

## UNIT 19

### FEMALE REPRODUCTIVE SYSTEM

Female reproductive system is the system of reproduction in female human beings.

#### Functions of Female Reproductive System

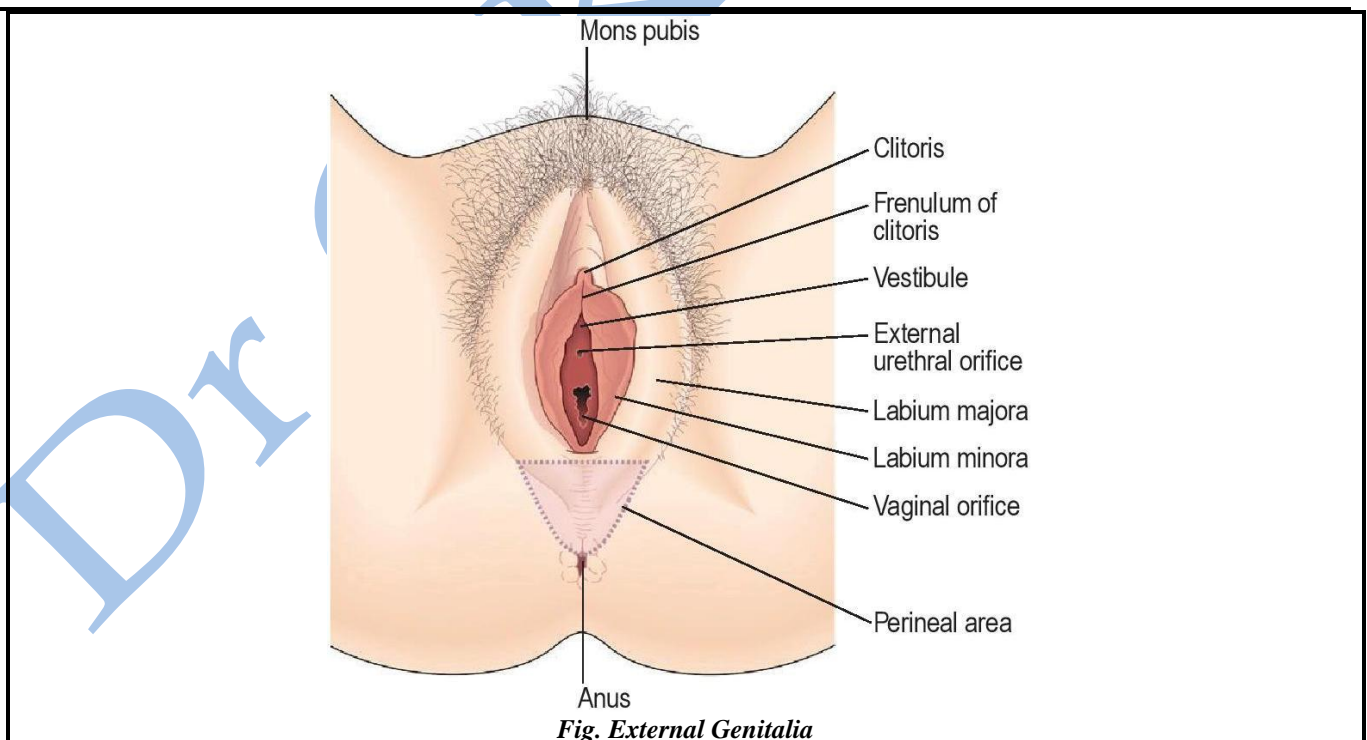
1. Formation of ova.
2. Reception of spermatozoa.
3. Fetal development.
4. Parturition (child birth).
5. Lactation, the production of breast milk, which provides complete nourishment for the baby in its early life.

