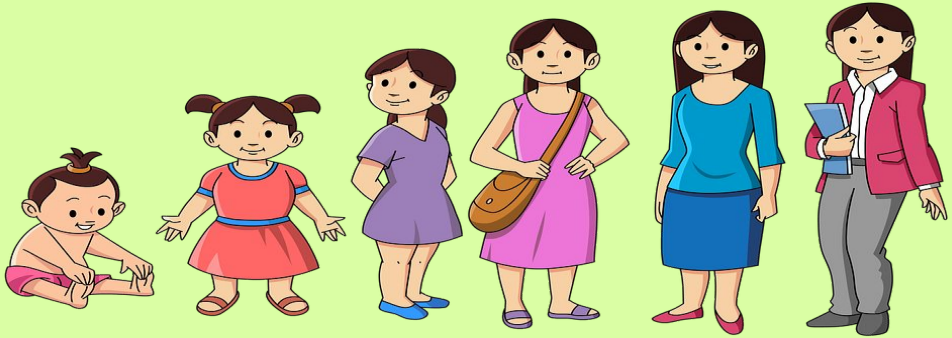
GROWTH
&
DEVELOPMENT
PPT



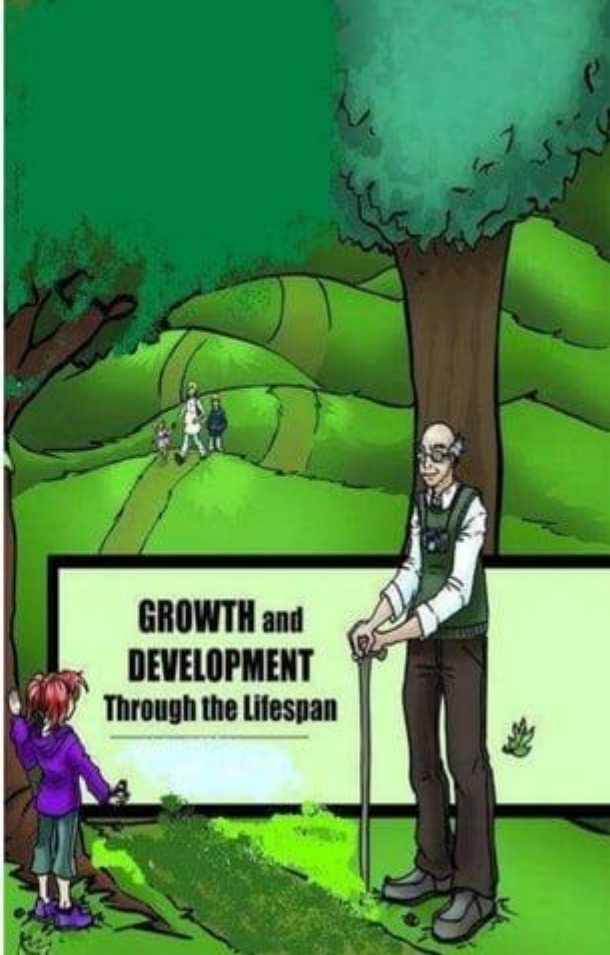
Growth

- It is the process of **physical maturation** resulting an increase in size of the body and various organs. It occurs by **multiplication** of **cells** and an increase in in intracellular substance. It is **quantitative** changes of the body.

Development

- It is the process of functional and **physiological maturation** of the individual. It is progressive increase in **skill** and **capacity** to function. It is related to maturation and **myelination** of the **nervous system**. It includes psychological, emotional and social changes. It is **qualitative** aspects.

