UNIT 11: REPRODUCTIVE SYSTEM I

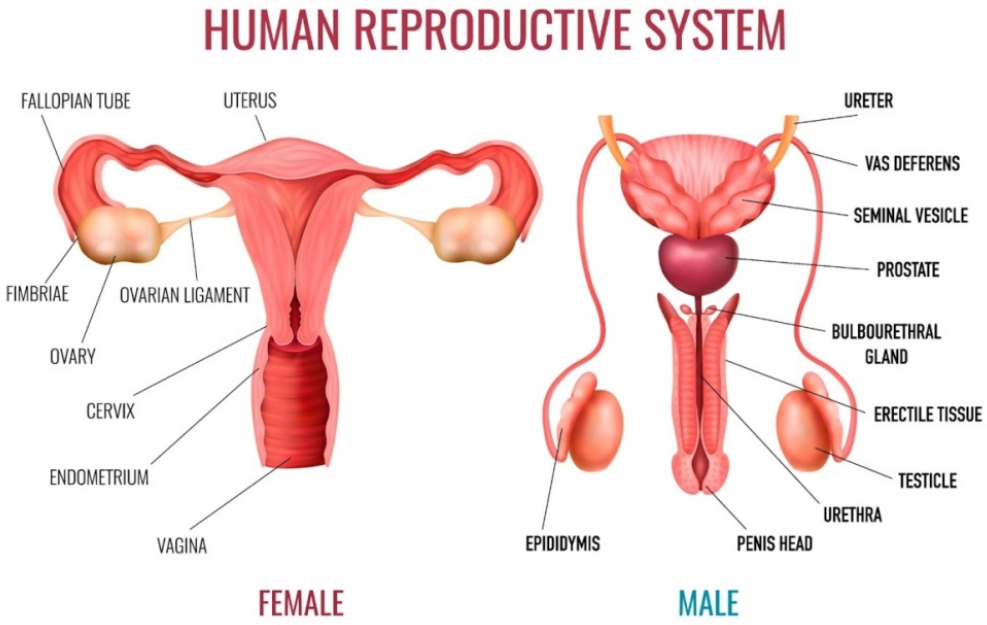
UNIT STRUCTURE

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11:1 Learning objectives:

After going through this Unit, You will be able to

- Understand the Anatomy and Physiology of the female and male reproductive system
- Learn the organs of each system
- Learn about the functions of each organ in the system



11.2 INTRODUCTION

The reproductive system is a group of specialized organs and structures responsible for the production of new individuals, ensuring the continuity of the human species. It also plays an important role in the formation of sex cells and the secretion of hormones that regulate growth, development, and reproductive functions. The male reproductive system is primarily concerned with the production and delivery of sperm, while the female reproductive system is adapted for the production of ova, fertilization, pregnancy, and childbirth. Together, these systems function in a coordinated manner to support reproduction, sexual development, and the maintenance of human life.

11:3 Male Reproductive system

The male reproductive system consists of a set of organs specialized for the production, storage, and transport of male gametes, as well as the secretion of male sex hormones. Its primary function is the formation of sperm through the process of spermatogenesis and their delivery into the female reproductive tract during copulation. The system includes the testes, ducts, accessory glands, and external genitalia, each performing a specific role in reproductive function. In addition to reproduction, the male reproductive system produces hormones, such as testosterone, which are essential for the development of secondary sexual characteristics and the regulation of male reproductive activities.

The primary structure and organs of the male reproductive system include:

1. Penis

The penis is the male organ for sexual intercourse. It has three parts: the root, which attaches to the wall of the abdomen; the body, or shaft; and the glans, which is the cone-shaped end of the penis. The glans, which also is called the head of the penis, is covered with a loose layer of skin called foreskin. (This skin is sometimes removed in a procedure called circumcision.) The opening of the urethra, the tube that transports semen and urine, is at the tip of the glans

penis. The penis also contains a number of sensitive nerve endings. The body of the penis is cylindrical in shape and consists of three internal chambers. These chambers are made up of special, sponge-like erectile tissue. This tissue contains thousands of large spaces that fill with blood when the man is sexually aroused. As the penis fills with blood, it becomes rigid and erect, which allows for penetration during sexual intercourse. The skin of the penis is loose and elastic to allow for changes in penis size during an erection.

2. Scrotum The scrotum is the loose pouch-like sac of skin that hangs behind the penis. It contains the testicles (also called testes), as well as many nerves and blood vessels. The scrotum has a protective function and acts as a climate control system for the testes. For normal sperm development, the testes must be at a temperature slightly cooler than the body temperature. Special muscles in the wall of the scrotum allow it to contract (tighten) and relax, moving the testicles closer to the body for warmth and protection or farther away from the body to cool the temperature

3. Testicles (testes)

The testes are oval glands about the size of 5cm long and 2.5cm wide that lie in the scrotum, secured at either end by a structure called the spermatic cord. The testes are responsible for making testosterone, the primary male sex hormone, and for producing sperm. Within the testes are coiled masses of tubes called seminiferous tubules. These tubules are responsible for producing the sperm cells through a process called spermatogenesis.

