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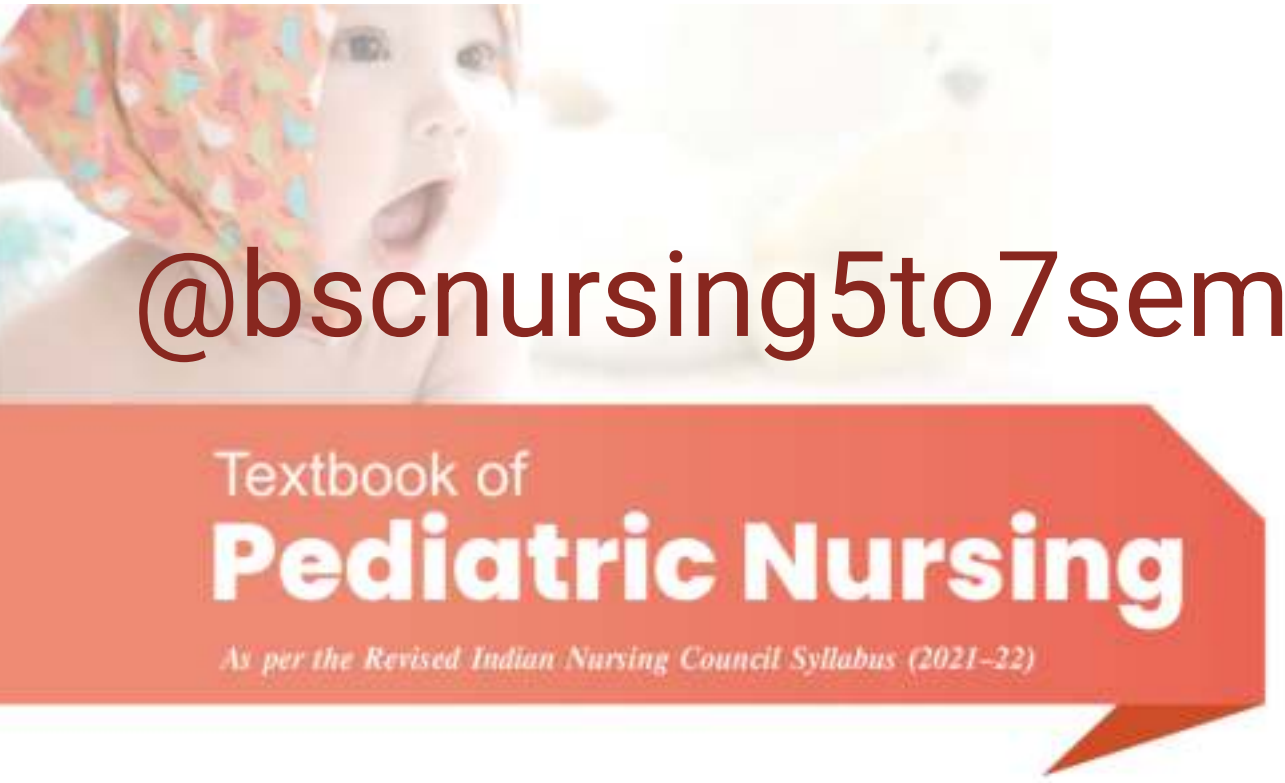


# Textbook of Pediatric Nursing

*As per the Revised Indian Nursing Council Syllabus (2021–22)*

| Unit | Time (Hrs) | Learning Outcomes | Content | Teaching/ Learning Activities | Assessment Methods |
|---|---|---|---|---|---|
| II | 12 (T) | Describe the normal growth and development of children at different ages | **The Healthy Child**<br>• Definition and principles of growth and development<br>• Factors affecting growth and development | • Lecture discussion<br>• Demonstration<br>• Developmental study of infant and children | • Short answer<br>• Objective type<br>• Assessment of field visits and developmental study reports |
| | | • Identify the needs of children at different ages and provide parental guidance<br>• Identify the nutritional needs of children at different ages and ways of meeting needs | • Growth and development from birth to adolescence<br>• Growth and developmental theories (Freud, Erickson, Jean Piaget, Kohlberg)<br>• The needs of normal children through the stages of developmental and parental guidance | • Observation study of normal and sick child<br>• Field visit to Anganwadi, child guidance clinic<br>• Videos on breastfeeding | • Short answer<br>• Objective type<br>• Assessment of field visits and developmental study reports |
| | | Identify the role of play for normal and sick children | • Nutritional needs of children and infants<br>▪ Breastfeeding<br>▪ Exclusive breastfeeding<br>▪ Supplementary/artificial feeding and weaning<br>• Baby friendly hospital concept<br>• Types and value of play and selection of play material | • Clinical practice/ field | |
| III | 15 (T)<br>20 (L) | • Provide care to normal and high-risk neonates<br>• Perform neonatal resuscitation<br>• Recognize and manage common neonatal problems | **Nursing Care of Neonate**<br>• Appraisal of newborn<br>• Nursing care of a normal newborn/essential newborn care<br>• Neonatal resuscitation<br>• Nursing management of low birth weight baby<br>• Kangaroo mother care<br>• Nursing management of common neonatal disorder<br>▪ Hyperbilirubinemia<br>▪ Hypothermia<br>▪ Hyperthermia<br>▪ Metabolic disorder<br>▪ Neonatal infections<br>▪ Neonatal seizures<br>▪ Respiratory distress syndrome<br>▪ Retinopathy of prematurity<br>• Organization of neonatal care unit<br>• Neonatal equipment | • Modular-based teaching: **ENBC and FBNC module (oral drills, videos, self-evaluation exercises)**<br>• Workshop on neonatal resuscitation: NRP module<br>• Demonstration<br>• Practice session<br>• Clinical practice<br>• Lecture discussion | • OSCE<br>• Short answer<br>• Objective type |
| IV | 10 (T)<br>5 (L) | Apply principles and strategies of IMNCI | **Integrated Management of Neonatal and Childhood Illnesses** | *Modular based teaching:*<br>**IMNCI module**<br>• Clinical practice/ field | • OSCE |
| V | 8 (T) | Describe the etiology, pathophysiology, clinical manifestation and nursing management of children with disorders of respiratory, and endocrine system | **Nursing Management in Common Childhood Diseases**<br>**Respiratory system**<br>• Identification and nursing management of congenital malformations<br>• Congenital disorders: Tracheoesophageal fistula, diaphragmatic hernia | • Lecture discussion<br>• Demonstration<br>• Practice session<br>• Clinical practice | • Short answer<br>• Objective type<br>• Assessment of skills with checklist |

*Contd...*

# Unit II

# The Healthy Child

## Learning Objectives

**At the end of this unit, the students will be able to:**

- Describe the normal growth and development of children at different ages.
- Identify the needs of children at different ages and provide parental guidance.
- Understand the nutritional needs of children at different ages and ways of meeting needs.
- Interpret the role of play for normal and sick children.

## Unit Outline

# Chapter 5

# Development Theories and Physical Examination

## Chapter Outline

- Introduction
- Principles and Factors Affecting Growth and Development
- Developmental Theories
- Development Assessment
- Pediatric History and Physical Examination
- Newborn Examination
- Newborn Reflexes

## INTRODUCTION

Growth refers to net increase in the size, height and weight. It tends to be cyclical, more rapid in utero, during infancy, and adolescence. Development is maturation of physiological and psychological function.

## PRINCIPLES AND FACTORS AFFECTING GROWTH AND DEVELOPMENT

The periods of growth are depicted in Table 5.1.

### Principles of Growth and Development

There are definite and predictable patterns in growth and development which are universal to all human beings. The principles of growth and development are:

- **Cephalocaudal (head to tail):** It refers to growth in a head-to-toe direction (Fig. 5.1). The head of the organism develops earlier than the lower part of the body. Structural control of head is achieved before the control of trunk and extremities.
- **Proximodistal (near to far):** It means the growth is occurring from inward to outward, and trunk to periphery. The shoulder control precedes the mastery of the hands, the whole hand is used as a unit before the fingers can be manipulated.

**Table 5.1:** Periods of growth

| | |
|---|---|
| **1. Prenatal period** | |
| Ovum | 0–14 days |
| Embryo | 14 days – 9 weeks |
| Fetus | 9 weeks – birth (40 weeks) |
| **2. Perinatal period:** | **22 weeks of gestation to 7 days after birth** |
| **3. Postnatal period** | |
| Newborn | 1–28 days |
| Early neonatal period | 1–7 days |
| Late neonatal period | 7–28 days |
| Infants | 1 month – 1 year |
| Toddlers | 1–3 years |
| Preschoolers | 3–6 years |
| School-age | 6–12 years |
| Adolescents | 12–19 years |

**Figure 5.1:** Cephalocaudal and proximodistal growth

- **Bilaterally symmetric:** Each side develops in the same direction and at the same rate as the other.
- **Differentiation:** The areas of development, like physical, mental, social and emotional proceed from single operations to more complex activities and functions.
- **Sequential:** Growth and development take place in a definite predictable sequence. Children crawl before they creep, creep before they stand and stand before they walk. It is a continuous and orderly process.
- **Developmental pace:** The development does not progress at the same rate or pace. Growth is relatively slow during middle childhood, markedly increase at the beginning of adolescence and levels off in early childhood.
- **Sensitive period:** The growth of an organism takes place in a specific manner during certain limited sensitive periods. For example, first three months of prenatal life are sensitive periods for physical growth of the fetus.
- **Individual differences:** Wide individual differences exist in growth rates. Each child grows in his or her own unique and personal way.

## Factors Affecting Growth and Development

Growth and development depend on many factors. These can be classified as genetic and environmental.

### *Genetic Factors*

- **Phenotype:** Parental traits are usually transmitted to offspring. Tall parents have tall children.
- **Characteristics of parents:** Parents with high IQ are more likely to have children with higher level of inherent intelligence.
- **Race:** Growth potential of children of different racial groups is different to a varying extent.
- **Sex:** Boys are generally heavier and taller than girls at the time of birth.
- **Biorhythm and maturation:** Daughters often reach menarche at a similar age as their mother.
- **Genetic disorders:**
  - **Chromosomal disorders:** May manifest as severe growth disturbances, e.g., Down syndrome.
  - **Gene mutation:** May lead to inherited disorders of growth, e.g., galactosemia.

### *Environmental Factors*

#### Prenatal Period

- Maternal undernutrition and anemia are related with Intrauterine Growth Restriction (IUGR). Maternal tobacco and alcohol abuse also causes fetal growth restriction. Obstetrics disorders, like pregnancy induced hypertension produce fetal growth restriction. Use of teratogenic agents like thalidomide may adversely affect the growing embryo. Maternal infections like rubella in first trimester may cause congenital anomalies.
- **Hormonal influence on growth:** Administration of anti-thyroid drugs and iodides in latter part of pregnancy may induce fetal goiter and hypothyroidism. Insulin stimulates fetal growth. In mothers with diabetes, the fetus is large with excessive birth weight.

#### Postnatal Factors

- **Nutrition:** Growth of children suffering with malnutrition is retarded.
- **Infections and infestations:** Persistent diarrhea or respiratory infections cause growth impairment.
- **Trauma:** Fracture of the end of bone damages the growing epiphysis and thus hampers the skeletal growth.
- **Social factors:** Children from families with high socioeconomic levels usually have a superior nutritional state. The velocity of growth may alter in different seasons.
- **Emotional factors:** Children from broken homes do not grow and develop at optimal rate.
- **Cultural factors:** Religious taboos against consumption on particular types of foodstuffs may affect the growth of children.

## DEVELOPMENTAL THEORIES

Personality and cognitive skills develop in a manner similar to biological growth. New accomplishments are built on previously mastered skills. Some of the developmental theories are depicted in Table 5.2.

**Table 5.2:** Developmental theories

| Stages | Psychosexual (Freud) | Psychosocial (Erikson) | Cognitive (Piaget) | Moral (Kohlberg) | Spiritual (Fowler) |
|---|---|---|---|---|---|
| **Infants (birth- 1 year)** | Oral | Trust vs Mistrust | Sensorimotor (birth- 2 years) | | Undifferentiated |
| **Toddlers (1–3 years)** | Anal | Autonomy vs shame and doubt | Preoperational, preconceptual phase (2–4 years) | Preconventional- Punishment and obedience orientation | Intuitive projection |
| **Preschoolers (3–6 years)** | Phallic | Initiative vs guilt | Preoperational, intuitive phase (4–7 years) | Preconventional- Naïve instrumental orientation | Mythical-literal |
| **School-age (6–12 years)** | Latency | Industry vs inferiority | Concrete operations (7–11 years) | Conventional level | Synthetic convention |
| **Adolescents (12–18 years)** | Genital | Identity vs role confusion | Formal operations (11–15 years) | Post- conventional level | Individuating reflective |

## Psychosexual Development—Freud

Human development proceeds through a series of stages from infancy to adulthood. Each stage is characterized by the inborn tendency of all individuals to reduce tension and seek pleasure. Each stage is associated with a particular conflict that must be resolved before the child can move successfully to the next stage. Experiences during the early stages can determine an individual's adjustment patterns and the personality traits that the individual has as an adult. Sexual instincts are considered significant in the development of personality. During childhood, certain regions of the body assume a prominent psychological significance as a source of pleasure and new conflicts gradually shift from one part of the body to another at particular stages of development. The stages of development according to Freud are:

- **Oral:** Birth to 12–18 months (infant), the major source of pleasure seeking is centered on oral activities, e.g., sucking, biting, chewing. Infant is concerned with self-gratification. When there is gratification of basic needs a sense of trust and security develops.
- **Anal:** 18 months – 3 years (toddler), interest centres around anal region as sphincter muscles develop and children are able to withhold or expel fecal material at will. A child begins to gain a sense of control over instinctive drives and learns to delay immediate gratification to gain a future goal. Toilet training must be considered at this stage.
- **Phallic:** 3–6 years (preschool), the genitals become an interesting and sensitive area of the body. Children recognize differences between sexes and become curious about dissimilarities. This is the period around which Oedipus complex, Electra Complex, penis envy and castration anxiety develop. The conflict is resolved when the child begins to identify with the parent of same gender.
- **Latency:** 6–12 years (school age), children elaborate on previously acquired trait and skills. Physical and psychic energy are channeled into acquisition of knowledge and vigorous play.
- **Genital:** 12–18 years (adolescent), there is maturation of reproductive systems. Genital organs become the major source of sexual tensions and pleasures. Energies are invested in forming friendships and preparation for marriage.

## Psychosocial Development—Erikson

Erikson's stages of psychosocial development explain eight stages through which a healthy developing human should pass from infancy to late adulthood. In each stage the person confronts, and masters, new challenges. Each stage builds on the successful completion of earlier stages. The challenges of stages not successfully completed may be expected to reappear as problems in the future.

- **Trust versus mistrust (infant):** This stage centers around the infant's basic needs being met by the parents. The infant depends on the parents, especially the mother, for food and comfort. The child's relative understanding of world and society come from the parents and their interaction with the child. If the parents expose the child to warmth and affection, the infant's view of the world will be one of trust. The infant learns trust that others are dependable and reliable. If the parents fail to provide a secure environment and meet the child's basic needs, then a sense of mistrust will result. The infant may believe that the world is in an undependable, unpredictable, and possibly a dangerous place.
- **Autonomy versus shame and doubt (toddler):** As the child gains control over eliminative functions and motor abilities, he/she begins to explore his/her surroundings.




The parents' patience and encouragement help foster autonomy in the child. As the child gains increased muscular coordination and mobility, toddler becomes capable of satisfying some of his own needs. He begins to feed, wash and dress himself, and use the bathroom. Child at this age likes to explore his world around and is constantly learning about his environment. Caution must be taken at this age while child may explore things that are dangerous to his health and safety. At this age, child develop his first interests. For example, a child that enjoys music may like to play with the radio. Child that enjoys the outdoors may be interested in animals and plants.

Caregivers should let children perform those tasks which they can do to develop a sense of autonomy in them, otherwise they develop a sense of shame and doubt about their ability to handle problems.

- **Initiative versus guilt (preschool):** Initiative adds to autonomy. The child is learning to master the world around him and learning basic skills. At this stage, the child wants to begin and complete his own actions for a purpose. He may feel guilt when this initiative does not produce desired results.
- **Industry versus inferiority (school age):** School years are critical for the development of self-confidence. They provide opportunities for children to achieve the recognition of teachers, parents and peers by producing things, like drawing pictures, solving addition problems, writing sentences, etc.

  If children are encouraged to make and do things and are then praised for their accomplishments, they begin to demonstrate industry by being diligent, persevering at tasks until completed, and putting work before pleasure.

  If children are instead ridiculed or punished for their efforts or if they find they are incapable of meeting their teachers' and parents' expectations, they develop feelings of inferiority about their capabilities.

  The child must deal with demands to learn new skills or risk a sense of inferiority, failure and incompetence. Children need to cope with new social and academic demands. Success leads to a sense of competence, while failure results in feelings of inferiority.
- **Identity versus role confusion (Adolescents):** As the children make transition from childhood to adulthood, adolescents think about the roles they will play in the adult world. Initially, they experience some role confusion—mixed ideas and feelings about the specific ways in which they will fit into society. They may experiment with a variety of behaviors and activities (e.g., doing small jobs for pocket money, starting to learn driving, baby-sitting for neighbors, affiliating with certain political or religious groups). Ultimately, most adolescents achieve a sense of identity regarding who they are and what is their goal in life.

The teenager must achieve a sense of identity in occupation, sex roles, politics, and religion. Adolescence is a stage at which he is neither a child nor an adult, life becomes complex as he attempts to find his own identity, struggle with social interactions, and grapple with moral issues.

The task is to discover who a child is as an individual, separate from his family of origin and as members of a wider society. If a child is unsuccessful in navigating this stage, he will experience role confusion and upheaval. Teens need to develop a sense of self and personal identity.

## Cognitive Development—Piaget

Jean Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence. It deals with the nature of knowledge itself and how humans gradually acquire it, construct it, and use it.

### *Sensorimotor Stage (Birth to 2 Years)*

In this first stage infant is trying to make sense of the world. The infants' knowledge of the world is limited to their sensory perceptions and motor activities. Behaviors are limited to simple motor responses caused by sensory stimuli. Children make use of their innate skills like looking, sucking, grasping, and listening, to learn more about the environment.

According to Piaget, the development of object permanence is one of the most important events at the sensorimotor stage of development. Object permanence refers to child's understanding that objects continue to exist even though they cannot be seen or heard.

Substages of the Sensorimotor Stage are:

The sensorimotor stage is divided into six separate substages that are characterized by the development of a new skill. These are as follows:

- **Reflexes (0–1 month):** This is a reflexive stage in which the child understands the environment purely through inborn reflexes such as sucking, grasping and looking.
- **Primary circular reactions (1–4 months):** This substage involves coordinating sensation and new schemas. Child makes specific movements for his own enjoyment like thumb sucking, kicking or smiling. For example, a child may suck his thumb by accident and then later intentionally repeat the action as he finds them pleasurable.
- **Secondary circular reactions (4–8 months):** In this substage, the child becomes more focused on the world and begins to intentionally repeat an action in order to get a response in the environment. For example, a child will purposefully pick up a toy in order to put it in his mouth or may throw a toy to hear a sound.
- **Coordination of reactions (8–12 months):** The child starts to show clearly intentional actions. The child may

also combine schemas in order to achieve a desired effect. Children begin exploring the environment around them and will often imitate the observed behavior of others. The understanding of objects also begins during this time and children begin to recognize certain objects as having specific qualities. For example, a child might realize that a rattle will make a sound when shaken. They begin to combine their learned abilities and reflexes to achieve goals. For example, they might crawl to pick up a toy. The baby is able to plan and coordinate actions in response to thoughts.

- **Tertiary circular reactions (12–18 months):** Children begin a period of trial-and-error experimentation during the fifth substage. For example, a child may try out different sounds or actions to get attention from a caregiver. Child explores their world and learn more about it through motor coordination, planning, and experimentation.
  They might take things apart in order to put them back together and perform certain activities again and again to see what happens each time. Child is able to carry out a series of planned actions to complete a task.
  They understand and respond to simple directions or questions and may begin using phrases. They may show a preference for certain short stories and songs.
- **Early representational thought (18–24 months):** Children begin to develop symbols to represent events or objects in the world. The understanding of the world begins through mental operations. Child can remember and repeat words or actions from previous days, his vocabulary develops. They might ask short questions and make requests with one or two words.

### *Preoperational Stage (2–7 Years)*

The hallmark of the preoperational stage is sparse and logically inadequate mental operations. During this stage, the child learns to use and to represent objects by images, words, and drawings. The child is able to form stable concepts as well as mental reasoning and magical beliefs. The child however is still not able to perform operations; tasks that the child can do mentally rather than physically. Thinking is still egocentric. The child has difficulty taking the viewpoint of others. The characteristics of preoperational stage are:

- **Egocentrism:** Egocentrism occurs when a child is unable to differentiate between their own perspective and that of other. Children tend to pick their own view of what they see rather than the actual view shown to others. An example is an experiment performed by Piaget and Barbel Inhelder; three views of a mountain are shown and the child is asked what a traveling doll would see at the various angles; the child picks their own view compared to the actual view of the doll.
- **Animism:** It is the belief that inanimate objects are capable of actions and have lifelike qualities e.g., teddy bears or dolls. A child may believe that stars twinkle in the sky because they are happy.
- **Centration:** Centration is the act of focusing all attention on one characteristic compared to the others. Centration is noticed in conservation; the awareness that altering a substance's appearance does not change its basic properties.
- **Conservation:** Conservation refers to the idea that a quantity remains the same despite changes in appearance. If a child is shown four marbles in a row, then spread them out, the preoperational child will focus on the spread, and tend to believe that there are now more marbles than before.

### *Concrete Operational Stage (7 and 11 Years)*

This stage is characterized by the appropriate use of logic. Important processes during this stage are:

- **Seriation:** The ability to sort objects according to size, shape, or any other characteristic. For example, if given different-shaded objects they may make a color gradient.
- **Transitivity:** The ability to recognize logical relationships among elements in a serial order, and perform 'transitive inferences' (for example, If A is taller than B, and B is taller than C, then A must be taller than C).
- **Classification:** The ability to name and identify sets of objects according to appearance, size or other characteristic, including the idea that one set of objects can include another.
- **Decentering:** Where the child takes into account multiple aspects of a problem to solve it. For example, the child will no longer perceive an exceptionally wide but short cup to contain less than a normally-wide, taller cup.
- **Reversibility:** The child understands that numbers or objects can be changed, then returned to their original state. For this reason, a child will be able to rapidly determine that if 4 plus 4 equals t, t minus 4 will equal 4, the original quantity.
- **Conservation:** Understanding that quantity, length or number of items is unrelated to the arrangement or appearance of the object or items.
- **Elimination of egocentrism:** The ability to view things from another's perspective. For instance, show a child a comic in which Jane puts a doll under a box, leaves the room, and then Mala moves the doll to a drawer, and Jane comes back. A child in the concrete operations stage will say that Jane will still think it's under the box even though the child knows it is in the drawer. Children in this stage can, however, only solve problems that apply to actual (concrete) objects or events, and not abstract concepts or hypothetical tasks.



