Polycystic Ovary Syndrome Demystified

Polycystic Ovary Syndrome Demystified:

A Guide for Patients and Practitioners

By

Harshal Ashok Pawar

and Dhingra Bhagyashree Sanjay Sneh

Cambridge Scholars Publishing

Polycystic Ovary Syndrome Demystified:
A Guide for Patients and Practitioners

By Harshal Ashok Pawar and Dhingra Bhagyashree Sanjay Sneh

This book first published 2026

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-0364-6712-8
ISBN (Ebook): 978-1-0364-6713-5

This book is lovingly dedicated for my parents, whose sacrifices and love made this possible, for my teachers, who opened my mind to new possibilities, and for my little brother, whose presence brings joy to my heart.

CONTENTS

ABOUT THE AUTHORS

Dr. Harshal Ashok Pawar, M. Pharm., PhD, MD (AM), DBM, DNYS, DYA, D. Acu.

He is currently working as an Associate Professor with Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar, Maharashtra (Affiliated to University of Mumbai, India). He has more than 23 years of teaching *cum* industry research experience. He has worked with various pharmaceutical industries such as Medley, Charak and Alkem Research Centre. He has also worked as a Head of Department of Quality Assurance for six years. He has published more than 100 research and review articles in various national / international journals of repute. He has also presented various research papers in national / international conferences, seminars, symposia and workshops. He has many patents, including US, South Africa, UK and Indian patents to his credit. He has received research grants for various projects from the University of Mumbai and several industries. He is on the editorial board and reviewer for many international journals as well as regulatory agencies. He has guided more than 35 M. Pharmacy Research scholars in the subject of Quality Assurance. He is also a recognized PhD guide of the University of Mumbai, Mansarovar Global University and Pacific University, and is a registered acupuncturist of the Government of Maharashtra. He has authored more than 10 books in the field of Pharmaceutical Sciences. He is a life member of the Association of Pharmaceutical Teachers of India (APTI).

Ms. Dhingra Bhagyashree Sanjay Sneh, B. Pharm, M. Pharm

She completed both her Bachelor's and Master's degrees in Pharmacy at Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar, Maharashtra (affiliated to University of Mumbai, India). She gained academic experience during her M. Pharm tenure by serving as a faculty member at the same institution, where she developed strong skills in teaching, mentoring, and guiding students.

Currently, she is an academician at Principal K. M. Kundnani College of Pharmacy, Ulhasnagar. Despite being early in her professional journey, she has actively contributed to research and has published many articles. Her M. Pharm research focused on Polycystic Ovary Syndrome (PCOS), reflecting her keen interest in clinical pharmacy and women's health.

In addition to her primary research work, she has been involved in various projects, including those based on aromatherapy. She has also filed two patent applications: *A Therapeutic Herbal Spray Formulation* and *A Polyherbal Stress Relief Oil Formulation*.

She has actively participated in several national and international conferences through presentations and academic engagements. During her academic career, she has received multiple awards and recognitions, including Best Student (BRC – Female Category) at the Beyond Research Science Conference (2025) and securing a rank in M. Pharm (AY 2023–24). She has also been recognized for her participation in national-level competitions, e-poster presentations, and innovation challenges, along with completing specialized training in HPLC and UV-spectrophotometry.

FOREWORD

It gives me immense pleasure and pride to write the foreword for this timely and much-needed book, **Polycystic Ovary Syndrome Demystified: *A Guide for Patients and Practitioners***. Women's health, particularly hormonal and metabolic disorders such as polycystic ovarian syndrome (PCOS/PCOD), has long required a compassionate, evidence-based, and practical approach that bridges the gap between clinical science and day-to-day self-care. This book successfully fulfils that need.

What makes this guide truly unique is its integrative outlook. Rather than focusing solely on pharmacological or symptomatic treatment, it emphasizes nutrition, lifestyle correction, stress management, sleep hygiene, and alternative therapies alongside modern medicine. This balanced perspective reflects the future of healthcare — one that combines science, prevention, and self-empowerment. As someone deeply involved in nutraceuticals, biotechnology, and women's welfare initiatives, I strongly believe that sustainable health begins with informed lifestyle choices supported by safe and natural interventions. This book aligns perfectly with that philosophy.

PCOS is not merely a medical condition; it affects emotional well-being, fertility, confidence, and overall quality of life. By presenting real-life experiences, case studies, and practical guidance, the author transforms complex medical information into understandable and actionable knowledge. Such an approach will help physicians counsel their patients better and enable women to actively participate in managing their own health.

I commend the author for creating a resource that is educational, empathetic, and scientifically sound. I am confident that this book will serve as a trusted companion for practitioners and a source of hope and clarity for countless women and families.

I wholeheartedly congratulate the authors on this valuable contribution to women's healthcare and wish this publication wide reach and lasting impact.

Kavita Dubepatil,
Director, Orah Nutrichem Pvt. Ltd.,
Kavita Biotech, Pune, Maharashtra, India.