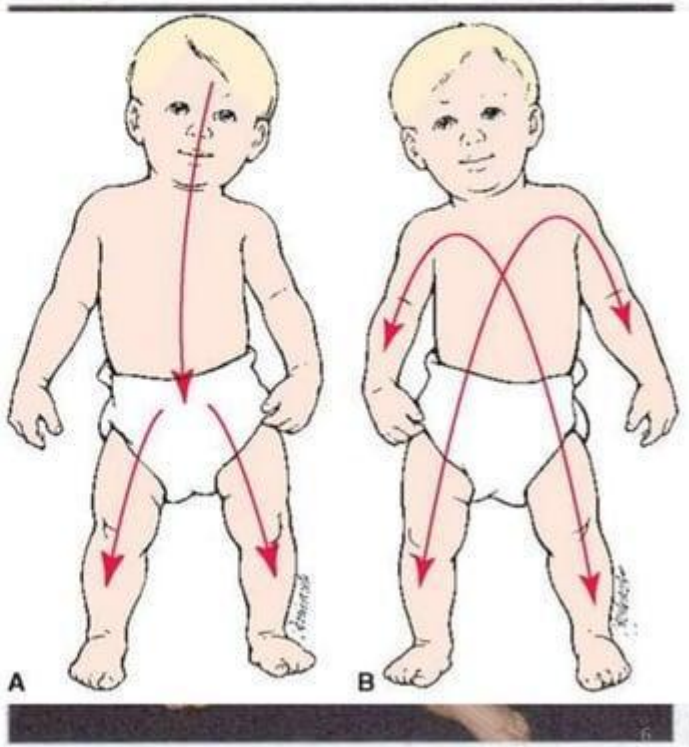
Principle of Growth and Development



- Cephalocaudal direction
- Proximodistal direction
- General to Specific

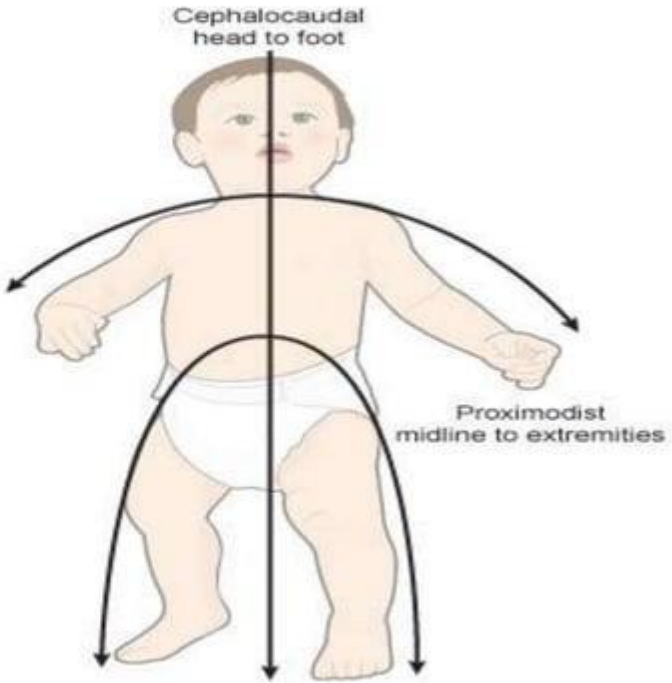
Cephalocaudal direction

- The process of **cephalocaudal** direction from **head** down to **tail**. This means that improvement in structure and function come first in the head region, then in the trunk, and last in the leg region.



Proximodistal direction

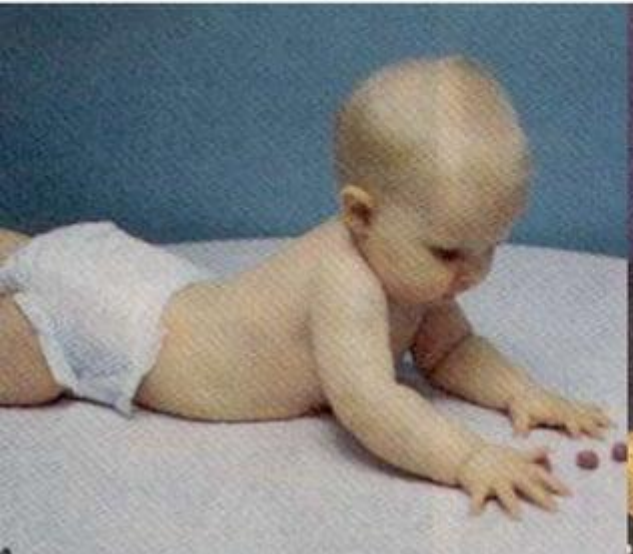
The process in proximodistal from center or midline to periphery direction. development proceeds from near to far - outward from central axis of the body toward the extremities



