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# Child Health Nursing

## (Pediatric Nursing) for GNM

As per the INC Syllabus

Parul Datta

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CHAPTER

7

# Growth, Development and the Healthy Child

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**Chapter Highlights**

- Growth and Development
- Needs of the Healthy Child
- Health Promotion of Children and Guidance to Parent for Child Care

## GROWTH AND DEVELOPMENT

The process of growth and development starts before the baby born, i.e. from the conception in the mother's womb. The period extends throughout the lifecycle. But the principal changes occur from the conception to the end of adolescence. Growth and development are closely interrelated. Each child has individualized pattern of growth and development. Promotion of child health and care of children depends upon understanding of growth and development.

### Importance of Learning Growth and Development

The study of growth and development is essential to the nurse to provide appropriate care to the children. It helps the nurses in the following aspects:

- To learn what to expect from a particular child at a particular age.
- To assess the normal growth and development of children.
- To detect deviations from normal growth and development, i.e. physical and psychological abnormalities and to understand the reasons of particular conditions and illnesses.
- To ascertain the needs of the child according to the level of growth and development.
- To plan and provide holistic nursing management to the child based on developmental stages.
- To teach and guide the parents and caregivers to anticipate the problems and to render tender loving care to their children.
- To develop a rapport with the child to enhance the provision of health care and to help to build healthy lifestyle for optimum health for the future.

### Definitions of Terms

#### *Growth*

It is the process of physical maturation results in an increase in size of the body and various organs. It occurs by multiplication of cells and an increase in intracellular substance. It is quantitative changes of the body which can be measured in inches/centimeters and pounds/kilograms. It is progressive and measurable phenomenon.

#### *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 aspect of maturation and difficult to measure. It is orderly, not haphazard and having direct relation between each stage and the next.

#### *Maturation*

It is an increase in competence and change in behavior and ability to function at a higher level depending upon the genetic inheritance.

### Characteristics of Growth and Development

Growth and development depend upon each other and in normal child they are parallel and proceed concurrently. Though these terms are used interchangeably but they are not the same. They are used together but not synonymous.

The characteristics and principles which regulate growth and development in children are as follows:

- Growth and development is continuous and orderly process with individual difference and is unique to each child.
- It proceeds by stages and its sequence is predictable and same in all children but there may be difference in the time of achievement.
- There is coordination between increase in size and maturation.
- They proceed in cephalocaudal (i.e. from the head down to the tail) and proximodistal (i.e. from the center or midline to periphery) direction.
- Initial mass activities and movements are replaced by specific response or actions by the complex process of individualized changes.

- Rate of growth and development is interrelated and rapid in infancy and in puberty but slow in preschool and school age.
- Growth and development depend on combination of many interdependent factors especially by heredity and environment.

## Stages of Growth and Development

Stages of growth and development can be studied as intrauterine life or prenatal period and extrauterine life or postnatal period.

### *Prenatal Period*

- **Ovum:** 0 to 14 days after conception
- **Embryo:** 14 days to 8 weeks
- **Fetus:** 8 weeks to birth.

### *Postnatal Period*

- **Neonate:** From birth to four weeks of life
- **Infancy:** First year of life
- **Toddler:** 1 to 3 years
- **Preschool child (early childhood):** 3 to 6 years
- **School-going child (middle childhood)**
  - 6 to 10 years (girls)
  - 6 to 12 years (boys).
- **Adolescent:** From puberty to adulthood
  - Prepubescent (early adolescent/late childhood)
    - 10 to 12 years (girls)
    - 12 to 14 years (boys).
  - Pubescent (middle adolescent)
    - 12 to 14 years (girls)
    - 14 to 16 years (boys).
  - Postpubescent (late adolescent)
    - 14 to 18 years (girls)
    - 16 to 20 years (boys).

## Factors Influencing Growth and Development

Growth and development depend upon multiple factors or determinants. They influence directly or indirectly by promoting or hindering the process. The determinants can be grouped as heredity and environment. Heredity determines the extent of growth and development that is possible but environment determines the degree to which the potential is achieved.

Heredity or genetic factors are also related to sex, race and nationality. Environment includes both prenatal and postnatal factors. Postnatal environment can be internal or external. All these factors determine constitution of the body.

### *Genetic Factors*

Each child has a different genetic potential. Genetic predisposition is the important factors which influence the growth and development of children. Different characteristics such as height, body structure, color of skin, eyes and hair, etc. depend upon inherited gene from parents. Thus, tall parents have tall children and parents with high intelligence are more likely to have children with high level of inherent intelligence.

Abnormal genes from ancestors may produce different familial diseases which usually hinders the growth and development, e.g. thalassemia, hemophilia, galactosemia, etc. The process of growth and development is also affected in children with chromosomal abnormalities, e.g. in Down's syndrome, Turner's syndrome, Klinefelter syndrome.

**Sex:** The sex of children influences their physical attributes and patterns of growth. Sex is determined at conception. At birth, male babies are heavier and longer than the female babies. Boys maintain this superiority until about 11 years of age. Girls mature earlier than boys and bone development is more advanced in girls. But mean height and weight are usually less in girls than boys at the time of full maturity.

**Race and nationality:** Growth potential of different racial groups is different in varying extent. Physical characteristics of different national groups also vary. Height and stature of Americans and Indians are usually differing because of the differences in growth patterns.

### *Prenatal Factors*

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

**Maternal malnutrition:** Dietary insufficiency and anemia lead to intrauterine growth retardation. Low birth weight and preterm babies have poor growth potentials. In later life, those children are usually having disturbances of growth and development.

**Maternal infections:** Different intrauterine infections like HIV, HBV, STORCH, etc. may transmit to the fetus via placenta and affect the fetal growth. Various complications may occur like congenital anomalies, congenital infections etc. which ultimately affect the growth and development in extrauterine life.

**Maternal substance abuse:** Intake of teratogenic drugs (thalidomide, phenytoin, etc.) by the pregnant women in the first trimester affects the organogenesis and lead to congenital malformations which hinder fetal growth. Presence of congenital anomalies in later life influence childhood growth and development. Maternal tobacco intake (smoking and chewing) and alcohol abuse also produce fetal growth restriction.

**Maternal illness:** Pregnancy-induced hypertension, anemia, heart disease, hypothyroidism, diabetes mellitus, chronic renal failure, hyperpyrexia, etc. have adverse effect on fetal growth. Iodine deficiency of the mother may lead to mental retardation of the baby in later life.

**Hormones:** Hormones like thyroxine and insulin influence the fetal growth. Thyroxine deficiency retards the skeletal maturation of the fetus. Maternal myxedema results in fetal hypothyroidism. Antithyroid drug therapy and iodides during last trimester of pregnancy may lead to fetal goiter and hypothyroidism. Excess insulin stimulates fetal growth leading to large size fetus with excessive birth weight due to macrosomia.

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**Miscellaneous:** Various prenatal conditions, which may also influence fetal growth include uterine malformations (septate uterus, bicornuate uterus), malpositions of the fetus, oligohydramnios, polyhydramnios, faulty placental implantation or malfunction, maternal emotion during pregnancy, inadequate prenatal care, etc.

### *Postnatal Factors*

Postnatal environment which influences growth and development are as follows:

**Growth potential:** Growth potential is indicated by the child's size at birth. The smaller the child at birth, the smaller she/he is likely to be in subsequent years. The larger the child at birth, the larger she/he is likely to be in later years. Low birth weight babies have various complications in later life which retard child's growth.

**Nutrition:** Balanced amounts of essential nutrients have great significant role in growth and development of children. Both quantitative and qualitative supply of nutrition (i.e. protein, fat, carbohydrates, vitamins and minerals) in the daily diet is necessary for promotion of growth and development. Adequate food intake helps the child in body building, energy production and protection from infections. Well-nourished child has positive physical and mental growth, whereas undernourished child usually suffers from growth retardation and various health problems. The nutritional requirements during growth period depend upon age, sex, growth rate, level of activity and health status of the child.

