IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

"The Menstrual Cycle and Its Disorders: From Physiology to Integrative Management (Modern Medicine & Ayurveda)"

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Abstract: - The menstrual cycle is a complicated process that plays a key role in a woman's reproductive health and ability to have children. Knowing how it works helps women take care of their bodies and notice any changes happening inside. It's also important for dealing with different menstrual problems that teenagers might face, like irregular periods and endometriosis. While modern medicine can offer fast relief, Ayurveda gives a natural, lasting way to take care of menstrual health and keep hormones in balance. Ayurveda uses a whole-body approach, including changes in daily habits and herbal remedies, to support reproductive health and handle issues like PCOS. This chapter explains the basics of menstrual problems in teens by covering how the menstrual cycle normally works, how to keep track of menstrual health, and what to expect during a typical menstrual cycle for teenagers.

Keywords: - Menstrual Cycle, Reproductive Health, Menstrual Disorder

1. Introduction

The menstrual cycle is a regular bodily process that happens in females, usually taking around 28 days, though is can be different for some people. It prepares the uterus for the possibility of pregnancy. The cycle has several stages: the follicular phase, where an egg develops; ovulation, when the egg is released; and the luteal phase, which readies the uterus for a fertilized egg. If the egg isn't fertilized, the lining of the uterus is shed, which is known as menstruation.

This cycle is controlled by hormones that are regulated by the hypothalamus, pituitary gland, and ovaries, working together in a coordinated way to support reproductive health and fertility. A normal cycle is the result of a complex system involving the hypothalamus, pituitary gland, and ovaries, along with various hormonal interactions. This system leads to the development of a dominant follicle, ovulation, and if pregnancy doesn't happen, the shedding of the uterine lining on a regular schedule.[1]

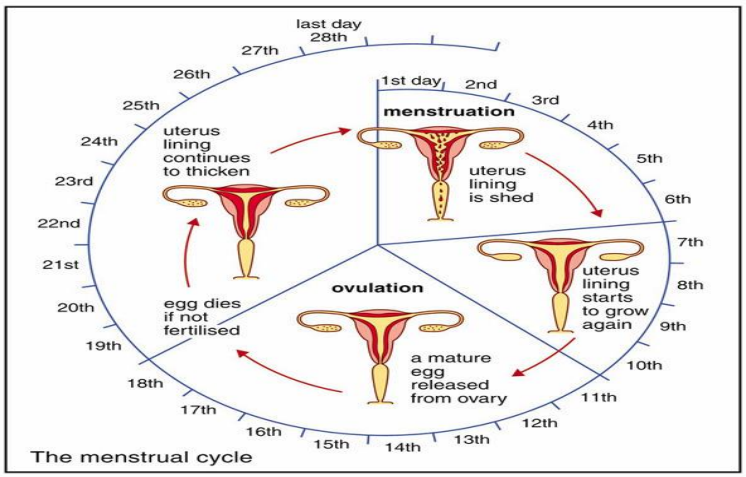

Fig No 1. Menstrual cycle

1.1 Menarche: -Menarche refers to a girl's first menstrual period, which usually happens when she is between 10 and 16 years old. On average, it starts around the age of 12.4 years. [2]

1.2 Menopause: - At the age of 40-45 years, the reproductive system ceases to function. Menopause typically (but not always) occurs in women during their late 40s or early 50s, and signals the end of the fertile phase of a women's life.[3]

1.3 Menstruation: -Menstruation is when blood and the shed lining of the uterus flow out of the vagina in a regular cycle.[4] Normal menstruation is now considered to be regular bleeding from the uterus that happens between the first period and the last period.[5]

