(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 4, Issue 4, Page No: 1152-1161
July-August 2021

IJMSCR

The effects of asthma on growth parameters in children

Sabah Hassan Alatwani[1], Moatasem Ghazi Hasoon Almhanna[1], Samaher Hakim Hadi Alwaeli[2]
[1]Dept. of Paediatric, College of Medicine, University of Karbala, Iraq
[2]Paediatric Teaching Hospital of Karbala, Iraq

***Corresponding Author:**
Sabah Hassan Alatwani
Dept. of Paediatric, College of Medicine, University of Karbala, Iraq

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

The growth of one hundred fifty children with asthma aged 1-12 years and a comparable number of control group with the same age group and sex were studied in term of height and weight centile and skin fold thickness at AL-Sadder General Teaching Hospital for the period between the first November 2014 to 31 March 2015 in Iraq, Missan province, taking in consideration the residency and the socio-economic status. According to the frequency of the attacks of asthma, presence of symptoms between the attacks, the treatment received and the duration of the disease were determined. The patients were divided into three groups of mild, moderate and severe asthma excluding the patients who were on steroid therapy. The results showed that males were affected more than females (62%, 38% respectively). The presentation was more in the first four years of life (55%). All the anthropometric measurements of the height, weight and skin fold thickness were significantly retarded in the asthmatic (P= 0.032). The more severe the disease and the longer the duration of the disease the more the retardation is in the height and weight (P=0.01) but the diminution in skin fold thickness was present with the severity rather than the duration of the disease which was affected earlier in the disease. In conclusion; growth retardation in asthma needs to be detected earlier and might be prevented if asthma had been properly managed.

Keywords:Asthma; Children; Height; Weight

INTRODUCTION

Asthma is the commonest chronic respiratory disorder in children, and may cause considerable disability throughout childhood. It is defined as hyper-reactivity of airways to a variety of stimuli and a high degree of reversibility of obstructive process, which may occur either spontaneously or as a result of treatment [1,2]. At some stage of childhood 20% of individuals wheeze as a result of asthma. It account for 10% of medical emergency room visits, and 10% of medical hospitalization. About 1 in 40 asthmatic children has serious airway obstruction which may persist for several months or occasionally years [3,4]. Asthma may have its onset at any age, 30% of patients are symptomatic by one year of age, whereas 80-90% have their first symptoms before 4-5 years of age. About 10-15% of boys and 7-10% of girls may have asthma at some time during childhood. Before puberty, approximately twice as many boys as girls are affected, because during adolescence, girls show less improvement than boys, so that by early adult life the sex difference no longer exist [1,3].

Approximately 70% of asthmatic children appear to be outgrow their asthma by the age of 12 year and many of the remaining 30% improve. The progress depends on severity of asthma, positive family history of allergy and the duration of the disorder before the start of the treatment. The prognosis for cure depends on the greater the severity, longer the duration of symptom and allergic the family, and the poorer. Factors associated with poor prognosis or death from asthma include, delayed in seeking medical attention, underestimation of the severity of the episode by patient,

parents and physician, sedation, under use of bronchodilator and corticosteroid, frequent and severe symptoms, especially in early morning, frequent hospitalization, dependence on oral steroid, living in chaotic, unsupportive or disturbed family, delay in implementation of appropriate treatment and black race [1,2,5-8].

Acknowledge of normal growth of children is essential for preventing and detecting diseases by recognizing overt deviations from normal patterns. Although the processes of growth and development are not completely separable, it is convenient to refer to "growth" as the increase in the size of the body as a whole or the increase in his separate parts and to reserve the development for changes in function, including those influenced by the emotional and social environment [20].

Deviations in growth patterns are nonspecific but very important indicator for serious medical disorder. They often provide the first clue that something is wrong,, occasion-ally even when the parents don't suspect a problem. An accurate measurement of the height and weight should be obtained at every health supervision visit [20]. Although recent interest in the growth of asthmatic children has centered on growth failure as potential side effect of corticosteroid treatment, it is has long been recognized that asthma itself can impair the growth. It is now over a hundred years (1868) since Hyde satire, describing the appearance of the asthmatic patients, comment that if the asthma has come on young, be is generally below the average height. Some asthmatic however have nothing whatever the matter with their appearance, and will be taken for perfectly healthy people [11,19].

The height being unaffected in milder cases but with increasing severity of the allergic disease. There was impaired growth and finally delayed sexual maturation. There is association between uncontrolled asthma with growth impairment and found that the satisfactory control of allergic disease was associated with improved energy intake as well as satisfactory growth [11]. Asthma and perhaps allergy in general is associated with delayed maturation, and hence with prolongation and Deeping of the prepubertal growth such an effect would not be expected to have any great influence on final adult height [11].