**Childhood illness:** Chronic childhood diseases of heart, (congenital heart disease, rheumatic heart disease), chest (tuberculosis, asthma), kidneys (nephrotic syndrome), liver (cirrhosis), malignancy, malabsorption syndrome, digestive disorders, endocrinal abnormalities, blood disorders, worm infestations, metabolic disorders, etc. generally lead to growth impairment.

Acute illnesses like ARI, diarrhea, repeated attack of infections result in malnutrition and growth retardation.

Congenital anomalies, accidental injury and prolong hospitalization usually have adverse effect on growth and development.

**Physical environment:** Housing, living conditions, safety measures, environmental sanitation, sunshine, ventilation and fresh air, hygiene, safe water supply, etc. are having direct influence on child's growth and development. Drought, famine and disaster also influence the child's growth.

**Psychological environment:** Healthy family, good parent-child relationship and healthy interaction with other family members, neighbors, friends, peers and teachers are important factors for promoting emotional, social and intellectual development. Lack of love, affection and security lead to emotional disturbances and hinder emotional maturity and personality development. Broken family, sibling jealousy and inappropriate school environment has poor effect on psychological development.

**Cultural influences:** Growth and development of an individual child are influenced by the culture in which he or she is growing up. The childrearing practices, food habit, traditional beliefs, social taboos, attitude towards health, standard of living, educational level, etc. influence the child's growth and development. The child learns standard of traits like honesty, discipline, intellectual inquiry, manners, aggression, individual industry and achievement from the culture of the family and society.

**Socioeconomic status:** Poor socioeconomic groups may have less favorable environment for growth and development than the middle and upper groups. Parents of unfortunate financial conditions are less likely to understand and adopt modern scientific child care. They lack money to buy essentials for diet and health care and even unable to accept medical or hospital services.

**Climate and season:** Climatic variation and seasonal changes influence the child health. Weight gain is more in late summer, rainy season and autumn. Maximum gains in height among children occur in the spring. These variations may be due to difference in activity level.

**Play and exercise:** Play and exercise promote physiological activity and stimulate muscular development. Physical, physiological, social, moral, intellectual and emotional developments are enhanced by play and exercise.

**Birth order of the child:** Birth order alone does not determine intelligence, personality traits or method of coping but it has a significant influence on all of these. The first born child gets full attention until the second child born. They learn from adult, whereas the second born child learns mainly from elder one. Middle born child gets less attention during rearing.

The first born child is usually intelligent, achievement oriented, conforming, perfectionistic and anxious. The only child is likely to develop more rapidly and intellectual with higher self-esteem but may be more dependent. The middle born is more adaptable, less achievement oriented less aggressive towards goals and learns how to compromise. The youngest child receives a great deal of love and attention, and tends to develop a good natured, friendly, warm personality and with high self-esteem. However, each child is different and need total attention and care from parents to develop their personality to the fullest extent possible.

**Intelligence:** Intelligence of the child influences mental and social development. A child with higher intelligence adjusts with environment promptly and fulfil own needs and demands, whereas a child with low level of intelligence fails to do that. Intelligence is correlated to some degree with physical development.

**Hormonal influence:** Hormones are the important aspects of internal environment which have vital role in growth and development of the children. All hormones in the body affect growth in some manner. The important three influencing hormones are somatotropic hormone, thyroid hormone

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and adrenocorticotropic hormone that stimulate to secrete gonadotropic hormones. Other hormones that less directly influence the process of growth and development include insulin, parathormone, cortisol and calcitonin.

Thus, growth and development is a complex process with the influence of various factors. Favorable conditions promote growth and development. Whereas, unfavorable factors inhibit the process leading the growth retardation or growth failure and developmental delays. Pediatric nurse is the unique person to detect the deviations at the earliest time and initiate prompt interventions to overcome the problems and deprivations of children.

## Postnatal Growth Patterns

Different tissues of the body grow at different rates in the postnatal period. Major four types of growth are: i. studied, i.e. general body growth, ii. neural growth, iii. genital growth and iv. lymphoid growth.

### *General Body Growth*

It is increased in size of the body as a whole externally, including the total growth of muscles, skeleton and various internal organs. This growth occurs slowly and steadily but marked acceleration as growth spurt is found in infancy and during puberty.

### *Neural Growth*

It includes the growth of brain, spinal cord, meninges and optic apparatus. At birth, head size is about 65 to 70% of adult's size which grows to about 90% by the age of two years. At 8 years, it is close to the adult size which is maintained without regression.

### *Genital Growth*

The growth of genital structures like testes, ovaries, epididymis, uterine tube, prostate, prostatic urethro and seminal vesicle, remain dormant during childhood. But at puberty, they grow faster causing various changes with appearance of secondary sex characteristics.

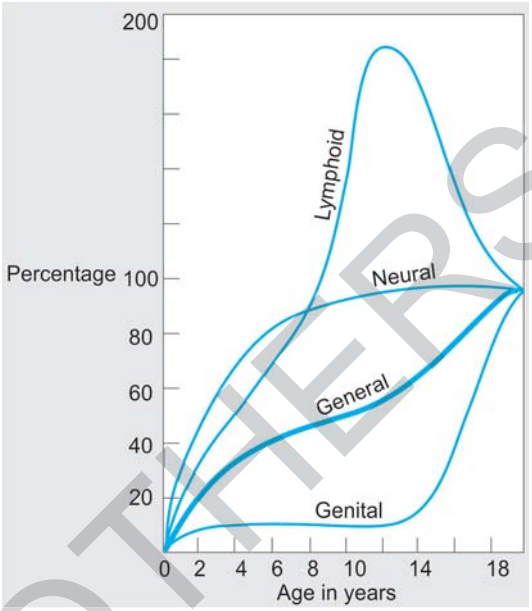



**Fig. 7.1:** Major types of postnatal growth curves

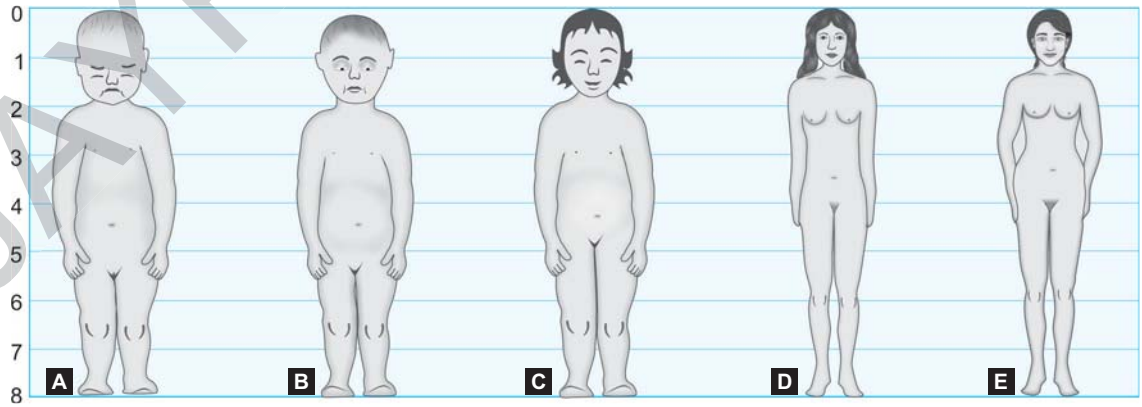
### *Lymphoid Growth*

The growth of lymphoid tissue is rapid in infancy and highly accelerated during mid-childhood. It reaches the peak of development at about the age of 12 years and stops growing or regress.