#### Organs of Female Reproductive System

The female reproductive organs are divided into three parts:

1. External female reproductive organs/ external reproductive organs/ the vulva
  - a. Mons pubis
  - b. Labia majora
  - c. Labia minora
  - d. Clitoris
  - e. Hymen
  - f. Vestibular glands
  - g. Perineum
2. Internal female reproductive organs/Internal genitalia
  - a. Vagina
  - b. Uterus
  - c. Uterine tube
  - d. Ovary
3. Mammary glands/ Breast

#### EXTERNAL FEAME REPRODUCTIVE ORGANS

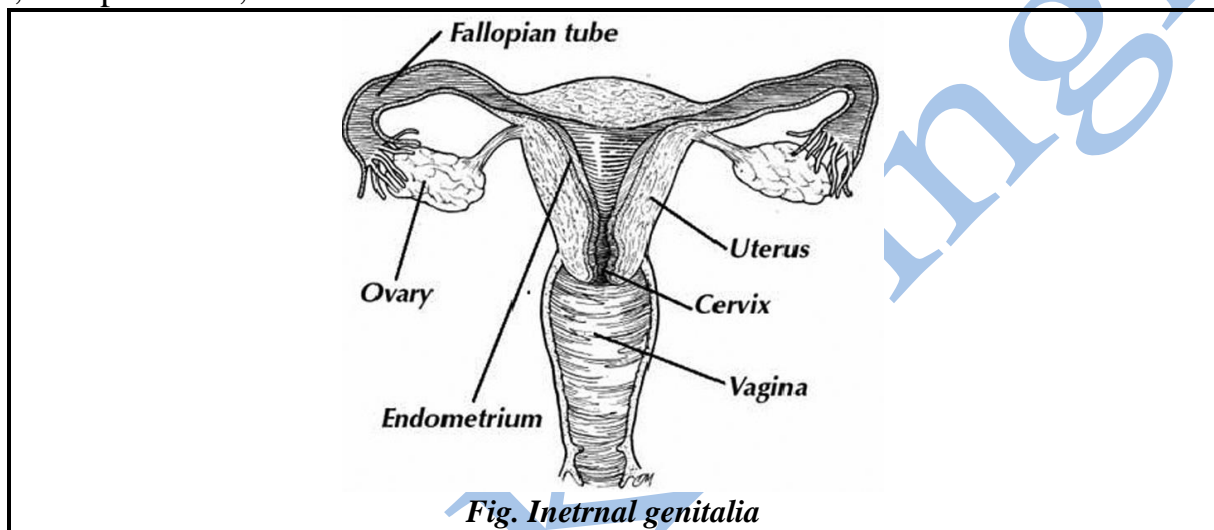


- a. **Mons pubis:** It is a round eminence present in front of the symphysis pubis. It is formed by accumulation of subcutaneous fat. It is covered with pubic hair, after puberty.
- b. **Labia majora:** The labia majora are two round and thick folds of skin which form the side of valva.
- c. **Labia minora:** The labia minora are two thin folds of skin which lie in the space enclosed by labia majora.

- d. **Clitoris:** The clitoris is an erectile organ. It is situated behind the anterior commissure of the labia majora.
- e. **Hymen:** It is a thin membrane which covers the vaginal orifice of virgin woman. It is usually perforated so as to allow menstrual flow.
- f. **Vestibular glands:** The vestibular glands (bartholin's glands) are situated on each side of vaginal orifice. The vestibular glands secrete mucus that keeps the vulva moist.
- g. **Perineum:** Perineum is an area extending from the base of labia minora to the anal canal. The area is about 2 to 4cm. It is roughly triangular and consist of connective tissue, muscle and fat.

### INTERNAL FEMALE REPRODUCTIVE ORGANS

The internal female reproductive organs are lies in the pelvic cavity and consist of vagina, uterus, fallopian tube, ovaries.



### VAGINA

Vagina is a fibro muscular tube like organ. It lies in the front of the rectum & anus and behind the urinary bladder. It is about 3 inches long.

#### Functions of Vagina

1. It provides passageway of birth.
2. It provides passageway of sperm cells.
3. It is sexual intercourse part.

### UTERUS

Uterus is a pear shaped, hollow muscular, flattened organ. It situated in the pelvic cavity between the urinary bladder and the rectum. It is about 7.5cm long, 5cm wide, 2.5cm thick and weight about 30 to 40 gm.

#### Parts of Uterus

The uterus is divided into three parts:

- a. **Fundus:** It lies above the entrance of the uterine tubes.
- b. **Body:** It lies below the entrance of the uterine tubes.
- c. **Cervix:** It lies anterior wall of the vagina.