It is tempting to speculate that asthmatic children who commonly suffer from night time symptoms with consequent sleep disturbance, might have impaired nocturnal growth hormone secretion but administration of growth hormone has no effect on the growth of asthma children, although has yet to be evaluated in under growth asthmatic children who have not had corticosteroid treatment [11].

Methods

One hundred fifty patients known case of asthma aged between 1-12 years with acute asthmatic attack of those asthmatic patients admitted to the casualty unit (Al-Sader general teaching hospital-Missan province-Iraq) during the period from first November 2014to 31st March 2015. Another one handed fifty healthy children matched for age, sex, socioeconomic state and residency, without any history of medical problem or chronic disease included as control group. The patient should have the following criteria to be selected in the study:-

1- Age between 1-12 years.

2- Have more than one attack of air way obstruction which were reversible.

3- Should not be on steroid therapy.

The information on each patient were selected using a well-structured questionnaire form which include name, age, sex, residence, socioeconomic state, duration of asthma, frequency (no., of attack /year), presence of symptoms in between the attacks, hospitalizations number and treatment received at home in between the attacks. Then for each patient weight, height and skin fold thickness were measured. The information on each child in the control group include the age, sex, residency and socioeconomic state, then height, weight and skin fold thickness were measured.

The length of children aged between one -two years was measured by supine length (England made, min. 23.5 cm - max. 113 cm). The length required two person to carry out the manovour the baby head is held with occiput in back plate and the crown of head touching the base plate. One leg is extended and the movable foot plate brought up to make contact with sole of babies food which be at right angle to the lower leg [12]. The height of children aged between two-twelve year was measured by standing in bare feet with back against the measuring scale and the head held in the frankfurter plane with gentle upwards pressure on the mastoid by using siadiometer (Seca, Germany made, min. 75 cm. max. 200 cm) [12]. The skin fold of children taken in study was measured by picking up a fold of skin and fat of triceps between the thumb and forefinger and measuring it is thickness with special, constant pressure caliper called Harpeden caliper (England made, measure 0 - 3 4 mm) [17]. The weight of children was measured by Seca weight

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

scale for infant (Germany made, min. 0.5 Kg, max. 16 Kg) for those children aged between one and two years and by bath room scale for weight for those aged greater than two years.

The results were compared with normal values on growth charts for children (National Center for Health Statistics Percentile "NCHS") [1]. According to frequency of attack, presence of symptoms in between the attacks hospitalization number and need of treatment in between the attacks, the patients divided to mild, moderate and severe asthma [1].

1-Mild asthma: the frequency of attacks is variable, up to twice each week, response to bronchodilator within 24-48 hours free of symptoms in between the attack, not require treatment in between the attacks.

2- Moderate asthma: the attack more frequent, there is symptoms in between the attacks, mostly cough and wheezing, require treatment in between the attacks.

3- Severe asthma: there is daily wheezing, more frequent and severe attacks, they require recurrent hospitalization, which is rarely required for mild or moderate asthma treatment needed continuously.

Results

Determination of Age and Sex

The study show that more than half (55%) of asthmatic patients are younger than four years and about (24%) between 5-8 years old, while (21%) are between 9- 12 years old, also the study show the boys are affected more than the girls, as shown in table (1). The same age group and sex were selected as control group.

Table 1: Distribution of age and sex for both patients and controls.

Age group (years)	No. of patient		%	No. of control		%
1-4	83	Male =53 Female =30	55	83	Male =53 Female =30	55
5-8	36	Male =21 Female =15	24	36	Male =21 Female =15	24
9-12	31	Male =19 Female =12	21	31	Male =19 Female =12	21
Total	150		100%	150		100%

Determination of WEIGHT

The weight of both patients and controls are affected, but the asthmatic are affected more than the control. There is only 28% of patients he within the mean (50* percentile) and 50% are below the mean and only 22% above the mean. Regarding the control, 44% he within the mean, 28% below the mean and 28% above the mean, as shown in table 3.

Table 2: The weight percentile of patients and controls *.

Weight Percentile	patients No.	Control No.
> 95 th	-	2%
95 th	2%	2%

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

90 th	**6%**	**4%**
75 th	**14%**	**20%**
50 th	**28%**	**44%**
25 th	**14%**	**10%**
10 th	**14%**	**6%**
5 th	**10%**	**4%**
<5 th	**12%**	**8%**

• X2= 0.96, d.f. = 2, P=0.618 (NS)

Determination of height

The height for both patients and control are affected but the height for patients are more affected, where only 24% of patients he within the mean, while 58% are below the mean, and only 18% above the mean for the control group, 40% within the mean. 30% above the mean and 30% below the mean as shown in table 4 and figure 2. Also these results showed that the height is more affected than weight.

