UNIT 1  STRUCTURE AND FUNCTIONS OF MALE REPRODUCTIVE ORGANS

Structure

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1.0  OBJECTIVES

After going through this unit you will be able to:

- list and describe the organs of the male reproductive system;
- explain the functions of various male reproductive organs;
- describe the secondary sexual characteristics in boys; and
- emphasize that nocturnal emission is a normal phenomenon.

1.1  INTRODUCTION

Adolescents are usually shy about asking questions related to their reproductive organs and rely on their peers and other sources which provide incomplete and unreliable information. It is therefore essential, as a responsible adult to open channels of communication and give them correct and complete information.

The most important change which occurs during adolescence is related to changes in the reproductive organs. In this unit you will learn about the structure and functions of the male reproductive organs and related changes. This topic is of great concern to adolescents as they have curiosity about the changes in their bodies. This has long term impact on their self-esteem and personality development.

In addition, you will undertake several activities, to reflect and understand the structure and functions of reproductive organs of male.
1.2 MEANING AND CONCEPT OF MALE REPRODUCTIVE SYSTEM

One of the most important characteristics that differentiate a living organism from a non-living organism is their ability to reproduce. All living things reproduce. Reproduction is essential to keep a species alive. Each sex has its own unique reproductive system, different in shape and structure, but both are specifically designed to produce, nourish, and transport the eggs or sperms during the process of reproduction.

Definition of reproduction

Reproduction is the process by which living beings produce organism of their own kind.

Unlike the female, whose sex organs are located entirely within the pelvis, the male has reproductive organs, or genitals, that are both inside and outside the pelvis.

1.2.1 External Reproductive Organs

Let us now learn about the Male external reproductive organs. Most of the male reproductive system is located outside the body. The external structures of the male reproductive system are the penis, the scrotum, the testicles and the epididymis. Details are as follows:

Penis: The penis is a cylindrical structure made up of special, sponge-like erectile tissue. These tissues contain thousands of large spaces that fill with blood when the man is sexually aroused. 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 sensitive end of the penis. The head of the penis, known as glans, is covered with a loose layer of skin called the foreskin. All boys are born with a foreskin, a fold of skin at the end of the penis covering the glans. However, some boys have a circumcision, which means that a doctor cuts away the foreskin. The opening of the urethra, the tube that transports semen and urine, is at the tip of the glans penis.

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.

Testicles (testes): The testes are two oval organs about the size of lemons that lie in the scrotum. The testicles are oval-shaped and grow to be about 5 centimeters in length and 3 centimeters in diameter. Before birth they are in the abdomen but descend into the scrotum following birth. Most men have two testes. The testes are made up of Seminiferous tubules responsible for the production of sperm.

Epididymis: The epididymis is a long, coiled tube that rests on the backside of each testicle. The seminiferous tubules in the testes join together to form epididymis. A small quantity of sperms is stored in them.
1.2.2 Internal Reproductive Organs

The internal organs of the male reproductive system include the following:

- **Vas deferens (Sperm tube):** The vas deferens is a long, muscular tube that travels from the epididymis into the pelvic cavity, to just behind the bladder. The vas deferens transports mature sperm from the testes to the urethra during ejaculation.

- **Ejaculatory ducts:** These are formed by the fusion of the vas deferens and the seminal vesicles. The ejaculatory ducts empty into the urethra.

- **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 sexual inter-course, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm.

- **Prostate gland:** The prostate gland is a walnut-sized structure that is located below the urinary bladder in front of the rectum. The urethra, which carries the sperms to be expelled during orgasm, runs through the center of the prostate gland.

- **Bulbourethral glands:** The bulbourethral glands, or Cowper’s glands, are pea-sized structures located on the sides of the urethra just below the prostate gland.
1.3 MATURATION OF MALE SEX ORGANS

Sexual maturation consists of two types of changes in the reproductive system. Those that relate to primary sex organs such as the penis and testes in males, are called primary sexual characteristics. Associated changes visible on the body are referred to as secondary sexual characteristics. These include facial hair or beard in males and growth of underarm and pubic hair in both sexes.

