HUMAN ANATOMY & PHYSIOLOGY

UNIT 5

Rx Pharma Education

UNIT-5 HAP

Reproduction

- Reproduction is defined as a biological process in which an organism give rise to young ones (offsprings) similar to itself
- Human beings are sexually reproducing organism.
- The reproductive events in humans include formation of Gametes.
- Male Gametes : Sperm
- Female Gametes : Ovum
- Formation of Sperm : Spermatogenesis
- Formation of Ovum : Oogenesis
- Spermatogenesis + Oogenesis → Gametogenesis
- Fusion of sperm & Ovum → Zygote.

① Define Anatomy & Physiology of Male Reproductive System.
The organs of male reproductive system can be classified into :
① External Genital Organs
② Internal Genital Organs.

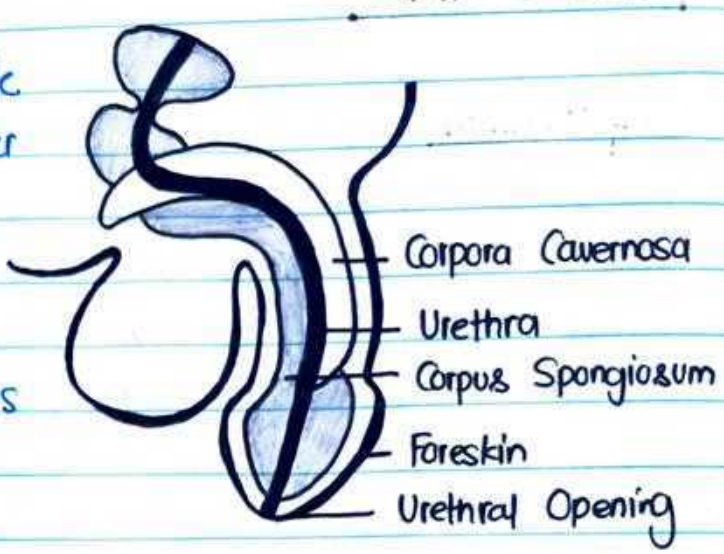
① External Genital Organs

It mainly contains Penis containing Urethra

PENIS : • It is the copulatory organ and also contains the terminal part of urethra.
• It contains following parts :
① Corpora Cavernosa
② Corpora Spongiosum
③ Glans Penis
④ Prepuce

Corpora Cavernosa

These are two pillars of erectile tissue lying side by side under the skin of penis



Corpora Spongiosum

It contains urethra and it lies below corpora cavernosa

Glans Penis

It is the enlarged tip of penis

Propuce

It is a fold of skin covering the glans penis

② INTERNAL GENITAL ORGANS

It mainly contains :

- Testes
- Vas Daferens
- Seminal Vesides
- Prostate Gland
- Scrotum
- Ejaculatory ducts

Testes

- Testes are male reproductive organs that produce spermatozoa.
- These are two oval shaped bodies.
- Each testes is enclosed in a sac called tunica vaginalis.
- Each testis contains a number of tubules called seminiferous tubules.
- Spermatozoa are formed in the walls of these tubules.

Vas Deferens (Seminal Duct)

- They are two in number, one for each testis & begins from epididymis at the upper end of testis.
- It travels upwards within the spermatic cord & enters the abdominal cavity.

Seminal Vesicles

- They are also two in number, each one lies at the side of terminal part of vas deferens & forms ejaculatory duct.
- They produce a thick secretion that is added to the spermatozoa during ejaculation.

Prostate Glands

- It lies below the bladder and it surrounds the first part of urethra.
- It is pyramidal in shape.

Scrotum

- The scrotum is an outpouching of lower part of anterior abdominal wall.
- It mainly contains testes and epididymides.
- It is divided on its surface into two compartments.
- Each compartment contains one of the two testes & one of the epididymides.
- Normal sperm production requires a temperature of about 2-3°C below body temperature.

The walls of scrotum has following layers

- Skin
- Superficial fascia
- Spermatic fascial
- Tunica vaginalis

Ejaculatory Ducts

- The two ejaculatory ducts are formed by union of vas deferens and duct of seminal vesicle.
- The ejaculatory ducts drain the seminal fluid into the prostatic urethra.

Functions of Male Reproductive System

- Testis produces sperm and testosterone.
- Epididymis matures & stores sperm.
- Sperm duct carries sperm from epididymis to the urethra.
- Seminal Vesicles, Cowper's Gland and Prostate Gland produces seminal fluid that feeds the sperm.
- Sperm and seminal Fluid collectively called **Semen**.
- Urethra allows the passage of either urine or sperm.
- Penis places sperm inside the body of female.
- Scrotum keeps testes at a lower temperature 35°C.

