

Growth Assessment in Asthmatic Patients

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ABSTRACT:

BACKGROUND:

Asthma is a chronic disease & the chronic disease states regardless etiology can cause growth failure in infant & toddler.

OBJECTIVE :

To assess growth of asthmatic patients

PATIENT AND METHODS:

One hundred asthmatic children between (5-15 years) of age . Both asthmatic & control group studied in term of height, weight & Skin fold thickness, all anthropometric measurements of height, weight & skin fold thickness measured for both groups.

RESULT:

Height, weight & skin fold thickness were significantly retarded in asthmatic, the more severe the disease & longer duration the more retardation in the height & weight.

The height was affected more than the weight by the disease duration & severity .The diminution in skin fold thickness was retarded both with increase disease duration & severity but the female was less retarded than male as the disease duration prolonged.

CONCLUSION:

All growth parameter (height, weight, SFT) affected by asthma (duration & severity), so the growth parameters can be used in asthmatic children to evaluate the effect of treatment.

KEYWORD: growth parameter , bronchial asthma.

INTRODUCTION:

Asthma is a chronic disease & the chronic disease states regardless etiology can cause growth failure in infant & toddler. During period of remission or on correction of the offending influence, the rate of growth may be accelerated (i.e. catch-up growth). As normal channels of growth are approached the rate may return to normal, but when growth failure has been severe & prolonged the child may never regain his normal growth potential ^(1,2,3) .

Also repeated adverse disease influences can interfere with statural growth, resulting in delayed bone maturation, extension of the growth period, & ultimate diminution of potential growth. It should be recognized that motor, language, cognitive & psychosocial development may also be depressed by chronic diseases. The time of insult is a significant as the duration. Disease states occurring in infants & young children may more seriously affect growth & development than if the same disorders occur in older children. ⁽⁴⁾ .

So any chronic disorders of major system like bronchial asthma (without steroid) may lead to stunting of growth ⁽⁵⁾ . The demonstration of growth retardation (i.e. height or weight < 3rd percentile) is a supportive of long standing severe asthma being present. Sudden & unexpected death occurred only in children with significant chronic disease. In formulating the diagnosis of sudden death due to asthma in children ,delaying growth parameters may therefore be an additional useful morphological marker indicating an at-risk child ⁽⁶⁾ .

AIM OF THE STUDY:

This study was conducted to assess growth of asthmatic patients in term of weight, height & skin fold thickness

PATIENTS AND METHODS:

Study design:-case control study period: the study covered the period from 1st December 2009 to 31st May 2010. One hundred patients who are known case of asthma aged between 5-15 years (of those asthmatic patients) admitted with acute asthmatic attack to causality unit central teaching hospital for children in Baghdad City during the study period.

The patients should have the following criteria to be selected in the study :

Baghdad Medical City.

1-age between 5-15 years.(those below 5 years were unexpected to perform with peak flow meter properly).

2-Should have more than one attack of airway obstruction which were reversible & show a response to antiasthmatic medication.

3- Should not be on chronic or continuous steroid therapy.

4- Should have no other medical problem or chronic disease other than asthma.

Another one hundred healthy children matched for age, sex, socioeconomic state & residency Without any history of medical problem or chronic disease. These children were randomly selected from the outpatient department of Central Teaching Hospital for Children ,Baghdad during a study period. Those children studied as control group.

The information on each patient was selected using a well-structured questionnaire which includes :- Name, age, sex, residence, socioeconomic state ,age of onset, personal & family history of asthma or atopy ,precipitating factors, duration of disease ,frequency(no. of attack / year),presence of symptoms in between the attacks, hospitalization no. & treatment received at home in between the attacks. Each patient was subjected to a questionnaire form & after routine examination of the child .

A peak flow meter used to measure the degree of airway obstruction, a standard Wright peak flow meter (personal best type) with patients seated upright & nose unoccluded, the same peak flow meter used for all patients in this study following this instruction :-

1-Push the pointer on the peak flow meter back to zero.

2-keep the meter horizontal & keep your fingers away from the sliding scale.

