

Chapter – 8: Reaching the Age of Adolescence

- Previous chapter – human reproduction – various organs related to it
- BUT – to reproduce – humans must reach – certain age – specific growth and development
- This chapter – various changes – human body goes through

Endocrine System

- Reproduction, growth, development – human body – controlled by – specialized organ system – endocrine system
- This system – different glands – endocrine glands – release chemicals – hormones
- These hormones – released directly into blood – reach wherever required

Characteristics of hormones

- Released by endocrine glands – also known as ductless glands
- Control various processes – growth, development, behavior, reproduction
- Required in small quantities
- Do not act – where produced
- Released directly into blood – blood carries them – site of action – target site – very specific

Functions of endocrine glands

Endocrine gland	Location	Hormones produced	Hormone function
Pituitary*	Brain	Prolactin	Milk production
		Growth hormone	Growth and development
		THS (Thyroid Stimulating Hormone)	Stimulates thyroid gland – produce thyroxin
*Pituitary gland – also known as master gland – controls working – other glands			
Thyroid^	In the neck region	Thyroxine	Regulates – growth and metabolism
^Decrease production of thyroxine – deficiency of iodine – result – goitre			
Adrenal	On each kidney	Adrenaline (fight and flight hormone)	Prepare body – handle – stress, anxiety, anger, fear, etc
Pancreas ⁺	Below the stomach	Insulin	Regulates – blood sugar level
⁺ Pancreas – fail to produce insulin – blood glucose level – increases – result – diabetes			
Ovary (female only)	Inside lower abdominal cavity	Oestrogen Progesterone	Control – ova production and sexual characters in females
Testis (male only)	Outside abdominal cavity – scrotal sacs	Testosterone	Control – sperm production and sexual characters in males

Role of hormones in life cycle of insects and frogs

- Animals – also need hormones – growth and development

- Metamorphosis – controlled by insect hormones
- Thyroxine – produced by thyroid glands – control metamorphosis in frogs

Puberty and Adolescence

- Humans – reproduce – only after maturity
- Phase – body mature physically – puberty
- Period of life – start of puberty to adulthood – adolescence
- Begins around – age 11 – upto age 18,19
- This period – coincide with ‘teen’ years – thirteen to nineteen – adolescents – referred as teenagers
- Girls – adolescence begins – 1 or 2 years before boys
- Period of adolescence – varies – person to person
- Start of puberty – lots of changes – physical, emotional, intellectual, etc
- Adolescent – matures sexually – puberty ends

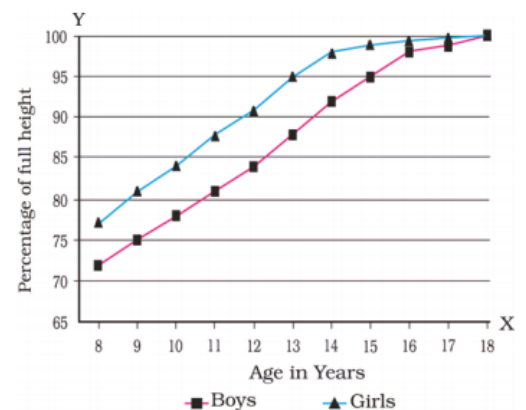
Changes during puberty

- Increase in height –
 - Most visible change – sudden increase in height – boys, girls
 - Reason – elongation (stretching) of bones – arms, legs
 - Initial years – girls grow faster than boys
 - By the age of 18 – both – girls, boys – reach maximum height
 - Rate of increase – different for everyone
 - Height – also depends on – genes received from parents
 - Calculate maximum height you can reach – table and formula
 - Formula –

$$\frac{\text{Present height (cm)}}{\% \text{ of full height at this age}} \times 100$$

- Table –

Age in Years	% of full heights	
	Boys	Girls
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



- Graph shows – girls grow faster than boys
- Proper growth – require proper nutrition – eat balanced diet – very imp.

- Change in body shape –

- Many changes – both boys, girls – this age
- This period – differences between boys, girls – more clear
- Boys –
 - Shoulders become broader
 - Body muscles – more prominent (visible)
 - Chest becomes wider
- Girls –
 - Region – below waist – grow wider
 - Breasts – develop – increase in size
 - Mammary glands – develop inside breasts
- Development of hair –
 - Both – boys, girls – hair growth – armpits, pubic regions
 - Hair growth – also visible – arms, legs
 - Boys – more facial hair – beard, moustache
 - These features – differentiate males from females – secondary sexual characters
- Change in voice –
 - Voice box (larynx) – grows during puberty
 - Larger in boys – shorter in girls
 - Growing larynx in boys – visible as overhanging part – Adam's apple
 - In girls – larynx – shorter – not visible
 - Girls – high pitched voice – boys – deep voice
 - Growth of larynx in boys – voice may become – hoarse (rough) – cracking of voice
 - This change – temporary – voice becomes normal soon
- Increased activity – sweat, oil glands –
 - During puberty – sweat, sebaceous (oil) glands – overactive
 - Many adolescents – acne, pimple problems
 - Increased sweating – body odour
- Development of reproductive organs –
 - Reproductive organs – develop fully – this period
 - Start of puberty –
 - Boys –
 - Testosterone – released by testes
 - Result – organs – testes, penis – develop completely – start sperm production
 - Girls –
 - Oestrogen, progesterone – released by ovaries
 - Result – ovaries grow – production of ova begin – 1 egg per month released