The major types of postnatal growth curves are shown in the Figure 7.1.

There are variations in body proportions as the body growth is not uniform at different ages. During infancy size of the head is larger in relation to the size of the body. Gradually this proportion changes to assume adult shape. In younger children, the limbs are short, but in later life, they continue to grow rapidly.

The changes in body proportion from birth to physical maturity are shown in Figures 7.2A to E.




**Figs 7.2A to E:** Changes in body preparation from birth to adolescence. **A.** Newborn infant; **B.** 18 months old child; **C.** 3 years old child; **D.** 11 years old child; **E.** 18 years old adolescence

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## Types of Body Build

The physical growth of the body may differ from one individual to other during the process of maturation and at the time of full maturity. Sheldon classified the human physique into three categories.

### *Ectomorph*

Having linear structure with light bone, small musculature and less subcutaneous tissue in relation to body length.

### *Endomorph*

Having large amount of soft tissue with stocky body build. Maturity is earlier than the ectomorphs.

### *Mesomorph*

Having hard heavy rectangular structure with more muscle, connective tissue and bone. Mixed features of ectomorphs and endomorphs are found.

## Assessment of Growth

Assessment of physical growth can be done by anthropometric measurements and the study of velocity of physical growth. Measurement of different growth parameters is the important nursing responsibility in child care. The criteria for assessment of physical growth are mainly weight, length or height, head circumference, chest circumference and mid upper arm circumference.

Assessment of body mass index, body ratio, fontanelle closure, skinfold thickness, dentition and bone age also used as parameters for evaluation of physical growth.

## Technique of Assessment of Growth

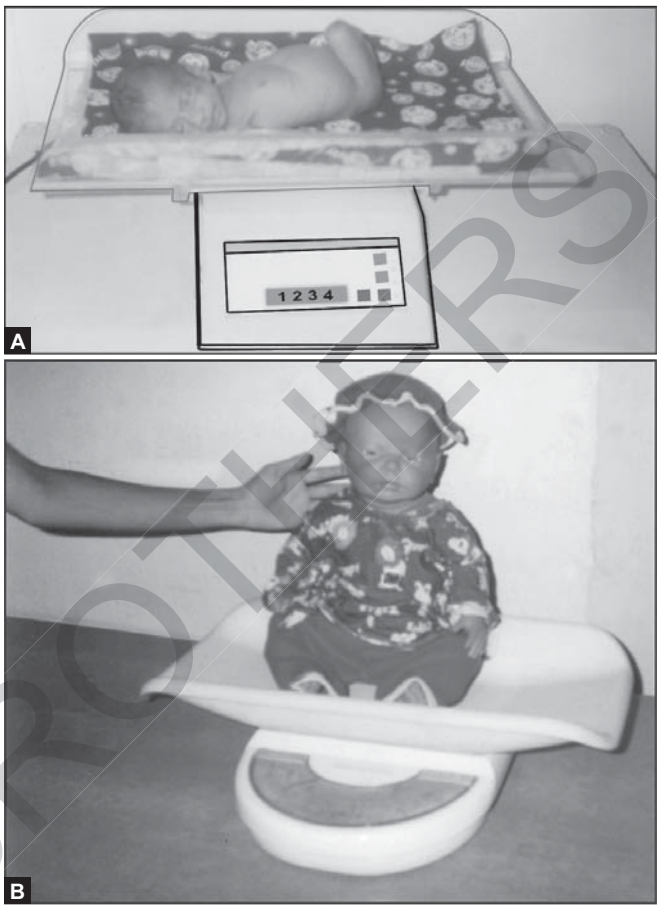
### *Weight*

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-term neonate at birth is approximately 2.5 to 3.8 kg. There is about 10% loss of weight during first week of life, which regains by 10 days of age. Then, weight gain is about 25 to 30 g per day for the first 3 months and 400 g per month till 1 year of age. After that, the weight gain follows an average pattern. The infants doubled their birth weight by 5 months of age, trebled by 1 year, 4 times by 2 years, 5 times by 3 years, 6 times by 5 years, 7 times by 7 years and 10 times by 10 years of age. Then weight increases rapidly during puberty followed by gradual maturation to adult size.

Measurement of weight should be done by the use of same weighing scale accurately. Beam balance, electronic weighing machine and adult weighing machine can be used according to availability, child's age and ability (Figs 7.3A and B). Weighing should be done with minimum clothing to prevent chilling. Precautions must be taken to prevent fall and infections.

Recording should be done in 'road to health' card at regular interval. Maintenance of growth chart is important to assess the growth of the children and to detect any abnormalities. Health workers are responsible for creating awareness in the parents about the importance of weight recording (Fig. 7.4).




**Figs 7.3A and B:** Measurement of weight. **A.** Weighing baby in digital machine; **B.** Weighing infant in baby weighing machine (dial type)

### *Length and Height*

Increase in height indicates skeletal growth. Yearly increments in high 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 at 9 months and 75 cm at 1 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 doubles the birth length by 4 to 4.5 years of age. Afterwards, there is about 5 cm increase in every year till the onset of puberty. Gradual slow increase in height is usually found up to the period of postpubescence. *Appendix IV* shows the height and weight of Indian boys and girls from 1 to 18 years of age.

Recumbent length is measured up to 2 years of age. Infantometer or simple tape measure is used for assessing the crown-heel length by placing the child on hard surface in supine position with extended legs. In older children standing

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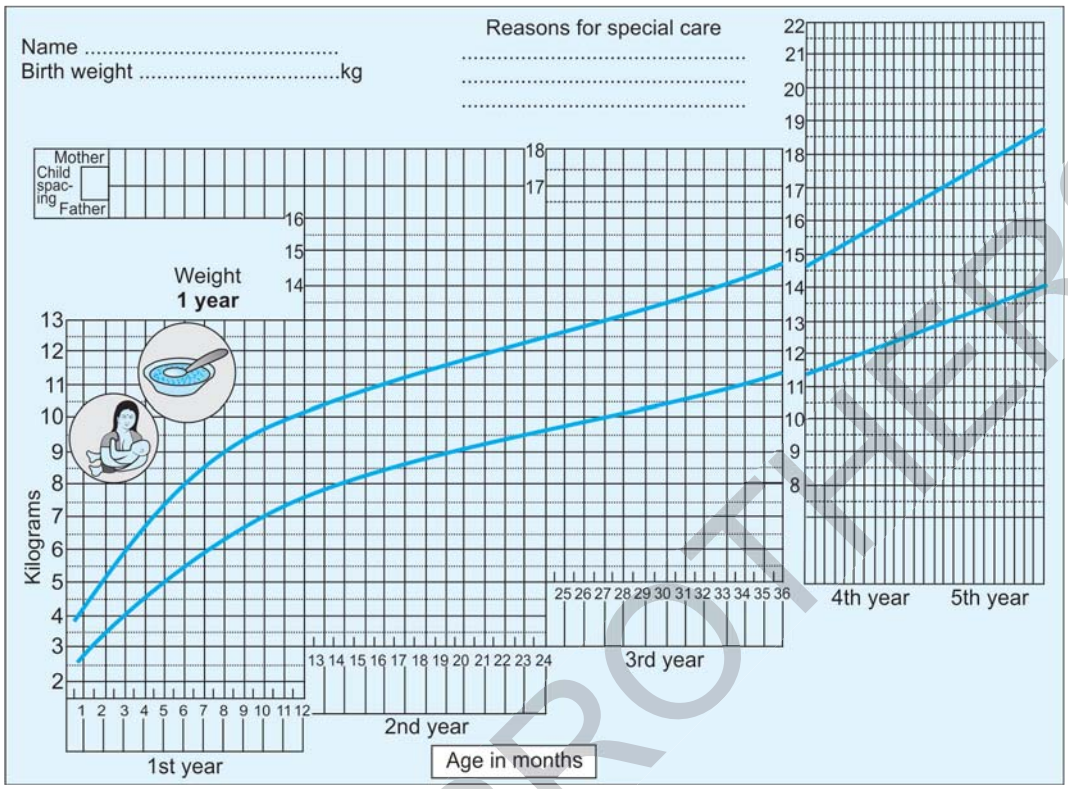


**Fig. 7.4:** Growth curve, road to health card

height is measured by vertical height scale or stadiometer or with tape-measure. Standing height can be measured against a wall, while the child stands in bare feet on the floor surface, arms hang by the side and occiput, upper back, buttocks and heels touch the wall along with straight head in parallel vision. A flat object is placed top of the head and the height is then marked and measured accurately using simple tape measure. Measurement of length of a baby lying on a mattress with cloth tape is inaccurate and not recommended (Fig. 7.5).