4. Epididymis

The epididymis is a long, coiled tube that rests on the backside of each testicle. It functions in the carrying and storage of the sperm cells that are produced in the testes. It also is the job of the epididymis to bring the sperm to maturity, since the sperm that emerge from the testes are immature and incapable of fertilization. During sexual arousal, contractions force the sperm into the vas deferens.

5. Urethra

The urethra is the tube that carries urine from the bladder to outside of the body. In males, it has the additional function of expelling (ejaculating) semen when the man reaches orgasm. When the penis is erect during sex, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm.

6. Seminal vesicles

The seminal vesicles are sac-like pouches that attach to the vas deferens near the base of the bladder. The seminal vesicles produce a sugar-rich fluid (fructose) that provides sperm with a source of energy and helps with the sperms' motility (ability to move). The fluid of the seminal vesicles makes up most of the volume of a man's ejaculatory fluid, or ejaculate.

7. Prostate gland

The prostate gland is a walnut-sized structure that is located below the urinary bladder in front of the rectum. The prostate gland contributes additional fluid to the ejaculate. Prostate fluids also help to nourish the sperm. The urethra, which carries the ejaculate to be expelled during orgasm, runs through the center of the prostate gland.

11:4 Female Reproductive System

The female reproductive system is a complex arrangement of organs designed to produce female gametes, support fertilization, and provide a suitable environment for the growth and development of the embryo and fetus. Its primary functions include the formation of ova, secretion of female sex hormones, reception of sperm, and nourishment of the developing offspring until birth. The system comprises the ovaries, fallopian tubes, uterus, vagina, and external genitalia, each contributing to different stages of reproduction. In addition to reproduction, the female reproductive system regulates the menstrual cycle and plays a vital role in pregnancy, childbirth, and lactation.

1. Vulva

The female external reproductive organs consist of the mons pubic, which is covered with pubic hair; two folds of tissue, called the labia majora and labia minora which surround a space called vestibule.

2. Mons Pubis

The mons pubis is formed at the upper margin of the symphysis pubis and is shaped like an inverted triangle. It is located over the two pubic bones of the pelvic. This structure is composed of fatty tissue lying beneath the skin and from puberty on, is covered with varying amount of hair. The mons pubis surrounds delicate tissue and protects it from injury.

3.Labia Majora and Labia Minora

The labia majora: are two folds of fatty tissue that form the lateral boundaries of the vulva. They are covered with coarse skin and pubic hair on the outer aspect and are smooth and moist on the inner aspect, where the openings of numerous small glands are found.

The labia minora : are soft folds of skin that are rich in sebaceous glands. The labia minora are moist and are composed of erectile tissue containing loose connective tissue, blood vessels, and involuntary muscles. The functions of the labia minora are to lubricant and waterproof the vulvar skin and to provide bactericidal secretion that help prevent infections.

4. Clitoris

The clitoris is a small, sensitive structure that, like the penis, is composed of erectile tissue, nerves, and blood vessels; it is covered at the tip with very sensitive tissue. It exists primarily for female sexual pleasure.

5. Vaginal Vestibule

The vaginal vestibule is a boat shaped depression enclosed by the labia minora and is visible when the labia minora are separated. The vestibule contains the vaginal opening (introitus) , which is located between the external and internal genitalia. The vestibule contains the openings of five structures that drain into it the ureteral meatus, skene's ducts, and the ducts from Bartholins

glands that are located on each side of the vagina. The vestibule ends with the formation of the fourchette.

6. Urethra

The opening to the urethra is just below the clitoris. Although it is not related to sex or reproduction, it is included in the vulva. The urethra is actually used for the passage of urine. The urethra is connected to the bladder. In females the urethra is 1.5 inches long, compared to males whose urethra is 8 inches long.

7. Hymen

The hymen is a thin, elastic, mucous membrane that partially covers the vagina in young females. Does not seem to have a specific physiological function or purpose. Many shapes are possible. Normal variations of the hymen range from thin and stretchy to thick and somewhat rigid; or it may also be completely absent

8. Vagina

The vagina is a curved tube leading from the uterus to the external opening at the vestibule. It lies between the urinary bladder and the rectum. Because it meets at a right angle with the cervix, the interior wall is about 2.5cm(1inch) shorter than posterior wall, which varies from 7-10cm (approximately 2.8 to 4 inches).it consist of muscle and connective tissue and is lined with epithelial tissue , which contains folds called rugae. These folds allow the vagina to stretch considerably during childbirth. The epithelial cells lining the vagina show cyclic changes related to estrogens, progestins and androgens. Doderlein's bacilli, which are normally present in the vagina, act on glycogen from the epithelial cells to produce lactic acid. This maintains the acidity of the vagina and is the reason that the vagina is resistant to most infection .a change in the PH of the vagina , which can be caused by frequent douching , antimicrobial therapy, or deodorant tampons, can increase the vagina's susceptibility to invading pathogens.

9. Cervix

The cervix consists of a cervical canal with an internal opening near the uterine corpus called the internal os and an opening in to the vagina called external os the mucosal lining of the cervix.