### Formal Operational Stage (11 Years–adulthood)

There is development of abstract reasoning. A child develops abstract thought and can easily conserve and think logically in his mind. The child moves beyond concrete experiences and begins to think abstractly, reasons logically and draws conclusions from the information available, and applies all these processes to hypothetical situations. The abstract quality of the adolescent's thought is evident in the adolescent's verbal problem solving ability. The logical quality of the adolescent's thought is when children are more likely to solve problems in a trial-and-error fashion. Adolescents begin to think more as a scientist, developing plans to solve problems and systematically testing solutions. They use hypothetical-deductive reasoning, which means that they develop hypotheses, and systematically deduce, or conclude, which is the best way to solve the problem. During this stage the adolescent is able to understand things as love, "shades of grey", logical proofs and values. During this stage the young person begins to entertain possibilities for the future.

## Moral Development—Kohlberg

Kohlberg's theory specifies six stages of moral development, arranged in three levels- Level 1, 2 and 3.

### Level 1 (Preconventional)

The pre-conventional level consists of the first and second stages of moral development, and is solely concerned with the self in an egocentric manner. A child with pre-conventional morality has not yet adopted or internalized society's conventions regarding what is right or wrong, but instead focuses largely on external consequences that certain actions may bring. It has two stages:

- **Stage one (obedience and punishment driven):** In this stage individuals focus on the direct consequences of their actions on themselves. This stage of moral development is especially common in young children, but adults are also capable of expressing this type of reasoning. At this stage, children see rules as fixed and absolute. Obeying the rules is important because it is a means to avoid punishment. For example, an action is perceived as morally wrong because the perpetrator is punished. "The last time I did that, I got spanked so I will not do it again." The worse the punishment for the act is, the more "bad" the act is perceived to be.
- **Stage two (self-interest driven)** espouses the "what's in it for me" position, in which right behavior is defined by whatever is in the individual's best interest. At this stage of moral development, children account for individual points of view and judge actions based on how they serve individual needs.

Stage two reasoning shows a limited interest in the needs of others, but only to a point where it might further the individual's own interests. As a result, concern for others is not based on loyalty or intrinsic respect, but rather a "you scratch my back, and I'll scratch yours" mentality.

### Level 2 (Conventional)

The conventional level of moral reasoning is seen in adolescents and adults. The adolescents judge the morality of actions by comparing them to society's views and expectations. The conventional level consists of the third and fourth stages of moral development. At this level an individual obeys rules and follows society's norms even when there are no consequences for obedience or disobedience. Adherence to rules and conventions is rather rigid, and appropriateness or fairness of a rule is seldom questioned.

- **Stage three (interpersonal accord and conformity driven):** Often referred to as the "good boy-good girl" orientation, this stage of moral development is focused on living up to social expectations and roles. There is an emphasis on conformity, being "nice," and consideration of how choices influence relationships. "I want to be liked and thought well of; apparently, not being naughty makes people like me." Desire to maintain rules and authority exists to support these social roles.
- **Stage four (authority and social order obedience driven):** People begin to consider society as a whole when making judgments. The focus is on maintaining law and order by following the rules, doing one's duty and respecting authority. It is important to obey laws, dictums and social conventions because of their importance in maintaining a functioning society.

### Level 3 (Postconventional)

The post-conventional level, also known as the principled level, consists of stages five and six of moral development. The individuals realize that they are separate entities from society, and that their own perspective may differ from society's view. They may disobey rules inconsistent with their own principles. These people live by their own abstract principles about right and wrong. They view rules as useful but changeable mechanisms.

- **Stage five (social contract driven):** People begin to account for the differing values, opinions and beliefs of other people. Rules of law are important for maintaining a society, but members of the society should agree upon these standards. The world is viewed as holding different opinions, rights and values. Such perspectives should be mutually respected as unique to each person or community. Laws are regarded as social contracts rather than rigid edicts. Those who do not promote the general welfare should be changed when necessary to meet "the greatest good for the greatest number of people".

- **Stage six (universal ethical principles driven):** Kolhberg's final level of moral reasoning is based upon universal ethical principles and abstract reasoning. At this stage, people follow these internalized principles of justice, even if they conflict with laws and rules. Laws are valid only as far as they are grounded in justice, and a commitment to justice carries with it an obligation to disobey unjust laws. Although Kohlberg insisted that stage six exists, he found it difficult to identify individuals who consistently operated at that level.

## Spiritual Development-Fowler

Fowler's Stages of Faith Development form a framework for the spiritual development of people throughout their lives. The model was developed by theologian James W Fowler. He states that the development of people's spiritual awareness runs parallel to other aspects of human development.

### *Stage 0: Undifferentiated Faith*

Stage 0 starts from birth to about the second year of life. A child at this stage learns to trust the goodness or badness of the world based on the way the child is treated by his parents.

The baby should develop a sense of security, consistency and confidence at this stage. These feelings later translate into feelings of trust and security in the universe and the divine.

Conversely, situations of neglect or abuse can lead to the formation of feelings of distrust and fear of the universe and the divine. In many cases this forms the seed for later doubt and fear or existence on earth.

This phase corresponds to Jean Piaget's sensory-motor phase.

### *Stage 1: Intuitive-Projective Faith*

Stage 1, the second stage, is the stage where children begin to use symbols and their imagination. This phase starts where stage 0 ends and continues until about the seventh year of life.

Children at this stage are very self-centered and tend to take ideas about right and wrong very literally. The ability to distinguish real from fantasy is not yet well-developed. Also, they are generally not yet able to see the world from another person's perspective. Children cannot think like a scientist, cannot consider logical arguments and think through and elaborate complex ideas.

Children in this phase are therefore not yet able to develop a formalized religious faith.

Faith at this stage is experiential and develops primarily through hearing stories, images, and the influence of others. An awareness of what is right and wrong also develops in this stage.

This stage ties in with Jean Piaget's preoperational phase.

### *Stage 2: Mythic-Literal Faith*

The second stage starts around the sixth or seventh year of life and continues until about the twelfth year of life. In this stage, information is organized into stories and together with moral rules are concretely understood by the child. There is still little ability to distance yourself from a story and formulate an overarching meaning.

Justice and fairness are seen as reciprocal. Some people stay in this phase their whole lives.

### *Stage 3: Synthetic-Conventional Faith*

Stage three starts from about age 12 to age eighteen. This stage is characterized by young adults' identification with a religious institution, belief system, or authority. Personal religion or spirituality also takes a growth spurt.

Conflicts can also begin to arise at this stage. However, these are often ignored because they threaten a person's identity, which is, after all, based in large part on faith.

What were once simple and compelling stories is now seen as a cohesive story of values and morals. In this stage, children develop the ability to think abstractly and see layers of meaning in the stories, rituals, and symbols of their faith.

### *Stage 4: Individuative-Reflective Faith*

Stage 4 is called individuative-reflective and runs from the mid-twenties to late thirties. This stage is characterized by fear and struggle as the person takes responsibility for his/her beliefs and feelings.

People in these stages begin to question their own assumptions. In addition to questioning their assumptions about faith, they also begin to question existing authority structures within their faith.

## DEVELOPMENT ASSESSMENT

**Development assessment** is the ongoing process by which qualified professionals, together with families, through standardized tests and observation, look at all areas of a child's development: motor, language, intellectual, social/emotional and self-help skills, including dressing, toileting, etc. It is an essential component of any health assessment. Both areas of strength and those requiring support and intervention are identified. It is a process of obtaining information about the skills and potentials of individuals.

**Developmental milestones** are the behaviors or physical skills seen in infants and children as they grow and develop. Rolling over, crawling, walking, and talking are all considered milestones. The milestones are different for each age range. There is a normal range in which a child may reach each milestone. For example, walking may begin as early as 8 months in some children. Others walk as late as 18 months and it is still considered normal.

**Developmental delay** refers to a child who is not achieving milestones within the age range of that normal variability.




## Purposes of Development Assessment

- To determine the existence of a developmental delay.
- To identify strengths and needs
- To develop strategies for intervention
- To determine progress on significant developmental achievements
- To serve as a basis for reporting to parents
- Validation that a child is developing normally
- Early detection of problems
- Identification of concerns of caregivers and child
- Provision of an opportunity for anticipatory guidance and teaching about age appropriate expected behaviors.

## Rules of Development Assessment

- The development assessment must be based on integrated model of child development, which includes developmental domains and child functional capacities
- It should involve multiple sources of information and multiple components
- It should follow a certain sequence
- It should be a spontaneous, motivated interaction of caregiver with the child forming the cornerstone
- Evaluator must have the sound knowledge in the developmental sequence
- It should emphasize attention to the child's level and pattern of organizing experience
- It should identify current competencies and the next step in the development of sequence
- It is a collaborative process
- It is the first step in potential intervention process
- Reassessment should occur in the context of daily family or intervention activities

Biological risk factors warranting regular developmental screening is shown in Table 5.3.

**Table 5.3:** Risk factors for developmental screening

| Prenatal or perinatal risk factors | Postnatal risk factors |
|---|---|
| • Birth weight less than 1000 g<br>• Chronic lung disease of prematurity<br>• Apgar score of 0–3 at 5 minutes<br>• Hyperbilirubinemia<br>• Intraventricular hemorrhage<br>• Neonatal seizures<br>• Sepsis, IUGR<br>• Maternal phenylketoneuria<br>• Maternal HIV infection<br>• F/H/O childhood deafness or blindness | • Meningitis<br>• Brain or spinal cord trauma<br>• Lead poisoning<br>• Chronic serous otitis media<br>• Seizures<br>• Severe chronic illness<br>• Child abuse or neglect |

Through the development tests, the development milestones in four major areas is assessed, namely. Fine motor, Language and Personal Social.

- Gross motor skills are larger movements the baby makes with his arms, legs, feet, or his entire body, e.g., crawling, sitting, standing, running, etc.
- Fine motor skills are smaller actions making use of finger and thumb, e.g., eating, drawing, writing, etc.
- Language involves speaking, using body language and gestures, communicating and understanding what others say.
- Personal social refers to interacting with others, having relationships with family, friends, and teachers, cooperating and responding to the feelings of others.

The key developmental milestones in four areas are depicted in Table 5.4 and Figure 5.2.

**Table 5.4:** Key Developmental Milestones till 3 years of age

| Gross motor | Fine motor | Language | Personal Social |
|---|---|---|---|
| Age (months)- Milestones | | | |
| 3. Neck holding<br>5. Sitting with support<br>8. Sitting without support, crawling<br>9. Standing with support<br>10. Walking with support<br>11. Creeping (keeping abdomen off the floor)<br>12. Standing without support<br>13. Walking without support<br>18. Running<br>24. Walking upstairs<br>36. Riding tricycle | 4. Grasps a rattle<br>5. Bidextrous grasp (holding an object with both hands)<br>7. Palmar grasp (holding an object with palm)<br>9. Pincer grasp (holding with thumb and forefinger) | 1. Turns head to sound<br>3. Cooing<br>6. Monosyllables - ma, ba<br>9. Bisyllables - mama, baba<br>12. Two words with meaning<br>18. Ten words with meaning<br>24. Simple sentence<br>36. Tells a story | 2. Social smile<br>3. Recognizing mother<br>6. Smiles at mirror image<br>9. Waves "bye-bye"<br>12. Plays a simple ball game<br>36. Knows gender |

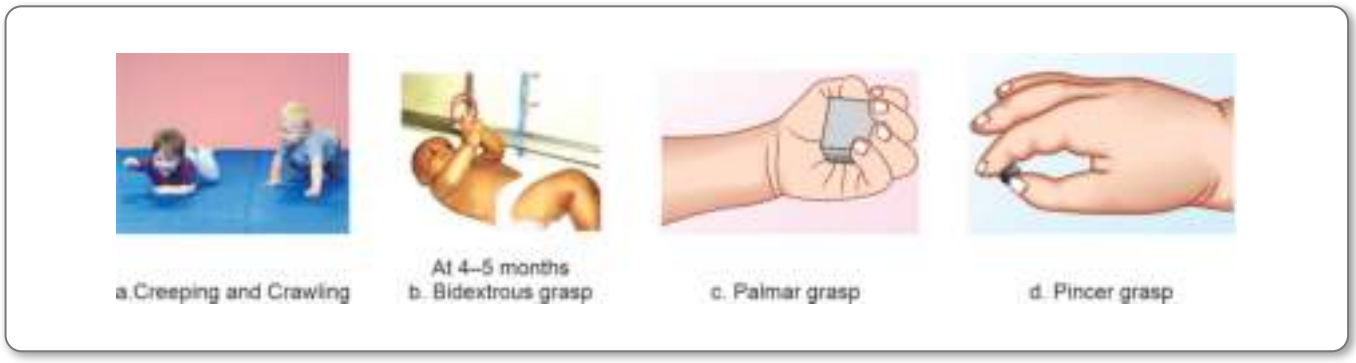



**Figure 5.2:** Key milestones

## Screening Tests

Screening tests or developmental tools are used to identify any development delays in children. The following are the properties of a good screening test. It should be:

- Reliable
- Valid—the extent to which it measures what it purports to measure
- Sensitive—it is the % of children with true problems who are correctly detected
- Specific—it is the % of children without problems who are correctly detected
- Standardized on diverse populations
- Simple, brief, convenient to use, cover all areas of development
- Culturally sensitive

Common Tools used in developmental assessment are:

- **Neonatal Behavioral Assessment Scale (NBAS):** It is an instrument designed to assess the neurological and behavioral functioning of newborn and very young infant. It assesses the newborn's behavioral repertoire with 28 behavioral items, each scored on a nine-point scale and infant's neurological status on 20 items, each scored on a four-point scale. It assesses the infants' ability to tune out stimuli, to respond to visual and auditory stimuli, soothability, motor functioning and reflexes. It describes the baby's strengths, adaptive responses, and possible vulnerabilities.
- **Trivandrum Developmental Screening Chart (TDSC):** It is designed and validated at the Child Development Center, Trivandrum shown in Figure 5.3. It is a simplified form of Bayley Scales of Infant Development, used for children below 2 years of age. The sensitivity of this test is 0.67 and specificity is 0.79. It has 17 test items. Test materials include pen and bunch of keys. It can be administered by aganwadi workers or someone with minimal training.
  A vertical line is drawn or a pencil kept vertically, at the chronological age of the child being tested. If the child fails to achieve any item that falls on the left side of the vertical line, the child is considered to have a developmental delay. Any obvious asymmetry is also considered abnormal.
  **Advantages:** It is easier to use, suits Indian working condition. It provides development quotient (DQ), developmental age and developmental curves.
- **Developmental Assessment Scale for Indian Infants (DASII):** It can be used for children less than 30 months of age. It was developed by Ms Promila Phatak based on Bayley Scales of Infant Development. It has 2 scales i) Mental scale which consists of 163 items and ii) Motor scale which consists of 67 items.
  Mental scale assesses sensori-perceptual acuities, memory, learning and problem solving ability, verbal communication, generalizations and classifications, abstract thinking. The results are expressed as standard score, Mental Development Index (MDI).
  Motor scale assesses degree of control of body, coordination of the large muscles, fine manipulatory skills of hands and fingers. The results are expressed as standard score, Psychomotor Development Index (PDI).
  It helps to identify child's performance in 15 areas of development and helps to plan intervention. It gives DQ, developmental age and percentile of score.
- **Developmental Observation Card (DOC):** It is prepared by Child Development Center (CDC), Trivandrum. It is a self-explanatory and simple card that can be used by the parents. The large majority of developmental delays could be identified by using cut off points for four simple developmental milestones (Table 5.5), i.e.
  - Social Smile achieved by completed 2 months
  - Head holding achieved by completed 4 months
  - Sitting alone achieved by completed 8 months
  - Standing alone achieved by completed 12 months
- **Neurological Evaluation, Amiel – Tison Passive Angles Method (Figs 5.4A and B)**
  Abnormalities in muscle tone can be picked up by a method devised by Amiel-Tison. Time needed is 10 mins. Evaluation is done every 3 months. Repeated neurodevelopmental assessments are made at 2, 3, 5, 7 years.

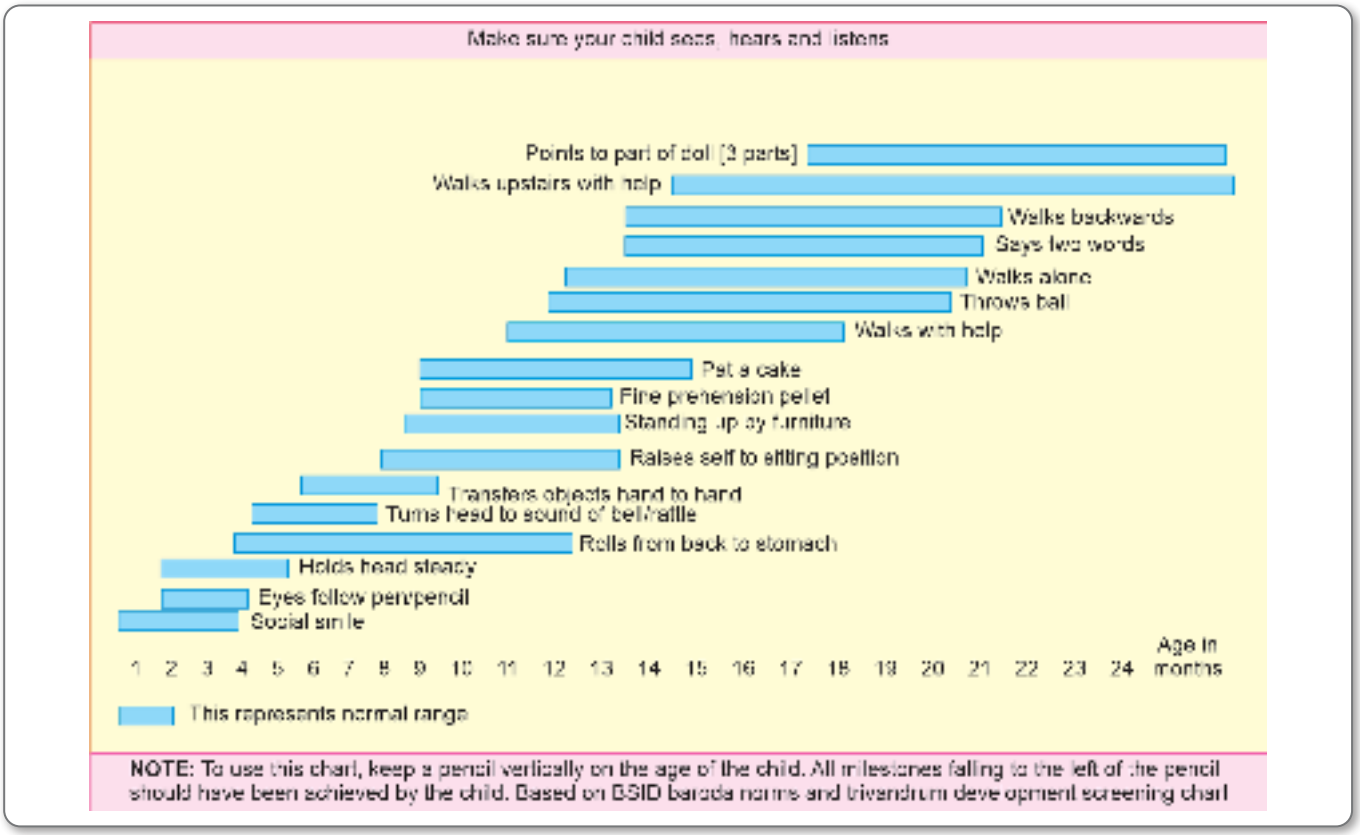



**Figure 5.3:** TDSC

**Adductor angle:** The legs are extended and gently pulled as far apart as possible. The angle formed by the legs at this point is measured

**Heel to ear:** The legs are held together and pressed as far as possible towards the ears. The pelvis must not be lifted from the table. The arc extending from the infant's heel to the table represents the angle.

**Figure 5.4A:** Amiel-Tison passive angles

**Popliteal angle:** Thighs are flexed laterally at the hip along both sides of the abdomen. Press the lower leg as far as possible towards the thigh. Angle formed by the colt and the thigh is measured in both legs simultaneously.

**Dorsiflexion angle of the foot:** Flex the foot towards the leg. Angle formed by the dorsum of the foot and the anterior aspect of the leg is measured.

**Scarf sign:** Pulls the arm as far as possible across the chest towards the opposite shoulder. Four positions are possible in describing the position of the elbow in relationship to the umbilicus.

**Figure 5.4B:** Amiel-Tison passive angles

Neurologic assessment of tone and primitive reflexes is done. Evaluation of tone is based on the study of spontaneous posture, passive tone and active tone. It includes neurosensory, neuromotor, head growth and neurobehavior evaluation. It helps in early identification of tone abnormality for early intervention. The best time to do this technique is 3 months. The disadvantage of this test is that it only assesses neuromotor abnormalities and hence requires additional test for mental development of child. It is more sensitive in picking abnormalities till 9 months of age.

After the assessment, babies are grouped into:

- Normal babies
- Babies with patterns of transient abnormalities
- Babies with patterns of persistent abnormalities

- **Denver II (Figs 5.5A and B):** It is a common developmental screening test for young children, developed by Dr. William Frankenburg in Denver, Colorado. The oldest form of this test was Denver Development Screening test (DDST), developed in 1967 containing 105 items. It was revised in 1981 as DDST(R). Denver II contains 125 items. The development is assessed in areas, like **Personal social, Fine motor, Gross motor and Language.** It requires 20 minutes to perform this test. It can be used for children from **1 month to 6 years** of age. It compares a given child's performance with the performance of other children the same age. Items needed for this test are Cup, Pencil, Blocks, Raisins, Rattle, Yarn, Doll and Pictures. Child's exact age is calculated and marked on the score sheet. Scorer administers selected items based on where the age line intersects each functional area. The scorer can then determine if child's responses fall into or outside of the normal expected range of success on that item for the child's age. Each test item is represented on the form by a bar that spans the ages at which 25%, 50%, 75% and 90% of the standardization sample passed that item. The number of items upon which the child scores below the expected age range determine whether the child is classified as within normal range, suspect, or delayed. Those with suspect scores are monitored by more frequent screening, while those with delayed scores are referred to for further assessment.
- **Baroda Development Screening Test for Infants (BDST):** It can be used for children till two and half years of age. The sensitivity is 0.66–0.93, and specificity is 0.77–0.94. It contains 22 motor and 32 mental items, validated against BSID Baroda norms. Items arranged to 97% passage placement. They are grouped age wise monthly till 12 months, 3 monthly till 18 months and 6 monthly till 30 months
- **Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III):** is an individually administered instrument. It identifies children with developmental delay so that information for intervention planning can be provided. The Bayley-III assesses infant and toddler development across five domains: Cognitive, Language (Receptive and Expressive), Motor (Gross and Fine), Social-Emotional and Adaptive.
- **Good Enough Harris Drawing Test:** It is a psychological projective personality or cognitive test used to evaluate children and adolescents for a variety of purposes. Children are asked to draw a man, a woman, and themselves. Drawings (such as specific body parts and clothing) are evaluated for various criteria, including presence or absence, detail, and proportion.
- **Goddard-Seguin Form Board Test:** It is based on the single factor theory of intelligence, measures speed and accuracy. It is useful in evaluating a child's eye-hand co-ordination, shape-concept, visual perception and cognitive ability. The test primarily used to assess visuo-motor skills. The form board (Fig. 5.6) includes Gesell figures wherein the child is asked to copy ten geometrical figures to evaluate visuo-motor ability. Test materials consist of ten differently-shaped wooden blocks and a large form board with recessed corresponding shapes.
- **Stanford Binet Intelligence Scale, Fifth Edition:** It includes five factors: fluid reasoning, knowledge, quantitative reasoning, visuospatial processing, and working memory. It is used to diagnose developmental or intellectual deficiencies in young children.
- **Wechsler Intelligence Scale for Children®** Fifth Edition (WISC®-V): It is an intelligence test that measures a child's intellectual ability and 5 cognitive domains that impact performance. It is used for children between ages 6–16 years. The purpose is to determine the student's cognitive strengths and weaknesses.
- **Binet Kamat Test of Intelligence (BKT):** It is a valid measure of intelligence.
- **Malins Intelligence Scale for Indian Children** (MISIC): Malin's has been adapted from the American test WISC developed by Dr. David Wechsler. It is an intelligence test for children from the ages of 6–15 years 11 months. It is administered individually and takes about 2–2½ hours. The test comprises 12 subtests divided into two groups, Verbal and Performance. Verbal Scale consists of 6 subtests and Performance Scale consists of 5 subtests.
- **Vineland Social Maturity Scale (VSMS):** It is one of the widely used psychological assessment tools in the Indian Subcontinent. It is mainly used to assess social and adaptive functions or social competency. Generally, VSMS is administered along with other tests such as Binet-Kamat Test and Bhatia's Battery of Intelligence test, to obtain the comprehensive picture of the child's abilities. VSMS is the most preferred test to assess intelligence whenever standard intelligence tests cannot be used due to various reasons such as when child's speech output is inadequate, when the person is not cooperative.

