RESULTS AND ANALYSIS OF DATA

The present study was carried out on 55 subjects, 40 of them (22 males and 18 females) were suffering from acute exacerbation of bronchial asthma. Their ages ranged from $4\frac{2}{12}$ -14 yrs., with a mean age of 7.5± 2.9 yrs. The study included as well 15 healthy age and sex matched children (8 males and 7 females), as a control group with a mean age of 8 ± 2.8 yrs. and with negative history of asthma and atopy.

Based on the presence of family and/or personal history of atopy, the level of total serum IgE and the result of skin prick tests done, the asthmatic children were classified into:

* **Group I** included 27 patients (the atopic asthmatics).
* **Group II** included 13 patients (the non-atopic asthmatics).

These two groups were further classified into **a** and **b** groups according to the specific treatment given.

- **Group Ia** (No.14) and **group IIa** (No. 6) received treatment in the form of ordinary bronchodilators + dexamethasone.
- **Group Ib** (No. 13) and **group IIb** (No. 7) received treatment in the form of bronchodilators alone.

* **Group III** included 15 healthy age and sex matched children as a control.

The results of our study:

Table (12): Shows age and sex distribution among the studied asthmatic patients . It shows that 21 patients (52.5%) fall in the age group 3-6 years, 13 patients (32.5%) in the age group 6-10 years, and 6 patients (15%) lie

between 10-14 years. It also shows that 22 patients (55%) were males while 18 patients (45%) were females.

Figure (7) : Shows the distribution of patients according to the age.

Figure (8): Shows the distribution of patients according to the sex.

Table (13): Shows statistical comparison of the age in all asthmatic patients (either atopic or non atopic) and normal controls. Statistically the differences between the three groups were not significant.**Figure (9)** demonstrates the comparison between the mean ages of patients and controls using bar chart.

Table (14): Demonstrates the distribution of patients according to different clinical parameters.

- Regarding the age of onset of asthma, 9 patients (22.5%) had their first attack below 1 year, 21 patients (52.5%) had it between 1 and 3 years and 10 patients (25%) over 3 years.
- Regarding the duration of the disease , 5 patients (12.5%) had the disease since less than 3 years, 25 patients (62.5%) had the disease since 3-6 years and 10 patients (25%) had the disease for more than 6 years.
- Regarding the severity of asthmatic attack, 21 patients (52.5%) had mild attack, 14 patients (35%) were moderately affected and only 5 patients (12.5%) had a severe exacerbation.
- Regarding the atopic state, it is observed that 27 patients (67.5%) were atopic and 13 patients (32.5%) were non-atopic.

Figure (10): Shows the distribution of patients according to age of onset of the disease.

Figure (11): Shows the distribution of patients according to the severity of asthmatic attack.

Table (15) and figure (12): Illustrate the frequency of positive skin prick tests to common environmental allergens among the studied asthmatic patients. House dust and dust mite were the most frequent with percentages of positivity of 37.5% and 32.5% respectively followed by mixed pollen, mixed mould, egg, feathers, grass, wool, cat hair and milk in a percentages of 30%, 17.5%, 10%, 7.5%, 7.5%, 5%, 5% and 2.5% respectively.

Table (16): Shows the following regarding the total serum IgE level.

- A statistically highly significant relation between atopic group and normal controls group $P < 0.001$.
- A statistically significant relation between non atopic group and normal controls $P < 0.05$.
- There was also a statistically highly significant relation between atopic and non-atopic groups $P < 0.001$.

Figure (13): Compares the means of total serum IgE levels between the 3 groups using a bar chart.

Table (17): Shows statistically highly significant relation between the mean level of AEC in both atopic and non-atopic groups compared to normal control $P < 0.001$& < 0.001 respectively but there was insignificant relation between atopic and non-atopic groups $P > 0.05$.

Figure (14): Compares the means of AEC between the 3 groups using a bar chart.

Table (18): Shows the following regarding the total serum IL-13 level during acute exacerbation:

- A statistically highly significant relation between atopic group and normal controls group $P < 0.001$.
- Although the mean concentration of serum IL-13 was higher in non-atopic asthmatics compared to normal controls, no statistically significant difference could be observed between the two groups, $P > 0.05$.
- A statistically highly significant relation between atopic and non-atopic group $P < 0.001$.

Figure (15): Demonstrates the difference between the mean serum IL-13 level in the 3 groups using a bar chart.

Table (19) and Figure (16): Show a statistically highly significant difference between mean serum level of IL-13 during acute exacerbation and one week after remission in all asthmatic patients (no. 40).

Table (20) and Figure (17): Show statistical comparison of mean serum IL-13 level during acute exacerbation and after remission in atopic and non-atopic groups. A highly significant relation is present in both groups. They also show a statistically insignificant relation in the remission level of IL-13 between atopic and non-atopic groups.

Table (21): Shows that the mean serum IL-13 level increases as the number of positive skin prick tests increases demonstrating a highly significant relation.

Figure (18): Shows a rise in the mean serum IL-13 level during acute exacerbation as the number of positive skin prick tests increases in patients demonstrating a highly significant relation.

Table (22): Shows a statistically highly significant relation between serum IL-13 level during acute exacerbation and the severity of asthmatic attack.

Figure (19): Shows an increase in the mean serum IL-13 level during acute exacerbation with the severity of the asthmatic attack thus demonstrating a statistically significant relation.

Table (23): Shows correlation coefficients and probability between mean serum IL-13 level during acute exacerbation and other parameters. There was a statistically highly significant relation between serum IL-13 level and each of IgE , AEC and PEFR, the table also demonstrates an insignificant relation between serum IL-13 level during acute exacerbation and age of the patients.

Figure (20): Demonstrates a positive correlation between mean serum IL-13 level during acute exacerbation and total serum IgE level in all patients.

