

Male Reproductive System and Functioning

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Introduction

The literature on the physical basis of sex is found primarily in the field of medicine and its allied sciences. The anatomy of sex organs, for example, is treated like the other body systems and knowledge about it has accumulated progressively through the long history of medicine. The study of sex hormones, like endocrinology itself, is a more recent but rapidly expanding field.

The human body is, in fact, made up of several organs like the head, the trunk, the limbs etc. Each organ performs a function. For instance, the organs of digestion include the liver, the stomach, the gall bladder, and the bowel or intestines. The organs of hearing consist of the ear and the auditory nerve. Similarly, the wind pipe, bronchial tubes and lungs form the organs of respiration. The organs of circulation, likewise, are made up of the heart, the arteries and the veins. We are able to make our movements with the help of the bones and muscles. All these organs are identical in men and women. In other words, they look same and function in the same way. But, the sex organs, which make us either a man or a woman, a boy or a girl, look different from each other and do not work in the same, they function differently. Broadly speaking, the sex organs are important in three different ways; i) they make men and women look different from each other; ii) they enable a man and a woman to express their

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love for each other; and iii) they make it possible for new life to be created and for children to be born.

The reproductive system in human beings has three structural components; the gonads or organs for the production of the germ cells (testes in males producing sperm, and the ovaries in females producing ova or the egg), a set of tubes for the transport of germ cells (vas deferens in males, and fallopian tubes in females), and in the female, for housing the product of their union, and the organs for the delivery and reception of sperm (the penis and the vagina).

Centuries of inhibitions and taboos have formed a barrier between generations which prevents the elders from freely sharing their knowledge with the youngsters about these all important facts of life. The difficulties have their roots in the refusal to accept sexuality as a rich and positive value for the full expression of human personality. It amounts to relegating sexuality to a mere means for procreation, or otherwise, a source of dangerous tendencies and sins.

For the purpose of a better understanding, we will now discuss these issues in detail. In this chapter, we will focus on the male reproductive system; followed by the female reproductive system and related relevant issues in the next few chapters.

Physiological Changes at the Onset of Adolescence

As you all might know, adolescence is a very important period in a person's life because it prepares a child for his life as grown up. This is the time when he is no longer a child, but not yet an adult; when he begins to find a number of changes taking place in himself, Delarge (1971) compares adolescence with "the building of a house as the house: is being built the dreadful noise of a hammering and the ugly scaffolding reaching

up into the sky can be rather depressing and irritating; but when the house is finished it is nice to look at and pleasant to live in". Most of you would have experienced the turmoil of this age.

But, remember that just as noisy hammering is a necessary part of the building of a house, the unhappy moments of adolescence are necessary part of growing up.

The term adolescence comes from the Latin word *adolescere*, meaning 'to grow' or 'to grow to maturity'. It includes mental, emotional, and social maturity as well as physical maturity. This point of view has been expressed by Piaget (1969) when he said:

"Psychologically, adolescence is the age when the individual becomes integrated into the society of adults, the age when the child no longer feels that he is below the level of his elders, but equal, at least in rights.....This integration into adult society has many effective aspects more or less linked with puberty.... It also includes very profound intellectual changes. The intellectual transformations typical of the adolescent's thinking enable him to achieve his integration into the social relationships of adults, which is infact, the most general characteristic of this period of development".

In other words, you can say that all the developmental tasks of adolescence are focused on overcoming childish attitudes and behaviour patterns and preparing for adulthood. The developmental tasks of adolescence require a major change in the child's habitual attitudes and patterns of behaviour. Fundamentally, the need for mastering the developmental tasks in the relatively short time that adolescents have reason for much of the stress that plagues many adolescents.

You may, perhaps, be aware of how difficult it is for adolescents to accept their physiques if, from earliest childhood, they have a glamourized concept of what they

wanted to look like when they are grown up. It takes time to revise this concept and to learn ways to improve their appearance so that it will conform more to their earlier ideals. Also, because of antagonism towards people of the opposite sex that often develops during late childhood or puberty, learning new relationships with members of the opposite sex, actually, is quite difficult.

Most of the adolescents experience emotional instability from time to time, which is a logical consequence of the necessity of making adjustments to new patterns of behaviour and to new social expectations. While adolescent emotions are often intense, uncontrolled, and seemingly irrational, there is generally an improvement in emotional behaviour with each passing year.