FOREWORD

It is a privilege to write a few words for **Polycystic Ovary Syndrome Demystified:** ***A Guide for Patients and Practitioners***, a thoughtful and comprehensive work that addresses an increasingly prevalent women's health concern with clarity, sensitivity, and scientific understanding. Although my specialization lies in General Surgery, clinical practice consistently reinforces how systemic conditions such as PCOS/PCOD extend far beyond menstrual irregularities. They impact metabolic health, emotional well-being, reproductive potential, and long-term quality of life. A resource that presents these complex aspects in a structured and accessible manner is of immense value to both patients and healthcare professionals.

This book is particularly commendable for its patient-centered and educational approach. It begins by explaining the fundamentals of the female reproductive system and menstrual health, and then progresses into a detailed discussion on PCOS, including its underlying mechanisms, clinical manifestations, associated risks, and management options. By simplifying medical concepts without compromising scientific accuracy, the author has created a guide that encourages awareness, early intervention, and informed decision-making.

From a broader clinical perspective, it is evident that conditions like PCOS are closely linked with metabolic disturbances, weight management challenges, insulin resistance, and long-term risks such as cardiovascular disorders. The author has rightly emphasized the importance of lifestyle modifications, including nutrition, physical activity, stress management, and proper sleep. In clinical practice, sustained lifestyle changes often play a significant role in improving overall health outcomes and preventing complications. This balanced outlook strengthens the practical relevance of the book.

By combining medical knowledge with practical guidance, the author has created a meaningful bridge between healthcare providers and the community. This book will help practitioners better educate and support their patients, while also empowering women to take an active and informed role in managing their health.

I sincerely congratulate the author for this valuable contribution to women's health education. I am confident that this work will serve as a dependable reference for professionals and a reassuring guide for women seeking holistic understanding and long-term management of PCOS.

Dr. Abhilash Pawar, MBBS MS MRCS (Edinburgh)
Former Assistant Professor (General surgery) RN Cooper Hospital
HBTMC Mumbai
Specialty Doctor – General and Laparoscopic Surgery
Darent Valley Hospital, NHS Trust, UK.

PREFACE

Millions of women worldwide suffer from the complicated and frequently misdiagnosed disorder known as polycystic ovarian syndrome, or PCOS. Despite being common, PCOS is still mysterious to many patients and even to some medical professionals because of the wide range of symptoms and expressions it can have. This fluctuation frequently causes dissatisfaction, perplexity, and a lack of precise direction when navigating diagnosis and treatment. To close this gap and offer a thorough, useful resource for people with PCOS and the medical professionals who assist them, *Polycystic Ovary Syndrome Demystified: A Guide for Patients and Practitioners* was created.

Our goal in writing this book is to simplify medical jargon and provide simply understood material based on the most recent research, all while helping readers understand the complexity of PCOS. Our goal is to offer a roadmap that is both instructive and empowering, whether you are someone recently diagnosed, living with the condition, or a healthcare professional trying to deepen your understanding. We address the emotional and psychological aspects of PCOS in addition to its biological and medical components. We provide comprehensive advice on symptom management, quality of life enhancement, and a closer patient-physician relationship.

This book's central thesis is the straightforward yet profound notion that "knowledge is power." Patients can become active participants in their own health and advocates for the care they deserve with increased awareness and comprehension. In response, professionals can provide more individualised, efficient treatment programs that deal with PCOS's underlying causes as opposed to its symptoms.

You will discover easily understandable scientific explanations, practical guidance for daily life, and perspectives from subject matter specialists as you flip the pages of this guide. By the time we finish this journey, we hope that the mysteries surrounding PCOS will be much less intimidating, if not completely answered. Together, we can change the tone of the conversation from one of bewilderment and frustration to one of empowerment and clarity.

Anyone who wants to learn more about PCOS—whether they are a patient, a healthcare professional, or just someone interested in this, sometimes disregarded, illness—should read this book. We cordially encourage you to jump in, heart and mind open, prepared to finally unravel the mystery behind PCOS.

—Dr. Harshal Ashok Pawar
—Ms. Dhingra Bhagyashree Sanjay Sneh

CHAPTER 1

PRELIMINARY INFORMATION

The most prevalent endocrine condition affecting women who are fertile is called polycystic ovarian syndrome, or PCOS. On an ultrasound scan, 20% of women will have polycystic ovaries, and 7% of women will also have the extra clinical or biochemical symptoms of PCOS. A combination of hyperandrogenism (hirsutism and skin breakouts) and anovulation (oligomenorrhea, barrenness, and needless uterine seepage), with or without the presence of polycystic ovaries on ultrasound, is known as polycystic ovarian syndrome, or PCOS. In clinical practice, 50% of women with PCOS have repeated pregnancy loss and 75% have anovulation infertility. It is unclear, therefore, if the malfunctioning of the uterus itself or the disruption of the connection between the uterine cells and the growing foetus is the origin of these problems. Endometrial cancer is more common in young women with PCOS-induced endometrial hyperplasia than in non-PCOS women. Pre-adult PCOS patients should have it evaluated and treated from the beginning because of potential conceptual, metabolic, and ontological issues. Medication, food, and lifestyle modifications are all part of the treatment options.

