVID-19 infection on the endometrium is unlikely. Nonetheless, indirect effects on endometrial function may occur, because the endometrium is sensitive to systemic inflammation and immune responses. The influx of circulating immune cells and altered endometrial inflammation may be implicated in the AUB. Treatment of COVID-19 may have off-target effects that lead to menstrual disturbances. For instance, the antiviral medication—ritonavir—is a cytochrome P450 inhibitor, which can interact with hormonal contraception and heighten adverse effects. Hospitalised patients may receive low-dose steroids and anticoagulants to reduce mortality. Endogenous glucocorticoids can inhibit endometrial angiogenesis; therefore, proper haemostatic function is essential to minimise endometrial bleeding and menstrual blood loss[18]. The impact of COVID-19 on menstruation is bidirectional; symptoms of long COVID can be influenced by menstrual cycles. Sex difference in infection and fatality also affects menstruation and ovarian sex hormone levels, which may modulate disease susceptibility[18,19].

Impacts of abnormal uterine bleeding

AUB can lead to anaemia; 30% of women with AUB are anaemic, and the percentage increases to 60% in South Asia[20], possibly compounded by dietary deficiency. Iron deficiency is the commonest micronutrient deficiency and a major cause of anaemia[21]. Iron-deficiency anaemia is a public health issue that is under-recognised and under-reported across social and economic backgrounds.

According to the Population Health Survey 2020-2022 in Hong Kong[22], the prevalence of iron deficiency among the population aged 15 to 84 years was 5.7%, whereas that among women of reproductive age (15 to 49 years) was 17.5%. The prevalence was 0.7% among men, 10.2% among women, and 2.7% among postmenopausal women. The prevalence of iron-deficiency anaemia was also higher among women of reproductive age than among postmenopausal women (10.6% vs 2.1%), probably because of regular and heavy menstrual blood loss. These findings are consistent with those reported in high-income countries[22].

Reduction in anemia is one of the six nutrition targets endorsed by the World Health Assembly, and combating anaemia in women of reproductive age is one of the targets for the United Nations 2030 Agenda for Sustainable Development[21]. The Hong Kong College of Obstetricians and Gynaecologists is a member of the Working Group on Prevention of Iron Deficiency of the Department of Health. Joint recommendations are made on iron intake, including consumption of iron-rich foods, adequate consumption of vegetables and fruits, and reduction in tea and/or coffee intake with meals. Management of health conditions and iron supplementation should be considered for those at risk of iron deficiency.

The mental health effects of AUB are often overlooked. The health-related quality of life score is <25th percentile in women with AUB, compared with the general female population of the same age[3]. Of women

with heavy menstrual bleeding and mental health concerns, 50% reported heavy menstrual bleeding as the cause of their anxiety and depression[23]. Menstrual symptoms affect interpersonal relationships, school and work performance, and job and financial prospects, incurring healthcare burdens and loss of opportunities.

Menstruation as a vital sign

Healthy menstruation encompasses regularity, normal flow and duration, and the absence of dysmenorrhoea. These characteristics are indicators of a healthy reproductive system and overall well-being. The concept and advocacy of menstruation being the fifth vital sign was first brought up by the Society for Menstrual Cycle Research in 2004. The committee opinion of The American College of Obstetricians and Gynecologists (published in 2006, updated in 2015, and reaffirmed in 2020) recommended including an evaluation of the menstrual cycle as an additional vital sign in girls and adolescents[24]. It was endorsed by the American Academy of Pediatrics[25]. This approach highlights the importance of menstruation in assessing overall health status for patients and caretakers. Similar to how abnormalities in blood pressure, heart rate, or respiratory rate can signal serious health conditions, identifying irregular menstrual patterns during adolescence (such as menarche, changes of cycle interval, flow length, and menstrual product use) can facilitate early detection of potential health concerns for adulthood.

Charting menstrual symptoms is more than planning for vacations or beach trips; it is as informative as monitoring blood pressure. Assessment of menstrual blood flow is useful for clinical practice and research. However, self-perception of menstrual blood loss has limitations, as subjective assessment of menstrual blood loss does not always correspond to the actual amount. Nonetheless, it may prompt women to seek medical attention to improve their quality of life[6].

Practical insights for clinicians

Clinicians should (1) recognise menstruation as a vital sign in women of reproductive age because menstrual health is a key indicator of overall and reproductive well-being; (2) integrate menstrual history as part of routine evaluations by reviewing menarche, changes in menstrual patterns including cycle regularity, flow, and duration, as well as symptoms of AUB (refer to the FIGO System 1); (3) evaluate the underlying causes of AUB based on the FIGO System 2 and treat the underlying causes accordingly; (4) address complications of AUB, identify, treat, and prevent iron deficiency and anaemia in reproductive-age women, and raise public awareness about the recommendations on adequate iron intake; and (5) educate patients on menstrual health by offering guidance on what constitutes a healthy menstrual cycle and when to seek medical attention for AUB, empowering individuals to engage in personalised health management.

Famtech

Famtech (female technology) includes fertility solutions, pregnancy and nursing care, women's sexual wellness, and reproductive system health care, focusing on menstrual care through period-tracking apps[26]. In August 2024, the Hospital Authority of Hong Kong added the Menstrual Chart, under MyHealth section, to the HAGo app for recording menstrual symptoms, medication use, cycle dates, flow volume, and other conditions, facilitating personalised health management and patient involvement.

A survey on women's experiences of using menstrual tracking applications found user distribution across the reproductive lifespan, despite mainly teenagers and young women. Increased menstrual literacy, anticipatory management, and participation in personalised healthcare are the main reasons for using the apps. Most users considered that the tracker predicted periods correctly most of the time; one in four users reported heavy menstrual flow. Most reported that the tracking applications provided a sense of preparedness and empowerment, although some reported anxiety and stress[27].

General public knowledge about menstruation remains poor. Famtech empowers women to make decisions about their own bodies and reproductive health, although there are concerns about data sharing. Some applications may share data with social media for fertility- or pregnancy-related products. The sensitivity and intimate nature of menstruation may still be a cultural taboo and cause societal stigma related to women's health, body, and sexuality. Mishandling of data has implications for privacy, safety, reputation, and overall well-being. The overturning of the Roe v Wade case in the United States highlighted concerns that data in applications could one day become criminal evidence[28]. Securing privacy and proper handling of sensitive data are therefore of paramount importance. Practically, it would be difficult to comply with a wide range of laws and data privacy regulations in different countries. Womanhood and women's health are not a one-size-fits-all experience. In low-income regions, accessibility to femtech is not guaranteed[27].

Conclusion

Menstruation is a vital sign for women. Assessment of AUB is essential, because it reflects underlying health status. The high prevalence of iron deficiency and iron-deficiency anaemia in women of reproductive age must not be overlooked. Monitoring menstrual symptoms with femtech can facilitate personalised health management and enhance women's health and well-being.

Contributors

The author designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. The author had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

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Data availability

All data generated or analysed during the present study are available from the corresponding author upon reasonable request.

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