UNIT 4: PHYSICAL - MOTOR DEVELOPMENT

UNIT STRUCTURE

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4.1 LEARNING OBJECTIVES

After going through this unit, you will be able to -

- discuss patterns of physical development
- describe the principles of physical development
- explain what kinds of motor development take place during infancy and preschool age
- discuss importance of play and
- explain role of parents and teachers with regard to motor development of children.

4.2 INTRODUCTION

In the previous unit, we have discussed concept of growth, development, maturation, and various perspectives of development. We have highlighted the important issues related to development, and presented some techniques that are used to collect data with regard to development of children. In this unit, we shall discuss some important aspects related to physical - motor development of children. We shall discuss patterns of
physical development, highlight important principles of physical growth, and also discuss what types of motor development take place in infancy and preschool children. You must know play is very important for physical development. We shall discuss the role of parents and teachers with regard to motor development of children.

### 4.3 PATTERNS OF PHYSICAL DEVELOPMENT

Biologically oriented developmental theorists argue that new behaviour arise from old behaviour owing to district maturational changes in the physical structures and physiological processes of the organism.

The growth of a young child's physical abilities is amazing. Isn't it? You may think of all the physical abilities a child develop to adjust to the world such as, learning to see and recognize others, holding a bottle or cup, crawling around objects, differentiating sounds from one source to another, and so on.

All these physical tasks require strength, coordination, perception, and normally developed organs of the body.

Physical development provides children with the abilities they need to explore and interact with the world around them.

A child's physical growth first begins as muscles gain strength with use and s/he gradually develops coordination. The development of muscular control is the first step in this process.

Physiological growth in human follows standard, orderly pattern. The growth proceeds in two directions: from the top down and from the centre outward.

Growth occurs through approximately the first twenty years of life in humans. Growth is more rapid and more likely to show spurts during both the infancy to early childhood period and the adolescent period.

Different parts of the body show different growth patterns. The nervous system is almost fully developed by the age of 6. Body size/ which includes skeleton, muscles and internal organs shows moderate early growth and then slows down until adolescence, and then increases again. The reproductive system grows very slowly until adolescence, and then
grows rapidly. These growth patterns have implications for social and psychological development.

The findings of variety of research works suggest that parents’ expectations for a child’s physical development depend on culture, family status or the presence of physical limitations.

For example, in a culture where a sport such as soccer is played early and very competitively, a parent’s assessment of a child’s physical abilities may be linked to performance on the soccer field. But the basic patterns of physical development in children are universal.

The concept of development includes two major categories: normative development and dynamic development (Brotherson, 2006).

i. Normative development concerns the typical (normal) capabilities, as well as limitations, of most children of a given age within a given cultural group. It indicates a typical range of what children can and cannot be expected to do and learn at a given time. Normative development is important because it allows parents, teachers and other adults to understand what to expect of a child physically at different ages. For example, expecting a 3-year-old child to zip her own coat would be unrealistic because she still is developing the physical ability to use finger in that way.

ii. Dynamic development concerns the sequence and physical changes that occur in all aspects of a child’s functioning with the passage of time and increasing experience, how these changes interact.

Development milestones

How do you know what a child should be able to do physically? Typically, this is referred to developmental milestones to indicate steps in physical ability for a child that should be reflected at different ages.

Charts indicating common development milestones in physical abilities have been depicted in section 4.4.

4.4 PRINCIPLES OF PHYSICAL GROWTH

A number of principles regarding physical growth can be helpful in understanding a child’s physical development (Brotherson, 2006). We have
discussed these principles briefly in the following paragraphs.

(i) Directional Growth
The growth of a child’s body follows a directional pattern in three ways. The patterns of development are:

(a) Large to small muscle or gross to fine motor development:
Large to small muscle development means large muscles develop in the neck, trunk, arms and legs before the small muscles in the fingers, hands, wrists and eyes develop. You have observed that children can walk before they can write or scribble.

(b) Head to toe or top to bottom: Children’s muscles develop from head to toe. This is why babies can hold up their heads long before they can walk.

(c) Inside to outside or center to outside: Muscles develop from the center of the body first and then toward the outside of the body. Muscles around the trunk of the body develop earlier and are stronger than muscles in the hands, feet, etc.

(ii) General to specific growth
You are aware that large muscle movement begins with waving of the arm and legs of infants, and it then develops into the more specific movements of an older child who can walk and draw a picture. Muscle growth begins with more general abilities and becomes more specific and refined as children get older.