1.1 Structure of female reproductive system

Gynaecology, which means "gynaeco-woman; -logy study of," is a speciality area of medicine that focusses on the identification and management of disorders affecting the female reproductive system. The female reproductive system's organs consist of the following:

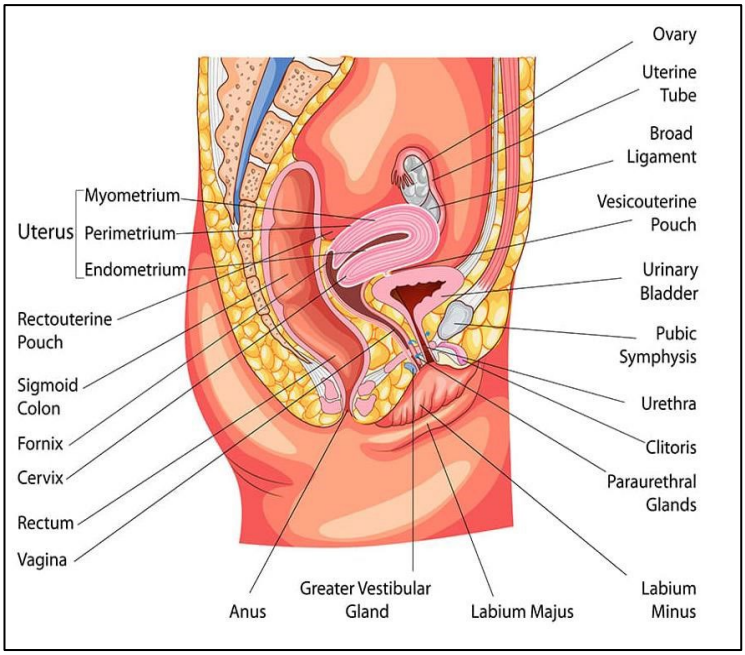


Figure 1: Structure of female reproductive system (1)

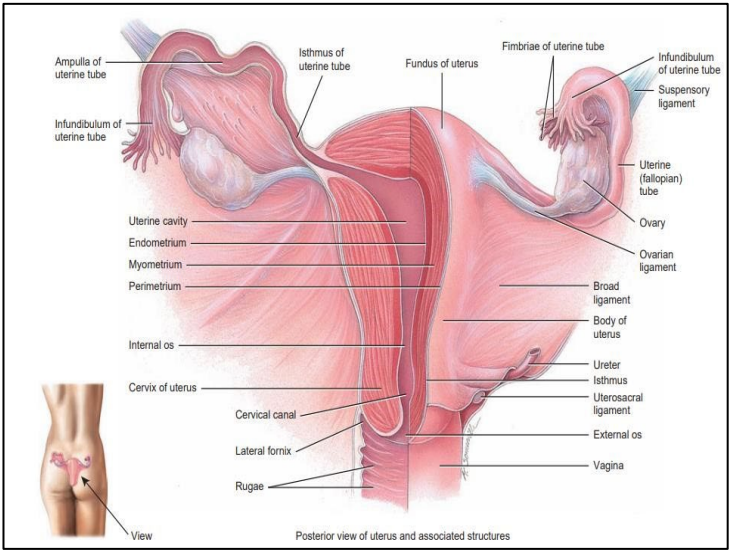


Figure 2: Structure of female reproductive system (2)

1) The vagina: The vagina is a mucous membrane-lined, tubular, fibromuscular canal that runs from the outside of the body to the uterine cervix. It is 10 cm (4 in.) length. It serves as the penis's container during sex, a menstrual flow exit, and a delivery channel for babies. The vagina, which connects to the uterus, is orientated superiorly and posteriorly, between the rectum and the bladder. The inferior end of the vaginal aperture is bordered by a thin fold of vascularised mucous membrane known as the hymen, which also partially covers the vaginal orifice to the outside. All that is left of the hymen are remains when it ruptures, which normally happens after the first sexual encounter.

