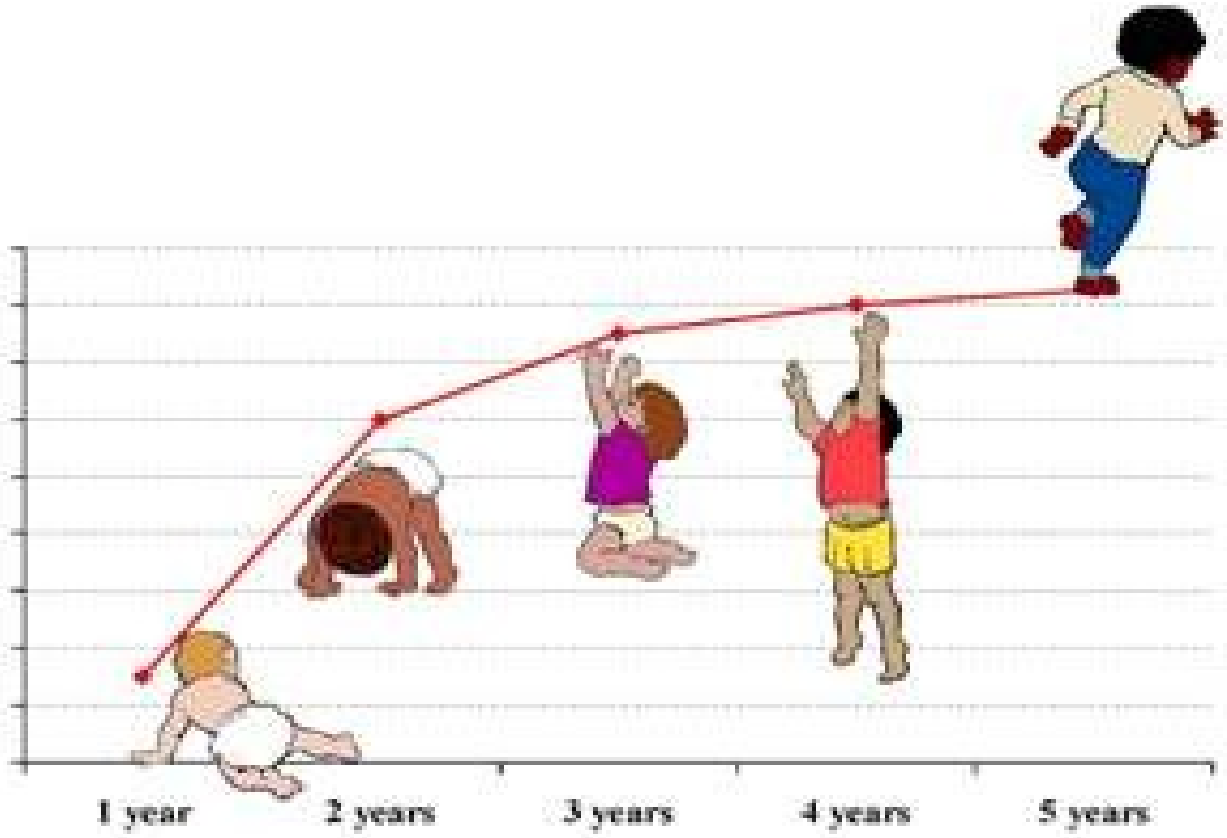
Child growth and development



Learning objectives

By the end of this lecture, the student will be able to:

- Define growth and development.
- Outline the principles of growth and development.
- Identify the importance of growth and development.
- Describe factors affecting growth and development.
- List types of growth and development.
- Identify the stages of development.

Introduction

- Growth and development begins at conception and ends at maturation
- Growth; Increase in size and weight of the whole body or any of its parts due to increase in number and size of cells.
  - It is simply a quantitative change in the child's body.
- Development; increase in complexity and capacity to function optimally in the society
  - It is a qualitative change in the child's functioning
- Maturation; Increase in child's competence and adaptability
  - It is the qualitative change in the child's overall growth and development