These changes happen at a different pace in different individuals and there exists a great range of “normalcy”. Not all adolescents begin puberty at the same time or follow equal pace of change. Since puberty happens in a certain range of time and not at the same age for everyone and not at the same pace – different adolescents of the same age group show different levels of growth. That is why some may feel “different” and have anxieties about their growth and development. In fact, there is a great deal of variation. Some youngsters may begin and complete their pubertal changes before (Early Maturers) and some later (Late Maturers) than other adolescents. This is a concern that to the child and parent. The adolescents and parents have to be reassurance that these variations are normal as each child have their own pace of growth and development.

Now let us discuss the physical changes in the reproductive system or sexual maturation in a male child as below:

- During the first stage of male puberty, the scrotum and testes grow larger, and the hormone testosterone is released.
- The penis becomes longer and thicker, and the seminal vesicles and prostate gland grow.
• Hair begins to appear in the pubic area and later it grows on the face and underarms.

• A male’s voice also deepens.

Voice change and quantity and thickness of facial hair are two common areas that the boys are very concerned and stressed. Both these changes are because of the effect of male hormones that are circulated in increased amount from the inception of puberty. The voice “cracks” or becomes hoarse as the “voice box” (larynx) of the boys becomes bigger whereas it stays at the same size for the girls. Thus while the boys’ voice breaks during puberty; the girls retain their quality of the voice even after puberty. Another feature during puberty for male is development of facial hair – on the upper lip (moustache) and chin and face (beard). The timing of appearance of facial hair, their spread and thickness and quality vary from person to person and show a great range of normalcy.

**Sexual Development in boys**

After reading sexual maturation stages, it is very important to know the sexual changes which occurs corresponding to the age as given below:

<table>
<thead>
<tr>
<th>Table 1.1: Sexual changes as per Age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sexual Changes</strong></td>
</tr>
<tr>
<td>Testes and scrotum enlarge; scrotum</td>
</tr>
<tr>
<td>becomes pigmented</td>
</tr>
<tr>
<td>Penis enlarges in length and girth,</td>
</tr>
<tr>
<td>along with enlargement of the glans</td>
</tr>
<tr>
<td>penis (head of the penis)</td>
</tr>
<tr>
<td>Penis and testes and prostate</td>
</tr>
<tr>
<td>enlarge, pubic hair becomes curly.</td>
</tr>
<tr>
<td>Testes and penis are fully grown;</td>
</tr>
<tr>
<td>pubic hair extends upwards and</td>
</tr>
<tr>
<td>backwards</td>
</tr>
</tbody>
</table>

Seminal vesicles, prostate and bulbo-urethral glands also enlarge sex desire gradually increases due to release of testosterone by the testes. This leads to attraction towards the opposite sex.

**Spermarche:** This is the first ejaculation, or orgasm, and is the first time the semen leaves the penis, and may happen during the age of 13 – 15 years. This is a sign that the male is beginning to produce sperm. An adolescent boy becomes potentially fertile with his first ejaculation. This might happen at night during a wet dream or a nocturnal emission, or it might happen during masturbation (self stimulation).

**Secondary Sexual Characteristics**

These are the changes which occur in the body due to the release of the male sex hormone, testosterone. These are seen from the age of 12 to 14 years in boys but last for a longer period till 18 to 21 years.
SECONDARY SEXUAL CHARACTERISTICS IN BOYS AT PUBERTY

- Growth spurt occurs. (height and weight)
- Overall increase in size of body parts, e.g., hands, face, legs.
- Skin becomes oily prone to pimples. Body sweats more and smells. Increased secretions of oil and sweat glands, often lead to the acne and body odor.
- Coarsening or rigidity of skin texture, due to less subcutaneous fat
- Shoulders and chest broaden.
- Muscles develop.
- Larynx (voice box) enlarges causing a prominent Adam’s apple, voice deepens.
- Facial hair appears.
- Growth of body hair, including under arm, abdomen, chest, and pubic area.