3-Take as big a breath as possible with mouth closed around the meter & tongue away from the opening. 4-Blow as hard & fast as you can.

5-Read where the pointer reaches, then push it back to zero.

6-The highest of the three readings was taken.

PEFR was measured in three times (2min. interval between each measure). & Best PEFR was selected. According to frequency of attacks, presence of symptoms in between the attack, hospitalization no.& need for treatment between the attack the patients were divided into 4 groups: -

1- Mild intermittent asthma.

2- Mild persistent asthma

3- Moderate persistent asthma.

4- Severe persistent asthma.

The height of children was measured by standing in bare feet & both feet flat on floor & heel against the broad with back against the measuring scale & the child should be facing forward with head in frankfurter plane with gentle upward traction & pressure on mastoid to ensure height is at its maximum by using stadiometer (seca, Germany made, minimum 75cm, maximum 200cm).

The weight for those children was measured by (Seca, Germany made). The skin fold of children taken in study was measured by picking *up* a fold of skin & fat of triceps between the thumb & forefinger halfway down left arm between tip of acromian & the tip of the olecronon with the arm hangs relaxed at the side. & Measuring it's thickness with special, constant pressure caliber called Harpeden caliber (England made, measure zero- 34mm). The height, weight, skin fold thickness was measured for each one of the control group & the results of both asthmatic patients & control group measurement were compared with normal values on growth chart for children (National center for health statistics percentile (NCHS). Then the data were coded using coding sheet & entered in computer system for statistical analysis by using SPSS program.

RESULTS:

The distribution of asthmatic patients and control by gender show that the male more affected (67%) than female (33%) among asthmatic patients. The distribution of asthmatic group according to age of onset shows that > half (50%) of the patients presented within 1st 2 years of life while other half (50%) of the patients presented between (3-10 years) of life.

Table No1: The weight percentile of patients and control.

Weight percentile	Patient		control	
	No.	%	No.	%
> 95 th	3	3	3	3
95 th	3	3	5	5
90 th	7	7	9	9
75 th	10	10	17	17
50 th	26	26	32	32
25 th	17	17	18	18
10 th	15	15	9	9
5 th	7	7	5	5
<5 th	12	12	2	2

$X^2 = 12.19$ P = 0.1429 (N.S)

The study show that there is only (26%) of the patient's weight lie within the mean (50th percentile) and below the mean and there is only (23%)above the mean. While among the control group (32%) of them lie within the mean, and (34%) below the mean and (34%) above the mean, so the weight of both patients and controls are affected but the asthmatic are more affected than the control.

Table No 2: The height percentile for patients and control.

Height percentile	patient		control	
	No.	%	No.	%
> 95 th	—	—	4	4
95 th	3	3	7	7
90 th	4	4	8	8
75 th	10	10	8	8
50 th	19	19	28	28
25 th	23	23	16	16
10 th	13	13	15	15
5 th	10	10	7	7
<5 th	18	18	7	7

$X^2 = 11.57$ P = 0.0255(s).

Retardation in height is noticed in the majority of children (64%) have their height below 50th percentile, and (18%) have their height below the 5th percentile. The weight also affected. But to a lesser extent than height 51% of patients weight were below the mean and only (12%) below the 5th centile. As shown in table 2.

Table No. 3: The skin fold thickness of patient and control by age and sex with standard skin fold thickness.

Age group	Standard SFT	%	Patient SFT	%	Control SFT	%
Male 5-8 years	8.6	100	6.6	76	7.4	86
Female 5-8 years	10.2	100	7.4	72	8.3	81
Male 9-12 years	8.5	100	6.9	81	7.6	89
Female 9-12 years	11	100	8.8	80	9.2	83
Male 13-15 years	9.2	100	6.1	66	7.3	79
Female 13-15 years	12.7	100	8.7	68	10.4	81

Female $X^2 = 26.487$ d.f = 1 P = 0.028(S) Male $X^2 = 20.908$ d.f =1 P = 0.032(S)

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The study shows that the control skin fold thickness range from 79-89% of the standard chart, while the patients skin fold thickness (SFT) range from 66% -

81%, both patients and control group SFT was affected but the patient SFT more significantly affected than the control SFT.