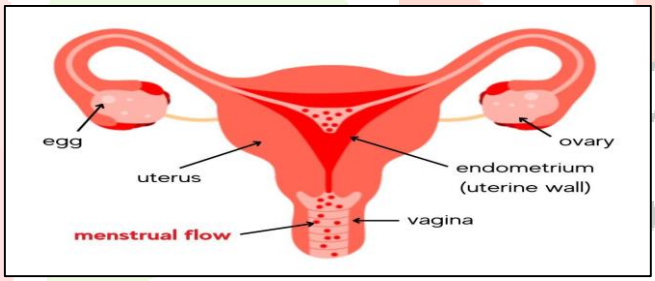

Fig No 1.2 Menstruation

2. Physiology Of Menstrual Cycle

In the beginning part of the menstrual cycle, low amounts of estradiol and progesterone encourage the brain's hypothalamus to release GnRH. This then causes the pituitary gland to release LH and FSH. LH helps the cells in the ovaries make androgens, while FSH acts on other ovarian cells to turn androgens into estradiol using an enzyme called aromatase. As the cycle progresses, the dominant follicle starts producing more estradiol, which encourages the lining of the uterus to thicken. Estradiol continues to rise until it hits a high point of about 200 pg/mL and stays there for at least 36 hours. During this time, the feedback system between the ovaries and the pituitary gland changes from a negative to a positive loop, leading to a sudden increase in LH called the mid-cycle surge, which triggers the release of an egg from the ovary.[6]

During ovulation, the mature follicle ruptures and releases an egg, then changes into a structure called the corpus luteum, which starts the luteal phase. The luteal phase usually lasts about 14 days and is more consistent in length than the follicular phase. During this time, the corpus luteumproduces progesterone and a little bit of estrogen, mainly because of the hormone LH. Higher progesterone levels help change the lining of the uterus from a growing state to a more prepared state, ready for a potential pregnancy. Progesterone also raises body temperature and makes cervical mucus thicker, which was thinner and more watery earlier to help sperm travel. If fertilization doesn't happen, the corpus luteum breaks down into a structure called the corpus albicans, leading to lower levels of estrogen and progesterone in the body. This drop in hormones causes the uterine lining to shed, resulting in a period, and the cycle starts again.[7]

3. PHASES OF MENSTRUAL CYCLE

1) Menstrual phase (First 5 days)
2) Post menstrual /pre ovulation/proliferative/follicular phase (6th -13th day)
3) Ovulation phase (on 14th day)
4) Luteal phase (15-28 days)

3.1 Menstrual phase

This stage starts on the first day of your period and happens at the same time as your period, continuing until you ovulate. Hormones cause the ovaries to create multiple follicles, and one of them becomes the mature egg that will be released. At the same time, the lining of the uterus starts to grow thicker in case a fertilized egg comes to stay.[8]

3.2 Follicular Phase

The follicular phase starts on the first day of a period and continues until ovulation. During this time, a woman's basal body temperature is usually lower, and the ovaries are working to develop follicles. The process of forming these follicles starts in the last few days of the previous menstrual cycle and continues until a mature follicle is released during ovulation. As the menstrual cycle nears its end, the corpus luteum produces less steroid, and inhibin A levels drop sharply, which lets follicle stimulating hormone levels go up in the final days of the cycle. [8].

3.3 Ovulation Phase

Ovulation occurs approximately 10-12 hours after the LH peak.[9] The LH surge starts when there's a big increase in estradiol, which is made by the follicle that's about to release an egg. To reach the level of estradiol that triggers this surge, the main follicle is usually more than 15 millimetres in size when viewed with an ultrasound. [10] The LH surge usually starts about 34 to 36 hours before ovulation and is a pretty accurate way to tell when ovulation will happen. [11]

3.4 Luteal Phase

This phase typically lasts about 14 days in most women. After ovulation, the granulosa cells that didn't come out with the egg keep growing, start looking empty inside, and begin to collect a yellow substance called lutein. These luteinized granulosa cells join with the theca-lutein cells that formed recently and the surrounding ovarian tissue to form the corpus luteum. The corpus luteum is a temporary hormone-producing structure that mainly releases progesterone. Its main job is to get the endometrium, which was already prepared by estrogen, ready for a fertilized egg to implant. [12]

4.CYCLE VARIATION

Menstrual cycle variation means that the length and other features of the period can be different from one person to another, or even from month to month for the same person. This happens because of the way hormones like estrogen, progesterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH) work together between the hypothalamus, pituitary gland, and ovaries.[13]

4.1Normal Variation

A normal menstrual cycle lasts between 21 and 35 days, and the actual bleeding usually lasts 2 to 7 days. The difference between the shortest and longest cycle in adults should be no more than 7 to 9 days, and for teenagers, it can be up to 20 days.[14]

4.2What Is Considered Irregular?

