
UNIT 1 PHYSICAL CHANGES

Structure

1.0 Introduction

1.1 Objectives

1.2 Adolescent Development

 1.2.1 Meaning and Definition

 1.2.2 Early Adolescence (12-14 years)

 1.2.3 Middle Adolescence (14-17 years)

 1.2.4 Late Adolescence (17- 19 years)

1.3 Physical Development

 1.3.1 Puberty

 • Adolescent Males

 • Adolescent Females

1.4 Let Us Sum Up

1.5 Unit End Questions

1.6 Suggested Readings

1.0 INTRODUCTION

Adolescence can be understood as a phase of transition from child to an adult. This period generally extends from 12 to 19 years of age, which is broadly categorised into three stages, viz., early adolescence, middle adolescence and late adolescence. Teenagers experience some physical milestones as they move from childhood to adolescence. Normal growth during adolescence includes both an increase in body size and sexual maturation (puberty).

During adolescence, boys and girls reach adult height and weight. Adolescence is the time for growth spurts and puberty changes. An adolescent may grow several inches in several months followed by a period of very slow growth, and then have another growth spurt.

Puberty happens to all individuals, whether boys or girls. In girls, it may start at the age of 9 or 10 and in boys it may begin around 12 or 13 years, although there is variation in the age from one person to the other. Girls experience puberty as a sequence of events, but their pubertal changes usually begin before boys of the same age.

In this unit, we will discuss the various physical development that takes place during adolescence and some ways to understand the complex nature of teens.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- define the meaning and definition of adolescent development;
- describe the physical changes occurring during adolescence;
- explain some of the reactions to the physical changes during adolescence; and
- analyse the factors that contribute to these physical changes.

1.2 ADOLESCENT DEVELOPMENT

1.2.1 Meaning and Definition

Adolescence is the phase of transition from being a child to an adult. It extends from 12 to 19 years of age and it can be broadly categorised into three stages – early adolescence, middle adolescence and late adolescence. This transition involves biological (i.e. pubertal), psychological and social changes. Just before reaching adulthood, the youngster's behaviour seems to be confusing to parents. Parents find this to be a stormy period because it appears, as if there is nothing that parents say or do is right for the adolescents.

1.2.2 Early Adolescence (12-14 years)

Early adolescence is a contradictory phase. It is a phase when the child is not yet mature and at the same time she is no longer a child. They insist that they have grown up enough to be independent, while parents do not provide them much freedom. This is the time the youngster finds the drastic physical changes as a source of irritation. Some who are physically not well grown feel somewhat inferior to others. There is a fear that they may remain short and small and become the target of ridicule of the peers. There is a lot of confusion, hesitation and a search for one's own real identity. This arises due to the fact that though physically they look like an adult, mentally they are still children. Parents and elders treat them at one time as a grown up and at other time as a child. This causes problems in identity – as to 'Who am I?' and 'What am I?' etc.

Adolescence is the time when all of a sudden the world starts looking different. The youngster faces considerable competition. The sheer innocence of friendship is lost. Several new kinds of fantasies beyond the fun fantasy of Tom and Jerry start taking a toll on the mind of the youngster. This is the time when the individual needs understanding parents. This is the time in their life when they start thinking about their future.

1.2.3 Middle Adolescence (14-17 years)

Middle adolescence is the phase, when a child is on the road to transformation. There are whole lot of changes that occur, be it, physical, mental, cognitive or sexual. While most of the girls cross their puberty stage, boys are still on the road of maturing physically. It is that time of life, when the young individual is most concerned about one's look, body and appearance. Middle adolescent is the time when, the teenagers are developing their unique personality and opinions.

Friends play a pivotal role during these years. Young teenagers take great care to maintain their identity in the peer group.

Competitiveness also becomes a major priority in the life of middle teens. Many of them try to analyse the experiences they are going through and try to understand their inner turbulence by writing diaries and journals. Remember, middle teens are more capable of setting goals. However, the goals they set are often too high and as a result are unable to reach the goal and feel frustrated and disappointed. Withdrawal from the parents is also one of the key characteristics found in children of this age. That is they reduce their dependency on their parents and try to take decisions for themselves.

