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Menstrual cycle: An overview

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Abstract

The menstrual cycle is a complex physiological process regulated by hormonal fluctuations, preparing the female reproductive system for potential conception. This paper provides a comprehensive overview of the menstrual cycle, its phases, hormonal changes, and associated psychological, emotional, and physiological effects. The menstrual cycle consists of four primary phases: menstruation, follicular, ovulation, and luteal, each governed by the interplay of estrogen, progesterone, follicle-stimulating hormone (FSH), and luteinizing hormone (LH). Various factors, including genetics, stress, and nutrition, influence cycle regularity and health. Abnormal menstrual patterns such as amenorrhea, menorrhagia, and dysmenorrhea are discussed, along with their underlying causes and health implications. The paper also explores the emotional and psychological changes experienced during different phases, including mood swings, cognitive variations, and their impact on mental health. Additionally, the study highlights menstrual hygiene practices and their role in maintaining reproductive health. Understanding the menstrual cycle's dynamics is essential for early detection of menstrual irregularities and ensuring overall well-being. Future research should focus on improving menstrual health awareness, addressing associated disorders, and enhancing healthcare interventions for optimal reproductive health outcomes.

Keywords: Menstrual cycle, ovulation, hormones, reproductive health, menstrual disorders, menstrual hygiene

Introduction

Menarche

Menarche refers to the first occurrence of menstruation in a woman's life, marking the onset of her menstrual cycles. It is a significant milestone in female puberty and typically occurs during early adolescence, usually between the ages of 9 and 15 years. The exact age of menarche can vary depending on genetic, environmental, and nutritional factors ^[1, 2].

The menstrual cycle is a natural, recurring process that occurs in fertile women of reproductive age. It involves a series of physiological changes in the reproductive system that prepares the body for a potential pregnancy. The menstrual cycle typically lasts around 28 days but can vary in length from woman to woman ^[2, 3].

The menstrual cycle is divided into several phases

- **Menstruation (Day 1-5):** The shedding of the uterine lining, which results in menstrual bleeding.
- **Follicular phase (Day 1-14):** Hormones stimulate the development of follicles in the ovaries, each containing an egg.
- **Ovulation (Day 14):** A mature egg is released from the ovary and can potentially be fertilized by sperm.
- **Luteal phase (Day 15-28):** After ovulation, the ruptured follicle transforms into the corpus luteum, which releases progesterone to prepare the uterus for pregnancy.

If fertilization doesn't occur, the corpus luteum disintegrates, hormone levels drop, and the uterine lining is shed, leading to the next menstruation. This cycle repeats until menopause, which typically occurs in a woman's late 40s or early 50s, marking the end of her reproductive years ^[3].

It's important to note that individual menstrual cycles can vary in length and regularity due to factors such as stress, hormonal imbalances, diet, and underlying medical conditions. If you have concerns about your menstrual cycle, it's best to consult a healthcare professional for guidance and evaluation ^[4].

Safe and unsafe periods, often referred to as "fertile" and "non-fertile" periods, are terms used in the context of family planning and natural methods of contraception.

- **Safe (Non-fertile) periods:** These are the times during a woman's menstrual cycle when the chances of pregnancy are relatively low. The safe period typically includes the days before and after menstruation when a woman is less likely to ovulate and conceive. However, it's important to note that the safe period is not a foolproof method of contraception and should not be solely relied upon to prevent pregnancy [5, 6].
- **Unsafe (Fertile) periods:** These are the days during a woman's menstrual cycle when the chances of pregnancy are higher. The unsafe period usually includes the time around ovulation when a mature egg is released from the ovary and can potentially be fertilized by sperm. Ovulation usually occurs around the middle of the menstrual cycle (around day 14 in a 28-day cycle), but this can vary from woman to woman [5, 6].

It's essential to remember that accurately predicting safe and unsafe periods can be challenging as menstrual cycles can vary in length and ovulation timing may not always be regular. If you are considering using natural methods of contraception, it's crucial to understand their limitations and effectiveness. For more reliable contraception, it's advisable to consult a healthcare professional to discuss other birth control options that may be more suitable for your needs.

Reproductive hormonal changes

During the menstrual cycle, the hormonal status in a woman's body undergoes dynamic changes that orchestrate the various phases of the cycle. The main hormones involved in regulating the menstrual cycle are:

- **Follicle-Stimulating Hormone (FSH):** FSH is produced by the pituitary gland and plays a key role in the follicular phase of the menstrual cycle. It stimulates the development of follicles in the ovaries, each containing an egg [7, 8].
- **Luteinizing Hormone (LH):** LH is also produced by the pituitary gland and is responsible for triggering ovulation. A surge in LH levels leads to the release of a mature egg from the ovary, typically occurring around day 14 of a 28-day cycle [7, 8].
- **Estrogen:** Estrogen is primarily produced by the developing follicles in the ovaries. Its levels increase during the follicular phase and play a crucial role in preparing the uterus for a potential pregnancy (7,8).
- **Progesterone:** Progesterone is mainly produced by the corpus luteum, which forms from the empty follicle after ovulation. It dominates the luteal phase of the menstrual cycle and prepares the uterine lining for implantation if fertilization occurs [7, 8].