(iii) Variations in growth
You know that children vary in their physical abilities at different ages. Different parts of the body grow at different rates. Physical skills that are expected in gross or fine motor development are different in preschool children than infant.

(iv) Optimal tendency in growth
If growth in children is slowed for a particular reason, such as malnutrition, the body will try to catch up later when it is able to do so. Because grown in human tries to fulfill its potential in different stages.
(v) **Sequential growth**

Development is orderly and occurs in a pattern. Children must be able to stand before they can walk. This pattern is evident in a number of ways, as evident in milestones of development (see section 2.4).

(vi) **Growth during particular period**

Growth in certain areas of a child’s physical development may be more important at particular times during childhood. For example, the first few years of life are very important in the development of the brain’s growth. The critical time for the development of motor skills is between 18 and 60 months of age. Research suggests children go through four physical growth cycles: two of which are slow and two rapid growth cycle. The first period of rapid physical growth goes from conception to the age of 6 months. The rate of growth gradually slows during the toddler and preschool periods. The second period of rapid growth is during puberty in the years of preadolescence and adolescence. Another period leveling off occurs after puberty until adult growth is achieved.

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**CHECK YOUR PROGRESS**

Q 1: Read the following statements and write whether these are true or false.

I. Physiological growth in human follows standard, orderly pattern.
II. Different parts of the body show different growth patterns.
III. Children’s muscles develop from toe to head.
IV. First few years of life are very important in the development of the brain’s growth.

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**4.5 MOTOR DEVELOPMENT IN INFANCY**

Infants grow at a rapid pace over the first two years of their lives. By the age of 5 months, the average infant’s birth weight has doubled to around 15 pounds and by the first birth day, the baby’s weight has tripled to about 22 pounds. The pace of weight gain slows during the second year, though still continues to increase (Feldman, 2010). By the end of the
second year the average child weight around four times as much as he did at birth.

There is a relation between weight gain and increased height. By the end of the first year an average baby grows almost a foot and is about 30 inches tall. By the second birthdays, children become around 3 feet in height. All parts of the human body do not grow in same rate. At the time of birth the head remains around one fourth of the infant’s whole body size. By the end of the second year the head of the baby is only one fifth of the body length.

There are gender differences in height and weight. Girls are slightly shorter and weight less than the boys. Similarly, there are ethnic differences too. Asian infants are generally slightly shorter than North American Caucasian infants (Feldman, 2010).

**Motor development**

Motor development relies on changes in the neuromuscular system. Motor functions follow a predictable pattern. Infants cannot walk before they sit. Gross motor control involving large areas of the body is achieved more easily than fine motor control involving smaller muscle groups. As the time passes the mass movement becomes specific or differentiated.

**Posture and locomotion**

By 13 to 14 months time significant changes in posture and locomotion take place. The nature of these changes and the approximate times at which they are achieved have been reported in the literature. Frankenburg and Dobbs (1969) reported the following motor milestones for posture and locomotion of 75% of the babies they tested.

Lift head 45° at 1.9 months

Holds chest up, arm support of 3.5 months
Sits supported, head steady of 3.6 months
Sit without support at 6.5 months

Stands holding on at 8.5 months
Crawls at 10 months

Walks holding on to furniture at 10.2 months

Stands alone momentarily at 12.1 months
Walks alone well at 13.5 months

According to Shirley, who studied the growth of upright locomotion, suggested that it occurs in five fundamental stages.

**Stage I:** The infant achieves control of the upper body.

**Stage II:** The infant achieves control of the entire trunk.

**Stage III:** The infant makes an effective effort toward locomotion.

**Stage IV:** The infant is able to crawl.

**Stage V:** The infant can control posture and coordination for walking.

The infant must first be able to control his or her new body posture in a static position, and then movement concerned with that posture. For example, before the infant start walking, he would have a posture of standing with good control.
Manual skills

The newborn has no control over the arms, hands and fingers. Slowly flailing of the arms begins and gradually it comes under control. By 4 months of age infants are interested in observing the movement of their hands and in touching the objects. As the coordination of the hand and fingers increase, most infants are able to produce precise pincer movement which allows the infants to manipulate objects with greater precision.

By 18 months most of the infants can scribble spontaneously and build a house with few blocks. Before they go to kindergarten, most babies can reasonably copy a circle and square, draw rough human figure and use crayons with confidence (Frankenburg and Dobbs, 1969).