Differences between growth and development

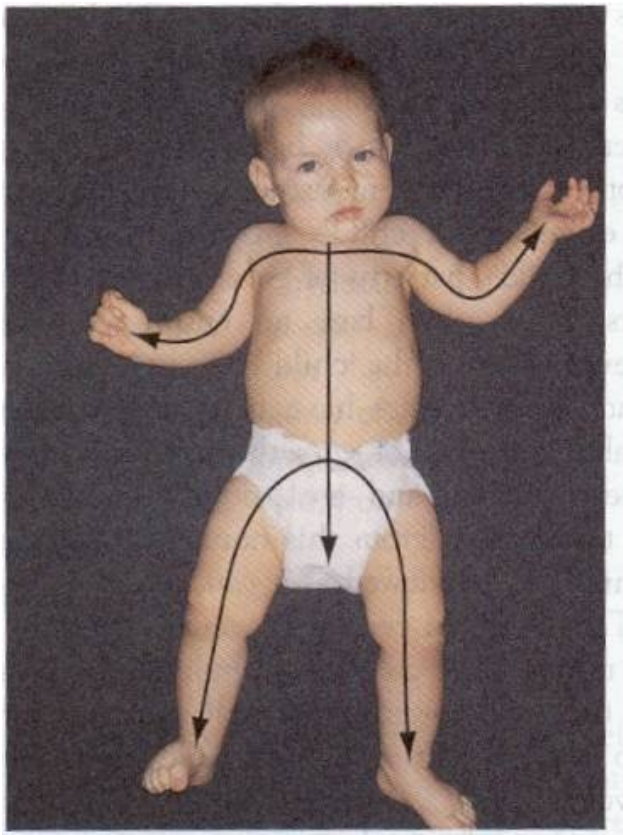
Growth	Development
Term used purely in physical sense, it generally refers to increase in size, length i.e. changes in the quantitative aspects.	Implies overall change in shape, form or structure resulting in improved working or functioning, changes in the quality or character rather than the quantitative
Does not continue throughout life. It stops when maturity has been attained.	It continues throughout life and is progressive.
The changes produced by growth are the subject of measurement. They may be	Implies improvement in functioning and behavior and hence brings qualitative

Stages of growth and development

- Pre- natal; conception- birth
  - Germinal: conception – 2 weeks
  - Embryonic: 2- 8 weeks
  - Fetal: 8-40 weeks
- Infancy
  - Neonate: 0- 28 days
  - Infancy: 1 month-1 year
- Early childhood
  - Toddler:1-3 years
  - Pre-school: 3-6 years
- Middle childhood
  - School age: 6-12 years
- Late childhood
  - Adolescence
  - 12 – app. 18 years.

Principles of growth and development

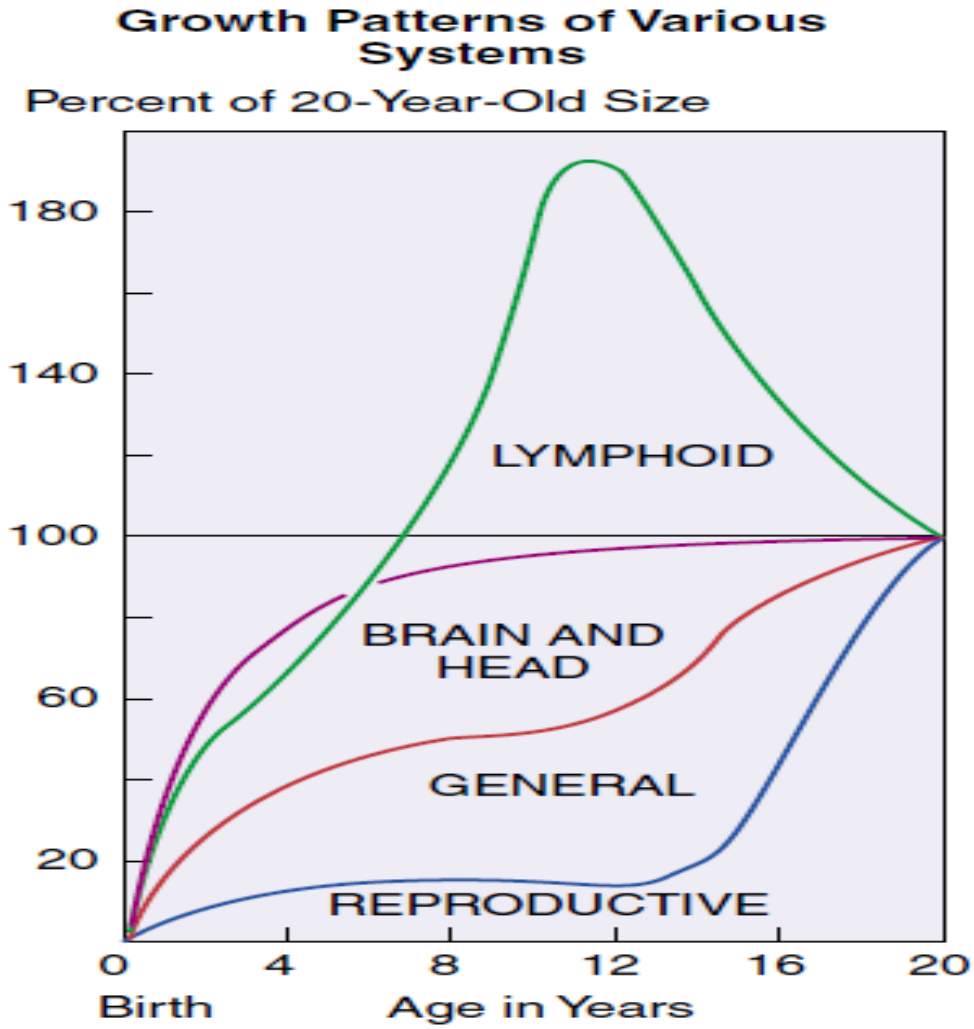
- Continuous, occurs in a sequential process; predictable and follows a universal timetable
- Directional; skill development proceeds along different pathways;
  - Cephalocaudal(head to toe)
  - Proximal distal (inward-outward)
  - General to specific
  - Simple to complex
- Wide individual difference in growth and development