Reaching mental, intellectual, emotional maturity

- Adolescents – more independent
- Various physical changes – teenagers – more self-conscious
- Intellectual development – spend more time – thinking, planning, exchanging ideas with others

- Some adolescents – develop insecurity – experience mood swings
- Sexual maturity – both boys, girls – attracted towards opposite gender
- Imp. – teenagers realize – these changes – natural part – growing up

Role of pituitary gland – reproductive function

- Pituitary – activates – testes, ovaries – release – testosterone (males), oestrogen (females)
- Hormones – released in blood – reach different body parts – target site

Reproductive Phase in Females

- Reproductive age – females – begin at puberty – age 10-12
- This period – ovaries – release ova (eggs)
- 1 mature ova – per month – carried through fallopian tube to uterus
- Release of egg – ovulation
- Hormones – oestrogen, progesterone – released by ovaries
- Result – wall of uterus – become thick and prepares itself – receive fertilised egg
- Egg – fertilised – result in pregnancy – zygote formation
- Zygote – cell division – form embryo – embedded (joined) into uterus wall
- If – egg – not fertilised – inner lining of uterus breaks
- Egg – along with blood, uterine remains – flushed out through vagina
- Flow – blood, other materials – 3-6 days – termed as menstruation
- Women – reproductive age (adolescents) – undergo this phase every month – called as ‘period’
- Stages – menstrual cycle –
 - Maturation of egg
 - Release of egg – ovulation
 - Thickening of uterus wall
 - Breakdown of uterine wall – if no pregnancy
- Menstrual cycle – 28-30 days – middle of this cycle – ovulation happens
- First menstrual flow – start of puberty – **menarche**
- This cycle – irregular in the start – become regular overtime
- Around 45-50 – women lose – ability to reproduce – menstrual cycle stops - **menopause**

Determination of Gender (Sex) of Baby

- Gender of baby – nature of gametes – fuse to form zygote
- Inside nucleus – chromosomes – determine (decide) hereditary (passed down generations) characters
- 46 chromosomes (23 pairs) – every human cell – 2 out of these – sex chromosome – ‘X’ and ‘Y’
- Female – both ‘X’ – male – 1 ‘X’ and 1 ‘Y’
- Egg – only X chromosome – sperm – may have X or Y chromosome
 - Sperm with X chromosome – fertilises egg – zygote – have 2 X chromosomes – develop into female
 - Sperm with Y chromosome – fertilises egg – zygote – have 1 X, 1 Y chromosome – develop into male
- Gender of child – decided by chromosome – provided by father

Reproductive Health

- This issue – need to be discussed
- Lack of awareness – many men, women – face problems – reproductive system
- People – embarrassed to talk – do not seek (find) help
- Information, facilities – available now – men, women – protect their families – regular checkups
 - Family planning –
 - Basic health reason – gap between children – major impact – mother's health
 - Several methods – available for use – both men, women
 - Number of kids – controlled by planning – necessary steps
 - Sexually transmitted diseases (STDs) –
 - Number of diseases (including AIDS) – transmitted (transferred) – unprotected sexual acts
 - Regular tests done – use of preventive techniques – encouraged – remain safe from STDs

Health of mother and infant

- Health of baby – depend on health of mother
- Very imp. – understand needs – pregnant women and lactating (feeding breast milk) mother
- Following points – keep in mind –
 - Hygiene –
 - Maintain cleanliness – prevent infection – before and after delivery
 - Nutrition –
 - Extra protein, calcium – included in mother's diet – benefit both mother and child
 - Breast-feeding –
 - Mother's milk – contain nutrients, antibodies
 - Child – breastfed upto required age

Reproductive health in adolescents

- During adolescence – many changes in body
- Adjust with these changes – take care of mental, physical health
 - Nutrition –
 - Adolescence – stage – rapid growth, development – balanced diet – required
 - Balanced diet – meals include – proteins, carbohydrates, fats, minerals, vitamins – right amounts
 - Eat proper amounts – cereals, pulses, fresh fruits, vegetables, milk, meat, etc
 - Fast foods – chips, aerated (soft) drinks – not to be consumed
 - Personal hygiene –
 - Very imp. – teenagers – take care – their cleanliness
 - Reason – increased activity – sweat glands – body odour
 - Everyday bath – very imp.
 - Without cleanliness – chances of infection
 - Physical exercise –
 - Imp. for teenagers – exercise regularly – body – fit and healthy
 - Walking, jogging, playing outdoor – good for adolescents
 - Say 'no' to drugs –

- Adolescence – period – confusion, insecurity
- Imp. for teenagers – control their mind
- Sometimes – teenagers – start doing drugs (addiction) – spoil (effect badly) their health, career, life
- Once taken – desire to take them again increase – known as addiction
- Very imp. – say ‘NO’ to drugs
- Drug user – may get infected – AIDS – infected syringes, needles
- HIV – virus responsible for AIDS
- HIV – spreads through – sexual contact, mother to baby, through blood transfusion
- During puberty – parents, teachers, other elders – best guide – solve problems – SO – do not hesitate to ask for help