An irregular menstrual cycle is when the length of the cycle changes by more than 9 days in adults or 20 days in teenagers, or when the cycle is shorter than 21 days or longer than 35 days. Irregular periods can signal problems with ovulation or hormone balance. Causes include not ovulating, polycystic ovary syndrome (PCOS), thyroid issues, stress, weight changes, or perimenopause.[15]

4.3 Variability in Menstrual Cycle Length

How much the menstrual cycle changes can change with age and hormone levels. During teenage years and perimenopause, cycles are often irregular because ovulation isn't consistent. The follicular phase is usually the main reason for this change, while the luteal phase stays pretty steady (12 to 14 days). In young reproductive years (15 to 19), the average change is 5 to 10 days; in mid-reproductive years (20 to 40), it goes down to less than 7 days; and during perimenopause (over 45), the change can go back up to more than 10 days (4).[16]

5. MENSTRUAL CYCLE DISORDER

Apart from conditions of atypical menstruation, positive disorders are multiplied in women when compared to men. Those situations are associated with hormone differences in addition to hormone adjustments during the menstrual cycle. Elevated autoimmune conditions, which includes rheumatoid arthritis, are believed to be associated with estrogen enhancement of humoral immunity [17].

There are several sorts of menstrual disorders issues can range from heavy, painful intervals to no intervals in any respect.

1.Dysmenorrhea (Painful Cramps)

2.Menorrhagia (Heavy Bleeding)

3. Amenorrhea (Absence of Menstruation)

4. Oligomenorrhea

5. Premenstrual Syndrome (PMS)

1. Dysmenorrhea (Painful Cramps)

Dysmenorrhea is severe, common cramping in the course of menstruation. Ache happens inside the lower stomach however can unfold to the decrease back and thighs. Dysmenorrhea is usually referred to as primary or secondary:

A. Types of Dysmenorrhea

- Primary dysmenorrhea
- Secondary dysmenorrhea

B. Causes of Dysmenorrhea (Painful periods)

- **Primary dysmenorrhea**: -Is resulting from prostaglandins, hormone-like materials that are produced inside the uterus and reason the uterine muscle to settlement. Prostaglandins additionally play a role in the heavy bleeding that causes dysmenorrhea.
- **Secondary dysmenorrhea**: -May be caused by some of clinical situations. not unusual causes of secondary dysmenorrhea include
- **Endometriosis:** Endometriosis is a chronic and frequently revolutionary sickness that develops while the tissue that strains the uterus (endometrium) grows onto other regions, such as the ovaries, peritoneum, bowels, or bladder. It frequently reasons persistent pelvic pain.[18]

2.Menorrhagia (Heavy Bleeding)

Menorrhagia is the clinical time period for extensively heavier periods. Menorrhagia may be caused by various of things. for the duration of an everyday menstrual cycle, the common woman loses approximately 1 ounce (30 mL) of blood and changes her sanitary merchandise around three to 5 times consistent with day.

A. Types

- Metrorrhagia
- Menometrorrhagia
- Dysfunctional uterine bleeding (DUB) [19]

B. Causes of Menorrhagia (Heavy Bleeding)

a) Hormonal Imbalances

b) Ovulation troubles

c) Uterine Fibroids

d) Endometriosis and Adenomyosis

e) Bleeding problems

f) Being Pregnant or Miscarriage [20]

3. Amenorrhea (Absence of Menstruation)

Amenorrhea is the absence of menstruation. There are two categories: number one amenorrhea and secondary amenorrhea. Those phrases talk to the time whilst menstruation stops

A. Types

- primary amenorrhea,
- Secondary amenorrhea

B. Causes of Amenorrhea

a) Polycystic Ovarian Syndrome (PCOS)

b) Multiplied Prolactin Stages (Hyperprolactinemia)

c) Weight Loss And Eating Issues

d) Athletic training

e) Stress

f) Premature Ovarian Failure (POF) [21]

4. Oligomenorrhea

Oligomenorrhea is a circumstance wherein menstrual cycles are rare happening extra than 35days apart. It is very not unusual in early formative years and does no longer usually imply a scientific hassle.

5. Premenstrual Syndrome (PMS)

Premenstrual syndrome (PMS)is a fixed of physical, emotional, and behavioral signs that arise over the counter week of over-the-counter luteal segment (per, week before menstruation), in maximum cycles.[21]

3. Risk Factors

Age performs a key position in menstrual disorders. Girls who begin menstruating at age 11 or more youthful are at higher hazard for extreme pain, longer durations, and longer menstrual, cycle.