Figure (21): Demonstrates positive correlation between mean serum IL-13 level during acute exacerbation and the AEC in all patients

Figure (22): Shows inverse relationship between mean serum IL-13 level during acute exacerbation and PEFR in all patients.

Table (24) and Figure (23): Show statistical comparison of the mean serum IL-13 level in atopic asthmatics before and after one week treatment with bronchodilators + steroids in group Ia VS bronchodilators alone in group Ib there was a highly significant relation in each group. They also show statistically significant relation between mean serum IL-13 level during remission in group Ia versus group Ib.

Table (25) and Figure (24): Show statistical comparison of the mean serum IL-13 level in non-atopic asthmatics before and after one week treatment with bronchodilators and steroid in group IIa VS bronchodilators alone in group IIb there was a highly significant relation in group IIa and a significant relation in group IIb. They also show a statistically insignificant relation between mean serum IL-13 level during remission in group IIa versus group IIb.

Table (12): Age and sex distribution among the studied asthmatic children

	No	%
Age (years):		
-3-6 yrs	21	52.5
->6-10 yrs	13	32.5
-> 10-14 yrs	6	15.00
- Range (years)	4.2 / 12 – 14	
- Mean ± SD	7.5 ± 2.9	
Sex:		
Male	22	55
Female	18	45

Fig (7): Distribution of patients according to age.

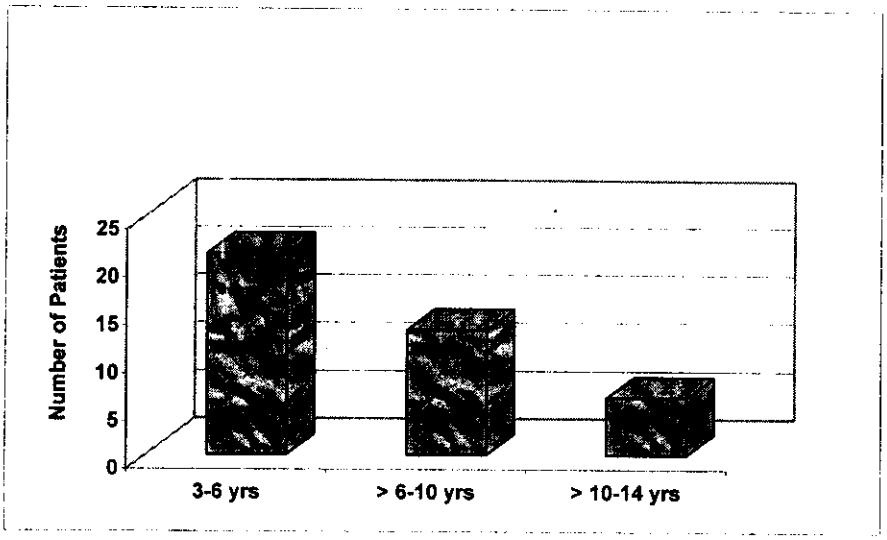


Fig (8): Distribution of patients according to sex.

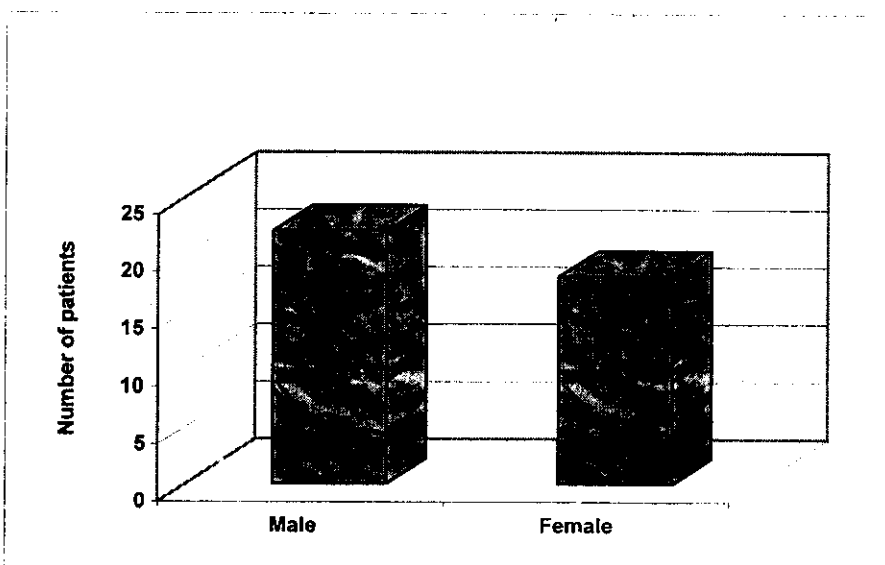
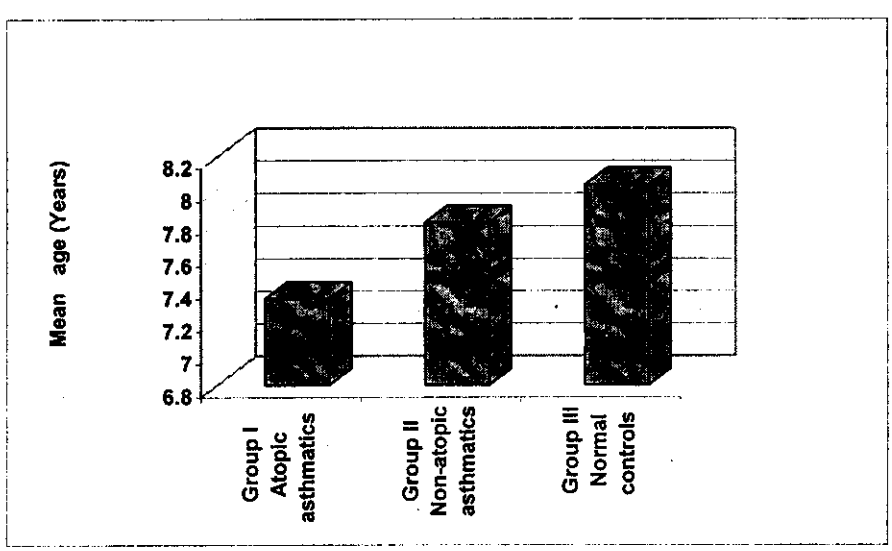