1.2.4 Late Adolescence (17-19 years)

Physical Changes

A late adolescent is closer to adulthood and the youngster develops a firm identity and more stable interests. Soon to be adults they attain greater emotional stability and have a more developed sense of humor. They are able to delay their gratifications of their desires, and are able to think ideas through. They learn to express their feelings in words, compromise and make independent decisions. Unlike the earlier stages of childhood, late adolescents show greater concern for others. They become more self-reliant and take pride in their work. They start finalising their thoughts about the role they want to play in their lives and become more concerned about their future. Table below presents the details regarding heights and weights of adolescents during this period.

Table 1: Reference Body Weights and Heights of Adolescents according to NCHS

Age (Years)	Boys		Girls	
	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)
12 +	147	37.0	148	38.7
13 +	153	40.9	155	44.0
14 +	160	47.0	159	48.0
15 +	166	52.6	161	51.4
16 +	171	58.0	162	53.0
17 +	175	62.7	163	54.0
18 +	177	65.0	164	54.4

This table gives an outline of average proportion of weight and height for both boys and girls in different age group.

1.3 PHYSICAL DEVELOPMENT

Adolescence is characterised by dramatic physical changes moving the individual from childhood into physical maturity. Teenagers experience some physical milestones as they move from childhood to adolescence. Normal growth during adolescence includes both an increase in body size and sexual maturation (puberty). The timing and the speed with which these changes occur vary and are affected by both heredity and environment.

During adolescence, boys and girls reach adult height and weight. Early, prepubescent changes are noted with the appearance of secondary sexual characteristics.

Adolescence is the time for growth spurts and pubertal changes. An adolescent may grow several inches in several months followed by a period of very slow growth, and then have another growth spurt. Changes with puberty may occur gradually or several signs may become visible at the same time.

There is a great amount of variation in the rate of changes that may occur. Some adolescents may experience these signs of maturity sooner or later than others. It is important to remember that these changes happen at different times for everyone. Being smaller or bigger than other girls or boys is normal as each child experiences puberty at his/her own time.

Sexual and other physical maturation that occurs during puberty results from hormonal changes. As the adolescent nears puberty, the pituitary gland increases the secretion of a hormone called follicle-stimulating hormone (FSH). This hormone then causes

additional effects. In girls, FSH activates the ovaries to start producing estrogen. In boys, FSH causes sperm to develop.

The following are the average ages when puberty changes may occur:

Adolescent Males: Height: 4 to 12 inches

Age of Puberty: 9.5 to 14 years

First pubertal change: enlargement of the testicles

Penis enlargement: begins approximately one year after the testicles begin enlarging

Appearance of pubic hair: 13.5 years of age

Hair under the arms, on the face, voice change, and acne: 15 years of age

Nocturnal emissions (or wet dreams): 14 years of age

In boys, it is difficult to know exactly when he has reached puberty. There are changes that occur, but they occur gradually over a period of time rather than as a single event.

The following are additional changes that may occur for the male as he experiences the changes of puberty:

His body size will increase, with the feet, arms, legs, and hands sometimes growing “faster” than the rest of the body. This may cause the adolescent boy to experience a feeling of clumsiness.

Some boys may get some swelling in the area of their breasts as a result of the hormonal changes that are occurring. This is common among teenage boys and is usually a temporary condition.

Voice changes may occur, as the voice gets deeper. Sometimes, the voice may “crack” during this time. This is a temporary condition and will improve over time.

Not only will hair begin to grow in the genital area, but males will also experience hair growth on their face, under their arms, and on their legs.

As the hormones of puberty increase, adolescents may experience an increase in oily skin and sweating. This is a normal part of growing. It is important to wash daily, including the face. Acne may develop.

As the penis enlarges, the adolescent male may begin to experience erections. This is when the penis becomes hard and erect because it is filled with blood. This is due to hormonal changes and may occur when the boy fantasizes about sexual things or for no reason at all. This is a normal occurrence.

During puberty, the male sex organs begin producing sperm. Semen, which is composed of sperm and other bodily fluids, may be released during an erection. This is called ejaculation. Sometimes, this may happen while the male is sleeping. This is called a nocturnal emission or “wet dream.” This is a normal part of puberty and will stop as the male gets older.