Recording of length/height and comparing them with weight, as indicator of growth, are important aspect of assessment.

### *Body Mass Index (BMI)*

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

$$\text{BMI} = \frac{\text{Weight in kg}}{\text{Height in meter}^2}$$



**Fig. 7.5:** Measurement of length by infantometer

The BMI remains constant 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 than 15 kg/m$^2$, it indicates malnutrition.

**Body proportion:** It is upper and lower segment ratio of the body. At birth, the ratio between the upper and lower segment as measured from symphysis pubis, is 1.7:1.0. It is due to low growth of legs and more development of head and upper segment in intrauterine life. This ratio becomes 1.3 : 1.0 at 3 years of age. At the age of 10 to 12 years, the ratio becomes 1:1.

### *Head Circumference*

It is related to brain growth and development of intracranial volume. Average head circumference measures about 35 cm at birth. At 3 months, it is about 40 cm, at 6 months; 43 cm, at one year; 45 cm, at 2 years; 48 cm, at 7 years; 50 cm and at 12 years of age; it is about 52 cm, almost same as adult.

If head circumference increases more than 1 cm in two weeks during the first 3 months of age, then hydrocephalus should be suspected. Abnormal growth may be found as abnormal shape and size of head. Large size head may be found in hydrocephalus, rickets, chondrodystrophy or syphilis. Familial large head or macrocephaly is harmless. Small size head or microcephaly is usually associated with premature closure of skull sutures and found in Down's syndrome and mental retardation. Abnormal growth may be seen as tomb-shaped (oxycephaly), boat-shaped (scaphocephaly) and asymmetrical (plagiocephaly).

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**Fig. 7.6:** Measurement of head circumference

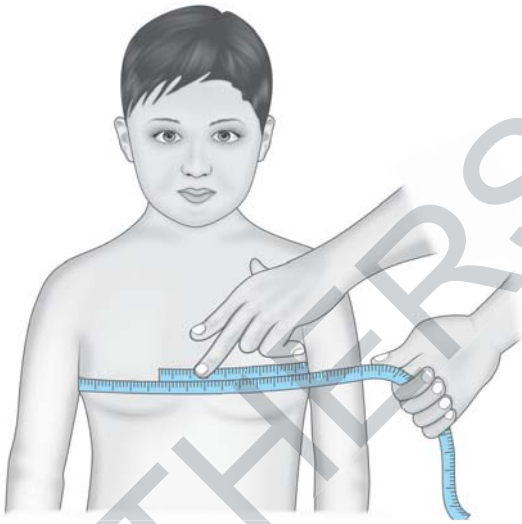

**Fig. 7.7:** Measurement of chest circumference

Head circumference is measured by ordinary tape measure, placing it over the occipital protuberance at the back, above the ears on the sides and just over the supraorbital ridges in front and measuring the point of highest circumference (Fig. 7.6).

### *Fontanelle Closure*

At birth, anterior and posterior fontanelles are usually present. Posterior fontanelle closes early within a few weeks (6–8 weeks) of age. The anterior fontanelle normally closes by 12 to 18 months of age. Early closure of fontanelle indicates craniostenosis due to premature closure of skull sutures. Delayed closure may be due to rickets, malnutrition, hydrocephalus, cretinism, congenital cyanotic heart disease, etc. Craniotabes may be present in prematurity, rickets, syphilis, or osteogenesis imperfecta. Craniotabes is demonstrated by pressing the occipitoparietal area of the skull with the thumb which results indentation (a sort of 'give').

### *Chest Circumference*

Chest circumference or thoracic diameter is an important parameter of assessment of growth and nutritional status. At birth, it is 2 to 3 cm 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 years, it is about 5 cm larger than head circumference.

At birth, chest is approximately round in shape with nearly equal transverse and anteroposterior diameters. Thereafter, the width of chest becomes greater than depth due to rapid increase in transverse diameter. Abnormal shape of chest is found in rickets, malnutrition and congenital heart disease. Chest circumference is measured by placing the tape measure around the chest at the level of the nipples, in between inspiration and expiration (Fig. 7.7).

### *Mid Upper Arm Circumference*

This measurement helps to assess the nutritional status of younger children. There is growth retardation due to inadequate nutrition, which can be detected by this simple practical and useful measurement. The average mid upper arm circumference (MUAC) at birth is 11 to 12 cm, at 1 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 21 cm.

To assess MUAC, the left upper arm is measured firmly gently without compressing. The arm is measured while the hand is left hang freely. The measurement is taken at the midpoint of the upper arm between the tip of acromion process of scapula and olecranon process of ulna. The simple tape measures are used. There should be no clothes on the arm.

### *Dentition or Eruption of Teeth*

There is a variation for the time of eruption of teeth. First teeth commonly the lower central incisors 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 a dependable parameter for assessment of growth.

There are two sets of teeth, temporary teeth for small face in small size and permanent teeth, bigger in size for growing face. There is a phase of mixed dentition with two sets of teeth.

Temporary or milk teeth also called as deciduous teeth which erupt at the rate of one tooth every month after first eruption. By the age of 2.5 to 3 years, the child has full set of temporary teeth numbering 20. The first permanent teeth usually erupt at the age of 6 years. Then all temporary teeth

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**Table 7.1:** Eruption of teeth

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

are replaced gradually. Total permanent teeth numbering 32 usually erupt within 12 years of age. Except third molars which may appear 18 years of age or later. Table 7.1 shows the number of temporary and permanent teeth according to child's age.

Rarely, baby may born with natal tooth at birth, which is usually harmless. It may interfere with breastfeeding. Delayed dentition may be found due to familial tendency, poor nutritional status, rickets and osteogenesis imperfecta. Malocclusion of teeth may occur due to thumb sucking. No teeth or anodentia may occur as congenital anomalies. No dentition beyond 1.5 years needs special attention.

### *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 is distinct from the chronological age. Skeletal maturation starts from intrauterine life and continue up to 25 years of age.

A full-term neonate has five ossification centers namely, i. at distal end of femur, ii. proximal end of tibia, iii. talus, iv. calcaneus and v. cuboid. By 6 months of age two more ossification centers appear in carpal bones, i.e. capitate and hamate. A child of 2 years will have 3 ossification centers at wrist. It will be a useful guide to remember that number of ossification centers at wrist is equal to age in years plus one. 20 ossification centers are generally used for determining bone age. These include carpal and metacarpal bones, patella, phalanges and toes.

Advanced bone age may be found, is precocious puberty, thyrotoxicosis and adrenal hyperplasia. Retardation of bony growth is found in cretinism.

### *Stem Stature Index*

It refers to the sitting height (crown-rump length) as a percentage of total height or recumbent length. It is 70 at birth, 66 at 6 months, 64 at 1 year, 61 at 2 years, 58 at 3 years, 55 at 5 years, 52 at puberty and 53 to 54 at 20 years.

