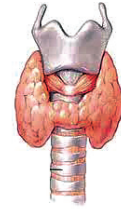


The Age of Adolescence



Usually, we see changes in the age of 10-19 years. This period is called “Adolescence”. During this period changes take place inside (internal) and outside (external) the body. For example, Change in voice, growing tall etc.



- *Observe these changes in yourself too.*
Write down the changes that you observed during your adolescence.

Have you reached the age of “Adolescence”?

Read the following questions. Think whether the following changes have occurred in you too.

- *Did your voice change?*
- *Is hair growing under arm pit/genital region?*

- *Are there pimples or acne on your face?*
- *Are you looking your face in the mirror frequently?*
- *Are you showing restlessness while your parents suggest you to do something?*

If your answers are ‘Yes’ for most of the above questions it reflects that you are in ‘adolescence’.

This is a complex stage of our life, because we grow from childhood to adolescence. We have a lot of stress due to these changes and are unable to decide whether we belong to adulthood or childhood. This is the period of confusion and transition.



Fig-1

Changes at adolescence

Increase in Height

Growth is one of the important characteristic in human beings. Can we go on growing through out our life time? We can't grow like plants. We grow to certain height for certain period only. This change takes place in adolescence at maximum pace. You may have observed that you and your friends are growing and slowly gaining new features.

An individual reaches his / her maximum height during adolescence period only. You may also be growing taller now.

- Do you know upto what age you will grow?

- Will your growth in height stop after a certain age?

Activity-1

Observing growth rate

The following chart gives the average rate of growth in height for both male and female with age (Table-1).

The figures given in Column-2 (Male) and Column-3 (Female) of Table-1 show the percentage of height against the age attained by a person as shown in Column-1 of the same table.

These figures are only representative and there may be individual variations.

TABLE-1

| Age in years | % of maximum height (Male) | % of maximum height (Female) |
|--------------|----------------------------|------------------------------|
| 8 | 72 | 77 |
| 9 | 75 | 81 |
| 10 | 78 | 84 |
| 11 | 81 | 88 |
| 12 | 84 | 91 |
| 13 | 88 | 95 |
| 14 | 92 | 98 |
| 15 | 95 | 99 |
| 16 | 98 | 99.5 |
| 17 | 99 | 100 |
| 18 | 100 | 100 |

Percentage of full height

Age in years

Male Female

What have you observed from the above table? Using the data of table-1, graph has been drawn. Observe the graph and answer the following questions.

- When does growth in height nearly stop?
- Which period of age according to you is the fastest growing period for girls?
- Which period of age is the fastest growing period for boys?
- Who among the males and females grow faster? How can you say?

Initially the female grow faster than boys. But by about 18 years of age both reach their maximum height. The rate of growth in height varies in different individuals.

Some may grow suddenly and then growth slows down gradually.

You may try to calculate your approximate height on the basis of a standard growth chart as given in table-1.

Maximum height that you may attain =

$$\frac{\text{Present height (cm)}}{\% \text{ of full height at this age (as given in the chart)}} \times 100$$

For example Sneha is 13 years old with 125 cm tall. At the end of the growth period she is likely to be $125/95 \times 100 = 131.5$ cm.

Use the information as given in Table- 1 and calculate the maximum height that you reach.

Table -1 shows that girls grow faster than boys in their adolescent period. For example by the age of 11, a boy has reached 81 % of his probable maximum height, while a girl has reached 88% of her maximum height. Form a group of six students including you in your class. Measure heights and calculate future heights of the group members in the following table.

Activity-2

TABLE-2

| Name of the Student | Age | Present height | Maximum growth in height in future |
|---------------------|-----|----------------|------------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

The above activity helps you to calculate how tall you would be. To reach a proper height, along with heredity there are several other factors involved. One of them is proper nourishment.

Activity-3

Changes in your body

Form five groups in your class. Take at least 15 students in each class (6-10). Your selection should be random which means students with odd role number or whose name starts with letter 'S' etc.

Collect body measurement data of the selected 15 students. For this you need to observe health record which is available in your school.