General to Specific

- Children use their cognitive and language skills to reason and solve problems.
- Children at first are able hold the big things by using both arms, In the next part able to hold things in a single hand, then only able to pick small objects like peas, cereals etc.
- Children when able to hold pencil, first starts draw circles then squares then only letters after that the words.

- Development proceeds from general to specific responses



Factor influencing Growth and Development

- Growth and development depend upon multiple factors or determinates.

- They influence directly or indirectly by promoting or hindering the process.

- Genetic factors
- Prenatal factors
- Postnatal factors

Genetic factors

- Genetic predisposition is the importance factors which influence the growth and development of children.
- Sex
- Race and Nationality

Prenatal factors

- Intrauterine environment is an important predominant factor of growth and development. Various conditions influence the fetal growth in utero.

- Maternal malnutrition
- Maternal infection
- Maternal substance abuse
- Maternal illness
- Hormones
- Miscellaneous

Postnatal factors

- Growth potential
- Nutrition
- Childhood illness
- Physical environment
- Psychological environment
- Cultural influence
- Socio economic status
- Climate and season
- Play and exercise
- Birth order of the child
- Intelligence
- Hormonal influence

GROWTH AND &DEVELOPMENTAL AGE PERIODS

- Infancy
  - –Neonate
    - •Birth to 1 month
  - –Infancy
    - •1 month to 1 year

- Early Childhood
  - Toddler
    - 1-3 years
  - Preschool
    - 3-6 years

- Middle Childhood
  - School age
  - 6 to 12 years
- Late Childhood
  - Adolescent
  - 13 years to approximately 18 years

Growth and Development Monitoring

Assessment of growth

- Assessment of physical growth can be done by anthropometric measurement and the study of velocity of physical growth.
- Measurement of different growth parameters is the importance nursing responsibility in child care.

Weight

- weight is one of the best criteria for assessment of growth and a good indicator of health and nutritional status of child.
- Among **Indian** children, weight of the full terms neonate at birth is approximately **2.5 kg to 3.5kg**.
- there is about **10%** loss of weight first week of life, which regains by **10 days** of age.

- Then, weight gain is about **25- 30 gm** per day for 1st **3 month** and **400gm/ month** till **one year** of age.