Table (13): Statistical comparison of the age in all asthmatic patients and normal controls

	Group I (Atopic asthmatics)	Group II (Non-atopic asthmatics)	Group III (Normal controls)
No.	27	13	15
Range	4.2 / 12 – 14	4 – 13	4 – 13
Mean ± SD	7.333 ± 2.646	7.807 ± 3.345	8.033 ± 2.862
P. value	> 0.05	> 0.05	Not significant
P1. Value	> 0.05	Not significant	

P. value : Group III versus group I & group II.
P1. Value : Group I versus group II

Fig (9) : Mean ages in all asthmatic patients and normal controls



Table(14) Distribution of patients according to different clinical parameters

	No	%
Age of onset		
-<1 yrs	9	22.5
-1-3 yrs	21	52.5
-> 3 yrs	10	25
- Range	0.5-8	
- Mean ± SD	2.5 ± 2.01	
Duration of the disease		
-<3 yrs	5	12.5
-3-6 yrs	25	62.5
-> 6 yrs	10	25
- Range	2-10	
- Mean ± SD	5.09 ± 2.19	
Severity of the attack		
- Mild	21	52.5%
- Moderate	14	35
- Severe	5	12.5
Atopy		
+ ve	27	67.5
- ve	13	32.5

Fig (10): Distribution of patients according to age of onset of asthma .

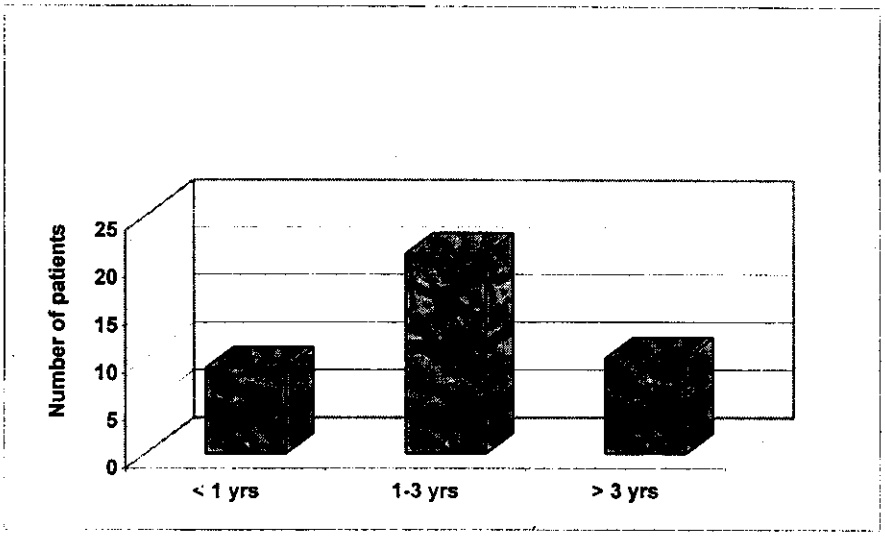


Fig (11): Distribution of patients according to severity of the attack .

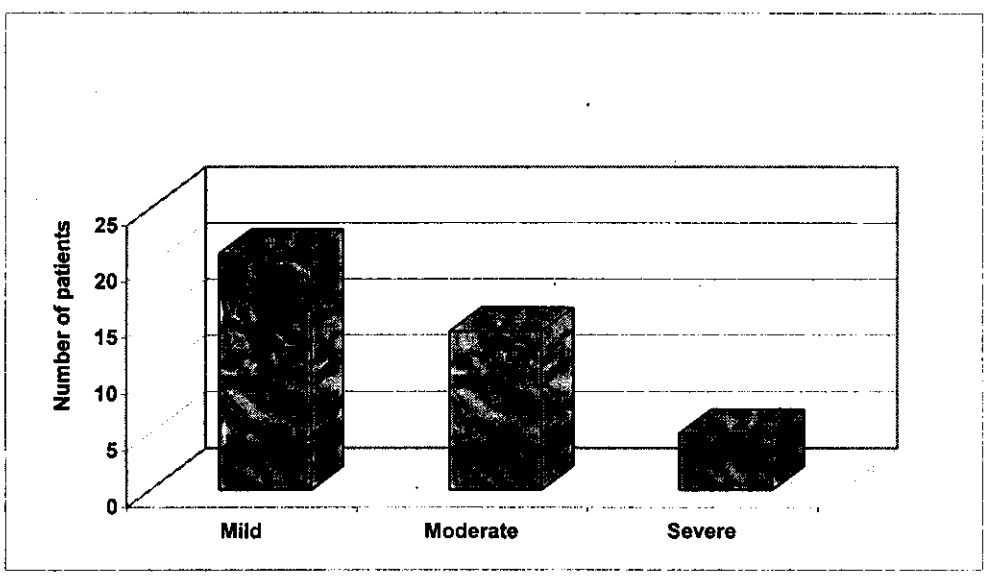


Table (15): Frequency of positive skin prick tests among the studied asthmatic children No. (40)

Skin prick test	Total No. of Patients (40)	%
Mixed mould (M.M)	7	17.5
Feathers (Frs)	3	7.5
House dust (H.D)	15	37.5
House dust mite (H.D.M)	13	32.5
Mixed Pollen (M.P)	12	30
Egg	4	10
Cat hair (C.H)	2	5
Grass (Gss)	3	7.5
Wool (WL)	2	5
Milk (MK)	1	2.5

Fig (12): Frequency of positive skin prick tests among the studied asthmatic children (No.40).