Principles cont…

- Hierarchical integration; Skills develop separately and independently thereafter, are integrated into more complex skills
- Growth and development is not uniform throughout life; there are periods of accelerated and decelerated growth (growth spurts).
- New skills pre-dominate; strong drive to practice and perfect new abilities, especially early in life.

- Rates and patterns of growth are specific to certain parts of the body; different body tissues and systems mature differently



- Development is interrelated; physiological, psychosocial, cognitive and moral aspects of development are affected by one another

- Each stage of G&D is affected by the preceding types of development

Importance of understanding growth and development to the nurses

- Help the nurse provide screening for physical and emotional problems.
- Gaining better understanding of the reasons behind illnesses.
- Helping in formulating the plan of care.

- Develop a rapport with the child to enhance the provision of health care;
- Anticipatory guidance and teaching to parents in order to achieve optimal growth & development at each stage
- Provide education to the family to build a healthy lifestyle for the future.

Factors affecting growth and development:

- Hereditary
- Environmental factors

Pre-natal environment

1. **Factors related to mother during pregnancy**:
   - Nutritional deficiencies
   - Obstetric disorders of pregnancy; Chronic medical conditions
   - Exposure to radiation
   - Torch infections
   - Drug and substance use
2. **Factors related to the fetus**

- Mal-position in uterus
- Faulty placental implantation
- Multiple pregnancy

Post-Natal Environment

External environment:

- socio-economic status of the family
- child's nutrition
- climate and season
- child's ordinal position in the family
- Number of siblings in the family
- Family structure (single parent or extended family …)
- Cultural factors

Child's internal environment

- Child's health status
- Child's intelligence
- Hormonal influences
- Emotional factors

Types of growth and development

- **Types of growth**:
  - Physical growth (Ht, Wt, head & chest circumference)
  - Physiological growth (vital signs …)