#### Structure of Uterus

The wall of the uterus is composed of three layers of tissue:

- a. **Perimetrium:** It is outer layer of uterus and composed of peritoneum.
- b. **Myometrium:** It is middle layer of uterus and composed of smooth muscle fibers with areolar tissue, blood vessels and nerves.
- c. **Endometrium:** It is inner layer of uterus and composed of columnar epithelium.

## Support of the Uterus

The supports of the uterus are:

- The pelvic floor
- Muscles of pelvic floor
- Broad ligaments
- Round ligaments
- Uterosacral ligaments
- Transverse ligaments
- Pubocervical ligaments
- Peritoneum
- Connective tissues

## Functions of Uterus

1. It provides site for implantation of embryo.
2. It provides space for growth of fetus.
3. It provides nutrition to the fetus.
4. It provides passageway for sperm to reach to the fallopian tube for fertilization, for menstruation.
5. Periodic contraction and relaxation during labor to expel out fetus.

## FALLOPIAN TUBE

Fallopian tubes are two tortuous ducts like organ. It extends from the lateral side of uterus to ovary. It is also known as uterine tube. It is about 10 cm long.

## Parts of Fallopian Tube

The fallopian tube is divided into four parts:

- a. **Interstitial or intramural part:** It is the segment that pierces the uterine wall.
- b. **Isthmus:** It is the narrowest part of the tube and lies just lateral to the uterus.
- c. **Ampulla:** It is the widest part of the tube. It is most common site of fertilization.
- d. **Infundibulum:** It is the funnel-shaped lateral end of the fallopian tube.

## Structure of Fallopian Tube

The uterine tube is composed of three layers of tissue:

- Outer layer is composed of peritoneum.
- Middle layer is composed of smooth muscle.
- Inner layer is composed of ciliated epithelium tissue.

## Functions of Fallopian Tube

1. It provides site of fertilization.
2. It provides nourishment for the fertilized ovum and transports it to the cavity of the uterus.
3. It transports spermatozoa from the uterus to the ampulla part.

## OVARY

Ovary is a female reproductive organs and sex glands of the female. It lies in the shallow fossae on the lateral wall of the pelvis. It is about 2.5-3.5 cm long, 2 cm wide and 1 cm thick.

## Structure of Ovary

The ovary contains:

- A central soft tissue known as stroma.
- An outer surface known as germinal epithelium.

The germinal epithelium contains the graffian follicles. The graffian follicles contain the ova. The ova are surrounded by a fluid known as liquor folliculi.

## Functions of Ovary

1. It develops and matures ova.
2. It discharges mature ovum at each mense.
3. It produces sex hormones such as estrogen and progesterone.

## FUNCTIONS OF ESTROGEN

1. It increases size of uterus.
2. It increases blood supply to endometrium.
3. It increases size of uterine tube.
4. It reduces the pH of the vagina.
5. It increases the shape and size of vagina.
6. It develops the mammary glands (breast).
7. It develops hair in the pubic region and axilla.
8. It brings softness and smoothness to the skin.
9. Voice: The larynx remains in pre pubertal stage which produces high pitch voice.
10. It increases bone growth (osteoblast activity).

## FUNCTIONS OF PROGESTERONE

1. It increases thickness of the endometrium.
2. It increases size of the uterine glands.
3. It increases secretory activities of glandular cells.
4. It increases depositions of lipid and glycogen in the stroma cells.
5. It promotes secretory changes in the mucosal lining of the fallopian tube.

## MAMMARY GLANDS

The mammary glands are the most important organs of the female reproductive system. It is also known as breast. It lies in the superficial fascia of the pectoral region, extent to the vertically, the 2<sup>nd</sup> to 6<sup>th</sup> ribs and horizontally, it extends from the lateral border of sternum to the mid axillary line.

### Structure of Breast

The mammary glands are made up of:

- a. **Glandular tissue:** The glandular tissue made up of about 15- 20 lobes composed of solid cords of ductal cells.
- b. **Fibrous tissue:** The fibrous tissue supports the glandular tissue and ducts.
- c. **Fat tissue:** The fat tissue covers the surface of the gland and also found between the lobes.

