Chapter – 7: 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

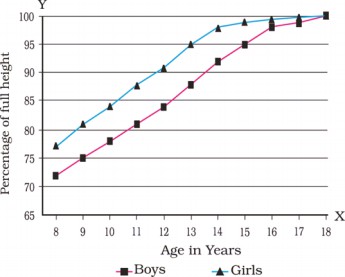
## Changes during puberty

* 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 –
    - 𝑃𝑟𝑒𝑠𝑒𝑛𝑡 ℎ𝑒𝑖𝑔ℎ𝑡 (𝑐𝑚)

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* + Table –

x 100



|  |  |  |
| --- | --- | --- |
| 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