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PRIMARY SCHOOL CHILDREN'S PHYSICAL GROWTH IN RELATION TO THEIR LEVEL OF ACHIEVEMENT

THESIS

Submitted in partial Fulfilment for
The Master of Science in Childhood Studies

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1988

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ACKNOWLEDGEMENT

Iwish to express my deep gratitude to my supervisor Prof. Dr. Diaiy M. Hassein Prof. of Pediatries, Military Medical Academy for her generous advices, guidance and unlimited support.

I am also greatly endebted to Prof. Dr. Saadia M. Bahader, Assoc. Prof. of Developmental psych., Ain Shams University for the precious time she devoted to the supervision of this study and for her instructions throughout the performance of this work.

INTRODUCTION
&
AIM OF THE WORK

INTRODUCTION

Learning can be viewed as a complex adaptive phenomenon influence by many factors. Amongst are socio-cultural factors e.g. economic level, housing, growth, nutration, eductional facilities and medical services. Alsopsychological factors especially congintive capacities are of outmost importance (Walzer and Richmond 1973).

Growth is defined as a continuous increase in the total mass of an organism resulting from an increase in the total number of cells and in the size of the individual cell, and reflected by gain in weight and enlargment of linear dimensions.

Optimal growth is essential for childs schoolastic achievement (Ibrahim 1978).

Growth affected by various factors e.g. genetic, racial, nutrational, sociocultural and psychological factors. Rate of growth at any age is the outcome of the interaction of genetic and enviromental factors (Vaughan 1983).

Mal nutrition especially protein defeciency may result in the structural lesion in C.N.S. and may interfer with the C.N.S. development in the pre-school years (Coursin 1965).

Iron defeciency anaemia might affect the general energy level of the child (Walzer and Richmond 1973).

Tiredness, Lassitude, easy fatiguability and generalized mascular weakness are the most common and often the earliest symptoms of anaemia, fitness, giddiness, headche lack of concentration are among others (Pearson 1983).

The relatively high incidence of a family history of psychiatric disorders among failing pupils might suggest one causative factor for their academic difficulties, either through biological predisposition or due to enviromental consequences (Okasha et al., 1985).

Polygomy, divorce, separation and marital disorder are found more often in the home of failed children (Okasha et al., 1985).

AIM OF THE WORK

The aim of this work "Relation between physical growth and school achievement" is to review the recent literature about this subject and review cases in egyption students to find the type of this relation if present.

The study will include the following :

1. Physical growth inrelation to
   - age
   - sex
2. School achievement inrelation to
   - age
   - sex

REVIEW OF LITERATURE

A. FACTORS AFFECTING SCHOOL ACHIEVEMENT

A.1. SOCIO-ENVIRONMENTAL FACTORS

There has been much recent interest in the effects of social and cultural factors on the educational achievement of children (Walzer and Richmond, 1973).

Socio-economic factors can affect the child scholastic performance either directly (Eisenberg, 1966) or via affection of his growth and development.

Richmond (1970), has demonstrated a downward drift in the development of young children of low socio-economic background, and Abbassy (1981), has shown that the child's academic performance depends on the soundness of his early development.

Also, social factors affect growth of the children (Rona et al., 1978), and lack of optimal growth interfers with the child's performance at school (Ibrahim, 1978). This occours probably by influencing the incidence of infectious diseases and dietary intake (Christiansen et al., 1975).

The child's intelligence is also dependent to a great deal on socio-cultural factors (Eisenberg and Earls, 1975). It is highly correlated with academic success as measured by I.Q. tests (Eisenberg, 1980). Although Bayley (1965) has demonstrated no significant decline in intellectual performance on the basis of social class before 15 months of age, there is uniform agreement that by 3 years of age, there is a definite decline in the level of intellectual functioning in children from impoverished and socially disorganized families. This deficit appears in the form of developmental retardation and discrepancy in performance that widens during the early school years (Walzer and Richmond, 1973).

A.1.1. Homefactors :

An excellent qualitative description of the developmental consequences of depriving environments has been presented by Wortis and her colleagues (1963) who stated that other elements than child rearing patterns in the environment were preparing the child to take over a lower class role and that the inadequate incomes, crowded homes, lack of consistant family ties, the mother's depression and others were as important as her child-rearing practices in influencing the child's development and preparing him for adult role.

Also, area of family dwelling, persons per bedroom and persons per bed all have highly significant relationships with physical growth of young children. The greater the crowding, the lower is the incidence of normal physical growth (Christiansen et al., 1975). The effect of overcrowding on growth is clarified by Abbassy (1981) who stated that over-crowded housing and poor sanitation cause the spread of infectious diseases and affect the quality of the care given by the parents to the child (Abbassy, 1981).

It is clear that sanitary conditions, e.g., bath, sewage disposal, cleanliness and conditions of flooring and others are related to better physical growth of young children (Christiansen et al., 1975).

Nutritional deficiencies have a very definite influence on the development and behaviour of the small child. Studies suggest that the brain may be permanently affected if nutritional restrictions are imposed at a time when it is undergoing its period of fastest growth. This period is mainly concerned with myelination and occurs during the last few months of gestation and to a lesser extent during the first few months of post-natal life (Abbassy, 1981). The etiology of malnutrition may be related to non-nutritional factors such as literacy and the occupation of parents, to the number of children in the family and to the economic potential and policies (Okeahialam, 1982).

Traditional practices and customs of infant and child rearing practices determine the pattern of growth of children in a community (Rathy, 1984). The Egyptian family is traditionally nuclear and ohhesive. Family attitudes tend to be conservative and heavily influenced

by religion. This will certainly affect school performance in various ways, e.g., by influencing his intelligence (Okasha et al., 1985).

It is suggested that the first essential for a child to achieve his best is love and security - the satisfaction of his basic emotional needs. This means that the child must have affection, acceptance however meagre his performance; tolerance, sympathy, and under standing for his developing mind, wise loving discipline in place of angry scolding; the gradual acquisition of independence and encouragement to acquire it as soon as he is ready (Illingworth, 1975). He also advised that children should thrive on encouragement rather than discouragement, praise and rewards rather than punishment though excessive praise should be avoided, for it could lead to an undesirable fear of failure. There must be an absolute avoidance of constant criticism, scolding, negging, sarcasm, disparagement, favouritism , unnecessary prolonged separation of the child from his parents and constant friction with him. The parents need ambition for their child but not overambition which demands more of him than his intellectual endowment will permit. Spock (1970) said that all kinds

of worries, and troubles and family frictions can interfere with a child's school work. Jealousy of a younger child may lead to a tanse, distracted older one whi is unable to pay attention.

Family size of over 4 children, birth order over 4 children and closely spaced births (less than 2 years apart) increase the risk of malnutrition and developmental abnormality in young children according to Bindary et al., (1976).

School achievement and attendance correlate with parental care and appreciation of the value of education. There are many factors which are chiefly responsible for determination of the level of school achievement, amongst are the opportunity which the parents give the child to enlarge his vocabulary and to acquire knowledge and experience outside the home and school, the opportunity and facilities which they give him to do his homework, the stimulation which they provide and the reward for good work (Illingworth, 1975).

The child may be an underachiever because his parents want him to leave school in order to earn money (Illingworth, 1975).

Sometimes a child is afraid to try in school for fear of failing. This may be because his parents have always been critical of his accomplishments or set too high standards (Spock, 1970). Overanxious parents may create harmful atmosphere of urgency about learning (Illingworth, 1975).

Rona et al. (1978), showed that the fathers unemployment was associated with impaired growth of their children, and Okasha et al. (1985), found that if the father was in the prison, had employment problems, drank heavily or abused drugs, all these would be accompanied by high failure rates of their children.

The educational level of the mother is related positively to her children's academic success (Hartzell and Compton, 1984). Whether the mother's working outside the home harmful to her child or not depends upon: a) the provision of a safe caring environment for the child and b) the mother's satisfaction in her outside work, the support and help of her family and her vitality at the end of the day to nurture her children (American Academy of Pediatrics, 1984).

Bindary et al. (1976), showed the effect of maternal age on the children's development :a mother who is either too young or too old (less than 18 years or more than 35 years old) is more liable to have children with developmental abnormalities. They have also shown that family instability, including one-parent siblings, multiproblem families, etc... is accompanied with abnormally developed children. Also, lack of maternal education which affects mothering practices has the same unwanted effect.

Ryle (1967) found that the death of either parent before the child is 15 years old may have adverse effects on the child's educational achievement, while Okasha et al. (1985), found no effect for death of a parent on academic performance.

Ryle (1967) and Okasha et al. (1985) reported that the relatively high incidence of a family history of psychiatric disorders among failing pupils migh suggest one causative factor for their academic difficulties , either through biological predisposition or due to environmenal consequences.

The role of T.V. should not be ignored. Children may watch T.V. for a longer period than they spend in school (Forman et al., 1983). Okasha et al. (1985) found that watching T.V. and listening to the radio are accompanied by poor academic performance.

There are several hypotheses of how T.V. may influence school performance. The most obvious is that T.V. displaces reading, the children have less incentive to read and spend less time reading. This would be especially important during the elementary school years when children are first learning to read. There is a controversy about the impact of T.V. viewing and the child's attention in the classroom. Some authors see that educational programs cater to children's short attention spans. Others showed that these would make children less enthusiastic but not less attentive in school (Zuckerman and Zuckerman, 1985).

Weissbluth et al. (1981) have concluded that increasing T.V. viewing is inversely proportional to the child's abilities in reading, writing and mathematics Superior school performance and increased intelligence test scores are associated with longer duration of evening sleep. Prolonged T.V. viewing may adversely affect school performance by shortening the duration of evening sleep.

A.1.2. School factors :

One of the most important developmental tasks of the child 5 years and older is to come beyond the family sphere into the school community, where academic achievement, social competence and regular attendance are major goals (Fowler et al., 1985).

The ideal school makes work interesting and finds way to bring out the best in every child (Spock, 1970). And this can be made easier by providing information, stimulation, a warm friendly atmosphere, the physical requirements in an attractive way, and by personally listening, sympathizing, supporting and encouraging (Clements and McClosky, 1964).

Pringle (1967), in an adress to the Royal Society of Medicine, said that learning to learn does not mean beginning to learn arithmetic or reading at the earliest possible time. It is far more basic and subtle, and includes motivating the child to find pleasure in learning to develop his ability to pay attention to others, to engage in purposeful activity, to delay gratification of his wishes, and to work for more distant rather than

immediate rewards and goals. It also includes developing the child's view of adults as sources of information and ideas, as well as of approval and rewards. Evidence is accumulating to show that early failure to stimulate a child's desire to learn may result in a permanent impairment of learning ability or intelligence. The child must find very early that learning is pleasure.

Children should be given the apportunities to learn as soon as they are ready. They enjoy their new skills and should be given the chance to employ them (Illingworth, 1975).

The teacher's effect on children's performance is multifactorial. It is the personality of the teacher more than what he knows, or what methods he uses, that determines the rate and direction of the child's progress at school (Clements and McCloskey, 1964). The degree of motivation and interaction between the personalities of the pupil and his teacher is correlated with school work (Illingworth, 1975).

By the very nature of his position, the teacher is aparent figure, an object of identification, a target for

confidences, aggression and displaced hostility, and a source of emotional support. His success depends on the warmth, humaneness of his personality, his sensitivity to the personal needs of children and his skills in establishing relationships with them. The teacher's adress, voice, ability to smile, emphasis on the positive, competence without dogmatism, respect for others and the confidence in the worth of each individual are all attributes which influence pupil behaviour (Clements and McCloskey, 1964).

Also, many teachers have behaviour problems, like all children, and a teacher who has to deal with difficult parents may become to dislike the child-and the feeling becomes mutual with the result that the child does badly. Some teachers use the method of threats, ridicule, sarcasm and discouragement instead of encouragement with bad results (Illingworth, 1975).

As regards teaching methods, a good teacher will inclucate in the children the qualities of application and the proper methods of learning, so that children can form the right approach from a young age and can carry on self education (Ibrahim, 1978). The teacher

must have a scientific objective knowledge of children, be skilful in teaching methods and competent in the technical aspects of the educational process (Clements and McCloskey, 1964). Spock (1970), remarked that the pupils performance would not be better because of rigid teachning methods and harsh attitude of the teacher or expecting the pupils to fulfill the teacher's needs rather than their own.

The teachers in a good school know well that every child needs to develop self discipline which can bot be snapped onto him from the outside, but it has to develop inside himself by first understanding the purposes of his work and feeling a sense of responsibility to others in how he performs it (Spock, 1970).

The effect of the child's peer relations cannot be ignored. Rejection by classmates may be the cause of poor school performance (Ibrahim, 1978).

Adequate examinations done by proper examiners would have good influence on the education program. On the other hand, there is no evidence that once a person qualifies as a teacher, he is automatically a competent examiner. He may expose the child to inadequate or improper exams, this has a determental effect on the pupil's school performance (Illingworth, 1975).

The school curriculum should be geared to the educational needs of the children (Walzer and Richmond, 1973).

Students like private tutoring because it is more individualized and more useful. Private tutoring is highly related to academic success (Hartzell and Compton, 1984).

School environment has got a profound effect on the health of the school children. There is a close relationship between health and education. Education is fundamental to health and health is vital for efficient education (El-Shabrawy, 1982).

School building should fulfil all sanitary ideals required. It should be durable, well-ventilated and efficiently lightened (Hanlon, 1974).

Arrangements should be provided to have : i)damp-proof, ii) fire-proof, and iii) rat-proof building.

The direction of the front of the school is preferred to be north-easterly, (breeze in summer and sun in winter). The school building should be 2 or 3 storeys

and no more. There should be more than one staircase in order to avoid overcrowding (El-Shabrawy, 1982).

The roof of the top storey, if made from concerete, should be covered by an insulating layer to minimize the excessive heat radiating from the ceiling. Such hazards include predisposition to respiratory affections and reduction of work and study efficiency on the part of the teacher and scholar (El-Shabrawy, 1982).

The classroom, is preferable to be of a rectangular shape with average dimensions 6 x 8 = 48 square meters. A minimum of 1 - 1.5 square meters of the floor area is allowed for the pupil to avoid overcrowding which is associated with inadequate supervision (Khalil, 1981).