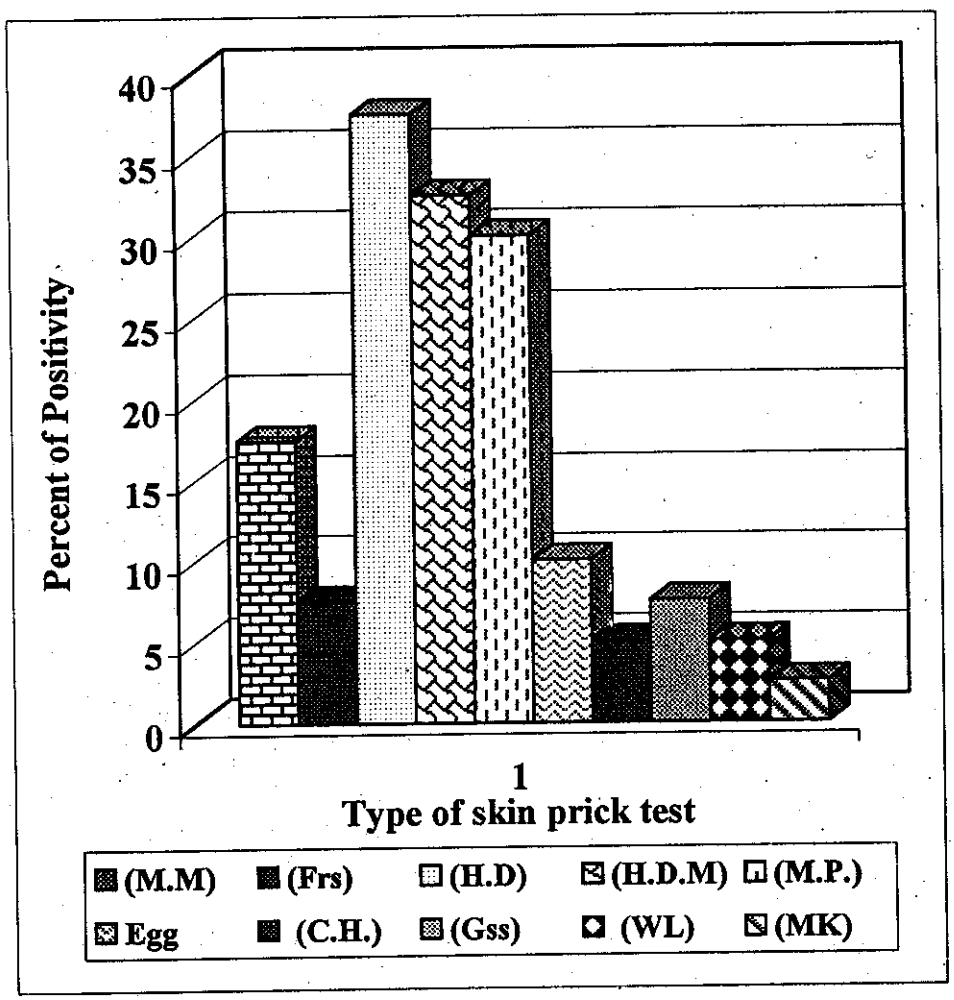
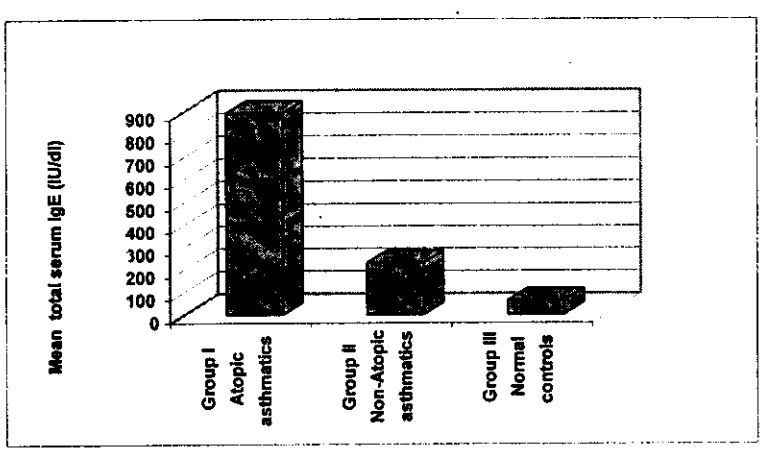


Table (16): Statistical comparison of total serum IgE (IU/ml) in all asthmatic patients during exacerbation and normal controls.

	GroupI Atopic asthmatics	Group II Non-atopic asthmatics	Group III Normal controls
No.	27	13	15
Range	209-4000	12-632	12-106
Mean + SD	892.8 ± 776.3	228.54 ± 232.9	60.47 ± 24.2
P. value	<0.001	<0.05	Highly significant & significant respectively
P1. value	<0.001	Highly significant	

P. value : Group III versus group I & group II.
P1. value : Group I versus group II

Fig (13): Mean total serum IgE level during acute exacerbation in patients and normal controls



Table(17) : Statistical comparison of AEC in all asthmatic patients during acute exacerbation and normal controls

	Group I (Atopic asthmatics)	Group II (Non-atopic asthmatics)	Group III (normal controls)
No.	27	13	15
Range	0 – 1168	0 – 900	0 – 324
Mean + SD	410.9 + 346.10	344.62 + 356.4	111.0 + 117.55
P. value	< 0.001	< 0.001	Highly significant
P1. value	> 0.05	Not significant	