Erikson, in his book "Eight Ages of Man" (1950) argued that all human beings pass through eight stages of development which are determined by our genes. He was of the view that each of these stages of development must be resolved successfully before the individual can move to the next higher stage of development.

On the psychological level, argues Erikson, even though adolescents can think abstractly and do realize that their views are not the only valid views in the world, they continue to assume that everyone is as obsessed with their behaviour as they are. It is this assumption that accounts for their ego-centrism—their self centeredness.

Social Adjustments

One of the most difficult developmental tasks of adolescence relates to social adjustments. Because adolescents spend most of their time outside home with members of their peer groups, it is understandable that peers would have a greater influence on adolescents' attitudes, speech, interest, appearance and behaviour

than the family has. Most adolescents, for example, discover that if they wear the same type of clothes as popular group members wear, their chances of acceptance are enhanced. Of all the changes that take place in social attitudes and behaviour, the most pronounced is the area of heterosexual relationships. In a short period of time, adolescents make the radical shift from disliking members of the opposite sex to preferring their companionship to that of members of their own sex. As a result of broader opportunities of social participation, social insight improves among older adolescents. They develop new values concerning the selection of friends and also concerning social acceptance. They also develop a strong 'interest themselves', partly because they realize that their social acceptance is markedly influenced by their general appearance, and partly because, they know the social group judges them in terms of their material possessions. Their interests, as you might be aware, tend to range from their appearance, achievements, their independences, education, and religion and so on.

Physical Changes

During adolescence, besides the changes on the psychological and social level, physical changes are among the most striking and amazing. Here we will discuss the physical changes in the body of a male adolescent. The event marking the beginning of manhood (usually between the ages of 13 and 15 years) is the secretion of gonadotropic hormones by the pituitary gland, which is situated at the base of the brain. They cause the testicles to mature and in turn to secrete their own hormones (androgens), the most important of which is testosterone. Testosterone is responsible for the many physical changes taking place during adolescence.

First of all, the teenager starts growing up fast. The shape of his body and the muscles now begin to grow

firmer. The voice begins to “break”: it becomes deeper in sound but until it has found its proper adult pitch, it sounds rather rough. Hair starts growing near genital organs and round the anus, under the armpits and on the lower part of the abdomen (the so called pubic region, hence, the name “puberty” is also given to this stage). Hair also starts growing on the face, first on the upper lips, and then on the cheeks, chin and anterior neck. Later on (in some men), hair also grows on the chest and abdomen.

It may happen to some boys that one or both of the breasts get slightly enlarged. This situation is normal and temporary. A boy need not worry that the body is becoming feminized. The enlargement will disappear automatically in a few months or years.

It is the testicles and the penis that make the real difference during adolescence. The male sex glands and the testicles do not begin to work in the normal way until sometime between the ages of twelve to fifteen. But, when the testicles begin to release the male hormones through the blood-stream to the rest of the body, the adolescent boy begins to appear much more masculine. At the same time the penis becomes longer and thicker and the testicles held in the scrotum becomes larger and firmer. Soon the testicles will be to produce their first sperms or life cell: this means that the boy is capable of becoming a father.

For a better understanding, we will now discuss the various organs of the male reproductive system along with their functions. The males reproductive system is not cyclical and thus, not as hormonally or endocrinologically complex as that of the female, which we shall study in detail in the next unit.

Scrotum and Testicles

The major sexual endocrine glands are the two testes or testicles, which are contained and protected in a

sac-like structure called the scrotum. The word 'testes' is derived from the word 'testify' meaning to 'witness'. It is based on the ancient custom of taking oath by solemnly placing the hands on the genitals.

Scrotum is a sac of skin, divided into two parts, which holds the testes, epididymides, and a portion of the vas deferens. When the skin is stretched a large number of small glands are visible, which resemble pimples. These are entirely normal. The scrotum protects the testes from any injury. Each testis is enclosed in a tough fibrous sheath and suspended from a spermatic cord in a separate compartment of the scrotal sac. Each of these characteristics has important practical consequences. When the organ attempts to swell, for example, during an infection, the unyielding cover will not give way but will choke its delicate structures. This condition, which occurs when an adult male develops mumps involving the testes, may result in sterility. Prepubescent boys are in no danger as their sperm producing structures are not yet functional and thus not subject to damage.