### Function of Mammary Glands

The mammary glands are only active during pregnancy and after childbirth, when they produce milk (lactation). Lactation is stimulated by hormones known as prolactin.

## MENSTRUAL CYCLE

Menstrual cycle is defined as cyclic events that take place in a rhythmic fashion during the reproductive period of a woman's life. Menstrual cycle starts at the age of 12 to 15 years, which marks the onset of puberty. The commencement of menstrual cycle is known as menarche. Menstrual cycle stops at the age of 45 to 50 years. Permanent cessation of menstrual cycle in old age is known as menopause.

### Duration of Menstrual Cycle

Duration of menstrual cycle is usually 28 days. But, under physiological conditions, it may vary between 20 and 40 days.

### Phases of Menstrual Cycle

The menstrual cycle occur in three phases:

- Menstrual phase
- Proliferative phase
- Secretory phase.

## 1. Menstrual Phase

- It is also known as mense phase or bleeding phase.
- In this phase, discharge of blood, connective tissue and mucus from endometrium (inner layer of uterus). The loss is about 50 to 100 ml and continues for 3 to 5 days.
- In this time, the level of oestrogen and progesterone is very low in the blood.
- It occurs only when the ovum is not fertilized.
- It is also known as weeping of uterus for loss of ovum.

## 2. Proliferative Phase

- Proliferative phase extends usually from 5<sup>th</sup> to 14<sup>th</sup> days of menstrual i.e. the time between the day when menstruation stops and ovulation occurs.
- In this phase, endometrial cells proliferate rapidly
- Epithelium reappears on the surface of endometrium within the first 4 to 7 days
- Uterine glands start developing within the endometrial stroma
- Blood vessels appear in the stroma
- Proliferation of endometrial cells occurs continuously, so that the endometrium reaches the thickness of 3 to 4 mm at the end of proliferative phase.

All these uterine changes during proliferative phase occur because of the influence of estrogen released from ovary. On 14<sup>th</sup> day, ovulation occurs under the influence of LH.

## 3. Secretory Phase

Secretory phase extends between 15<sup>th</sup> and 28<sup>th</sup> day of the menstrual cycle, i.e. between the day of ovulation and the day when menstruation of next cycle commences. After ovulation, corpus luteum is developed in the ovary. It secretes large quantity of progesterone and small amount of estrogen. These two hormones act on uterine endometrium and causes further proliferation of cells in uterus, so that the endometrium becomes thicker.

Secretory phase is the preparatory period during which the uterus is prepared for implantation of ovum. If ovum is fertilized, it is implanted in the endometrium of uterus and starts developing the fetus. If ovum is not fertilized, menstruation occurs after this phase and new cycle begins.