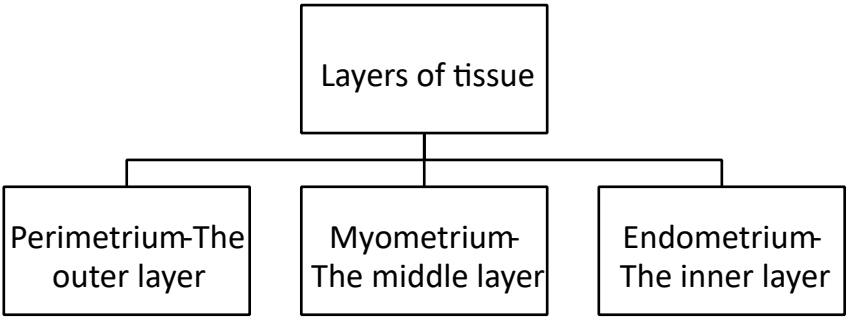
2) The uterus: It is an organ with a hollow pear shape. The cervix is a little canal that divides it from the vagina. Sperm deposited in the vagina go via the uterus (womb) to reach the uterine tubes. It is also the location of labour, the development of the foetus throughout pregnancy, and the implantation of a fertilised ovum. The uterus is the source of menstrual flow during reproductive cycles in the absence of implantation. It measures roughly 7.5 cm (3 in.) in length, 5 cm (2 in.) in width, and 2.5 cm (1 in.) in thickness in females who have never given birth. When sex hormone levels are low, as they are after menopause, the uterus shrinks (atrophies) and becomes larger in females who have just given birth.

Anatomical subdivisions of uterus:

(1) A dome shaped portion superior to the uterine tubes called the fundus,
(2) A tapering central portion called the body, and
(3) An opening into the vagina known as the cervix, a thin part below. The isthmus, a narrow passageway measuring approximately 1 centimetre (0.5 in.) in length, lies between the uterine body and the cervix. The cervix's inside is referred to as the cervical canal, and the uterus' interior is known as the uterine cavity. At the internal os, which resembles a mouthlike aperture, the cervical canal enters the uterine cavity; at the external os, it opens into the vagina.

Histology of uterus:

Histologically, the uterus consists of three layers of tissue:



3) Fallopian tubes/ Uterine tubes: These are slender channels that join the top portion of the uterus. The two oviducts, or uterine (fallopian) tubes, that emerge laterally from the uterus are present in females. The tubes are located between the folds of the uterine wide ligaments and are roughly 10 cm (4 in.) length. From the ovaries, the eggs pass through them to the uterus, where they meet the sperm (fertilisation). The fertilised egg then passes through the tubes and into the uterus, where it attaches itself to the wall of the uterus to develop into an embryo.

It is divided into:

1. The **funnel-shaped portion** of each tube, called the **infundibulum**, is close to the ovary but is open to the pelvic cavity. It ends in a fringe of finger like projections called **fimbriae.**
2. The **ampulla** of the uterine tube is the widest, longest portion, making up about the lateral two-thirds of its length.
3. The **isthmus** of the uterine tube is the more medial, short, narrow, thick-walled portion that joins the uterus.

4) Ovaries: On the sides of the uterus are these tiny glands. Within the ovaries, where they develop, eggs and female hormones are produced. The female gonads, or ovaries (or egg receptacles), are paired glands that are similar in size and shape to unshelled almonds and function similarly to the testes.

The ovaries produce:

1. Gametes, secondary oocytes that develop into mature ova (eggs) after fertilization, and
2. Hormones, including progesterone and oestrogens (the female sex hormones), inhibin, and relaxin.

Histology of ovary:

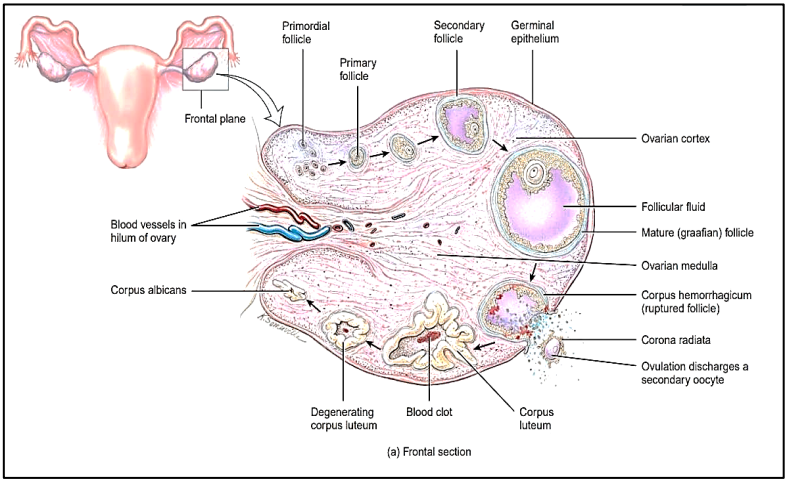
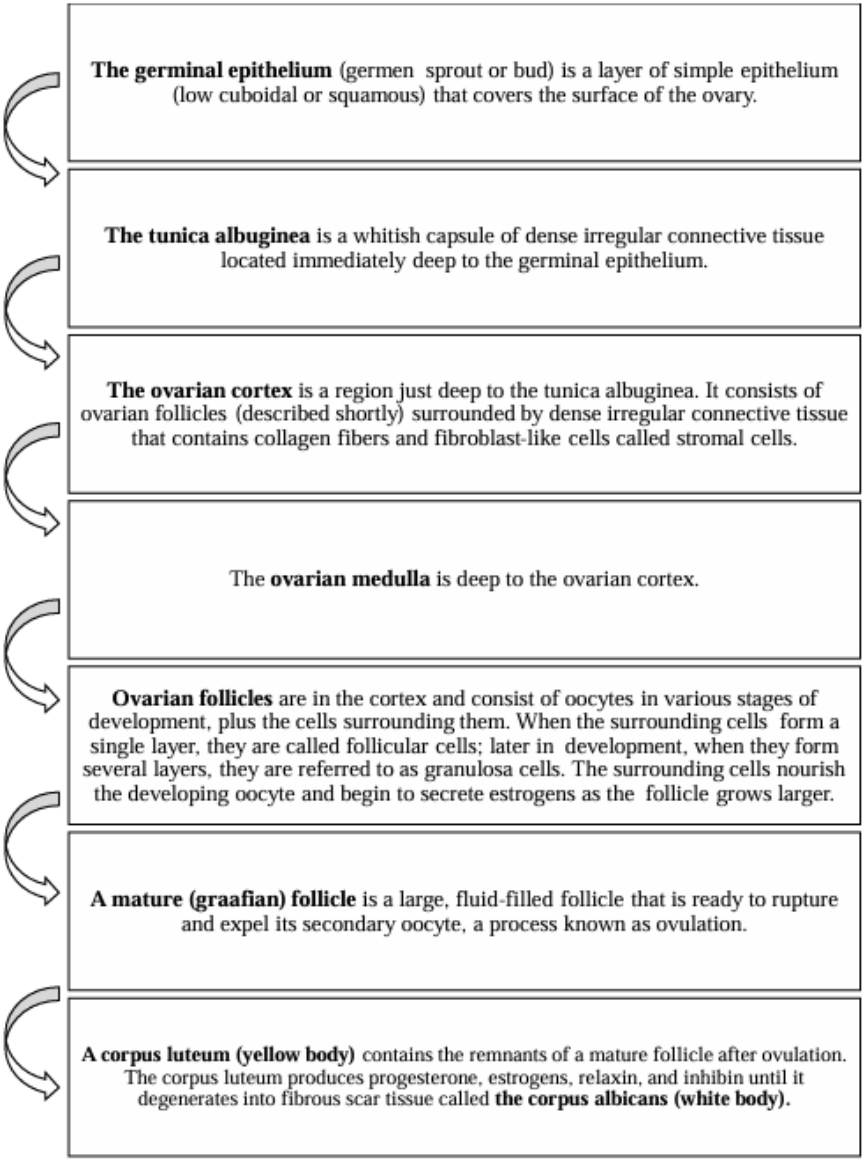


Figure 3: Histology of ovary

Each ovary consists of the following parts:


The germinal epithelium (germen sprout or bud) is a layer of simple epithelium (low cuboidal or squamous) that covers the surface of the ovary.
The tunica albuginea is a whitish capsule of dense irregular connective tissue located immediately deep to the germinal epithelium.
The ovarian cortex is a region just deep to the tunica albuginea. It consists of ovarian follicles (described shortly) surrounded by dense irregular connective tissue that contains collagen fibers and fibroblast-like cells called stromal cells.
The **ovarian medulla** is deep to the ovarian cortex.
Ovarian follicles are in the cortex and consist of oocytes in various stages of development, plus the cells surrounding them. When the surrounding cells form a single layer, they are called follicular cells; later in development, when they form several layers, they are referred to as granulosa cells. The surrounding cells nourish the developing oocyte and begin to secrete estrogens as the follicle grows larger.
A mature (graafian) follicle is a large, fluid-filled follicle that is ready to rupture and expel its secondary oocyte, a process known as ovulation.
A corpus luteum (yellow body) contains the remnants of a mature follicle after ovulation. The corpus luteum produces progesterone, estrogens, relaxin, and inhibin until it degenerates into fibrous scar tissue called **the corpus albicans (white body).**

5) **Mammary glands**: Every breast is a projection of a hemisphere. The nipple, a pigmented protrusion on each breast, contains a network of closely spaced duct openings known as lactiferous ducts, which are where milk is released. The areola is the term for the spherical, pigmented region of skin that surrounds the nipple. The suspensory ligaments of the breast, also known as Cooper's ligaments, are strands of connective tissue that support the breast by running between the skin and fascia. The mammary gland, a modified sudoriferous (sweat) gland that secretes milk, is located within each breast. There are 15 to 20 lobes, or compartments, in a mammary gland, and they are divided by varying amounts of adipose tissue. Each lobe contains several smaller chambers known as lobules, which are made up of clusters of milk-secreting glands called alveoli that resemble grapes. Milk is propelled towards the nipples by the contraction of the myoepithelial cells that surround the alveoli. Milk is created by moving through a sequence of secondary tubules after leaving the alveoli and entering the mammary ducts. The mammary ducts enlarge at the nipple to form lactiferous sinuses, which are sinuses where some milk may be held before emptying into a lactiferous duct. Normally, each lactiferous duct transports milk to the outside from one of the lobes. The production, secretion, and ejection of milk are the activities of the mammary glands; these processes, collectively referred to as lactation, are connected to conception and delivery. Prolactin, which is released by the anterior pituitary, is the primary hormone that stimulates milk production; progesterone and oestrogens also play a role. Oxytocin is released from the posterior pituitary in response to an infant sucking on a mother's nipple, which stimulates the ejection of milk.