Temperature Difference

It is important for you to note that spermatogenesis, the production of sperm, is highly sensitive to temperature differences. It is hampered by the warm environment inside the body and the testes proceed optimally within the scrotal sac where temperatures are somewhat lower. In fact, the scrotum keeps the testes upto 5 degrees cooler than normal body temperature in order to allow for production of sperm. The scrotum is situated as a projection outside the body since within the body the temperature would be higher. Muscle fibres are attached to the inner surface of the skin, which contract during sexual excitement or when it is cold. The scrotum then becomes rounded small and wrinkled. When it is warm, the scrotum hangs lower and is pear shaped in appearance. This adjustability

helps to maintain a steady temperature. This facilitates the proper production of sperms.

Structure of the Testes

The testes, two oval-shaped bodies suspended in the scrotum, are the most important glands of the entire reproductive system. Upto the age of fourteen, the testes are approximately only 10 percent of their mature size. Then, there is rapid growth for a year or two, after which the growth slows down, the testes are fully developed by the age of twenty-one. The testicles contain two groups of structures which perform different functions. One is a series of cells: interstitial cells (meaning: situated between) which secrete the male sex hormones. The other group of structures is the seminiferous tubules which are a very large number of fine hairs like tubules in which the sperm are formed. This network of tiny tubules in the testes constantly produces sperm, beginning at puberty, but no sperm is produced until then. Testes descend from the abdomen of male baby normally shortly before or just after birth. The testes also produce the male sex hormones testosterone. Estrogen is also produced in minute amounts by the testes, as well as by the liver.

Developments of Testes

At the foetal stage of a male, testes develop in abdominal cavity of the foetus. Then they gradually descend to the edge of the pelvis. Usually, by the eighth month of intrauterine life, they descend into the scrotum. However, in few cases they make this descent during the post-natal period or in infancy. Sometimes, we may come across child with one testicle only, or even without testicles, because they do not descend into the scrotum and are retained within the abdomen. This situation is called cryptorchism (hidden testicles). It is obligatory that the testes descend prior to puberty because undescended testes are sterile. They get irreversibly damaged by the higher temperatures

present in the body. It may happen, sometimes that one or both testes become enlarged with or without pain. In this case, it is necessary to consult a doctor. The scrotum may at times, becomes apparently enlarged by liquid collection around the testes (hydrocele). At other times some veins above the testicles become enlarged and may ache (veriocele). You would be aware of the fact that with the advancement of medical sciences, it is now possible to correct any developmental complications medically or surgically. Parents should take care to detect such complications in children. It can be easily done while bathing a child or dressing him.

Problems with Undescended Testes

Some of the problems related to undescended testes include development of 'rupture' or inguinal hernia and cancer. This can happen to any child. Therefore, it is advisable that those parents take necessary care to observe such abnormalities. In some cases, one of the testes may descend while the other may not. In such cases also medical help should be sought. There is no harm in removing one of the testes surgically if it does not descend. You should keep in mind that such a surgical removal would not affect the reproductive system. It is very necessary for parents to be aware of the pros and cons of such developments. They may need counselling before the surgery is done on her child. When the child notices that one of his testes is missing, it can embarrass him. It is the duty of his parents to explain to him the reasons, how he lost one of his testes. Parents should also instill in him confidence, so that he does not worry about the missing organ. Parents should take utmost care to keep these facts confidential between themselves and their child.

Testosterone

When the testes mature they begin to produce the male hormones. This highly complex chemical compound is

called the testosterone. Men are not the only ones who make testosterone; women make some too. But men make about 10 times more testosterone than women. Testosterone does more than just allow men to make sperm. It is carried to various parts of the reproductive system where it directs each part in its physical growth. As you have read earlier in this unit, it triggers the growth of facial hair, causes men's voice to deepen, their muscles to develop and the genital organs themselves to grow in size. Later in life, testosterone also plays a role in balding.