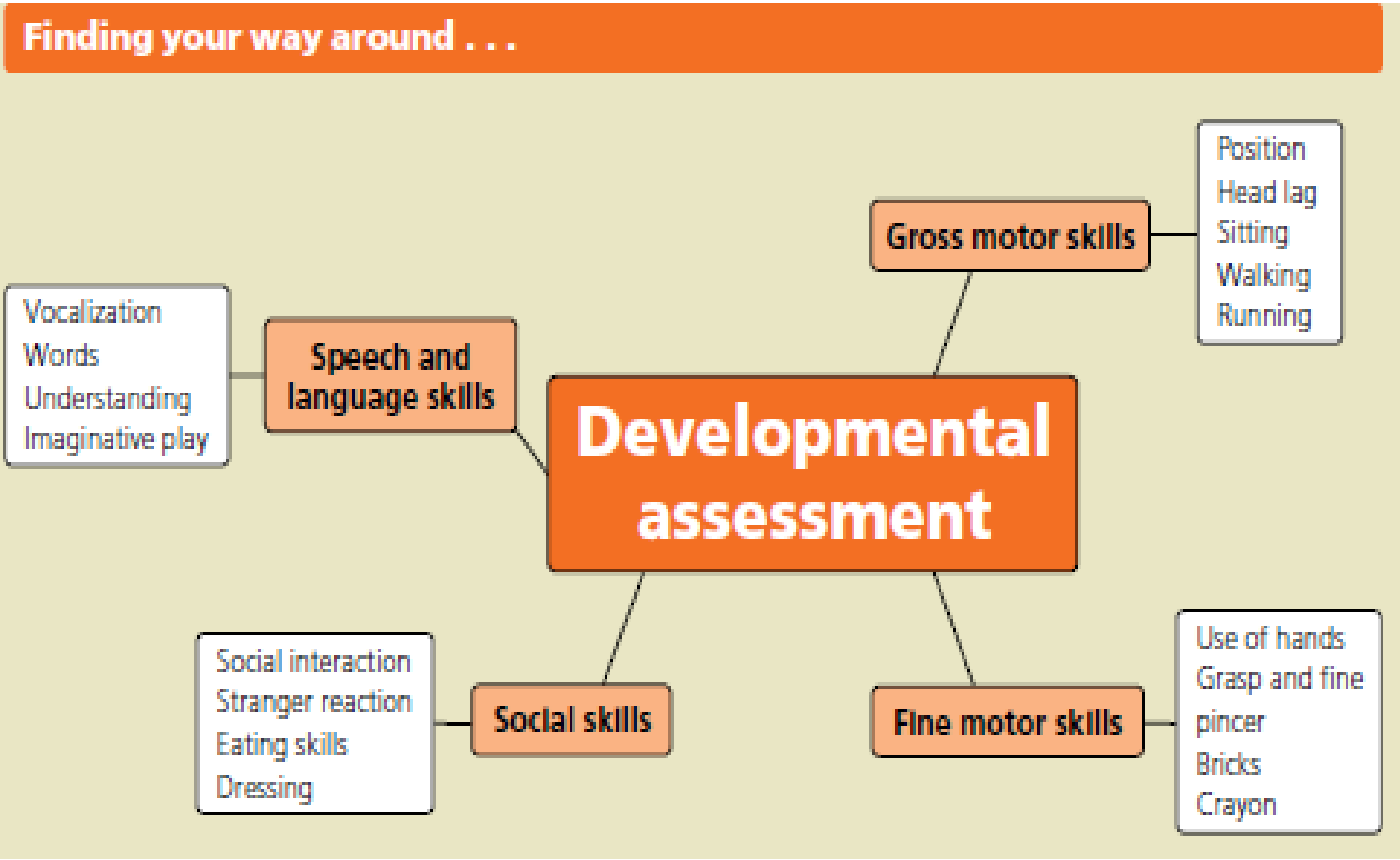
- **Types of development**:
  - Motor development
  - Cognitive development
  - Emotional development
  - Social development

Development assessment

- Developmental assessment is an integral part of the pediatric examination and assessment
- Mainly done by assessing milestones; children accomplish maturation of different biological functions at anticipated age, with margin of a few months on either side
- Requires practice and skill.
- Systematic in approach to ensure all areas of development are covered
- Developmental assessment is divided into four major areas:
    - Gross motor; control of child over his body
    - Fine motor; coordination of eyes, hand-eye coordination, hand – mouth coordination and skills for manipulation with hands
    - speech and language,
    - Social.

Delay in <u>all four</u> indicates intellectual disability, isolated delay in any one area is often not abnormal.

Development assessment



Newborn growth & development

Physical growth

- Birth weight; 2.700 – 4 kg
- 1st week of life: baby looses 5-7% of birth weight which should be regained by 10th day of birth. Weight loss is due to;
  - Withdrawal of hormones from mother.
  - Loss of excessive extra cellular fluid.
  - Passage of meconium (feces) and urine.
  - Limited food intake
- From 10th day- 1month
  - Growth rate for males- 40 g/kg/day
  - Growth rate for females- 35 g/kg/day
- Gain ¾ kg by the end of the 1st month

Physical growth cont…

Height

- Boys average Ht = 50 cm
- Girls average Ht = 49 cm
- Normal range for both (47.5- 53.75 cm)

Head circumference

- 33-35 cm
- Head is ¼ total body length
- Skull has 2 fontanels (anterior & posterior)

Chest circumference

- It is 30.5 to 33cm (usually 2–3cm less than head circumference).

Motor development

- **Gross motor development**
  - The newborn's movement are random, diffuse and uncoordinated. Reflexes carry out bodily functions and responses to external stimuli.
  - Eyes follow bright moving objects.
  - Lies awake on back.
  - Responds to sounds of bell and other similar noises
- **Fine motor development**
  - Holds hand in fist
  - Immediately drops objects placed in hands.
  - When crying, he draws arms and legs to body
- **Reflexes**
  - Swallowing
  - Gagging
  - Sucking
  - Grasp
  - Rooting
  - Step reflex

Cognitive development

- Refers to the development of thinking, gaining and using knowledge.
- Reflexive
- Learning occurs through imitation and habituation- ability to decrease response to disturbing stimuli.
- Newborns at age 12 can be able to imitate facial and manual gestures of adults
- The newborn infant responds to sounds with either cry or eye movement, cessation of activity and / or startle reaction
- Sensitive to touch and handling; It is the most highly developed sense. It is mostly at lips, tongue, ears, and forehead.

