GROWTH AND MATURATION OF CHILDREN WITH INSULIN-DEPENDENT DIABETES MELLITUS

Thesis

Submitted for the partial fulfilment

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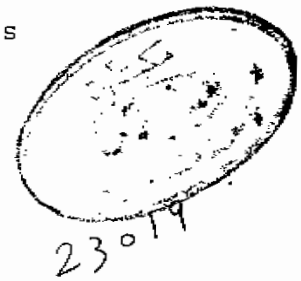

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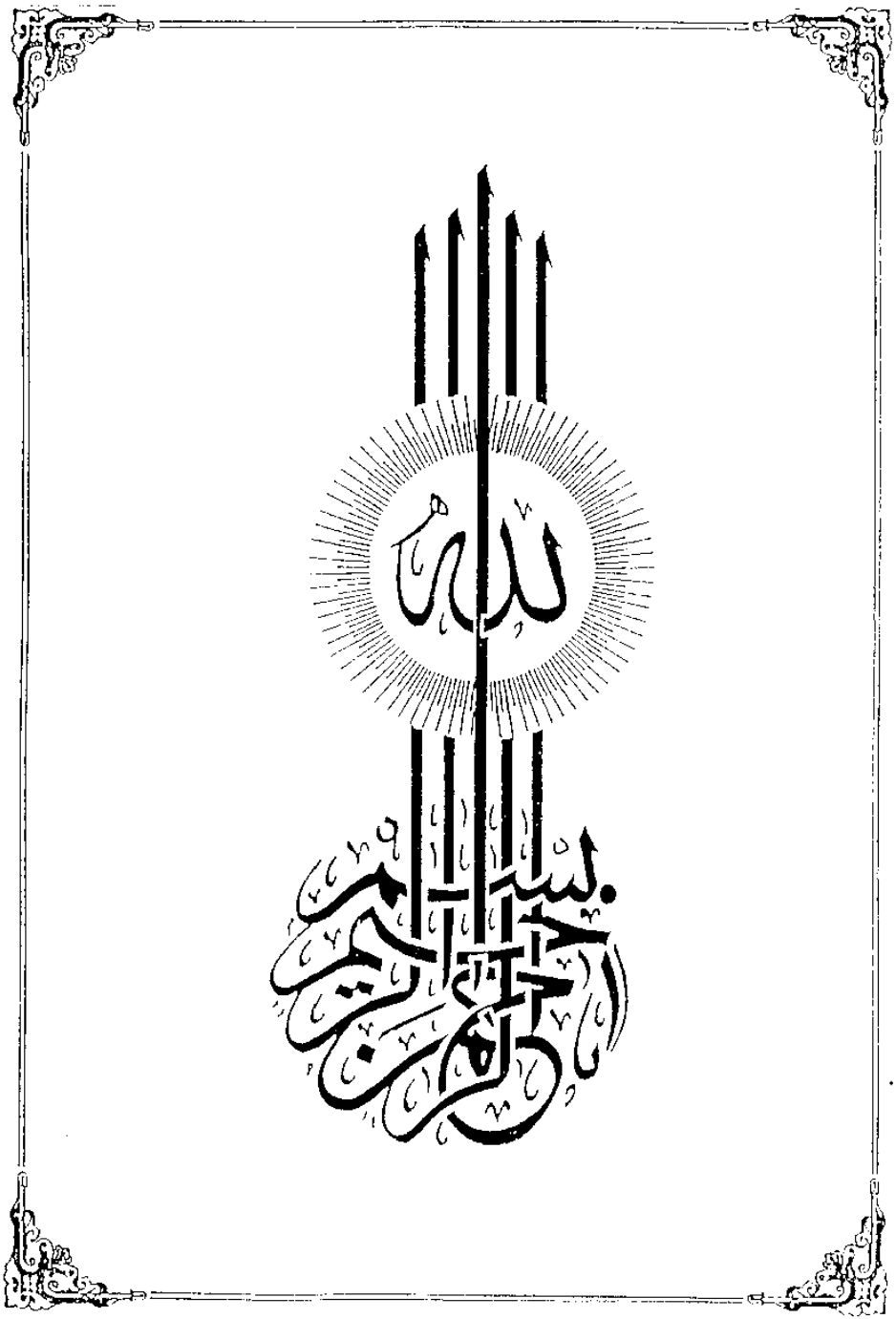