The window area should not be less than 1/5 the floor area. Windows should be dispersed on opposite sides to allow for cross-ventilation. Air draughts can be avoided by the use of certain types of windows which direct air to ceiling. The lower border of the windows should be higher than the level of the desks. The upper border should extend high up to allow for

efficient ventilation and lighting (Khalil, 1981 and El-Shabrawy, 1982). Failure to fulfil ventilation instructions will favour the development of mental fatigue, inattentiveness and interferes with education process (Khalil, 1981). The majority of windows should be located on the left side of the pupils, to avoid the shadow of the right hand during writing. There should be no windows at the front or the back of students to avoid glare in the first instance and body shadow in the second case. The best illumination is through natural lighting. Ceilings should be white, and the walls should be light in tint. All dark shades should be avoided (El-Shabrawy, 1982). It may be necessary to have artificial light, especially in schools working at night. The indirect type of illumination is preferable. It should be of optimum power and distribution (Khalil, 1981).

The black board should have a dark matt surface, suspended at a suitable level at the center of the wall in front of the pupils. The distance between the blackboard and the first row of desks should not be less than 1.5 meters (El-Shabrawy, 1982).

The desk design should satisfy the following requirements : 1) it should be comfortable, ii) allow for a healthy setting, iii) suitable for reading and writing without any strain (Khalil, 1981).

Sanitary regulations should be available in each school. Public purified water supply must be used if possible. In urban areas, piped system is used(Khalil, 1981). In some rural areas, where there is no such supply deep well - water is resorted to. This should fulfill sanitary standards. This water should be raised through an efficient pump to a cistern on the roof of the building to be distributed to various taps. Such cisterns should be periodically inspected and cleaned (El-Shabrawy, 1982). Drinking fountains are best used for drinking purposes. If ordinary taps are used, then each scholar should be instructed to procure his own cup to avoid spread of droplet infection (Khalil, 1981). Soap should be supplied, communal towels should not be used for fear of spread of contact and droplet infections (El-Shabrawy, 1982).

Proper sanitary means for sewage disposal should be provided according to the circumstances whether pipe system as in towns or septic tanks or cesspits in rural areas. Water closets should be distributed in all storeys of the school, in the yard and playgrounds, but should be separated away from class-rooms.

They should be well ventilated, and have screened windows (El-Shabrawy, 1982).

Scavenging, sweeping and cleaning of schools should be done at the end of the school day after exit of the scholars. Wet sweeping is preferable (El-Shabrawy, 1982). Each class-room should have a refuse receptacle. Refuse bins should be distributed in corridors, in the yard and in playground. They should be of sanitary types and should be emptied daily and sprayed with an insecticide (Khalil, 1981 and El-Shabrawy, 1982). In urban areas, refuse disposal is the responsibility of local authorities or private contractors. In rural areas, disposal by burning or dumping can be practised (El-Shabrawy,1982).

Other measures for a sanitary environment include food control and control of personnel engaged in food preparation or serving in and around the school. They should be licensed, free from infectious diseases, and periodically inspected by medical officer of school health (El-Shabrawy, 1982).

A. 2. INTELLIGENCE

According to Eisenberg (1980) the child's intelligence as measured by I.Q. tests is the single variable that correlates most highly with academic success and poor school performance is commonly explained by the poor I.Q.

Despite some limitations (Satler, 1974), the I.Q. test remains a good overall screening test to determine whether a child can learn in a normal school, setting with 30 other children, in the class and using normal teaching methods. If he scores poorly, he will probably need extrahelp in school (Brown and Mac Donald, 1984).

Generally speaking, a child with an I.Q. between 80 - 90 will be educationally retarded, but can possibly fitted into an ordinary school. Those with an I.Q. of 50 - 80 will need to be placed in a special school (Davis, 1963).

Factors affecting the child's intelligence are numerous. Genetic ones are on top of these factors. Intelligence is inherited on a polygenic basis. Putting aside inherited diseases affecting mentality, some perfectly

normal people can happen to have lower intelligence than normal. It is not known whether they have fewer neurones or less complex pattern of denderitic connections. They have no disease and usually only present a problem when they go to school (Brown and MacDonald, 1984).

The I.Q. of the parents may be a better guide to a child's intelligence (Illingworth, 1983). Parents of superior intelligence are likely to have children of a superior intellectual level (Illingworth, 1971).

Socio-environmental factors are also very important as regards the child's intelligence. Amongst are prenatal and perinatal factors which are numerous . Bleeding during pregnancy (Illingworth, 1983), acetonuria (Churchill and Berendes, 1969), heavy irradiation, maternal toxemia, placental abnormalities (Illingworth, 1971), and malnutrition during pregnancy (Taft, 1983) are among the related factors. Prematurity (Francis - Williams and Davis, 1974), and postmaturity (Field et al., 1977), especially when associated with asphyxia, convulsions and other complications (Illingworth, 1971) are associated with subsequent low I.Q. scores in variable degrees.

Severe deprivation of environmental stimulation and experience during the first 3 years of life may set an actual organic pattern in the brain which can not later be reversed by increased stimulation (teaching) (Brown and MacDonald, 1984).

The eldest, the youngest and the only children are usually more intelligent than the intermediate ones (Lynn, 1959). This is presumably due to environmental factors, such as the amount of contact which the child has with adults and the amount of attention which his mother is able to give him (Illingworth, 1983).

The general opinion seems to be that not more than 20 - 40 % of an intelligence test score is likely to be the product of environment, the rest being the product of heredity. A more exact estimate can not be given (Illingworth, 1983).

A good nutritional status is essential for intellectual development, the last trimester of pregnancy and the first 6 months of life are of prime importance from the point of view of total nutrition (Brown and MacDonald, 1984).

Stoch et al. (1982) evidenced that malnutrition in infancy has a harmful effect on subsequent mental development if the malnutrition is not corrected in the early weeks of infancy. It reduces the number and size of cells in the brain together with the lipid, nucleic acid, enzyme and protein content (Winick, 1972). Children whose malnutrition is prevented by supplementary diets in the first 2 years, have significantly higher I.Q. scores than those suffered from kwashiorkor. (Evans et al., 1980). Another effect of malnutrition is apathy, which in turn affects the mother-child interaction, so that the mother responds less to her baby, and the baby receives less stimulation from the mother (Illingworth, 1983).

A.3 PHYSICAL FACTORS

A.3.1. Growth and Development:

A.3.1.1. Development :

Normal development correlates positively with the child's academic achievement, and developmental dysfunctions are usually accompanied by learning impairment (Levine, 1983).

Visual - perceptual function plays a central role in learning, particularly in the earliest grades (Levine, 1983). The child has to learn from one side of the page (right or left), to control his eye movements, to scan on word at a time and to differentiate between shapes and remember these shapes as having linguistic significance (Brown and Mac Donald , 1984).

Children with delays in development of visual perceptual or visual motor function may encounter problems in learning to read, to write, to arrange words and sentences on a page, and to deal with the written aspects of the arithmetic processes (Levine, 1983). Also, they may lack the ability to "revisualize" words so as to spell accurately (Levine et al., 1983).

Sequencing (ordering) is used to described performance of the tasks of : 1) taking a whole, breaking it into parts, and working with each part until the whole is accomplished (e.g., "clean up- your room". "pick up all your toys", or "Do your homework" and 2) following multistep commands or tasks to completion (e.g., "stand up, get in line, go to the rest - room, pick up your lunch pox, and come back to this room "or" here are 20 arithmetic problems, have them finished in 20 minutes).

Spelling, arithmetic, and syntax are other skills requiring ordering (sequencing of symbols) Swaiman and Wright, 1982).

Memory is fundamental to learning. Three basic stages of memory involve reception of information, data storage and retrieval. To learn, children must select appropriate stimuli for retention, "file" these data for later use and, when an appropriate occasion arises, retrieve what has been stored with- out undue effort or delay (Levine, 1983).

ItIt is clear that memory is involved in compre- hension, some children who primarily have problems in

'retaining' what they hear, fail in school because they can not remember a series of oral directions. The child with a 'retrieval' problem, can not remember words he wants to say, even though he can understand and repeat them (Johnson, 1979).

Memory can also be weakened by chronic anxiety or by low motivational power in the information presented (Levine, 1983).

Fine motor function, such as dextrity with the hands, is critical for writing, copying and drawing. Some children may have inefficiencies of the fine motor performance and compensate by developing a maladaptive pencilgrip, which may later impair their ability to produce a large volume of output. Such children may be overwhelmed by lengthy writing assignments (Levine, 1983).

Attention or concentration is the ability to 'gate' significant from insignificant sensory input coming to the brain (Brown and Mac Donald, 1984). It allows children to focus purposefully for appropriate lengths of time on incoming data that will lead them towards productive learning (Levine, 1983).

Children with mental retardation may be easily distracted, or they may continue to attend to a particular stimulus after it is no longer appropriate. Some may be easily distracted by extraneous stimuli (Warren & Taylor, 1984).

Children who have emotional difficulties may be preoccupied by chronic anxiety, depression or specific fears (sometimes of failure). Such pre-occupations may "drain" attention. Inattention may be situational, e.g., the problem lies in the classroom, at home, or else where. These problems may include inappropriate corriculum or materials, inadequate teaching, discrepancies between a child's cognitive style and expectations, cultural discordance between the child and the educational system and inappropriate academic pressure at home (Levine, 1983).

Various investigators have pointed to a high prevalence of perinatal risks, allergies (Levine et al., 1982), sensitivities to food additives (Swanson and Kinesbourne, 1980), and family problems (Cantwell, 1972) among children with attention deficits. Morrison and Stewart (1971), have emphasized economic and cultural influences.

Motivation is the force or energy associated with an internal state that propels a person to engage in behaviour to satisfy a need or desire. Attitude is the preparatory mental posture with which one receives stimuli and reacts to them (Kaplan et al.,1980).

Sociocultural values influence attitude and motivation toward learning. The drive for academic excellence may in some families tend to maximize a child's achievement. Alternatively a poor performance may sometimes be due to excessive parental pressure (Levine, 1983).

A.3.1.2. Growth :

Optimal growth is essential for child's scholastic performance (Ibrahim, 1978).

The term 'growth' has commonly been used to indicate natural increase in size, i.e., weight and length as well as the size of different organs (Abbassy, 1981).

Children who are below the third percentile in height and weight are defined as growth retarded (Hansen et al., 1971).

The early school years are a period of relatively steady growth ending in a pre-adolescent growth spurt, about the age of 10 in girls and about 12 in boys. The average gain in weight during these years is about 3 - 3.5 Kg/year and in height approximately 6 cm/year. Growth in head circumference increasing from about 51 cm to 53 - 54 cm between the ages of 5 - 12 years. At the end of this period, the brain has reached virtually adult size (Vaughan, 1983).

Klein and associates (1972), concluded that physical growth is correlated and contributes to mental development. Nelson and Deutschberges (1970), stated that

I.Q. is directly related to head circumference. Gifted children showed to be above average in measurements of head circumference, height and weight. Further evidence that children of above average intelligence or academic achievement tend to be accelerated in size and physical maturity has been reported by other investigators (Weinberg et al., 1974).

Connell and associates (1965), found that children with mental retardation have heights and weights below the expected norm and that children with a head circumference below minus 2 standard deviations have even lower heights and weights. The authors failed to show a linear relationship of mental subnormality and decreasing head size.

Growth and development are affected by various factors, e.g., genetic, racial, nutritional, sociocultural and psychologic factors.

Rate of growth at any age is the outcome of the interaction of genetic and environmental factors (Vaugha , 1983). Clark (1972), has speculated that, when evaluating growth of any kind (physical or mental) in optimal

environments, genetic factors might appear more important than environmental influences, but in suboptimal conditions the environmental effects could be more obvious.

The inheritence is probably transmitted as much by the father as the mother and is due not to a single gene but to many genes (Tanner, 1984). Levine, (1983) has shown that some developmental dysfunctions are hereditary or genetic. Certain families have a high incidence of reading problems with no ready environmental explanation. Some children with attention deficits have parents whose behaviour was similar during childhood.

There are racial differences in rate and pattern of growth leading to the racial differences seen in adult body build, some of these are clearly genetically controlled whereas others depend perhaps on climatic differences and certainly on nutritional ones (Tanner, 1984).

Malnutrition delays growth. Children subjected to an episode of acute starvation recover more or less completely by virtue of their regulation powers, provided

the adverse conditions are not too severe and do not last too long (Stein et al., 1975). Prolonged chronic malnutrition leads to impaired growth (Tanner, 1984). A diet that does not provide the minimum requirements of proteins, calories, vitamines and minerals will invariably result in retarded growth. As an example, in the developing countries, the protein source is frequently legumes protein with an imbalanced pattern of aminoacids (Hansen et al., 1971).

The impact of disease on growth depends on its severity and duration. Minor and short illness such as measles, influenza, middle ear infection, or even pneumonia cause no discernible retardation of growth rate in the great majority of well nourished children. In children with a less adequate diet this may cause some disturbance. Often children with continuous colds, ear disease, sore throats, and skin infections are on average smaller than others but inquiry reveals that they come from economically depressed and socially disorganized homes where proper meals are unknown and cleanliness is too much trouble. The small size is more likely to be due to malnutrition than to the effects of the continued minor disease (Miller et al., 1960).

Bosch and Haak (1966), stated that infectious and parasitic diseases are the predominant cause of impaired growth in children of developing countries, by causing anorexia, malabsorption and destruction of tissues resulting in undernutrition and weight loss.

Infections or other inflammations of the C.N.S. may be followed by attentional weakness and deficits in cognitive processing (Levine, 1983).

The socio-economic condition of the family has got its effect on the growth and development of infants and children (Abbassy, 1981). Children of the managerial and professional classes are taller than those of the unskilled labourers (Goldstein, 1971). However, more recent data indicate that there is no difference in height associated with father's occupation (Lindgren, 1976). Weinberg et al. (1974) found that the higher the social class, the greater are the I.Q., head circumference and height of the children.

In weight the difference is less, since the lower socio-economic class children have a greater weight for height due to greater relative breadth of bone and muscle and more fat (Tanner, 1984).

Physical growth is negatively associated with crowded living conditions and family size (Christiansen et al., 1975). There is also a difference in height and weight in children according to the number of siblings present at home, growth being slower the more siblings there are at home (Rona et al., 1978).

Other social circumstances that may cause growth retardation are : poverty, inadequate maternal care , disturbed family relationships, overcrowding, lack of educational and play facilities, illness, scant medical facilities and general paucity of cultural environment (Hansen et al., 1968).

The causes of socio-economic differential are multiple and complex. Differences in nutrition are certainly important, in addition to habits of regular meals , sleep, exercise and general organization which, from this point of view, distinguish a good home from a bad one. The growth differences are more related to home conditions than to the economic conditions of the families, and home conditions reflect to a considerable degree, the intelligence and personality of the parents.