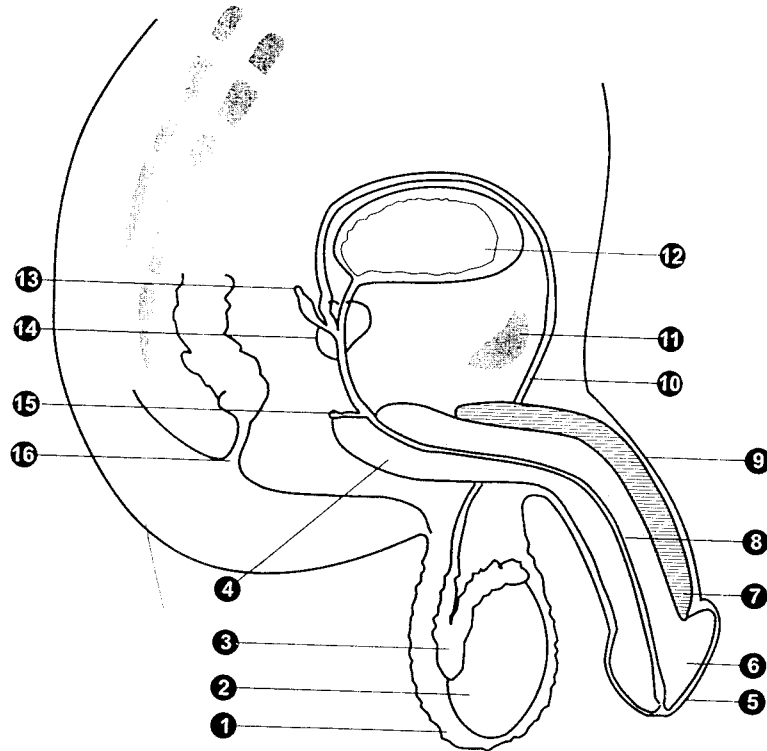
At maturity, the left testes generally will hang lower than the right one and the scrotum becomes darkened and wrinkled.

The Sperm

Inside each testicle there are hundreds of fine tubules, closely packed. With the help of microscope, we can see the inside of these tubes which is lined with millions of cells. You already know that the testicles produce hormones which the blood carries to all the cells of the body. Another function of the testes is to produce spermatozoa or the sperm cells. The sperms are among the smallest cells in the human body, so small that we need a microscope to see them. It is possible to differentiate between the two groups of sperms, according to their sizes and shapes. One group is formed by small, round headed sperms carrying the Y chromosomes (androsperms), and the other groups of larger, oval-shaped sperms carrying the X chromosomes (gymnosperms). Sperm production takes place in the somniferous or sperm bearing tubules. These tubules are very long and measure hundreds of feet, which permit the production of millions of sperm, or what we call 'the tiny life cells' during a male's fertile lifetime. When you see them under a microscope, you will find that sperms are shaped like seeds and have a long tail.

The movements of the tail make the sperm move in a straight direction when they are ejaculated (suddenly emitted) from the penis.

Male Reproductive System



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|---------------------|-------------------|
| ① Scrotum | ⑨ Shaft of Penis |
| ② Testicle | ⑩ Vas Deferens |
| ③ Epididymis | ⑪ Pubic Bone |
| ④ Corpus Spongiosum | ⑫ Urinary Bladder |
| ⑤ Foreskin | ⑬ Seminal Vesicle |
| ⑥ Glans | ⑭ Prostate Gland |
| ⑦ Corpus Cavernosum | ⑮ Cowper's Gland |
| ⑧ Urethra | ⑯ Anus |

Epididymides

Sperms are produced in the testes, and mature in the epididymides, each of which is a tube tightly coiled over the top and behind each testes, in the shape of a helmet. On straightening, each tube may measure about twenty feet. This provides a vast capacity for the storage of semen. Mature sperms move from the epididymides to the vas deferens. The vas deferens are two long, narrow tubes that carry the sperms from each epididymis to the seminal vesicles. There are two seminal vesicles located beneath the bladder. The seminal vesicles produce seminal fluid, in which the sperms move and are nourished. Seminal fluid combined with secretions from the prostate and Cowper's glands is called semen.

Vas Deferens

The shorter and straighter continuation of the epididymis, known as the vas deferens, is one of the components of the spermatic cord from which the testicles get suspended. During its upward course within the scrotum, vas deferens can be felt as a firm cord, before it disappears into the abdominal cavity. You should be aware of the fact that since this structure is easily located, and surgically accessible, it is most convenient target for sterilizing men. This operation, known as vasectomy, simply involves the cutting or tying of the vas deferens (on both sides) through two small incisions performed under local anesthesia. Vasectomy results in permanent sterility (a man becomes sterile, because the sperms will not be able to reach the urethra); but this does not have any impact on the sexual desire, performance or male characteristics. There is not even any noticeable effect upon the quantity of ejaculate because of the volume sperm contribution to semen is very little.