### *Span*

It is the distance between tips of middle fingers when the arms are outstretched. In young children, it is 1 to 2 cm less than the length or height. At 10 years of age, it is equal and after 12 years, it is 1 to 2 cm more than the height.

## Systemic Changes during Growth and Development

### *Respiratory Changes*

Respiratory rate in neonates is about 36 to 40 breaths per minute and gradually it diminished to 16 to 20 breaths per minute at 15 years. In newborn baby the breathing is diaphragmatic and breath sound is bronchovesicular. In infancy, it is mainly thoracic and breath sound is vesicular.

Sinuses gradually developed which complete within 7 years of age. In young children, larynx is 1/3rd of adult size and maximum growth occurs at puberty.

### *Cardiovascular Changes*

Functional closure of temporary structures of fetal circulation occurs soon after birth and anatomical closure occurs within 2 to 3 months. Apex beat shifted from 4th intercostal space to 5th intercostal space. There is a gradual change in pulse and blood pressure as the age increases.

Pulse rate in newborn is in between 120 and 160 beats per minute, at 1 year it is about 100 to 160 beats per minute, at 4 years it is 80 to 120 beats per minute, at 8 years it is 70 to 100 beats per minute, at 15 years it is 70 to 90 beats per minute, and at 18 years it is 70 to 80 beats per minute.

Blood pressure in neonates is 80/46 mm Hg (average), at 1 year it is about 96/66 mm Hg, at 4 years it is 99/65 mm Hg, at 8 years it is 102/56 mm Hg, at 12 years it is 113/59 mm Hg and at 14 years it is about 118/60 mm Hg.

Hb level in newborn baby is about 17 (14–20) g/dL, at 3 months to 6 years it is about 12 (10.5–14) g/dL and in older children about 14 to 16 g/dL. The size of RBCs, number of RBCs and WBCs and hematocrit values are gradually reduced as age increases.

### *Brain Growth*

Brain growth occurs two-third in first years, four-fifth in second year and fully developed within 5 years.

### *Gastrointestinal System*

The secretary enzymes of the digestive tract are usually adequate for the newborn baby. Fat digestion is less. Liver in neonates is usually 4% of body weight and increases gradually to 10 times in puberty from 120 to 160 g to 1500 to 2300 g at 15 years. Liver is palpable throughout the childhood usually up to 18 months of age.

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### *Urinary System*

The kidneys are large at birth. The urine amount gradually increases from 250 mL per day in neonates to 1200 mL per day in 14 years. The amount of creatinine is low in infants about 10 to 20 mg/kg/day which gradually changed to 5 to 40 mg/kg/day in older children.

### *Lymphoid Tissue and Immunity*

The growth of lymphoid tissue (spleen, tonsils, thymus) reaches its peak at 6 to 7 years which becomes about double of adult size. Then gradually regresses up to puberty.

Synthesis of gamma globulin antibodies ordinarily begin after 2 to 4 weeks of age. Then depending upon the antigenic stimuli the gamma globulin level increased and usually reached the adult range (700 to 1200 mg/100 mL) by the 3 to 4 years of age.

### *Hormonal Changes*

Thyroid is well-developed at birth and islets cells of pancreas are relatively large. The adrenal glands are large and become proportionate within one year. Testicular and ovarian hormones appear at puberty.

### *Sexual Development*

Preparatory changes of adolescence may be detectable as early as 7 to 8 years of age. The process of maturation of adolescence continues till the attainment of physical, emotional and mental maturity of adulthood.

### *Changes in Puberty (Adolescence)*

Adolescence begins with the onset of puberty. It is defined by the UNICEF as 'The sequence of events by which the individual is transformed into a young adult by a series of biological changes.' It is the period of development of secondary sex characteristics. Adolescence period extends from the onset of puberty till the time sexual maturation is completed. Somatic growth is also almost completed during this period and the individual is psychologically mature to be able to contribute to the society.

The ages of onset of puberty and sexual maturation vary widely in different individual depending on the genetic and environmental factors. According to WHO, adolescence is the period of life that extends from 10 years to 19 years. It is divided into three phases—i. early, ii. middle and iii. late adolescence. Early adolescence refers to age 10 to 13 years, middle adolescence to 14 to 16 years and late adolescence to 17 to 19 years. (*see* stages of growth and development).

In girls, preadolescent growth spurt begins at about 10 to 12 years of age and in boys it is 12 to 14 years of age. Structural growth usually extends up 16 to 17 years in girls and 18 to 19 years in boys.

During prepubescent period, rapid physical growth and appearance of secondary sex characteristics occur. In puberty, the girls begin to menstruate and the boys produce spermatozoa. Menarche refers to the time of first menstrual bleeding. Puberty changes in boys and girls follow an order of appearance of various characteristics toward physical development. Puberty is basically the organic phenomenon of adolescence when they become mature in psychosexual aspect.

### *Common Order of Puberty Changes in Girls*

- Accelerated growth in weight and height gain
- Breast changes like pigmentation of areola and enlargement of breast tissue and nipple
- Increase in pelvic girth mainly the transverse diameter
- Appearance of pubic hair and change in vaginal secretion
- Activation of axillary sweat glands
- Appearance of axillary hair
- Onset of menstruation (menarche). First bleed occurs usually 2 years after the first manifestation of puberty
- Abrupt slowing of gain in height.

### *Common Order of Puberty Changes in Boys*

- Accelerated increase in weight and height gain.
- Increase in the size of external genitalia.
- Appearance of pubic hair followed by hair in axilla, upper lip, groin, thigh and between symphysis pubis and umbilicus.
- Appearance of facial hair two years after the pubic hair.
- Changes in voice as cracking then deepening.
- Nocturnal discharge of semen during sleep.
- Abrupt slowing in height gain.

Adolescents need special attention during this period of transition. There are numbers of problem found in this age group. But adolescence health is till neglected. They are not considered as adult nor as children. There problems need to be handled with care. The child health care services should include the prevention and management of adolescent problems. According to the Indian Academy of pediatrics (IAP), health problems of children up to 18 years should be the responsibility of pediatricians. The new medical speciality, Ephebiatrics, is now in practice to help the teenagers to solve their problems and to fulfil their special needs. (Ephebos—means youth and puberty). A worldwide campaign has also begun to focus attention on adolescence health by concerted efforts of the WHO and the UNICEF.

## Different Aspects of Development

Development of children has different aspects which can be described in four important areas, *viz*. gross motor, fine motor-adaptive, language and personal-social behavior. Other aspects are sensory, intellectual, emotional, sexual, moral and spiritual. These divisions of development are arbitrary. They all usually progress together in the process of maturation and learning.

### *Motor Development*

Motor development depends upon maturation of muscular, skeletal and nervous system. It is usually termed as gross and fine motor development.

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**Gross motor development** involves control of the child over his/her body by increasing mobility. It is assessed by ventral suspension, supine position, prone position, turning, reaching the object, etc. The important gross motor developmental milestones include head holding, sitting, standing, walking, running, climbing upstairs, riding tricycle, etc. It promotes independent locomotion and proceeds fine motor activities.

**Fine motor development** depends upon neural tract maturation. Initial neurological reflexes are replaced by purposeful activities. Fine motor developments promotes adaptive activities with fine sensory motor adjustments and include eye coordination, hand-eye coordination, hand-to-mouth coordination, hand skill as finger-thumb apposition, grasping, dressing, etc. It develops as the reflexes give way to the acquisition of motor dexterity.

Motor development is not affected by sex or geographical area or parental education. It is mostly affected by nutritional status and adverse environmental influence. It varies widely in young children.

### *Language and Speech Development*

Language development is the sensory motor development. It depends upon hearing, level of understanding, power of imitation and encouragement. It is skill of communication with development of true speech.