Fine motor skills

While infants develop gross motor skills for example, rolling over, sitting without support etc., they develop some fine motor skills also. For example, by the end of three months, infants show some ability to coordinate movements of their limbs. The motor skills become more sophisticated by the time the infants reach eleven months. They are able to pick up the ground objects as small as marbles. By the end of the two years, children can hold a cup carefully, bring it to their lips and take a drink without spilling a drop (Feldman, 2010).

Nutrition and motor development

There is a positive relation between rapid physical growth and nutrition. Infants cannot reach their potential without proper nutrition. Malnourished children show a slower growth rate by the age of six months. Chronically malnourished children score lower on IQ test and perform below average in school.

Factors of motor development

To what extent is motor development a function of physical maturation, and to what extent does it rely on experience? Maturation refers to an unfolding of the capacities of the organism that is relatively independent of training or experience (Liebert, wicks – Nelson and Kail, 1986).

Motor behaviour is initially controlled by the lower centers of the
brain i.e. cerebellum. As the cerebellum and the cortex continue to develop during the first year of life, the cortex starts controlling voluntary movement. Research studies showed that practice facilitate the development of walking (Zelazo, Zelazo and Kolb, 1972).

You must keep in mind that the landmark of motor development of children is based on norms. Norms represent the average performance of a large sample of children of a given age (Feldman, 2010). Norms are useful only to the extent that they are based on data from a large, heterogeneous, culturally diverse sample of children. Differences exist in the timing of development in children from different cultural, racial and social groups.

CHECK YOUR PROGRESS

Q 2: Answer the following question in about 40 words.

(i) How nutrition is related to motor development of children?

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4.6 MOTOR DEVELOPMENT IN PRESCHOOL CHILDREN

During the preschool years children rapidly develop physical abilities, their height and weight increase remarkably. However, average differences between boys and girls increase during the preschool years. The boys start becoming taller and heavier, on average, than girls.

During the preschool years, the shape of the body also changes. They become less round and more slender. The arms and legs lengthen, and the head becomes more adult like. The proportions of the body become similar to those of adults. Muscle size increases and children become stronger.
Motor Skills

Gross motor skills

Around the age of 3, children mastered a variety of skills like jumping, skipping and running. In between the age of 4 and 5, they gain increasing control over their muscles, so their skills become more refined. For example, at the age of 3, children can throw a ball but with less accuracy. At the age of 4 to 5, they can throw a ball with more accuracy, so that their father can catch it. They can learn how to ride bicycles, climb ladder and so on.

Due to differences in muscle strength boys and girls differ in certain aspects of motor coordination. Boys can jump higher and throw a ball greater than girls. Girls generally do better in balancing act.

Fine Motor Skills

Fine motor skills mean the skills which involve more delicate and smaller body movements such as using a spoon, cutting with scissors, tying shoelaces etc. These skills require practice.

You know that of the age of 3, children can draw a circle and square, can fit blocks of different shapes into matching holes without much precision. By ages 4 to 5 they can do these activities better with more precision.

4.7 IMPORTANCE OF PLAY

You must know play is very important for child development. At about 12 months babies begin to play with objects in ways that are increasingly similar to the ways these objects are conventionally used by adults. Between the ages of 15 and 18 months, babies investigate objects before doing anything with them. Between the ages of 18 and 24 months, babies begin to treat an object as if it were another. They comb the doll’s hair with a scale or something else. This kind of behaviour is called symbolic play (Cole and Cole, 1989). During the second year, symbolic play becomes more complex and elaborate. Malcom, Watson and Kurt Fischer (1980) observed four kinds of pretending that differed with respect to how the action was carried out. (see table 2.1).
Table 4.1 four steps in the developing of agent use in pretending

<table>
<thead>
<tr>
<th>Type of Agent use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self an agent</td>
<td>The baby puts his head on a pillow to pretend to go to sleep</td>
</tr>
<tr>
<td>2. Passive other agent</td>
<td>The baby puts a doll on a pillow to pretend that it goes to sleep</td>
</tr>
<tr>
<td>3. Passive substitute agent</td>
<td>The baby puts a block on the pillow to pretend that it goes to sleep</td>
</tr>
<tr>
<td>4. Active other agent</td>
<td>The baby has the doll lie down, on the pillow and go to sleep, as if the doll were actually carrying out the action itself</td>
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</table>

Developmental psychologists believe that play serves important function for the developing organism. Early forms of infant play provide practice in activities that will become important later.

Play allows exploration and invention without the possible negative consequences of the “real thing”.