Table 3: The percentage of the height and length percentile of the patients and controls

Height & length	patients	Control
Percentile	**No.**	**No.**
> 95th	**-**	**4%**
95th	**2%**	**6%**
90th	**4%**	**10%**
75th	**12%**	**10%**
50th	**24%**	**40%**
25th	**16%**	**8%**
10th	**12%**	**12%**
5th	**12%**	**6%**
<5th	**18%**	**4%**

• X2= 6.92, d.f. - 2, P=0.032 (S)

Determination of skin fold thickness

The study shows that the skin fold thickness for both patients and controls was affected, but the patients were affected more than the controls. The control skin fold thickness range from 73-85% of the standard chart while the patients range from 60-75% of standard chart. This is applicable for all age groups and for both males and females. (Table 4)

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

Table 4: The skin fold thickness of the patients and controls by age and sex with the standard skin fold thickness.

Age group	Standard		Control		Patients	
	SFT	%	SFT	%	SFT	%
1-4 Male	10.25	100	8.7	85	7.75	75
Female	11.25	100	9.25	83	8	71
5-8 Male	8	100	6.5	81	5.25	65
Female	9.7	100	7.5	80	6.5	67
9-12 Male	7	100	4.75	73.3	4	60
Female "	8.25	100	6.25	75	5.5	65

Determination of duration of asthma

1- Weight with duration of asthma

The weight had a strong relationship with the duration of the disease where about 20% of those with 2 years duration are weight retarded, but there is about 50% of those with 4 years are weight retarded. While for those with 5 years or more duration the retardation percentage was 5%. So the duration of the disease is directly related to the degree of retardation of weight (Table 5).

Table 5: The relation between the duration of the disease and weight of patients in percentile

Weight Percentile	Duration of the disease						
	1 year	2 years	3 years	4 years	5 & more	Total No. %	
> 95 th	-	-		-	_	-	_
95 th	2	1	-	_	-	3	2
90 th	4	4	1	_	-	9	6
75 th	12	4	3	_	2	21	14
50 th	16	10	6	4	6	42	28
25 th	7	8	1	1	4	21	14
10 th	5	5	3	2	6	21	14
5 th	1	2	2	2	8	15	10
<5 tb	1	. 2	2	3	10	18	12
Total	48	36	18	12	36	150	100%

' X2 = 5.38, d.f. = 4, P=0.178 (NS)

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

2- Height with duration of asthma

The study results showed that about 15% of those with 2 years duration are height retarded, while about 60% were height retarded of those with 4 years duration. On other side those children with 5 years or more duration 90% are retarded in height. So more prolong the duration of the disease lead to more height retardation (Table 6)

Table 6: The relation between the duration of the disease and Height of patients in percentile *.

Height	Duration of the disease						
	1 year	2 years	3	4	5 &	Total	
^Percentile			years	years	more	No.	%
> 95 th	-	-	-	-	-	-	-
95 th	2	1	-	-	-	3	2
90 th	4	1	1	-	-	6	4
:i5th	10	5	2	1	-	18	12
j50 th	18	10	4	2	2	36	24
25 th	8	12	1	1	2	24	16
no th	5	3	4	-	6	18	12
5 th	1	2	3	2	10	18	12
<5 th	-	2	3	6	16	27	18
Total	48	36	18	12	36	150	100%

*** X2= 9.29, d.f. = 4, P=0.01 (S)**

3-Skin fold thickness with duration of asthma

The skin fold thickness for those children with 2 years duration was 70% of standard skin fold thickness, while those with 4years duration of the disease had 66% of standard skin fold thickness. For those with 5 years and more, the skin fold Sickness was 64% of the standard skin fold thickness. From these results we can conclude that there was no significant relationship between the duration of the disease and the degree of skin fold thickness retardation. (Table 7)

Table 7: The relation between the duration of the disease and skin fold thickness by age and sex.