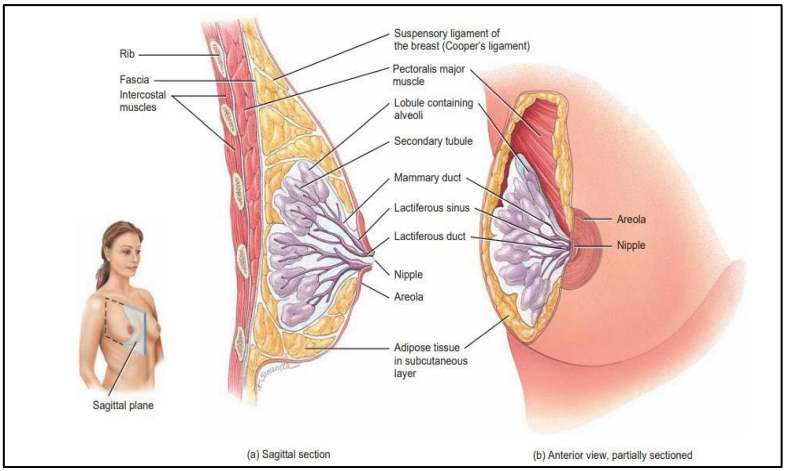


Figure 4: Mammary gland

1.2 Stories about menstruation

As far as we know, women have been having menstruation for as long as there have been women. We are not the only animals that go through periods; several primate species also go through menstrual cycles. However, the majority of other mammals go through oestrus cycles, which are physiologically distinct from menstrual cycles. It should come as no surprise that most civilisations and cultures have been fascinated by the first appearance of a bloody discharge in young girls and its recurrence on occasion thereafter. Why are women's periods? What is the purpose of it? What is the meaning of this blood? Menstrual explanations can be found in anthropological reports, mythology, and folklore in addition to medical and scientific literature. The underlying premise of all these stories is that menstruation and fertility are somehow related, even if most of the explanations do not address how this relationship manifests itself. The regular emergence of blood in the absence of injury is far more significant.

1.3 The female reproductive cycle

Nonpregnant females typically experience cyclical changes in the ovaries and uterus during their reproductive years. Every cycle lasts roughly one month and entails both oogenesis and the uterus's preparation for receiving a fertilised ovum. The set of processes that take place in the ovaries both

during and after an egg reaches maturity is known as the ovarian cycle. The uterine (menstrual) cycle is a sequential set of alterations in the uterus's endometrium that get ready for an ovum that has been fertilised and will grow inside of it until it is born. Ovarian hormones decrease in the absence of fertilisation, leading to the endometrium's stratum functionalis peeling off. The ovarian and uterine cycles, the hormonal fluctuations that govern them, and the associated cyclical changes in the breasts and cervix are all included in the generic term "female reproductive cycle."

Hormonal regulation:

1) The hypothalamus secretes gonadotropin-releasing hormone (GnRH), which regulates the ovarian and uterine cycles.
2) Follicle-stimulating hormone (FSH) and luteinizing hormone (LH) are released from the anterior pituitary in response to growth hormone (GnRH).
3) Follicle growth is triggered by FSH, and ovarian follicle development is further stimulated by LH.
4) The ovarian follicles are also stimulated to release oestrogens by both FSH and LH.
5) A growing follicle's theca cells are stimulated by LH to create androgens.
6) The androgens are absorbed by the follicle's granulosa cells and transformed into oestrogens when FSH is present.
7) LH is known as luteinizing hormone because it causes ovulation at midcycle and thereafter stimulates the development of the corpus luteum.
8) The corpus luteum secretes and manufactures oestrogens, progesterone, relaxin, and inhibin in response to LH stimulation.
9) Stimulated by LH, the corpus luteum produces and secretes oestrogens, progesterone, relaxin, and inhibin.
10) Ovarian follicles release oestrogens, which serve several crucial purposes:
    1) Oestrogens support the growth and upkeep of the breasts, secondary sex traits, and female reproductive structures. The distribution of adipose tissue in the breasts, abdomen, hips, and mons pubis, as well as voice pitch, a wide pelvis, and the pattern of hair growth on the head and body, are hallmarks of secondary sex characteristics.
    2) Oestrogens promote protein anabolism, which includes the development of robust bones. In this sense, human growth hormone (hGH) and oestrogens work in concert.