Table No 4: The relation between the duration of the disease and weight of patients in percentile.

Weight percentile	Duration of the disease					Total
	1 year	2 year	3 year	4 year	5 year & more	
> 95 th	2	1	—	—	—	3
95 th	1	2	—	—	—	3
90 th	1	3	3	—	—	7
75 th	3	2	2	3	—	10
50 th	4	2	3	8	9	26
25 th	—	5	3	2	7	17
10 th	1	3	1	4	6	15
5 th	1	—	1	2	3	7
<5 th	2	1	2	2	5	12
Total	15	19	15	21	30	100

$$X^2 = 6.42 \quad \text{d.f.} = 5 \quad P = 0.148 \text{ (NS)}$$

There is strong relationship between the weight of the patients and the duration of the disease, table 4 shows that there is an increase in the no. of the patients who lying below the mean with increase

duration of the disease. So the study show that there is only about 24% of the patients blow the mean if the duration of the disease less than one year, but the weight of 68% of patient were below the mean if the duration is within five years.

Table No. 5: The relation between the duration of the disease and height of patients in percentile.

Weight percentile	Duration of the disease					Total
	1 year	2 year	3 year	4 year	5 year & more	
> 95 th	—	—	—	—	—	
95 th	2	1	—	—	—	3
90 th	2	1	1	—	—	4
75 th	2	3	2	3	—	10
50 th	3	2	4	5	5	19
25 th	2	8	3	6	4	23
10 th	2	1	2	2	6	13
5 th	1	1	1	2	5	10
<5 th	1	2	2	3	10	18
Total	15	19	15	21	30	100

$$X^2 = 11.26 \quad P = 0.028 \text{ (S)}$$

This table shows that the height retardation in asthmatic patients increases with prolongation of disease duration. In patient with 1 year disease

duration there is only about 30% of them below the mean while those with 5 years duration there is 85% of them develop height retardation below the mean.

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Table No. 6: The relation between the duration of the disease and skin fold thickness by age and sex.

Average of skin fold thickness according to sex	Duration of the disease						Standard SFT	
	2years	%	4 years	%	5 years & more	%	Standard SFT	%
5-8 years Male	6.9	80%	6.5	75%	6.1	70%	8.6	100
female	7.8	76%	7.4	72%	6.9	68%	10.2	100
9-12 years male	7.1	83%	6.7	78%	6.4	75%	8.5	100
female	9.2	84%	8.9	80%	8.3	76%	11	100
13-15years male	6.3	68%	6.0	66%	5.6	60%	9.2	100
female	9.0	70%	8.7	68%	8.1	63%	12.7	100

Male: $t = 6.2$ d.f. = 2.9 $P = 0.031$ (S) Female: $t = 1.3$ d.f. = 4.7 $P = 0.146$ (NS)

The patients SFT for those with 2 years duration of the disease was 76% of standard SFT, and for those with 4 years duration was 73% of standard SFT and 68% of standard SFT to the patients with 5 years duration of the disease. So this study show that both male and female are affected in SFT degree by increasing disease duration, but statistical analysis show that male more significantly affected than female.

Table No. 7: The relation between weight percentile and severity of the disease.

Weight percentile	Mild intermittent	Mild persistent	Moderate persistent	Sever persistent	%
> 95 th	2	1	—	—	3
95 th	2	1	—	—	3
90 th	4	2	1	—	7
75 th	2	5	3	—	10
50 th	1	17	8	—	26
25 th	1	13	3	—	17
10 th	—	11	4	—	15
5 th	—	2	4	1	7
<5 th	—	3	6	3	12
Total	12	55	29	4	100

$X^2 = 9.25$ d.f. = 3.6 $P = 0.128$ (NS)

This study show direct relationship between severity of asthma and the degree of weight retardation. There is 6% of patients with mild intermittent asthma develop weight retardation below the mean. While about 45% of patient with mild persistent asthma are below the mean and 65% of patients below the mean in moderate persistent asthma, and 100% of patients are weight retarded below the mean in severely affected group.