Smith (1982) reported four major types of play that provide practice for later functions:
1. Locomotor play e.g., action that involve running, jumping etc.
2. Object play, which includes pulling, shaking things etc.
3. Social play which can be divided into two types: (a) play that involves physical contact, such as chasing and wrestling and (b) play that does not involve physical contact, such as building with blocks.
4. Fantasy play, in which the meanings of objects and action are transformed to fit an imaginary situation.

Vygotsky (1978) opined that social nature of symbolic play is important to development.

Play is very important as it helps the children develop physically, mentally and socially.

At the beginning of the preschool years, children engage in functional play. This kind of play is simple and repetitive activities e.g., pushing an object or can on the floor, jumping etc.

By age of 4, children like more sophisticated and constructive form
of play. In this kind of play children manipulate objects to build something, e.g. building a house using wooden blocks.

Constructive play given children a chance to practice their physical and cognitive skills and fine muscle movements.

Many a time children are engaged in parallel play, that is, the two or more children are engaged in play with similar kind of toys or objects. For examples, they may be engaged in building houses using similar wooden blocks, but there is no interaction between them.

Children may be engaged another type of play i.e. onlooker play, in which a child simply watch other children at play, but do not participate actively.

In another type of play, children may interact with one another by sharing toys, although they do not perform the same act. This type of play is called associative play.

While children play with one another, it is called cooperative play.

### 4.8 ROLE OF PARENTS AND TEACHERS

It has been observed that normally significant physical growth and motor development occur in the preschool years. Children become taller, stronger, and their muscles become more coordinated. They acquire gross motor skills, i.e. develop abilities to use the large muscles and fine motor skills i.e. small-muscles abilities in a predictable sequence.

Teachers, parents and others have important role to play. They should provide opportunities for children to exercise large muscles every day. They should create areas or space in the house and in the school. These might include low climbers, tossing games, a balance beam, and so on.

Preschool children should be engaged in games that involve running and walking, such as open-ended chasing on the playground, follow-the-leader, and giant steps.

Preschool children should be given small balls and toys for catching and throwing, such as soft, large balls, and other objects, both in the classroom and on the playground.
Balance materials should be available for preschool age children. Low balance beams, tires, and line on the sidewalk or classroom floor are some of the important materials that help developing motor skills.

You should appreciate the importance of rough-and-tumble play. Safe areas for rough play, such as soft mats and grassy hills, can be identified. Rules for rough-and-tumble play, such as taking your shoes off when wrestling on the mat, can be instituted. If you monitor carefully rough play will not lead to injury.

You can offer a range of activities like drawing, painting, sculpting, cutting and making collages and materials such as blocks, puzzles, books, stringing beads etc. which promote fine motor development in children.

Children’s motor development varies from culture to culture. Children in some cultural group acquire certain abilities quickly, others more slowly. How newly learned motor behaviors are used also differs significantly across cultures. Some children play tag, others fly kites, and still others chase cows or chickens. However, all these activities promote the same basic motor abilities.

You must understand and appreciate cultural differences in motor development. You must recognize that some children will be more rough or active and that other will be quieter or less advanced in terms of motor developing. You should always keep in mind that you should not compare the development of the children in one culture with the children of another culture and think their slow development is a deficit.

You can create a multicultural motor curriculum in the classroom by interviewing families about motor activities and games played in the home. This information can be used to integrate traditional games of diverse cultural groups into classroom play activities. Children will gain motor skills as well as cultural understanding when playing such games.

You should integrate the arts – including drawing, painting, and sculpture – into all learning activities and projects.

Girls and boys show different pattern of physical growth motor activity. Some of these differences are related to genetics, others to experience.
You must understand and appreciate gender diversity in motor play. Difference in activity level, accuracy or strength in movement, and play preference must not be construed as deficits that need to be remediated.

Advancements in motor development allow preschoolers to perform self-help skills and family chores. The kinds of family tasks young children will be assigned vary by culture. Children in same culture are often given tasks, such as cleaning their own rooms or helping wash dishes. In some culture they may be asked to garden, heard livestock, and care for younger siblings.

You can plan classroom activities around caring for oneself and helping family members with chores. Children can be encouraged to reflect on ways they assist their family and friends. Such activities will inspire a desire to contribute to family life and the classroom community.

You can plan daily chores to be assigned to all children in the classroom. Caring for plants and animals, cleaning up after snack, putting away blocks, or helping a friends with a puzzle with give children a sense of responsibility and belonging.