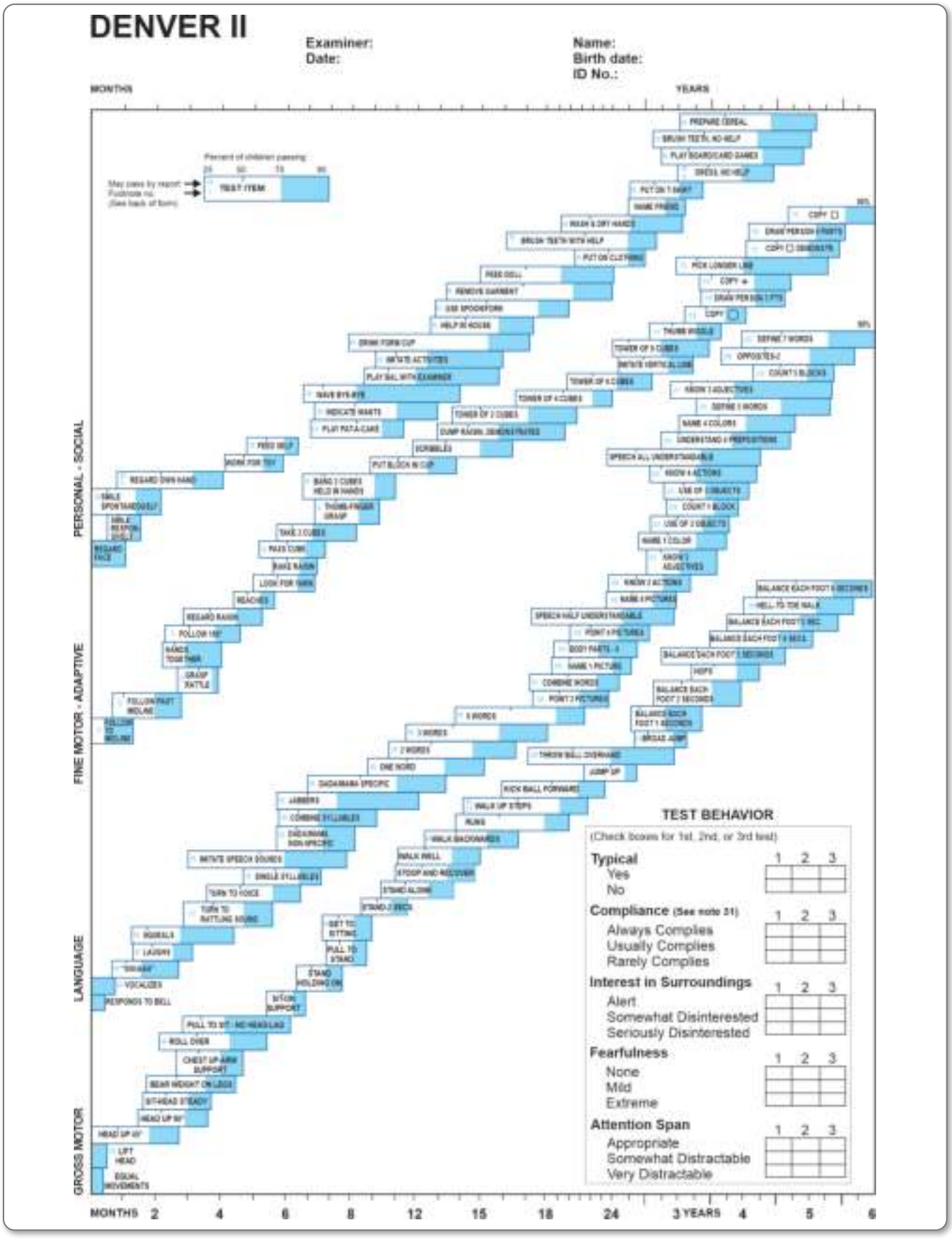



**Figure 5.5A:** Denver II

## Directions for Administration

1. Try to get child to smile by smiling. talking or waving. Do not touch him/her.
2. Child must stare at hand several seconds.
3. Parent may help guide toothbrush and put toothpaste on brush.
4. Child does not have to be able to tie shoes or button/zip in the back.
5. Move yarn slowly in an arc from one side to the other, about 8" above child's lace.
6. Pass if child grasps rattle when it is touched to the backs or tips of fingers.
7. Pass if child tries to see where yarn went. Yarn should be dropped quickly from sight from tester's hand without arm movement.
8. Child must transfer cube from hand to hand without help of body, mouth, or table.
9. Pass if child picks up raisin with any part of thumb and finger.
10. Line can vary only 30 degrees or less from tester's line.
11. Make a fist with thumb pointing upward and wiggle only the thumb. Pass if child imitates and does not move any fingers other than the thumb.

12. Pass any enclosed form. Fail continuous round motions.

13. Which line is longer? (Not bigger.) Turn paper upside down and repeat. (pass 3 of 3 or 5 of 6)

14. Pass any lines crossing near midpoint.

15. Have child copy first. If failed, demonstrate

When giving items 12, 14, and 15, do not name the forms. Do not demonstrate 12 and 14.

16. When scoring, each pair (2 arms, 2 legs, etc.) counts as one part.
17. Place one cube in cup and shake gently near child's ear, but out of sight. Repeat for other ear.
18. Point to picture and have child name it. (No credit is given for sounds only.) If less than 4 pictures are named correctly, have child point to picture as each is named by tester.





19. Using doll, tell child: Show me the nose, eyes, ears, mouth, hands, feet, tummy, hair. Pass 6 of 8.
20. Using pictures, ask child: Which one flies?...says meow?...talks?...barks?...gallops? Pass 2 of 5, 4 of 5.
21. Ask child: What do you do when you are cold?...tired?...hungry? Pass 2 of 3, 3 of 3.
22. Ask child: What do you do with a cup? What is a chair used for? What Is a pencil used for? Action words must be included in answers.
23. Pass if child correctly places and says how many blocks are on paper. (1, 5).
24. Tell child: Put block on table; under table; in front of me, behind me. Pass 4 of 4. (Do not help child by pointing, moving head or eyes.)
25. Ask child: What is a ball?...lake?...desk?...house?...banana?...curtain?...fence?...ceiling? Pass if defined in terms of use, shape, what it is made of, or general category (such as banana is fruit, not just yellow). Pass 5 of 8, 7 of 8.
26. Ask child: If a horse is big, a mouse is? If fire is hot, ice is? If the sun shines during the day, the moon shines during the ? Pass 2 of 3.
27. Child may use wall or rail only, not person. May not crawl.
28. Child must throw ball overhand 3 feet to within arm's reach of tester.
29. Child must perform standing broad jump over width of test sheet (8½ inches).
30. Tell child to walk forward, [illegible] → heel within 1 inch of toe. Tester may demonstrate. Child must walk 4 consecutive steps.
31. In the second year, half of normal children are non-compliant.

**Observations:**

**Figure 5.5B:** Directions for Denver II

**Figure 5.6:** Senguin form board

## PEDIATRIC HISTORY AND PHYSICAL EXAMINATION

Taking an accurate history of the child is the single most important component of physical examination. There are three different types of health histories:

1. **Complete or initial history:** Data is gathered about the time of conception to the current status of the child.
2. **Well interim history:** Data is gathered about the child from the last well visit to the current visit. When doing a well interim history, the examiner assumes that there is a data base in place.
3. **Problem-oriented or episodic history:** Information is gathered about a current problem. Information about the specific problem is then added to an already existing data base.

Points to be kept in mind for gaining cooperation of parents and child during pediatric nursing history taking:

- Welcome parent and child to a clean and comfortable physical environment where history is to be taken.
- Maintain privacy.
- Provide a space where the child can play during the parent-nurse interview.
- Introduce child and caregivers to members of heath team.
- Clarify your role as a nurse in the health team
- While interviewing demonstrate empathy for and interest in all family members.
- Assure the child and parents that information will be kept confidential and will be shared with nursing staff and physician for planning care for the child.
- Explore any concerns about past events that may influence parents' ability to handle stress and help them reduce anxiety to obtain cooperation.
- Use effective communication techniques. Use simple sentences to promote understanding, avoid medical jargon.
- Plan goals mutually with child and caregivers.
- Demonstrate respect for the child and parents during the history taking.
- Maintain eye contact when child speaks.

### Pediatric History

Assess history from parents/caregiver. Children above the age of four may be able to provide some of their own history. Observe parent-child interactions while taking history. Assess quality of relationship. Parental behaviors are important. Assess for parental guilt. Maintain non-judgmental attitude. Provide reassurance.

#### *Demographic Data*

Ask about name of child, age in years with months and days, Parent's names, address, date and time of interview, informant's name and relationship with the child.

#### *Presenting/Chief Complaints*

It includes the main problem or complaints for which the child has been brought to hospital. Record the child's or parent's own brief account of the complaints and its duration in chronological order. Use the words of the informant whenever possible.

**Example;**
Fever – 5 days
Vomiting – 4 days
Loose motion – 4 days
Decreased urine output – 2 days
Lethargy – 1 day
Fast breathing – 1 day

#### *History of Present Illness*

It includes more information on the specific complaints mentioned above. Find out the onset of complaints (the child was apparently well 2 weeks back when she suddenly started having headache and vomiting). Repeated episodes, e.g., of seizures or infection should be recorded. Note the treatment received so far.

#### *Past History*

- **Antenatal:** Assess for health of mother during pregnancy including medical supervision, drugs, diet, infections such as rubella, other illnesses, vomiting, toxemia, other complications; Rh typing and serology, pelvimetry, X-ray, maternal bleeding, mother's previous pregnancy history. Ask for 3 'I's- infection, irradiation, injection. Ask about folic acid supplementation (NTD)
- **Natal:** Duration of pregnancy, birth weight, kind and duration of labor, duration of the 3 stages of labor, type of delivery, presentation, sedation and anesthesia (if known), state of infant at birth, resuscitation required, onset of respiration, first cry.

- **Postnatal/neonatal:** APGAR score; term, birth weight, color, cry and activity should be noted. Also note cyanosis, pallor, jaundice, twitchings, excessive mucus, paralysis, convulsions, fever, hemorrhage, congenital abnormalities, birth injury, Difficulty in sucking, rashes, excessive weight loss, feeding difficulties. Record any resuscitation steps if used and whether hospitalized after birth. Passage of meconium within first 24 hours (if absent suspect anal atresia, intestinal obstruction) and voiding within 48 hours (renal agenesis)
- **Developmental history:**
  - Developmental milestones for assessing physical and neurological maturity
    - Gross motor-first raised head, rolled over, sat alone, pulled up, walked with help, walked alone
    - Fine motor-grasping, scribbling
    - Social-smile, recognition
    - Language–cooing, babbling, talked meaningful words; sentences.
  - Urinary continence during night; during day/ Control of feces.
- **Dietetic history**
  - **Breast or formula:** Type, duration, major formula changes, time of weaning, difficulties. Be specific about how much milk or formula the baby receives.
  - **Vitamin supplements:** Type, when started, amount, duration.
  - **"Solid" foods:** When introduced, how taken, types.
  - **Appetite:** Food likes and dislikes, allergies, reaction of child to eating. An idea of child's usual daily intake is important.
- **Past illnesses**
  - A comment should first be made relative to the child's previous general health, then the specific areas listed below should be explored.
  - Infections: Age, types, number, severity.
  - **Contagious diseases:** Age, complications following measles, rubella, chickenpox, mumps, pertussis, diphtheria, scarlet fever.
  - **Past hospitalizations:** Including operations, age.
  - Allergies, with specific attention to drug allergies - detail type of reaction.
  - Medications patient is currently taking.
- **Immunizations and tests:** List date and type of immunization as well as any complications or reactions.
- **Accidents and injuries (include ingestions):** Ask about the nature, severity, sequelae of any injury.
- **Behavioral history:** Ask about any unusual behavior such as thumb sucking, excessive masturbation, severe and frequent temper tantrums, negativism, any sleep disturbances/Phobias/Pica, abnormal bowel habits, e.g., stool holding, involuntary passage of stools or urine.

### Family History—Use Family Tree

- Father and mother (age and condition of health)
- **Marital relationships:** Little information should be sought at first interview; most information will be obtained indirectly.
- **Siblings:** Age, condition of health, significant previous illnesses and problems.
- Any stillbirths, miscarriages, abortions; age at death and cause of death of immediate members of family.
- Any incidence of tuberculosis, allergy, blood dyscrasias, mental or nervous diseases, diabetes, cardiovascular diseases, kidney disease, rheumatic fever, neoplastic diseases, congenital abnormalities, cancer, convulsive disorders, others.
- Health of contacts

### Sociocultural and Economic History

Assess information about child's living conditions, background and education of parents, father's work, medical insurance and family income. Ask about type of housing, ventilation, toilet and potable water facility. Enquire about traditional beliefs and child rearing practices.

### System Review

A system review brings out symptoms or signs which are missed in collection of data about the present illness. It serves as a screening device for detecting symptoms, past or present, which were omitted in the earlier part of the interview.

- **Skin:** Ask about any rashes, hives, problems with hair, skin texture or color, etc.
- **Eyes:** Ask about cross eyes, any foreign body or infection or use of glasses for any reason.
- **Ears, nose and throat:** Assess for frequent colds, sore throat, sneezing, stuffy nose, discharge, post-nasal drip, mouth breathing, snoring, otitis, hearing, adenitis.
- **Teeth:** Assess for age of eruption of deciduous and permanent teeth, number of teeth at one year and comparison with siblings.
- **Cardiorespiratory:** Assess about frequency and nature of disturbances and symptoms, like dyspnea, chest pain, cough, sputum, wheeze, expectoration, cyanosis, edema, syncope, tachycardia.
- **Gastrointestinal:** Ask about vomiting, diarrhea, constipation, type of stools, abdominal pain or discomfort, jaundice.
- **Genitourinary:** Enquire about enuresis, dysuria, frequency, polyuria, pyuria, hematuria, character of stream of urine, vaginal discharge, menstrual history, bladder control, abnormalities of penis or testes.
- **Neuromuscular:** Ask about headache, nervousness, dizziness, tingling, convulsions, habit spasms, ataxia, muscle or joint pains, postural deformities, exercise tolerance, gait.

- **Endocrine:** Ask about any disturbances of growth, excessive fluid intake, polyphagia, goiter, thyroid disease.
- **General:** Ask about any unusual weight gain or loss, fatigue, temperature sensitivity, mentality, pattern of growth (record previous heights and weights on appropriate graphs), time and pattern of pubescence.

## Physical Examination

A complete systematic examination at regular intervals should be done for children. Head to toe physical examination must be done.

**Points to Note:**

- Approach the child in a calm and unhurried manner. Spend adequate time with him. Use a friendly manner, quiet voice, and behave appropriately according to the age of child.
- Observe the child from the time he first enters until he leaves; it should not be based solely on the period during which the patient is on the examining table.
- Patience and skill are required to gather information when examining a child. Talk to child according to his cognitive level, and try to gain his trust. For example, for a toddler or preschooler you can say 'I am looking for animals in your ear'.
- Wash hands with warm water before starting the examination.
- The order of the exam should be according to the age and temperament of the child. For example, many infants under 6 months are easily managed on the examining table, but from 8 months to 3 years can be managed on mother's lap.
- Certain parts of the exam can sometimes be done more easily with the child in the prone position or held against the mother. After 4 years, they are often co-operative to perform the exam on the table.
- With the younger child, examine the heart, lungs and abdomen before crying starts. Examine the throat and ears in the last.
- If part of the examination is uncomfortable or painful, tell the child in a warm and honest manner.
- Various techniques may be used to restrain children while examining them, if needed.
- Sometimes during the examination, every part of the child may need to be undressed. Provide privacy using screen or curtains.

### *General Physical Examination*

#### Vital Signs and Anthropometry

- Vital signs- assess temperature, pulse, and respiratory rate, blood pressure (the cuff should cover 2/3 of the upper arm).
- Anthropometry- check weight, height, head circumference, chest circumference, and Mid upper arm circumference (MUAC), skin fold thickness.

Weight- is measured by weighing scale (Fig. 5.7) average weight of baby at birth is 2.5–2.9 kg. It should be recorded at each visit using weighing scale. It doubles at 5–6 months, triples at one year, and quadruples at two years of age. Wasting refers to low weight-for-height where a child is thin for his/her height but not necessarily short.

| Weech's formula for expected weight | |
|---|---|
| Age | Expected weight (kg) |
| 3–12 months | (age (months) + 9)/2 |
| 1–6 years | age (years) × 2 + 8 |
| 7–12 years | (age (years) × 7 – 5)/2 |

Length is measured by infantometer (Fig. 5.7) till 2 years of age and then height is measured by stadiometer for young children. At birth length is 50 cm, at 3 months – 60 cm, at 9 months – 70 cm and at 1 year it is 75 cm. Maximum growth takes place during first year of life followed by puberty. At 2 years – 90 cm and at 4–4.5 years – 100 cm. **Stunting** refers to low height-for-age, when a child is short for his/her age but not necessarily thin.

| Weech's formula for Expected Height up to 12 years |
|---|
| Length or height (in cm) = age in years × 6 +77 |

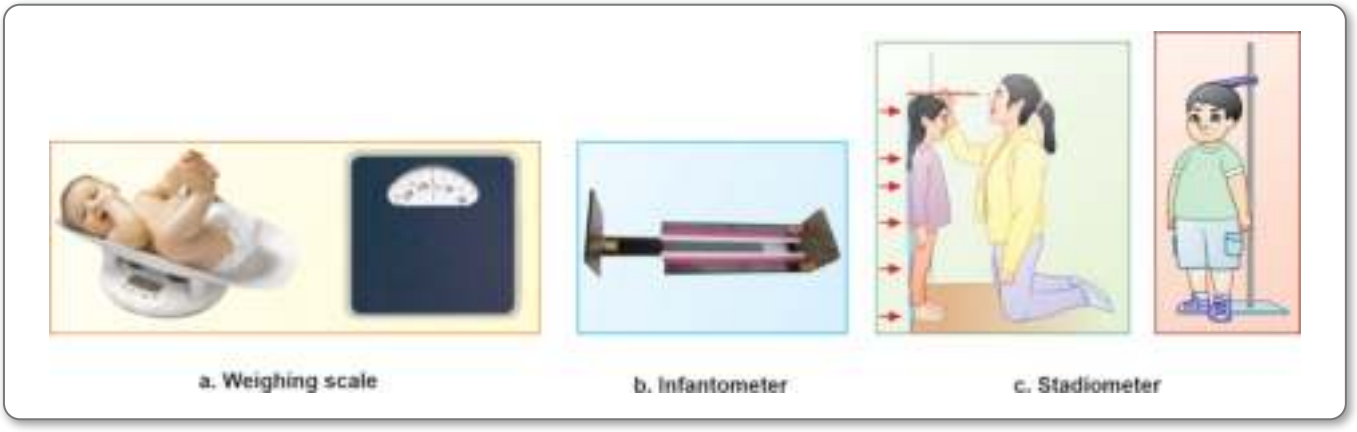



**Figure 5.7:** Weighing scale, infantometer and stadiometer

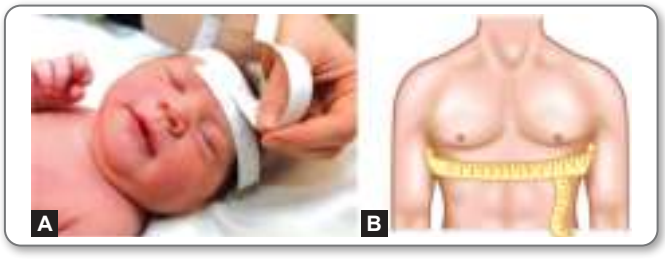
**BMI:** BMI is calculated as weight in kilograms divided by the square of height in meters. It helps is assessing the nutritional status of child.

**Head and chest circumference** at birth HC > CC. By one year both becomes equal. After one-year CC should be greater than HC. It can be measured by using a measuring tape (Figs 5.8A and B).

**MUAC:** Measured by Shakir's tape (Fig. 5.9 and Table 5.5). It has color coding of red, yellow and green indicating about child's nutritional status.

**Skin fold thickness:** Harpenden and Lange callipers (Figs 5.10A and B) are used to assess the skinfold thickness, as a measure for subcutaneous fat. Areas commonly measured are biceps, triceps, subscapular and suprascapular. When there is insufficient intake of calories for over a long period of time, the skin fold thickness reduces thus indicating undernutrition.

**Comparing with growth charts:** Growth plotted over time on standard growth charts provides an overview of the child's physical, nutritional, emotional, and developmental well-being. Growth charts are graphical representations of anthropometric measurements. Multiple measurements at intervals are of much greater value than single ones since they give information regarding the pattern of growth that cannot be determined by single measurements.




**Figures 5.8A and B:** **A.** Measuring head; **B.** Chest circumference

**Figure 5.9:** Shakir's tape for measuring MUAC

**Table 5.5:** Interpretation of mid-upper arm circumference (MUAC)

| Color coding | MUAC | Interpretation |
|---|---|---|
| Red | 0–11.5 cm | Severe acute malnutrition (SAM) |
| Yellow | 11.5–12.5 cm | Moderate malnutrition |
| Green | 12.5–26.5 cm | Well nourished |


**Figures 5.10A and B:** Measuring skin fold thickness using Harpenden's calipers

Types of growth charts:

- NCHS growth charts – 1977
- CDC growth charts – 2000
- WHO growth charts – 2006

WHO growth charts are preferred for under 5 children. They are based on multicentre growth reference study conducted across 6 countries, i.e., Brazil, Ghana, US, India, Oman and Norway, which enrolled only exclusive breastfed babies. The WHO growth charts are available for:

- Weight for age
- Weight for height
- Height for age
- HC for age
- MAC for age
- Skin fold thickness for age
- BMI for age
- Major motor milestones

There are separate growth charts for boys and girls for each parameter.

For each parameter there are two types of charts—percentile based and SD or Z score based charts.

The height, weight, and circumference of the child should be compared with standard charts and the approximate percentiles recorded. A combined WHO – IAP height and weight chart allows to monitor growth from birth to 18 years on a single chart and relation between child's height and Mid-parental height (MPH) can be readily observed on the same chart even for children younger than 5 years. Blue chart is for boys and pink for girls (Figs 5.11A and B).