Re-establishing fertility in a man who has undergone vasectomy is very rare although it is not an impossible

task. But, when a person wants to opt for vasectomy, it is important for him to seek necessary counselling and guidance. A person should make sure that he has all the necessary information on vasectomy, before opting for it. In fact some religious teaching do not permit vasectomy. Therefore, one should examine all such matters from the concerned religious or spiritual guides.

Ejaculations

The tip of the vas deferens joins the duct of the seminal vesicle to form the ejaculatory duct. Mature sperms move from the epididymides into the vas deferens. During sexual excitement, the vas deferens and the other internal reproductive organs tighten and relax in a pulse-like rhythm. The contractions push the sperms through the vas deferens into urethra. In the urethra, fluids from the prostate gland, seminal vesicles, and cowper's gland mix to form semen. The semen is pushed through the urethra by pulse-like contractions, and at the peak of sexual excitement, the semen exits through the opening of the urethra in the glands of the penis. This process is known as ejaculation.

The seminal vesicle situated behind the urinary bladder produces a gelatinous, yellowish secretion which mixes with the sperm, thickens the semen and gives it greater volume. The seminal vesicles produce also the sugar fructose which is essential for giving the sperms the capacity of fertilizing the egg.

Erection

Distension of the seminal vesicles when full of secretions stimulates the phenomenon of erection (stiffness of the penis). Also a full distended urinary bladder can press on the seminal vesicle and give rise to erection. This explains the frequent occurrence of erection in the morning because the urinary bladder is usually full of urine collected during the night.

Prostate Gland

The prostate gland is located below the bladder. It produces a thin alkaline fluid that helps the sperm to become mobile and active and able to make their journey into the female reproductive system. It gives the semen its characteristic odour and viscosity. The prostatic secretion accounts for much of the volume of semen and neutralizes the acid in a man's urethra and a women's vagina. In older men, sometimes the prostate enlarges, causing difficulty in urination. Cancer of prostate is also a common feature in many older men.

Cowper's Glands

There are two cowper's glands attached to the urethra as it descends from the prostate gland. The cowper's glands secrete the fluid that makes the seminal fluid sticky. The secretion from this gland is the fluid that forms on the end of the penis, when a man initially becomes sexually aroused. It was in the seventeenth century, when William Cowper first described the function of this gland. Therefore, it has been named after him. You should not confuse the fluid produced by cowper's glands with semen. However, the important fact is that this fluid also may contain some quantity of sperms, which can also, at times result in pregnancy, even if an intercourse has not ended in ejaculation.

The Penis

The penis is a soft, cylindrical organ that hangs under the abdomen at the junction of the thighs. It is formed of two parts: the body or shaft, and a smooth part shaped like a helmet called glands. The body of the penis is formed by three parallel cylinder of spongy tissue: two are in an upper position (each one is called 'corpuscavernosum' or hollow body) that are responsible for the stiffness of the erected penis and a softer one is below them ('corpus spongiosum' or spongy body) expanding on the top of the penis to form the glands.

The urethra runs through the middle of the spongy body. Urethra in the male is a tube that originates from the bladder, and passes through the spongy body, to the opening in the glands of the penis. It carries urine from the bladder, and semen from the vas deferens. The urethra in male remains closed to urine during erection of the penis on ejaculation.

Erection

The three cylindrical bodies of the penis are made of soft tissue, which contain numerous blood vessels. These are known as erectile tissue. During sexual excitement, when blood flows through the blood vessels, they swell and exert pressure inside the penis, in effect it is erected upward in appearance, length and stiffness. This is called erection. The penis can become erected very early in male's life. However, ejaculation cannot take place until puberty, when sperm production begins.

Functions of Penis

The penis begins to grow in size only after it receives the male hormones from the testicles when the boy is 11 or 12, and attains adult size when he is about 20. The penis is an organ which serves two purposes. One of its functions is to pass urine. The other function is related to reproduction. This male sex organ is specially designed by nature, when firm and erect, to fit into the vagina of the female as the channel for passing semen from the man's reproductive organ into the woman's reproductive organ during sexual intercourse.

Foreskin

The penis has no bone. As you have read earlier, it ends in a nut-shaped enlargement called glands, which is soft. In uncircumcised men, the foreskin covers the glans. The glans is highly sensitive. It is equivalent to the clitoris in a woman, as a source of sexual pleasure. The foreskin, also known as the prepuce, is a retraceable tube of skin that covers and protects the

glans of the penis. It is connected to the rim of the glans on its undersurface by a thin bridge of tissue called the frenulum, and this, if it is short, can tear and bleed during intercourse. Around the crown of the glans, in certain men, many small white spots can be seen. These are frequently found and are quite normal.