② Define the Anatomy & Physiology of Female Reproductive System.

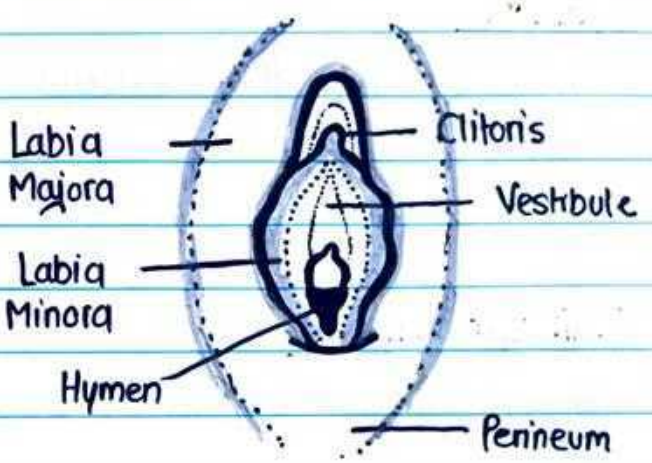
The Female Reproductive System can be classified into following parts:

- External Genital Organs
- Internal Genital Organs
- Secondary Sexual Organs

① EXTERNAL GENITAL ORGANS

It mainly consist of :

- Labia Majora
- Labia Minora
- Clitoris
- Perineum
- Vestibular Glands



Labia Majora

- These are two large folds forming the boundary of vulva.
- They composed of skin, Fibrous tissue and fat
- They contain large number of sebaceous & sweat glands.
- The area between labia minora is called Vestibule.
- Labia Majora also known as 'greater lips' are the part of vagina containing two Bartholin's glands that helps in lubrication during intercourse.

Labia Minora

- These are two smaller folds of skin b/w labia majora.
- The area between labia minora is called Vestibule.
- Vestibule is homologous to membranous urethra of male

Clitoris

- The clitoris corresponds to the penis in male & contains sensory nerve endings.
- It is a small pea-shaped structure.
- It plays an important part in sexual excitement in females.

Perineum

- It is the area that extends from fourchette to the anus.

Vestibular Glands

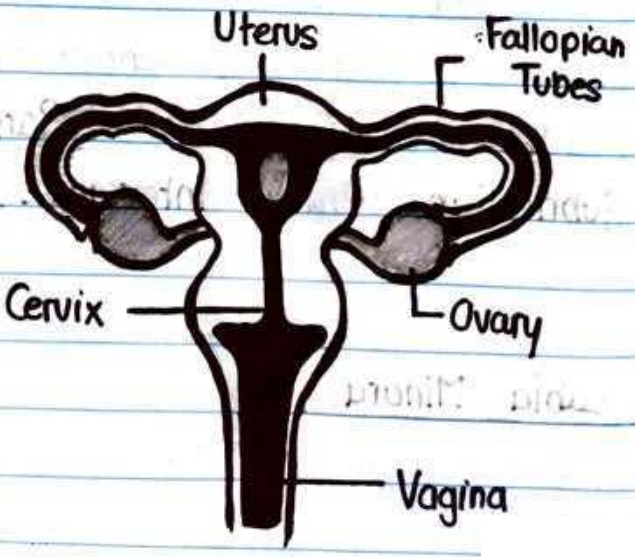
- They are present on either side of urethral orifice & it secretes mucus.
- There are mainly two types of vestibular glands:

① Lesser Vestibular Glands
② Greater Vestibular Glands

INTERNAL GENITAL ORGANS

It mainly consist of:

- Fallopian Tubes
- Uterus
- Cervix
- Vagina
- Ovaries



Fallopian Tubes

- It is also known as Uterine tubes.
- Each of two uterine tubes is close but not directly connected to the ovary & divided into sections.
- Fertilization of ovum generally takes place in the upper portion of Fallopian Tube.
- It provide a suitable environment for fertilization & transportation of egg.
- The main function of Fallopian tube is to collect the mature ovum from ovaries and provide passage to the fertilized ovum to reach the uterus for implantation.

Uterus

- It lies in the pelvic cavity, between rectum & urinary bladder
- Uterus is a hollow muscular organ with a thick wall.
- It has a central cavity that opens into vagina.

Cervix

- It is lower constricted part of uterus.
- It is divided into two portions:

① Upper Vaginal Portion
② Lower Vaginal Portion

Vagina

- It is a short tubular organ.
- It is lined by mucus membrane.

Ovaries

- They are two in numbers & lie on both side of uterus.
- The ovaries lie below the fallopian tube of each side.
- The ovary contains :
  - A central soft issue called stroma.
  - An outer surface called germinal epithelium.