Adolescent Females: Height: 2 to 10 inches

Age of Puberty: 8 to 13 years of age

First pubertal change: breast development

Pubic hair development: shortly after breast development

Physical Changes

Hair under the arms: 12 years of age

Menstrual periods: 10 to 16.5 years of age

Girls experience puberty as a sequence of events, but their pubertal changes usually begin before boys of the same age. Each girl is different and may progress through these changes differently.

The following are additional changes that may occur for the female as she experiences the changes of puberty:

There may be an increase in hair growth, not only the pubic area, but also under the arms and on the legs.

The females' body shape will also begin to change. There may be not only an increase in height and weight, but the hips may get wider. There may also be an increase in fat in the buttocks, legs, and stomach. These are normal changes that may occur during puberty. Her body size will increase, with the feet, arms, legs, and hands beginning to grow in advance of the body. This may cause the adolescent girl to experience a time of feeling clumsy. As the hormones of puberty increase, adolescents may experience an increase in oily skin and sweating. Acne may develop.

Adolescent girls will also experience menstruation, or menstrual periods. This begins when the body releases an egg from the ovaries. If the egg is fertilized with a sperm from a male, it will grow into a baby inside the uterus. If the egg is not fertilized, the endometrial lining of the uterus is not needed and is shed through the vagina as fluid. The fluids are bloody and are usually released monthly. After a girl begins to menstruate, she is able to get pregnant.

Self Assessment Questions

1) Define and discuss the characteristics of each in brief:

a) Late Adolescence

.....
.....

b) Early Adolescence

.....
.....

c) Middle Adolescence

.....
.....

2) Complete the sentences

a) Adolescence is the phase of _____

b) They may lead to few health problems such as _____ during this stage.

c) There is lot of confusion in this stage because _____

- 3) Describe the physical changes that occur during adolescence, in both males and females separately.

.....
.....
.....
.....

1.3.1 Puberty

Puberty is the stage of life during which you become biologically and sexually mature. Puberty is the one to three-year process of hormonal and physical change that causes the young person to reach sexual maturity; girls usually enter it about a year earlier than boys. It is the entry into adolescence, a period of tremendous changes in the body, emotions, attitude, values, intellect and relationships. This is the transition from the world of the child that gives way to the world of the adult.

Puberty happens to all individuals – boys and girls. In girls, it may start at the age of 9 or 10 and in boys it may begin around 12 or 13 years, although there is variation in the age from one person to the other.

Puberty is often talked about as a period of turbulence and trials because the child begin to develop a sex drive, experience mood swings, develop relationships with people of the same and/or opposite gender, and face different kinds of pressure at home and at school. Change is always a difficult process, but is an inevitable part of life. Without change and without pain there is no journey, there is no quest, there is no progress. Holding on to the past can be comfortable and secure, and the future often appears uncertain; but tries to think of it as an exciting adventure into and with you.

Most adolescents feel that they do not get adequate information about the changes they are going through, and they feel that the adults around are not understanding. So there is worry, fear, and insecurity. However, feelings like this are normal during puberty.

Some of the greatest anxiety at this stage is about our physical body because it is changing and growing in new and uncertain ways; it appears to have a life of its own and nothing what we think or feel can stop its rate of change. Understanding these physical changes helps in realising that you are not alone in this journey, and will help the youngster make their way through the turbulent sea of adolescence.

There are some very visible and invisible changes that occur in an individual's body. Some changes occur silently without you realising them, and there are other more obvious changes that are loud and confusing. Though the external feeling is confusion or awkwardness, there is an internal chemistry that is in harmony, all changes are interconnected and proceed smoothly within. What it all reveals is the miracle of life and the mystery of the human body as it prepares itself for change and choice and growth.

Puberty in boys and girls begins in a tiny corner of the brain called the pituitary gland, chemical messengers called hormones are sent to the reproductive organs

to release another set of hormones, which leads to changes in the body. In boys, the hormone that creates these changes is called testosterone, and in girls it is estrogen.