P. value : Group III versus group I & group II.
P1. value : Group I versus group II

AEC : Absolute eosinophilic count

Fig (14): Statistical comparison of AEC in all asthmatic patients during acute attack and normal controls

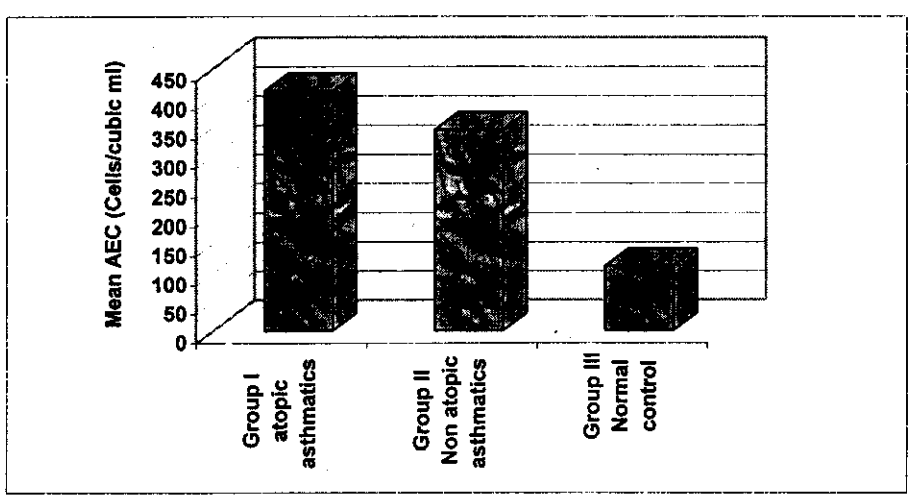


Table (18): Statistical comparison of serum IL-13 level pg/dl in all asthmatic patients during acute exacerbation and normal controls

	Group I (Atopicasthmatics)	Group II (Non-atopic asthmatics)	Group III (Normal controls)
No.	27	13	15
Range	38-88	30-46	29-35
Mean ± SD	54.01 ± 12.6	37.85 ± 4.81	32.2 ± 2.04
P. value	< 0.001	> 0.05	Highly significant & not significant respectively
P1. value	< 0.001	Highly significant	

P. value : Group III versus group I & group II.
P1. value : Group I versus group II

Fig (15): Mean serum IL-13 level (pg/dl) in all asthmatic patients during acute exacerbation and normal controls

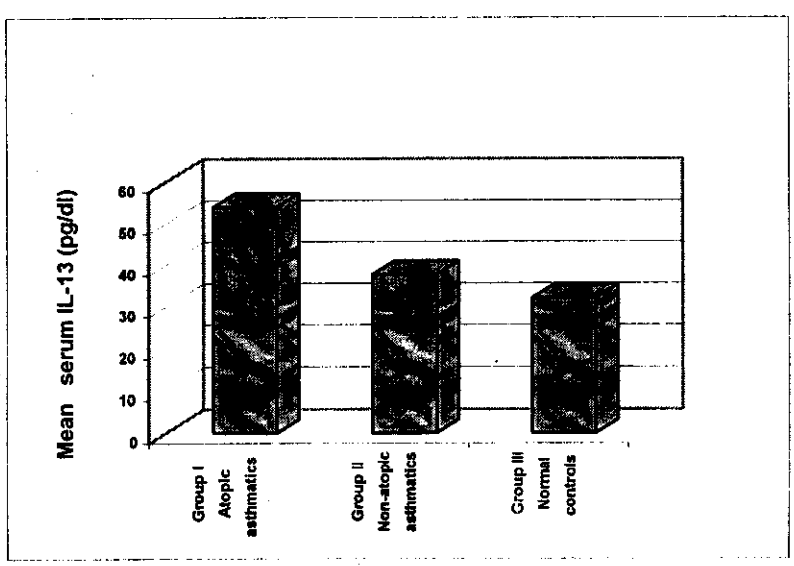
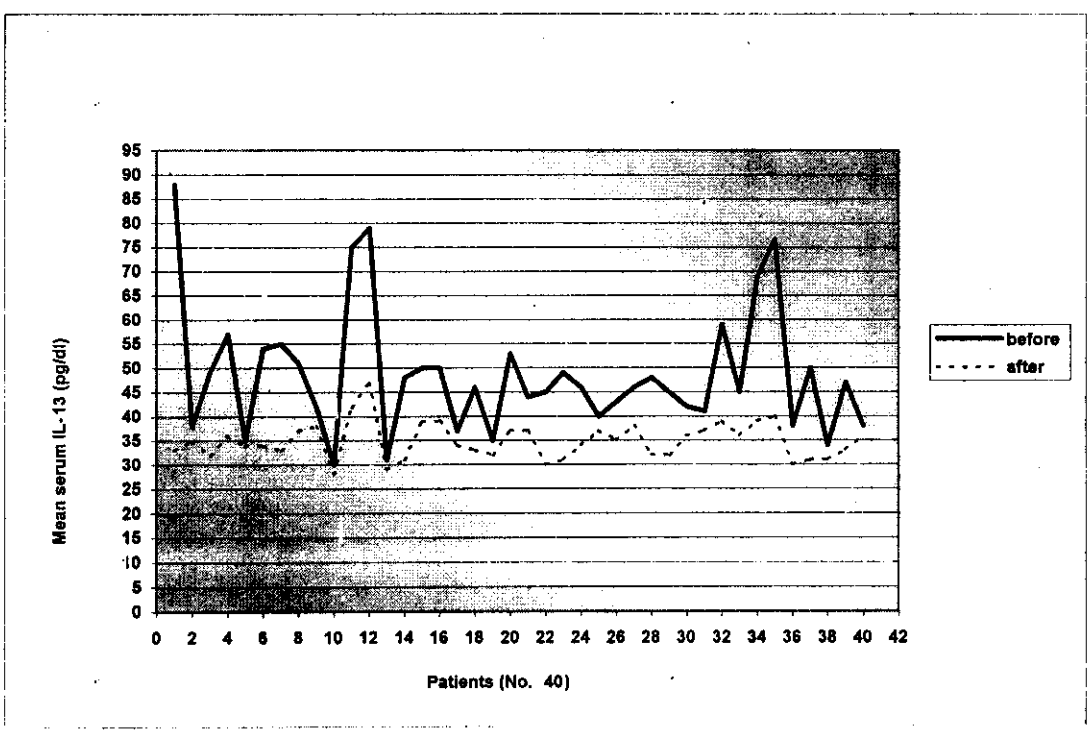