It is perhaps therefore, more intelligent children are at all ages taller than less intelligent children of the same occupational background (Tanner, 1984). The influence of these social factors can be exemplified by the observation that the support of family, cultural values, early cognitive experiences may modify developmental process and compensate for any mild physiologic impairment (Levine, 1983). Also severe psychological stress seems capable of retarding growth (Tanner, 1984), and emotional factors may modify developmental processes (Levine, 1983).

A.3.2. Special Senses :

A.3.2.1. Vision :

Five to 10% of preschool children have some kind of visual impairment. The 5 years old child should have visual acuity of 20/30 or better in both eyes (Kempe et al., 1982).

Goldberg (1983), stated that if a child does not develop perceptual skills before the age of 6 years, he could have learning difficulties. If his interpretation of letters and symbols is distorted, his ability to read and correctly interpret what he reads will be impaired.

It is generally agreed that peripheral factors are not causative in determining reading ability (Goldberg, 1983), and children with learning impairment have the same incidence of occular abnormalities, e.g., refractory errors and muscle imbalance, as children who are normal achievers - reading at grade level. Eye defect does not cause reversal of letters, words or numbers (American Academy of Pediatrics, 1972).

A.3.2.2. Hearing :

Hearing is the primary sensory pathway by which children normally develop speech and language. Hearing disorders at any age, even of mild degree, can cause problems of speech, language and learning (Towne, 1983).

Hearing deficits occur in approximately 1% of young school children. In 10% of them the loss is profound and bilateral (Kempe et al., 1982).

Most children with hearing loss have recurrent otitis media (purulent or serous). Even children with a single episode of otitis media may have some degree of hearing impairement for 3 - 6 months after the acute episode (Kempe et al., 1982).

Critical periods of speech and language development occur prior to the age 3 years (Dale, 1972). It is during these formative years of language development, that the child is most susceptible to chronic middle ear infection (Mc Eldowney and Kessner, 1972, & Shurin et al., 1979). Early severe chronic otitis media has been associated with subsequent educational retardation (Zinkus & Gottlieb, 1980). as well as a significant lowering of verbral intelligence (Howie, 1977).

A.3.2.3. Language and Speech :

Speech and language development is a significant indicator of later learning abilities. Language may be defined as knowledge of the symbol system used for verbal communication, speech is the demonstration of that knowledge in audible behaviour. The child who talks early and well also performs well in later learning activities, and the child with later development of speech and language will show problems in school. For proper development, the child requires proper hearing, intact nervous system, physical structures and physiologic control permitting the integrated complex acts of speech and encouraging environment (Towne, 1983).

The child entering school should be able to speak distinctly and clearly without difficulty; should be able to answer questions; and after a period of being acquainted, should be able to carry on a conversation with the physician about recent events (Kempe et al., 1982).

Any defect of speech in a school child can be serious unless corrected. Such children often rapidly

develop emotional difficulties from the frustration of being unable to make themselves readily understood and this in turn will tend to aggravate their speech defect (Davis, 1975).

Speech, hearing and intelligence are intimately associated with each other. Delay in the development of speech may result from defective hearing or intelligence (Davis, 1963).

A.3.3. Nutrition :

Not only somatic growth as reflected in body length, weight and body proportions is affected by malnutrition. It may also be associated with changes in the psychological functioning manifested in reduced intelligence scores, developmental lags and defective learning (Cravioto et al., 1966).

Approximately one half of the population of the world has survived a period of serious nutritional deprivation during childhood (Graham, 1967). As countries begin to industrialize, breast feeding becomes less and less frequent and malnutrition occurs at an earlier age (Winick, 1969).

Malnutrition results in a large pool of poorly functioning people who in turn rear their children under conditions destined to produce a new generation of malnourished individuals (Cravioto et al., 1966).

Malnutrition can affect learning by acting in 2 ways one deriving from a direct interference with the development of C.N.S. and the other from a series of indirect effects.

Malnutrition, especially protein deficiency, may result in structural lesions in the C.N.S. and may interfer with the C.N.S. development in the pre-school years (Coursin, 1965). Children who have experienced severe malnutrition in the first 2 years of life have lower levels of intelligence at school age than their sibs and classmates (Chase and Martin,1970).

Malnutrition may affect the development of inter-sensory organization directly by modifying the growth and biochemical maturation of the brain. Increase of cell cytoplasm with extension of axons and dendrites, one of the processes associated with the growth of human brain at birth, is largely a process of protein synthesis (Cravioto et al., 1966).

Ambrosius (1961), reported that severely malnourished children show a distortion of the normal relation between brain weight and total body weight. This finding is interpreted as an indication of arrested growth of the C.N.S. Whereas cell number is most affected by early nutritional stress, other aspects of nervous system growth such as dendritic proliferation, axonal branching and synapse formation, (all of which are potentially of

great functional significance (Altman et al., 1970), remain vulnerable to malnutrition at considerably later ages (Hertzig et al., 1972).

Among the indirect effects of malnutrition on learning is loss of learning time : since the child is less responsive to his environment when malnourished, at the very least he has less time to learn and has lost a certain number of months of experience on the simplest basis, therefore, he could be expected to show some developmental lags (Cravioto et al., 1966).

Critical periods in human learning has not been definitely established, but Cravioto and Robles (1965) have shown that as contrasted to older patients, infants under 6 months recovering from kwashiorkor did not recoup their mental age deficit during the recovery period. In older children ranging from 15 - 41 months of age, too, the rate of recovery from the initial mental deficit varied in direct relation to chronological age at time of onset of the disease. Similarly, the findings of Barrera - Moncada (1963), indicate a strong association between persistence of later effects on mental performance and periods of onset and duration of malnutrition.

One of the first effects of malnutrition is a reduction in the child's responsiveness to stimulation and the emergence of various degrees of apathy. Apathetic behaviour in its turn can function to reduce the value of the child as a stimulus and to diminish the adult's responsiveness to him (Diller and Birch, 1964 and Isenberg 1964), and contribute to a cumulative pattern of reduced adult - child interaction. If this occurs, it can have consequencies for stimulation and for learning, the end result being significant backwardness in performance on later more complex learning tests (Cravioto et al., 1966).

The impact of socio-environmental factors on nutrition is obvious. Social customs, ignorance, infections, or environmental paucity of food staffs appear to result in malnutrition which may produce a large pool of individuals who come to function in suboptimal ways (Cravioto et al., 1966).

The positive relation of mother's education to intersonsory adequacy must be considered in association with the distribution of responsibility within the household, and in particular with the relation of mother to

child care and child health. The better educated mother will rely less on traditional methods of feeding and child care, which are a direct cause of reduced intake of nutrients in health and disease, particularly in early life (Gravioto et al., 1966).

Factors such as poverty, unempolyment, child abuse and neglect, emotional instability of parents, emotional deprivation, marital problems, and family disruption have high positive correlation with undernutrition (Evans et al., 1980).

The effects of iron deficiency and anemia are discussed by many authors. Several investigators have declared that iron deficiency adversely affects children's attentional process and scholastic performance (Webb and Oski, 1973 ; 1974).

Studies suggest that significant iron deficiency is associated with low developmental scores in infancy (Oski and Honig, 1978). The question of the deliterious effect that iron deficiency may have on children's attentional processes and scholastic performance requires further investigations (Dienard et al., 1976). Oski and Nieburg (1976), pointed out that an association exists

between iron deficiency anemia and poor scholastic performance. They cautioned that other factors, possibly nutritional, might also be acting to produce this relationship and that anemia itself might only reflect the presence of multiple nutritional deficits and poor home environment.

Iron deficiency anemia might affect the general energy level of the child (Walzer and Richmond, 1973). Tiredness, lassitude, easy fatiguability and generalized muscular weakness are the most common and often the earliest symptoms of anemia. Faintness, giddiness, headache and lack of concentration are among others (Pearson, 1983 , de Gruchy, 1983 and Willoughby, 1984). The physical endurance and activity are curtailed (Gardner et al., 1975). This may be due to decrease in mitochondrial cytochromes with the resultant affection of maximal oxygen utilization and A.T.P. production (Dollman and Schwartz, 1965).

Cantwell (1974), proved that hypoxemia from anemia causes brain damage if occured during infancy with the resultant less attentiveness and less I.Q. scores at school age.

A.3.4. Chronic Illness and Parasitic Infestation :

Optimal health is essential for proper school performance of children (Ibrahim, 1978).

The majority of children with chronic illness or physical disability are of normal intelligence. Despite this fact, there is evidence that chronically ill children underachive and do more poorly academically than do their healthy peers (Rutter et al., 1970 and Sultz et al., 1972).

The condition is aggravated if the burden of low socioeconomic status is added (Fowler et al., 1985).

Only children with certain congenital syndromes or nervous system pathology are at increased risk for mental retardation, e.g., cerebral palsy, spina bifida, and to a lesser degree epilepsy (Weitzman, 1984).

Maladjustment to illness may cause pseudo-retardation shown by lower intelligence test scores (Pless and Pinkerton, 1975).

Among the commonest medical problems, that interfere with a child's education, are heart conditions (rheumatic heart diseases and congenital heart diseases), chest diseases (asthma, bronchiectasis and tuberculosis diabetes and blood diseases) (Davis, 1975).

Limited alertness or stamina, side effects of medications, prejudicial treatment, psychosocial maladjustment and excessive days missed owing to illness, all may contribute to a chronically ill child's underachievement in school. Some children are easily fatigued, e.g., those with certain respiratory or cardiac difficulties. Other children, e.g., those with hemophilia, sickle cell anemia, or osteogenesis imperfecta often experience repeated painful episodoes. Certain medications such as many of the drugs used to treat asthma, may cause anxiety, irritability and inattention. Other medications such as phenobarbitone may make children drowzy (Weitzman, 1984).

There is general consensus that learning and school achievement are facilitated by psychological well being and that well-adjusted children with expectations of success and high self-esteem tend to perform better in

school than equally intelligent pupils with more psychological problems. Although maladjustment and underachievement are not characteristics of children with chronic illness there is substantial evidence suggesting that psychosocial problems occur 2 - 3 times more frequently in these children than their healthy peers. Psychologic characteristics, such as intellectual abilities mativation, perseverance, flexibility and ability to cope with stress are all important factors in how well a child adjusts to the demands of school. However, school performance may suffer as a consequence of overservicing, overprotectiveness, or inappropriate or unrealistic expectations of well intentioned but misguided teachers or parents (Weitzman, 1984).

Parasitic diseases, like intestinal worms, are fairly frequent in school children and large numbers may suffer from schistosomiasis. Even though these may not be considered serious health hazards, they do interfere with a child's performance at school at least by sapping his energies (Ibrahim, 1978).

Bilharziasis is endemic in Egypt, the size of the problem can be seen according to the data obtained by

Hammam et al. (1976) who stated that 50% of the population of our country are infected with the disease (Schistosoma hematobium and/or mansoni). El-Mahdy (1983) showed that the heighest rate of infection was recorded in those aged 10 - 20 years. This may be attributed to age related changes in the pattern of water contact (Manson and Apted, 1982). As regards the sex, males are more commonly affected than females (Hammam et al., 1976).

Schistosomiasis may produce a secondary anemia (Jelliffe and Stanfield, 1981) because of iron deficiency resulting from blood loss (Khairy et al., 1978). It may also lower the appetite and affect the general well-being of the child and is thus likely to lead to nutritional disease in a child already on a poor diet. Malnutrition here, may account for the anemia (Jelliffe and Stanfield, 1981). Ross and Blair (1948) concluded that Bilharziasis might impair a scholar's chances of reaching a standard acceptable for enterance to a course of academic secondary education. Clarke and Blair (1966) stated that the disease must have a deleterious effect on the full development of a child's mental and

intellectual capacity. In a further study, Castle et al. (1974) confirmed that infected scholars suffer as regards scholastic attainment due to debilitating effects of the disease and not so much from any specific cerebral effect (Jellife & Stanfield, 1981).

The hook worm infestation occurs in all tropical and subtropical countries (Manson and Apted; 1982).

Infestation is usually asymptomatic, the significant sequelae of chronic hook-worm infestation include: microcytic hypochromic anaemia, hypoalbuminemia and oedema , (Roche and Layrisse, 1966).

Hook-worm is one of the world's chief causes of anemia as it has been estimated that 100 worms will cause a daily loss of 4 mg of iron. A balanced diet easily compensates for this loss, but iron deficiency soon develops on a marginal dietary intake (Goldsmid et al., 1984).

Ankylostomiasis is associated with increased plasma volume, decreased red cell volume, decreased blood volume (Awwaad et al., 1973) and low serum iron (Roche and Layrisse, 1966).

HB concentration below 5 gm/dl has been associated with heart failure and sudden death. Hypoalbuminemia resulting from excess blood loss may also occur, the attendant decrease in plasma oncotic pressure may lead to edema (Mahmoud, 1983).

Children with heavy hook-worm infestation suffer from chronic malnutrition (Blackman, 1969), they are stunted, and all aspects of development are retarted. There may be general debility and undue tiredness(Goldsmid et al., 1984).

Infestation with Ascaris lumbricoides is the most prevalent human helminthiasis with an estimated one billion cases worldwide (Mahmoud, 1983), possibly one in every 4 of the world's population is infested (Manson & Apted, 1982). Infestation is most common in preschool and young children (Mahmoud, 1983). Heavy infestation with Ascaris have been associated with chronic malnutrition and stunting of growth (W.H.O., 1967).

The combination of malnutrition, vitamin and iron deficiency and the almost invariable presence of intestinal parasites of other types, make the part played by Ascaris difficult to assess (Goldsmid et al., 1984).

However, studies have shown malabsorption associated with heavy loads of Ascaris which improved after deworming (Tomkins, 1979) . A large worm load will drain off a considerable proportion of a child's nutritional intake. Such cases of heavy infestation are usually seen in primitive and unprivileged countries where nutrition is already inadequate (Goldsmid et al., 1984). Ascariasis may interfere with host nutrition by the production of antiproteolytic substances by the worms , anorexia of the host and to a lesser extent, utilization of nutrients for parasite metabolism (Venkatachalum, 1966). Many studies have provided some evidence of an adverse effect of the parasite or vitamin absorption (Rodger et al., 1969 ; Sivakumar and Reddy, 1975). There is also malabsorption of fat, protein, carbohydrates (Tripathy et al., 1972) and vitamin C (Dodin, 1955).