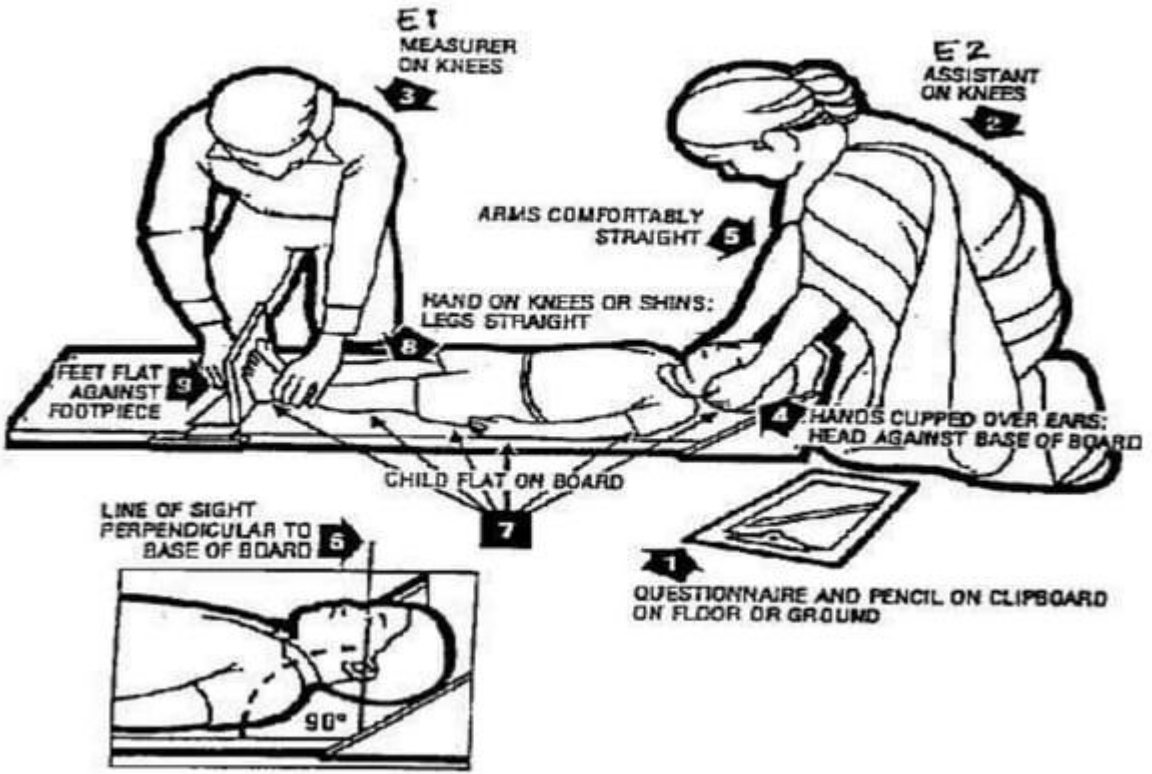
- The infants **double** weight gain their birth weight by **5month** of age, **trebled** by **one year**, **fourth** time by **two years**, **five** times by **three year**, **six** times by **five year**, **seven** times by **seven** year and **ten** times by **ten year**.

- Then weight increases rapidly during puberty followed by weight increase to adult size.

Length and height

- Increase in height indicates skeletal growth. Yearly increments in height gradually diminished from birth to maturity.
- At birth average length of a healthy Indian newborn baby is **50 cm**.
- it increases to **60 cm** at **3 months**, **70 cm** of **9 month** and **75 cm** at **one year** of age.

- In **second year**, there is 12 cm increase, **third year** it is **9 cm**, **fourth year** it is **7 cm** and in **fifth year** it is **6 cm**.
- so the child **double** the birth by **4 to 4.5 years** of age afterwards there is about **5 cm increase** in every year till onset of puberty.


E1
MEASURER
ON KNEES
3
E2
ASSISTANT
ON KNEES
2
ARMS COMFORTABLY
STRAIGHT
5
HAND ON KNEES OR SHINS:
LEGS STRAIGHT
8
FEET FLAT
AGAINST
FOOTPIECE
9
4
HANDS CUPPED OVER EARS:
HEAD AGAINST BASE OF BOARD
CHILD FLAT ON BOARD
7
LINE OF SIGHT
PERPENDICULAR TO
BASE OF BOARD
6
90°
1
QUESTIONNAIRE AND PENCIL ON CLIPBOARD
ON FLOOR OR GROUND

Body Mass index (BMI)

- It is an important criteria which helps to assess the normal growth or its deviations i.e. malnutrition or obesity.

$$\text{BMI} = \frac{\text{Weight in Kg}}{(\text{Height in meter})^2}$$

- BMI remains content up to the age of 5 years. If the BMI is more than **30 kg/m^2**, it indicates **obesity** and if it is less then **15Kg/m^2** , it indicates **malnutrition**.