Till now we have discussed the structure of external and internal male reproductive organ and further you have read the secondary sexual characteristics also. All the adolescents boys become conscious of changes and unfortunately they do not even discuss so with teacher or parent. You should make them feel sensitive and responsible for hygiene of private part as discussed below:

**Prepuce/Hygiene (Private parts) for boys**

A number of small glands located in the glans penis discharge their secretions on the head of the penis. These secretions may accumulate under the prepuce (foreskin of the penis) as a smelly cheese like substance called smegma. If the prepuce and glans are not cleaned daily, the smegma can trap germs and cause infection. Some ways to prevent this infection are:

- Wash the genitals daily.
- Gently remove the foreskin back and wash the tip of the penis.
- Change underwear daily.
- Use cotton undergarments only. Synthetic garments do not absorb moisture and also increase the temperature.
- Wash undergarments everyday and dry in the sun.

**Check Your Progress 2**

a) One of the following is the phenomenon of ejaculation of semen during sleep.
   i) Erection
   ii) Masturbation
   iii) Nocturnal emission

b) One of the following change does not occur in boys during puberty.
   i) Shoulders become broader
   ii) Voice gets deeper
   ii) Hips become broader
   iv) Facial hair growth
1.4 FUNCTIONS OF MALE REPRODUCTIVE ORGANS

After reading the structure in detail let us now learn the functions of male reproductive organs.

The organs of the male reproductive system are specialized to:

- produce, nourish and transport sperm and semen
- discharge sperm during ejaculation
- produce and secrete male sex hormones

Penis: The male organ for passing urine and semen, through the tube called the urethra. The outer erectile tissue gets tense with blood during sexual arousal causing an erection.

Scrotum: It is a protective bag for the testes. It controls the temperature of the testes at 5 to 6 degrees below body temperature for better sperm production and survival.

Testis: The two testes producing sperms starting from puberty. The testis performs the vital function of producing sperms or make sperm cells for the process of reproduction. The other function is the production of male sex hormone, the testosterone, which is responsible for the development of male secondary sex characteristics, sexual desire, and attraction towards the opposite sex.

Epididymis: It functions in the storage, maturity and transport of the sperm cells that are produced in the testes.

Vas Deferens: Passage for the sperm to travel from the testis to the ejaculatory duct.

Prostate gland: Secretes nutrients and a thin milky fluid which forms part of the semen. This secretion stimulates the motility of sperms. The prostate gland contributes 20% fluid to the semen. Prostate fluids also help to nourish the sperm.
Seminal vesicles: Stores the semen. They also secrete a thick milky fluid which forms a part of semen. It produces a sugar-rich fluid (fructose) that provides sperm with a source of energy and helps with the sperms’ motility (ability to move).

Erection: The process by which the penis fills with blood and becomes hard in response to thought, fantasies, touch, sexual stimulation or temperature.

Ejaculation: The release of 2 to 5 ml semen form the penis is called ejaculation. It can occur due to sexual intercourse, masturbation or as a nocturnal emission.

Sperms are the male sex cells produced by the testes. It rapidly ascends through the vagina, cervix and uterus at 3 mm per minute, to enter the fallopian tubes in 30 to 60 minutes, where it may meet the freshly released egg. Only one sperm is required for fertilizing an egg. The rest of the army help in attacking the protective covering of the egg, and many die on the way.

Vasectomy: This is a simple procedure for sterilization in males, in which both the vas deferens are cut and tied. It is a permanent, irreversible method of family planning. This prevents the passage of sperms up the vas deferens and out of the urethra. Except for this prevention of the passage of sperms, a vasectomy does not interfere with ejaculation or other functions of the reproductive organs. The man is still able to produce semen and have erections and ejaculate, though the semen contains no sperm. For the first two months after vasectomy, some stored sperms may be released; therefore conventional methods should be used for two months after vasectomy.

