

A Study of Growth and Development of Child

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Introduction:-

The term growth and development refers to the process by which the fertilised ovum becomes an adult perso. Growth implies principally changes in size of the body as whole or of its individual parts; development embraces other aspects of differentiation of form, including those driven by genetic endowment, but also involves changes of function, including those that are shaped mainly by interaction with the environment, whether these produce stuctural, emotional, or social changes.

Manifestations of physical growth and development range from those at the molecular level, such as the activation of enzymes in the course of differentiation, to the complex interplay of metabolic and physical changes associated with puberty and adolescence.

Neurodevelopmental processes, such as the acquisition of basic gross and fine motor skills, depend to a great extent on maturation of neural structures, but they may be profoundly modified by the environment and by experience.

Cognitive growth and development depends on both genetic and environmental factors, In early infancy this process may bedifficult to differentiate from neurologic and behavioural maturation. In later infancy and childhood, cognitive and intellectual functions are increasingly measured by communicative skills and by the ability to handle abstract and symbolic material.

The psychosocial development of the child integrates all of the foregoing in a process that incorporates genetic constitution, cognition, and experience into the continuing and ultimate definition of the individual as a unique person and personality.

Genetic factors may set limits to biologic potential, but these are intimately interwoven with the environment. Physical trauma may be prenatal or postnatal, nutritional, chemical, residual from infection, or immunologic. Nutritional factors may reflect primarily socioeconomic realities. Social and emotional factors affecting growth potential include the sex of the child, the position of the child in the family, the quality of interaction of the infant of child withsiblings, parents and others, the personal concerns and needs of the parents, and the child rearing patterns of the parents and of the community. Cultural considerations may either limit or expand the range of behaviour of children by establishing conventional expectations and may later the schedule for acquisition of skills, such as sitting or walking, which were once regrded as depending almost entirely on maturation. Politics and culture are closely related, in as much as the political life of any community provides the arena in which public priorities are set, including those that may have profound effects on children.

The experience of each child is unique, and the patterns of development may be profoundly different of r individual children within the broad limits that designate normality. Patterns of physical growth and development, for example have such variability that they can often be expressed only in statistical terms. The period between the 12th and 40th week of gestation, the fetal, period, is marked by rapid growth and elaboration of function. Not until the 24th-26th week, however, is the fetus generally viable.

Physical Development :-

The 1st week of embryonic life is germinal; its chief feature is cellular division. During the 2nd week, the cell mass differentiates into two layers (ectoderm and endoderm); during the 3rd week, mesoderm is added. During the 4th week, the growing organism elaborates the somites and undergoes rapid differentiation between the 4th and 8th week into an essentially human form. At 8 week of age, the fetus weighs about 1 g and is about 2.5 cm in length; at 12 week it weighs about 14 g and is about 7.5 cm long, and at 16 week it is about 100 g and 17cm long. By the end of the 2nd trimester (28 week), the fetus weighs about 1,000 g and is about 35 cm (14 inch) in length. During the 3rd trimester the increase in size of the fetus involves primarily subcutaneous tissue and muscle mass.

Respiratory movements of the fetus occur as early as the 18th week of gestation, but the level of development of alveolar structures usually does not permit survival until the 24th – 26th week. The development of pulmonary surfactant is underway by 20 week of gestation but may not be adequate until late in the 3rd trimester, the tidal flow of amniotic fluid into and out of the developing lung may contribute to pulmonary arborization. Late in pregnancy, when amniotic fluid contains more cells and may contain meconium and other debris, aspiration may deposit these materials into the alveoli, leading to respiratory difficulties following delivery.

The hemoglobin of the fetus is predominantly fetal in type (Hgb F). At a given oxygen tension, Hgb F carries more oxygen than adult hemoglobin (Hgb A). Hgb A is produced in late fetal life and represents approximately 30 per cent of the hemoglobin in the mature newborn infant.

Bile begins to be formed by about 12 week of gestation and digestive enzymes soon thereafter. Meconium, the distinctive intestinal content of the fetus, is present by 16 week; it consists of desquamated intestinal cell and fluids, and of squamous cells and lanugo hair from amniotic fluid swallowed by the fetus.

The fetus makes wallowing movements as early as the 14th week of gestation; at 17 week the upper lip may protrude on stimulation in the oral area, and by the 20th week both lips protrude. At 22 week the lips are pursed on stimulation, and by 26-28 week the fetus may actively suck in attempting to gain nourishment.

The placenta is the chief route of metabolic exchange between the mother and the fetus. Its most urgent function is to provide for gas exchange; for this, adequate perfusion is needed on both the fetal and the maternal side. The placenta .

Elaborates hormones and enzymes that participate in the regulation of pregnancy, and it effects the selective transfer of nutrients and metabolites between the mother and the infant. Maternal hormones and drugs may also be transferred to the infant. Placental permeability is selective even for such closely related substances as the antibodies against viruses and those against bacteria; the former (e.g., immunoglobulin G [IgG]) are more readily transmitted than the latter (e.g., IgM). Much of the transfer of calcium, iron, and IgG to the infant occurs in the last trimester, with the result that the infant born prematurely may have a greater need than the full term infant for calcium and iron, may be more susceptible to infection.

Having shown the importance of hereditary factors and their unfoldment and also that of the environmental conditions in general for the growth of personality, the relative importance of nature and nurture in the development of physical, intellectual, emotional, social and moral aspects has to be further examined in some details. Then again, the question whether this growth is in a set and regular order or that it exhibits fluctuations and irregularity needs consideration.