Physical Changes

Adolescent Males: Changes in the male body start between the age of 12 and 14 years. Different boys react differently to the changes, and the changes happen at different times to all of us. This is reflective of our uniqueness, and since all of us are different there can really be no “standard” to compare ourselves to.

- i) *The penis:* The penis has two main parts, a head (tip or glans) and a shaft. The head of the penis, particularly its rim is much more sensitive than the shaft. The penis is used for two things, urinating and penetrative intercourse. Usually penises are not straight, some tilt to the left and others to the right. There is no need to worry about it.

Angle or tilt, all of us feel uncomfortable or insecure about how the penis is shaped and how it looks. To reproduce, the male penis must be inserted into the woman’s vagina where sperm (testicles) are released, which will eventually meet and fertilize the egg.

- ii) *Foreskin:* The penis is covered with fine loose skin. The skin that surrounds the head of the penis is loose and is called the foreskin. The foreskin usually does not fully retract for several years and should never be forced. The foreskin can be retracted when it’s inside surface separated from the glands and the opening widens. This usually happens by age 18. Once a boy discovers that his foreskin is retractable, he can easily learn to care for himself. When the Foreskin is fully retractable, it is important to wash underneath it everyday, so as to prevent SMEGMA (a white waxy substance consisting of natural secretions and shed skin cells) from forming. Good general hygiene and common sense are key to preventing infection and disease.
- iii) *The testicles:* Men have two testicles, which hang in a sack called the scrotum. The testicles produce tadpole-shaped sperm, which join with a woman’s eggs to make babies. Sperms are contained in fluid called semen. The scrotum hangs outside the body because sperm need to be kept cooler than your internal body temperature, to prevent them from getting damaged. The scrotum is usually darker in color than the surrounding skin. One testicle always hangs lower than the other, this is so that they don’t bash into each other when you are running or playing. The testicles are connected to the penis by a long thin tube. Both urine from the bladder and semen pass down this tube through the penis. This tube is called the urethra.
- iv) *Erections:* Normally a man’s penis is soft and hangs down, but different kinds of sensations and feelings – physical, psychological, or sensual - can lead to an erection. An erection occurs when a nerve centre at the base of your spinal cord sends out impulses to your penis, filling it up with blood. At this point the penis gets stiff, grows longer and wider, sticks upward and outwards from the body and the foreskin stretches, leaving the head of the penis exposed. The muscles at the base of your penis tighten, so that blood can’t drain back out. There are no muscles in the penis itself, it is a kind of a sponge (that is why you can’t move it very much when soft!). Erections are unreliable and can come and go without warning.
- v) *Ejaculation:* Ejaculation is the emission of semen from the penis. This is essential for reproduction, and it also leads to a feeling of sexual pleasure – a combination of physical sensations and intense emotional feelings. During this time 3-15

contractions occur. Each last about a second and the first three are usually the most intense. To achieve ejaculation there must be stimulation and erection of the penis. When a man ejaculates, he releases on average a teaspoonful of semen containing up to 300 million sperm. Ejaculation is not always voluntary. For example, sometimes, while sleeping men can ejaculate. Although the semen comes out of the penis through the urethra (through which urine too comes out), there is no chance of any urine coming out during ejaculation as a muscle closes the bladder off. After ejaculation, the semen is stored again at the base of the penis, until the next one.

While the male child is developing in the uterus, the testicles are already secreting the male hormone, testosterone, which after 13-14 years kick in and steer the baby towards becoming a boy and man. During childhood, the sex gland remains inactive and makes neither hormones nor sperm. During puberty, the testicles begin to be active again under the influence of a secretion from the pituitary gland, which is tucked away in a small part of the brain. The testicles produce testosterone, which is circulated throughout the body in the blood. Under its influence the boy is transformed into a man over a period of years.

Most changes in boys are all external and visible unlike with girls where most changes happen inside the body.