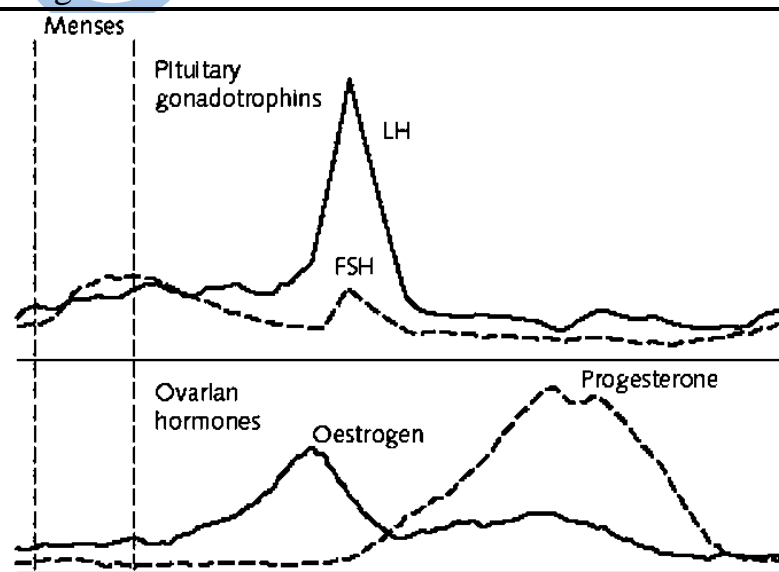


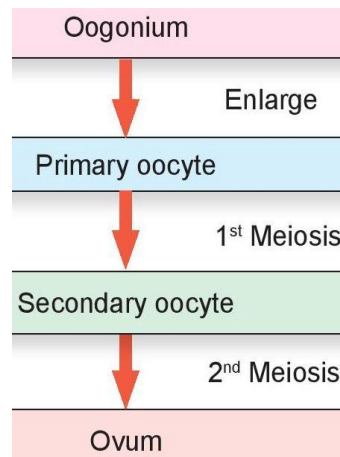
Fig. Menstrual cycle

## OOGENESIS

Oogenesis is the process by which oogonia is developed into mature ovum.



## Process of Oogenesis



### Differences between Spermatogenesis and Oogenesis

No	Spermatogenesis	Oogenesis
1.	It is the production of sperm from spermatogonia.	It is the production of ovum from oogonia.
2.	It occurs inside the testes in males.	It occurs inside the ovary in females.
3.	All stages occur inside the testes.	All stages, except the last stage, occur inside the ovary.
4.	A primary spermatocyte divides to form two secondary spermatocytes.	A primary oocyte divides to form one secondary oocyte and one polar body.
5.	No polar body is formed.	Polar body is formed.
6.	A spermatogonium forms four spermatozoa.	A oogonium forms only one ovum.
7.	It is a continuous process and completed in approximately 74 days.	It is a discontinuous process and completed in a few days to year

### OVULATION

Ovulation is the process by which the graffian follicle in the ovary ruptures and the ovum is released into the abdominal cavity.

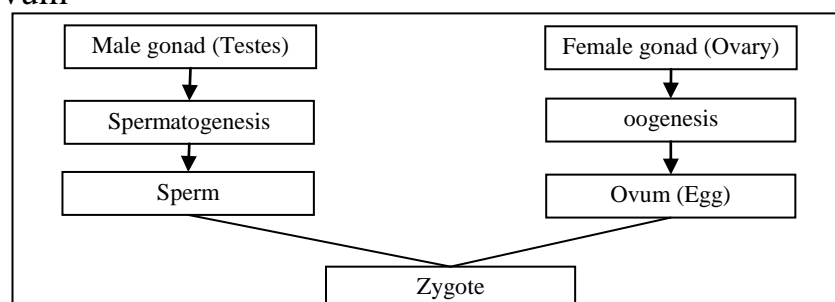
**Time of ovulation:**-It occur  $14 \pm 1$  days after the onset of menstruation.

### FERTILIZATION

The fusion of male gamete (spermatozoa) and female gametes (ovum or eggs) in ampulla region of fallopian tube to form zygote is known as fertilization.

If sexual intercourse occurs at ovulation time and semen is ejaculated in the vagina, the sperms travel through the vagina and uterus to reach the fallopian tube. Sperms reach the ovarian end of fallopian tube within 30 to 60 minutes.

Among 200 to 300 millions of sperms entering female genital tract, only a few thousand sperms reach the spot near the ovum. Among these few thousand sperms, only one succeeds in fertilizing the ovum



## SEX DETERMINATION

The sperm enters the ovum 23 chromosomes from ovum and 23 chromosomes from the sperm join together to form the 23 pairs (46) of chromosomes in the fertilized ovum. Now, sex determination occurs. Ovum contains the X chromosomes. Sperm has either X chromosome or Y chromosome. If the ovum is fertilized by a sperm with X chromosome, the child will be female with XX chromosome. And if the ovum is fertilized by a sperm with Y chromosome, the sex of the child will be male with XY chromosome. So, the sex of the child depends upon the male partner.

## SECONDARY SEXUAL CHARACTERISTICS IN FEMALE

1. Maturation of ovary, uterus and uterine tubes.
2. Enlargement of vagina and breast.
3. Growth of axillary and pubic hair.
4. Enlargement of pelvis.
5. Changes in voice.
6. Starting of menstruation.
7. Attraction of opposite sex.
8. Increased deposition of fat in subcutaneous tissue.

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