You must be aware of the characteristics of children who have physical challenging conditions and who suffer from malnutrition. Early identification of exceptionalities is one of the most important responsibilities of professionals working with young children.

You can support the motor play of children with special needs. You can adapt classroom, equipment, and materials so that all children have access to games and activities. You can guide children with physical challenges in exercising small and large muscles.

You must ensure that children get exercise every day. It is an incorrect assumption that children will get all the exercise they need after school at home or at child care.

You should redesign organized games so that all children should move all the time while playing them. Again, you can also modify some games in which less competent children are quickly eliminated and have to sit out e.g., musical chairs. Select games in which all can take part continuously for reasonable period of time.
CHECK YOUR PROGRESS

Q 3: Answer the following question in about 40 words.

(i) Mention two important activities of the teacher to provide better play environment for the children.

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(Note: Answer from section 4.7. No answer has been provided for this question at the end of the unit.)

ACTIVITY 4.1

By this time you have understood that play and activities are very important for the children as these help to develop their physical abilities.

We have listed few activities below. Attempt these activities. For collecting some information, you may discuss with your parents/spouse/other family members/friends/colleagues, and so on.

1. What was your favourite indoor and outdoor play or activity during childhood?

2. If you have any child in your home, what kind of play and activity you suggest for him/her?

3. In your opinion, what are the benefits of indoor play and outdoor play?
   (You may list the name of the play and benefits from your own experience.)

4. What are the problems you face for allowing your children (if any) to play indoor games and outdoor games? What should be the solution?
In this unit we have discussed patterns of physical development, important principles of physical growth, various types of motor development take place in infancy and preschool children, and also the importance of play for motor development.

You have learned that a child’s physical growth first begins as muscles gain strength with use and s/he gradually develops coordination. The development of muscular control is the first step in this process.

Physiological growth in human follows standard, orderly pattern. The growth proceeds in two directions: from the top down and from the centre outward. You have also learned that different parts of the body show different growth patterns.

The concept of development includes two major categories: normative development and dynamic development.

Normative development concerns the typical (normal) capabilities, as well as limitations, of most children of a given age within a given cultural group.

Dynamic development concerns the sequence and physical changes that occur in all aspects of a child’s functioning with the passage of time and increasing experience, how these changes interact.

You have seen that infants grow at a rapid pace over the first two years of their lives. Motor functions follow a predictable pattern. Infants cannot walk before they sit. Gross motor control involving large areas of the body is achieved more easily than fine motor control involving smaller muscle groups.

We have discussed motor milestones for posture and locomotion that have been reported in the literature. We have also discussed the nature of motor development in infancy and preschool children.

You have learned that the landmarks of motor development of children are based on norms. Norms represent the average performance of a
large sample of children of a given age.

- Developmental psychologists believe that play serves important function for the developing organism. We have discussed various types of play the children remain engaged in different stages and also the role of parents and teachers in providing opportunities for play.

### 4.10 FURTHER READING


### 4.11 ANSWERS TO CHECK YOUR PROGRESS

**Ans to Q No 1:** (i) T, (ii) T, (iii) F, (iv) T

**Ans to Q No 2:** (i) Infants cannot reach their potential without proper nutrition. Malnourished children show a slower growth rate by the age of six months. Chronically malnourished children score lower on IQ test and perform below average in school.

### 4.12 MODEL QUESTIONS

**A) Very Short Questions**

**Q 1:** What are the various factors on which the expectations of parents depend with regard to their children’s physical development?
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Q 2: Fill up the gap: Muscle growth begins with more ______ abilities and becomes more ______ and refined as children get older.

Q 3: How many physical growth cycles are there through which children have to pass?

Q 4: Is there any difference in height and weight between girls and boys?

Q 5: At what age a baby should be able to sit without any support?

Q 6: What do you mean by fine motor skills? Give one example.

Q 7: Give an example of symbolic play.

Q 8: What is the meaning of cooperative play?

Q 9: Does culture play any role in the motor development of children?

B) Short Questions (Answer in about 150 words)

Q 1: What are the two major categories of development? Write briefly on them.

Q 2: Describe the three directional patterns of the growth of a child’s body.

Q 3: Write a short note on motor development in preschool children.

Q 4: Describe some of the play activities for children in preschool age.

C) Long Questions (Answer in about 300-500 words)

Q 1: Discuss on the patterns of development.

Q 2: Describe the principles of physical development.

Q 3: Explain what kind of motor development takes place during infancy.

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