3) Because oestrogens cut blood cholesterol, women under 50 are probably far less likely than men to develop coronary artery disease.
4) Both the anterior pituitary's secretion of LH and FSH and the hypothalamus' release of GnRH are inhibited by blood levels of oestrogens that are moderate.

11) Progesterone, which is mostly released by corpus luteum cells, works with oestrogens to prepare the endometrium for fertilised ovum implantation and to prepare the mammary glands to secrete milk. High levels of progesterone also inhibit secretion of GnRH and LH.
12) The myometrium's contractions are inhibited by the tiny amount of relaxin that the corpus luteum produces throughout each monthly cycle, which relaxes the uterus.
13) The placenta makes a lot more relaxin during pregnancy, and it keeps the smooth muscle in the uterus relaxed. Relaxin also helps dilate the uterine cervix and makes the pubic symphysis more flexible during the end of pregnancy, which facilitates easier baby birth.
14) Following ovulation, both the corpus luteum and the granulosa cells of growing follicles release inhibin. It inhibits FSH and, to a lesser extent, LH secretion.

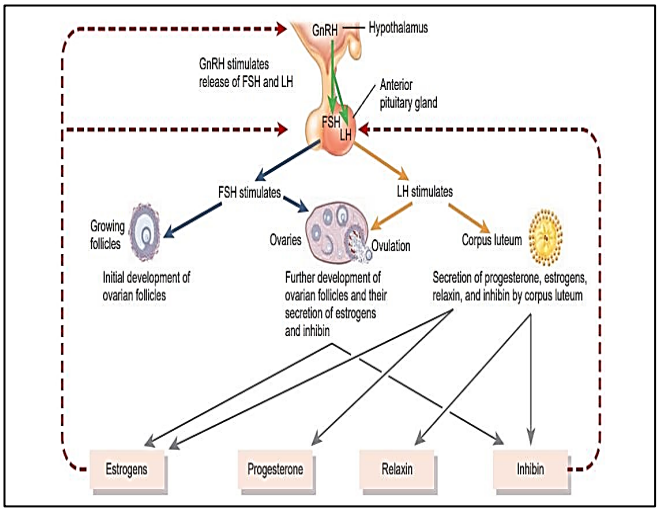


Figure 5: Hormone regulation

1.3.1. Phases of female reproductive cycle

Table 1: Phases of female reproductive cycle

CYCLE	Pre-ovulation		OVULATION	Post-ovulation
OVARIAN CYCLE	Follicular phase			Luteal phase
UTERINE CYCLE	PERIOD	Proliferative phase		Secretory phase

1) Premenstrual syndrome (PMS)

A group of symptoms that occur in women, typically between ovulation and a period. Some psychological and physical changes may occur during the luteal phase:

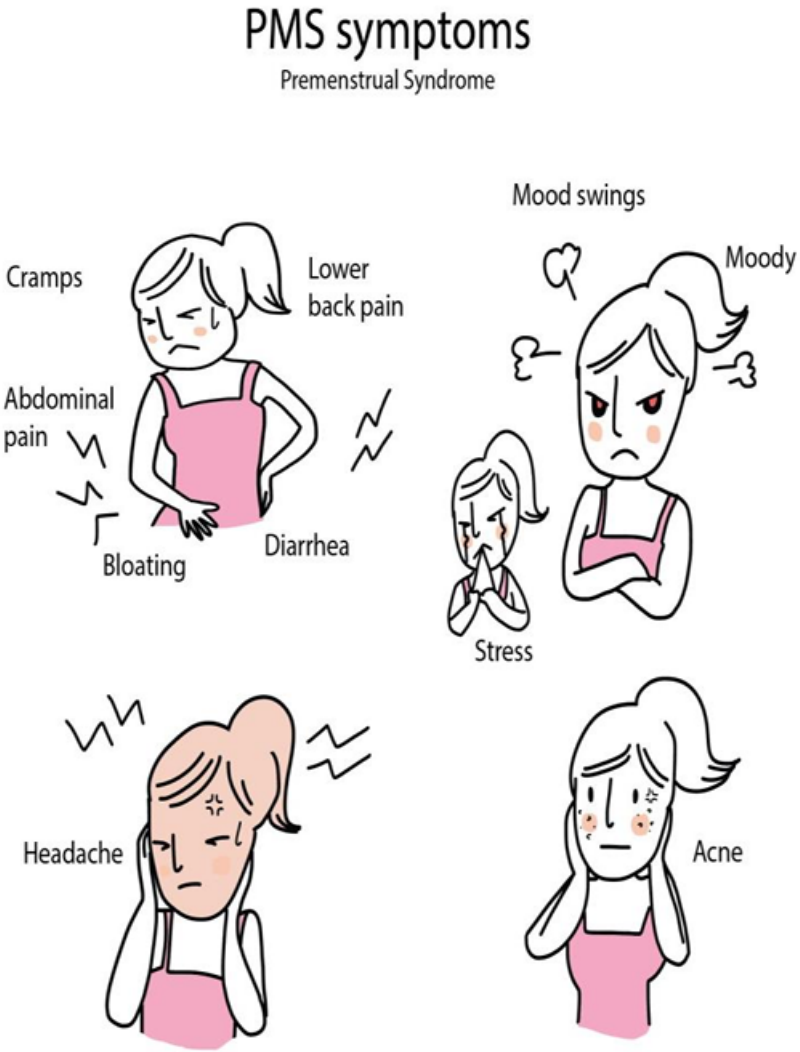
Physical changes:

1) Breast tenderness and swelling
2) Diarrhoea or constipation
3) Bloating and gas
4) Cramps
5) Headaches or backaches
6) Fluid retention
7) Fatigue and vertigo
8) Inability to tolerate noise or bright lights
9) Acne

Psychological changes:

1) Aggressive behaviour and irritability
2) Trouble sleeping (too much or too little)
3) Changes in appetite
4) Difficulty concentrating and remembering
5) Stress and anxiety
6) Mood swings
7) Depression or sadness or Reduced libido

These changes occur due to the sudden drop in progesterone and oestrogen. However, they disappear a few days after menstruation once hormones are back to their elevated levels.



GENERAL ADVICE

1) Try to eat healthy foods with lots of fruit and vegetables.

2) Reduce your salt intake as it causes fluid retention.

3) Consume less caffeine as it causes stress.

4) Eat foods rich in calcium as calcium alleviates PMS symptoms.

5) Use painkillers such as Ibuprofen to help alleviate the pain from cramps.

6) It is best to monitor and record menstruation dates and the accompanying symptoms to help diagnose problems when they arise.

7) Change sanitary napkins every three or four hours.

8) Stop smoking.

9) Place warm compresses on your stomach.

10) Go for a light walk to reduce psychological stress.

11) Consult a doctor before using any contraceptive method.

The duration of the female reproductive cycle typically ranges from 24 to 35 days. For this discussion, we assume a duration of 28 days and divide it into four phases:

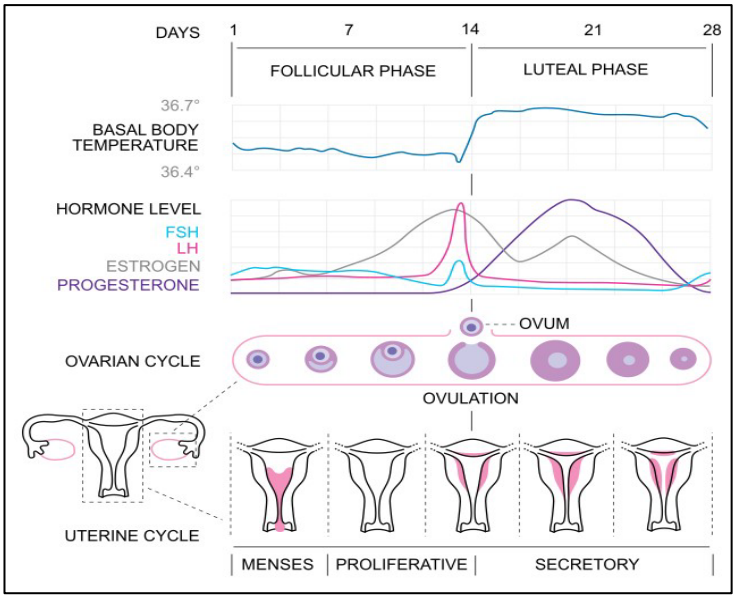


Figure 6: Phases of menstrual cycle

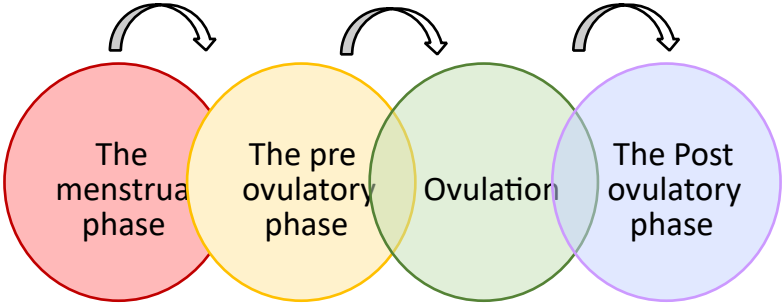


Figure 6: Phases of menstrual cycle

2) The menstrual phase

The first about five days of the cycle are devoted to the menstrual phase, commonly known as menstruation or menses. Several primordial follicles undergo development into primary and subsequently secondary follicles under the effect of FSH. Between 50 to 150 mL of blood, tissue fluid, mucus, and endometrial cells lost are all part of the menstrual flow from the