Blumenthal and Schultz (1976) studied the biochemical changes in children infested with ascariasis. They concluded that HB., hematocrit value, serum vitamin A, serum carotenes, plasma vitamin C, serum folic acid, total serum proteins, and serum albumin were all deficient but the deficiency was highly significant in plasma vitamin C and serum albumin only.

Entrobius vermicularis is world wide in distribution and occurs as a group infestation especially in family groups (Manson and Apted, 1982). The incidence is highest in school children from 5 - 14 years. Boys and girls are equally affected (Goldsmid et al., 1984). It occurs in all socio-economic groups (Mahmoud, 1983). The commonest complaints are restless sleep , nightmares (Goldsmid et al., 1984) and nocturnal anal pruritis , (Mahmoud, 1983).

Approximately half a billion cases infected with Trichuris trichiura are estimated to occur world wide. It is most common in poor rural communities, where sanitary facilities are lacking (Mahmoud, 1983).

Most infested individuals are asymptomatic. Adult Trichiuris sucks approximately 0.005 ml of blood/worm/day. However, only heavy infestations in children may produce mild anemia, (Mahmoud, 1983).

Nata et al. (1977) found that there is flattening of the growth curve of children infested with Trichiuria trichiura compared with children of the same ethnic group in a more privilleged environment where intestinal parasites are less common.

Giardia lumblia is the most common intestinal parasite in Egyptian infants and children being found in nearly 18% of children with gastrointestinal symptoms, with its highest incidence in those aged 1.5 years(Gholmy et al., 1968). It is more common in male children and in those from poor socio-economic back grounds (Carswell et al., 1973).

The affected child may be completely symptomless, but for many years the association of Giardia lumblia intestinal infestation with chronic diarrhea has been recognized (Forfar & Churmokly, 1984). For long it was suggested that intestinal giardiasis might be responsible for intestinal malabsorption in childhood, some studies have shown little definite evidence that the infestation could cause intestinal malabsorption (Cantor et al., 1967 ; & Palumbo et al., 1962). However, Mahmoud (1983) concluded that it causes malabsorption of sugars (such as xylose and disaccharides), fats and fat soluble vitamines. There is commonly weight loss and failure to thrive. Chester and Mac Murray (1980) reported that constipation is commonly noted in 40% of cases of giardiasis, often alternating with diarrhea which is present in 28%.

The term amebiasis denotes the condition of harbouring Entameba histolytica, with or without clinical manifestations (W.H.O., 1969). Amebiasis is strongly associated with slum condition, bad sanitation, poverty and ignorance (Manson & Apted, 1982). When it does occur in the young, it tends to be commoner below the age of 6 years (Rubedge, 1984).

Mata et al. (1977) found that there is flattening of the growth curve of children infested with Entameba histolytica compared with children of the same ethnic group in a more privilleged environment where intestinal parasites are less common.

Chronic strongyloidiasis may result in malabsorption with protein losing enteropathy and weight loss (Mahmoud, 1983). A heavy worm load causes epigastric pain, bowel upset often with bloody diarrhea, iron deficiency anemia and debility (Goldsmid et al., 1984).

Tenia saginata infestation is present in countries eating beef meat like Egypt (Mahmoud and Nassif, 1969).

The worms absorb digested food through their cuticle and thus they compete for dood with the host and in this process food deprivation and digestive upsets may occur (Goldsmid et al., 1984). The worm may also cause malabsorption (Brandborg, 1973).

A.3.5. School Absence :

Children who are frequently or persistently absent from school tend to perform poorly in school and are likely to drop out before graduation from high school. It is a problem of major social importance with a large health component. Important epidemiologic information about excessive school absence and its relationship to physical and mental health problems of the children and their families is still lacking (Weitzman et al., 1982).

There are many causes of repeated absence from school (Gelder et al., 1983). Such as illness, phobia and others.

Chronic illness of the child, e.g., bronchial asthma (Parcel et al., 1979) and epilepsy (Weitzman , 1984) , or one of family members (Boardman et al., 1975) , constitutes approximately 75% of cases of school absence (Basco et al., 1972).

The prevalence of school phobia is reported to be approximately 17/1000 school aged children (Kennedy, 1972). It is commonest at 3 periods of school life, between 5 and 7 years, at 11 years with the change of school and

at 14 years and older (Gelder et al., 1983). The etiology differs according to age of the child. In younger children, separation anxiety is the important cause (Gelder et al., 1983). In older, children there may be fear of certain aspects of school life , or fears of failure and rejection (Smith, 1970). Difficulty at school may lie in a brisk unimaginative teacher or rough older boys (Rendle - Short, 1971). The refusal may appear after an enforced absence for an illness (Illingworth, 1975). School phobia may present in a psychosomatic manner. Some of the children complain of symptoms of anxiety such as headache, abdominal pain , diarrhea and sickness or vague complaints of feeling ill (Wolf and Hersov, 1984).

Some children may be deliberately kept at home by parents to help with domestic work or for company (Gelder et al., 1983). Others choose not to attend school because they donot believe that it is a positive addition to their lives. Furthermore, some families donot believe the schools are meeting their children's needs and may encourage non-attendance as a reaction to school policies (Weitzman et al., 1982).

The literatures that deal with the relationship between school attendance and academic achievement are in conclusive and contradictory, with some studies finding an association (Levanto, 1975) and others finding no association (Karweit, 1975 and Fowler, 1985).

One explanation for these differences may be that in general school population, increased absence is often associated with low socio-economic status which can adversely affect achievement (Levanto, 1975).

Lloyd (1976), has found a strong correlat ion between high absence and dropping out before graduation from high school. Block (1978), stated that dropping out of school has been found to be associated with adult maladjustment, unemployment and imprisonment.

A. FACTORS AFFECTING GROWTH

A:I. PRENATAL FACTORS

A.1.1. Hormones Affecting Growth Perinatally :

A.1.1.a. Insulin :

Maternal insulin does not cross the placenta. Release of fetal insulin and glucagon is stimulated by a peptide secreted in the ventrolateral hypothalamic region (Lockhart et al., 1976). Coupled with simultaneous parasympathetic innervation of the fetal pancreas, this neural peptide augments release of insulin and secretion of glucagon. Insulin has been found in fetuses as early as the 8th week and by 8-10 weeks it influences significantly the biochemical events that regulate the fetal pancrease (Like and Orci, 1972). During periods of maternal feeding fetal glucose levels follow maternal serum ones, although there is a delay in maternal to fetal glucose equilibrium with a slight decrease in fetal levels compared to maternal serum levels (Miller and Merritt, 1979).

Syndromes characterized by excessive fetal growth

have clearly been associated with elevated insulin release. Fetal islet cell tumors (insulinomas) characteristically produce fetal and neonatal macrosomia. Hyperplasia of iselts of langerhans and fetal macrosomia are also found in the Backwith-wiedmann syndrome, erythroblastosis and infants of diabetic mothers (Miller and Merritt 1979).

A.1.1.b. Growth Hormone :

Maternal GH does not cross the placenta in early pregnancy and cannot be found in the cord sera of newborn. The peak level of GH achieved during the postpartum period in the mother by induced hypoglycemia does not correlate with neonatal birth weight (Gitlin et al., 1965).

Fetal growth hormone has been detected in human fetal pituitary tissue culture from 5 weeks of age to late in gestation (Siler-Khodr et al., 1974). Postnatal levels of GH in sera of newborn infants depend on their gestational ages, premature infants have elevated levels of GH for as long as 2 months

after birth, and in term infants GH rises transiently and then remains relatively constant (Cornblath et al., 1965).

Studies of anencephalic infants and dwarfs suggest that GH has some effect on fetal growth. Hennebier and Swaab (1973) reported that birth weights of anencephalic fetuses were significantly less than those of control infants, even after correcting for the missing brain tissue. Naeys and Blane (1971), using quantitative micromorphologic techniques in anencephalic babies, reported smaller organs with reduction in cell number. Shortened body lengths have been reported in infants with familial dwarfism who had high levels of biologically inactive GH (Laron et al., 1972).

A.1.2.c. Thyroid Hormone :

Human thyroid tissue is found in fetuses by the third month and thyroxine has been identified in fetal plasma at 15 weeks (Fisher, 1961). A limited number of athyroid infents have been described as having a

significant decrease in body length, a delay in skeletal ossification and reduced neural maturation for a given gestational age (Cheek et al., 1977). Maternal hyperthyroidism also alters fetal growth in a predictable way. Such infants often show accelerated neurologic maturation and advanced skeletal ossification but have normal birth weights (Miller and Merritt, 1979).

A.1.1.d : Somatomedin :

Somatomedin is a peptide that influences the peripheral action of growth hormone on the prolifereation of epiphyseal cartilage and consequently is a potent regulator of fetal growth. Somatomedin level in the cord plasma and maternal plasma are identioal, but these levels are lower than tose found in normal nonpregnant females (Hintz et al., 1977). The comparatively lower somatomedin levels in the fetus and newborn suggest either that fetal tissues are more sensitive to this peptide or that less somatomedin is protein-bound in the human fetus.

A.1.2 : Fetal Kidney :

The fetal kidney exerts both hormonal and environmental constraint on fetal growth by participating in fetal electrolyte and water homeostasis and contributing to amniotic fluid volume. Infants with bilateral renal agensis (Potter's syndrome) manifest growth retardation and pulmonary hypoplasia (Potter and Craig, 1975). Degradation of fetal insulin occurs in the fetal kidney (Miller and Merritt, 1979). Derangements in insulin metabolism, mentined above , profoundly influence fetal growth. Furthermore, the oligohydraminos resulting from renal dysgenesis and/or urinary obstruction in utero leads to characteristic constraints on fetal growth with shortened and contracted limbs and typical facies.

A.1.3 : Genetics of Growth :

The genes influence growth through control of the production of enzymes necessary for building up and maturation processes of various cells and systems (Altenberg, 1957).

Stature is one of the most heritable traits recognized in man. The correlation coefficient for stature in monozygotic twins is 0.95 (Blumer, 1970). There are many genes affecting growth (polygenic inheritance). The offspring of an otherwise tall parent and a short parent tend to be medium in size with a fairly wide range of variability, whereas the offspring of medium sized parents tend to be medium sized with a smaller range of variability (Garn, 1962).

The size at birth does not correlate well to mid-parental height (the mean height of the parents) or to the height of the same individual at maturity (Tanner et al., 1956). Given an adequate environment. Postnatal growth shifts within one to two years to bear a significant relatinship to the genetic background of the individual, as examplifed by the mid-parental height (Smith et al., 1976). This is applied not only to the eventual growth but also to the maturation rate (Smith, 1976).

The influene of genes on growth and development is manifest in inborn errors of metabolism e.g. children

homozygous for galactosemia have birth weight 300 gram less than of normal control (Hsia and Walker, 1961). Abnormalities of autosomal chromosomes as in Down's Syndrome are almost always associated with low-birth weight (Hall, 1964) and postnatal growth and developmental retardation (Andrews, 1970).

A.1.4 : Pregnancy Complications :

Many maternal diseases have an influence on fetal growth. Among these the most important are maternal diabetes mellitus, placental lesions and intrauterine infections.

The majority of diabetic mothers have significantly shorter pregnancies than the nondiabetic ones. However, most of their babies are of large size with flushed, podgy face. The size of the baby is believed to be influenced by the control of maternal hyperglycemia, the coexistence of maternal nephropathy, fetal hyperinsulinism and possibly a genetic factors (Battaglia et al., 1966).

The relationship between the severity of maternal

diabetes and the abnormal neuropsychological attributes of her child was studied. The developmental deficits in such children have been correlated with the existence of a constant or intrmittent but frequent acetonuria in their mothers (Churchill and Brendes, 1969). Acetonuria probably operates upon the fetus by impairing his higher cerebral functions, either by a direct toxic effect of acetone or keteacids, or by a disturbance in acid-base balance (Miller and Merritt, 1979).

Placental dysfunction may lead to intrauterine growth failure, mental retardation, hypoglycemia, respiratory distress and anoxic brain damage in the affected infant (Fox, 1967).

The principal infections in pregnancy which may damage the fetus are in particular Rubella. Herpes simplex, Cytomegalovirus and Toxoplasmosis, It has been suggested that hyperthermia due to any cause in pregnancy may damage the fetus (Smith et al., 1978).

A.1.5 : Maternal Age :

It has effect on fetal development. The incidence

of fetal wastage, neonatal morbidity and mortality is significantly high at the extremes of the reproductive period. In U.S.A. perinatal mortality is highest among women aged 15-19 years, drops sharply to a low point at ages 20-24 years and climbs raidly as age increases beyond 30 years (Ross, 1964).

A.1.6 : Maternal Nutrition :

During pregnancy, the nutritional requirements of the mother are increased. The greatest demands for additional nutrients are met with during the later part of pregnancy and are much more of proteins, minerals and vitamins than an increase in caloric requirements (John et al., 1970). There is a good evidence that if the mother becomes sufficiently depleted nutritionally the fetus may suffer to spare the mother. Burk et al., (1943a) studied the physical condition of infants at birth in relation to the quantitative dietary level of the mother. They found a consistent decrease in the average weight and lengths of the infants as the maternal diet became poorer. The protein content of the maternal diet in important for normal fetal growth (Burk et al.,

1943 b). Studies on animals revealed that malnutrition, whether prenatal or postnatal, affects the physical composition of the brain and this in turn may lead to impairment of its neurological performance (Winick and Nobel, 1966; Winick, 1969).

A.1.7 : Maternal Size :

The size of a fullterm infant does not correlate well with the size of the father, it correlates more with the maternal size (Morton, 1955, Tanner et al., 1956 El-Sherbiny and El Sadek, 1973).

A.1.8 : Maternal Stress:

Many efforts have been made to relate psychological stress in pregnancy to psychological absormalities in infant and children. A retrospective study found that there was a great incidence of prenatal and perinatal complications in schizophrenic children especially in boys compard to their nonschizophrenic siblings and others unrelated. The complications included, advanced maternal age, hyperemesis, antepartum haemorrhage, eclampsia and hypertension (Taft and Goldfarb, 1964).

Mothers with many psychosomatic symptoms were more likely to have infants of low-birth-weight (Gunther, 1963).