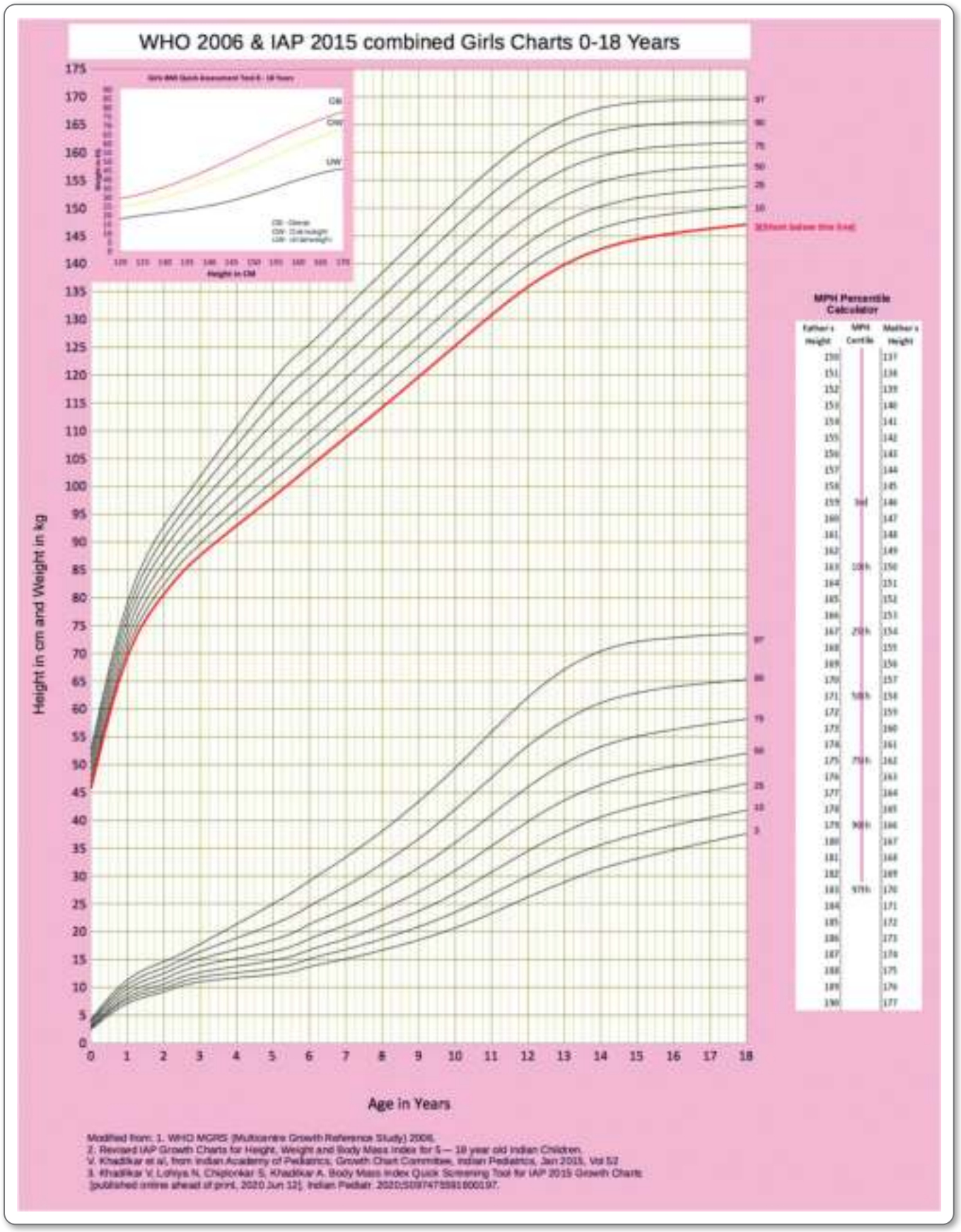



**Figure 5.11A:** WHO 2006 and IAP 2015 combined girls charts (0–18 years)

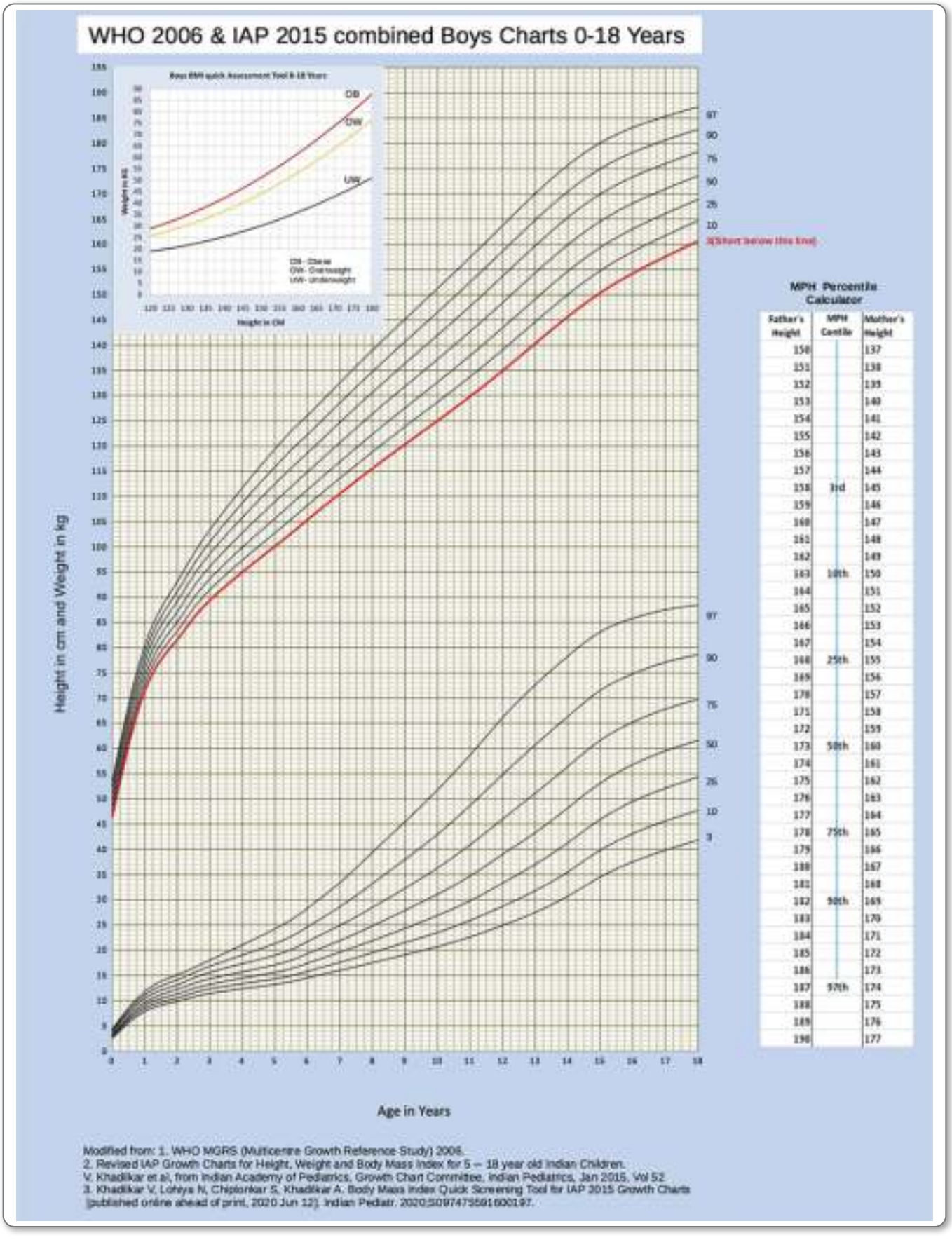



**Figure 5.11B:** WHO 2006 and IAP 2015 combined boys charts (0–18 years)




The tool has three lines which depict obese (OB), overweight (OW) and underweight (UW), the overweight line is orange and obese line is red (same color code as the IAP BMI charts). Based on where the child's weight lies on y axis for the height on x axis, the child can be classified as having BMI within the normal range (between UW and OW lines), overweight (between OW and OB lines), obese (above the OB line) or underweight (under the UW line).

## General Appearance

Assess whether the child appears swell or ill. Look for degree of prostration; degree of cooperation; state of comfort, nutrition, and consciousness; abnormalities, gait, posture, and coordination; estimate of intelligence; reaction to parents, physician, and examination; nature of cry and degree of activity, faces and facial expression.

### *Skin*

Assess skin for color (cyanosis, jaundice, pallor, erythema), texture, eruptions, hydration, edema, hemorrhagic manifestations, scars, dilated vessels, hemangiomas, cafe-au-lait areas and nevi, Mongolian spots, pigmentation, turgor, elasticity, and subcutaneous nodules. Striae and wrinkling may indicate rapid weight gain or loss. Assess skin for sensitivity, hair distribution and character, and desquamation.

### *Lymph Nodes*

Assess lymph nodes for location, size, sensitivity, mobility, consistency. Palpate various lymph nodes like suboccipital, preauricular, anterior cervical, posterior cervical, submaxillary, sublingual, axillary, epitrochlear, and inguinal. Enlargement of the lymph nodes occurs much more quickly in children than in adults. Small inguinal lymph nodes are palpable in almost all healthy young children. Small, mobile, non-tender nodes are commonly found in residue of previous infection.

### *Head*

Assess head for size, shape, circumference, asymmetry, cephalhematoma, bosses, craniotabes, head control, molding, bruit, fontanel (size, tension, number, abnormally late or early closure), sutures, dilated veins, scalp, hair (texture, distribution, parasites) and face.

The head is measured at its greatest circumference, i.e., at the mid-forehead anteriorly and around to the most prominent portion of the occiput posteriorly.

Normal findings include:

- Slight pulsations over the anterior fontanel may occur in normal infants. Bruits may be heard over the temporal areas in normal children.
- Craniotabes may be found in the normal newborn infant (especially the premature) and for the first 2-4 months.
- A positive McEwen's sign, i.e., "cracked pot" sound when skull is purcussed with one finger) may be present normally as long as the fontanel is open.

### *Face*

Assess for symmetry, paralysis, distance between nose and mouth, depth of nasolabial folds, bridge of nose, distribution of hair, size of mandible, swellings, hypertelorism, Chvostek's sign, tenderness over sinuses.

### *Eyes*

Examine the eyes for red reflex, and pupillary and blink response.

- **Red reflex:** The red reflex refers to the reddish-orange reflection of light from the back of the eye, or fundus, observed when using an ophthalmoscope to detect congenital cataract.
- **Pupillary reflex:** The pupils constrict in response to light.
- **Blink response:** It is an involuntary blinking of the eyelids elicited by stimulation of the cornea. At 2–4 weeks an infant will follow light. By 3–4 months, coordinated eye movements should be seen.

Second screening to be done during child's first year of life to assess for healthy eye alignment and movement.

Between 12 and 36 months, assess for healthy eye development and alignment**.** Look for photophobia, visual acuity, muscular control, nystagmus, Mongolian slant, Brushfield spots, epicanthial folds, lacrimation, discharge, eyelids, exophthalmos or enophthalmos, conjunctivas; pupillary size, shape, reaction to light and accommodation; corneal opacities, cataracts; fundi, visual fields (in older children).

Between 3 and 5 years assess for visual acuity, strabismus, refractive errors (myopia, hyperopia, astigmatism). To test for strabismus in the very young or uncooperative child, note where a distant source of light is reflected from the surface of the eyes; the reflection should be present on corresponding portions of the two eyes.

Vision can be assessed using Snellen's chart.

Examination of the fundi should be part of every complete physical examination, irrespective of the age of the child; dilatation of pupils may be necessary for adequate visualization.

Normal findings include:

- The newborn infant will usually open his eyes if he is placed in the prone position, supported with one hand on the abdomen, and lifted over the examiner's head.
- Usually, one pupil is normally larger than the other. This sometimes occurs only in bright or in subdued light.
- A mild degree of strabismus may be present during the first 6 months of life but should be considered abnormal after that time.
- Small areas of capillary dilatation are commonly seen on the eyelids of normal newborn infants.
- Most infants produce visible tears during the first few days of life.

### *Nose*

Assess nose for shape, mucosa, patency, discharge, bleeding, pressure over sinuses, flaring of nostrils, septum. At birth the maxillary antrum and anterior and posterior ethmoid cells are present. At 2–4 years, pneumatization of the frontal sinus takes place but is rarely a site of infection until the 6th–10th year.

### *Mouth*

Assess lips (thinness, downturning, fissures, color, cleft), teeth (number, position, caries, mottling, discoloration, notching, malocclusion or malalignment), mucosa (color, Epstein's pearls), gum, palate, tongue, uvula, mouth breathing.

The number and condition of the teeth should be recorded. A child should have 20 teeth by age 2½ years. When the teeth begin to erupt is quite variable but most infants have their two lower central incisors by 8–10 months.

### *Throat*

Assess tonsils for size, inflammation, exudate, crypts, inflammation of the anterior pillars, mucosa, hypertrophic lymphoid tissue, postnasal drip, epiglottis, voice (hoarseness, stridor, grunting, type of cry, speech).

- Before examining a child's throat, it is advisable to examine his mouth first. Allow the child to handle the tongue blade, nasal speculum and flashlight so that he can overcome his fear of instruments. Ask the child to stick out his tongue and say "Ah" louder for an adequate examination. The tongue blade is applied firmly to the rear of the tongue. Examine one side of the tongue at a time, pushing the base of the tongue to one side and then to the other.
- Young children may have to be restrained to obtain an adequate examination of the throat. Eliciting a gag reflex may be necessary if the oral pharynx is to be adequately seen.
- The small child's head may be restrained satisfactorily by having the mother place her hands at the level of the child's elbows while the arms are held firmly against the sides of his head.
- If the child can sit up, the mother is asked to hold him erect in her lap with his back against her chest.

### *Ears*

Assess pinna (position, size), ear canals, tympanic membranes (landmarks, mobility, perforation, inflammation, discharge), mastoid tenderness and swelling, hearing (including hearing screen).

- Low-set ears (Fig. 5.12) are associated with many congenital syndromes, e.g., mental retardation. The ears may be considered low-set if they are below a line drawn from the lateral angle of the eye and the external occipital protuberance.

**Figure 5.12:** Low set ears

- Congenital anomalies of the urinary tract are frequently associated with abnormalities of the pinnas.
- In examining the ear, as large a speculum as possible should be used and should be inserted no farther than necessary, both to avoid discomfort and to avoid pushing wax in front of the speculum so that it conceals the field. The otoscope should be held balanced in the hand by holding the handle at the end nearest the speculum. One finger should rest against the head to prevent injury resulting from sudden movement by the child.
- The child may be restrained most easily if he is lying on his abdomen.
- To examine the ears of an infant it is usually necessary to pull the auricle backward and downward; in the older child the external ear is pulled backward and upward to move the acoustic meatus in line with the canal.
- All babies should be screened for hearing loss no later than 1 month of age.

Congenital or acquired hearing loss in infants and children has been linked with lifelong deficits in speech and language acquisition, poor academic performance, personal-social maladjustments, and emotional difficulties. Audiologic tests for children are listed in Table 5.6.

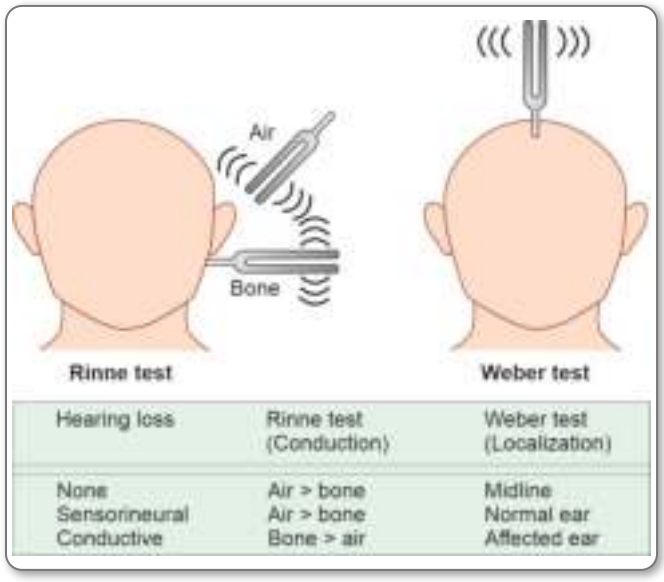
- Rinnie and Weber test are done using a tuning fork to assess sensorineural and conductive hearing loss (Fig. 5.13). In Rinnie test, normal hearing will show an air conduction time that is twice as long as the bone conduction time. In Weber test- normal hearing will produce equal sound in both ears; conductive loss will cause the sound to be heard best in the abnormal ear and; sensorineural loss will cause the sound to be heard best in the normal ear.

### *Neck*

Assess the position of neck (torticollis, opisthotonos, inability to support head, mobility), look for swelling, thyroid (size, contour, bruit, isthmus, nodules, tenderness), lymph nodes, veins, position of trachea, sternocleidomastoid (swelling, shortening), webbing, edema, auscultation, movement, tonic neck reflex. Palpate the gland from behind in older children.

**Table 5.6:** Audiologic tests for infants and children

| Developmental age of child | Auditory test/average time | Type of measurement |
|---|---|---|
| All ages | Evoked otoacoustic emissions (OAEs), 10–minute test  | Physiologic test specifically measuring cochlear response to presentation of a stimulus. This test uses a tiny, flexible plug that is put into the baby's ear. Sounds are sent through the plug. A microphone in the plug records the otoacoustic responses (emissions) of the normal ear in reaction to the sounds. There are no emissions in a baby with hearing loss. This test is painless and it often takes just a few minutes. It is done while the baby sleeps. |
| Birth to 9 months | Automated Auditory brainstem response ABR, 15–minute test  | Electrophysiologic measurement of activity in auditory nerve and brainstem pathways. |
| 9 month – 2.5 years | Visual reinforcement audiometry (VRA), 15–30 minutes test | Behavioral tests measuring responses of the child to speech and frequency-specific stimuli presented through speakers or insert earphones. The child is trained to look toward a sound source. When the child gives a correct response, he is rewarded through a visual reinforcement like a toy. |
| 2.5–4 years | Play audiometry, 15–30 minutes | Behavioral test of auditory thresholds in response to speech and frequency-specific stimuli presented through earphones and/or bone vibrator. The toddler is asked to do something with a toy (such as touch or move a toy) every time the sound is heard. |
| 4 years to adolescence | Conventional audiometry, 15–30 minutes test | Behavioral test measuring auditory thresholds in response to speech and frequency-specific stimuli presented through earphones and/or bone vibrator |
| All ages | Diagnostic ABR | Electrophysiologic measurement of activity in auditory nerve and brainstem pathways |
| All ages | Tympanometry | Relative change in middle-ear compliance as air pressure is varied in the external auditory canal |




| Hearing loss | Rinne test (Conduction) | Weber test (Localization) |
|---|---|---|
| None | Air > bone | Midline |
| Sensorineural | Air > bone | Normal ear |
| Conductive | Bone > air | Affected ear |

**Figure 5.13:** Rinne and weber test

*Thorax*

Assess thorax for shape and symmetry, veins, retractions and pulsations, beading, Harrison's groove, flaring of ribs, pigeon breast, funnel shape, size and position of nipples, breasts, length of sternum, intercostal and substernal retractions, asymmetry, scapulas and clavicles.

At puberty, in normal children, one breast usually begins to develop before the other. In both genders, tenderness of the breasts is relatively common. Gynecomastia is common in males.

*Lungs*

Assess lungs for type of breathing, dyspnea, cough, expansion, fremitus, flatness or dullness to percussion, resonance, lung sounds, rales, wheezing. Normally breath sounds in infants and children are more intense and more bronchial, and expiration is more prolonged, than in adults. Generally, the young child's respiratory movement is produced by abdominal movement; there is very little intercostal movement.

*Heart*

Assess the location and intensity of apex beat, precordial bulging, pulsation of vessels, thrills, size, shape, auscultation (rate, rhythm, force, quality of sounds), murmurs (location, position in cycle, intensity, pitch, effect of change of position, transmission, effect of exercise). Many children normally have sinus arrhythmia. The child should be asked to take a deep breath to determine its effect on the rhythm. The heart should be examined with the child recumbent.

*Abdomen*

Examine the abdomen for size and contour, visible peristalsis, respiratory movements, veins (distension, direction of flow), umbilicus, hernia, musculature, tenderness and rigidity, tympany, shifting dullness, tenderness, rebound tenderness, pulsation, palpable organs or masses (size, shape, position, mobility), reflexes, femoral pulsations, bowel sounds. If the liver is palpable below the right costal margin, its total span must be recorded. A deep abdomen palpation must be done on every child.

The abdomen may be examined while the child is lying prone in the lap of mother or held over her shoulder, or seated on the examining table with his back to the doctor. These positions will be helpful where tenderness, rigidity, or a mass needs to be palpated.

Light palpation, especially for the spleen, often will give more information than deep.

Umbilical hernias are common during the first 2 years of life. They usually disappear spontaneously.

*Male Genitalia*

Assess male genitalia for circumcision, meatal opening, hypospadias, phimosis, adherent foreskin, size of testes, cryptorchidism, scrotum, hydrocele, hernia, pubertal changes.

*Female Genitalia*

Assess vagina for any imperforation, discharge or adhesions, hypertrophy of clitoris and pubertal changes.

*Rectum and Anus*

Irritation, fissures, prolapse, imperforate anus. The rectal examination should be performed with the little finger (inserted slowly). Note muscle tone, character of stool, masses, tenderness, sensation. Examine stool on glove finger (gross, microscopic, culture, guaiac), as indicated.

*Extremities*

- **General:** Assess extremity for any deformity, hemiatrophy, bowlegs (common in infancy), knock-knees (common after age 2), paralysis, edema, coldness, posture, gait, stance, asymmetry.
- **Joints**: Assess for swelling, redness, pain, limitation, tenderness, motion, rheumatic nodules, tibial torsion.
- **Hands and feet:** Look for extra digits, clubbing, simian lines, curvature of little finger, deformity of nails, splinter hemorrhages, flat feet (feet commonly appear flat during first 2 years), abnormalities of feet, width of thumbs and big toes, syndactyly, length of various segments, temperature.
- **Peripheral Vessels:** Presence, absence or diminution of arterial pulses.

*Spine and Back*

Assess the posture, curvature, rigidity, webbed neck, spina bifida, pilonidal (hair in cyst) dimple or cyst, tufts of hair, mobility, Mongolian spots, tenderness over spine, pelvis or kidneys.

## Neurologic Examination

- **Cerebral function:** Assess general behavior, level of consciousness, intelligence, emotional status, memory, orientation, illusions, hallucinations, cortical sensory and motor integration, ability to understand and communicate, recognition of visual objects, speech, ability to write, performance of skilled motor acts.
- **Cranial nerves:** Assess the functioning of 12 cranial nerves.
- **Cerebellar function:** It can be assessed by performing certain tests, like finger to nose, finger to examiner's finger, rapidly alternating pronation and supination of hands; ability to run heel down other shin and to make a requested motion with foot; ability to stand with eyes closed; walk; heel to toe walk; tremor; ataxia; posture; arm swing when walking; nystagmus; abnormalities of muscle tone or speech.
- **Motor system:** Assess muscle size, consistency, and tone; muscle contours and outlines; muscle strength; myotonic contraction; slow relaxation; symmetry or posture; fasciculations; tremor; resistance to passive movement; involuntary movement.
- **Sensory system:** Assess hearing, vision, light touch, pain, position, vibration.
- **Reflexes:** Assess the following reflexes:
  - **Deep tendon reflexes:** A brisk contraction of a muscle in response to a sudden stretch induced by a sharp tap by a finger or rubber hammer on the tendon of insertion of the muscle. Deep tendon reflexes (DTRs) (Fig. 5.14) include: i. Biceps reflex ii. Brachioradialis reflex iii. Triceps reflex iv. Patellar reflex v. Achilles tendon reflex.