- Responses are generally limited to tension states or discomfort.
- Gains satisfaction from feeding and being held, rocked, fondled, and cuddled.
- Taste; well developed as bitter and sour fluids are resisted while sweet fluids are accepted.
- Smell; only evidence in newborn infant’s search for the nipple, as he smell breast milk.

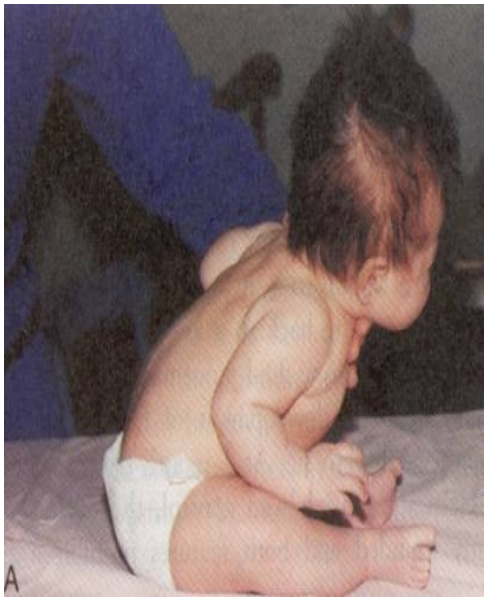
Social Development

- Intently regards face of mother
- Respond to auditory stimulus by turning head and looking at the source of the stimuli.

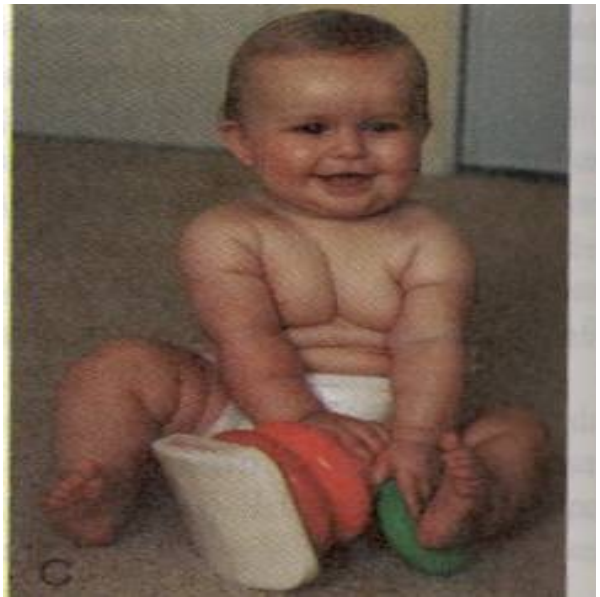
Infancy

- It is the period which starts at the end of the first month up to the end of the first year of age.
- Infant's growth and development during this period is rapid

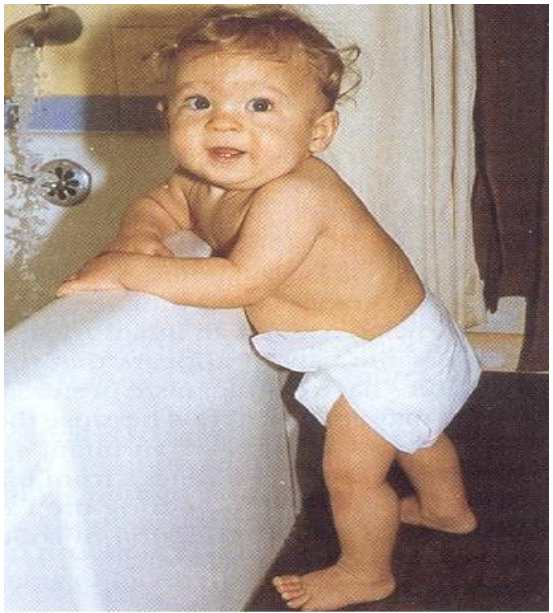
2 months



6 months



12 months



Physical Growth in Infancy

- Weight : the infant gains :
  - Birth to 4 months → ¾ kg /month
  - 5 to 8 months → ½ kg / month
  - 9 to 12 months → ¼ kg /month
  - The infant will double his birth wt by 4-5 months and triple it by 10-12 months of age
- Approximation of Infant weight from 3 to 12 months

$$\text{Weight} = \frac{\text{Age in months} + 9}{2}$$

Example; Wt of 7 months old infant = $\frac{7+9}{2} = \frac{16}{2} = 8$ kg

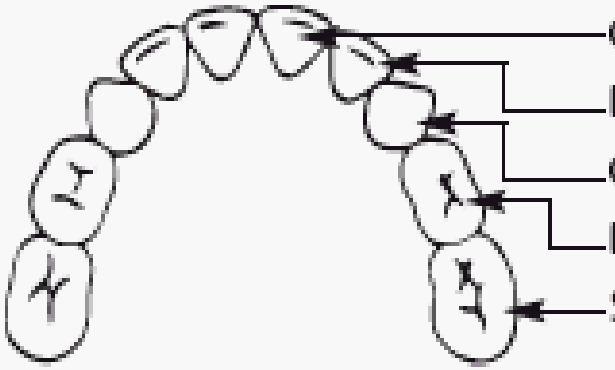
- Length increases by 50% in first year
  - Length increases about 3 cm /month during the 1st 3 months of age,
  - then it increases 2 cm /month at age of 4-6 months,
  - Then, at 7 – 12 months, it increases 1 ½ cm per month