How far is the individual modifiable and educable ? Can his future behaviour and development be predicted on the basis of his hereditary endowment or on the basis of his performance at one time ? How much are the sex differences ? Are there any race differences in intellectual powers ? A discussion of such like questions would prove valuable for throwing light on educational problems and for enabling parents and teachers to direct their efforts on the right lines.

Physical growth goes on from birth onwards, in tissues, muscles, bones, height, weight, strength, sense organs, brain or inner organs and, in fact in every physical aspect, function or formation. A child grows in every system of his body simultaneously, although this growth in every system cannot be described simultaneously.

The bones of the body grow in length, width and thickness, as children mature. Long bones become, generally, longer, in adolescence and there is final articulation of all the bones at their respective joints. Teeth grow and face changes strength and agility increase. Each child's growth in weight, height and motor skills, as in other spheres, is unique with his own rate of growth and cannot be judged on standards based on group averages, although if a child does not increase his stature, his muscles do not grow stronger, his brain does not mature, his internal organs do not increase in size or his body is not enlarge with greater weight and height, there is something wrong with him and he will not be a fully grown individual in his own way to take his place in adult society.

Physical growth is affected by various factors, such as inheritance lying in the genetic constitution, nutrition, living conditions and medical facilities and timely help. It is, for example, made out that due to better food, better living conditions and better medical care, boys and girls are found to be taller, heavier and healthier than their counterparts during the last half century in the world as a whole. 2 Mean height and weight are said to have increased from earlier decades to more recent years, as from 1927, 1937 and 1947 mean weight varied from about 51, 53 to 55 Ibs in order and height increased from 47 inches to 48 and 49 inches in the case of 7 year olds³.

Any prolonged deprivation has its retarding effect on the rate of growth and on the development of personality traits. The retarded are noted to suffer from inferiority leading to over-compensatory behaviour and even rebellion or domineering way of dealing with others.

There is no doubt, that a person may be tall or short, thin or stout healthy or unhealthy, handsome or ugly with respect to the quality of the genes. But physical development is affected by many environmental conditions such as supply of food, accident or disease. Even geographical conditions (as one type of environment) influence physical appearance and health. A man's skin becomes darker in strong sunlight of tropical countries. The somatic character of an individual is determined, to a certain extent, by the region in which he lives, since the materials which his body uses are supplied from the soil where, if there is a deficiency or excess of any minerals or chemicals, important physical and physiological changes may result. The absence of calcium, for example (needed by bones and the blood), produces weak legs and rickets. The absence of iron and copper salts causes anaemia. The absence of Iodine deteriorates the thyroid glands, leading to enlarged necks with goitre. 5

Although natural and other differing environments produce differences in bodily and physical characteristics, the body of man is not like mere clay in the hands of surrounding conditions. The reasons for the limits to the modification of man's constitution lie in his congenital structure. "Long-headed and round-headed men and women live in the same location.

Neurodevelopment:-

Neurologic activity in the fetus is first manifest by about 8 week of gestation, when isolated muscular contractions may be seen in response to local stimulation. By 9 week, contralateral flexion may be followed by ipsilateral flexion, and some spontaneous movements occur. By 9 week of gestation, the palms and soles have become reflexogenic; by 13-14 wk, graceful flowing movements may be produced by stimulation of all areas except the back, of the head, and the vertex. At this time, the movements of the fetus may first be felt by the mother. The grasp reflex is evident by 17 week and is generally well developed by 27 week. Weak phonation may occur in the fetus delivered at 22 week. By 25 week, the earliest signs of the Moro response can be elicited. In late pregnancy the fetus is capable of habituation to certain sensory stimuli; for example, fetal movement and acceleration of the fetal pulse in response to noise transmitted through the mother's abdomen are blunted on repetition of the noise (see orienting response, later).

Fetuses differ in level of activity, and there is evidence that fetal activity may respond to maternal emotions, possibly as a result of placental transfer of epinephrine or other substances. Little is known about how the activity of newborn infants or the quality of the infants demands during the first few weeks of life may reflect aspects of gestation that are dependent on maternal emotional states.

The comfort that some newborn infants receive from rhythmic motion or rhythmic sound may stem from similar sensation imparted by maternal motion, breathing or heart sounds.

Problems of Embryonic and Fetal Life

Mortality during the embryonic period is probably higher than at any other time of life. Causes include abnormalities of genes and chromosomes and alterations in maternal health. These may be interrelated; advanced maternal age, for example, disposes to certain chromosomal abnormalities. Maternal infection or the administration of certain drugs to the mother during the 1st trimester may alter the differentiation of the fetus and may result in congenital anomalies. Intrauterine environmental factors responsible for defects in differentiation exert their effects principally within the 1st trimester.

Morbidity during the fetal period may result from a variety of intrauterine factors. These include interference with oxygenation secondary to disturbances of the placenta or umbilical cord; infections of bacterial, viral, or protozoan origin; injury by radiation, trauma, or noxious chemicals; immunologic disorders due to maternal immunisation and transfer of isoantibodies; and maternal nutritional disturbances.

The effects of intrauterine malnutrition on cerebral structure or function in later life are not fully understood. The rate of increase in the number of neurons is high during gestation, and their number probably continues to increase at decreasing rate until about 18mo of postnatal age. In this postnatal period there is also an increase in the number and complexity of dendritic connections, in the number of neuroglial cells, in the size of neurons and glial cells, and in myelination. The effects on the central nervous system of malnutrition that occurs after this time can be much more readily reversed than those that result from undernutrition during periods of rapid cellular proliferation.

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