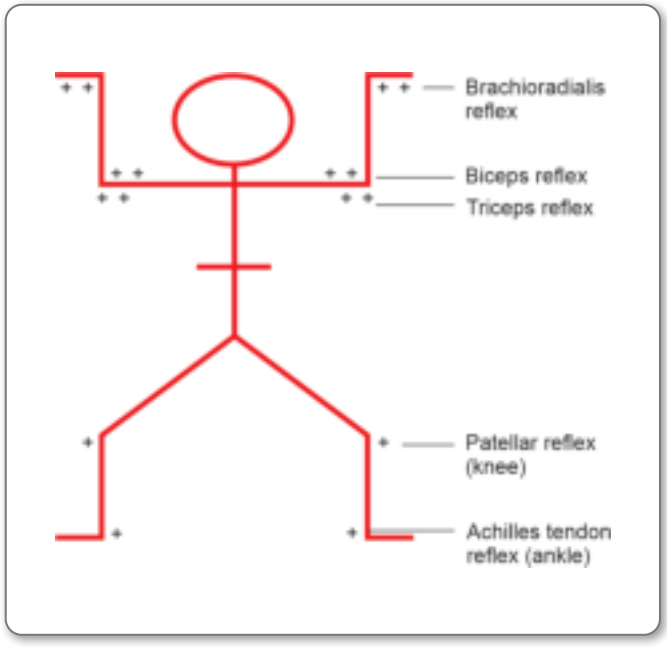



**Figure 5.14:** Deep tendon reflexes


**Figure 5.15:** Babinski reflex

Absence of the reflex may be caused by damage to the muscle, peripheral nerve, nerve roots, or spinal cord at that level. A hyperactive reflex may indicate disease of the pyramidal tract above the level of the reflex arc being tested. Generalized hyperactivity of DTRs may be caused by hyperthyroidism.

- Superficial reflexes include (i) Abdominalis (ii) Cremasteric (iii) Plantar (iv) Gluteal
- Pathologic reflexes – Babinski reflex (Fig. 5.15) is normal in infants. Dorsiflexion of the big toe on stimulation of the sole, occurs in lesions of the pyramidal tract.

## NEWBORN EXAMINATION

Newborn assessment refers to the full examination of a newborn baby to identify any anomalies so that prevention and management can be done as soon as possible. The purpose of the newborn physical examination is to assess the baby's transition from intrauterine life to extrauterine existence and to detect congenital malformations and actual or potential disease.

Physical assessment of newborn can be divided as:
A. Initial assessment including APGAR scoring
B. Assessment of gestational age
C. Systematic physical examination

### APGAR Scoring

Newborn's immediate adjustment to extrauterine life is assessed by APGAR scoring (Table 5.7). The five parameters, i.e., heart rate, respiratory effort, muscle tone, reflex irritability and color are assessed. Each item is given a score of 0,1 and 2. Evaluations are made at 1 and 5 minutes. A score of 0–3 represents severe distress, 4–6 moderate distress and 7–10 excellent condition.

### Assessment of Gestational Age

Gestational age of a fetus or of a newborn can be assessed currently by three different methods: mother's menstrual history, prenatal ultrasonography and postnatal maturational examination.

**Table 5.7:** APGAR scoring

| Sign | 0 | 1 | 2 |
|---|---|---|---|
| A-Activity (muscle tone) | Limp | Some flexion of extremities | Well flexed |
| P-Pulse (heart rate) | Absent | <100/min | >100/min |
| G-Grimace (reflex irritability) | No response to stimulation | Feeble cry | Cry or sneeze |
| A-Appearance (color) | Blue, pale | Body pink, extremities blue | Completely pink |
| R- Respiratory effort | Absent | Weak cry | Good, strong cry |

An accurate menstrual history, when obtainable, remains the best measure of gestational age, but depends upon normal maternal physiology and a reliable history.

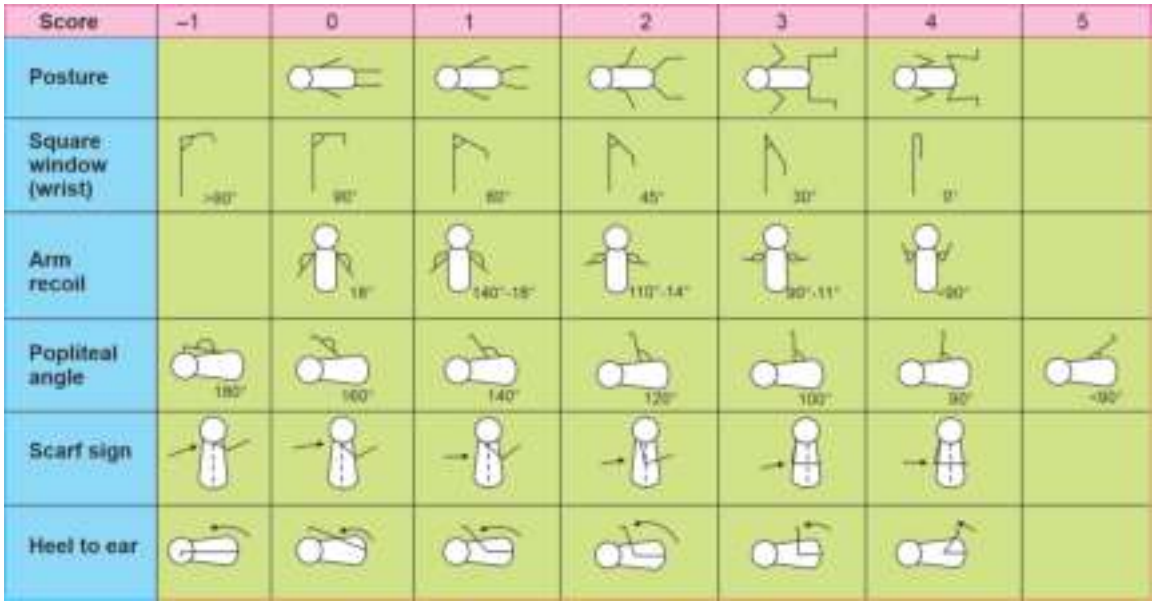
The **New Ballard Score** is a set of procedures developed by Dr Jeanne L Ballard to determine Gestational Age through 6 neuromuscular and 6 physical signs of a newborn (Fig. 5.16).

Each sign has a number score, and the cumulative score correlates with the maturity rating of 20–44 weeks of gestation. The scoring relies on the intra-uterine changes that the fetus undergoes during its maturation. The neurological criteria depend mainly upon muscle tone, the physical ones rely on anatomical changes. The neonate is in a state of physiological hypertonia. This tone increases throughout the fetal growth period, meaning a more premature baby would have lesser muscle tone.

### *Assessment of Neuromuscular Maturity*

- **Posture:** Total body muscle tone is reflected in the infant's preferred posture at rest and resistance to stretch of individual muscle groups. As maturation progresses, the fetus gradually assumes increasing passive flexor tone that proceeds in a centripetal direction, with lower extremities slightly ahead of upper extremities. For example, very early in gestation only the ankles are flexed. Knees will flex as wrists just begin to flex. Hip flexion, then abduction is just ahead of elbow, then appears shoulder girdle flexion. The preterm infant primarily exhibits unopposed passive extensor tone, while the infant approaching term shows progressively less opposed passive flexor tone.
  To elicit the posture item, the infant is placed supine. Gentle manipulation (flex if extended; extend if flexed) of the extremities will allow the infant to seek the baseline position of comfort. Hip flexion without abduction results in the frog-leg position as depicted in posture square #3. Hip abduction accompanying flexion is depicted by the acute angle at the hips in posture square #4. The figure that most closely depicts the infant's preferred posture is selected.
- **Square window:** Wrist flexibility or resistance to extensor stretching are responsible for the resulting angle of flexion at the wrist. The examiner straightens the infant's fingers and applies gentle pressure on the dorsum of the hand, close to the fingers. From extremely pre-term to post-term, the resulting angle between the palm of the infant's hand and forearm is estimated at; >90°, 90°, 60°, 45°, 30°, and 0°. The appropriate square on the score sheet is selected.
- **Arm recoil:** This maneuver focuses on passive flexor tone of the biceps muscle by measuring the angle of recoil following very brief extension of the upper extremity.
  With the infant lying supine, the examiner places one hand beneath the infant's elbow for support. Taking the infant's hand, the examiner briefly sets the elbow in flexion, then momentarily extends the arm before releasing the hand. The angle of recoil to which the forearm springs back into flexion is noted, and the appropriate square is selected on the score sheet. The extremely preterm infant will not exhibit any arm recoil. Square #4 is selected only if there is contact between the infant's fist and face. This is seen in term and post-term infants.
  Care must be taken not to hold the arm in the extended position for a prolonged period, as this causes flexor fatigue and results in a falsely low score due to poor flexor recoil.
- **Popliteal angle:** This maneuver assesses maturation of passive flexor tone about the knee joint by testing for resistance to extension of the lower extremity. With the infant lying supine, and with diaper removed, the thigh is placed gently on the infant's abdomen with the knee fully flexed. After the infant has relaxed into this position, the examiner gently grasps the foot at the sides with one hand while supporting the side of the thigh with the other. Care is taken not to exert pressure on the hamstrings, as this may interfere with their function. The leg is extended until a definite resistance to extension is appreciated. In some infants, hamstring contraction may be visualized during this maneuver. At this point the angle formed at the knee by the upper and lower leg is measured.
- **Scarf sign:** This maneuver tests the passive tone of the flexors about the shoulder girdle.
  With the infant lying supine, the examiner adjusts the infant's head to the midline and supports the infant's hand across the upper chest with one hand. The thumb of the examiner's other hand is placed on the infant's elbow.
  The examiner nudges the elbow across the chest, feeling for passive flexion or resistance to extension of posterior shoulder girdle flexor muscles.
  The point on the chest to which the elbow moves easily prior to significant resistance is noted. Landmarks noted in order of increasing maturity are: full scarf at the level of the neck (-1); contralateral axillary line (0); contralateral nipple line (1); xyphoid process (2); ipsilateral nipple line (3); and ipsilateral axillary line (4).

**Neuromuscular maturity**




**Physical maturity**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Skin | Sticky, friable, transparent | Gelatinous, red, translucent | Smooth, pink; visible veins | Superficial peeling and/ or rash; few veins | Cracking, pale areas: rare veins | Parchment, deep cracking; no vessels | Leathery, cracked wrinkled |
| Lanugo | None | Sparse | Abundant | Thinning | Bald areas | Mostly bald | |
| Plantar surface | Heel-toe 40–50 mm –1 <40 mm –2 | >50 mm, no crease | Faint red marks | Anterior transverse crease only | Creases anterior 2/3 | Creases over entire sole | |
| Breast | Imperceptible | Barely perceptible | Flat areola, no bud | Stippled areola, 1-2 mm bud | Raised areola, 3–4 mm bud | Full areola, 5–10 mm bud | |
| Eye/Ear | Eyelids fused–tightly, loosely (–1) | Eyelids open; pinna flat; stays folded | Slightly curved pinna; soft; slow recoil | Well curved pinna; soft but ready recoil | Formed and firm, Instant recoil | Thick cartilage ear stiff | |
| Genitals (male) | Scrotum flat, smooth | Scrotum empty, faint rugae | Testes in upper canal, rare rugae | Testes descending, few rugae | Testes down, good rugae | Testes pendulous, deep rugae | |
| Genitals (female) | Prominent clitaris; flat labia | Clitoris prominent, small labia minora | Clitoris prominent, enlarging minora | Majora and minora equally prominent | Majora large, minora small | Majora cover clitoris and minora | |

| Maturity Rating | |
|---|---|
| Score | Weeks |
| –10 | 20 |
| –5 | 22 |
| 0 | 24 |
| 5 | 26 |
| 10 | 28 |
| 15 | 30 |
| 20 | 32 |
| 25 | 34 |
| 30 | 36 |
| 35 | 38 |
| 40 | 40 |
| 45 | 42 |
| 50 | 44 |

**Figure 5.16:** New ballard score

- **Heel to ear:** This maneuver measures passive flexor tone about the pelvic girdle by testing for passive flexion or resistance to extension of posterior hip flexor muscles.
  The infant is placed supine and the flexed lower extremity is brought to rest on the mattress alongside the infant's trunk.
  The examiner supports the infant's thigh laterally alongside the body with the palm of one hand. The other hand is used to grasp the infant's foot at the sides and to pull it toward the ipsilateral ear.
  The examiner feels for resistance to extension of the posterior pelvic girdle flexors and notes the location of the

heel where significant resistance is appreciated. Landmarks noted in order of increasing maturity include resistance felt when the heel is at or near the: ear (-1); nose (0); chin level (1); nipple line (2); umbilical area (3); and femoral crease (4).

### Assessment of Physical Maturity

- **Skin:** Maturation of fetal skin involves the development of its intrinsic structures along with the gradual loss of its protective coating, the vernix caseosa. Hence, it thickens, dries and becomes wrinkled or peels, and may develop a rash as fetal maturation progresses. This process may occur at varying paces in individual fetuses depending on the maternal condition and the intrauterine environment.
  At term and post-term, the fetus may expel meconium into the amniotic fluid. This may add an hastening effect to the drying process, causing peeling, cracking, dehydration, and causing a parchment, then leathery, appearance to the skin. For scoring purposes, the square which describes the infant's skin the most closely should be selected.
- **Lanugo:** Lanugo is the fine hair covering the body of the fetus. In extreme immaturity, the skin lacks any lanugo. It begins to appear at approximately 24th to 25th week and is usually abundant, especially across the shoulders and upper back, by the 28th week of gestation.
  Thinning occurs first over the lower back, wearing away as the fetal body curves forward into its mature, flexed position. Bald areas appear and become larger over the lumbo-sacral area. At term, most of the fetal back is devoid of lanugo.
  Variability in amount and location of lanugo at a given gestational age may be attributed to familial traits and to a certain hormonal, metabolic, and nutritional influences. For example, infants of diabetic mothers characteristically have abundant lanugo on their pinnae and upper back until close to or beyond full-term gestation. When scoring for lanugo, the examiner selects the square that most closely describes the relative amounts of lanugo on the upper and lower areas of the infant's back.
- **Plantar surface:** This refers to the major foot creases on the sole of the foot. The first appearance of a crease appears on the anterior sole at the ball of the foot. This may be related to foot flexion in utero, but is also contributed by dehydration of the skin.
  Very premature and extremely immature infants have no detectable foot creases. To further help define the gestational age of these infants, measuring the foot length or heel-toe distance is helpful. This is done by placing the infant's foot on a metric tape measure and noting the distance from the back of the heel to the tip of the great toe. For heel-toe distances less than 40 mm, a minus two score (–2) is assigned; for those between 40 and 50 mm, a minus one score (–1) is assigned.
- **Breast:** The breast bud consists of breast tissue that is stimulated to grow by maternal estrogens and fatty tissue which is dependent upon fetal nutritional status. The examiner notes the size of the areola and the presence or absence of stippling (created by the developing papillae of Montgomery). The examiner then palpates the breast tissue beneath the skin by holding it between thumb and forefinger, estimating its diameter in millimeters, and selects the appropriate square on the score sheet.
  Under- and over-nutrition of the fetus may affect the size of breast size at a given gestation. Maternal estrogen effect may produce neonatal gynecomastia on the second to fourth day of extrauterine life.
- **Eye/ear:** The pinna of the fetal's ear changes its shape and the cartilage content is increased as maturation progresses. Assessment of ear includes palpation for cartilage thickness, then folding the pinna forward toward the face and releasing it. The examiner notes the rapidity with which the folded pinna goes back away from the face when released, then selects the square that most closely describes the degree of cartilagenous development.
  In very premature infants, the pinnae may remain folded when released. In such infants, the examiner notes the state of eyelid development as an additional indicator of fetal maturation. The examiner places thumb and forefinger on the upper and lower lids, gently moving them apart to separate them. The extremely immature infant will have **tightly fused eyelids**, i.e., the examiner will not be able to separate either palpebral fissure with gentle traction. The slightly more mature infant will have one or both eyelids fused but one or both will be partly separable by the light traction of the examiner's fingertips. On the basis of findings, examiner selects on the score sheet a minus two (–2) for slightly fused, or minus one (–1) **for loosely or partially fused eyelids**.
- **Genitals-male:** The fetal testicles begin their descent from the peritoneal cavity into the scrotal sack at approximately the 30th week of gestation. The left testicle precedes the right and usually enters the scrotum during the 32nd week. Both testicles are usually palpable in the upper to lower inguinal canals by the end of the 33rd to 34th weeks of gestation. Simultaneously, the scrotal skin thickens and develops deeper and more numerous rugae.
  Testicles found inside the rugated zone are considered descended. In extreme prematurity the scrotum is flat, smooth and appears sexually undifferentiated. At term to post-term, the scrotum may become pendulous and may touch the mattress when the infant lies supine.

**Must Know**

In true cryptorchidism, the scrotum on the affected side appears uninhabited, hypoplastic and with underdeveloped rugae compared to the normal side, or for a given gestation, when bilateral. In such a case, the normal side should be scored, or if bilateral, a score similar to that obtained for the other maturational criteria should be assigned.




- **Genitals-female:** To examine the female infant, partially abduct the hips, approximately 45° from the horizontal with the infant lying supine. Exaggerated abduction may cause the clitoris and labia minora to appear more prominent, whereas adduction may cause the labia majora to cover over them.
  In extreme prematurity, **the labia are flat and the clitoris is very prominent** and may resemble the male phallus. As maturation progresses, the clitoris becomes less prominent and labia minora become more prominent. Approaching term, both clitoris and labia minora recede and are finally enveloped by the enlarging labia majora.
  The labia majora contains fat and their size are affected by intrauterine nutrition. Over-nutrition may result in large labia majora earlier in gestation, whereas under-nutrition, as in intrauterine growth retardation or post-maturity, may result in small labia majora with relatively prominent clitoris and labia minora late into gestation.

## Systematic Physical Examination

The newborn should be examined briefly immediately after birth. This should be confined to quick assessment of respiration, circulation, temperature, neurological status, and screening for anomalies or disease that might mandate emergency treatment. The initial examination should be done with minimal disturbance to the baby, taking particular care to prevent excessive cooling from exposure. Hand should be washed, dried and pre-warmed.

A complete examination should be performed within the first 24 hours and again at discharge from the nursery. The full examination should be performed when the baby is quiet. The baby should be observed from a distance before being touched since a great deal can be learned by observing the infant's spontaneous activity. The newborn assessment is explained in Table 5.8 and neonatal reflexes in Table 5.9.

**Table 5.8:** Newborn assessment

| Usual findings | Common variations | Potential signs of distress/major abnormalities |
|---|---|---|
| **General Measurements**<br>**Head circumference:** 33–33.5 cm about 2–3 cm larger than chest circumference. Measure occipitofrontal circumference using a measuring tape.<br>**Chest circumference:** 30.5–33 cm. Measure at the level of nipples during normal breathing when the baby is lying on back.<br>**Crown to rump length:** 31–35 cm. It is the measurement of the length from the top of the head (crown) to the bottom of the buttocks (rump).<br>**Birth weight:** 2700–4000 g.<br>Adjust the zero error of the weighing scale.<br>Place a paper on weighing scale then place the naked baby on it.<br>Ensure the scale is not cold.<br>In case the baby is wearing nappy, subtract the weight of nappy from the baby's weight. | Molding occurs after birth<br>Head circumference is equal to chest circumference at birth | HC <10 or >90 percentile |
| **Vital signs**<br>• Axillary temperature: 36.5°–37.5°C<br>• Record axillary temperature by keeping thermometer in axilla in horizontal line with the body so that the tip of thermometer faces the axilla. Ensure axilla is free of sweat or vernix by cleaning it with a clean swab.<br>**Apical heart rate:** 120–140 beats/min. It can be assessed at 5th intercostal space, left sternal border. Check for 6 seconds and then multiply by 10 to get 1 minute apical rate.<br>**Respiration:** 30–60 breaths/min. Count for one full minute when the baby is not crying and breathing quietly.<br>Blood pressure- 65/41 mm Hg. | Crying slightly increases body temperature, heart rate and respiratory rate. | Hypothermia, hyperthermia<br><br>Bradycardia: HR <80–100 beats/min<br><br>Tachycardia: HR >160–180 beats/min<br><br>Tachypnea: RR >60 breaths/min<br>Apnea: Breathing stops for 20 seconds<br><br>Less systolic BP in calf as compared to upper extremities is a sign of coarctation of aorta |

*Contd...*

| Usual findings | Common variations | Potential signs of distress/major abnormalities |
|---|---|---|
| **General appearance**<br>**Posture:** Flexion of head and extremities which rest on chest and abdomen | Frank breech- extended legs, abducted and fully rotated thighs, flattened occiput, extended neck | Limp posture, extension of activities |
| **Skin**<br>Color—at birth bright red, puffy, smooth<br>Day 2–3 pink, flaky, dry<br><br>Vernix caseosa, lanugo<br>Edema around eyes, face legs, dorsum of hands, feet and scrotum or labia<br>**Acrocyanosis:** Cyanosis of hands and feet | Neonatal jaundice after first 24 hours<br>Ecchymosis or petechiae caused by birth trauma<br>**Milia:** Pinpoint white papules caused by blocked sebaceous glands on the nose, cheeks and chin.<br>**Lanugo:** Fine hair on the shoulders and back<br>**Vernix caseosa:** A cheesy white covering, is normally present at birth<br>**Mongolian spots:** Large blue patches of pigment over the lumbar area, buttocks, or extremities which tend to fade over time.<br>**Telangiectatic nevi (stork bites):** Flat deep pink localized areas usually seen on back of neck. | Progressive jaundice, in first 24 hours<br>Pallor, mottling, greyness, plethora, haemorrhage<br>Sclerema, rashes, poor skin turgor, pustules, blisters<br>**Café-au-lait spots** – light brown spots<br>**Nevus flammeus** – port wine stain |
| **Head**<br>Anterior fontanel—diamond shaped<br>Posterior fontanel—triangular<br>Fontanels are flat, soft, firm | Molding after vaginal delivery<br>Bulging fontanel because of crying or coughing<br>**Caput succedaneum:** A round boggy swelling of the soft tissues of the scalp from accumulation of fluid within the area of pressure from the pelvis during vaginal delivery<br>**Cephalohematoma:** Hematoma between periosteum and skull bone. | Fused sutures, bulging or depressed fontanels, widened sutures and fontanels,<br>**Craniotabes** is a feature of thin skull bones such that when the occipital or posterior parietal bones are pressed upon they depress like a ping-pong or table tennis ball. |
| **Eyes**<br>• Lids usually edematous<br>• Absence of tears<br>• Presence of red reflex, corneal reflex, pupillary reflex, blink reflex | Epicanthial folds, nystagmus, Strabismus | Purulent discharge<br>• Upward slant,<br>• Hypertelorism, hypotelorism, congenital cataract<br>• Dilated or fixed pupil<br>• Absence of reflexes<br>• Yellow sclera |
| **Ears**<br>• Top of pinna is in horizontal line with outer canthus of eye<br>• Startle reflex elicited by sudden loud noise<br>• Flexible pinna, cartilage present | Pits or skin tags | Low set ears |
| **Nose**<br>• Patent nose<br>• Thin white mucus<br>• Sneezing reflex | Flattened and bruised | Non-patent canals<br>• Nasal flaring<br>• Thick bloody discharge<br>• Copious nasal secretions |
| **Mouth and Throat**<br>• Intact, high arched palate,<br>• Uvula in midline,<br>• Frenulum of lip, and upper tongue<br>• Rooting reflex, gag reflex, extrusion reflex, vigourous cry | Natal teeth<br>Epstein pearls- small, white epithelial cysts along midline of hard palate. | Cleft lip, cleft palate, protruded tongue<br>Candidiasis (oral thrush)<br>Inability to pass NG tube<br>Hoarse, high pitched or abnormal cry |