Physical growth cont…

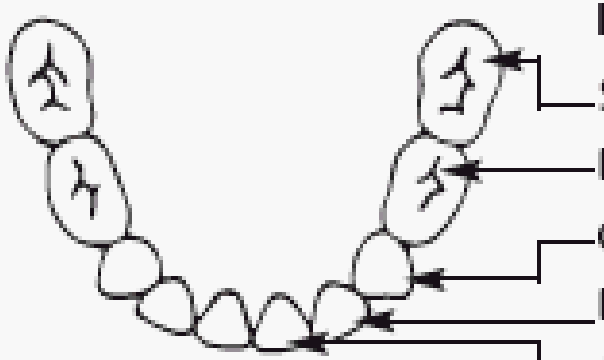
- Head circumference;
- It increases about 2 cm /month during the 1st 3 months,
- Then, ½ cm/month during the 2nd 9 months of age.
- By 12 months, the infant's brain will be 2/3 the size of an adult's
- Posterior fontanelle closes at approximately 4 months
- Chest circumference
- By the end of the 1st year, it equals head circumference.

Physical growth cont…

PRIMARY DENTITION



Upper Teeth	Erupt	Exfoliate
Central incisor	8-12 months	6-7 years
Lateral incisor	9-13 months	7-8 years
Canine (cuspid)	16-22 months	10-12 years
First molar	13-19 months	9-11 years
Second molar	25-33 months	10-12 years



Lower Teeth	Erupt	Exfoliate
Second molar	23-31 months	10-12 years
First molar	14-18 months	9-11 years
Canine (cuspid)	17-23 months	9-12 years
Lateral incisor	10-16 months	7-8 years
Central incisor	6-10 months	6-7 years

Motor development

Gross motor development

- **At 2 months**
  - Turn heads from side to side.
  - Reflexive behavior is slowly being replaced by voluntary movements.
  - Begins to lift head momentarily from prone position.
  - Shows eye coordination to light and objects.
  - If bell is sounded nearby, infant will stop activity and listen.
  - Eyes follow better, both vertically and horizontally. Focuses well.

- **At 3 months**
  - Hold head erects and steady.
  - Open or close hand loosely.
  - Hold object put in hand
- **4 months**
  - Can lift head and shoulders, head control achieved
  - Hold head erect and steady while in sitting position.
  - Bring hands together in midline and plays with fingers.
  - Grasp objects with both hands.

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  - Hold head erects and steady.
  - Open or close hand.
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  - Hold head erect and steady while in sitting position.
  - Bring hands together in midline and plays with fingers.
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Gross motor development cont…

- 5 months; rolls over, sits with support
- 6 months ;sits without support, bear weight on legs
- 9 months, the baby can get into the sitting position alone, stands alone with support .

Mobility.

- Crawling at 7–9 months, some babies don’t pass through the crawling phase. Others bottom shuffle.
- Pulling up to standing occurs at 10 months
- Cruising occurs by 11 months.
- 12–13 walks independently variable.
- 15 months stands from crouching

Fine motor development

Require dexterity and cognitive ability.

- 2 months, grasp reflex fades, grasps and momentarily holds objects before dropping, hands held open.
- 3 months; laces fingers in the mouth, holds a rattle and shakes.
- 5 months; voluntary palmer’s grasp, reach out for a toy.
- 6 months, transfers object from one hand to the other.
- 7 months, grasp an object and bring it to the mouth.
- 9 months pincer grasp, emergence of dominant hand
- 1 year, a baby will give a 2-cm square wooden block

to you and release it.

- Turns multiple pages of a book

Speech & language

- Vocalizes at about 3 months and starts to enjoy playing with his voice.
- 6 months; makes consonant sounds such as ‘da’, ‘ba’, ‘ma’ and ‘ka’.
- 8 months; ‘double babble’ (dada, baba, mama).
- 10 months; understand spoken speech and responds in appropriate manner
- 12 months and two or three words with meaning for objects of daily use (True speech).