Find an average body measurements for boys and girls in each class separately (If school health record is not available you will take teachers help to measure the components perfectly) record them in your note book as per the table given below.

(For component under voice, you put tick (✓) mark in relevant column)

TABLE-3

| S.No | Name | Age | Height | Chest | Shoulder | Voice | |
|------|------|-----|--------|-------|----------|-------|--------|
| | | | | | | Soft | Hoarse |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

For each class (VI to X) you have to prepare one table. And then you have to calculate averages of the collected information with the help of your teacher. Find the average for each component of your table.

- What relations do you find in these four components?
- Is the change sudden or gradual?
- In which classes do you find a maximum growth in height?

(Information collected by you will give a clue about some changes you notice in your body as you grow, especially during a particular period of life, that is the adolescent period).

You might have noticed that boys in your class have broader shoulders and wider chests than the boys of class 6. In girls the region below the waist starts becoming wider to prepare the body to deliver baby in future. Muscles of the body grow more prominent in boys than in girls. Thus changes occurring in adolescent boys and girls are different.

Voice Change

- If you attend a phone call of a child, can you say whether the child is a boy or a girl? Why?
- How do you know whether the speaker is a boy or a girl?
- Why do break in voice commonly occur in boys during adolescence?

Generally change in voice is seen during adolescence the voice of boys become hoarse in this stage. Let us know about this.

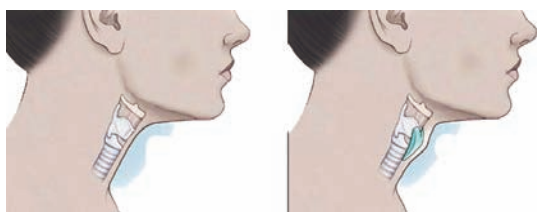


Fig-2

Adam's apple in an adolescent boy

Look at figure-2 and observe some projections at the boy's throat. Try to see the same thing in any of your school mates. This is known as Adam's apple.

The Adam's apple is actually a partial growth of our voice box or larynx. The larynx is made up of 9 cartilages (the kind of substance that you can feel by bending your external ear) one of which is the largest, called as thyroid cartilage. The Adam's apple is formed due to elongation of the thyroid cartilage which protrudes out in front of the neck. This is caused mainly by some male hormones (regulatory chemicals) during adolescence. As a result

of this, muscles (chords) attached to the cartilage get loosened and thickened. When air passes through these loosened and thickened chords a hoarse sound is produced. The laryngeal prominence is usually more prominent in adult men than in adolescent boys.

This is the reason for disturbance in your voice in the stage of adolescence. At the end of the adolescence stage you will get perfect voice.

Sweat and pimples

Naturally in adolescence, boys and girls take care of their face and look frequently in mirror. They also feel worried of their pimples and acne. Sometimes these pimples lead to infection.

The secretions of sweat glands and sebaceous glands in adolescents are very active. Many adolescent boys and girls get pimples on the face, because of increased activity of these glands in the skin, often the pimples become infected too. Owing to extra secretions, sometimes a distinctive odour is also produced from their bodies. Do not squeeze the pimples or it might hurt and result into dark spots on your skin.

What should be done?

- Do not scratch the pimples
- Wash your face regularly with a mild soap
- Use luke warm water to wash pimples and acne. Consult doctor if necessary.
- Never get worried of pimples because stress and strain may help them to increase.

Development of body

Let us recall about the male and female reproductive organs already learnt in the previous chapter.

At this age, male sex organs like the testes and penis develop completely. The testes also begin to produce sperms. In girls, the ovaries enlarge and ovum begin to mature. Ovaries also start releasing mature ovum.

In girls breasts begin to develop, whereas in boys facial hair, moustaches and beards begin to grow. Hair starts growing on the chest of boys. In both boys and girls hair grow in the armpits and at the genital region. These characters are called '**secondary sexual characters**'. The sex organs by which children are identified as boys or girls at birth represent **primary sexual characters**.