Average of skin fold thickness according to sex	Duratior			of Disease				
	2 years	%	4 years	%	5 years	%	Stand ard skin fold	%
1-4 Male Years Female	8.25 8.25	80% 75%	7.75 7.75	75% 70%	7.5 7.75	73% 70%	10.25 11.25	100% 100%
5-8 Male Years Female	5.5 6.75	70% 70%	5 6.25	65% 65%	5 6.25	63% 65%	8 9.7	100% 100%

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

9-12 Male Years Female	4.25 5.75	60% 70%	4 5.5	58% 68%	3.75 5.25	54% 65%	7 8.25	100% 100%

The severity of asthma

1- Weight with severity of asthma

About 18% of patients with mild asthma had weight retardation, while about 50% of those with moderate asthma. The weight was retarded. Those children with severe asthma the weight retardation was 66%. From these findings one can exclude the direct relationship between the weight and severity of the disease. (Table 8).

Table 8: The relation between weight percentile and the severity of the disease

Weight percentile	Mild	Moderate	Severe	Total	%
>95th	-	-	-	-	-
95th	2	1	-	3	2
90th	6	3	-	9	6
75th	16	4	1	21	14
50th	30	10	2	42	28
25th	11	8	2	21	14
10th	8	11	2	21	14
5th	4	8	3	15	10
<5th	3.	10	5	18	12
total	80	55	15	150	100%

>X2= 2.23, d.f. = 4, P=0.328 (NS)

2- Height with severity of asthma

The results showed that 20% of mild cases had height retardation, while 56% of those with moderate disease had height retardation on other side those with severe disease, there was 80% of them were height retarded. So there is strong relationship between the severity and the degree of height retardation. (Table 9)

Table 9: The relation between height percentile and the severity of the disease:

Height percentile	Mild	Moderate	Severe	Total	%
>95th	-	-	-	-	-
95th	3	-	-	3	2
90th	5	1	-	6	4

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

75th	12	6	-	18	12
50th	24	11	1	36	24
25th	16	6	2	24	16
10th	10	6	2	18	12
5th	6	9	3	18	12
<5th	4	16	7	27	18
Total	80	55	15	150	100%

• X2= 3.44, d.f. = 4, P=0.179 (NS)

3- Skin fold thickness with severity of asthma

The results showed that those with mild asthma had average skin fold thickness of 75% of the standard skin fold thickness, while those with moderate asthma had 68% of the standard skin fold thickness. For those patients with severe asthma, the skin fold thickness average was 61.5% of the standard skin fold thickness. From theses results, we could conclude that the more severe the disease, the more the skin fold thickness retarded. (Table 10).

Table 10: The relation between skin fold thickness with the severity of the disease by age and sex.

Average of skin fold thickness according to sex	Severity of the Disease							
	Mild	%	Moderate	%	Severe	%	Standard skin fold thickness	%
1-4 years Male	9.25	90	8.25	80	7.25	70	10.25	100
Female	8.75	73	8	70	7.5	68	11.25	100
5-8 years Male	5.75	72	5.25	65	4.75	62	8	100
Female	6.75	70	6.25	64	6.25	64	9.7	100
9-12 years Male	4.25	60	4	56	3.75	53	7	100
Female	5.75	70	5.25	65	5.25	65	8.25	100

4- The duration and severity of asthma

Those patients with the duration of one or two years mostly having mild asthma, while those with three and four years duration having mostly moderate asthma. Furthermore, the duration of five years and more are closely related to the severe asthma. So the duration of the disease was directly related to the severity of asthma, as shown in table 11.

Table 11: The relation between the duration of the disease and the severity of the asthma

Disease	Duration of the disease					Total No.
Severity of asthma	1 year	2 year	3 year	4 year	5 and more	
Mild	36	26	8	5	5	80

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

Moderate	**10**	**8**	**8**	**4**	**25**	**55**
Sever	**2**	**2**	**2**	**3**	**6**	**15**
Total No.	**48 (32%)**	**36 (24%)**	**18 (12%)**	**12 (8%)**	**36 (24%)**	**150 (100%)**

Discussion

In majority of those one hundred fifty patients, asthma occur in first four years of life, this result was in consistent with other studies done by Ali .JA. 1995 and Zaid K. Al-Hummady 1997 [13,14]. Male were more predominant in this study. This result was similar to other done by Eosin.R.R 1990, Yasigi, 1993 and Said. JA. Al-Hummady [14-16]. The socioeconomic state for patients and controls had no significant difference. The study showed that fathers were educated more than the mothers and those were house wife's and minority were work outside the home is because of cultural back ground. Three quarter of fathers having a job, either government or free job while one quarter were unemployed and our observation that, the children of unemployed fathers usually having moderate or severe This may be due to poverty and the unavailability of good environment for children.