BMI Categories:-

- Underweight = <18.5
- Normal weight = 18.5–24.9
- Overweight = 25–29.9
- Obesity = BMI of 30 or greater

Head circumference

- It is related to brain growth and development of intracranial volume. Average head circumference measured about **35 cm** at birth.

- At **3 months** it is about **40 cm**, at **6 month 43 cm,** at **one year 45cm**, at **2 years 48 cm**, at **7 year 50 cm** and at **12 years** of age it is about **52 cm**, almost same a adult.

- If head circumference increase more than **1 cm** in **two weeks** during the **first 3 month** of age then **hydrocephalus** should be suspected.
- Head circumference is measured by **ordinal tap**, placing it over the **occipital protuberance** at the back, above the ear on the side and just over the supraorbital ridges in front measuring the point of height circumference.

Fontanelle Closure

- At birth, anterior and posterior fontanelle are usually present. **Posterior fontanelle** closes early few weeks(**6-8week**) of age.
- The **anterior fontanelle** normally closes by **12-18 months** of age. Early closure of fontanelle indicates **craniostenosis** due to premature closure of skull sutures.

Chest circumference

- chest circumference or thoracic diameters is an importance parameter of assessment of growth and nutrition status.
- At birth it is 2-3cm less than head circumference. At 6 to 12 months of age both become equal.
- After first year of age, chest circumference is greater than head circumference by 2.5 cm and by the age of 5 year, it is about 5 cm larger than head circumference.

- Chest circumference is measured by placing the tape measure around the chest at level by placing the tape measure around the chest at the level of the nipple, in between inspiration and expiration.


Irish
18
19
20
2
3
4

Mid Upper Arm Circumference(MUAC)

- This measurement helps to asses the nutritional status of younger children.
- There is growth due to inadequate nutritional, which can be this simple particle and useful measurement.


mm
mm

- The average MUAC at **birth** is **11 to 12 cm**, at **one** year of age it is **12 to 16 cm**, at **1 to 5** years it is **16 to 17** cm, at **12 years** it is **17 to 18 cm** and at **15 years** it is **20 to 21cm**.

Eruption of teeth

- There is a variation for the time of eruption of teeth. First teeth commonly the lower **central incision** may appear in **6 to 7 months** of age.
- It can be delayed even up to **15 months**, which also can be considered within the normal range of time for teething.
- So dentition is not dependable parameters for assessment of growth.
- There are 'two sets of teeth, temporary teeth bigger in size for two sets of teeth.

Age	Type	Total number of teeth
	Temporary teething	
6 – 12 months	Incisors(central and lateral)	**2-8**
12 – 15 months	First moral	**8- 12**
15 – 24 months	Canines(cuspids)	**12 – 16**
24 – 30 months	Secondary moral	**16 - 20**
	Permanent teething	
6 -7 years	First permanent molars	**24**
7 10 years	Replacement of temporary	
10 -12 years	Replacement of temporary molar by premolars	
12 – 15 years	Secondary permanent molars	**28**
16 years	Third permanent molars	**32**

Osseous growth

- Bony growth follows a definite pattern and time schedule from birth to maturation.
- It is calculated by the appearance of ossification center by **X – ray** study.
- Skeletal maturation or bone growth is an indicator of physiological development and continue up to 25 years of age.