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Introduction & Aim Of The Work

INTRODUCTION AND AIM OF THE WORK

Growth is a manifestation of life in the young, and its rate and quality are related closely to the general health and nutrition of the child. Most studies published since 1930, indicate that retardation of growth and maturation continues to be relatively frequent in children with insulin-dependent diabetes mellitus (Jackson, 1984). It seems that the growth of the young diabetics who are well controlled since the beginning of their disease is identical to normal children. However onset of puberty seems to be retared by one year in the diabetic patient (Job and Pierson, 1981). With this idea in mind our work will be conducted to assess the growth and maturation in Insulin-dependent diabetics.

Review Of Literature

Part I : Growth and development

1- Growth and development

2- Factors affecting growth and development

3- Puberty

Growth and Development

The term growth and development in humans generally refers to the process by which the fertilized ovum attains adult status. Growth implies changes in size or in the values given by certain measurements of maturity. Development may encompass other aspects of differentiation of form or function including those emotional or social changes pre-eminently shaped by interaction with environment (Vaughan, 1983) .

Growth periods:

Patterns of growth vary somewhat from one species to another. In humans, there are 2 periods of rapid growth (Figure,1). The first in infancy and the second in late puberty, just before growth stops. The first period of accelerated growth is partly a continuation of foetal growth period. The second growth spurt and subsequent cessation of growth are due mainly to the action of sex hormones. Since girls mature earlier than boys, this growth spurt appears earlier in girls (Ganong, 1981).

Parameters of physical growth:

The following basic measurements must be taken and followed for the proper evaluation of growth in infants and chidren (Jelliffe, 1966):

1- Weight

2- Linear measurements

   a- Height or length

   b- Head circumference

   c- Chest circumference

3- Soft tissue

   a- Subcutaneous fat (skinfold thickness)

   b- Muscle mass

4- Bone age.

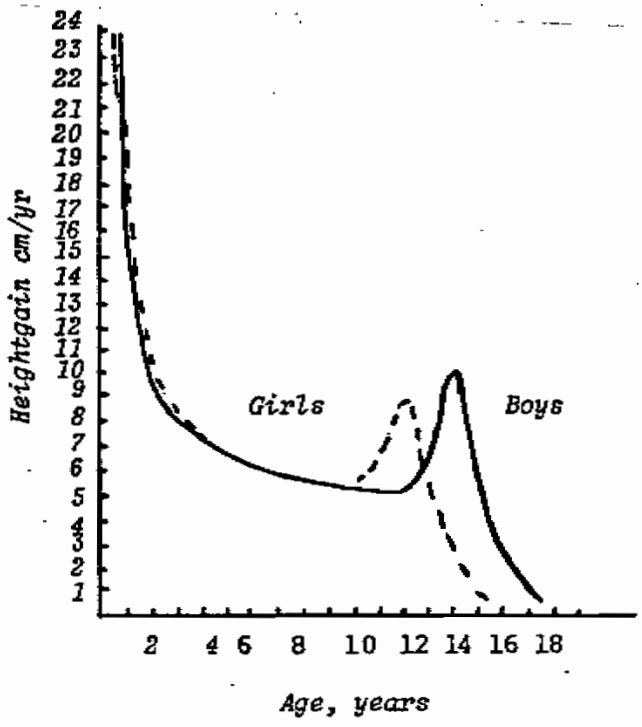

Fig. (1): Typical-individual velocity curves for supine length or height in boys and girls (from Tanner, Whitehouse and Takaishi, 1966).

1- Weight:

The child weight is the easiest measurement to investigate and , as well as giving the best overall index of body mass. It is also well understood by mothers in any part of the world and represents a practical form of nutrition education (Jelliffe and Jelliffe , 1979).