### *Personal and Social Development*

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

### *Sensory Development*

Sensory development depends upon myelinization of nervous system and responds to specific stimuli. Taste, smell, touch and hearing are initial senses present in newborn babies. The visual system is the last to mature at about 6 to 7 years.

### *Emotional Development and Personality Development*

Emotional development and personality development is a continuous process. It is the sum total (sum total indicates total resulting from addition of items) of physiologic, psychological and sociological qualities of the individual. Adequate guidance and problem solving at different stages help for the healthy progress to next stage of personality development which promotes emotional maturation in adulthood. The emotional needs also considered as emotional foods, are essentials for healthy development of personality. The emotional needs include effective mothering, love, affection, safety, security, protection, play, faith, achievement of potentialities, guidance and counseling, independence, acceptance with positive approach, approval, etc.

According to Erik Erikson the stages of psychosocial development and Freud's psychosexual stages are shown in Table 7.2.

### *Psychosexual Development*

The sex of a child is determined genetically at the time of conception. Development of sexuality after birth is influenced by the development of physical, mental, emotional and sociocultural aspect of living. Human sexuality is expressed in everyday life. It refers to the total quality of an individual, not just to the genitals and their functions. It is normal human process that expresses itself in a vast range of individual variability. It is related to many aspects of total personality functions. It is concerned with cultural beliefs, attitudes, feeling like loving and caring, sex-role, stereotypes, self-image, body image and spiritual values. Open communication improves human sexual functioning.

According to *Sigmund Freud,* the development of sexuality proceeds in different stages, i.e. oral, anal, phallic, latency, puberty and genitality. Freud believed that sexual feelings do not suddenly emerge during puberty and adolescence. They are present from infancy and gradually change from one form to another until adult sexual life is achieved. Freudian psychoanalytic theory with its stages of psychosexual development has greatly influenced modern psychiatric thinking. In each stage, instinctual sexual energy (libido) is invested in different biologic areas of body. These areas determine how the child interacts with other people. *Freud's* phases of psychosexual development include the followings:

**Table 7.2:** Stages of psychosocial and psychosexual development

| Stage | Approximate age | Erikson's psychosocial stage | | Freud's psycho-sexual stages | Significant persons |
|---|---|---|---|---|---|
| | | Task | Counterpart | | |
| Infancy | 0–1 year | Sense of trust | Mistrust | Oral | Maternal person or substitute |
| Toddler | 1–3 years | Sense of autonomy | Shame and doubt | Anal | Parental persons |
| Preschool age | 3–6 years | Sense of initiative | Guilt | Phallic | Basic family |
| School age | 6–12 years | Sense of industry | Inferiority | Latency | Neighborhood, school |
| Early adolescence | 12–? years | Sense of identity | Identity diffusion | Puberty | Peer groups, out groups, models of leadership |
| Late adolescence and young adult | — | Sense of intimacy and solidarity | Isolation | Genitality | Partners in friendship, sex competition, cooperation |

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The *oral stage* includes roughly the period of infancy, the first year of life. The greatest sensual satisfaction is obtained through stimulation of oral region or sensory area of mouth as in breastfeeding and sucking.

The *anal stage* includes the toddler period, the second and third years of life. Gratification is obtained from the anal and urethral areas through holding or expelling feces or urine.

The *phallic stage* includes the preschool period, the 4th and 5th years of life. The greatest sensual enjoyment is obtained from the genital region by fondling the genitals. The Oedipal complex develops in this stage. The child loves and feels attraction to the parent of opposite sex and the parent of same sex is considered as rival.

The *latency stage* includes the school age from 6th to 12th year of life (roughly). In this stage sexual interests are repressed and lie dormant. The child develops close relationship with others of same sex and same age. This is period of gang formation, gang loyalties and fierce. Oedipal conflict resolved in this stage.

The genital stage or *pubescent stage* and *adolescence* include the period from 12 years of age to adulthood. In this period of puberty and genitality, the secondary sexual characteristics appear in both sexes with experience of romanticism and emotional changes. The psychosexual conflict of Oedipal period revived in the phase. With the resolve of that conflict, the child develops normal heterosexual relationship and feels attraction with opposite sex. The normal heterosexual relationship is determined by family relationship and social experiences of the child rather than biologic factors alone. Early learning of gender role or sexual identity is very important in determining gender identity of human beings in later life.

Other important aspects of development are social development, intellectual development, moral development, development of body image, and spiritual development.

*Social development* or socialization is achieved through the training of the child by meeting and communicating with people and participating in the group activities.

*Intellectual development* depends upon genetic inheritance and environmental influences through mental maturation and achievement of intelligence. It occurs as a result of maturation of innate abilities, learning by association of stimulus response, i.e. by conditioning, reinforcement of appropriate behaviors, imitation of behavior of others and insight. Intellectual and mental developments are found as ability to solve problems and as general understanding. Potential mental ability is inherited at birth and its development is influenced by environment which leads to behavior change.

According to Piaget's theory of intellectual or cognitive development, there are four major stages. These stages include as follows:

1. **Sensorimotor stage (0–2 years):** Children learn about physical objects in this stage.
2. **Preoperational stage (2–7 years):** Children are concerned with symbols in language, dream and fantasy in this period.
3. **Concrete operational stage (7–11 years):** Children learn about abstract world, numbering, relationship and reasoning by this time.
4. **Formal operational stage (11–15 years):** In this stage children become logical in thoughts.

*Moral development* helps in formation of value system. It is not acquired by simply following rules of society but through an internal and personal series of changes in attitudes. Moral development parallels mental development and consists of two stages, i.e. respect for rules and a sense of justice. It is a complicated process of formation of values through experience which affect behavior.

According to Kohlberg's theory of moral development, there are six stages of potential moral development occurred in three levels. These levels and stages include as follows:

**Level–1 Preconventional morality, ego centricity:** Moral judgments develops on the basis of reward (i.e. a right action) or punishment (i.e. a wrong action). This level has three stages:

1. **Stage–0 (0–2 years):** In this stage, children learn good is what they like and bad is what hurt them.
2. **Stage–1 (2–3 years):** In this stage, children learn punishment and obedience. If they are punished, they consider the action as wrong, and if not punished the action is right.
3. **Stage–2 (4–7 years):** This is stage of instrumental hedonism and concrete reciprocity. Children learn to satisfy themselves and get pleasure. They consider those actions are right that meet their own needs or others needs.

**Level–2 Conventional morality:** Children learn correct behavior is that, which is approved and accepted by authority. This level has one stage, i.e.

**Stage–3 (7–9 years):** This is stage of orientation to interpersonal relationship. Children learn to become socially sensitive by gaining approval of actions in their family and from peers and teachers.

**Level–3 Postconventional morality:** In this level adolescents and adults consider that what actions are taught to them are right and acceptable behavior. This level has two stages:

**Stage–4: Orientation of higher laws and conscience:** In this stage, adolescents learn culturally appropriate values and act for the benefit of society.

**Stage–5: Orientation of universal ethical principles:** In this stage, highest level of moral values, standards and self-actualization develop in adolescents.

*Development of body image* occurs as a mental picture of what the body is like along with certain attitudes toward it and its parts. It includes both conscious and unconscious feeling about the body. It is closely related with ideas of self-worth and acceptance by family and peers.

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*Spiritual development* is closely related to cultural background and influences the family relationship and responsibilities. It is expressed through religious belief, rituals, symbols specific to religious traditions and faith. Faith is universal feeling. It is multidimensional and a way of learning about life as an ongoing process.