Table (19): Statistical comparison between serum IL-13 level during acute exacerbation and one week after treatment in all asthmatic patients

	Serum IL-13 (acute exacerbation)	Serum IL-13 (remission)
No.	40	40
Range	30-88	28-47
Mean ± SD	48.76 ± 13.08	34.92 ± 3.85
P Value	< 0.001	H.S

Fig (16): Relation between serum IL-13 level during acute exacerbation and remission in all asthmatic patients



Table(20): Statistical comparison of serum IL-13 during acute exacerbation and one week after treatment in atopic and non atopic groups

	Group (I) No. 27 Atopic asthmatics		Group (II) No.13 Non atopic asthmatics	
	Before	After	Before	After
Mean ± SD	54.01 ± 12.56	35.22 ± 4.09	37.846 ± 4.81	34.32 ± 3.38
t	9.16		6.43	
P value	< 0.001	H.S	< 0.001	H.S
P_1 value		> 0.05		N.Sig

P. value **The attack versus the remission level of IL-13 in groups (I & II)**
P_1 value **The remission level of IL-13 in group I versus group II**

Fig (17): Mean serum IL-13 during acute exacerbation and one week after treatment in atopic and non-atopic groups

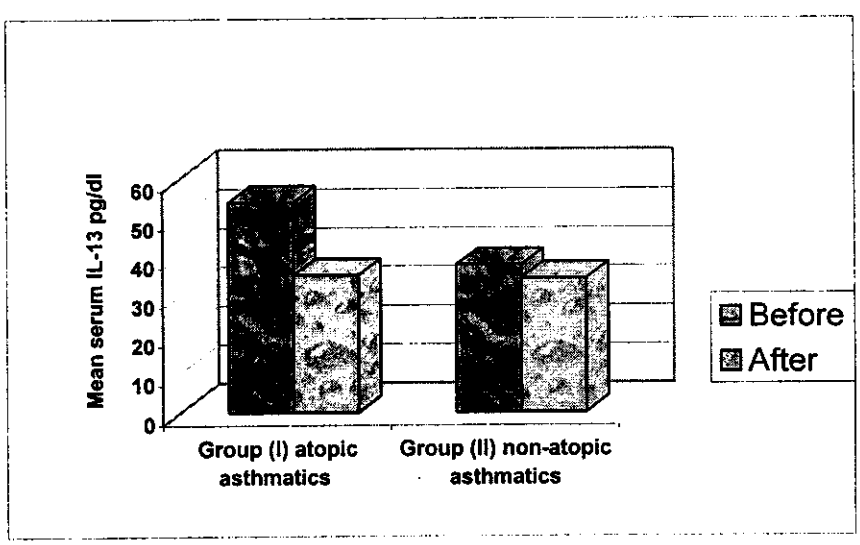


Table (21): Comparison of the mean serum IL-13 level during acute exacerbation and the number of positive skin prick tests in patients

	Number of +ve skin prick tests			
	0 (-ve)	1 (+ve)	2 (+ve)	3 (+ve)
No. of patients	7	12	14	7
Range	30 – 41	35 – 51	38 – 79	42 – 88
Mean ± SD	36.00 ± 4.4	44.56 ± 5.68	51.43 ± 9.93	63.37 ± 18.14

Mean serum IL-13 level increases as the number of +ve skin prick tests increases ($P. < 0.001$) demonstrating highly significant relation.

- 0 (- ve) vs	1 + ve	$P < 0.05$
- 0 (- ve) vs	2 + ve , 3 + ve	$P < 0.001$
- 1 (+ ve) vs	2 + ve	$P < 0.05$
- 1 (+ ve) vs	3 + ve	$P < 0.001$
- 2 (+ ve) vs	3 + ve	$P < 0.05$

Fig(18) Comparison of the mean serum IL-13 level during acute axacerbation and the number of positive skin prick tests in patients.

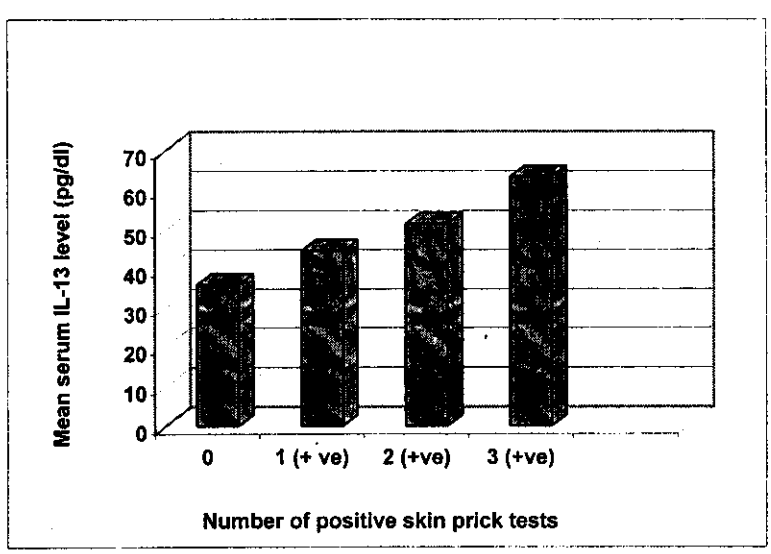


Table (22): Comparison between serum IL-13 level during acute exacerbation and the severity of asthmatic attack