The hormonal status during the menstrual cycle can be summarized as follows:

- **Menstruation (Days 1-5):** Low levels of estrogen and progesterone, leading to the shedding of the uterine lining [8, 9].
- **Follicular phase (Days 1-14):** Rising levels of estrogen, which stimulate the growth and development of the follicles. FSH and LH levels also increase, with a peak of LH triggering ovulation [8, 9].
- **Ovulation (Day 14):** A surge in LH triggers the release of a

mature egg from the ovary. Estrogen levels are high at this point [8, 9].

- **Luteal phase (Days 15-28):** After ovulation, the empty follicle transforms into the corpus luteum, which produces progesterone. Progesterone levels rise and dominate during this phase. If fertilization does not occur, progesterone levels decline, leading to menstruation and the start of a new cycle [8, 9].

These hormonal fluctuations work together to regulate the menstrual cycle and prepare the body for potential conception and pregnancy. Any imbalances in these hormones can lead to menstrual irregularities or other reproductive health issues.

Some common abnormal menstrual cycles

There are several types of abnormal menstrual cycles, which can be characterized by irregularities in the timing, duration, or flow of menstruation. Some common abnormal types of menstrual cycles include

- **Amenorrhea:** This refers to the absence of menstruation. Primary amenorrhea occurs when a woman has not experienced her first period by the age of 16, while secondary amenorrhea occurs when a woman who previously had regular periods stops menstruating for at least three months [10, 11].
- **Oligomenorrhea:** Oligomenorrhea is characterized by infrequent or very light menstrual periods, with cycles longer than 35 days [10, 11].
- **Polymenorrhea:** Polymenorrhea is when a woman has menstrual cycles that are shorter than the typical 21 to 35 days, resulting in more frequent periods [10, 11].
- **Menorrhagia:** Menorrhagia involves abnormally heavy or prolonged menstrual bleeding, often leading to the need to change sanitary protection frequently or significant disruption to daily activities [10, 11].
- **Metrorrhagia:** Metrorrhagia refers to irregular, non-menstrual bleeding between periods [12].
- **Dysmenorrhea:** Dysmenorrhea is severe menstrual pain and cramping that can significantly interfere with a woman's daily life [11, 12, 13].
- **Menstrual irregularities during perimenopause:** As women approach menopause, the menstrual cycles may become irregular, with changes in cycle length and flow [11, 12, 13].

Abnormal menstrual cycles can be caused by various factors, including hormonal imbalances, certain medical conditions (such as polycystic ovary syndrome or thyroid disorders), stress, extreme weight changes, and certain medications [14]. If you are experiencing abnormal menstrual cycles or have concerns about your menstrual health, it's essential to consult a healthcare professional for proper evaluation and diagnosis. Treatment options will depend on the underlying cause and may include hormonal therapies, lifestyle adjustments, or other medical interventions.

Menstrual cycle associated other changes

During the menstrual cycle, many women experience psychological, emotional, and physiological changes due to the fluctuation of hormones in their bodies. These changes can vary from woman to woman and even from cycle to cycle. Here are some common effects associated with each category:

1. **Psychological changes:** Mood Swings: Hormonal

fluctuations, especially changes in estrogen and progesterone levels, can lead to mood swings, making some women feel irritable, sad, or anxious [15, 16, 17].

- **Bipolar disorders:** Several women regularly experience hypomania, mania, or psychosis during the premenstrual and menstrual phases. Hypomania experienced by women for two weeks and depression two days prior to menstruation, with gradual improvement throughout menstruation [15, 17, 18].
- **Suicide:** Research consistently demonstrates that rates of self-harm, suicide, and suicide attempts are significantly elevated during the premenstrual and menstrual phases [19].
- **Anxiety and stress:** Symptoms of anxiety and stress have been examined in healthy women's menstrual cycles across a variety of laboratory protocols [20].
- **Cognitive changes:** Some studies suggest that cognitive function, including memory and concentration, may be influenced by hormonal changes during the menstrual cycle [21, 22].

Emotional changes

- **Irritability and tension:** Premenstrual Syndrome (PMS) is a collection of emotional and physical symptoms that some women experience in the days leading up to their period. It can include irritability, tension, and mood changes [22].
- **Depression and anxiety:** Some women may experience heightened feelings of depression or anxiety during their menstrual cycle, particularly during PMS [16, 17, 23].