Most full term infants regain their birth weight by the age of 10 days. The full term infant will generally double the birth weight by 5 months and triple it in 1 year. During the second year of life there is a furthur deceleration in the rate of growth, the average child will gain about 2.5 kg. During the 3rd., 4th and 5th year of life gain in weight is relatively steady at approximately 2.0 kg/year. The early school years are a period of relatively steady growth ending in a preadolescent growth spurt by about the age of 10 years in girls and 12 years in boys. The average gain in weight during these years is about 3-3.5 kg/year (Vaughan, 1983).

A formula can be used after the 1st year of life to calculate the weight roughly: (Zeitoun,, 1983)

(Age in years X 2) + 8 = weight in Kg.

The typical girl weighs a little less than the boy at birth, equals him at age of 8 years, becomes heavier at age 9 or 10 and remains so that till about the age of $14\frac{1}{2}$ years (Forfar and Arneil, 1978).

Anthropometric charts provide a mean of comparing measurements of physical growth with those of other children of similar age and sex. These charts demonstrate the wide range of normality among children of same chronologic age. Comparison of the percentile rankings of a child with those of previous examinations should be made in order to detect any significant acceleration or deceleration in his rate of growth; i.e the child may be compared with others of the same age, but much better with himself (Zeitoun, 1983).

(Figure: 2): Shows gain in weight of Egyptian infants during the 1st year of life (mean and percentiles for weight according to age).

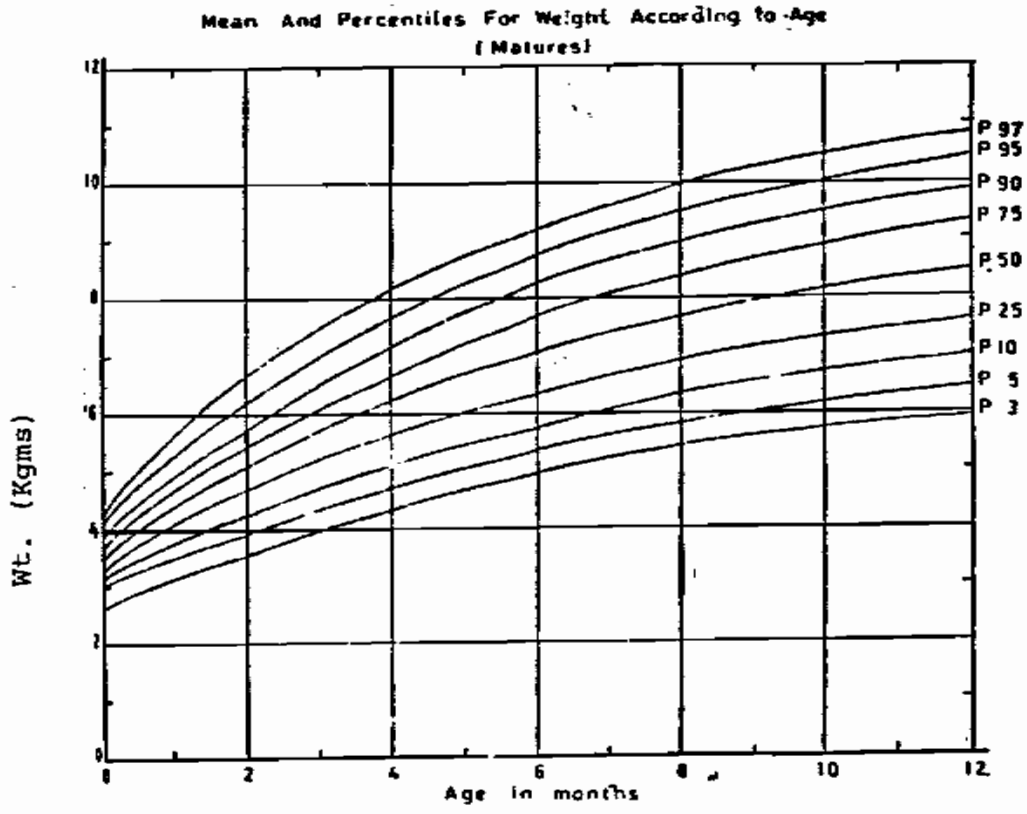

Fig.(2). Gain in weight of Egyptian infants during the first year of life.