According to Fowler, 'Stage of theory of faith' includes the following:

- **Stage I: Primal faith (infancy):** In this stage, there is development of mutual trust, love and dependence progressing to autonomy through variety of experiences between parents and infant.
- **Stage II: Intuitive–projective faith (early childhood):** In this stage, child learns about the world by imagination, perception and feeling.
- **Stage III: Mythic–literal faith (childhood and beyond):** In this stage, child learns to differentiate their own thinking and beliefs from others.
- **Stage IV: Synthetic–conventional faith (adolescence and beyond):** During this stage, individuals have cluster of values and beliefs for others. They become aware of emotions, personality, ideas and thoughts.

## Developmental Milestones

Development is the functional maturation of organs. It depends upon neuromuscular maturity, genetic determinants and environmental influences. Developmental milestones are accomplished by the children at an anticipated age. There may be great variations of time in achievement of different levels of development with extreme ranges. Indian infants attain their developmental milestones earlier than the Europeans.

The average achievement levels in different age group of children up to 12 years are as follows:

### *Infants (Fig. 7.8)*

**1 to 2 months:** Able to lift the chin momentarily on prone position. Able to regard bright colored object at 20 cm distance. Cries when hungry or at discomfort. Able to turn head toward sound and smiles back to mother or caregiver.

**2 to 3 months:** Able to lift head and front part of chest by supporting weight on extended arms. Can follow moving object with steady eye movement and able to focus eyes. Produce 'cooing' sound and enjoy people talking with her/him. Able to recognize mother and turn head to sound.

**4 to 5 months:** Can hold head steadily in upright position. Able to hold a rattle and bring to mouth. Can reach a thing and grasp it crudely with palm. Make coos, gurgles and respond by making sounds. Join hands together in play, enjoy people and laugh out loudly.

**5 to 6 months:** Able to sit with support, can hold a cube and transfer from one hand to other. Try to imitate sound and enjoy own mirror image.

**7 to 8 months:** Can sit without support and roll in bed from back to side then back to abdomen. Produce bubbles and say '*aam*', '*da*', '*la*'. Recognize unknown person and show anxiety. Resist toys to be taken from him/her.



**Fig. 7.8:** Healthy infants of 7 months

**8 to 9 months:** Able to crawl on abdomen. Speak '*Da-Da*' and '*Ma-Ma*' combining syllables without meaning.

**9 to 10 months:** Able to creep on hands and knees. Can stand with support and cruises around furniture. Able to pick up a pellet with thumb and index finger. Understand emotions like anger, anxiety. Wave 'bye-bye' and want to please caregiver, say *ba-ba*, *da-da*, *ma-ma* with meaning.

**10 to 12 months:** Can stand without support and walk holding furniture. Able to feed himself/herself with spilling. Pick up small bits of food and take to mouth. Able to push toy car alone and play simple ball game. Can speak 3 to 5 meaningful words and understand meaning of several words. Respond for affection by kiss.

### *Toddlers (Fig. 7.9)*

**15 months:** Able to walk alone, can walk several steps sidewise and few steps backward. Can feed himself or herself without spilling. Able to turn 2 to 3 pages at a time.

**18 months:** Can creep upstairs. Able to feed from cup. Take shoes and socks off. Want potty, point the parts of body, if asked. Build tower of two blocks and stop taking toys to mouth. Use 6 to 20 words. Copy mother's action.

**2 years:** Able to run and try to climb upstairs by resting on each step and then climbing up on next. Put shoes and socks on. Can remove pants. Build tower of six to seven blocks. Can copy and draw a horizontal and vertical line. Control bladder at day time (dry-by-day). Speak simple sentences without use of verb.

**3 years:** Can walk on tip-toes and stand on one leg for seconds. Jump with both feet. Climb upstairs by coordinated manner. Ride tricycle. Can dress and undress. Brush teeth with help. Can draw a circle. Build tower of nine blocks. Has vocabulary of about 250 words. Repeat three numbers (once in three times). Know own name and sex. Achieve bladder

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Fig. 7.9: Healthy toddler

control at night (dry-by-night). Fear dark. Interact and play simple games with peers.

### *Preschooler*

**3 to 6 years:** Can jump and hop. Able to draw a cross ('+') by 4 years and tilted cross ('x') by 5 years of age. Can draw a rectangle by 4 years and a triangle by 5 years. Able to copy letters. Can tell stories and describe recent experience. Become independent, impatient, aggressive physically and verbally. Jealous of sibling but gradually improve in behavior and manner.

### *School Age (Fig. 7.10)*

**6 to 8 years:** Able to run, jump, hop and climb with better coordination. Develop better hand-eye coordination. Able to write better and take self-care. Able to use complete sentences to express feelings and follow commands. Play in group. Learn discipline. Appreciate praise and recognition.

**8 to 10 years:** Play actively with different physical skill. Improved writing skill and speed. Use short and compact sentences. Participate in family discussion. Peer group involvement and increased awareness about sex role.

**10 to 12 years:** Develop more coordinated, skilful manipulative activities and games. Able to use parts of speech correctly. Accepts suggestions and instruction obediently. May show short burst of anger.

### *Important Developmental Milestones at a Glance up to 3 Years*

- **Social smile:** 6 to 8 weeks
- **Head holding:** 3 months
- **Sitting with support:** 5 to 6 months



Fig. 7.10: Healthy school children

- **Sitting without support:** 7 to 8 months
- **Reaches out to an object and holds it:** 5 to 6 months
- **Transfers object from one hand to other:** 6 to 7 months
- **Holding small object between index finger and thumb:** 9 months
- **Creeping:** 10 to 11 months
- **Standing with support:** 9 months
- **Standing without support:** 10 to 12 months
- **Walking without support:** 13 to 15 months
- **Feeding self with spoon:** 12 to 15 months
- **Running:** 18 months
- **Climbing upstairs:** 20 to 24 months
- **Says bisyllables words (da-da, ba-ba):** 8 to 9 months
- **Says two words with meaning:** 12 months
- **Says ten words with meaning:** 18 months
- **Says simple sentence:** 24 months
- **Tells story:** 36 months
- **Takes shoes and socks off:** 15 to 18 months
- **Puts shoes and socks on:** 24 months
- **Dresses ownself fully:** 3 to 4 years
- **Controls bladder and bowel at day time:** 2 years
- **Controls bladder and bowel at night time:** 3 years
- **Knows full name and sex:** 3 years
- **Riding tricycle:** 3 years.

## Assessment of Development

Assessment of development is essential to detect abnormal developmental delays. The most widely used screening test for detecting developmental delays in infancy and preschool years is known as Denver Developmental Screening Test (DDST). It is a worldwide popular test developed in 1967, for the assessment of development in four areas, i.e. i. gross

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motor, ii. fine motor-adaptive, iii. language and iv. personal-social behavior. There are 105 items, some of which are indeed difficult to administer. It is inappropriate for children with mothers having poor education. It has less items related to language. DDST was modified in 1992 in the form of Denver II or modified DDST with 125 items.

Other developmental screening tests include DASII Scale (Developmental Assessment Scale of Indian Infant). Baroda DST, Trivandrum DST, Gessell DST, Bayley DST, Woodside DST, cognitive adaptive test, early language milestones scale, etc.

For older children 3 to 15 years, the development chart can be used. Assessment of development should not be confused with assessment of general intelligence using such tests as Stanford-Binet intelligence scale, Welchsler intelligence scale, etc.

In India, *Baroda screening test* 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 minutes mainly by the psychologists.

*Trivandrum development screening* test is the simplified version of Baroda DST that can be used by the health workers, nurses and pediatricians/physicians. It has 17 test items relevant for 0 to 2 years of age. The children are evaluated in three domains, i.e. gross motor, fine motors and cognitive for 5 minutes only. Figure 7.11 presents Trivandrum Development Screening Test (TDST).

### Approaches of Development Screening

- Informal screening during routine pediatric check up and collecting history from parents.
- Routine formal screening in systematic developmental screening of all children with the help of standardized screening instruments.
- Focused screening in suspected developmental problems and in high-risk neonates with potential developmental delay.