Degree of Asthma	No	Range	X ± SD	One way (ANOVA) F	P
Mild I	21	35-75	42.21 ± 8.18		
Moderate II	14	30-79	48.73 ± 14.9	1.67	< 0.05
Severe III	5	39-88	55.98 ± 19.16		

P < 0.05 Group (I) versus Group (II)
P < 0.05 Group (I) versus Group (III)
P < 0.05 Group (II) versus Group (III)
F Analysis of variance (ANOVA)

Fig (19): Mean serum IL-13 level during acute exacerbation and the severity of asthmatic attack

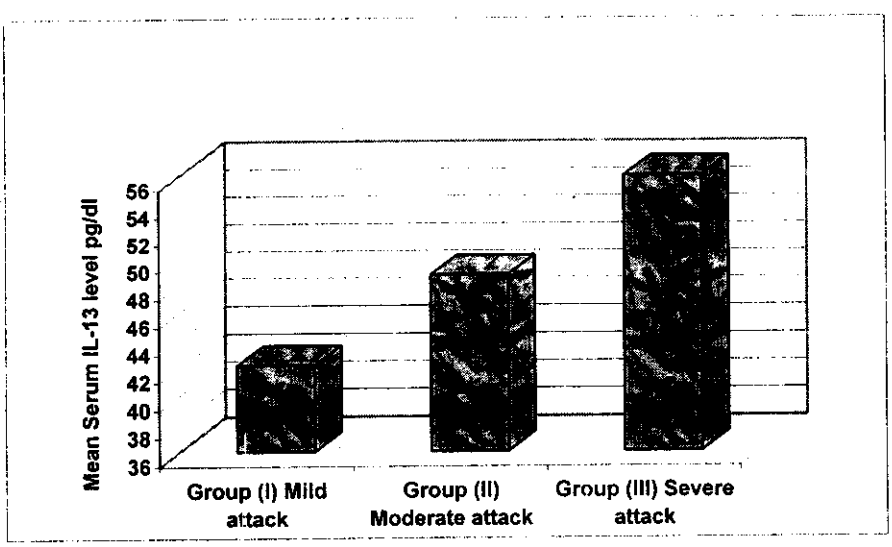


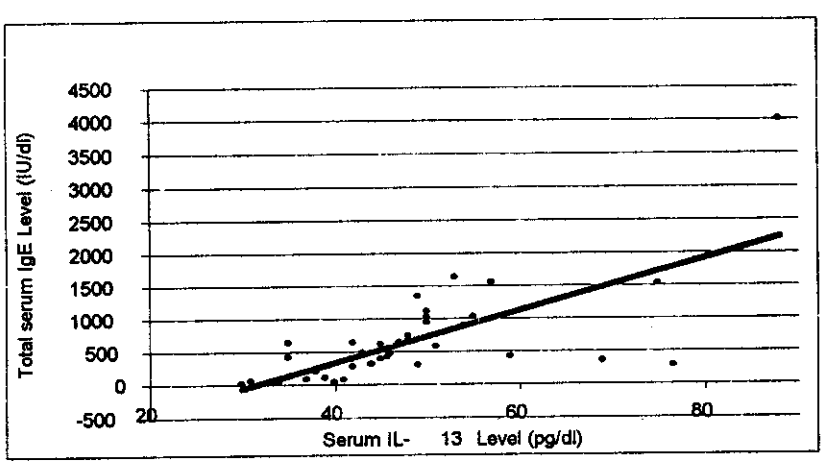
Table (23): Correlation coefficients between serum IL-13 level during acute exacerbation and other parameters.

	Serum IL-13	Total serum IgE	AEC	PEFR	Age of patients	Duration of the disease
No	40	40	40	33	40	40
Range	30-88	12-4000	0-1168	28-91	4-14	2-10
Mean ± SD	48.8 ± 13.1	676.9±719.6	389.4±346.9	68.5 ± 25.8	7.49 ± 2.86	5.09 ± 2.19
P		< 0.001	< 0.05	< 0.05	> 0.05	> 0.05
r		0.72	0.30	-0.24	0.17	0.11

This table illustrates

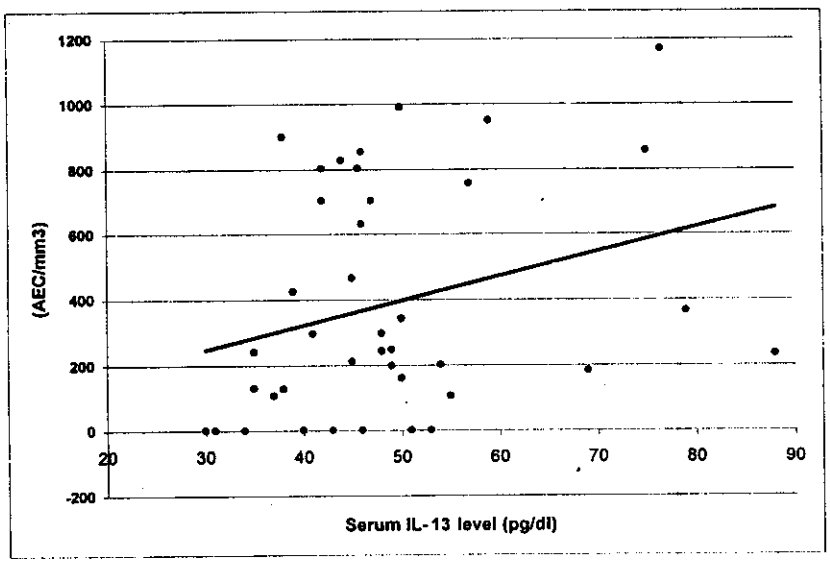
* + ve correlation between serum IL-13 and IgE level
* + ve correlation between serum IL-13 and AEC
* Inverse relationship between serum IL-13 and PEFR