Reproductive phase of life in humans

Reproduction is required for continuation of human race. You know that reproduction takes place by the fusion of male and female gametes.

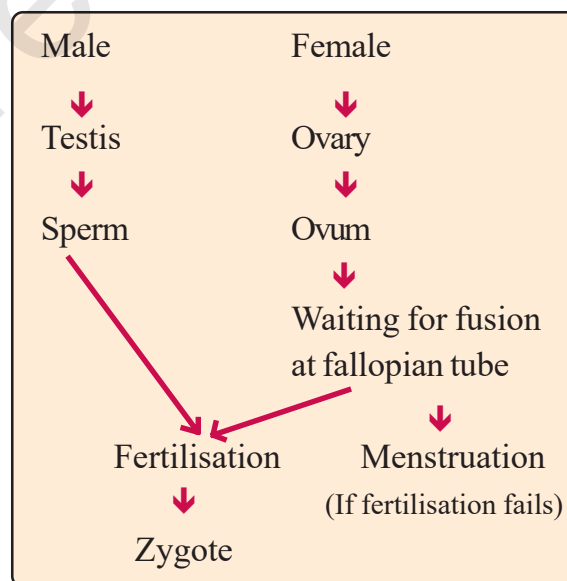
Do you know? When do our reproductive capacity begin?

Adolescents become capable of reproduction when their testes and ovaries begin to produce gametes. Actually there is no specific age; mostly in between 11-15 years. It differs from person to person. (Now-a-days girls are reaching adolescent period earlier than expected.

Some studies explain that it is because of polluted food material such as estrogen present in milk. This fact may also effect the boys and delay the reach of the reproductive phase.) The reproductive capacity lasts for a much longer period in males than in females. Though their bodies are prepared for reproduction physically, mental growth and maturity are still far away.

The first menstrual cycle begins at adolescence and is termed as 'menarche'. It is the sign of starting of release of ova in female reproductive life.

Look at the sequential order of reproductive stage and answer the questions that follow



Schematic diagram of menstrual cycle and reproduction

- Do the production of ova (eggs) last long in females?
- What would happen if ovulation stops?
- What happens if ovum is not released?

- How does ovum change after fertilization?
- What happens if fertilization does not take place?

In females, the reproductive phase of life begins usually around 10-12 years of age and generally lasts till the age of approximately 45-50 years. The ova begin to mature with the onset of adolescence. One ovum matures and is released by one of the ovaries once in about 28 to 30 days. During this period the wall of the uterus becomes thick so as to receive a fertilized egg and if this occurs it results in pregnancy. If fertilization does not occur, the released egg and thickened lining of the uterus along with its blood vessels are shed off resulting in bleeding. This process is called "Menstruation". It is nature's wonderful phenomena.

At 45 to 50 years of age, the menstrual cycle stops. This stage is known as menopause.

Menstruation occurs once in about 28-30 days. In some cases, initially menstrual cycle may be irregular. It takes some time to become regular. If it remains irregular beyond an year, then one must consult a doctor (gynecologist).

Menstruation and myths

Some sections of people in our society believe that during the period of menstruation women are untouchable. So, they are asked to keep a distance from others. During this time, females may be restricted from taking bath, cooking food

or going to school. In that case they may lag behind in their studies. In some sections of the society even women are also forced to stay in the huts built at the outskirts of the village.

In what way this kind of discrimination is harmful for girls and women?

Several researches have been done to prove that all these are myths and there is no scientific reason behind these. If the ovum is not fertilized, the materials of the uterus are expelled out along with blood and ovum.

This is a biological phenomena. So how can it be impure or unclean?

During menstruation period proper care regarding health and hygiene is needed rather than following myths.

Child marriage – A social evil

Marriage is social and cultural practice. It also helps in continuing the next generation. However marrying before attaining proper age is an unhealthy practice.

Child marriage is social evil and should be stopped by any means. It affects the lives of children adversely and cause unwanted damage to their lives.

Let us read the story of Latha which is about a protest against child marriage.

Latha was studying VIII class in Bijjaram village of Kosgi Mandal in Mahaboobnagar district. Her parents decided to get her married. She protested as much as possible.