Social skills

Refers to child interaction with people, and acquisition of everyday skills such as eating and dressing

- Sights and sounds are the most important stimuli that elicit reactions in a baby.
- 4 weeks; quietens to speech, or opens their eyes widely in response spoken word.
- 6 weeks; smiles responsively, major milestone. Failure to smile by 8 weeks is abnormal.
- 3 months; squeals with pleasure, recognizes mother
- 4 months; Gastrocolic reflex disappears, discriminates between strangers and familiar people.

- 6 months; Play is self-contained, Laughs out loud, makes “talking” sounds in response to others' talking.
- 8 – 10 months; Begins fear of strangers.
- ‘Permanence of objects’ develops on average by 9 months – prior to this age, a baby shows no reaction when an object is dropped from view
- Waves ‘bye bye’
- 10 months appreciates phrases such assays ‘no’.
- 12 months; separation anxiety.
- 12 months; mimics action carried out by mother

Cognitive development

- Becomes alert when mother is around, 2-3 months
- Reaches for dropped toy by 8 months
- Loves peek- a boo game by 10 months

Toddler growth and development

Toddler stage is between 1-3 years of age. Growth slows down considerably

- **Physical growth**

Weight:

The toddler's average weight gain is 1.8 to 2.7 kg/year.

Formula to calculate normal weight of children over 1 year of age is

Age in years X 2+8 = ….. kg.

e.g., The weight of a child aging 4 years

= 4 X 2 + 8 = 16 kg

Physical growth cont…

Height

- During 1–2 years, the child's height increases by 1cm/month.
- The toddler's height increases about 10 to 12.5cm/year.
- Estimation of height
- Age in years X 5 + 80 = cm.
- e.g., the length of 2 years old child

  = 2 X 5 + 80 = 90cm

Head & chest circumference

- The head increases 10 cm only from the age of 1 year to adult age.
- During toddler years, chest circumference continues to increase in size and exceeds head circumference.

Teething

- By 2 years of age, the toddler has 16 temporary teeth.
- By the age of 30 months (2.5 years), the toddler has 20 teeth

Motor development

Gross motor development

15 months

- Walks alone, creeps upstairs,
- Assume standing position without falling.
- Hold a cup with all fingers grasped around it.

At 18 months:

- Hold cup with both hands.
- Transfer objects hand-to hand at will.
- child scribbles with a crayon and can turn the pages of a book
- Go up and down stairs alone with two feet on each step.

At 24 months:

- Hold a cup with one hand.
- Remove most of own clothes.
- Drink well from a small glass held in one hand.

2-3 years

- 2 dimension diagram

30 months:

- Jump with both feet.
- Jump from chair or step.
- Walk up and downstairs, one foot on a step.
- Drink without assistance

Fine Motor development

- 1 year old: transfer objects from hand to hand
- 2 year old: can hold a crayon and color vertical strokes
- Turn the page of a book
- Build a tower of six blocks
- 3 year old: copy a circle and a cross – build using small blocks

Social development

- Stranger anxiety – should dissipate by age 2 ½ to 3 years
- Temper tantrums: peak incidence 18 months – most disappear by age 3
- Sibling rivalry: aggressive behavior towards new infant: peak between 1 to 2 years but may be prolonged indefinitely
- Thumb sucking
- Toilet Training15 months, can drink from a cup and use spoon to eat.
- 24 months; indicates toilet needs, with toilet training by day usually achieved by 2 1/2 years
- Help with dressing by holding out an arm or leg at 1 year, and by 3 dress and undress independently
- Engage in parallel play

Language development

- Jargon (unintelligible but highly expressive ‘language’) develops at about 15 months of age.
- By 18 months, the average child has 10–20 recognizable words
- 24 months words linked into two-word sentences.
- 3 years the child can form full sentences and talks incessantly

Cognitive development

- 3 years; Able to categorize similar objects such as animals, vehicles etc
- 4 years; counts sequentially
- 5 years; identifies five different colors
- Moral development

PRE-SCHOOL

Physical growth:-

Weight: The preschooler gains approximately 1.8kg/year.

Height: He doubles birth length by 4–5 years of age.