A.1.9 : Parity and Family Size :

The first-born is smaller than subsequent offspring by 0.34 cm in length, 0.18 kg in weight and 0.14 cm in head circumference (Castle, 1941). This is probably due to relatively more uterine constraint on late fetal growth during the first pregnancy. The first-born grows more rapidly during the first few postnatal months.This most likely represents catch up growth compensating for the late fetal restraint on growth. The first-brom at 7 years average 2.3 cm taller than later born children who have less adequate nutrition especially in large families of lower socioeconomic status (Goldstein, 1971).

There is an inverse relationship between the size of the family and the ntelligence of the child (Holley et al., 1969). If the intersib interal is short, the mother may have no sufficient time between pregnancies

to restore her supplies of critical nutrients. The birth weight is considerably reduced with every such consecutive delivery (Jehn et al., 1970). Also the intellectual scores for children with short intersib intervals are significantly lower than those of children with longer intersib intervals (Holley et al., 1969).

A.1.10 : Multiple Pregnancy :

There is evidence that multiple pregnancy is associated with a higher incidence of mental retardation and of cerebral palsy than single pregnancies (Benirschke and Kim, 1973). The causes may be prematurity, abnormal delivery, hypoglycemia in the second twin and placental abnormalities or insufficiency. Also, twins are more often born to an older mothers and in multiple pregnancies there is a higher incidence of toxaemia and hydraminos, both conditions tend to be associated with fetal malformations.

Nevertheless Fujikura and Froehlich (1974) studying the development of 125 monozygotic win sets with un-

equal birth weights, found neither significant difference in the performance between co-twins in the Bayley Mental and Motor scores at 8 months, nor in the standard Binet scale at 4 years.

A.1.11 : Maternal Drugs Taken in Pregnancy :

Essentially all drugs taken by a pregnant women are transferred across the placenta to the fetus (Barker et al., 1981). Of those found to affect the fetus are antidiabetic drugs, antimitotic, antibiotic, antiemetic, antiepileptic, analgesics, amphetamines, salicylates, warfarin, magnesium sulfate and stilbesterol. As this number is vast, the history of drugs taken in pregnancy must be part of the history taken when assessing infant's development.

Children born to heroin addicts may be irritable with tremors and poor concentration for at least a year (Wilson et al., 1973). They have smaller head circumference compared to normal (Lifschitz et al., 1985).

Drugs taken during labour are likely to depress the respiratory centre and adversely affect the baby's

behaviour responses and sucking. Barbiturates cause significant depression. Diazepam may cause some degree of hyptoonia. Oxytocin may increase the level of serum bilirubin in girls (Pocock and Turner, 1982).

Beside drugs, the effect of therapeutic radiation on the growing fetus was reviewed by Brill and Forgoston, 1964; pelvic irradiation of the pregnant woemen resulted in an increased incidence of growth retardation, microcephaly and mental retardation when applied between the seventh and fifteenth weeks of gestation.

A: 2. PERINATAL FACTORS

A.2.1 : Neonatal Asphyxia :

Fetal and neonatal asphyxia with subsequent anoxic brain damage can be caused by a variety of adverse conditions which affect the O_2 transport to the tissues. Among such conditions are maternal hypoxia and acidosis (Molly 1966), maternal hypotension (Bieniarz et al., 1965). deienished uterine blood flow, placental insufficiency due to any cause (Hon, 1959), cord complications (Kupli et al., 1969), fetal hypotension (Molly, 1966) and severe fetal anemia (Adamsons et al., 1965). Among the factors affecting the prognosis as regard mental development are the time of onset of regular respiration, good prognosis is expected if less than 20 minutes (Type et al., 1982), onset of anoxia (Scott, 1976), and interaction of prenatal factors with the prinatal ones (Illingworth, 1983).

A.2.2 : Birth Injury :

Ross (1964) reported that both prolonged and precipitous labors carry increased neurologic risk to the infant. However, Gross and Colleagues (1968) found

that at autopsy there was morphological brain damage which could reasonably be ascribed to birth injury in less than half of these who had an abnormal delivery.

A.2.3 : Neonatal Convulsions :

It is difficult to assess for sure the relationship between neonatal convulsions and subsequent development since the various causes responsible viz, metabolic, vascular, infectious, inborn error of metabolism and hypoxia are interrelated and follow up examination over a period of several years is needed (Illingworth, 1983).

It is suggested that it is irrational to ascribe a child's mental or neurological handicap to the events of birth without considering prenatal factors which may have been for more important than perinatal factors in damaging the fetus. Obviously true birth injury does occur, but one should not ignore prenatal factors, some of which interacting with perinatal factors. Furthermore both factors may well interact with postnatal influences on development for instance, a difficult pregnancy may

well affect postnatal management of the child and the mother's attitudes to him (Illingworth, 1983).

A.2.4 : Preterm Delivery and Intrauterine Growth Retardation :

Causes for premature interruption of pregnancy are listed in many textbooks (Nelson et al., 1983). In preterm infants there is an eight times greater incidence of congenital anomalies than in other infants. Most of these factors are also applied in the "small-for-date" infants, they are commonly associated with placental insufficiency and defective intrauterine growth (Ellenburg and Nelson, 1979; Benett et al., 1981). Severe respiratory difficulties and positive pressure ventrilation seem to be associated with a high incidence of neurological handicaps on follow up (Fithardinge et al., 1976; Marriage and Davies, 1977 and Kunper, 1978).

Bjerre (1975) found that the growth of low birth weight children was slightly retarded in respect of stature , weight and osseous delopement, but not regarding head circumference.

A.2.5 : **Postmaturity** :

Postmaturity is dangerous to the fetus because of placental insufficiency, Field and his Colleagues (1977) found that postmature babies had more illness, more feeding and sleep disturbance, and acored less well on the Denever and Bayley scales when compared to controls. In another study 28 % of 100 children with cerebral palsy had experienced a gestation period of 41 weeks or more (Wagner and Arndt, 1968).

A.3 : POSTNATAL FACTORS (ENVIRONMENTAL FACTORS)

Under normal conditions, the progress of any individual from early embryonic life to adulthood is the result of continuous interaction between this innate genetic potential and the environment around him. However, if a child is born with a deficient genetic constitution, a change in environment will not go far towards improving him beyond the limits of his developmental potential. Individuals with superior gene combinations are those who take advantage of the opportunities which environment might serve in developing beneficial tendencies and/or repressing undesirable ones. On the other hand, the environment may cause the genetic heritage to deviate temporary from its course. If its influence is too intense or too prolonged the deviation becomes definitive and can no longer be automatically compensated. The influence of genetic or hereditary factors on the physical and mental growth status is usually not clearly demonstrable in the normal child until the age of three years prior to that time the environmental effects are more prominent (El-Abassy et al., 1972).

The environmental factors must therefore be taken into consideration in assessing a caild. Purely objective tests which ignore these factors must inevitably miss important information which is necessary for a proper assessment (Illingworth, 1983).

A.3.1 : Sensitive and Critical Periods :

Sensitive period is a particular stage of development at which learning in response to the appropriate stimuli is easier than at other time. Critical period is a stage of development beyond which learning is impossible. There is evidence that there is a sensitive period for learning in human beings (Ilingworth,1983). For example, if a baby is not given solid foods when he can chew (usually at 6 to 7 months), it becomes increasingly difficult to get him to take solids later (Palmer et al., 1975). If a child's congenital cataract is not removed by a certan age, the child will not be able to see. If a cleft palate is not operated upon by the age of 2 or 3, it becomes increasingly difficult to obtain normal speech. It is possible that there is a sensitive

period for each subject of the school curriculum for each child. For instance, if a child is taught arithmetic too seen, he will find it difficult and may develop such a dislike for it that he never learns it well. On the other hand, if he taught it too late, he way have lost interest in it and find it difficult to learn, (Illingworth, 1983).

A.3.2 : Race and Ecological Conditions :

There are racial differences in rate and pattern of growth leading to the racial differences seen in adult body built. Some of these are clearly genetically controlled whereas others depend perhaps on climatic and nutritional differences. There is quite a close positive relationship between the linearity of people as judged by their adult weight for heightt, and the mean annual temperature where they live (Tanner, 1984).

When socioeconomic conditions are similar for Negross and Whites, the birth weight and rate of growth are similar (Crump and Hoeton, 1961). Differences in growth of preschool children associated with social

class, are many times those which can be attributed to ethnic factors alone. Therefore, height and weight standards chosen to represent optimal preschool growth can be drawn from already published studies of well-to-do children. regardless of race or ethnicity (Habicht et al., 1974).

Cross-cultural study is interesting as a mean of comparing some aspects of environmental influence upon behaviour (Werner et al., 1971, Werner 1972). Traditionally reared rural infants accomplished motor milstones of development more rapidly than "westernized" urban infants in Africa. This persisted throughout the first year (Traditional refers to a relaxed and lesiurely attitude by parents with few expectations. Breast feeding on demand, nearly constant body contact with an adult caretaker, no toilet training, lack of clothing and membership in a large stable family are typical features). On the average, all native African children achieved motor milestones at an earlier age than Causcasian children. During the second year progress in language and adaptive behavior (Gesell and

Bayley items) were slower in the African children as compared to the Caucasian. Since weaning usually takes place for the black infants at about 12-18 months Werner (1972) attributed some of the relative decline to the onset of poor nutrition and infections, especially parasitic. In those cultures characterized by isolation of infants and absence of any type of stimulation, motor and language development were considerably delayed.

A.3.3 : Season :

Marshall et al., (1971) demonstrated seasonal variability in the pace of growth in England, the children growing faster from March through July than from September through February.

A.3.4 : Socioeconomic Condition :

Children from different socioeconomic levels differ in average body size at all ages, the upper socioeconomic groups being larger. The causes of socioeconomic differential may be difference in nutrition, the habits of regular meals, sleep ,

excercise and general organization, which from this point of view distinguish a good home from a bad one (Tanner, 1984).

In most studies socioeconomic status has been defined according to father's occupation e.g. babies with unempoyed fathers have mean birth weight 150 gm less than for babies whose fathers were employed (Cole et al., 1983). However, in recent years it is becoming clear that in many countries father's occupation does not distinguish people's living standard or style of living as well as formely (Tanner, 1984).

There are no effectof race or maternal educatimn one the development during infancy. By 3 years and beyond there is a systemic increase in performance as the mother education increases with white doing better than blacks at all maternal educational levels because equivalent educational level does not necessarily mean equivalent education (Kndoloch and Pasamanich, 1959 ; Drillien, 1959; 1961, Nelson and Deutschberger, 1970).

Children's growth was more advanced in families in which both parents worked and cognitive development were related to socioeconomic factors rather than maternal employement per se (Cherry and Eaton, 1977). There is a difference in height and weight in children according to the number of siblings, growth being slower the more siblings there are at home. This difference, unlike the socioeconomic status one, disappears when adulthood is reached (Tanner, 1984).

In a study of 184 American students from multiple child families, it was found that the larger and more closely spaced the family, the lower was the tested intelligence of the children (Dandes and Dow, 1969).

Television (T.V.) is a major source of information and influence for children's life. In recent years, T.V. is increasingly being perceived as having a negative impact on the mental and physical well being of children. The theoretical basis for concern about T.V. impact on children is social learning theory, which predicts that a child will learn and imitate behavior seen on T.V., even in the absence

of any obvious reinforcement. There is only an association rather than a causal relationship between T.V. viewing and children's behavior because of the difficult methodology of research (Zuckerman and Zuckerman, 1985).

T.V. viewing in childhood has minimal or no effect on day or evening sleep (Weissbluth et al., 1981). Higher scores on intelligence test were found to be associated with longer duration of evening sleep (Terman 1929).

Hollenbeck and Sloby (1979) found that 6 months old infants looked longer at T.V. during sound plus picture conditon than during the picture only and longer during patterned picture conditons than during condition that lack a patterned picture, infants vocalised more during the picture only condition than during the sound only condition.

A.3.5 : Nutrition :

During childhood, the rapid growth of organs and tissues implies higher storage and consumption rates for the different nutrients. The nutritional requirements vary with the rate of growth of different tissues in the body, with the sex and body build. In periods of rapid growth when the child is under metabolic stress, such as infancy and the prepuberal spurt, the probability of nutritional imbalance is great.

In the tropical and subtropical parts of the world, particularly in the poor and developing countries, the malnutrition syndromes of infancy and early childhood (protein calorie malnutrition, as kwashiorkor and marasmus) are considered as the major undermining factors which account for the high morbidity and mortality rates encountered there (Jelliffe, 1955). Caloric undernutrition in infancy is the most common type of growth deficiency (Smith, 1976).

In these poor areas of the world, the average curves for the gain in weight usually manifest a special

and common pattern which seems to be almost universal for countries with a traditional subsistence enconomy. Breast fed babies grow normally and satisfactorily for the first 6 months or so after birth. Between about 6 months and 2 years of age, when supplementation with predominantly carbohydrate semisolids is inadequate for nutritional requirements, their growth curve starts to lag behind the British and American ones. After about 2 years of age, the weight increments usually approaches again those of Western communities. If the degree of growth retardation has been mild and of ahort duration a growth "catch up" that usually corrects the early deficit occurs (Thomson, 1968). On the other hand, if the period of manutrition has been prolonged or if it starts at a very young age, the increments of growth will be low throughout the period of maximum growth resulting in "nutritional dwarfism". Such children are light in weight, short in stature, with relatively normal body proportions. The malnutrition will also delay puberty and skeletal maturation. However, in the recovery period after nutritional deprivation, growth in

height proceeds faster than ossification, this permits the attainment of a nearly normal adult height.

Malnutrition inflicts some damage on the developing brain. There is evidence that malnutrition in infancy has a harmful effect on subsequent mental development if the malnutrition is not corrected in early weeks of infancy (and Robels, 1965; Cravioto and and Delicardic, 1970). This damage involves the number and size of cells in the brain together with the lipid, nucleic acid, enzyme and protein content (Dobbig , 1970; Winich, 1972).

A.3.6 : Infections :

Minor and relatively short illness cause no discernible retardation of growth rate in most well nourished children while major and chronic dimeases may cause considerable slowing down of growth, followed by a catch up when the disease is cured. The mechanism of retardation probably varies from one disease to another. In some an increased secretion of cortisol may be the cause (Tanner,

1984).

Chronic infection with parasites in children is studied in relation to their growth by Abd El Aal et al. (1970) who revealed a considerable decrease in somatic growth and hemoglobin percentage, the decrement was more pronounced with multiple infestations.

However, Badran et al., (1967) compared the skel- et al development as measured by the weight, height, vertex to symphysis pubis, arm span and chest circumforence in a group of children infested with urinary bilharsiasis and another group with intestinal helminths (ascaris, oxyuria, hymenolepis nana and ankylostoma). They concluded that all these parasites have no significant effect on the skeletal and somatic development in children.