❖ **Other Threat Elements Encompass**

a) Weight

b) Menstrual Cycles and over-the-counter

c) pregnancy history

d) Smoking

e) stress

f) workout [18]

4. Diagnosis of disorders

a) Menstrual cycle patterns, including length of time between periods, number of days that period last, number of days of heavy or light bleeding.

b) The presence or history of any medical conditions that might be causing menstrual problems.

c) Any family history of menstrual problems.

d) History of pelvic pain.

e) Regular use of any medications (including vitamins and over-the-counter drugs).

f) Diet history including caffeine and alcohol intake.

g) Past or present contraceptive use.

h) Any recent stressful events.

i) Sexual history.[21]

6. MEDICATIONS FOR MENSTRUAL DISORDER

There are a number of different medicines prescribed for menstrual disorders.

A. Common Pain Relievers for Cramps (NSAIDs) [20]

Ex, Naproxen, Ibuprofen

B. Oral Contraceptives [22]

Ex, Levonorgestrel, Ethinyl Estradiol

C. Progestins [23]

Ex, Etonogestrel Implant, Mirena, Depo-Provera

D. GnRH Agonists

Ex, Leuprolide Acetate

E. Synthetic Steroid. [24]

Ex, Donazol

F. Non-Hormonal Drugs

Ex, Lysteda

❖ **Side Effect of Medication**

1.NSAIDs: - Over-the-counter medications like ibuprofen and naproxen alleviate muscle spasms; however, they may lead to gastrointestinal issues including upset stomachs, vomiting, and erosions in the digestive tract. Prolonged exposure might elevate risks for renal impairment and cardiovascular issues among vulnerable groups.[25]

2.Oral Contraceptives: -The combined pill might lead to feelings of sickness, sore breasts, slight fluctuations in body mass, and emotional ups and downs. Less common severe outcomes involve blood clots, strokes, or high blood pressure, particularly among older heavy smokers. [26]

3.GnRH Agonists: - Pseudopregnancy medications like luteinizing hormone-releasing hormone antagonists may induce symptoms similar to natural menopause including flushing, atrophy of the vulva, diminished bone mass, and amenorrhea when taken over extended periods.[27]

7.MEDICINAL HERBS USE IN MENSTRUAL CYCLE DISORDER

Herbs	Synonyms	B.S.	Constituent's	Use for MC
1.Fenugreek [28]	Methi,greek, Trigonella.	Seed	Diosgenin, Saponins	Regulates cycle, reduces pain [29]
2.Pomegranate [30]	Punica, Chinese apple	Fruit/peel	Ellagic acid	Hormonal balance, PMS relief [31]
3.Ginger [32]	Adarak, Ginger	Rhizome	Gingerol Shagol	Relive cramps [33]
4.Ashoka [34]	Ashoka tree Indian Ashoka	Bark	Flavonoids, Tannin	Uterine tonic, Reduce heavy bleeding [35]
5.Shatavari [36]	Asparagus Shatavari root	Root	Saponins Isoflvones	Regular Menstruation [37]
6.Turmeric [38]	Halad,Turmeric	Rhizome	Curcumin	Reduce PMS & cramps [39]
7.Aloe vera	Korfal, Aloe	Leave juice	Aloin,	Regulate flow & Reduce pain [40]

Table No. 7.1 Herbs Used in MC Disorder

8. CONCLUSION

The menstrual cycle is a complicated process that involves hormones and changes in the body. It's important to understand the menstrual cycle because it plays a key role in reproductive health and fertility. Knowing about the menstrual cycle helps women take care of their health, be aware of their fertility, and recognize how their body changes each month. Having a good understanding of how the menstrual cycle works, especially in teenage girls, is important for doctors and families. Allopathy offers quick relief regarding healing time, but the results are frequently temporary. Symptoms may recur after drugs are stopped. While slow to produce effects, Ayurveda assures deep healing, leading to a longer and better life. For individuals looking for a natural, side-effect-free, and long-term solution to chronic ailments, Ayurveda is an excellent choice. Ayurveda is

natural and generally free from harmful side effects when followed correctly. herbs, and lifestyle modifications, which work holistically to balance hormones and support reproductive health. Even for women dealing with PCOS, these natural methods offer effective ways to manage irregularities and maintain overall well-being.

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