③ SECONDARY SEXUAL ORGANS

It mainly contains Mammary Glands.

Mammary Glands

- It is also known as Breast Glands.
- It is responsible for lactation & production of milk.
- Milk production is stimulated by prolactin.

Functions Of Female Reproductive System

- Germinal Epithelial Cells of ovary produce ova.
- Fertilization takes place in Fallopian Tube.
- After puberty the uterus goes through Menstrual Cycle.
- Implantation & Prenatal growth take place in uterus.
- The vagina receives the seminal fluid during copulation
- Parturition process of birth of child is also important function of Female Reproductive System.
- Mammary Glands of female secrete milk after parturition.

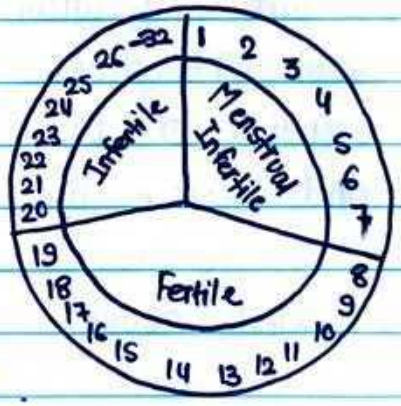
③ Define Menstruation Cycle.

- Menstrual Cycle is defined as cyclic events that take place in a rhythmic fashion during the reproductive period of a woman's life.
- It starts at the age of 12-15 years, which marks the onset of puberty.
- Menstrual cycle ceases at the age of 45-50 years.
- Permanent cessation of menstrual cycle in old age is called Menopause.

Phases Of Menstrual Cycle

The menstrual cycle consist of following 4 phases:

① Menstrual Phase
② Follicular Phase
③ Ovulatory Phase
④ Luteal Phase



MENSTRUAL PHASE

- It is also known as Bleeding Phase.
- In a 28 day menstrual cycle, the menses takes place on cycle days 3-5
- The production of LH from the anterior lobe of the pituatary gland is considerabely reduced.
- The withdrawl of this hormone causes degeneration of corpus luteum and, therefore, progesterone production reduced.
- Production of estrogen is also reduced in this phase.
- The endometrium of uterus breaks down and menstruation begins
- The endometrium cells secretions, blood & unfertilized ovum constitute the menstrual flow.

FOLLICULAR PHASE

- This phase usually includes cycle days 6-13 or 14 in a 28 day cycle.
- The follicle stimulating hormone (FSH) secreted by the anterior lobe of the pituitary gland stimulate the ovarian follicle to secrete estrogen.
- Estrogen stimulate the proliferation of the endometrium of the uterine wall
- The endometrium becomes thicker by rapid cell multiplication and this is accompanied by an increase of uterine glands and blood vessels.

OVULATORY PHASE

- Both LH and FSH attain a peak level in the middle of cycle about 14th day.
- Rapid secretion of LH induces rupturing of Graafian Follicle and thereby the release of ovum in human beings secondary oocyte is released.
- This is called ovulation in fact LH causes ovulation.

LUTEAL PHASE

- It is the phase lasting for next 14 days.
- During this phase, the endometrium becomes thick and vascular to receive the fertilized ovum.
- Now, the corpus luteum secretes progesterone
- If conception occurs by implantation of fertilized ovum, the secretion of progesterone continues throughout pregnancy.
- Later, the capillaries of endometrium burst and menstruation occurs.

④ Define Fertilization

Fertilization refers to fusion of male and female gametes (sperm & ovum) to form a new offspring.

Steps in Fertilization

- After sexual intercourse, semen is ejaculated in the vagina, the sperm travel through the vagina and uterus to reach the Fallopian Tube.
- Movement of the sperm through uterus is facilitated by the antiperistalsis contractions of uterine muscles.
- Uterine contractions are induced by oxytocin, which is secreted from posterior pituitary by neuroendocrine reflex during sexual intercourse.
- Among 200 - 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.
- It is facilitated by hyaluronidase and proteolytic enzymes present in acrosome of sperm.
- Proteolytic enzymes from acrosome of sperm diffuse through the structures of zona pellucida and inactivate the other sperms entering the ovum.
- Immediately after fertilization, ovum divides into matured ovum and a second polar body.
- Nucleus of matured ovum becomes female pronucleus with 23 chromosomes that include 22 autosomes & one sex chromosomes called X chromosome.
- Simultaneously, head of sperm swells and become male pronucleus.
- Then 23 chromosomes of sperm & 23 chromosomes of ovum arrange themselves to reform the 23 pairs of chromosomes in the fertilized ovum.