Acquires more posturally erect contour

Visual acuity reaches 20/20

More organized sleep patterns

Gross motor

- Walking, running and jumping is well established
- Can stand in one foot for a short time, skips on alternate feet, walk on heels
- Catch ball with two hands

Fine Motor Development

- 4 year old: use scissors, color within the borders
- 5 year old: write some letters and draw a person with body parts
- Buttoning clothing
- Holding a pencil
- Building with small blocks
- Playing a board game
- Have child draw picture of himself
- 5 year old; attempts to tie shoe lace

Social & Emotional Development of Preschooler

- Fears the dark
- Tends to be impatient and selfish
- Expresses aggression through physical and verbal behaviors.
- Shows signs of jealousy of siblings.
- Egocentric
- Tolerates short separation
- Less dependant on parents

- May have dreams & night-mares
- Attachment to opposite sex parent
- More cooperative in play
- Starts to learn right from wrong
- Becomes less rebellious and quarrelsome
- Understand sex-role functions

school-age

- **Characterized by gradual growth.**
- **Physical growth**

Weight:

- School–age child gains about **3.8kg/year.**
- Boys tend to gain slightly more weight through **12 years.**
- **Weight Formula for 7 - 12 yrs**

$$= \frac{(\text{age in yrs} \times 7) - 5}{2}$$

Height:

- The child gains about 5cm/year.
- Body proportion during this period: Both boys and girls **are long-legged**.

Dentition:

- **Permanent teeth** erupt during school-age period, **starting from 6 years**, usually in the same order in which primary teeth are lost.
- The child acquires permanent molars, medial and lateral incisors.

School Years: Motor development

Gross motor

- Balancing, catching, throwing, jumping and climbing becomes refined

Fine motor

- Fine motor is refined
- Writing skills improve
- Fine motor with more focus
  - Building: models – logos
  - Sewing
  - Musical instrument
  - Painting
  - Typing skills
  - Technology: computers

Motor development

At 6–8 years, the school–age child:

- Rides **a bicycle**.
- Runs Jumps, climbs and hops.
- Has improved eye-hand coordination.
- Prints word and **learn cursive writing**.
- Can brush and comb hair.
- 8 to 10 years: **team sports**
- Age ten: **match sport** to the physical and emotional development

At 8–10 years, the school–age child:

- Throws balls skillfully.
- Uses to participate in organized sports.
- Uses both hands independently.
- Handles eating utensils (spoon, fork, knife) skillfully.

At 10–12 years, the school–age child:

- Enjoy all physical activities.
- Continues to improve his motor coordination.

Emotional development

The school–age child:

- Fears **injury to body** and fear of **dark.**
- **Jealous** of siblings (especially 6–8 years old child).
- **Curious** about everything.
- Has **short bursts of anger by age of 10 years but able to control anger by 12 years.**
- Continues to be egocentric.
- Wants other children to play with him.
- Insists on being first in every thing
- Becomes peer oriented.
- Has greater self–control, confident, sincere.
- Respects parents and their role.
- Joins group (formal and informal).
- Engage in tasks in the real world.

Red flags: school age

- School failure
- Lack of friends
- Social isolation
- Aggressive behavior: fights, fire setting, animal abuse

Adolescent age

- **Adolescence is a transition period from childhood to adulthood**.
- Physical growth
- Physiological growth
- Secondary sex characteristics
- Cognitive development
- Emotional development
- Social development

Physical growth:

Weight:

- Growth spurt begins earlier in girls (10–14 years, while it is 12–16 in boys).
- Males gains 7 to 30kg, while female gains 7 to 25kg.

Height:

- By the age of 13, the adolescent triples his birth length.
- Males gains 10 to 30cm in height.
- Females gains less height than males as they gain 5 to 20cm.
- Growth in height ceases at 16 or 17 years in females and 18 to 20in males

Social & emotional development

- As teenagers gain independence they begin to challenge values
- Critical of adult authority
- Relies on peer relationship
- Mood swings especially in early adolescents
- Emotional development:changes in emotional control, exhibits alternating and recurrent episodes of disturbed behavior with periods of quite one. He may become hostile or ready to fight, complain or resist every thing.

- Social development: develops a sense of identity. If the adolescent is unable to formulate a satisfactory identity from the multi-identifications, sense of self-confusion will be developed
- Adolescent shows interest in other sex.
- He looks for close friendships.

Red Flags development

Infancy

- Unable to sit alone by age 9 months
- Unable to transfer objects from hand to hand by age 1 year
- Abnormal pincer grip or grasp by age 15 months
- Unable to walk alone by 18 months
- Failure to speak recognizable words by 2 years.

Toddler

Pre-school

- Inability to perform self-care tasks, hand washing simple dressing, daytime toileting
- Lack of socialization
- Unable to play with other children
- Unable to follow directions during exam

Red flags Cont….

School age

- School failure
- Lack of friends
- Social isolation
- Aggressive behavior: fights, fire setting, animal abuse

Essential milestones

Age	Milestone
4–6 weeks	Smiles responsively
6–7 months	Sits unsupported
9 months	Gets to a sitting position
10 months	Start of pincer grasp
12 months	Walks unsupported
	Two or three words
	Tower of two cubes
18 months	Tower of three or four cubes
24 months	Two- to three-word sentences