## NEEDS OF THE HEALTHY CHILD

Each child has basic human needs like adults to fulfil the essentials of life and to promote growth and development. The physical, social, emotional and intellectual needs are the motivating force behind human behavior. According to Maslow (1954), the physiologic needs are primary needs and nonphysiologic or secondary needs are higher needs.

The physiologic needs are essential for survival and stimulation. Water, air, food, warmth, hygiene, elimination, rest, sleep, comfort, sexual pleasure, activity and avoidance of pain are the predominant needs in the motivation of behavior and maintenance of homeostasis of the internal environment of the body.

The nonphysiologic and higher needs are: (a) safety and security needs for the protection from environmental hazards, (b) need for love and affection, closeness and intimacy with family and friends for emotional maturation, (c) need for recognition and self-esteem to become independent, (d) need for creativity and self-actualization for ultimate use of individual abilities, (e) cognitive needs for knowledge, comprehension, understanding of new ideas and learning, (f) esthetic needs as desire for beauty in its various forms.

All these needs are important, but their total fulfilment is impossible, whether the child is well or ill. The responsibility of the nursing personnel is to help the parents and child to adjust to the problem situation in the best way possible. To assist the children and their families to achieve the highest level of possible wellness, the nurse should promote self-care or provide compensatory care when they cannot fulfil their needs for health care. The major aspects of child care should

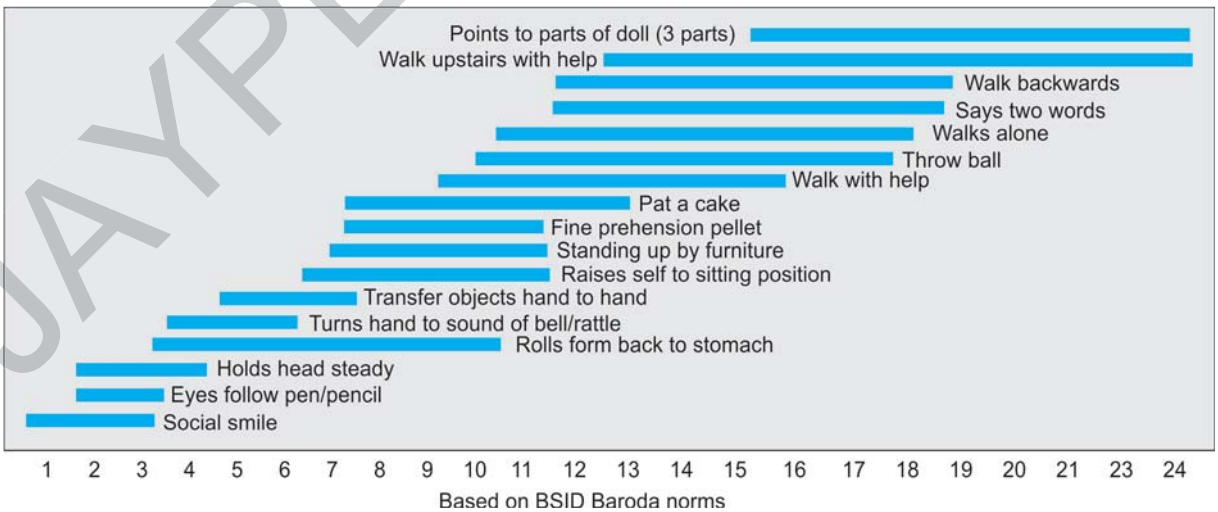


**Fig. 7.11:** Trivandrum Developmental Screening Chart (TDSC)

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be emphasized through promotion of health, prevention of illness, maintenance of health and restoration of health.

Health promotion during different stages of childhood and prevention of illness can be enhanced by nutritional counseling, weaning, immunization, toilet training, provision of play and toys, safety measures with prevention of accidents, sex education, etc.

## Nutritional Counseling and Weaning

(*see* Chapter 5)

Nutritional counseling weaning and immunization are important needs of the healthy child.

## Immunization

(*see* Chapter 4)

## Toilet Training

The children begin to learn independence in self-care, by the time they reach 3 years of age. Initially, the children imitate the actions of parents and siblings for self-care skills in feeding, dressing, toileting and grooming. Achievement of control of the bodily functions of defecation and urination is one of the major tasks of the toddler period during growth and development. The self-care skills depend upon the development of fine muscle control, cognitive ability, ability to communicate and environmental situations. It also depends upon cultural pattern, socioeconomic status of the family and lifestyle of parents.

The achievement of control over elimination develops when the child is operating on the basis of reality principle rather than pleasure principle. The child learns this control when the family and the society do not approve the behavior of toddler to excrete whenever like the infant does. If parents give high priority on cleanliness, the child takes the elimination control on moral value. Excessive emphasis on cleanliness may inhibit this normal development.

### *Age for Toilet Training*

During first three months of life, the infant tends to defecate after each feed due to gastrocolic reflex. This reflex becomes weak by the age of 4 months. Bowel movement becomes regular without any relation to feed at about 7 months of age. The infant can be placed on potty chair or toilet seat at the age of 10 months, as sitting without support usually achieved within this age. By the age of 15 to 18 months toddler can walk to toilet and ready for starting toilet training and should be encouraged to go to toilet. At 2 years the child is trainable. By the age of 3 years the child can withhold and postpone bowel movement.

For bladder control, the child is able to indicate wet pant by the age of 18 months. At 2 years, the child is generally toilet trained in the daytime and remains dry-by-day. The 2.5 years old child may have begun to master night time bladder control and usually by the age of 3 years becomes dry-by-night. Bladder control may not be completed until the child is 4 to 5 years of age.

### *Indications of Toddler's Readiness for Toilet Training*

An important responsibility of the nurse is to help parents to determine the readiness of their toddlers for toilet training. The actual age of readiness can be determined on evidences of their physiological, psychological and intellectual levels of maturity.

**Physiological readiness:** Children are physiologically ready for toilet training in the following situations:

- When neuromuscular systems are sufficiently mature, i.e. when myelination of nerves has occurred to the urinary and anal sphincter and the child is able to walk.
- When the bladder size has increased sufficiently so that the child can hold urine for two hours or awaken from sleep to keep the napkin dry. Toilet training is most successful during this stage.
- When the child is able to manipulate or put off clothing.

**Psychological readiness:** The toddlers' psychological readiness is indicated in the following situations:

- When the child can distinguish between sensation of holding on and letting go and can communicate this difference to the mother or primary caregiver.
- When the child is able to indicate the awareness of soiling or pulling at wet nappies, or carrying soiled diapers to the parents or conveying message through characteristics facial expressions, verbalizations or behavior that elimination is about to occur.
- When the child is attempting to imitate, the parent or older sibling of same sex in the act of urination.

**Intellectual readiness:** The toddlers, who have normal intelligence and able to communicate verbally are generally ready for toilet training by the middle of the second year of life. But those who are intellectually impaired may not be ready for a variable period after that time.

Learning a new skill is difficult before the critical period at which the child is able and motivated to learn. Unfavorable attitudes may develop, if the child is pressured to learn before this stage occurs. Even if toilet training is not done at proper time, the children may develop unfavorable response as they miss the pleasure of learning new skill and self-image may be damaged.

### *Process of Toilet Training*

The approach of parents is more important in the process of toilet training rather than actual procedure. Positive attitude of the parents towards toilet training, relaxed parental behavior without undue anxiety and healthy parent-child relationship are essentials for successful toilet training. Bowel training is easier than bladder training due to less number of stools in a day than the number of times of urination. Parents should be made aware about the following aspects during toilet training:

- Comfortable child size toilet seat or potty chair to be provided at suitable area as the child likes.
- Feeding at same time each day both at day and night.

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