But they did not agree. Teachers and local social workers and officials stopped this child marriage. Now she is studying in the school along with her friends.

- Discuss in your class why child marriage is wrong.
- Ask your teacher and write how child marriages cause damage to her health.

You might know that in our country, the legal age for marriage is 18 years for girls and 21 years for boys. This is because adolescent mothers are not prepared mentally or physically for motherhood.

Activity-4

Read the following check list. Put tick (✓) mark, which points reflect your behaviour.

| Check list: | |
|--|--|
| Prefer to spend more time before the mirror. | |
| Like to use perfumes. | |
| Do not want to listen to parent's suggestions. | |
| Feel only friends are correct, not parents. | |
| Want to be identified by teachers and peer group. | |
| Want more independence in taking decisions. | |
| Feel responsibility in work allotted at school, house. | |
| Like to take risks. | |
| Take decisions by critical thinking. | |
| Sometimes feels shy, sometimes feels confident. | |
| Have more self consciousness. | |
| Show more sensitivity towards others emotions. | |

To make your future in a right way, you need to know more about adolescence. For this here are some points to help. Do you know why you behave like this? You know the difference between good and bad. You

Early marriage and motherhood cause health problems to the mother and the child. It also curtails employment opportunities of the young women and may cause mental agony, as she is not ready for responsibilities of motherhood.

Adolescence : Changes in behaviour

Adolescence is the growing age where physical change takes place. Apart from this we may observe some changes in behaviour also. Adolescents often are very fast in taking decisions. Often do not want to be forced to do any work.

are often inclined towards anything that attracts you.

These are all common in the phase of adolescence. Interest towards body and self is natural. Attraction towards opposite sex

is also a normal response. No one needs to worry.

The mind of an adolescent is full of zealous acts and urge to find reasons of several things around. They develop abstract ideas as well. Emotionally they are in a turbulent state all the time. They get new thoughts for their life activities. They behave in a different manner as compared to what they did during childhood with peers and elders. They are more independent in nature and very self conscious.

An adolescent feels insecure while

trying to adjust to the changes in the body and the mind. They seek company of friends to share their feelings even if they are of the opposite sex. This is normal. They need a lot of attention, love and care as well as answer to all their queries regarding their body and its developments.

It is the first and foremost duty of every adult to prepare oneself to reveal to the adolescent the secrets of nature and the natural course of life as it is. Adolescent queries must never go unanswered

Effects of Hormones in Adolescence

The following figure helps you to know more about hormones that influence on adolescence. This figure shows the position of a special group of glands called endocrine glands in the human body. These glands help in the regulation of the functioning of the human body by releasing some chemicals directly into the blood.