- vi) *The genitals:* It is commonly believed that the first sign of puberty is enlargement of the testicles. They may double or quadruple. At the same time, the skin of the scrotum changes, the colour deepens becoming darker and its texture gets wrinkled. Sometime after this the penis starts to enlarge, becoming first longer and then broader. The final size is reached at the end of your growth spurt, which usually happens when you are 15-16 years old, but sometimes earlier or later.
- vii) *Wet dreams:* During puberty a boy becomes ready to reproduce since he can now produce and release sperm. At this stage wet dreams occur often in nearly all boys. At night there is an involuntary release of semen (ejaculation) during sleep, either during an erotic dream, or sometimes even in the absence of an erotic stimulation. This happens because there is a build-up of semen in the body and it needs to be released.

Boys wake up in the morning to find a sticky or dry residue of semen on the sheet, which is embarrassing, awkward, and even frightening. Wet dreams are a signal that you are growing up, which stops after a while.

- viii) *Growth Spurt:* Boys begin growing later than girls and carry on for longer, after the girls have stopped growing. The growth spurt in boys begins around 13-14 years and ends at 16-17 years. There is a sudden increase in height and weight, the chest expands and becomes broader, and the arms and legs fill out and become more muscular. Due to the influence of testosterone the larynx (the voice centre in the throat) expands, and the voice cracks before it deepens. This is another awkward phase but nit soon evens out to a voice cracks before it deepens. The aureole surrounding the nipples generally doubles in size during puberty. During this period hair starts growing on different part of the body, like legs, arms, chest, groin, armpits and face. Hair on face starts as a fine fuzzy layer and then becomes tougher and thicker as he starts shaving. Pimples, spots and blackheads may grow on face, neck, chest and back. These are by-products of androgens (male hormones that are responsible for most of the changes in adolescents' body).

- ix) *Body Odour*: The adolescents sweat glands (under their arms and in genital areas) are becoming more active. When sweat comes into contact with bacteria on the skin it creates an unpleasant smell, both in adolescent boys and girls.
- x) *Pimples*: The oil glands or ‘sebaceous glands’ produce an oily substance called sebum. If the sebum blocks the pores on the skin and combines with the bacteria, you can get pimples.
- xi) *Sexual Feelings*: During puberty and adolescence, sexual thoughts and fantasies become more frequent and become aware of sexual stimuli around. These sexual feelings and fantasies are also normal, and is common among all girls and boys at this stage.

Physical Changes

Adolescent Females

Changes in the female body can be considered in terms of visible and invisible changes..

The invisible changes: There are some invisible change that happens in a young girl’s body in their reproductive organs like ovaries, uterus and vagina. These are the changes that are also having an impact on the visible changes in her body.

- i) *Ovaries*: There are two ovaries in a young girls body, one on either side of the uterus and below the fallopian tube. These organs are located in the lower abdomen. Ovaries are about an inch long, approximately the size and shape of an almond and contain tiny egg cells. All the eggs are in a ‘frozen’ state before puberty. At puberty each ovary alternatively releases an egg or ovum every month, however sometimes two or more ova (the plural of ovum) may get released from the ovaries.

The hormone called estrogen is also produced in the ovary. The pituitary gland sends the message to the ovaries to produce this hormone. Estrogen is responsible for making a girl grow up to have a woman’s body and make it possible for her to have children.

- ii) *Uterus*: The uterus is called a womb. Its an upside-down pear-shaped structure inside a women’s abdomen, which is hollow and made of smooth muscles. This is where the baby grows, and during pregnancy the uterus expands to accommodate a full grown fetus (an unborn child). The uterus is wider at the top and narrows into a neck called the cervix, which opens into the upper end of the vagina.
- iii) *Fallopian Tube*: The fallopian tubes are called uterine tubes or oviducts. The two fallopian tubes are trumpet shaped and are located close to their respective ovaries. These tubes open on each side into the upper end of the uterus. The fallopian tubes pick up the eggs released in their respective ovaries and push it into the uterus and it takes 3 to 7 days for ovum to reach the uterus.
- iv) *Vagina*: The vagina is the passageway or a muscular tube extending from the cervix to the external genitals. The opening of the vagina is between the urinary opening and the anus. Every women has three opening in the genital area and these are :

Development During Adolescence

- a) urinary opening which is for the passage for urine
- b) vaginal opening which is for:
- c) passage for period/menstrual flow
- d) passage through which baby comes out at birth
- e) opening for sexual intercourse
- f) Male sperm travel through it to fallopian tubes.