A.3.7 : Emotional Factor :

Emotional deprivation retards children physically and mentally. Children need love throughout their childhood and subsequently, but deprivation of love in their

first 3 years may have a profound effect. It retards both development and physical growth and may cause dwarfism with decreasd human growth hormone secretion from the pituitary (Silver and Finkelstein, 1967).

Children react differently to emotional deprivation like separation from a parent. Genetic and constitutional factors govern the child response to his environment. Other factors are the quality of the parent child relationship before the deprivation occurred, the age at which it occurred, the length of separation, the experiences during the period of separation, the completeness of the separation and the attitude of the parents when the child is returned to them.

The mode of action of emotional deprivation is uncertan. Some of the retardation can be explained by lack of opportunity the baby who is ready to sit or walk may miss the help which he needs. No one has time to talk to him much, to play with him and towards the end of the first year to read to him. So that the development of speech is delayed. When normally he would

acquire control of he bladder, no one gives him the opportunity to use a suitable receptacle, so that sphincter control is delayed (Illingworth, 1983).

A.3.8 : The effect of Drugs :

Numerous drugs a may affect mental development and behaviour (Illingworth, 1980). Drugs may affect powers of concentration and memory, cause aggressiveness, irritability, overactivity, speed of cerebration excitement insomnia, confusion, depression, drowsiness, tremors, atoxia, dysphagia, dysarthria, auditory and visual efects, convulsions and general mental deterioration. Examples of these drugs, antihistaminics, phenothiazines barbiturates, lead ... etc. A full history of all drugs taken is essential.

A.3.9 : Endocrine Factors (Smith, 1976) :

1. Testosterone and other Androgens :

Testosterone, the most potent of the androgens, allows for an increase in muscle cell number and size as well as for an increase in bone mass, with accelerated epiphyseal cartilagenous linear growth. Breadening of the shoulders also occurs. Androgens accelerate osseous maturation more rapidly than linear growth, and hence bring the individual more rapidly to the stage of final height attainment. Thus, though testosterone and other androgens have profound effects on growth, they do not appear to be growth hormones in the sense that they do not increase the ultimate stature of the individual.

2. Estrogens :

Estrogens accelerate the lateral growth of the pelvis and thereby widens the lips, at the same time accelerate the speed of osseous maturation without affecting linear growth as pofoundly as testonsterone. Thus, the female reaches final height attainment sooner than the male and has less adolescent growth spurt.

3. Pituitary Growth Hormone and Somatomedin :

Pituitary growth hormone has a primary action on cell metabolism and affects the utilization of amino acids glucose and free fatty acids. Its predominant effect on linear growth is exerted through the stimulation of somatomedin production, apparently from the liver. Somatomedin enhances the rate of mitosis in cartilage cells at the epiphyseal plate thereby affecting liner growth. This is accomplished without under acceleration of osseous maturation, hence, somatomedin may be cosidered as growth hormone.

4. Thyroid Hormone :

It is essential for normal energy metabolism to facilitate growth after birth. It should not be considered a growth hormone, since excess thyroid hormone results in only mild acceleration of linear growth with moderate accelaration of osseous maturation, both at the expense of a dangerous increase in metablic rate.

B. GROWTH

B.1 : NATURE AND PHENOMENA OF GROWTH

B.1.1 : Intrauterine Life :

After the embryonic period of major organogenesis, the fetus enters into a period of incremental linear growth (Scammon, 1930) which achieves the greatest velocity at mid-fetal life (Thomson, 1942). With the development of adipose tissue at about 7 months of gestation, there is an acceleration in weight gain, with the weight doubling during the last two months in utero. At this stage the fetus fills out the unterine cavity to the extent that the uterine size constraint becomes a factor in late fetal growth (Mckeown and Record, 1952, Tanner, 1964). This often mildly limit the growth rate during late fetal life, which tends to be compensated for in early postnatal period. The male fetus grows faster than the female, predominantly after 32 weeks gestation (Thomson et al., 1968).

B.1.2 : Infancy :

The faster late fetal growth rate of the male as

compared to that of the female in length, weight, and head growth continues for three to six months after birth. Thereafter, there is no sex difference in growth rate until the advent of adolescence. This early acceleration of male growth may be the consequence of testosterone, which is produced in levels up to 250 ng per 100 ml in the serum of the infant male in the first few postnatal months. Thereafter, the serum testosterone values are low in both sexes until adolescence (Forest, 1974).

At birth, the infant shifs from a growth rate that is predominantly determined by maternal factors to one that is increasingly related to his own genetic background, as reflected by midparental size.

Infants who are relatively small at birth but whose genetic backgrund indicates larger size begin their acceleration toward the new growth rate soon after birth and they have acheived a new channel of growth by 4 to 18 months, (Smith et al., 1976). Thus, newborns who are small for gestational age but have the genetic capacity

to catch up to the normal range generally show accelerated growth within the first six months after birth. In contrast, most small-for-date babies who do not show catch up growth during the first six months continue to grow at a slow rate into childhood and are generally destined to be of small stature (Fitzhardine and Steven, 1972). Those who are relatively large at birth but whose genetic background is for smaller size tend to maintain the prenatal growth rate for several months before beginning their deceleration into a lower growth channel which is usually achieved by 8 to 19 months of age (Smith et al., 1976).

During this period the infant is generally obese and by 1 year is more than 50 per cent longer than at birth and about three times as heavy. Toward the latter part of the first year, there is a gradual diminution in growth rate accompanied by a reduction in the degree of adiposity (Garn, 1962). By 18 months to 2 years, the older infant has achieved the consistent growth rate of childhood.

B.1.3. Childhood :

By the age of 18 months to 2 years the major shifts in infantile growth rate are over and the child grows at a fairly consistent rate of 5 to 7.5 cm yearly. As shown in figures (1) and (2), there is a gradual deceleration of linear growth rate and an acceleration of weight gain in the period between infancy and adolescence. The major period of brain growth is then over and lymphoid tissue has achieved its greatest size in proportion to the individual. Adiposity is relatively less in mid-childhood but often increases in the few years before adolescence.

B.1.4 : Adolescence :

At a given biologic age, which correlates roughly with the level of osseous maturation (bone age), the hypothalamic gonodotrophin releasing centers are no longer suppressed by the very small amounts of androgen or estrogen produced during childhood. The amount of gonadotrophin (especially luteinizing hormone) rises gradually over a period of years. This results in a slow

increase in the levels of sex hormones, which singals the start of adolescence. The acceleration of linear growth gradually increases, with a peak growth velocity about two to three years after the advant of adolescence.

The female matures more rapidly than the male throughout childhood and begins adolescence two years earlier, at the average age of 10 years. Adrenal androgen is responsible for some of the growth and sexual changes, however, ovarian estrogen produces the most dramatic effects. The early signs are estrinization of the vaginal mucosa, wiich become thicker and pale pink indcolor, and development of breasts, nipples and areolae. Pubic hair and subsequently axillary hair develop. Physically, the hips widen, and the body fat is maintained or enhanced. The peak height velocity occurs at an average age of 12.1 years, averaging about 9 cm per year (Marshall and Tanner, 1974). Menarche occurs at approximately 13 years, after which there may be continued slow growth up to the age of 17 years (Cumming et al., 1972).

The male rate of growth and maturation is less predictable. Thus, there is greater variability in the male age at which adolescence begins and in its progression. The onset is heralded by gonadatrophin induced enlargement of the testes at about 9 to 12 years. Testosterone allows for enlargement of the penis,skin changes such as acne, apocrine sweating and development of pubic, axillary and facial hair. Linear growth accelerates, with a peak average growth velocity of 10.3 cm at 14.1 years (Marshall and Tanner, 1974) shoulder breadth is increased and facil and bone structure enlarged The vocal cartilage expands and the voice deepens.

Most linear growth has been acheived by the age of 18 years, with a further growth of an average total of one cm taking place between 18 and 21 years (Roche and Davila, 1972). Cessation of linear growth occurs first in the distal parts (the hands and feet), then in the legs, the trunk and the shoulder girdle.

B.2. CHANGES IN BODY PROPORTION WITH GROWTH

B.2.1. Head to Body Proportion :

The change of this proportion is the consequence of the early growth of the brain, which has already reacwhed two thirds of the adult size by early childhood as compared to the prolonged growth period for most of the rest of the body. Thus, at two months of fetal life, the brain is 20 percent of the body weight, by birth it is 12 pereent, by 10 years 6 percent and by 16 years it is only 3 per cent (Jackson, 1909; Mohlman, 1972 and Tanner, 1964).

B.2.2. The Limbs, Upper Segment and Lower Segment:

The limbs grow faster than the trunk from early fetal life until at least mid-adolescence. Thus, measured from the upper level of the pubic ramus to the medial base of the heel, the ratio of the upper to the lower segment is 1.7 at birth, 1.0 at 10 years and 0.9 in adolescent boys of 14 years. Thereafter, the long

bones ossify and stop growing owing to the effect of sex hormones, but the continued growth of the trunk results in an adult ratio of 1.0 (Prader, 1974).

The hips increase in breadth in the female owing to the effects of oestrogen, and the male testesterone causes the shoulder to increase in breadth and the bones to become broder (Smith, 1976). Growth occurs earlier in the distal part of the leg than in the proximal segment (Blais et al., 1956). The foot is half its adult size by 1½ years, whereas the femur does not acheive half its adult size until 4 years. Accelerated growth of the feet is one of the earliest and most sensitive indicators of the advent of adolescence and it usually precedes and predicts the adolescence growth spart. The feet achieve their final size one to two years before the remaining leg bones have stopped growing. Thus, the feet mature more rapidly than the long bones of the leg (Smith, 1976) and called by Tanner (1984) (growth maturation gradient).

B.3. GROWTH CURVES OF DIFFERENT BODY SYSTEMS

Various growth patterns are exhibited by various systems and the rate of growth of the different organs varies at different age periods. There are periods of acceleration and other periods of deceleration.

The fetal period is characterised by a rapid rate of growth. After birth and pargicularly after the first year, growth of the body as a whole enters a period of deceleration the rate of which decline further from the fourth year until adolescence. At puberty another period of acceleration takes place. By the end of adolescence the growth process ceases and the child has metamorphosed into a sexually mature adult (El-Abbassy et al., 1972).

These cycles constitutes the general growth characteristic of external dimensions, body weght, and the weight of the organs of digestion, respiration, circulation and excretion. Other systems and organs of the body

grow quiet differently. Neural growth is observed in the central nervous system and its integuments in the eye and auditory apparatus in a different pattern. It is rapid at first and undergoes a steady decline until it ceases sometimes after puberty. The reproductive organs internal and external, have a slow prepubesent growth, followed by a very large adolescent spurt. The lymphatic system reaches its maximum amount before adolescence and then, probably under the direct influence of sex hormones, declines to its adult value (Harris et al., 1930). Fig. (3).

Adipose tissue, desite wide individual variations, tends to follow a certain growth pattern. It is laid down in the second half of the gestational period, adiposity then increases after birth and with the advent of alking , the reserves of fat tend to decrease. Slenderness is the characteristic feature of many children during middle years of childhood. At puberty the adult contours are achieved in the male by an increase in muscle mass, whereas in the female,there is greater increase in subcutaneous fat, together with changes in the skeleton.

B.4. THE PHENOMENON OF CATCH UP GROWTH

Correction of the cause of a growth defeciency may be followed by catch up growth toward the size that would have been attained if the lag had not occured (Prader et al., 1963). The capacity for catch up growth after a period of induced growth defeciency seems to be limited during early fetal life.

Thus, it has been suggested that there may be a critical period during which the number of cells sets the stage for future growth. Growth defeciency prior to that time permanently affects the cell number and the ultimate size of the individual. At a later stage, however, when the control system has been set at a higher level, the same deficiency would be followed bynearly complete restitution of the cell number and ths size of the individual.

The velocity during a period of catch up may reach three or more times the average velocity for the chronological age. Catch up is said to be complete if it results in the achievement of full genetic potential

for size. Complete catch up may be achieved either by a rapid increase of velocity to supranormal levels, as described, or by a normal-for-age velocity but with growth prolonged beyond the usual time (catch up with delay). Often the two forms are combined (Tanner, 1984).

B.5. GROWTH ASSESSMENT

B.5.1 : Standards for Physical Measures :

Smith (1976) has recommended the following as regad to growth standards :

1. The standards utilized should not be those reflecting growth limiting environmental factors. One of the major purposes of following growth is to detect evidence of growth limiting factors for an individual. Hence, the standards should be from well nourished, healthy, well-cared-for children.

2. They should be accurately obtained from a sufficient number of indivuduals to allow for acceptable standard deviations.

3. The standards used for plotting a given child's growth data should be for the same ethnie background as the parents and should hopefully relate to the size of the parents themselves.

4. The data should be from the recent era, owing to the major shift in maturational rate and the minor shift in size that have occurred during he last 100 years.

5. Gestational age must be calculated from the presumed data of conception, two weeks after the begining of the last menstrual period. This more accurately reflects the true age of the newborn baby.

B.5.2 : Methods of Growth Assessmen :

Growth a may be assessed at one point in time and compared to standards for that age. It may also be evaluated over a period of time as the rate per unit time, or velocity of growth. The measurement should be obtained accurately. Two observers should differ by no more than 4 mm on 95 % of occasions. Untrained personnel who fail to position the child properly may quite well differ by 1.5 cm in their measurements (Tanner, 1984).

B.5.2.a. Standard Physical Measurements:

Length :

It is usually recorded frm birth till the age of 2 years with the infant in the supine position (Smith, 1976).

Height :

From the age of 2 years onwards, standing height is used. It tends to be slightly shorter than length (Tanner, 1984).

Weight :

It is easier to measure than stature but less useful for growth studies since it consists of a conglomerate of all the tissues. Failure to gain weight, or actual loss of weight in an older child, could signify merely better attention to diet and excerise whereas failure to gain height would call for immediate investigation.

Head Circumference :

It should be remembered that 1 mm of scalp hair thickness will increase the total circumference by about 6 mm. The most critical period for following head growth is during the first two years, scalp hair thickness is less a problem during this period (Smith, 1976).

The head circumference was found to be highly correlated with the body weight as well as with chest circum-

ference (Illingworth and Lutz, 1965, Illingworth and Eid, 1971).

The significance of single head measuement may be difficult to interpret. Far more important are serial measurements on a centile chart, compared with serial measurements of weight on the weight chart (Illingworth, 1983).