*Contd...*

| Usual findings | Common variations | Potential signs of distress/major abnormalities |
|---|---|---|
| **Neck**<br>Short, thick surrounded by skin folds<br>Tonic neck reflex | **Torticollis (wry neck):** Head held to one side with chin pointing to opposite side | Excessive skinfolds, resistance to flexion,<br>fractured clavicle,<br>crepitus |
| **Chest**<br>• AP and lateral diameters are equal<br>• Slight sternal retractions seen during inspiration<br>• Xiphoid process evident<br>• Breast enlargement | **Pectus excavatum:** Funnel chest<br>**Pectus carinatum:** Pigeon chest<br>Supernumerary nipples<br>**Witch's milk:** Secretion of milky substance from breasts | Depressed sternum<br>Marked chest retractions<br>Asymmetric chest expansion<br>Redness and firmness around nipples<br>Wide spaced nipples |
| **Lungs**<br>• Abdominal respirations<br>• Bilateral equal breath sounds | Irregular rate and depth of respiration | Inspiratory stridor<br>Expiratory grunting<br>Retractions<br>Crackles, wheezing, bowel sounds on one side |
| **Heart**<br>Apex is at 4–5th intercostal space, left sternal border | **Sinus arrhythmia:** HR increases with inspiration and decreases with expiration<br>Cyanosis on crying | Dextrocardia: Heart on right side<br>Cardiomegaly, murmur, thrills, persistent cent ral cyanosis, hyperactive precordium |
| **Abdomen**<br>• Cylindric<br>• Liver—palpable 2–3 cm below right costal margin<br>• Spleen—tip palpable at the end of the first week of age<br>• Kidneys—palpable 1–2 cm above umbilicus<br>• Umbilical cord—bluish white at birth with 2 arteries and 1 vein.<br>• Femoral pulses-equal bilaterally | Umbilical hernia<br>• Diastasis recti<br>• Wharton's jelly- unusually thick umbilical cord | Abdominal distension<br>• Absent bowel sounds, ascites, visible peristaltic waves, scaphoid abdomen, only one artery in cord<br>• Urine, stool or pus leaking from cord<br>• Absent femoral pulses, omphalocele or gastrochisis |
| **Female genitalia**<br>• Labia and clitoris – edematous<br>• Urethral meatus behind clitoris<br>• Vernix caseosa between labia<br>• Urination within 24 hours | Pseudomentruation<br>Hymenal tag | Fused labia<br>• Absence of vaginal opening<br>• Masses in labia<br>• Meconium from vaginal opening<br>• No urination within 24 hours<br>• Ambiguous genitalia<br>• Bladder exstrophy |
| **Male Genitalia**<br>• Urethral opening at tip of glans penis<br>• Testes palpable in each scrotum<br>• Scrotum usually large, edematous, pendulous, and covered with rugae, smegma<br>• Urination within 24 hours | Urethral opening covered by prepuce<br>Inability to retract foreskin<br>Epithelial pearls- small, firm white lesions at tip of prepuce.<br>Erection or priapism<br>Testes palpable in inguinal canal<br>Scrotum small | Hypospadias<br>• Epispadias<br>• Chordee<br>• Hydrocele<br>• Masses in scrotum, meconium from scrotum<br>• Ambiguous genitalia<br>• Bladder exstrophy |
| **Back and rectum**<br>• Spine intact, no openings, masses or prominent curves<br>• Trunk incurvation reflex<br>• Anal reflex<br>• Patent anal opening<br>• Passage of meconium within 48 hours | Delayed passage of meconium | Anal fissure, fistula<br>• Imperforate anus<br>• Absence of anal reflex<br>• Tuft of hair along spine<br>• Spina bifida |

*Contd...*

| Usual findings | Common variations | Potential signs of distress/major abnormalities |
|---|---|---|
| **Extremities**<br>• Ten finger and toes<br>• Full range of motion<br>• Nail beds pink<br>• Creases on anterior two-third of sole<br>• Symmetry of extremities<br>• Equal muscle tone<br>• Equal bilateral brachial pulses | Second toe overlapping third toe<br>Deep crease on plantar surface of foot | **Polydactyly**- extra digits<br>**Syndactyly**- fused digits<br>**Phocomelia**- absence of limbs<br>Hemimelia<br>Hyperflexibility of joints<br>Persistent cyanosis of nail beds<br>Sole covered with creases<br>Transverse palmar crease<br>Fracture<br>Decrease or absent range of motion<br>Unequal gluteal folds<br>Hip dislocation<br>Unequal knee height- Allis or Galeazzi sign<br>Ortolani's click |
| **Neuromuscular system**<br>• Extremities in some degree of flexion<br>• Head lag<br>• Ability to tilt head from side to side | Quivering or momentary tremors | • Hypotonia<br>• Hypertonia<br>• Opisthotonic posturing<br>• Marked head lag |

## NEWBORN REFLEXES

Reflexes are involuntary movements or actions. Some movements are spontaneous and occur as part of the baby's normal activity and some are responses to certain actions. These reflexes are crucial for baby's survival. Healthcare providers check reflexes to determine if the brain and nervous system are functioning properly. Some reflexes occur only in specific periods of development. Many infant reflexes disappear as the child grows older, although some remain through adulthood. A reflex that is still present after the age when it would normally disappear can be a sign of brain or nervous system damage. Common neonatal reflexes are shown in Table 5.9.

**Table 5.9:** Neonatal reflexes

| Reflex | Stimulation | Response | Duration |
|---|---|---|---|
| Babinski | Sole of foot stroked | Fans out toes and twists foot in | Disappears at 9 months to a year |
| Blinking | Flash of light or puff of air | Closes eyes | Permanent |
| Grasping | Palms touched | Grasps tightly | Weakens at 3 months; disappears at a year |
| Moro | Sudden move; loud noise | Startles; throws out arms and legs and then pulls them toward body  | Disappears at 3–4 months |

*Contd...*

| Reflex | Stimulation | Response | Duration |
|---|---|---|---|
| Rooting | Cheek stroked or side of mouth touched | Turns toward source, opens mouth and sucks  | Disappears at 3–4 months |
| Stepping | Infant held upright with feet touching ground | Moves feet as if to walk | Disappears at 3–4 months |
| Sucking | Mouth touched by object | Sucks on object  | Disappears at 3–4 months |
| Swimming | Placed face down in water | Makes coordinated swimming movements | Disappears at 6–7 months |
| Tonic neck | Placed on back | Makes fists and turns head to the right  | Disappears at 2 months |

## Summary

The growth and development follow certain principles, the common ones are cephalocaudal and proximodistal. The development of children has been described by several theorists, like Freud, Erikson, Piaget and Kohlberg into various stages. Each stage has its unique function and goal. The development of children can be assessed by several tools, like DDST, TDSC, WHO growth charts and many more. As a nursing student, it is important to understand the procedure of newborn examination, identifying the common anomalies and to report such findings so that early intervention can be planned.

## Assess Yourself

1. Explain the principles and factors affecting growth and development.
2. Describe the developmental stages given by Freud and Erikson.
3. Name three tools used for development assessment of children.
4. Define the terms — cephalocaudal growth, pincer grasp, parallel play, negativism, Oedipus and Electra complex, Mongolian spots, vernix caseosa, lanugo, polydactyly.
5. Make a list of neonatal reflexes.
6. Explain the six neuromuscular and six physical signs of a newborn as given by Ballard.

Chapter 6

# Growth and Development at Various Stages

## Chapter Outline

- Introduction
- Growth and Development of Infants
- Growth and Development of Toddlers (1–3 Years)
- Growth and Development of Preschoolers (3–6 Years)
- Growth and Development of School Age (6–12 Years)
- Growth and Development in Adolescents (12–18 Years)
- Nutritional Needs of Infants and Children
- Baby-Friendly Hospital Initiative
- Failure to Thrive
- Types and Advantages of Play

## INTRODUCTION

A child's growth and development can be divided into five periods: infants, toddlers, preschoolers, school age and adolescents. Growth and development include not only the physical changes that occur from infancy to adolescence, but also some of the changes in emotions, personality, behavior, thinking and speech that children develop as they begin to understand and interact with the world around them. Children grow at their own pace. Genetics, gender, nutrition, physical activity, health problems, environment and hormones all play a role in their development. It is important to regularly monitor their growth and development to spot any potential growth issues.

### Nursing Care of Healthy Child

The goals of care for a healthy child include:

- Child will achieve optimal development.
- Child will experience a safe environment and will be free from injury
- Child will receive optimal nutrition and dental care.
- Child will get adequate rest and sleep.
- Child will develop healthy sexuality.
- Child will be free from preventable communicable diseases.

Growth and development at different stages—infants, toddlers, preschoolers, schoolage and adolescents

## GROWTH AND DEVELOPMENT OF INFANTS

### Biological Development

#### *Proportional Change*

Growth is rapid during the first year.

**Weight:** Weight can be measured by spring balance or electronic weighing scales. At birth the average weight is 2.5–3 kg.

- 10% of body weight is lost during the first few days due to excretion of ECF and regain it by the age of 10 days as intake improves.
- Birth weight is doubled by 5 months, tripled by 1 year and four times at 2 years of age.
- Children gain 25–30 g/day till 3 months of life. Thereafter they gain about 400 g of weight every month for the remaining part of the first year.

- Weight in kg from 3 months to 1 year can be calculated by the following formula:
  For 3–12 months, weight (kg) = (age in months + 9)/2

**Length:** At birth, the length is 50 cm, it increases by 2.5 cm per month during the first 6 months and by half that amount during next 6 months. Average length is 65 cm at 6 months and at 1 year it is 75 cm.

**Head circumference (HC):** Newborn's head is one quarter of the body's length. At birth it is 33–35 cm which is 3 cm greater than chest circumference. Head circumference increases 2 cm/month from birth to 3 months, 1 cm/month from 4–6 months and 0.5 cm/month for next 6 months. Average HC at 6 months is 43 cm and at 12 months it is 46 cm. Closure of cranial sutures takes place with posterior fontanel fusing at 6–8 weeks of age and anterior fontanelle fusing by 12–18 months of age.

**Chest circumference:** At birth the circumference of chest is about 3 cm less than head circumference. Head circumference and chest circumference equals by end of first year.

**Vitals:** HR- 80–150 per minute, RR - 20–50 breaths/minute.

### *Sensory Changes*

These are as follows:

**Vision:** During infancy, visual acuity gradually improves and binocular fixation is established. Depth perception begins to develop by 7–9 months of age. Parachute reflex appears at 7 months. By the age of 6 months infants respond to facial expressions and can distinguish between familiar and strange faces. Separation anxiety is manifested during this time.

**Hearing:** The generalized response of a neonate to a sound are replaced with specific responses of locating sound as the myelination of auditory pathways occur.

**Gross motor development:** Gross motor behavior includes developmental maturation in posture, head balance, sitting, creeping, standing and walking.

**Head control:** Newborn is barely able to lift head. At 6 months an infant easily lifts head, chest and upper abdomen and can bear weight on arms.

**Sitting:** At 2 months the needs assistance, at 6 months he can sit alone in the tripod position and an 8-month-old child can sit without support and engage in play.

**Ambulation:** A 9-month-old can crawl. By the age of 1 year, he can stand independently from a crawl position.

**Fine motor:** It includes use of hands and fingers. At 1 month, the hands are predominantly close, and open by 3 months. The palmer grasp (using the whole hand) at 5 months of age is replaced by neat pincer grasp (using the thumb and index finger) at 11 months of age.

**Language:** Infant's first means of verbal communication is cry. Since language development is based on expressive and receptive skill so the infant must be exposed to expressive speech. Delays in language development are evaluated for potential hearing loss.

## Psychosocial Development (Developing a Sense of Trust, Erikson)

Infant's psychosocial development is based on the Erikson's theory of developing a sense of trust. Erikson's phase 1 (birth to 1 year) is mainly concerned with the developing a sense of trust by overcoming the sense of mistrust. Infants trust that their daily needs of feeding, comfort, stimulation will be met. If these needs of the infant are failed to be met by the caregiver, then mistrust develops which would finally lead to a sense of frustration in the developing infant. Trust acquired in infancy provides a base or foundation for all the succeeding phases in life.

## Cognitive Development (Sensorimotor Phase, Piaget)

Piaget theory best explains the cognitive development in children. The period from birth to 24 months is termed the sensorimotor phase. During the sensorimotor phase infant develops from the reflex behaviors to imitative acts. There are three crucial events which take place during this phase. These are:

- **Separation:** During this stage, infant separates himself from other objects in the environment.
- **Object permanence:** Here child starts to believe that objects that are out of the visual field still exist.
- **Use of symbols or mental representation:** This helps the infant to visualize himself in a situation without actually experiencing it.

## Development of Body Image

Here mouth is the prime area of satisfaction and other parts like hands and feet are considered the areas of pleasure. Infants feel comfortable to play with hands and fingers to suck. As their physical needs are met, they feel comfortable and satisfied with their physical body.

## Development of Gender Identity

At birth the child is named and parents acts in a particular way because of its gender. A child enjoys skin to skin contact and explores its own body for pleasure. Erections in male infants are common.

## Social Development

Social smile is the early step to social communication. Tremendous development is achieved in social communication. Attachment to the parent is increasingly evident while crying




is still used as a method to satisfactorily meet children's needs. A child is shy with stranger and exhibits stranger anxiety by 9–10 months of age.

**Temperament:** Child temperament at this age is the method of interaction between the child and the caregivers. The more dissonance or lack of harmony between the child's temperament and the parent's ability to accept, the greater is the risk for subsequent parent child conflict.

**Play (solitary):** Provide simple, easily handled, non-sharp, stimulating, washable, toys having non-removable parts. Provide toys, like mobiles, musical toys, rattles, balls and blocks. Child plays games like peek-a-boo and patty cake.

## Concerns in Infancy

**Separation and stranger fear:** This is one of the most concerned fears among all the other fears in infancy. Children usually require their parent's affection and their care. When infant is exposed to stranger they may react violently. Stranger fear and separation anxiety are components of a strong healthy parent child attachment.

**Thumb sucking:** Sucking is an activity of child pleasure. It is a strong need. The benefits of non-nutritive sucking includes improved pain management, weight gain. Malocclusion may occur if thumb sucking persists for more than 4 years.

## Promoting Optimum Health in Infancy

### *Nutrition*

**0–6 months:** Human milk is the most desirable complete food for first 6 months as the child's digestive organs are not mature enough to tolerate any other feeds. If the child is fed by a healthy mother, then there is no need of any vitamin supplements. Supplements of vitamin D is required if the mothers diet is inadequate.

**6–12 months:** The age period of 4–6 months of age is considered the transition period as by this period the gastrointestinal tract is matured sufficiently to handle complex food. Human milk is continued to be infant's prime food. Also provide strained, mashed vegetables and fruits.

**Sleep and activity:** Infants usually takes one or two naps during day and sleep 10–12 hours at night. Breastfed infants usually sleep for long hours than bottle-fed infants. Most infants develop nocturnal sleep pattern by 3 months.

**Dental health:** Good dental hygiene begins as soon as the first tooth erupts. Fluoride intake should begin at the age of 6 month to prevent teeth demineralization.

**Immunization:** BCG, hepatitis B and oral polio vaccines are given at birth.

**Injury prevention:** An infant should be supervised for each activity. Never leave the child alone and restrain the child when necessary. Close pins when changing diapers. Keep crib rails up. Keep plastic bags and small objects with removable parts away from children. Check water temperature before bathing child.

## Health Problems During Infancy

### *Malnutrition*

Malnutrition continues to be a major health problem in the world today. It is particular in children under 5 years of age. Lack of food is the major factor, diarrhea, inadequate knowledge of proper child care practices, illiterate parents are the major cause of protein energy malnutrition. The most extreme forms of PEM are kwashiorkor and marasmus. Kwashiorkor occurs due to deficiency of protein with an adequate supply of calories. The child with kwashiorkor has thin wasted extremities and a prominent abdomen from edema. Child becomes irritable, lethargic withdrawn and apathetic. Marasmus results as a lack of both calories and protein. The child appears to be very old with fat and flabby skin.

### *Failure to Thrive (FTT)*

It refers to children whose current weight or rate of weight gain is significantly below that of other children of similar age and sex. Infants or children that fail to thrive seem to be dramatically smaller or shorter than other children of the same age. Teenagers may have short stature or appear to lack the usual changes that occur at puberty.

### *Sudden Infant Death Syndrome (SIDS)*

It is the unexpected, sudden death of a child under age one year in which an autopsy does not show an explainable cause of death. The cause of SIDS is unknown. Many doctors and researchers now believe that SIDS is caused by several different factors, like problems with the baby's ability to wake up (sleep arousal) or inability for the baby's body to detect a build-up of carbon dioxide in the blood. SIDS can be prevented by putting the child on back to sleep, i.e., in supine position.

### *Diaper Dermatitis*

It is caused by prolonged contact of skin with an irritant, i.e., urine, feces, soap, friction and detergents.

**Management:** Keep skin dry, change diapers immediately if it is soiled, avoid over-washing of skin, expose irritated skin to air and apply moisturizer or ointment, like zinc oxide to red skin.

# GROWTH AND DEVELOPMENT OF TODDLERS (1–3 YEARS)

Period of 12–36 months of age in child's development is a period where child tries to experiment new things in the environment and where the child learns to control others

through temper tantrums negativism and obstinacy. It is a period of control for the parents for the proper development of the child.

## Biological Development

**Proportional changes:** Growth slows down during toddler period. Average weight of the toddler at 2 years is 12 kg and height is about 86.6 cm. Rate of increase in head circumference slows down by the end of infancy. Head circumference is equal to chest circumference by 1–2 years. Anterior fontanel closes between 12 and 18 months of age. Chest circumference continues to increase in size and exceeds head circumference during the toddler years.

**Vitals:** Pulse and respirations decrease, blood pressure increases with increasing size and age.

**Sensory changes:** Visually acuity of 20/40 considered acceptable during toddler years. Sense of hearing, smell, taste and touch is being increasingly developed. There is development of specific taste preferences.

**Maturation of systems:** Internal structures of ear and throat continue to be short and straight. Lymphoid tissues and adenoid continue to be large. As a result, child is exposed to otitis media and tonsillitis. Respiration and heart rate are slow and blood pressure increases. Respirations are abdominal. Digestive processes are fully attained by the toddler period. The acidity of gastric contents has a protective function in destroying bacteria. Elimination processes are not fully achieved.

**Gross and fine motor development:** The major gross motor skill during the toddler years is development of locomotion. By the end of second year, toddlers can stand on one foot, walk on tiptoe, and climb stairs with alternate footing. Toddlers can manipulate a pencil or crayon; by the end of the toddler period a child can copy a circle and imitate a cross.

## Psychosocial Development

It includes development of sense of autonomy by overcoming a sense of doubt and shame. Continue dependency creates a sense of doubt regarding their potential ability to control their action. This doubt is compounded by a sense of shame and an urge to revolt against others. As toddlers attempt to express their will, they often act with negativism which means over protection and excessive criticism can lead to negative feelings. There is development of id as the child attempts to tolerate frustration and learn socially acceptable ways. Ego is also evident as the child tolerates delayed gratification.

## Cognitive Development

There is development of rational judgment and intellectual reasoning. Child tries to experiment new objects and can tolerate longer periods of separation. Children are able to recognize new shapes and their relationship to each other. There is limited concept of time which means there is no tomorrow.

## Moral Development (Preconventional Level)

Toddler's development of moral judgment is at the most basic level. They have little concern for why something is wrong. The child is in the punishment and obedience orientation; whether the action is good or bad depends on whether it results in punishment or reward.

## Spiritual Development

Toddlers learn spiritualism through the words and actions of care takers or people who are close to them. They begin to assimilate behaviors associated with the divine, such as praying before going to bed.

## Development of Body Image

By 2 years of age child becomes aware of gender differences and it becomes well developed by 3 years of age. Children recognize themselves in the mirror and they realize that certain parts of body have various meanings such as genitals respond to toilet training.

## Development of Gender Identity

Toddlers believe that touching certain parts of their body parts is pleasurable. Gender identity is developed at the age of 3 years. They may transfer certain words to meanings such as if parents express genitals as dirty. They may consider the words in terms of sexual meaning.

## Social Development

Toddlers at this age have increased awareness about object permanence and may tolerate longer periods of separation. They can even tolerate moderate frustration. They understand the fact that parents do exist even in their absence.

- **Temperament:** Toddlers are more challenging considering the typical negativistic traits of this age group.
- **Play:** Solitary play progresses to parallel play as play magnifies child's physical and psychosocial development. Child will play beside, not with another child. Push pull toys, cycle, rocking horses, books wood puzzles are appropriate for children at this age.

## Nutrition

Period of 12–18 months of age, the growth rate slows down, decreasing the child need for calories, protein and fluid. Toddlers at 18 months of age suffer from physiologic anorexia




as a result they have decreased appetite. Iron fortified cereals and iron-rich diet are recommended for all children beyond 6 months of age. This may include fish, poultry, dried fruits and green leafy vegetables. Provide finger foods, serve small portions, do not use food as reward and recognize ritualistic needs like same utensils.

### Sleep and Activity

Total sleep decreases slightly during the second year and averages about 12 hours. Sleep problems are common during this age due to fear and separation. A regular bed time is necessary to implement by providing certain transitional objects such as stuffed toys.

### Dental Health

Child should have an oral health examination by 6 months of age. Oral hygiene should include brushing and flossing. Limit concentrated sweets.

### Immunization

Child should take DPT and OPV booster dose.

### Injury Prevention

A major cause of injuries during the childhood is the unrestricted freedom. Traumatic injury is one major cause of accidents in toddlers. This may include motor vehicle accidents, drowning, burns, aspiration and poisoning. Measures for injury prevention are:

- **Motor vehicles:** Apply car restraints. Observe and supervise the child. Watch if child is playing on roads.
- **Drowning:** Observe if child is near to water. Do not keep filled buckets. Keep bathroom doors closed.
- **Burns:** Cover electrical outlets hidden or out of reach of children. Place burning candles, matchsticks, cigarette lighters out of children's reach.
- **Aspiration:** Avoid foods such as popcorn, hard candies, nuts.
- **Poisoning:** Place all toxic agents out of children's reach. Do not store surplus agents. Caution against eating nonedible items.

### Concerns Related to Growth and Development in Toddlers

- **Toilet training:** Children should be provided with proper preparation and education guidance and support before starting with toilet training. Child must be able to recognize urge to hold and let it go and hold on. Night time bladder training may take several months to initiate.
- **Sibling rivalry:** The natural jealousy and resentment of children toward a new child in the family or toward other children in the family is known as sibling rivalry. The best way to reduce sibling rivalry is to prepare the toddler as early as possible.
- **Temper tantrums:** Temper tantrums are best exhibited by toddlers. The best approach toward tapering temper tantrums requires consistency and to develop appropriate expectation and rewards.
- **Negativism:** It is an attitude of persistently saying "no" to any activity. It is an aspect of developing self-control. Negativism begins to subside as children begin to go to the play school.
- **Regression:** The retreat from one's present pattern of functioning to past levels of behavior is known as regression. It is common in toddlers and is a part of developing tasks.