Growth monitoring

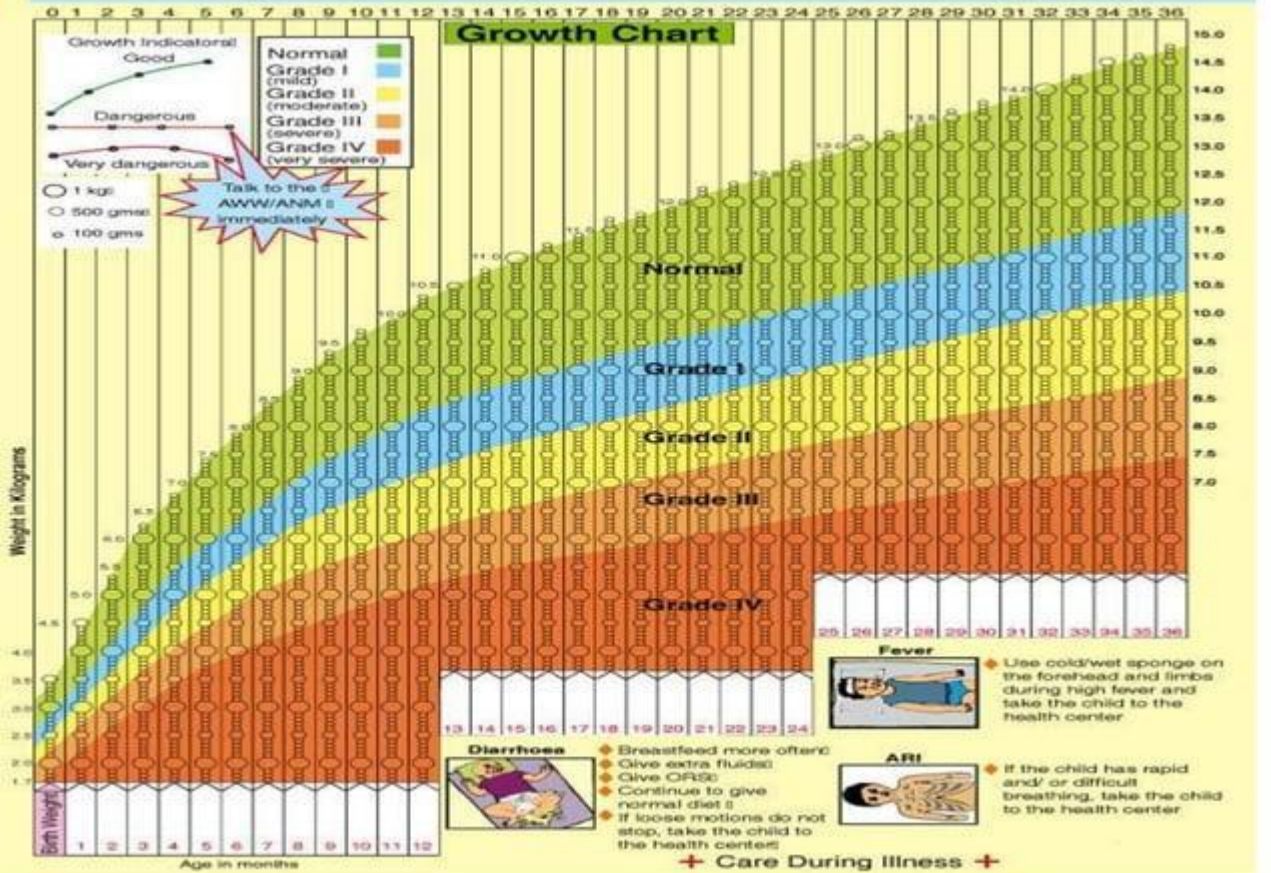
- Assessment of growth may be done by longitudinal & cross sectional studies. The common parameters used for growth monitoring include, head circumference, chest circumference, UL/LS ratio. The following are the 3 members used for comparisons:-

- Use of mean/median values.
- Use of percentile
- Use of indices as weight for height & weight for age.
- Common reference values-
  - WHO reference value
  - Indian standards-

Indian standards-

- **ICMR** under took a national wide cross sectional study during the year **1956- 1965**. this tool is widely used in India as the reference value to assess growth.

Have your child weighed at the AW centre regularly



Assessment of Development

- Normal development is a complex process & has a multitude of facets. However, it is convenient to understand & assess development under the following domains.

- **Gross motor development**
- **Fine motor skill development**
- **Personal & social development**
- **Language**
- **Vision & hearing.**

Gross motor development

- Motor development progress in an orderly sequence to ultimate attainment of locomotion & more complex motor tasks thereafter. In an infant it is assessed & observed as follows:-

Cont...