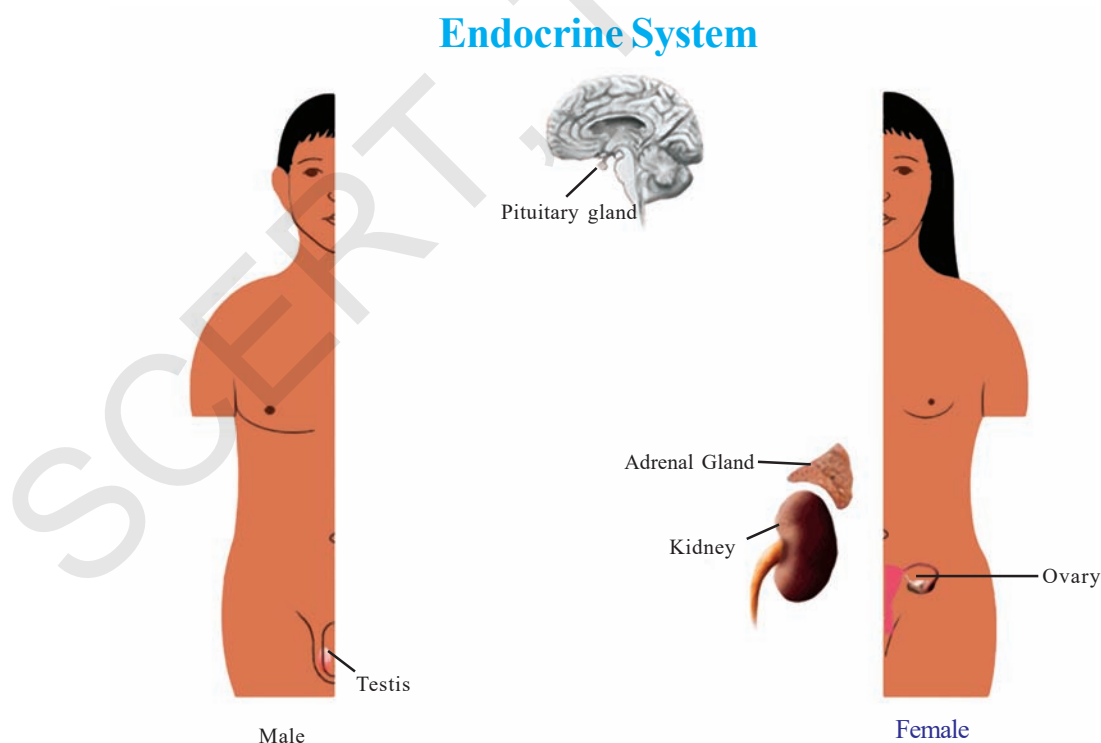


Fig-3 : Position of some endocrine glands in the human body

The endocrine glands do not have specialized ducts so, they are called as ductless glands. The secretions of these glands are known as hormones which are directly released into blood. The endocrine hormones perform several functions in the body like, controlling the sugar levels, salt and calcium levels in the blood, development of the reproductive system etc. Physical changes during adolescence,

starting of menses, pregnancy and menopause etc are largely under the control of these hormones.

The male hormone 'testosterone' is released by the testes at the onset of adolescence which causes changes in boys. In girls ovaries begin to produce the female hormone 'estrogen' which brings about the development of breasts. Milk secreting glands or mammary glands develop inside the breasts.

Do you know?

Following table shows a list of some endocrine glands and some of the hormones produced by them.

TABLE-4

| S. No. | Gland | Hormone | Effect |
|--------|-----------------|--|---|
| 1 | Testes | Testosterone | Formation of sperm, secondary sexual characters in male |
| 2 | Ovaries | 1. Estrogen 2. Progesteron | Formation of ovum, menstruation, embryo-implantation, secondary sexual characters in female |
| 3 | Pituitary gland | 1. Pituitary hormones like growth hormone, 2. follicle stimulating hormone (FSH) 3. Leutinizing hormone (LH) | Brings about general growth, stimulates other endocrine glands. FSH directs follicles for formation of ova or eggs, while in males directs testosterone to stimulate testes to produce sperms. LH causes the egg to burst out from follicle and flow into the fallopian tubes |
| 4 | Adrenal gland | Adrenalin | Controls emotions |

Adolescence and health

It is very important to be healthy and fit, at any stage of life. For this, proper

nutrition and hygiene is necessary. So far we have discussed that adolescence is the age when growth and development takes

place at a faster rate. That is why it becomes more essential to be careful about health and hygiene in the adolescent period.

Balanced diet

This is the stage of rapid growth and development, because the diet for an adolescent has to be carefully planned. Taking healthy and nutritive food is very important.

You already studied in the earlier classes that the balanced diet includes proteins, carbohydrates, fats and vitamins in requisite proportions. A meal of *roti*/rice, *dal* (pulses), vegetables, milk and fruits etc. is good for overall health.

We need to ensure that our meal contains the food components (carbohydrates, proteins, fats, minerals and vitamins).

Cleanliness

We have studied that sweat glands become more active in adolescents and give body a distinctive odour. So it is better to take bath regularly. Your clothes should be washed and cleaned every day. If cleanliness is not maintained, there are chances of having fungal, bacterial and other unwanted infections. Girls should take special care of cleanliness during menstruation. Making use of disposable napkins may reduce chances of infections.