Abbassy , et al , 1972.

2- Height:

Growth in height, like all other human measurements, is not uniform throughout life. The maximum rate of growth occurs before birth in the 4th month of fetal life, when it is about 1.5 mm, a day. Thereafter there is a progressive slowing down, though at birth the baby is still growing very fast indeed compared with the infant and child. In the first year after birth, body length increases by about 50% to be 75 cm, and in the 2nd year another 12 - 13 cm or so are added. Thereafter growth in height settles down to a rate of about 5-6 cm every year (Sinclair, 1975).

- A formula can be used after the 1st year of life to estimate roughly the length of the child before puberty: (Age in years X 5) + 80 = length in centimeters (Zeitoun, 1983). This is followed by the adolescent growth spurt with a peak height velocity of 9.5 cm/year in boys and 8 cm/year in girls, then follows a slowing of the growth rate towards the end of the growth period. The growth spurt occurs 2 years earlier in girls and does not reach the same height as in boys (Proder, 1975). The onset of the normal growth spurt is variable, it may begins as early as 9.5 years or as late as 14.5 years in the female and in the male as early as 10.5 yr or late as 16 yr. (Tanner et al., 1966).

Cross-sectional studies done by Marshall and Tanner(1969-1970) showed that the average mean chronologic age of the peak height velocity is 12.1 years for the female and 14.1 years for the male.

The study of El Melligy (1984), revealed that Egyptians, as compared to given European standards, were rather taller up till the age of 7 years, after which, the Europeans growth in height was more than that of the Egyptian one. The observed difference between the Egyptians and Europeans for the height parameter apply both for boys and girls. The average height of boys from 5 to 12 years varied between 118.4 and 149.6 cms. That of girls varied from 116.3 up to 147.2 cms. In Egyptian boys the adolescent growth spurt begins at 13.8 $\pm$ 0.97 years (Khalifa, 1983). The peak height velocity in Egyptian girls lies between 9-10 years (Mahmoud, 1981).

3- Head circumference:

The measurement of the maximum head circumference is an essential part of the examination of a baby. The head circumference must be related to the size of the baby. A large baby is likely to have a larger head than a small baby,and a small baby a smaller head than a large baby (Illingworth, 1975).

Table 1: Shows the mean head circumference in the 1st 3 years of life as found by Westrop and Barber (1956).

At the fifth year of life the head circumference reaches 50 cms, at seventh year 52 cms and the adult head circumference will be 55 cms (Zeitoun, 1983).

El Melligy, (1984) found that Egyptian boys and girls have equal head circumference up till the age of 9 years after which there was an increase in head circumference of boys more than in girls. The average head cirumference in boys at 5 to 12 years varied between 50.7 to 55.7 cms, in girls varied between 50.6 to 53.3 cms.

4- Skinfold Thickness:

Skinfold thickness will be useful in estimation of lean body mass and in study and management of obesity (Vaughn, 1983).

TABLE (1)
Mean Head Circumference
(Westrop and Barber)

Age	Boys Mean			Girls Mean		
	Inches	Cm	S.D.	Inches	Cm	S.D.
1 month	14·7	37·3	1·54	14·3	36·5	1·41
3 months	16·1	40·7	1·43	15·6	39·8	1·39
6 months	17·2	43·6	1·45	16·7	42·5	1·42
9 months	18·0	45·7	1·40	17·6	44·6	1·41
1 year	18·4	46·8	1·40	17·9	45·6	1·30
1½ years	18·9	47·9	1·40	18·5	47·0	1·32
2 years	19·4	49·1	1·47	18·8	48·0	1·35
3 years	19·8	50·4	1·35	19·6	49·5	1·45