The external genitalia structure also consists of a clitoris, which is a small cylindrical body and is situated above the urinary opening. It exists to provide women with sexual pleasure.

Near the opening of the vagina is the porous membrane called the Hymen, it stretches from one wall of vagina to the other. The hymen tears or gets ruptured during the first penetrative sexual act (intercourse) and is accompanied with little bleeding and pain.

The visible changes: There are some visible changes in female body, these are discussed here:

- i) ***The Growth Spurt:*** There is sudden increase in height and the body fills out. The greatest increase in height occurs around 10 to 11 years for girls. A girl usually stops growing between 16-18 years. Along with height the young girls note changes in the pelvic bones and hips widening.
- ii) ***Breast:*** Breast will start to develop and will become larger and fuller. They enlarge with a deposit of fat, they become soft and rounded during this stage. Breasts have milk glands and milk tubes that open into the nipples.
- iii) ***Hair Growth:*** Youngsters can notice hair growing on their arms, underarms, legs, upper lips, etc. Hair grows in the pubic area, this is a V-shaped area above the vagina. This is called pubic hair and it is thicker, curlier and coarser than the hair on head.
- iv) ***Body Odour:*** The adolescents' sweat glands (under their arms and in genital areas) are becoming more active. When sweat comes into contact with bacteria on the skin it creates an unpleasant smell, both in adolescent boys and girls.
- v) ***Pimples:*** The oil glands or 'sebaceous glands' produce an oily substance called sebum. If the sebum blocks the pores on the skin and combines with the bacteria, the person can get pimples.
- vi) ***Sexual feelings:*** At this stage the young girls may start to feel sexually aroused, and spend time in a fantasy world thinking about love and sex. The movements of hormones inside make the youngster feel more sexual and the body is changing.

Self Assessment Questions

- 1) Define and discuss puberty.

.....
.....
.....

- 2) What are visible and invisible changes occurring during adolescence? Explain.

.....
.....
.....
.....

- 3) Discuss the following terms:

Growth spurt

Pimples

Sexual feelings

Body odour

1.4 LET US SUM UP

According to the study of the entire unit, we can understand that adolescence is the phase of transition from being a child to an adult. In this period teenage or adolescence is generally extended from 12 to 19 years of age and which is broadly categorised into three stages viz., early adolescence, middle adolescence and late adolescence. Adolescence is characterised by dramatic physical changes moving the individual from childhood into physical maturity. Teenagers experience some physical milestones as they move from childhood to adolescence. Normal growth during adolescence includes both an increase in body size and sexual maturation (puberty). There are several marked changes during this period in the lives of both adolescent males and females.

Boys and girls begin the growth spurt at different ages, girls, on average, begin two years earlier than boys and complete them earlier as well. Boys and girls also begin to go through puberty during adolescence. Menstruation is just one of several changes in puberty that are related to the development of primary and secondary sex characteristics. Boys' penises and scrotums begin to grow at an accelerated rate around age 12 and reach adult size 3 or 4 years later. Spermarche occurs after boys' penises enlarge about the age of 13. Secondary sex characteristic development is characterised by growth of pubic hair and growth of underarm and facial hair. For girls, early maturation might offer increased popularity and an advanced social life, but they might also experience embarrassment over the changes in their bodies, which make them different from their peers. Late maturation can put boys at a distinct physical and social disadvantage, which can affect self-esteem and leave lasting, negative effects. Girls who mature late might suffer neglect by their peers of both sexes, but ultimately they appear to suffer no lasting ill effects and may even benefit from late maturation in the long run.

1.5 UNIT END QUESTIONS

- 1) Define and describe the period of adolescence.
- 2) What are the characteristic changes that take place during this period?
- 3) What are the changes that occur in the males during this period?
- 4) What are the changes that office during this period?

1.6 SUGGESTED READINGS

Nielsen, Linda,(1996). *Adolescence: A Contemporary View*, (3rd edition) Harcourt Brace College Publishers.

Meese, Judith L. (2004). *Child and Adolescent Development for Educators*. (3rd edition). McGraw Hill College, USA.