B.5.2.b : Occasionally Used Physical Measurements:

Most of them are obtained only when there is a more specific indication, such as a suspectd malproportionment in growth.

1. The Upper to Lower Segment Ratio :

It is obtained by measuring from the upper level of the pubic bone to the floor with the individual in the standing position, this value is substracted from the height to obtain the upper segment value. The ratio is the calculated. This technique is used by endocrinologists. It is a difficult measurement to obtain accurately, the technique may be cumbersome and embarrassing.

No adequate standards outlining a full range of normality exist (Smith, 1976).

ii. Sitting Height :

It is taken from the age of 2 years onwards.

iii. Crown-rump length :

It is measured instead of sitting height in children under 2 years.

iv. Skinfold (Subcutaneous adipose thickness) :

Subcutaneous fat is measured by the skin fold technique. The most reliable sites are over the triceps, under the acapula and above the anterior superior iliac spine. Following a long established anthropological convention, the left side of the body is used for all one sided measurements. The error between observers is greater for this measurement than for the other body measurements (Tanner, 1984). The skinfold in measured with a special insturment which provide a standard pressure. The normal standards form a skewed distribution hence the standards have been plotted following their logarithmic transformation.

v. Chest Circumference :

The main practical use of this measurement is in the second and third year of life. This is because the circumferene of the head and chest are about the same at six months of age. After this, the skull grows slowly and the chest more rapidly. Therefore, between the age of sis months and five years a chest head circumferences rtio of less than one may be due to failure to develop or to wasting of the muscles and fat of the chest wall and can be used as an indicator of malnutrition of early childhood (Dean, 1965).

vi. Midarm Circumference :

The upper arm circumference is a measure of fat and muscle mass of the arm. The upper arm circumference when corrected fər skinfold thickness in that area will be a measure of the muscle mass (and bone) which is a better measure of nutritional status in deprived communities (Khashaba and Abul-Fadl, 1986). It was found that the midarm circumference does not change from age of 1-5 years. During this age a measure more than 13.5 cm is considered as normal while 12.5-13.5 cm indicates early

malnutrition. A measure less than 12.5 cm denotes severe malnutrition (Shakir and Morley, 1974).

vii. Foot Length :

Mathur and his associates (1984) has introduced foot length as a newer approach in menoatal anthropomety. They found that the foot length had statistically significant correlation with crown to heel length and birth weight in three groups of newborn studied. They concluded that the body surface area for estimating drug dose can be easily calculated from weight and length derived from foot length by regression equatinn.

b.5.2.c :Assessment And Interpretation of Osseous Maturation:

This is done by measuring the size of fontanels provided that there is no hydrocephalus. Also, facial bone maturation may also be used as a crude index of osseous maturation but no measuring atandards exist,therefore, this assessment is presently one of clinical impression.

Osseous maturation in long bones (bone age), is the most commonly used index of biologic age. This assessment is made from reontgenograms of the relative level

of assification of secondary centers of ossification of the changes in bony from and of the final ossification of epiphyseal growth centers. The range of variability is broad in the normal individual (Smith, 1976).

Table 1 TIME OF APPEARANCE IN ROENTGENOGRAMS OF CENTERS OF OSSIFICATION IN INFANCY AND CHILDHOOD

Boys—Age at Appearance *Mean ± Std. Deviation**	Bones and Epiphyseal Centers	Girls—Age at Appearance *Mean ± Std. Deviation**
3 wk	*Humerus*, head	3 wk
	Carpal bones	
2 mo ± 2 mo	Capitate	2 mo ± 2 mo
3 mo ± 2 mo	Hamate	2 mo ± 2 mo
(30 mo ± 16 mo)	(Triangular)†	(21 mo ± 14 mo)
(42 mo ± 19 mo)	(Lunate)†	(34 mo ± 13 mo)
(67 mo ± 19 mo)	(Trapezium)†	(47 mo ± 14 mo)
(69 mo ± 15 mo)	(Trapezoid)†	(49 mo ± 12 mo)
(68 mo ± 15 mo)	(Scaphoid)†	(51 mo ± 12 mo)
(no standards available)	(Pisiform)†	(no standards available)
	Metacarpal bones	
18 mo ± 5 mo	II	12 mo ± 3 mo
20 mo ± 5 mo	III	13 mo ± 3 mo
23 mo ± 6 mo	IV	15 mo ± 4 mo
26 mo ± 7 mo	V	16 mo ± 5 mo
32 mo ± 9 mo	I	18 mo ± 5 mo
	Fingers (epiphyses)	
16 mo ± 4 mo	Proximal phalanx, 3rd finger	10 mo ± 3 mo
16 mo ± 4 mo	Proximal phalanx, 2nd finger	11 mo ± 3 mo
17 mo ± 5 mo	Proximal phalanx, 4th finger	11 mo ± 3 mo
19 mo ± 7 mo	Distal phalanx, 1st finger	12 mo ± 4 mo
21 mo ± 5 mo	Proximal phalanx, 5th finger	14 mo ± 4 mo
24 mo ± 6 mo	Middle phalanx, 3rd finger	15 mo ± 5 mo
24 mo ± 6 mo	Middle phalanx, 4th finger	15 mo ± 5 mo
26 mo ± 6 mo	Middle phalanx, 2nd finger	16 mo ± 5 mo
26 mo ± 6 mo	Distal phalanx, 3rd finger	18 mo ± 4 mo
28 mo ± 6 mo	Distal phalanx, 4th finger	18 mo ± 5 mo
32 mo ± 7 mo	Proximal phalanx, 1st finger	20 mo ± 5 mo
37 mo ± 9 mo	Distal phalanx, 5th finger	23 mo ± 6 mo
37 mo ± 8 mo	Distal phalanx, 2nd finger	23 mo ± 6 mo
39 mo ± 10 mo	Middle phalanx, 5th finger	22 mo ± 7 mo
152 mo ± 18 mo	Sesamoid (adductor pollicis)	121 mo ± 13 mo
	Hip and knee	
Usually present at birth	Femur, distal	Usually present at birth
Usually present at birth	Tibia, proximal	Usually present at birth
4 mo ± 2 mo	Femur, head	4 mo ± 2 mo
46 mo ± 11 mo	Patella	29 mo ± 7 mo
	Foot and ankle‡	

*To nearest month.
†Except for the capitate and hamate bones, the variability of carpal centers is too great to make them very useful clinically.
‡Standards for the foot are available, but normal variation is wide, including some familial variants, so that this area is of little clinical use

From (Nelson et al., 1983) .

B.5.3. Types of Growth Data :

B.5.3.a : Longitudinal Study :

It is the case when the same child at each age is used. It is laborious and tie connsuming. They demand great preservance on the part of those who make the and those who take part in them, also they demand very high technical standards, since in the calculation of a growth increment from one occasion to the next two errors of measurement occur. Its main advantage being that it is the base on which the diagnosis and treatment of growth disorder rests (Tanner, 1984).

B.5.3.b. : Cross-sectional Study :

It is the case when different children at each age are used. Cross-sectional surveys are cheaper and more quickly done and can include much larger numbers of children. They are the basis for constructing standards for height and weight and other measurements in a given community. Periodic cross-sectional surveys are valuable in assessing the nuritional progress of a country or a socioeconomic group and the health of the child population

as a whole. Its drawback being that they can never reveal individual differences in rate of grwoth or in the timing of particular phases such as adolescent growth spurt.

B.5.3.c : Mixed Longitudinal Study :

It is a longitudinal study in which some children leave and the others join it. It is usually the case. Special statistical techniques are needed to get the maximum information out of such data.

MATERIAL & METHODS

MATERIAL AND METHODS

Aatratified random sample of 240 pupils from El-Magrin and Ibnelwalid primary school of Dakahelia governorate.

This sample was divided as follow :

I - Rural pupils.

II - Urban pupils.

120 rural pupils half of them urere males and the other females. Their ages ranged from 10 to 12 years.

120 urban pupils half of them were males and the other females. Their aged ranged from 10 to 12 years.

The following procedures were carried out for every child.

1) Personal data :

- name.
- Age.
- Sex.

School form

Adress and district.

2) Socio-economic format.

- Education of mother.
- Occupation and education of father.

3) Family size.

4) Family income.

5) Clinical Examination.

Accurate and complete clinical examination was done for every child including :

1) General examination.

2) Heart examination.

3) Chest examination.

4) Abdomen examination.

Pupils having skeletal deformities or abnormal physical growth and chronich heart or chest disease were excluded as these may affect the results of our work.

6) Anthropometric measurments

including
- Height
- Weight.
- Head circumference.

Height :

Measured by using agraduate wooden measurer with a fixed transverse perpindicular piece on which the child stand, and another movable one touching the

crown the child was asked to stand straight, so his heels, scapulae and buttoks were in contact with the wooden vertical stand of the measuer. The child head was positioned so that the lower borders of the orbits were in the same horizontal plane as the external auditory meati (Frankfurtplane) and genitle upward pressuer was exerted on the mastoid processes (Jelliffe, 1966) and Marshall (1977) . The standing height was recroded to the nearest half centimeter.

Weight :

Weight was measured with minimum clothing without shoes to the nearest half kilogram by the use of the sping type balamce (Jelliffe, 1966).

INTELLIGENCE :

Each child correct the preparative intelligence test which was designed by Ahamed Z. Saleh on 1978, and from his score in that test (by using special table) we determined his mental age. Byknowing choronological age of the child we determined his I.Q.

$$I.Q. = \frac{\text{Mental age}}{\text{chronological age}} \times 100$$

Preparative intelligence test is a type of non verbal test applied to children from 8 - 17 years. It is a standardized Egyptian test that compose of 60 items. These items include picture each group contain five forms and one of them differ from the others 10 minutes was allowed for test.

SCHOOL ACHIEVEMENT :

The mean of each child in the monthly examination of year, 1988 and his mean in monthly examination one year before 1987, were used as an indecator for the student level of achievement.

STATISTICAL ANALYSIS

Statistical analysis of the results was carried out according to the following formulae (Yamane, 1969).

1) Mean value $\bar{X}$ = The sum of all observations divided by the number of observations

$$\bar{X} = \frac{x}{n}$$

Where X = sum of observations

n = number of observations.

2) Standard deviation (S.D.) :

$$S.D = \sqrt{\frac{(X - \bar{X})^2}{n - 1}}$$

where $(X - \bar{X})^2$ = the sum of squares of the difference between each observation (X) and the mean value of all observations($\bar{X}$)

3) To test the significance of difference between two means the following formula was used

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(S.D_1)^2}{n_1} + \frac{(S.D_2)^2}{n_2}}}$$

Where :

$\bar{X}_1$ = the mean value in sample (1) (before)

$\bar{X}_2$ = the mean value in sample (2) (After)

n_1 = the number of cases in sample (1)

n_2 = the number of cases in sample (2)

$S.D_1$ = the standard deviation in sample (1)

$S.D_2$ = the standard deviation in sample (2)

The probability (P) for this calculated value of (t) with degree of freedom = $(n_1 + n_2 - 2)$ was obtained from statistical tables. The lowest level of significance accepted for (P) 0.05.

4) Correlation coefficient between eductional and physical growth the used equation for computing the correlation coefficient is the following equation :

$$r = \frac{\Sigma X Y}{\sqrt{\Sigma X^2 \Sigma Y^2}}$$

RESULTS

&

DISCUSSION

RESULTS

Table 1 : Descriptive statistics of all studied parameters all children.

Table 1 a, 1-b, 1-c : Descriptive statistics of all studied parameters of seprate class 4th, 5th, 6th in Rural urban school.

The studied parameters are the child age (in years), father age in (years), mother age (in years), no of living and dead sons and sisters, weight in Kgm, height in cm. head circumference in (cm) , lang a age and arithmetic marks.

Table 2 : Descriptive statistics of studied growth parameters males and females.

Table 3 : Descriptive statistics of studied growth. parameters in Rural and urban.

Table 4 : Showing T test of growth and marks of Rural and urban.

Table 5 : Showing T test of growth and marks of seperate classes.

Table 6 : Showing T test of growth and marks of males and females in Rural and Urban school.

Table 1 : Descriptive statistics of all studied parameters (all children).

Variable	Mean	S.D.
Father's age (in years)	34.50	4.68
Mother's age (in years)	28.48	3.91
Child's age (in years)	11	0.81
No.of living brothers	1.81	0.76
No.of dead brothers	0	0
No of living sisters	1.75	0.73
No of dead sisters	0	0
Weight in Kg.	34.73	4.98
Height in Cm	143.47	8.74
Head circum ferance in Cm	53.83	1.53
Language mark	72.73	14.62
Arithmetic mark	73.63	15.63

S.D. = Standard deviation.

Table 1-a : Descriptive statistics of all studied parameters 4 th classes.

Variable	Rural		Urban	
	Mean	S.D	Mean	S.D.
Father's age	29.75	1.77	37.15	3.37
Mother's age	24.35	0.97	30.55	
Child's age	10	0	10	0
No.of living brothers	1.95	0.81	1.50	0.59
No.of dead brothers	0	0	0	0
No.of living sisters	1.95	0.74	1.55	0.67
No.of dead sisters	0	0	0	0
Weight in Kg.	31.07	3.21	32.05	4.19
Weight in Cm	135.12	8.28	138.30	8.19
Language mark	59.57	8.67	83.35	8.58
Arithmetic mark	59.40	8.29	84.62	8.55
Head circumference in Cm	53.72	1.46	53.45	1.56

Table 1-b : Descriptive statistics of all studied parameters 5 th classes.

Variable	Rural		Urban	
	Mean	S.D.	Mean	S.D.
Fathers age	30.60	2.06	39	1.72
Mother's age	25.35	0.97	32.50	2.80
Child's age	11	0	11	0
No.of living brothers	2.02	0.80	1.72	0.67
No.of dead brothers	0	0	0	0
No.of living sisters	2.05	0.63	1.45	0.67
No.of dead sisters	0	0	0	0
Weight in Kg.	33.75	5.13	34.90	0.41
Height in Cm	142.92	6.30	144.97	7.06
Head circumference in Cm	54.32	1.68	54.42	1.56
Language mark	60.12	8.38	86.67	6.08
Arithmetic mark	61.32	8.86	87.72	6.05

Table 1-c : Descriptive statistics of all studied parameters 6 th classes.