## GROWTH AND DEVELOPMENT OF PRESCHOOLERS (3–6 YEARS)

### Biological Development

Average weight of preschoolers is 14.6 kg at 3 years, 16.7 kg at 4 years and 18.7 kg at 5 years. The average weight gain is 2–3 kg/year. Growth in height also remains steady at a yearly increase of 6.5–9 cm. Average height is 95 cm at 3 years, 103 cm at 4 years and 110 cm at 5 years.

### Psychosocial Development: (Developing a Sense of Initiative, Erikson)

During this period of a child's life there is marked intellectual and emotional growth. During these years' child seeks to consolidate a sense of autonomy and extends it to increase the independence of action, to acquire initiative and to extend the personal world outside home to master impulses toward aggression. Child achieves a deeper sense of identification with both of them. Conflict arises when children overstep the limits of inquiry and experience a sense of guilt. There is development of superego or conscience.

### Cognitive Development: (Preoperational Phase, Piaget)

Piaget considered this developmental period in two phases-preconceptual phase from ages 2–4 and phase of intuitive thought from ages 4–7 years. There is a shift from total egocentric thought to social awareness and ability to consider other viewpoints. They have a magical thinking because of which they believe that all thoughts are powerful. They take the literal meaning of every verse.

### Moral Development: (Preconventional Level, Kohlberg)

Children often consider the rewards and punishment acquired by them to judge whether an activity is good or bad.

Children develop instrumental orientation in which they work toward satisfying their needs.

## Spiritual Development

Preschoolers consider God as an imaginary friend. They understand simple Bible stories and short prayers. They imitate simple ritual practices performed by their parents without understanding their importance. There are simple ritual practices performed by their parents without understanding their importance. There is strong development of conscience as they perceive things in terms of right and wrong.

## Development of Body Image

Children recognize difference in skin color and racial identity. They have little knowledge regarding their internal anatomy. They compare their sizes with their peers.

## Development of Sexuality

Preschoolers develop strong attachments to opposite sex parent while identifying same sex parent. There is sex role imitation like dressing up similar to a parent. Children are aware of gender by 2–3 years of age. Masturbation is normal. Child is curious about anatomic differences and investigates them.

## Social Development

Preschoolers overcome the anxiety associated with stranger and fear. They relate to unfamiliar people easily. They still require parent security reassurance, guidance. They cope with daily changes in routine.

- **Temperament:** Preschoolers demonstrate their sense of autonomy differently. Self-assertion is the major theme. By 4 or 5 years of age, they need little assistance in their daily activities. They are much sociable. They become aware of position and role in the family.
- **Play (cooperative):** Child learns sharing, social roles and language concepts through play. Play may be dramatic, imitative or creative. Mutual play also fosters development. Play activities include jumping, running and climbing. Types of toy include housekeeping toys, playground equipment, books, dolls, dress up clothes, etc.

## Nutrition

It is a slow growth period, needs an average of 1700 calories per day. Child learn table manners, food habits are forming.

## Sleep and Activity

Average preschooler sleeps about 9–12 hours a night and infrequently takes short naps. Provide quiet time before bedtime, use a nightlight and adhere to consistent bedtime pattern.

## Dental Health

Beginning of the preschool period starts when the eruption of deciduous teeth is completed.

## Immunization

Age-appropriate immunization to be done.

## Injury Prevention

Preschoolers are less prone to falls than are toddlers. They are aware of potential dangers. Accidental injuries and poisoning dangers increase. Pedestrian motor vehicle injuries also increase as children play on the parking area or street. Teach to wear helmet, follow traffic rules, not to play with matchsticks and avoid talking to strangers.

## Concerns Related to Growth and Development in Preschoolers

**Fears:** Greatest number and variety of real and imagined fears are present during the preschool years. They include fear of dark, being left alone, ghosts and sexual matters. Sometimes fears do not subside with simple measures or developmental maturation.

# GROWTH AND DEVELOPMENT OF SCHOOL AGE (6–12 YEARS)

The segment of the life span that extends from age 6 to approximately age 12 and has a variety of labels, each of which describes an important characteristic of each period. The middle years are often referred to as school age or the school years.

## Biological Development

As the child grows there are various changes that occur in the body systems.

**Gastrointestinal system:** Maturity of GI system is seen by fewer stomach upsets, better maintenance of blood glucose levels and an increase stomach capacity, which permits retention of urine for longer periods.

**Urinary system:** Bladder capacity, although differing widely among individual children, is generally greater in girls than in boys.

**Cardiovascular system:** Heart grows more slowly during the middle years and is smaller in relation to the rest of the body than at any other period of life.

**Immunological system:** Immune system becomes more competent in its ability to localize infections and to produce an antigen antibody response.

**Bones:** Bones continue to ossify throughout the childhood but yield to pressure and muscles pull more readily than mature bones.




## Psychosocial Development (Industry Versus Inferiority)

A sense of industry or a stage of accomplishment, is achieved somewhere between age 6 and adolescence. School age children are eager to develop skills and participate in meaningful and socially useful work. They acquire a sense of personal and interpersonal competence, receive the systematic instruction prescribed by their individual culture and develop the skills needed to become useful. The danger inherent in this period of development is the occurrence of situations that might result in the sense of inferiority.

## Cognitive Development (Concrete Operations)

When children enter the school years, they begin to acquire the ability to relate a series of events to mental representations that can be expressed both verbally and symbolically. This is the stage Piaget describes as concrete operations when children are able to use thought process to experience events and actions.

## Moral Development: Preconventional Level

There is a development of conscience and moral standards. During this period, children adopt rules and moral values set down by their parents. A child of this age knows what kind of behavior is expected from him but does not understand the reason for this expectation. Rewards and punishment guide their act. Children of 6–7 years of age consider accidents as bad acts. Older children are able to understand and accept the way of treating others.

## Spiritual Development

School-age children have a concrete way of thinking and analyzing things. They have a great desire to learn about God. They fear going to hell for any misbehavior. They view illness or an injury as a punishment for any misdeed. School age children begin to understand difference between natural and supernatural powers.

## Development of Body Image

School age children like their physical appearance as they grow older. They perceive their self-image with hair and eye color. Children are well aware of their own body, body of their peers and adults. Any physical impairments such as hearing or visual deficits is of greater importance.

## Development of Sexuality

The children's attitude toward sex is acquired indirectly at an very early age. There is development of curiosity to understand differences in body structure and adult body. It is the period when sex education should be provided. Sex education should involve communication with parents. Usually sexual information that the child receives is entirely from peer group.

## Social Development

The most important socializing agent is the peer group as it conveys substantial information to its members which promotes sense of detachment and solidarity from adults. A child's concept of appropriate sex role is influenced by its peers. Early school age involves few gender differences which may resolve automatically.

- **Temperament:** Children join group activities with unrestrained enthusiasm. Previously there were only limited interactions but under adult supervision but now there are wider opportunities. Children become more involved with peer group. Children also become increasingly sensitive to social norms and pressures. Interactions among peer groups lead to intimate friendships among same sex partners.
- **Play:** Here the children are involved in team play. It helps children to modify and exchange personal goals. It also promotes cognitive development in children. Reading becomes the newly-acquired skill. It is a collecting stage, i.e., collecting stamp, cards, rocks, etc.

## Nutrition

Parents as well as children should be aware of the importance of balanced diet to promote growth. Quality of the diet depends on the family's pattern of eating. There is temptation of junk foods at this age. Parents should observe their child eating pattern.

## Sleep and Activity

Here the child's sleep and rest depend on state of health and the amount of activity done by the child. School age children should take a 10 hours-sleep at night and does not require a nap during day time.

## Dental Health

Dental hygiene is important at this period as there is development of permanent teeth. The first permanent teeth appear at 6 years of age. Correct brushing techniques should be taught. Proper oral hygiene should be provided to avoid dental caries. Children often suffer from various dental problems, like dental caries, malocclusion, periodontal disease.

## Immunization

Second dose of DT should be given at the age of 5–6 years and at 10–16 years TT vaccine should be taken.

## Injury Prevention

The most common cause of injury and death in school-age children is motor vehicle accidents either as a pedestrian or as a passenger. Other serious injuries include accidents on skateboards, roller skates, cycle. Most injuries occur in near home or school. Children should be carefully observed during playing or travelling. Safety helmets, protective eye shields and protective padding are strongly recommended.

## Concerns Related to Growth and Development in School Age

**School experience:** School serves as the best medium for transmitting the values to the society to each generation. It is the best platform for setting up relation with the peers. Children want to go to school and adapt to the new condition with certain difficulty. Successful adjustment leads to physical and emotional maturity.

**Limit setting:** Disciplinary techniques help children control their own behavior. With better cognitive skills they are able to benefit with more cognitive techniques.

# GROWTH AND DEVELOPMENT IN ADOLESCENTS (12–18 YEARS)

## Biological Development

This is the time of rapid physiologic growth.

**Males:** Growth and development in males include development of secondary sex characteristics, i.e., enlargement of testicles, growth of pubic hair, axillary hair, hair on upper lip, hair on face. Rapid increase in height, increase in shoulder breadth, changes in larynx and voice, nocturnal emissions and abrupt deceleration of linear growth.

**Females:** Growth and development in females include development of secondary sex characteristics, i.e., increase in transverse diameter of pelvis, development of breasts, change in vaginal secretions, growth of pubic and axillary hair, onset of menstruation.

## Psychosocial Development: Development of Sense of Identity (Erikson)

The early period of adolescence begins with the onset of puberty and extends to relative physical and emotional stability at or near graduation from high school. During this time the group is faced with the crisis of group identity versus alienation. In the period that follows, the individual strives to attain autonomy from the family and develops a sense of personal identity as opposed to role confusion.

## Cognitive Development

Cognitive thinking culminates with the capacity of abstract thinking. This stage, the period of formal operations, is Piaget's fourth and last stage. Adolescents are no longer restricted to the real and actual which was a period of concrete thought; now they are also concerned with the possible. They think beyond the present. In adolescence young people begin to think about both their own thinking and others' thinking. They wonder what opinion others have of them, and they are able to imagine thoughts of others

## Moral Development: (Kohlberg's Theory)

In the conventional stage, adolescence have their own set of morals and values in order to gain autonomy from adults. In the postconventional stage social contracts are understood. They consider certain laws as unchangeable. In the adulthood stage moral reasoning becomes evident but it does not govern moral behaviors. They understand duty and obligation based on reciprocal rights of others.

## Spiritual Development

Adolescent begins to question values and ideals of their families. They are able to empathize and think logically. They tend to keep their thoughts private fearing that no one will understand their thoughts and their thoughts are special. They need encouragement and support.

## Development of Body Image

Development of sudden changes in the body image creates a sense of confusion in adolescents. Comparing themselves with their peers and making judgments about their own normality based on their observations. Any delay in the visible area of maturity is a cause of worry. Unfortunately, this is the time when hormonal effect of the sebaceous glands, produces acne which creates problem in many youngsters.

## Social Development

Adolescents want to grow up and to be free of parenteral restraints, but they are fearful of the restraints of independence. A teenager tries to identify his role in the society. Adolescence is a time of becoming social and a time of loneliness. Peer group support and love of families are required for maturity of adolescents.

## Nutrition

Rapid body changes are accompanied by increased nutritional requirements. Caloric and protein requirements are higher than any other period. Adolescents usually should have sufficient intake of calcium, iron, zinc during the period of rapid growth. Girls with heavy menses are susceptible to anemia, thus are advised to take an iron-rich diet.

## Sleep and Activity

Teenagers vary in their need for sleep and rest. During growth spurts the need for sleep is increased. Adequate sleep and rest at this time are important to a total health regimen.




## Dental Health

Dental care is an aspect of preventive care. Early adolescents usually go for orthodontic treatment. Dental care should not be neglected during adolescence.

## Immunization

About 10–16 years TT vaccine should be administered. DT, DPT vaccine should be taken if not taken.

## Injury Prevention

The most vulnerable ages are the years 15–24. Adolescents are exposed to motor vehicle injuries, drowning, burns, poisoning and bodily damages.

**Motor vehicle:** Promote safety and maintenance of two wheelers. Encourage them to wear helmets, jackets to protect themselves.

**Drowning:** Teach non-swimmer to swim. Teach basic rules for water safety.

**Poisoning:** Teach adolescents regarding hazards of drug use including alcohol.

**Suicide:** Be alert for symptoms of depression.

## Play

Adolescents are usually involved in group play. Sports competitions are common among the adolescent group. They like to party, dance and also involve in summer jobs.

## Sexual Activity

Adolescents are usually engaged in sexual experimentation and activity. Educate about safe sex, birth control methods and prevention from STDs.

The key developmental milestones till 5 years of age are depicted in Tables 6.1A to D.

**Table 6.1A:** Key gross motor developmental milestones

| Age | Key gross motor developmental milestones |
|---|---|
| 3 months | Neck holding |
| 5 months | Rolls over |
| 6 months | Sits in tripod fashion |
| 8 months | Sitting without support |
| 9 months | Standing with support |
| 12 months | Creeps well, Standing without support |
| 15 months | Walks alone, creeps upstairs |
| 18 months | Runs, explores drawers |
| 2 years | Walks up and downstairs; jumps |
| 3 years | Rides tricycle, alternate feet going upstairs |
| 4 years | Hops on one foot, alternate feet going downstairs |

**Table 6.1B:** Key fine motor developmental milestones

| Age | Key fine motor developmental milestones |
|---|---|
| 4 months | Bidextrous reach (reaching out for objects with both hands) |
| 6 months | Unidextrous reach (reaching out for objects with one hand), transfers objects |
| 9 months | Immature pincer grasp, probes with forefinger |
| 12 months | Pincer grasp mature |
| 15 months | Imitates scribbling, tower of 2 blocks |
| 18 months | Scribbles, tower of 3 blocks |
| 2 years | Tower of 6 blocks, vertical and circular stroke |
| 3 years | Tower of 9 blocks, copies circle |
| 4 years | Copies cross, bridge with blocks |
| 5 years | Copies triangle |

**Table 6.1C:** Key social and adaptive milestones

| Age | Key social and adaptive milestones |
|---|---|
| 2 months | Social smile |
| 3 months | Recognizes mother; anticipates feeds |
| 6 months | Recognizes strangers/stranger anxiety |
| 9 months | Waves 'bye, bye' |
| 12 months | Comes when called, plays simple ball game |
| 15 months | Jargon |
| 18 months | Copies parents in task |
| 2 years | Asks for food, drink, toilet; pulls people to show toys |
| 3 years | Shares toys, knows full name and gender |
| 4 years | Plays cooperatively in a group |
| 5 years | Helps in household tasks, dresses and undresses |

**Table 6.1D:** Key language milestones

| Age | Key language milestones |
|---|---|
| 1 months | Alerts to sound |
| 3 months | Coos (musical vowel sounds) |
| 4 months | Laugh loud |
| 6 months | Monosyllables (ba, da, pa) |
| 9 months | Bisyllables (mama, baba, dada) |
| 12 months | 1–2 words with meanings |
| 18 months | 8–10 word vocabulary |
| 2 years | 2–3 word sentences, uses pronouns I, me, you |
| 3 years | Asks questions, knows full name and gender |
| 4 years | Says song or poems, tells stories |
| 5 years | Asks meanings of words |

## NUTRITIONAL NEEDS OF INFANTS AND CHILDREN

Till six months of age, exclusive breastfeeding is recommended for children. They can continue breastfeeding as long as up to two years of age. The complementary feeding must begin after 6 months of age.

## Breastfeeding

The best milk for a baby is breast milk. All health professionals must be equipped with scientific information regarding the advantages of breast milk and must have sound knowledge about the correct technique of breastfeeding in order to promote breastfeeding with conviction and to support breastfeeding mothers with confidence.

## Exclusive Breastfeeding

Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given, not even water, except for oral rehydration solution, or drops/syrups of vitamins, minerals, or medicines. The duration of exclusive breastfeeding as given by the WHO is 6 months after birth. Infants must thereafter receive complementary baby food along with breast milk for up to 2 years of age.

### *Benefits to Breastfeeding to Baby*

#### Nutrition

During the initial six months, all the nutrients required for optimum growth and development of the baby are present in right proportion in the breast milk. Breast milk contains high percentage of lactose. Galactose, an important component of galactocerebroside, is essential for brain growth. It also facilitates absorption of calcium. Breast milk also contains amino acids like taurine and cysteine. The fats present in breast milk are mostly polyunsaturated fatty acids which are required for the myelination of the central nervous system. All the vitamins, minerals, and electrolytes are present in right proportion. Breast milk plays a role in maturation of intestinal tract by releasing hormones and growth factors.

#### Digestion

Breast milk contains proteins, like lactalbumin and lactoglobulin (more than 60%) which form a soft curd and they are easy to digest. Also, enzyme, like lipase present in breast milk helps in the digestion of fats.

#### Protective Factors

Breast milk contains a number of protective factors, which include secretary IgA, macrophages, lymphocytes, bifidus factor, unsaturated fatty acids, lactoferrin, lysozyme, complement factors, interferon, etc. Breastfed babies are less likely to develop infections. A breastfed baby is less likely to die due to diarrhea and respiratory infections.

### *Other Benefits for the Baby*

Breastfeeding protects against allergies, including asthma. It enhances emotional bonding between mother and baby. Studies have demonstrated that breastfed babies have a higher IQ and have less chance of developing hypertension, diabetes mellitus, coronary heart disease, liver disease and even cancer in later life.

#### Benefits for the Mother

Breastfeeding soon after birth helps in uterine involution thus, reduces chances of post-partum hemorrhage. It provides protection against pregnancy if the baby is exclusively breastfed during the first six months of life and the mother is amenorrhoeic. Breast feeding as birth control is also referred to as Lactational Amenorrhea Method, as the increased levels of prolactin hormone in Lactation, inhibits the secretion of Gonadotrophin Releasing hormone and leads to Amenorrhea.

When done correctly, breastfeeding can be convenient and time saving. It reduces the risk of breast and ovarian cancer. It improves the figure of the mother by consuming extra fat laid down during third trimester of pregnancy.

#### Benefits to the Family and Society

Breastfeeding saves money and time and conserves energy. The family and society spend less on milk, health care and illness. A nursing mother requires 600 calories extra for maintaining her lactation.

### *Anatomy and Physiology Related to Lactation*

The breast consists of glandular tissues as well as supporting tissues and fat. Milk is secreted by the glands and travels through tubules which drain into lactiferous sinuses. These sinuses lie below the areola and store small quantities of milk. They open out on to the nipple through lactiferous ducts. The thin layer of muscle (myoepithelium) surrounds each secretory gland. The contraction of these muscles causes ejection of milk from the glands.

#### Milk Production and Secretion

Milk is produced as a result of the interaction between hormones and reflexes. During pregnancy, the glandular tissue is stimulated to produce milk due to various hormonal influences. Two hormones, i.e., prolactin and oxytocin help in production and ejection of milk respectively.

##### *Prolactin Reflex*

Prolactin is produced by the anterior pituitary gland and is responsible for milk secretion by the mammary gland cells. The production of this hormone is stimulated when the baby sucks at the breast. When the baby sucks, the nerve endings

in the nipple carry messages to the anterior pituitary which in turn releases prolactin. This hormone passes through the blood to the glands in the breast promoting milk secretion. This cycle from stimulation to secretion is called the prolactin reflex or the "milk secretion reflex". The more the baby sucks at the breast, the greater is the stimulus for milk production. The earlier the baby is put to the breast, the sooner this reflex is initiated. The greater is the demand for milk, larger is the volume of milk produced. It is therefore important for a mother to feed the baby early, frequently and ensure complete emptying of the breasts at each feed.

*Oxytocin Reflex*

Posterior pituitary glands secrete a hormone called oxytocin. Oxytocin is responsible for contraction of the myoepithelium around the glands that leads to ejection of the milk from the glands into the lacteal sinuses and lacteal ducts. Oxytocin is produced as the baby stimulate the nerve endings of the nipples by suckling. It is also enhanced by the thought, sight, or sound of the baby. Mother's emotion plays an important role in breastfeeding as well as relaxed and confident attitude helps in "milk ejection reflex". On the other hand, lack of confidence, tension and pain hinders the milk flow. A healthcare worker should help the mother in successfully breastfeeding the baby, providing a kind and supportive environment. This will help the mother to gain confidence (Fig. 6.1).

*Feeding Reflexes in the Baby*

Reflexes that help in breastfeeding are:

- **Rooting reflex**. When the mother's nipple touches the baby's cheek, the baby turns in the direction of the nipple, opens his mouth. This is the rooting reflex in response to touch around the mouth.
- **Sucking reflex**. It is the most essential reflex for successful lactation. A baby sucks at the nipple and areola placed in his mouth, and forms an effective seal creating a negative pressure. The tongue presses the nipple and areola against the palate squeezing the underlying sinuses by compressing and stretching the nipple between the tongue and palate, a negative pressure is formed thus milking the lactiferous sinuses. Hence, for effective suckling the nipple and a part of the areola should be in the baby's mouth. If the baby sucks only at the nipple, milk is not ejected, baby does not get sufficient milk, he sucks more vigorously resulting in sore nipples.
- **Swallowing reflex**. A baby swallows the milk sucked into the mouth. This reflex develops earlier than the suckling reflex so that a baby who can suck effectively at the breast will always be able to swallow the milk.

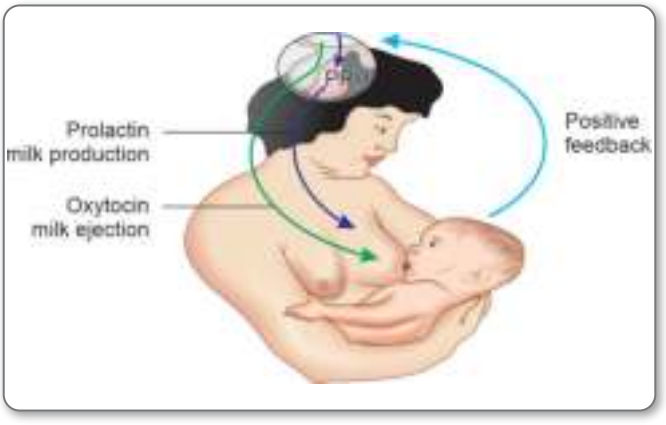



**Figure 6.1:** Prolactin and oxytocin reflex

## Types of Breast Milk

The composition of breast milk varies at different stages after birth to suit the needs of the baby. Milk of a mother who has delivered a preterm baby is different from the milk of a mother who has delivered a full-term baby.

- **Colostrum** is the milk secreted during the first week after delivery. It is yellow, thick and contains more antibodies and white blood cells. The antibodies are present in the form of immunoglobulins, specifically, IgA, IgM, IgG and secretory version of IgM and IgA. Though secreted only in small quantities, it has higher protein content and is most suited for the needs of the baby. It should NEVER be discarded.
- **Transitional milk** is the milk secreted during the following two weeks. The immunoglobulin and protein content decreases, while the fat and sugar content increases.
- **Mature milk** follows transitional milk. It is thinner and watery but contains all the nutrients essential for optimal growth of the baby.
- **Preterm milk** is the breast milk of a mother who delivers prematurely. It contains more proteins, sodium, iron, immunoglobulins, and calories that are needed by her preterm baby.
- **Fore milk** is the milk secreted at the start of a feed. It is watery and is rich in proteins, sugar, vitamins, minerals, and water and satisfies the baby's thirst.
- **Hind milk** comes later toward the end of a feed and is richer in fat content and provides more energy and satisfies the baby's hunger. For optimum growth, the baby needs both fore and hind milk. The baby should therefore be allowed to empty one breast before being offered the other breast.