Physiological changes

- **Breast tenderness:** Hormonal changes can lead to breast tenderness or swelling during the menstrual cycle [24, 25].
- **Abdominal cramps:** Many women experience menstrual cramps due to uterine contractions as the body sheds the uterine lining during menstruation [24, 25].
- **Headaches:** Some women may experience headaches or migraines in association with their menstrual cycle [24, 25].
- **Bloating:** Hormonal changes can lead to water retention and bloating, especially during the premenstrual phase (24,25).
- **Fatigue:** Some women may experience increased fatigue and lower energy levels during certain phases of their menstrual cycle [24, 25].

It's important to note that while some women may experience significant psychological and emotional changes during their menstrual cycle, others may have milder symptoms or none at all. The severity of these changes can vary based on individual factors and overall health. If these changes significantly impact daily life or become unmanageable, it's advisable to seek support from a healthcare professional who can provide guidance and potentially suggest treatments to alleviate symptoms. Additionally, tracking menstrual cycles and symptoms can help identify patterns and better manage any associated changes.

Happy and hygienic menstrual cycle

A happy and hygienic menstrual cycle involves feeling comfortable, confident, and well-cared for during menstruation. Here are some tips to achieve a happy and hygienic menstrual cycle:

1. **Use hygienic products:** Choose sanitary products (pads, tampons, menstrual cups) that suit your preferences and needs. Change them regularly to maintain hygiene and prevent infections.
2. **Maintain good hygiene:** Regularly wash your hands before

and after handling menstrual products. Keep your genital area clean and use gentle, pH-balanced soaps.

3. **Stay hydrated and eat nutritious foods:** Staying hydrated and consuming a balanced diet can support overall well-being during menstruation.
4. **Manage pain and discomfort:** If you experience menstrual cramps or discomfort, consider using a heating pad, taking over-the-counter pain relievers, or exploring other natural remedies for relief.
5. **Stay active:** Gentle exercise can help alleviate bloating and improve mood during menstruation. Listen to your body and choose activities that feel good to you.
6. **Manage stress:** Stress can exacerbate menstrual symptoms. Engage in stress-reducing activities like meditation, yoga, or spending time in nature.
7. **Practice good sleep hygiene:** Prioritize sufficient sleep, as it can positively impact mood and energy levels during menstruation.
8. **Track your cycle:** Use a menstrual tracking app or calendar to monitor your cycle, which can help predict and manage any changes in mood or symptoms.
9. **Create a comfortable environment:** Make your surroundings comfortable and welcoming during your period. Use cozy blankets, have a hot water bottle nearby, or engage in activities that make you feel good [26].
10. **Reach out for support:** If you experience significant emotional or physical discomfort during your menstrual cycle, talk to friends, family, or healthcare professionals for support and advice.

Remember that every woman's experience with menstruation is unique, and it's essential to find what works best for you to have a happy and hygienic menstrual cycle. If you have specific concerns or questions about your menstrual health, don't hesitate to consult a healthcare professional.

Sexual feeling and desires

Sexual feelings and desires can vary during the menstrual cycle due to hormonal fluctuations and individual factors. While some women may experience changes in sexual desire and arousal during their period, others may not notice any significant differences. Here are some common patterns that some women may experience:

1. **Increased libido:** Some women may experience heightened sexual desire and increased libido during their menstrual cycle, particularly during the pre-ovulation phase, which occurs in the days leading up to ovulation. This can be attributed to rising estrogen levels, which can enhance feelings of arousal [27, 28, 29].
2. **Decreased libido:** On the other hand, some women may experience a decrease in sexual desire during their period or during the premenstrual phase. Hormonal changes, along with physical discomforts like menstrual cramps or bloating, can contribute to decreased libido for some individuals [30].
3. **Emotional factors:** Emotional changes, such as mood swings or irritability, during the menstrual cycle can also impact sexual feelings. Stress or discomfort may affect the desire for sexual intimacy [29].

It's important to recognize that individual experiences with sexual feelings during the menstrual cycle can be highly variable. Some women may not notice any significant changes in their sexual desire, while others may experience noticeable shifts. Open communication with your partner and understanding each other's needs and preferences can help

navigate any fluctuations in sexual feelings during menstruation. Additionally, personal preferences and cultural beliefs around sex during menstruation can also play a role in how women feel about sexual activity during this time. Ultimately, it's essential to listen to your body, communicate with your partner, and prioritize comfort and well-being during the menstrual cycle. If you have any concerns about changes in your sexual feelings or desire, consider discussing them with a healthcare professional or a qualified sex therapist.

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