Variable	Rural		Urban	
	Mean	S.D	Mean	S.D
Father's age	31.05	1.98	39.50	1.98
Mother's age	25.77	1.09	32.37	2.77
Child's age	12	0	12	0
No.of living brothers	1.95	0.81	1.72	0.75
No.of dead brothers	0	0	0	0
No.of living sisters	2.05	0.67	1.50	0.71
No.of dead sisters	0	0	0	0
Weight in Kg.	37.87	2.98	38.75	3.33
Height in Cm	148.47	5.51	151.05	5.20
Head circumference in Cm	53.65	1.31	53.45	1.39
Language mark	61.87	8.70	84.80	7.28
Arith metic mark	62.65	7.43	87.40	7.04

Table 2 : Showing mean and S.D. of Height, weight language and arithmetic of males and females.

Variable	Female		Male	
	Mean	S.D.	Mean	S.D.
Weight in Kgm	33.14	4.21	36.27	5.23
Height in Cm	141.60	7.22	145.33	9.72
Language mark	73.08	14.60	72.82	15.30
Arith metic mark	74.45	15.30	73.25	14.63

Table 3 : Showing mean and S.D. of weight, Height language and arith metic of Rural and urban.

Variable	Rural		Urban	
	Mean	S.D	Mean	S.D.
Weight in Kgm.	34.23	4.77	35.23	5.16
Height in Cm	142.17	8.70	144.77	8.63
Language mark	60.52	8.57	84.94	7.45
Arith metic mark	61.10	8.23	86.58	7.36

Table 4 : Showing T test of growth and marks of Rural and Urban.

Variable	T	P
Weight	1.58	0.10
Hight	2.34	0.02
Language mark	22.82	0.001
Arith metic mark	25.37	0.001

Table 5 : Showing T test of growth and langauge arith metic marks of seperate classes of Rural and Urban.

Class	Variable	T	P
4th class	Weight in Kg	1.19	0.10
	Height in Cm	3.18	0.10
	Language mark	12.43	0.001
	Arithmatic mark	13.48	0.001
5th class	Weight in Kg.	0.98	
	Height in Cm	1.37	0.10
	Language mark	16.28	0.001
	Arithmetic mark	15.62	0.001
6th class	Weight in Kg.	1.25	0.10
	Height in Cm	2.16	0.05
	Language mark	12.81	0.001
	Arithmetic mark	15.37	0.001

Table 6 : Showing T test of growth and marks of language and arithmetic of males and females in Rural and Urban school.

Variable	T	P
Weight	5.21	0.001
Hight	3.39	0.001
Language mark	0.13	0
Arithmatic	0.62	0

DISCUSSION

Results obtained in this work, show that in general urban children are more privileged than their rural peers. Table (4) show that urban children have gained higher marks in arith metic and Arabic language and better teacher's opinion than rural children (P 0.00). Table (5) show that there is no significant difference between marks of the 5th class examination of urban versus rural children. This probably because these are local examination and are considered unimportant from the administrative point of view. Regarding marks of the general exams of 4th and 6th classes. Table (5), there's a highly significant increase of marks of the pupils of the urban classes (P 0.00). This may be explained on the basis of more paying of urban pupils to teachers for private tutoring. Besides, more firm supervision of the local eductional authorities in cities necessitates better examination results, probably for governmental causes. In the field of his study, it was found that the 4 th rural class had no regular teacher. This also may add to the cause of lower marks gained by the pupils of that class.

Class 5 urban pupils gained higher marks than their rural peers Table (5) P 0.00. This may be explained by the fact that rural teachers try to make the pupils level more apparent for their parenents in the year prior to the most important one (6 year), probably for persuading them for future private tuotoring. Also, we found that many of the school books did not reach to the pupils except late, if at all in the rural school and this may add for the pupil, lower level.

Again the higher level of urban children may be attributed to their better socio-economic and environmental conditions, beside their better general health.

Height is the most useful linear measurments. It is basically aguage of past nutrition. The like lihood that malnutrition in early childhood may cause permanent stunting is extremely probable inless full rehabilitation can be achieved and maintained through the remainder of growth (Jelliffe and Jelliffe, 1979).

The child's weight is easiest growth parameters to measure, as well as giving the best overall index of

body mass (Jelliffe and Jelliffe, 1979).
Table (4) show that although rural children are shorter than their urban peers (P 0.02), both rural and urban children are of the same weight range (P 0.10)

Eid et al. (1981) found that urban children below 5 years were taller and heavier than their rural peers. They related that finding to better education of urban mothers and their exposure to mass media promoting health consciousness. So, they have acquired better understanding of the supplementation of breast feeding and of the essential food groups that determine the growth of childten after weaning. In addition the prevalence of diarrhea was significantly higher in rural areas than in urban areas. Children who Seldom suffered from diarrhoeahad Substantially larger increments of high and weight than children who had diarrhoea more frequently. Mal nutrition and inferior medical care can aggravate the harm done by diarrhoea.

In all anthropometric measurments, boys are more affected by socio-economic conditions than girls, this may be due to that female, who have two big (X) chromosomes are more buffered against adverse social conditions

than male who have only one (X) chromosomes and small (Y) one.

There are significant difference between various physical measurments of two groups forboth sexes of the two classes there are gradual steady increase in the mean value of heigh by the increase of age. This pattern was also found by Sinclair (1975) and Tanner (1978) for each of the two classes the mean height of boys exceeds that girls of the same age. Tanner (1978) give the same difference between boys and girls if the same age.

Both boys and girls of the upper socio-economic class are taller than those of lower one at all age group. Tanner also found that children if high standard of living were taller than those of low standard.

For both sexes of the two classes there are gradual steady increase in the mean values of weight by the increase of the age. This pattern was also found by Tanner (1978).

Mean weight if boys exceeds that of girls of the same age (Tanner 1978) boys and girls of the upper class heavies than of lower social class.

RECOMMENDATIONS

So, we recommend improving socio-economic and environmental rural status. This can be achieved by improving rural health unit services in the field of prophylaxis and heatment of infectious disease especially parasitic infestations.
Also, management of mal nutrition and anemia is of utmost importance.

Rural schools should be firmly supervised by the educational authorities to attain an advanced level of rural pupils.

Lastly, we recommend further investigations in that new field for the welfare of our country.

Study of the nutritional status of children in both areas.

Study of the school environments.

Study of the psychological factors affecting school performance.

Detection of handicaped pupils and proper mangement.

SUMMARY & CONCLUSION

SUMMARY AND CONCLUSION

It is taken for granted that socio-economic and environmental conditions have their obvious effect on children's school achievement . We attempted to study these factors by doing a questionnaire about the parents occupation child's order among his sibs, number of other families and children inhabiting the same house of the child, number of sleeping rooms and presence of T.V.Sets. Results related to rural and urban children were compared. Urban children were more privileged than their rural peers Rural houses are occupied by more families and more children, less sleeping rooms and less T.V. Sets .

Growth is defined as a continous increase in the total mass of an orgainsm resulting from an increase in the total number of cells and in the size of the individual cell, and reflected by gain in weight and enlargment of linear dimension .

In this work a random sample of 240 students aged from 10 to 12 years, half of them were Rural and other half were Urban had been shosen. The sample is hemogenous as regard age and Sex. For each child we determined his level of achievement and growth and performed medicalexamination .

Our results addsupport to the previous research. The results of this study indicate that there is a difference in both physical growth and scholastic achievement between rural and urban .

Comparing the academic level of the urban Versus rural children through the teacher's opinion, and studying the school reports containing arithmetic and Arabic marks, we found that urban children are more advanced than their ruralpeers. They have more marks and better teacher's opinion . This is more apparent in 4th and 6 th classes where general examinations are held. This is not apparent inother years. Rural teachers gave more true assessment for the level of their pupils in the 5 th class .

Also , it was found in this research that there are significant difference between various physical-measurments of rural and urban. Both Boys and girls of the Urban are taller and heavier than of the rural.

It is concluded that advanced level of the urban children may be related to the better socio-economic status and to good general health .

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ARABIC SUMMARY

الملخص العربي

النموالجسمى لأطفال المرحلة الابتدائية وعلاقته بمستويات تحصيلهم الدراسى .

يشتمل هذا البحث على عدد من العوامل تؤثر على التحصيل الدراسى والنموالجسمى مع توضيح العلاقة بينهما وكما أظهر عدد من الباحثين أمثال ريكموند ولزر ١٩٧٣ - وهارتزل ١٩٨٤ أثر الظروف الاقتصادية والاجتماعية على التحصيل الدراسى نجد أن عدد آخر من الباحثين عكاشة ١٩٨٥ قد أظهر دور العوامل السيكولوجية وأثرها على التحصيل الدراسى وقد أظهر عدد آخر من الباحثين عن دور التغذية أمثال ايفنز ١٩٨٠ وكرافينو ١٩٦٦ وكما أظهر الباحث جولد زين ١٩٨٤ عن أثر الامراض المزمنة والاصابة بالامراض المتوطنة على التحصيل الدراسى وقد أظهر بعض الباحثين أمثال تنر ١٩٨٤ وليفين ١٩٨٣ عن دور النمو فى التحصيل الدراسى .

وقد اشتمل هذا البحث على عينة عشوائية ٢٤٠ تلميذا نصفهم من تلاميذ احدى مدارس الريف والنصف الآخر من الحضر تتراوح اعمارهم من سن ١٠ الى ١٢ سنة وقد تم توزيع العينة بالتساوى من حيث النوع والسن وقد تم عمل اختبار الذكاء لكل تلميذ باستخدام اختبار الذكاء المصور للدكتور أحمد زكى صالح وهو اختبار مكون من ستون سؤال كل سؤال يحتوى على خمس أشكال أربعة منها متشابهة والشكل الخامس مختلف والمطلوب معرفة الشكل المختلف وزمن الاجابة عشرة دقائق وباستخدام الجدول ثم قياس ذكاء كل تلميذ تثبت معامل الذكاء وقد تم استيفاء الاستمارات الاجتماعية والاقتصادية ثم سجلت الأطوال والأوزان ومحيطات الرأس ودرجات التلاميذ وقد جمعت البيانات وتم معالجتها احصائيا وتوضح النتائج مايلى :

١- توجد اختلافات دلالية واضحة بين القياسات الجسمية المختلفة لصالح الطبقات فى الحضر عن الريف ويمكن أن يعزى هذا الى اسلوب معيشة الأسرة ومعتقداتها الثقافية وعاداتها الغذائية كما يمكن أن يعزى ذلك الى نسبة انتشار المرض والعناية الطبية ثم اتجاهات الأسرة نحو الطفل فى كل من الريف والحضر .

٢ ـ أطفال الحضر أكثر تحصيلا من أطفال الريف ويرجع هذا الى الناحية الاقتصادية والعناية الطبية والاهتمام من ناحية الوالدين ٠

٣ـ يتأثر الأولاد بالظروف الاجتماعية والاقتصادية فى بعض القياسات الجسمية أكثر تأثيرا من البنات بتلك الظروف ٠ وقد يعزى هذا الى أن البنات يحملن زوجا كبيرا من الكروموسومات (xx) يكن أكثر تحملن للظروف البيئية السيئة من الاولاد الذين يحملون كروموسوما كبيرا واحدا (x) والآخر (لا) ٠

التوصيات والأبحاث المستقبلية

يوصى الباحث بتحسين الظروف الاقتصادية والاجتماعية فى الريف ويأتى هذا بتقديم خدمات صحية مع مقاومة وعلاج الأمراض المتوطنة وسوء التغذية مع الاشراف على المدارس فى الريف .

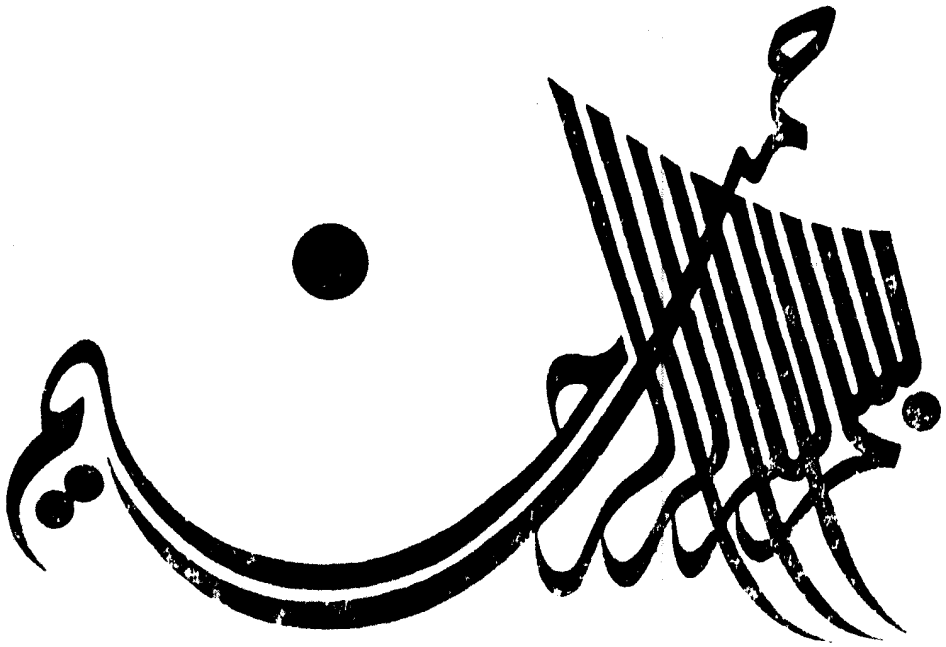
كما يوصى الباحث ببعض الأبحاث المستقبلية

١- دراسة عن التغذية بين الأطفال فى الريف والحضر

٢- دراسة البيئة المدرسية .

٣- دراسة عن العوامل السيكولوجية التى تؤثر على التحصيل الدراسى .

٤- اكتشاف التلاميذ المعوقين وعلاجهم .



سبحانك لا علم لنا إلا ما علمتنا
إنك أنت العليم الحكيم

صدق الله العظيم
(٣٢ البقرة)

جامعة عين شمس
معهد الدراسات العليا للطفولة
قسم الدراسات الطبية

النمو الجسمى لأطفال المرحلة الإبتدائية وعلاقته بمستويات تحصيلهم الدراسى

رسالة مقدمة

من

الطبيب / سمير حسن العوضى
بكالوريوس طب وجراحة

توطئة للحصول على درجة الماچستير

تحت إشراف

الأستاذ الدكتور
ضيائى محمد حسين
أستاذ طب الأطفال
الأكاديمية العسكرية

الأستاذ الدكتور
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جامعة عين شمس

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