Key gross motor development milestones

Age	Milestone
3m	Neck holding
5m	Rolls over
6m	Sits with own support
8m	Sitting without support
9m	Standing holding on (with support)
12m	Creep well, stand without support
15m	Walks alone creeps upstairs
18m	Runs
2 yr	Walks up and down stairs
3 yr	Rides tricycle,
4yr	Hops on one foot, alternate feet going downstairs.

Fine motor skill development

- Fine motor development upon neural tract maturation. Fine motor development promotes adaptive actives with fine **sensorimotor adjustments** and include **eye coordination**, **hand eye coordination**, **hand to mouth coordination**, **hand skill as finger thumb apposition**, **grasping**, **dressing** ect.

Key fine motor development milestone

Age	Milestone
4m	reaching out for the objects with both hands
6m	Reaching out for the objects with one hand
9m	Immature pincer graps
12m	Pincer graps mature
15m	Imitates scribbling, tower of 2 blocks
18m	Scribbles, tower of 3 blocks
2yr	Tower of 6 blocks, vertical and circular stroke
3 yr	Tower of 9 blocks, copies circle
4yr	Copies cross, bridge with blocks
5yr	Copies triangle, gate with blocks

Personal & social development

- Personal and social development includes personal reactions to his own social and cultural situations with neuromotor maturity and environment stimulation. It is related to interpersonal and social skill as social smile, recognition of mother, use of toys.

Key social and adaptive milestones

Age	Milestone
2m	Social smile
3m	Recognizes mother
6m	Recognizes strangers, stranger anxiety
9m	Waves "bye bye"
12m	Comes when called, plays simple ball game
15m	Jargon
18m	Copies parents in tasks
2yr	Asks for food, drink, toilet
3yr	Shares toys, knows full name and gender
4yr	Plays cooperatively in a group, goes to toilet alone.
5yr	Helps in household tasks, dressing and undressing

Language development

Age	Milestone
1m	Alerts to sound
3m	Coos (musical vowel sounds)
4m	Laugh loud
6m	Monosyllables (ba, da, pa) sound
9m	Bisyllables (mama, baba, dada) sound
12m	1-2 words with meaning
18 m	8 -10 words vocabulary
2yr	2-3 word sentences, uses pronouns "I", "Me", "you"
3 yr	Ask question
4yr	Says songs or poem, tell stories
5yr	Asks meaning of words

Assessment of Development

- ***Healthy development, in all forms, particularly social/emotional, communication, and behavior, should be monitored by parents and physicians through screenings at each well visit.***

- **The Denver Developmental screening test**
- **Denver articulation screening examination (DASE)**
- **Baroda screening test**
- **Trivandrum development screening test**
- **Other test**
  - **Woodside DST**
  - **Cognitive adaptive test**
  - **Early language milestone etc.**