Fig.(20) :Correlation between serum IL-13 level during acute exacerbation and total serum IgE in patients



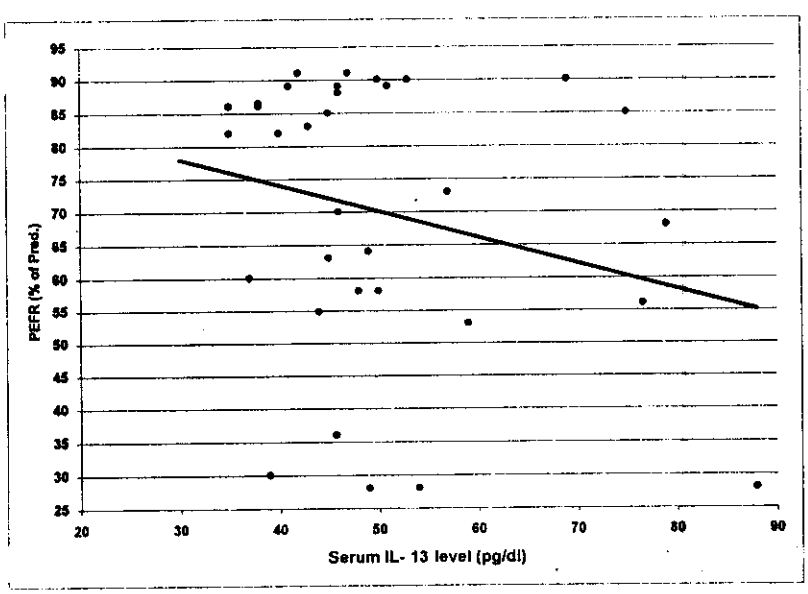
r = 0.72

Fig. (21):Correlation between serum IL-13 level during acute exacerbation and AEC in patients



r = 0.30

Fig (22) Correlation between serum IL-13 level during acute exacerbation and PEFR in patients



r = - 0.24

Table (24): Statistical comparison of serum IL-13 level in atopic asthmatics before and after 1 week treatment with BD + Steroids in group (I-a) vs BD alone in group (I-b)

	Group I a Atopic asthmatics No. 14		Group I b Atopic Asthmatics No. 13	
	Before	After	Before	After
Mean ± SD	60.38 ± 14.2	33.18 ± 3.1	47.15 ± 5.01	35.15 ± 2.7
Paired t		8.43		10.99
P. Value	< 0.001	H.S	< 0.001	H.S
P_1 value		< 0.05		Sig

P. value — The attack versus the remission level of IL-13 in groups (I a & I b)
P_1 value — The remission level of IL-13 in group I a versus group I b

Fig (23): Mean serum IL-13 level in atopic asthmatics before & after 1 week treatment with BD + steroids in group (1-a) vs BD alone in group (1-b).

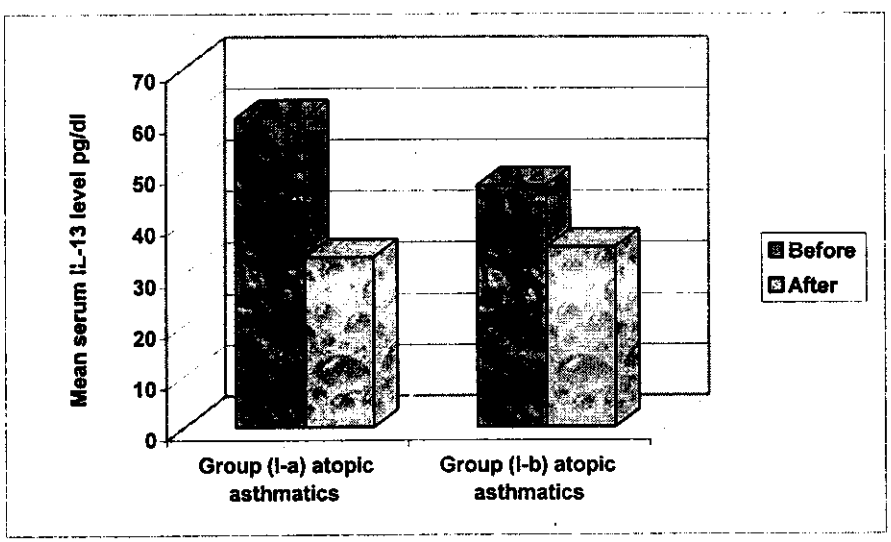


Table (25): Statistical comparison of serum IL-13 level in non-atopic asthmatics before and after one week treatment with BD + steroid in group (II-a) vs BD alone in group (II-b)

	Group (II-a) Non-atopic asthmatics No.6		Group (II-b) Non-atopic asthmatics No.7	
	Before	After	Before	After
Mean ± SD	39.3±5.1	35.2±3.4	36.6±4.5	33.6±3.4
Paired t		5.0		4.15
P value	< 0.001	H.S	< 0.01	S
P_1 value		> 0.05		N.S

P. value The attack versus the remission level of IL-13 in groups (II a & II b)
P_1 value The remission level of IL-13 in group II a versus group II b

Fig (24): Mean serum IL-13 level in non-atopic asthmatics before & after 1 week treatment with BD & steroids in group (II-a) Vs BD alone in group (II-b).