Table No. 8 : The relation between height percentile and severity of the disease.

Height percentile	Mild intermittent	Mild persistent	Moderate persistent	Sever persistent	%
> 95 th	—	—	—	—	—
95 th	1	2	—	—	3
90 th	3	1	—	—	4
75 th	4	4	2	—	10
50 th	1	14	4	—	19
25 th	2	15	6	—	23
10 th	1	9	3	—	13
5 th	—	7	2	1	10
<5 th	—	3	12	3	18
Total	12	55	29	4	100

$X^2 = 3.24$ d.f. = 4 $P = 0.244$ (NS)

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The result shows that about 25% of mild intermittent cases had height retardation below the mean. While about 65% of those with mild persistent had height retardation, on the other side

those with moderate persistent disease there was about 70% of them were height below the mean, and in severe persistent cases height retardation was about 100% of the patients.

Table 9: The relation between SFT and severity.

Average SFT according to sex	Mild intermittent		Mild persistent		Moderate persistent		Severe persistent		standard	
	SFT	%	SFT	%	SFT	%	SFT	%	SFT	%
5-8 yr male	7.8	90	7.2	83	6.4	74	—	—	8.6	100
female	8.7	85	7.7	75	7.2	70	—	—	10.2	100
9-12 male	7.5	88	7.1	83	6.9	81	6.4	75	8.5	100
female	9.3	84	9	81	8.6	78	—	—	11	100
13-15 yr male	7.0	76	6.5	70	6	65	5.6	60	9.2	100
female	9.4	74	8.9	70	8.5	66	—	—	12.7	100

Male $t = 3.333$ d.f. = 3.9 $P = 0.018$ (S) Female $t = 28$ d.f. = 28 $P = 0.023$ (S)

The result showed that those patients with mild intermittent asthma had average SFT of 82% of the standard. While those with mild persistent asthma had 77% of standard SFT, and for those with moderate persistent asthma patient the average SFT was 72% of standard. In severe persistent the average of SFT was 67% of standard.

From these result we could see that the more severe the disease the more affected and retarded SFT, which are significantly retarded fro both males and females.

DISCUSSION:

In this study bronchial asthma is more predominant in male (67%) than female (33%), this result is in agreement with other studies. Baxter-Jones ⁽⁷⁾ & Zaid K.Al-Hummady (10). In the majority of those patients the 1st presentation of asthma is occurring in 1st 3-4 years of life, &about 50% of them started their illness in the 1st year of life, this result was consistent with other study done by Ali JA. (9) , Baxter-Jones ⁽⁷⁾, Sabah H. Ali ⁽⁸⁾.

The height, weight &SFT was taken &measured for asthmatic &control groups. Both asthmatic &control groups have growth retardation, but the control group is affected to a lesser degree than asthmatic patients, and this result may be due to malnutrition of Iraqi children due to the effect events in the country. Height & weight retardation affected by both severity & chronicity (duration) of the disease, this is also noticed by other works. Champ-CS. ⁽⁶⁾

Retardation in height is noticed in the majority of asthmatic patients as the study has shown that height below the mean noticed in (64%) of patients while weight below the mean was seen in (51%) of

the patients, &those patients with height of 5th percentile & less was noticed in (18%) while retardation in weight (5th percentile & less than 5th percentile) was (12%). These results are similar to study done by Zaid K.Al-Hummady ⁽¹⁰⁾ & Sabah H.Ali ⁽⁸⁾.

The decrease in skin fold thickness is noticed in severe cases for both male & female, rather than the duration of the disease where the male more affected than female, there is no particular explanation to this finding. As in any chronic disease of childhood, it is good practice to monitor growth at least annually in children diagnosed with asthma

CONCLUSION:

From this study we can conclude that all growth parameter (height, weight, SFT) affected by asthma (duration & severity), so the growth parameters can be used in asthmatic children to evaluate the effect of treatment.

Recommendation:

The asthmatic children expended significantly more energy even at rest so good calorie intake & more care for asthmatic nutritional status is very important to catch-up normal growth & decrease the severity of growth retardation.

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