10. Uterus

The uterus (womb) is a hollow, pear-shaped, muscular organ. It is approximately 2.5 cm (1 inch) thick, 5cm (2inch) wide, and 7.5cm (3inch) long. During pregnancy, the uterus can stretch and enlarge considerably. the weight of the non-pregnant uterus is approximately 75g; it increases to approximately 907 g during pregnancy, the uterus increases in vascularity, which allows sufficient blood supply for its growth, and can stretch and enlarge to a considerable size. After pregnancy, it returns almost entirely to its former weight, size, and shape. The uterus lies between the bladder and the rectum. It is supported by two important pairs of ligaments, the round and broad ligaments. The uterus divided into three parts: fundus (upper portion), the corpus (body), the cervix. The uterus has three layers (perimetrium,myometrium, endometrium).

11. Fallopian Tube

The fallopian tubes extend laterally from the uterus, one to each ovary. They are small, narrow and approximately 10cm (4inch) long. The tubes carry the ovum from the ovary to the uterus by the contraction of the cilia: hairlike projections found in the lining of the tubes. Extending from the ends of the fallopian tubes are small, fingerlike projection called fimbriae. Their movement sweeps the ovum in to the tube, after which the ovum travels to the uterus. It takes approximately 5 days for the ovum to travel the 10cm from the ovary to the uterus. Fertilization of the ovum with spermnormally takes place in the outer third of the fallopian tube.

The four functions of the fallopian tube:

- A passageway in which sperm meet the ovum
- A site of fertilization
- A safe nourishing environment for the ovum or zygote (fertilized ovum)

- A means of transport tings the ovum or zygotes to the corpus of the uterus.

12. Ovaries

The ovaries in the female and the testes in the male are similar in embryologic origin. The ovaries are two small, almond shaped organs located on each gland. Approximately 2 million ova are present at birth. Many ova degenerate until puberty, when a few thousand remain. During the course of a women's reproductive life, only about 400 ova mature enough to be fertilized. During each menstrual cycle one follicle matures into what is called a graafian follicle, which contains the ovum that is released each month during ovulation. Estrogen released by the ovary stimulates the development of secondary sexual characteristics such as the breasts. Progesterone is responsible for preparing and maintaining the lining of the uterus for implantation of the ovum.

The ovaries have two functions:

- The development and maturation of and later expulsion of the ovum (ovulation)
- The secretion of hormones (estrogen & progesterone)

11:5 Lets sum up

- **The primary structure and organs of the male reproductive system include:**

- Penis: The male organ of copulation and in mammals of urinary excretion.
- Testis: The male gonad or reproductive gland either two oval glands located in the scrotum that produces testosterone.
- Scrotum: The pouch of skin that contains the testes
- Epididymis: Coiled tubule next to the testes where sperm mature and may be stored for a short time
- Urethra: Part of both the urinary and reproductive system that passes urine and mature sperm outside of the body

- Seminal vesicle: Ducts that are about 5cm long that add nutrients and fluid to semen
- Prostate gland: A donut shaped gland that adds fluid to the semen

➢ **Structure of external female reproductive anatomy include:**

- Clitoris: Sensitive ball of tissue creating sexual pleasure
- Labia majora: Two folds of skin, one on either side of the vaginal opening that protect the female organs
- Labia minora: Two folds of skin, inside the labia majora that extends from the clitoris
- Urethra:Opening where urine leaves the body
- Uterus: Reproductive organ where a fertilized ovum or egg, grows and develops into a fetus
- Ovary:Two reproductive glands where ova(egg) develop and one is released each month
- Endometrium: The lining of the uterus, which gradually thickens and then is shed during menstruation
- Cervix: Lower portion of the uterus that extends into the upper vagina. It produces mucus.

Check your progress

Q No 1: Indicate the following statement by whether true or false.

The urethra is a tube through which semen is released from the body.

Q No 2: After ovulation, the ovum is normally lives for …..(Length of time) in the reproductive tract.

Q No 3: What are the primary male reproductive organs?

Q No 4: What role does the prostate gland play in reproduction?

11:6 Further readings:

- Pearce, E. (1993). *Anatomy and Physiology for Nurses,* Jaypee Brothers Medical Publishers.
- Gray, H. *Anatomy of the Human Body*, Lea & Febiger, Philadelphia.
- Waugh, A. & Grant, A.(2014). *Ross & Wilson Anatomy and Physiology in health and illness,* Elsevier Health Sciences

11:7 Answer to check your progress:

Ans to Q No1: False

Ans to Q NO2: 24 hours

Ans to Q No3: The primary male reproductive organs are the testes, which produce sperm and testosterone.

Ans to Q No4: The prostate gland secretes a fluid that nourishes and promotes sperm, contributing to semen production.

11:8 Model Questions:

A. Very Short question

QNo 1. What are the primary organs of the male reproductive system?

QNo 2. What is the role of prostate gland?

QNo 3.What is the function of the ovaries?

B. Short question

QNo1. What are the role of scrotum.

QNo2. Write a short note on ovaries

C. Long question

QNo 1. Describe the structure and function of the male reproductive system.

QNo 2. Describe the structure and function of the female reproductive system.

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