Ensure exclusive breastfeeding during first 6 months of life. Additional water is not necessary even in summer.

## Steps for Successful Breastfeeding

The three prerequisites for successful breastfeeding are a willing and motivated mother; an active and sucking newborn; a motivator who can bring mother and newborn together (health professional or relative). The following steps must be practiced:

- Health education related to breastfeeding must be provided from the antenatal period itself. Benefits of breastfeeding for the mother and the baby should be informed. Regular breast examinations should be done. Mother should be motivated right from the antenatal period.
- Every hospital or health care facility must have a written breastfeeding policy and arrangement for *mother craft* classes in the hospitals.
- After the normal vaginal delivery a full-term normal baby must be put to the mother's breast within first hour of birth. Whereas, a normal baby born by caesarean section should be put to the mother's breast within four hours or earlier after birth.
- **Rooming in:** The best stimulus for milk production is to breast feed the baby, babies should be roomed-in with mother and fed on demand till the baby is satisfied. The mother should be advised to empty one breast fully before offering the other one. In this way the baby will receive foremilk and hind milk.
- **Frequency:** Frequent suckling by the baby on the mother's breast will help to stimulate milk production. It will also prevent breast engorgement. Breast feeding should be done whenever baby is hungry. Initially, some babies feed at short intervals of 1–2 hours followed by more fixed routine of every 2–3 hourly feeding.
- **Prelacteal feeds:** No Prelacteal feeds should be given to the baby. Feeds, like glucose, water, honey, etc. given in some cultures satisfy the baby's thirst and hunger. Once the baby is fed prelacteal feed, it will not suck vigorously at the breast. This will have an adverse influence on the milk production. Additionally, feeding the baby prelacteal feeds makes them more susceptible to infection.
- **Bottle feeds:** Giving bottle feeds to the baby causes nipple confusion. It acts as a source of infection and also interferes with the natural suckling process of the baby.
- **Feeding from both breasts:** A baby should be fed on both the breasts equally. When one breast is emptied, offer the other breast. Breast feeding is always done on demand. Alternate breast is offered first at each feed. The baby should be allowed to feed till satisfied. When the baby is satisfied, she releases the nipple.
- **Duration of breast feeding:** A baby should be exclusively breastfed for the first 6 months. Supplementary feeds given to the baby before six months reduces milk production and leads to infection and poor weight gain in the baby.
- **Cost of lactation:** Nursing mother needs only 600 calories extra for maintaining her lactation, which amounts to additional (x 1½ times) home-made food and fluids.
- **Cleaning the breasts:** There is no need to wash the breasts before or after a feed as frequent washing removes the natural oil from the nipple and predisposes to fissures in the nipple. The mother should wash her breasts during her daily bath.
- **Complementary feeds:** A baby should be given additional food after 6 months. Breastfeeding may be continued for one to two years.

## Positioning and Latching

**Positioning**: Both mother and baby should be in comfortable position for proper breastfeeding. Mother can feed either in lying down or in sitting position. Baby should be supported so that the head, neck and back are in the same plane. The entire baby should face the mother. The baby will have easy access to the breast if the baby's abdomen touches the mother's abdomen.

**Latching**: After proper positioning the baby's cheek is touched (rooting reflex), the baby will open the mouth. The baby is then quickly brought on the breast, so that the nipple and most of the areola is within the baby's mouth. As the baby is well positioned, the mother will feel no pain while feeding.

Four signs of good attachment are: (Fig. 6.2)

- Baby's mouth wide open
- Lower lip turned outward
- Baby's chin touches mother's breast
- Majority of areola inside baby's mouth.

## Problems in Breastfeeding

- **Inverted nipples**: Flat or short nipples which protract well (become prominent or pull out easily) do not cause difficulty in breast feeding. Inverted or retracted nipples make attachment to the breast difficult. They should be diagnosed in the antenatal period and mother should be supported and treated accordingly. Treatment should start immediately after the birth of the baby. Treatment includes manually stretching and rolling out the nipples several times a day. Before breast feeding, a plastic syringe is used to draw out the nipple and then the baby is handed over to the mother for breast feeding.
- **Sore nipple:** It is caused when the baby is attached to the breast incorrectly. Sore nipples occur due to vigorous suckling of the baby only at the nipple area; frequent washing the breast with soap and water causes drying of the nipples area causing sore nipples. If the baby is pulled off the breast while he is still sucking it may result in sore nipple. Another common cause of sore nipples is candida infection that occurs after the first few weeks of delivery.

**Figure 6.2:** Good attachment vs poor attachment




Check the correct latching and alignment of the baby to the breast. Apply hind milk on to the nipple after a feed and expose them to air, allow to heal in between feeds.

- **Breast engorgement:** After the delivery of the baby milk production increases during the second and third day. Alveoli in the breast will fill by breast milk if the feeding is delayed or infrequent or positioning of the baby is not maintained. When the breast milk production increases the alveoli will no longer be able to store it and it causes swelling, hardening, painful breast. This condition is termed an engorged breast. The treatment here is to prevent the milk accumulation in the alveoli. Provide correct position and attachment of the baby on the mother's breasts. Additionally, giving analgesics or applying warm packs locally can also reduce the pain. Milk can be expressed gently to soften the engorged breasts. Baby can be correctly latched on the breast.
- **Breast abscess:** If a congested engorged breast, an infected cracked nipple, a blocked duct, or mastitis are not treated in the early stages, then an infected breast segment may form a breast abscess. The mother may also have high grade fever and a raised leukocyte count. Treatment: Mother must be treated with analgesics and antibiotics. The abscess must be incised and drained. Breastfeeding must be continued from the normal breast. Start breastfeeding on affected breast as soon as possible.
- **Not enough milk:** Many mothers complain that they do not have enough milk. Only reassurance is needed if baby is gaining weight and passing adequate amount of urine. Common causes of 'not enough milk' include not enough breastfeeding, too short or hurried breastfeeds, poor suckling position, poor oxytocin reflex, breast engorgement or mastitis. Management consists of counseling the mother to put baby to breast frequently, making sure the baby is attached well to breast and building mother's confidence. Metoclopramide may help in increasing milk production.

### *Expression of Breast Milk*

If a mother is not able to feed her baby (e.g., ill mother, preterm baby, working mother etc.), she should express her milk in a clean, wide mouthed container and this milk should be fed to her baby. Expressed breast milk can be stored at room temperature for 10 hours, in a refrigerator for 24 hours and in a freezer at –20°C for 3 months.

**Method of milk expression:** The woman should lean forward, supporting the breast over the cup or bowl. With thumb above and first finger below the nipple at the areola the breast should be pressed in toward the ribcage. Then the thumb and finger should be brought together, producing squeezing movements behind the nipple. The breast should be released and the procedure repeated till milk starts to drip or flow. The areola should be pressed to the left and right of the nipple in the same way, to make sure that milk is expressed from all sectors of the breast.

## Nonhuman Milk

Use of milk other than from the mother should be avoided as far as possible in the first 6 months. If, for some reason a mother cannot feed her baby, other milk maybe used.

- **Animal milk:** If an animal milk is fed to babies it need not be diluted. When buffalo milk is used, the cream should be removed to lower the fat content. These babies require additional water and vitamins. Babies fed on animal milk are prone to develop anemia, and tetany and have increased risk of developing gastrointestinal and respiratory infections.
- **Formula milk:** Formula milk is an animal milk modified to resemble breast milk. Babies fed on formula feeds are more prone to infections and since milk is more expensive, there are greater chances of dilution resulting in malnutrition in these babies. Therefore, this milk is not recommended.

### *Method of Feeding Nonhuman Milk*

- **Bottle feeds** are not recommended as they cause nipple confusion and increase the risk of infection.
- **Katori-spoon feeds:** Wash hands thoroughly. Take a measured amount of expressed breast milk into a sterile Katori or cup. Position the baby on the lap of the mother/nurse holding the head up with left hand or left knee (if mother is sitting on the floor). Touch the sterile spoon or katori to the angle of baby' s mouth. At this moment, wait for the baby to open the mouth and pour the milk slowly into the mouth. Be patient and allow the baby to swallow, before next spoonful is offered. Burp the baby always after feeding. Teach mother that if the baby is gaining adequate weight and urine frequency is 5–6 times in a day, these are the signs of successful breast feeding (Fig. 6.3).

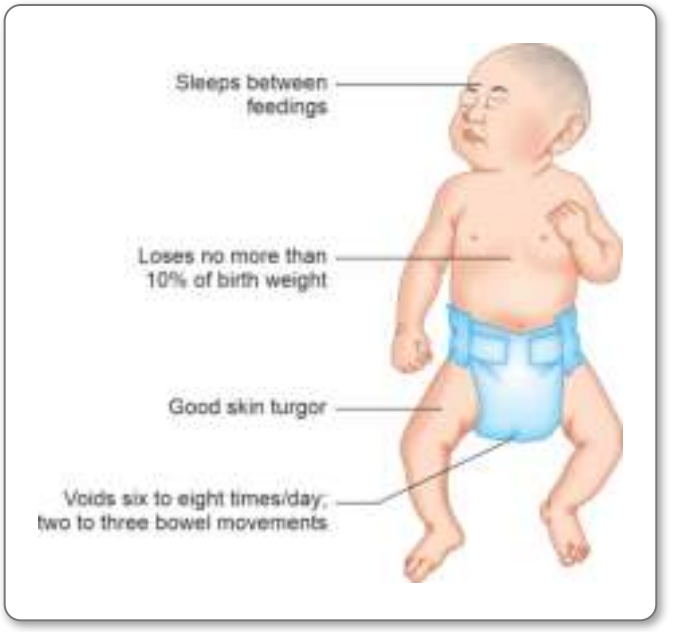



**Figure 6.3:** Signs of successful breastfeeding

## Complementary Feeding (Weaning)

It is the process by which the baby moves or shifts from having breast milk to consuming semi-solid or solid foods. There is a gradual reduction in the intake of breast milk and baby more often starts taking more solid food. Exclusive breast feeding is recommended till 6 months. Solid foods can be started after 6 months along with breast feeding. However, it is advised that do not force baby unless he or she is ready to eat semi-solid or solid food.

### *Need for Complementary Feeding*

After 6 months, breast milk does not provide all the nutrients that a growing baby needs, particularly iron and calories that solid foods provide. For other sources of nourishment, gradually introduce semi-solid or solid foods to the baby. Hence weaning provides child a nutritional balance for proper growth and development.

### *Guiding Principles of Complementary Feeding of the Breastfed Child*

- Practice exclusive breast feeding from birth to 6 months of age and then introduce complementary feeds at 6 months of age (180 days) while continuing to breast feed.
- Introduce only one food at a time as it will be easier to detect if baby is allergic to any food.
- Continue breast feeding on demand until 2 years of age or beyond.
- Practice responsive feeding, applying principles of psychosocial care
  - Feed infants directly and assist older children when they feed themselves. Feed slowly and patiently, encourage children to eat, but do not force them.
  - If children refuse any food, experiment with different food combinations, tastes, textures, and methods of encouragement.
  - Remember that feeding times are periods of learning and live-talk to children during feeding with eye to eye contact
- Practice hygiene and proper food handling.
- Start at 6 months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breast feeding.
- Gradually increase food consistency and variety as the infant grows older, adapting to the infant's requirements and ability.
- Increase the number of times that the child is fed complementary foods as the child gets older.
- At 6–9 months one can start with cereal based porridge (suji, wheat flour, rice, ragi, millet) enriched with oil, fat or animal milk or mashed fruits, like banana or papaya.
- Feed a variety of nutrient-rich and energy-dense foods from the family pot to ensure that all nutrient needs are met. The nutritive value of the food can be increased by mixing cereals with pulses, oil or ghee, sugar, and green vegetables.
- Use iron-rich complementary foods or vitamin-mineral supplements for infants as needed.
- Increase fluid intake during illness, including more frequent breast feeding and encourage the child to eat soft favorite foods. After illness, give food more often than usual and encourage the child to eat more.

### *Foods that can be given to a Baby*

- Boiled and mashed vegetables. Use vegetables like potatoes, cauliflower, carrots, beans, etc.
- Starchy foods which are rich in carbohydrates, like rice, potatoes, cereals, and oats.
- Ripe and mashed fruits, e.g., banana, apple.
- Diluted fruit juice (1part fruit juice to 10 parts of water).
- Dairy products, like cheese and yogurt.

### *Foods to Avoid*

- Avoid processed foods which contain high amounts of salt and sugar.
- Too much sugar may cause teething problems. Avoid it until baby is 1-year-old.
- Avoid honey till 1 year as it may cause infant Botulism in rare case.
- Nuts or seeds should be avoided as they may cause choking. If there is any family history of nut allergy, do not give nuts to baby till he or she is 3-year-old.
- Tea and coffee should not be given to baby.
- Cold drinks or any diet drinks should NOT be given as they are not meant for children.
- Avoid citrus fruits (e.g., orange) until baby is 6 months old as it may cause painful Diaper Rash.

### TIPS for Successful Complementary Feeding

- Always sit near baby while he or she is feeding so that baby does not choke.
- Never force feed the baby.
- Make sure that the food has the right temperature. Do not make it too hot.
- If baby refuses to eat a particular type of food, consider backing off and offer it later on.
- Offer baby a wide range of foods so that he or she gets used to different flavors.
- Introduce only one food at a time as it will be easier to detect if baby is allergic to any particular food.
- Encourage baby to feed himself.
- Try to make it a family affair as it can encourage baby to eat with enthusiasm.
- No two babies are alike. Some babies can be fussy in eating. Do not get disappointed if baby throws tantrums and refuses the food you offer. Take it easy, be patient and go at the baby's pace.




## BABY-FRIENDLY HOSPITAL INITIATIVE

The Baby-Friendly Hospital Initiative was developed jointly by WHO and UNICEF, and launched in 1991. The recent name change from Baby-Friendly Hospital Initiative to Baby-Friendly Health Initiative was to more accurately describe the work the Initiative is now doing. The internationally defined term 'Baby-Friendly' may be used only by maternity services that have passed external assessment according to the Global Criteria for the BFHI.

**Aim:** To implement practices that protect, promote and support breastfeeding.

It is an international project that aims to give every baby the best start in life by creating a health care environment where:

- Breastfeeding is the norm
- Practices known to promote the health and well-being of all babies and their mothers are followed.

Ten steps to successful breastfeeding is the global standard by which hospitals are assessed and accredited. A 'Baby-Friendly' hospital is one where mothers' informed choice of feeding is supported, respected and encouraged. Baby-friendly hospitals create a health care environment where breastfeeding is the norm and practices known to promote the health and well-being of all babies and their mothers are followed.

### Ten Steps to Successful Breastfeeding

1. Have a written breastfeeding policy that is routinely communicated to all health care staff
2. Train all health care staff in skills necessary to implement this policy
3. Inform all pregnant women about the benefits and management of breastfeeding
4. Place babies in skin-to-skin contact with their mothers immediately following birth for at least an hour and encourage mothers to recognize when their babies are ready to breastfeed, offering help, if needed.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants
6. Give newborn infants no food or drink other than breastmilk, unless medically indicated
7. Practice rooming-in, allow mothers and infants to remain together-24 hours a day
8. Encourage breastfeeding on demand
9. Give no artificial teats or dummies to breastfeeding infants
10. Foster the establishment of breastfeeding support and refer mothers on discharge from the facility.

## FAILURE TO THRIVE

### Definition

Failure to thrive refers to children whose present weight or rate of weight gain is significantly below than that of other children of similar age and sex.

Infants or children that fail to thrive seem to be smaller or shorter than other children of the same age. Teenagers may have short stature or appear to lack the usual changes that occur at puberty. However, there is a wide variation in normal growth and development.

### Etiology

Usually, the rate of change in weight and height is more important than the actual measurements. It is important to determine whether failure to thrive results from medical problems or some other environmental factors. There are multiple medical causes of failure to thrive. These may include:

- Chromosome abnormalities—Down syndrome and Turner syndrome
- Defects in major organ systems
- Problems with the endocrine system-thyroid hormone deficiency, growth hormone deficiency, or other hormone deficiencies
- Damage to the brain or central nervous system, which may cause feeding difficulties in an infant
- Heart or lung problems, which can affect how oxygen and nutrients are absorbed in body
- Anemia or other blood disorders
- Gastrointestinal problems—Malabsorption syndrome, lack of digestive enzymes, gastroenteritis, gastroesophageal reflux disease
- Cerebral palsy
- Chronic infections
- Metabolic disorders
- Complications of pregnancy and low birth weight

Other factors that may lead to failure to thrive include:

- Emotional deprivation as a result of parental withdrawal, rejection, or hostility
- Economic problems that affect nutrition, living conditions, and parental attitudes
- Exposure to infections, parasites, or toxins
- Poor eating habits

### Symptoms

Infants or children who fail to thrive have a height, weight, and head circumference that do not match standard growth charts. The child's weight falls lower than 3rd percentile (as outlined in standard growth charts) or 20% below the ideal weight for his height. Growth may have slowed or stopped after a previously established growth curve.

The following skills are delayed:

- Physical skills such as rolling over, sitting, standing and walking
- Mental and social skills
- Secondary sexual characteristics (delayed in adolescents)

## Diagnosis

Diagnosis of FTT can be established by performing a physical exam and checking the child's height, weight, and body shape. Take a detailed history, including prenatal, birth, neonatal, psychosocial, and family information. A Denver Developmental Screening Test reveals delayed development. A growth chart outlining all types of growth since birth is created. The following laboratory tests may be done:

- CBC count—WBC and RBC to rule out for possible indication of infection, anemias, or immune deficiency
- Urinalysis and culture—specific gravity, evidence of infection
- Renal function—Serum electrolytes, BUN, and creatinine levels
- Liver function tests for children with signs of protein wasting or organomegaly
- Hemoglobin electrophoresis to determine the presence of conditions such as sickle cell disease
- Hormone studies, including thyroid function tests
- X-rays to determine bone age
- Urinalysis

## Treatment

The treatment depends on the cause of the delayed growth and development. Delayed growth due to nutritional factors can be resolved by educating the parents to provide a well-balanced diet. Age-appropriate nutritional counseling should be provided to parents. Parents may also be instructed to provide calorie-dense foods by adding rice cereal to foods for toddlers, or adding gravies, cream sauces, or butter to foods for older children or adolescents. Vitamin and mineral supplements, especially zinc and iron may be considered.

If psychosocial factors are involved, treatment includes improving the family dynamics and living conditions. Parental attitudes and behavior contributing to child's problems should be examined. In many cases, a child may need to be hospitalized initially to focus on implementation of a comprehensive medical, behavioral, and psychosocial treatment plan.

## Prognosis

If the period of failure to thrive has been short, and the cause is determined and can be corrected, normal growth and development will resume. If failure to thrive is prolonged, the effects may be long lasting, and normal growth and development may not be achieved.

## Complications

Permanent mental, emotional, or physical delays can occur.

## Prevention

The best means of prevention is by early detection at routine well-baby examinations and periodically monitoring growth and development on growth charts when following-up with children.

# TYPES AND ADVANTAGES OF PLAY

Play is the work of child. There are several types of play as listed in Table 6.2.

## General Functions of Play for Children

- **Sensorimotor development:** A child explores the nature of the physical world. Infants gain impressions of themselves and outer world by tactile, auditory, visual and kinesthetic stimulation.
- **Intellectual development:** Through exploration and manipulation a child learns to identify colors, shapes, sizes, textures, numbers, also learns to associate words with objects, understands spatial relationships like 'up, down, under over', expands language skills and knowledge.
- **Socialization:** Through play child learns to establish social relationships with peers. They learn 'give' and 'take', moral values and ethics, right from wrong, standards of society and assume responsibility for their actions.
- **Creativity:** Children experiment and try out new ideas.
- **Self-awareness**: Through play activities they learn self-identity, how to regulate their own behavior, and know about their abilities.
- **Therapeutic value:** It provides a means for release from tension, and stress encountered in the environment. In play

**Table 6.2:** Types of play

| Type of play | Description |
|---|---|
| **Onlooker play** | Children watch what others are doing and make no attempt to enter into the play activity. |
| **Solitary play** | Children play alone with toys different from those used by other children in the same area, generally seen in infants. |
| **Parallel play** | Each child plays beside but not with other children. There is no sharing of toys and no group association. This type of play is commonly seen in toddlers. |
| **Associative play** | Children play together and are engaged in similar activity but there is no organization or rules, division of labor, leadership assignment or mutual group goals. |
| **Cooperative play** | Play is organized, children play in group, they discuss and plan activities to achieve a goal. |





children can express emotions and release unacceptable impulses in a socially acceptable fashion.

- **Moral value:** Interaction with peers during play contributes significantly to their moral training. If they have to become the acceptable member of the group they have to follow the acceptable codes of behavior like honesty, self-control, fairness, etc.

## Play Therapy

Play therapy is to children what counseling is to adults. Play therapy utilizes play, children's natural medium of expression, to help them express their feelings more easily through toys instead of words.

Association for Play Therapy (APT) defines play therapy as "the systematic use of a theoretical model to establish an interpersonal process wherein trained play therapists use the therapeutic powers of play to help clients prevent or resolve psychosocial difficulties and achieve optimal growth and development."

Play therapy includes a dynamic interpersonal relationship between a child and a therapist trained in play therapy procedures who provides selected play materials and facilitates the development of a safe relationship for the child to fully express and explore self (feelings, thoughts, experiences, and behaviors) through play, the child's natural medium of communication, for optimal growth and development.

### *Uses of Play Therapy*

- It helps to meet the emotional needs of children who have an illness or surgery that needs hospitalization. Being in the hospital can be stressful for children and their families. Children may feel scared, confused, and out of control. Play therapy is used to help children understand and cope with illness, surgery, hospitalization, treatments, and procedures.
- It prepares hospitalized child for medical procedures and learn about his or her surgery.
- It provides an opportunity for child to express his or her feelings through normal play.
- It provides diversion and brings about relaxation and helps in pain management.
- It helps the child feel more secure in strange environment.
- It provides a means for release of tension and expression of feelings.
- It encourages interaction and development of positive attitude towards others.

## Summary

Growth and development is continuous and specific for each child. It does follow some common principles like cephalocaudal and proximodistal. It is important to understand the age- appropriate concerns of children so that the appropriate nursing care can be given to them in an effective manner. The main food for child till 6 months of age is breastmilk which has enormous nutritive value. The concerns of mother, if any, during breastfeeding must be addressed.

## Assess Yourself

1. Discuss the milestones of a child till one year of age.
2. List the 10 steps of Baby-Friendly Hospital Initiative.
3. Write a short note on failure to thrive.
4. Discuss the types and advantages of play.
5. Mention the ages at which the following milestones are achieved:
   - Sitting with support
   - Sitting without support
   - Standing
   - Walking
   - Social smile
   - Use of bi syllables -mama, baba

**Fill in the blanks:**

1. The child's birth weight is doubled at ..... age, and tripled at ..... age. (6 months, 1 year)
2. Head circumference and chest circumference become equal at ..... age. (1 year)
3. Discuss the physiology of breastfeeding.
4. The two hormones responsible for breastfeeding are ..... and ..... (oxytocin and prolactin)