The glans, the frenulum, and the crown are the most sensitive parts of the penis because they consist of a great number of nerves. During erection, this skin usually stretches out leaving the glans uncovered, otherwise, if it is too tight on the top (a condition known as phimosis), it prevents the free movements of the penis during sexual intercourse and does not allow a proper cleaning of the glans. It may also be possible that in some new born babies the foreskin is stuck to the glans. In infancy, it may be difficult to pull it back. In such cases, it is always advisable for the parents to consult a doctor when taking a child for immunization.

Circumcision

The surgical removal of the foreskin known as circumcision leaves the glans permanently exposed. In some societies, cultures and religions, it is custom to have all boys circumcised. You might be aware, for instance that among the Jews and Muslims, circumcision of boys has a religious significance. This makes urinating easier. In the light of information available regarding HIV/AIDS, it is often advised to circumcise boys as one of the ways of preventing the spread of HIV. This is because during intercourse, the foreskin can hold back female secretions. If there are breaks or sores, on the penis or glans, the HIV (or any other infection) can enter the body of the man, if his partner is HIV positive (or infected).

Cleanliness

It is healthy for males to wash their genital organs daily. Uncircumcised men should pull back the foreskin

and wash the organs, in particular the inner parts. If the glans and inner part of the foreskin are not washed often, a thick and yellowish substance collects underneath (called the smegma) and may cause irritation and burning sensation. Regular cleaning will prevent organs from itching, irritation and developing sores.

Size of Penis

No other organ in the entire body varies so greatly in size from individual to individual. The size of the penis has caused many a boy much misgiving. A boy ought to know that the size of the penis has nothing to do with the degree of 'manliness' in him. This is a highly fallacious notion that has led to the development of inferiority complex in many uninformed and misinformed adolescents. They feel that they probably are less competent and potent to be sexually competent than other grown up men. A normal sized penis is usually three or four inches long. It enlarges to about six inches in length when erect, and about one to three centimeters in diameter. Perfectly normal and adequate penises can be considerably smaller in size. However, in some exceptional cases, penises larger than 13 inches have been reported. The size and shape of the penis has very little to do with the competence of the man in giving or receiving sexual satisfaction. It is also a fact that smaller penises tend to get proportionately larger than penises that are larger in size to start with.

Wet Dreams

During adolescence, the male starts getting a new experience, called 'night emissions'. Night emissions are a periodic discharge of semen (stored up sperm and fluid) generally occurring during sleep. Now and then, while he is asleep, the semen comes out spontaneously from an adolescent's penis. This phenomenon may occur from one or two to several times a month. The release of semen is often accompanied, in sleep, by a dream

which is erotic in nature. Hence, this phenomenon is also referred to as 'wet dreams'. Often adolescents may be dismayed that they have such dreams. They may be out of keeping with their accepted standards. It is not wise to take the imagery of dreams at its face value. The dream merely symbolizes the expression of the periodic physical and psychological tension. The emissions should be considered a consequence of the abundant daily presence of semen in the genitals, as a compensation in case of prolonged abstinence from sexual activity.

All of us should remember that these night emissions or 'wet dreams' are nature's normal safety valve for accumulated semen. This phase is a natural part of boy's development. He should be informed in advance about this fact and assured that there is no reason to be alarmed about when it does happen. It is just the sign that he is growing up in a healthy and normal manner. He can also be advised to channelize his energies into vigorous work and play, and various hobbies and interest.

Conclusion

In this chapter you learnt about the male reproductive system. You came to know the various physiological changes that take place in a boy during puberty. You also read about the structure and functions of the various organs involved in the process of reproduction.

You learnt about the scrotum which is a sac-like structure containing the testes. Also we discussed the testes, the male sex glands in the scrotum which produce the male hormone, 'testosterone', and also the sperm cells. Then we went on to discuss the sperm cell, which is shaped like a seed and has along tail. You have also been informed about the cycle of the sperm right from its production to ejaculation.

You were acquainted with the internal structure of the penis, soft, cylindrical, organs and the functions that it performs.

Also, in this chapter, you were made aware of certain phenomena like vasectomy, circumcision, and wet dreams, which are an important aspect of the male reproductive system.

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