The Denver Developmental screening test

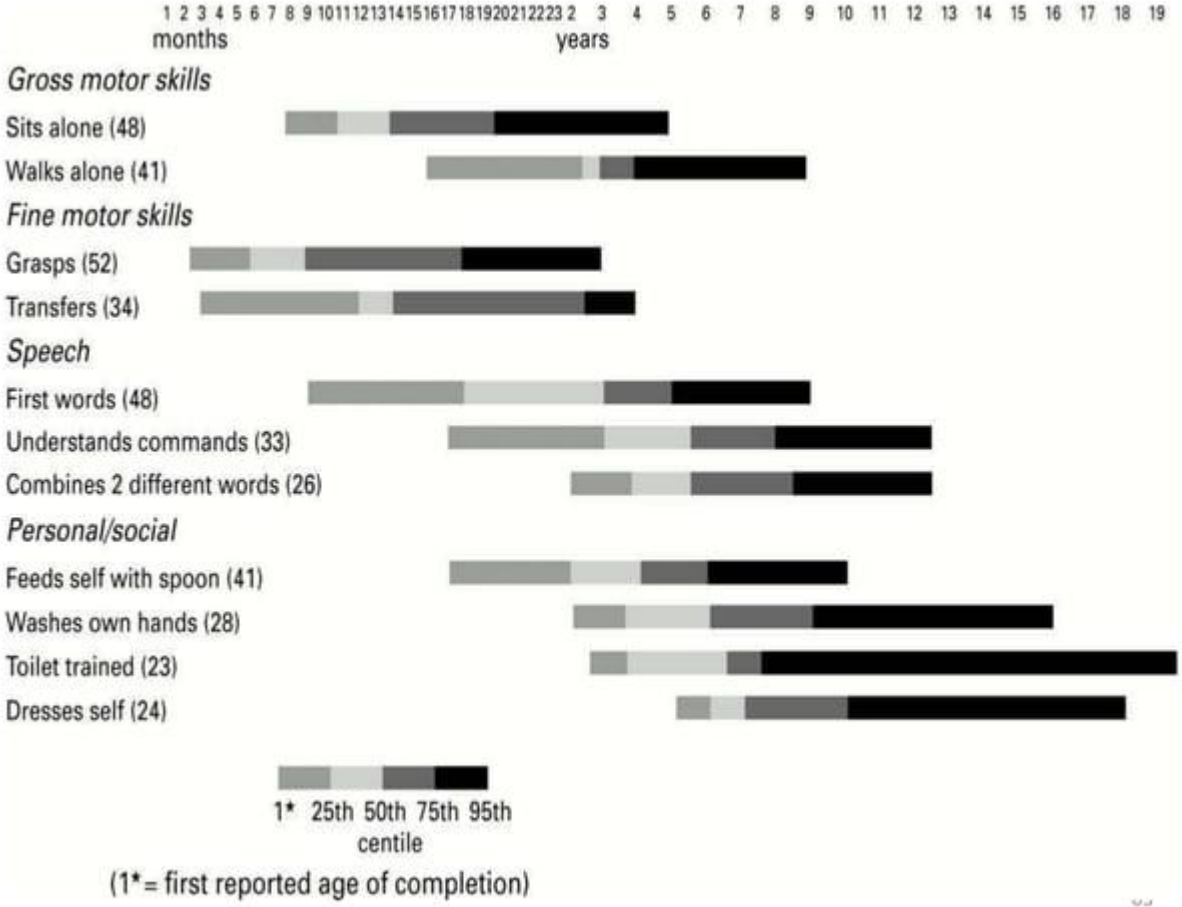
- Developmental originally by **Franken – burg** and **dodds(1967)**, this simple, economic and useful test screens for developmental delays during infancy and the preschool period.
- On the test, the age division are monthly unit 2 years of age , and half yearly from 2 to 6 years of age.

Baroda Screening test

- It was developed by **Dr. Promila phatak** with **25 test items** primarily for psychological aspects. The test is relevant for age **0 to 30 months**. **Gross motor**, **fine motor** and **cognitive aspects** are evaluated in **10 mints** mainly by the psychologist

Trivandrum development screening test

- It is simplified version of **Baroda DST** that can be used by the health worker, nurses and pediatricians/ physicians. It has**17** test items relevant for **0 to 2 years** of age. The children are evaluated in three domains(gross motor, fine motor and cognitive for **5 minutes** only.


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
months
years
Gross motor skills
Sits alone (48)
Walks alone (41)
Fine motor skills
Grasps (52)
Transfers (34)
Speech
First words (48)
Understands commands (33)
Combines 2 different words (26)
Personal/social
Feeds self with spoon (41)
Washes own hands (28)
Toilet trained (23)
Dresses self (24)
1* 25th 50th 75th 95th
centile
(1* = first reported age of completion)

THANK

YOU