Physical Exercise

Walking and playing in fresh air keeps the body fit and healthy. All young boys and girls should take a walk, exercise and play outdoor games. The physical activity leads to

conditions of better health and sound sleep.

Adolescence is a period when many changes take place in the body. Because of these changes one may get tensed, confused or feel insecure. In this situation if anybody suggests that you will get relief if you try some drugs, just say “NO”, unless prescribed by the medical doctor. In case of having any problems, insecurity or tensions it is better to discuss, take help and guidance of your elders, parents, teachers or doctors.

Do you know?

Consuming tobacco (gutkha, cigarettes, cigar, beedi, khaini) damages the internal organs of the body. The number of addicted people at the age of 15 or below is 57.57 lakhs (68%) in AP. When they reach 30 years of age their internal organ system becomes damaged, and this leads to several problems and sometimes, may cause death also. It is a dangerous trend in our country.



Think and Discuss

- If young generation is trapped into such unhealthy habits, what will be the future of our country? What are its effects?

Are you participating in adolescent education programmes in your school? Do you have a membership in red ribbon club? List out the programmes held for the last three months in your school and also add your opinion.



Key words

Adolescence, Larynx, Adam's apple, Maturity, Sweat glands, Sebaceous glands, Secondary sexual characters, Menstruation cycle, Menarche, Menopause, Pregnancy, Endocrine glands, Hormones, Testosterone, Estrogen.



What we have learnt

- Adolescence is the period of reproductive maturity which lies usually between the ages of 10 to 19 years.
- During adolescence a child's body undergoes many changes physically as well as mentally.
- Voice of boys becomes hoarse as chords of voice box get loosened and thickened during adolescence.
- Height gain in children take place during adolescence and stops after wards.
- The onset of puberty or development of secondary sexual characters and maturity of reproductive parts are controlled by hormones that become functional at the onset of adolescence.
- Hormones are the secretions of endocrine glands without ducts which secretes them directly into the bloodstream.
- Pituitary glands secrete hormones which include growth hormone and other stimulating hormones that make other glands such as the testes, ovary, adrenals etc secrete hormones.
- Testosterone is the male hormone and estrogen is the female hormone that bring about development of several secondary sexual characters.

- The uterine wall in female prepares itself to receive the developing fertilized eggs. In case there is no fertilization, the thickened lining of the uterus wall break down and goes out of the body along with the blood. This is called menstruation.
- It is important to take balanced diet for overall growth and development during adolescence.



Improve your learning



1. How is adolescence different from childhood? (AS1)
2. Write short notes on the following. (AS1)
 - a) Secondary sexual characters
 - b) Adam's Apple.
3. List out the changes in the body that take place at the age of adolescence? (AS1)
4. Match the following: (AS1)

| | | |
|--------------------|------------|-----------------------|
| 1. Testes | () | a. Estrogen |
| 2. Endocrine gland | () | b. Pituitary |
| 3. Menarche | () | c. Sperm |
| 4. Female hormone | () | d. First menstruation |
5. Why acne and pimples are common in adolescents? (AS1)
6. What can you suggest to your classmates to keep himself / herself clean and healthy? (AS7)

7. If you have a chance to talk to a doctor, what questions would you ask about adolescent emotions and changes in the body? (AS 2)
8. Some mobile phones have auditory meter to measure frequency of produced sound. By using this phone, measure your friend's voice frequency one from each class VI to X. Report your findings. (AS 3)
9. Write five suggestions to improve the performance of Red Ribbon club of your school? (AS 6)
10. Prepare a three minute speech on behavioural changes in adolescents. (AS6)
11. Nature prepares human body to reproduce her generations. What do you think of it? (AS 6)
12. You know that early marriage is a social taboo. Prepare some slogans to prevent this. (AS 6)
13. 13 years old Swaroop always think of his height. Can he improve his height? What do you suggest him? (AS 7)
14. Are you angry with your parents. How do you wish your parents to be? (AS 7)
15. What are your expectations about your parents and teachers? (AS7)