About more than half of patients having mild asthma, while one third having moderate asthma and only 10% of patients having severe asthma. This result was in agreement with other study done by Zaid K. AL Hummady 1997 [14]. The height, weight and skin fold of the children which taken as control group were affected but less than asthmatic patients. This is mainly due to the effect of the blockade on our country.

The height was affected more than the weight where 58% of patients had height below the mean. While 50% of patient had weight below the mean. The retardation in height (5^{th} percentile and less than 5^{th}percentile) was 30% of patient. While retardation in weight (5^{th} percentile and less than 5^{th}percentile) was 22% of patients. This result was similar to the study done by Zaid K. Al- Hummady [14]. The severity of the disease plays an important role in the growth. The more severe the asthma, even with short duration, had an effect on the weight and height These results were similar to the study done by George Russell 1993 [11].

Similarly, the skin fold thickness of the patients was affected and found to be related to the severity of the disease rather than to the duration. The chronicity of the disease was directly related to the severity of the asthma to the degree of the height and weight retardation. The more chronic the disease the more severe and more weight and height retarded.

In conclusion; From the study we can conclude that asthma has an effect on the growth in all parameters (weight, height and skin fold thickness) and the growth has significant relation with the duration and the severity of the disease Thus the growth retardation can be used as a very useful index in the assessment of the severity of asthma.

Recommendation from this study;

1- Education and explanation to the family the nature of the disease, progression, therapy and other aspects of the disease like preventive measures.

2- Early recognition of the severity of the disease by physicians to give proper 1 therapy.

3- Follow up of the patients as any chronic disease and during their visit serial measurements of the growth parameters done and then we can give useful instructions for improvement of the growth.

4- Good calorie intake must be encouraged to asthmatic patients because good nutritional state is very important to catch-up the normal growth and to decrease the severity of the growth retardation.

References

1- Behrman RE, Klicgman RM, Nelson WE, Vaughan VC.Nelson Textbook of Pediatric, 18^{th} ed. Philadelphia, W.B. Sanders Co. 2007, 953-70.

2- Simpson H. Asthma in children. Medicine Middle East, March 1980,16:727-28. 3

3- Phelan PD. Asthma in children. Medicine International, Jan. 1987:1526-30.

4- Hoekelman RA, Blatman S, Friedman SB, Nelson NM, Siedel HM.Primary pediatric care, Textbook of Pediatric, Washington, The C.V. Co. 1987, Asthma: 1145-49.

5- Kemper KJ. Chronic Asthma: An update; Pediatric in review, April 1996, 17:111-17.

Volume 4, Issue 4; July-August 2021; Page No 1152-1161

6- Micheal S. Asthma in childhood, 1985. Published by Current Medical Literature LTD.

7- Mcintoshik EH. The association of viral and bacterial respiratory infections with excessive wheezing in young asthmatic children, Hospital physician Medical Practice for Staff and Resident, Jan, 1995:319.

8- Behrman RE &Kliegman R.Nelson Essentials of Pediatrics, Philadelphia, W.B. Sanders Co. 1990, 254-57.

9- Schindler R.Asthmatology, Clinical evaluation, Sandroma, The physician's panorama; 1986, Special issue; A7-A13.

10- Page R, Friday R.Asthma and selective immunoglobulins subclass deficiency improvement of asthma after immunoglobulin, replacement therapy, J. of Pediatrics, Jan. 1988; 112

11- George Russell.Asthma and growth. Archives of Disease in Childhood 1993; 69:695-698.

12- Colin O. & Christopher C.Chamberlain's symptoms and signs in clinical medicine 1987.

13- Ali JA.Epidemiology, severity &complications of bronchial asthma in Iraqi children 1995.

14- Ziad K. Al-Hummady.Bronchial asthma in children; Assessment and a comparison therapeutic study. A thesis study - Iraq 1997.

15- Yassin RR. Profile of asthma in Iraqi children 1990.

16- Yazigi A, Mudawwar F.Childhood asthma in Lebanon, an epidemiological study, The Arab J. of Medicine, Dec. 1993;2:6-8.

17- Campbell AGM.Forfar and Arneils, Textbook of Pediatrics 4th ed. 1992; 393-394.

18- Shohat M, Shohat T, Kedem R, Mimouni M, DanonYL.Childhood asthma and growth outcome. Arch. Dis. Child. 1987; 62:63-5.

19- Salter HH.On Asthma; its pathology and treatment. 2nd Ed. London, Churchill, 1868.Richard E, Behrman MD. Essentials of Pediatrics. 1994; Growth and development.

20- Richard E, Behrman MD. Essentials of Pediatrics. 1994; Growth and development.

Volume 4, Issue 4; July-August 2021; Page No 1152-1161