Check Your Progress 3

a) One of the following is not an external sex organ in the male
   i) Penis
   ii) Testes
   iii) Scrotum
   iv) Seminal vesicles

b) The temperature in the scrotum is
   i) 5 to 6 degrees above body temperature
   ii) 5 to 6 degrees below body temperature
   iii) It varies from time to time

c) State True or False:
   i) Semen is produced in the penis (T/F)
   ii) Prostate gland is also present in females (T/F)

1.5 ROLE OF TEACHERS AND PARENTS

Growing children and adolescents are naturally curious about their body changes, reproduction and sex. Since this topic is usually a taboo at home and school, these adolescents retrieve a lot of information from unauthentic source such as their peers, cheap magazines and the media which may not be always correct and it adversely affect their concept of sex and sexuality. When a biology teacher
discusses this chapter in school, if at all (since it is usually skipped or deemed not important), both the teacher and the student are uncomfortable.

However, as it is the need of the hour, this topic is extremely important and it should always be taken by a teacher or a parent. The approach should be friendly and inviting queries however, irrelevant these may be. This will open up further lines of communication for the adolescent.

Knowledge about these ‘private parts’ should be started from early childhood when the child learns various parts of his body like the eyes and ears. It is usually hushed up and called ‘shame shame’, and hence we are programmed from childhood to consider it as an organ of shame. Society is extremely shy and embarrassed while talking about these parts. At puberty again the various changes should be explained to the confused adolescents and also the functions of reproductive organ. This will give them a healthy respect for their bodies and help them to look after it. An adolescent boy should be aware that night emissions are perfectly normal and not a “swapnadosh” as it is usually labeled.

The World Health Organization published a review of 1050 scientific articles on sex education programmes and found “no support for the contention that sex education encourages sexual experimentation or increased activity.” However, in the Indian society, a thought prevails even among the highly educated group that if we impart sex education to the adolescents, they will become more sexually active and indulge in sexual experimentations.

Thus teachers and parents should play an role of a guide and friend who will provide correct age appropriate information to the adolescent boys.

1.6 LET US SUM UP

After going through this unit you have learnt about the various organs of the male reproductive system and their function. You have also learnt the various secondary sexual characteristics in the human male. You now know that night emissions are normal in a growing adolescent boy as well as masturbation, which will be discussed further in the next block. In the next unit you will learn about the female reproductive system.

1.7 KEYWORDS

Pelvis : Bone in lower abdomen to protect the genital organs
Sexual Intercourse : Penetrative sex
Puberty : Stage in growth when sexual maturity occurs
Spermatogenesis : The process by which sperms are formed.
Sterilization : Make infertile

1.8 ANSWER TO CHECK YOUR PROGRESS

Check Your Progress 1

1) 1. Vas Deferens  2. Urinary Bladder  3. Prostate gland
   7. Scrotum
Check Your Progress 2

a) iii
b) iii

Check Your Progress 3

a) iv
b) ii
c) i) False
   ii) False

1.9 REFERENCES


Course Manual for Adolescent health by IAP – ITPAH (Indian Academy of Paediatrics International Training Programme on Adolescent Health)

Capacity Building of teachers in adolescent health promotion and counseling by SHAHN (Safdarjang Hospital adolescent Healthcare Network)

Youth and Sexual Health – A Question Bank by YUVA, Ministry of Youth and Sports, Government of India

Youth unite for victory on AIDS (YUVA): A training guide for young people by Ministry of Youth and Sports, Government of India

Reflections: A workbook for young people by CHETNA

S. Yamuna, Nobody Understands Me! Appreciating Teenagers and Adolescence

Orientation Programme for ANMs / LHVs to provide Adolescent – Friendly Reproductive and Sexual Health Services – Handouts, by IEC Division, Ministry of Health and Family Welfare

Orientation Programme for ANMs / LHVs to provide Adolescent – Friendly Reproductive and Sexual Health Services – Facilitator’s Guide, by IEC Division, Ministry of Health and Family Welfare.


William F. Ganong, Review of Medical Physiology.

Drake, Vogl and Mitchell, Gray’s Anatomy for Students.

Websites: