RESULTS

RESULTS

The results of this work were described and statistically analyzed in the following tables (1-11) and figures (1-11).

Tables (1) (2) & Fig. (1) (2):

Show statistical comparison as regards sex and age distribution among the studied groups. There was no significant difference between group I (children with family history of hypertension) and group II (children without family history of hypertension) with respect to sex and age.

Fig. (3):

Shows the family history distribution among group I (children of hypertensive parent). Children with one hypertensive parent were represent 83.3% and children with family history of hypertension of both parents were represent 16.7%.

Table (3) & Fig. (4):

Shows a comparison "as regards weight, hight and body mass index distribution" between group I versus group II. There was significant increase in hight in group I with a mean value 152.6 ± 11.7 cm in comparison to group II with a mean value 144.5 ± 8.8 cm ($P < 0.05$).

Table (4) & Fig. (5):

Shows a comparison "as regards resting pulse, D.B.P. and S.B.P. distribution" between group I versus group II. The resting pulse was significantly increased in group I with a mean value 93.1 ± 5.8 beta/min in comparison to the group II with a mean value 86.5 ± 3.05 beta /min (P= < 0.01).

Also diastolic blood pressure was significantly increased in group I with a mean value 80.5 ± 3.8 mmHg in comparison to group II with a mean value 75.0 ± 3.2 mmHg (P = < 0.01).

Table (5) & Fig. (6):

Shows a comparison between the studied children according to their echocardiographic parameters.

- Left ventricular mass (LVM) was significantly increased in group I with a mean value 99.67 ± 48.7 gm in comparison to group II with a mean value 80.5 ± 12.5 gm (P = < 0 05).
- Also diastolic function (E/A ratio) was significantly increased in group I with a mean 1.48 ± 0.34 in comparison to group II with a mean value 1.89 ± 0.37 (P = < 0.05).
- There was no significant difference between the two groups as regard EF.

Table (6) & Fig. (7):

Shows a comparison between group I and group II as regards heart rate, diastolic blood pressure at mide exercise. There was significant increase in all compared data in group I with mean values:

- Mid exercise HR 126.1 ± 13.2 beat/min
- Mid exercise S. Bl. P. 122.7 ± 6.8 mmHg
- Mid exercise D. Bl. P 83.2 ± 3.7 mmH

In comparison to group II with a mean values:

- Mid exercise HR 114.5 ± 10.8 b.at/min
- Mid exercise SBl. P. 118.0 ± 4.1 mmHg
- Mid exercise D. Bl. P 79.0 ± 5.0 mmHg

(P < 0.05) in all parameters

Table (7) & Fig. (8):

Shows a comparison between group I versus group II as regard heart rate, diastolic blood pressure, systolic blood pressure at peak exercise.

There was significant increase in all compared data in group I with a mean values:

- Peak exercise HR 152.3 ± 15.3 beat/min
- Peak exercise S. Bl. P 132 ± 9.2 mmHg
- Peak exercise D. Bl. P 87.3 ± 3.9 mmHg

In comparison to group II with a mean values:

- Peak exercise HR 142.0 ± 10.0 beat/min
- Peak exercise S.Bl.P. 127.0 ± 4.7 mmHg
- Peak exercise D. Bl. P. 81.5 ± 3.2 mmHg

P < 0.05 in peak exercise HR and S. Bl. P. and

P < 0.01 in peak exercise D. Bl.P.

Table (8):

Show correlation coefficient of body mass index (B.M.I) and other parameters in the studied children.

- There was significant positive correlation between B.M.I. and LVM, E/A ratio, HR and S.B.P. at rest and at mid and peak exercise.
- Otherwise, there was no significant correlation between BMI and DBP at rest and at mid and peak exercise.

Table (9) & Fig. (9,10):

Show correlation coefficient between left ventricular mass (LVM) and age & S.B.P & D.B.P. and E/A ratio among the studied children.

- LVM was significantly correlated with age (Fig. 9), E/A ratio.
- Also there is a significant positive correlation between LVM and DBP (Figure 10).
- Otherwise there was no significant correlation between LVM and S.B.P.

Table (10):

Show correlation coefficient of age and other parameters in the studied children.

- There was a statistical significant positive correlation between age and E/A ratio, SBP at rest and at mid and peak exercise, HR at mid and peak exercise and DBP at mid and peak exercise.
- Otherwise, there was no significant correlation between age and resting DBP.

Table (11) & Fig. (11):

Show correlation coefficient between weight (wt) and other parameters in the studied children.

- There was significant positive correlation between weight and LVM (Figure 11).

- There was also a statistically significant positive correlation between weight and E/A ratio, HR and SBP at mid and peak exercise.
- Otherwise there was no significant correlation between weight and DBP at mid and peak exercise.

Table (1): Sex distribution of the studied children.

St. group / Sex	Group I		Group II		Total	
	No.	%	No.	%	No.	%
Males	31	57.4	12	60.0	43	58.1
Females	23	42.6	8	40.0	31	41.9
Total	54	100.0	20	100.0	74	100.0

$X^2 = 0.040$ $P > 0.05$.

Fig. (1): Sex distribution among the studied children.

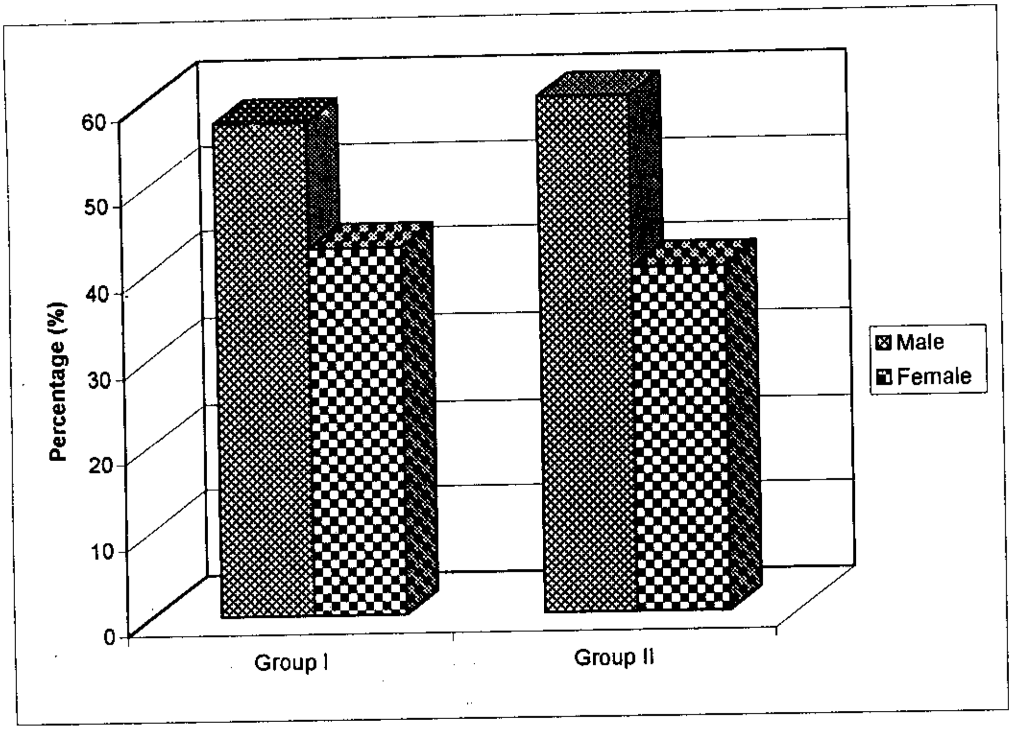


Table (2): Comparison between the studied groups regarding age.

St. groups / Age (ys)	Group I	Group II
Range	8.0 - 16.0	8.0 - 16.0
$\bar{X}$	12.7	12.1
± S.D.	± 2.1	± 2.4
t	1.133	
P	> 0.05	

Fig. (2): Age distribution among the studied children.

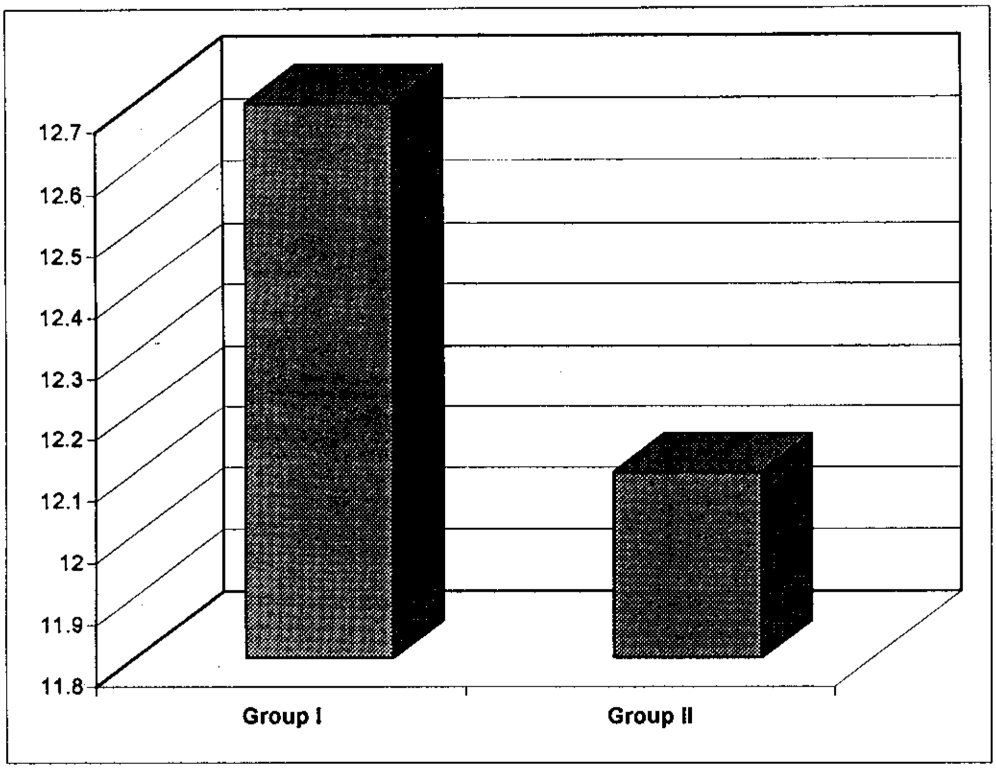


Fig. (3): Family history distribution among children of hypertensive parents.

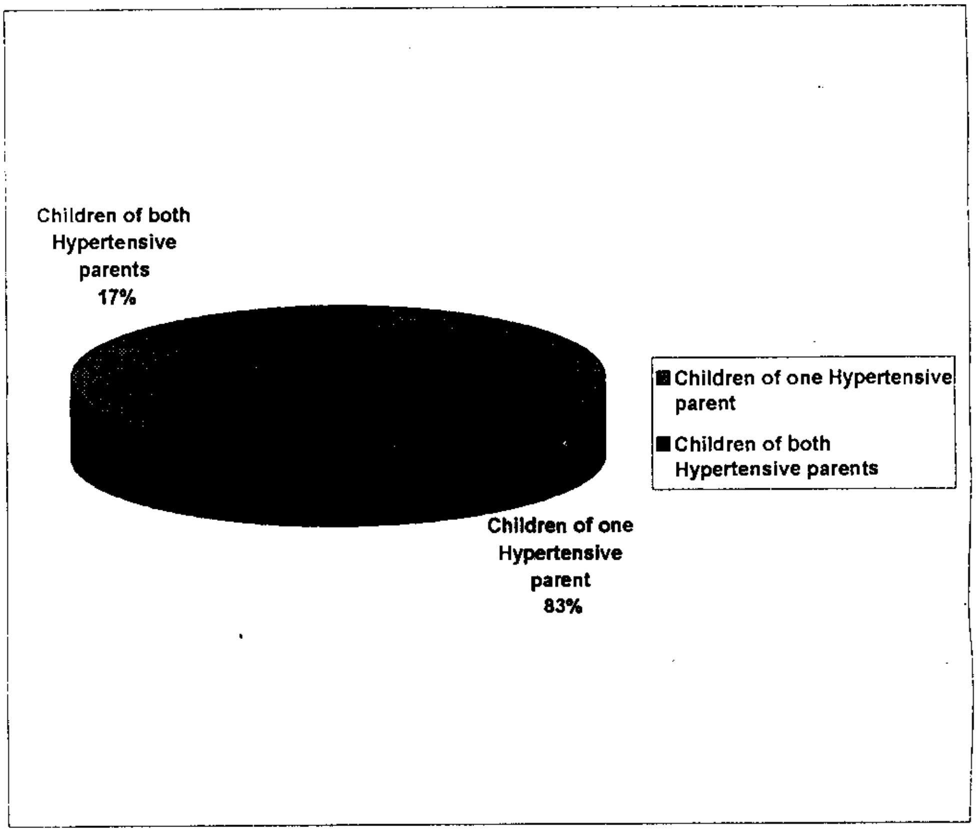


Table (3): Comparison between the studied children according to their weight, height and body mass index.

St. group	Group I $\overline{X} \pm$ S.D.	Group II $\overline{X} \pm$ S.D.	t	P
Wt. (kg)	37.8 ± 13.4	33.6 ± 9.7	1.291	>0.05
Ht. (cm)	152.6 ± 11.7	144.5 ± 8.8	2.8232	< 0.05*
B.M.I*	15.8 ± 3.9838	15.8 ± 2.9	0.0590	> 0.05

$$\text{* Body mass index} = \frac{\text{weight (kgs)}}{\text{square hight (meters)}}$$

* P < 0.05 (significant)

Fig. (4): Comparison between the studied children according to their weight, height and body mass index.

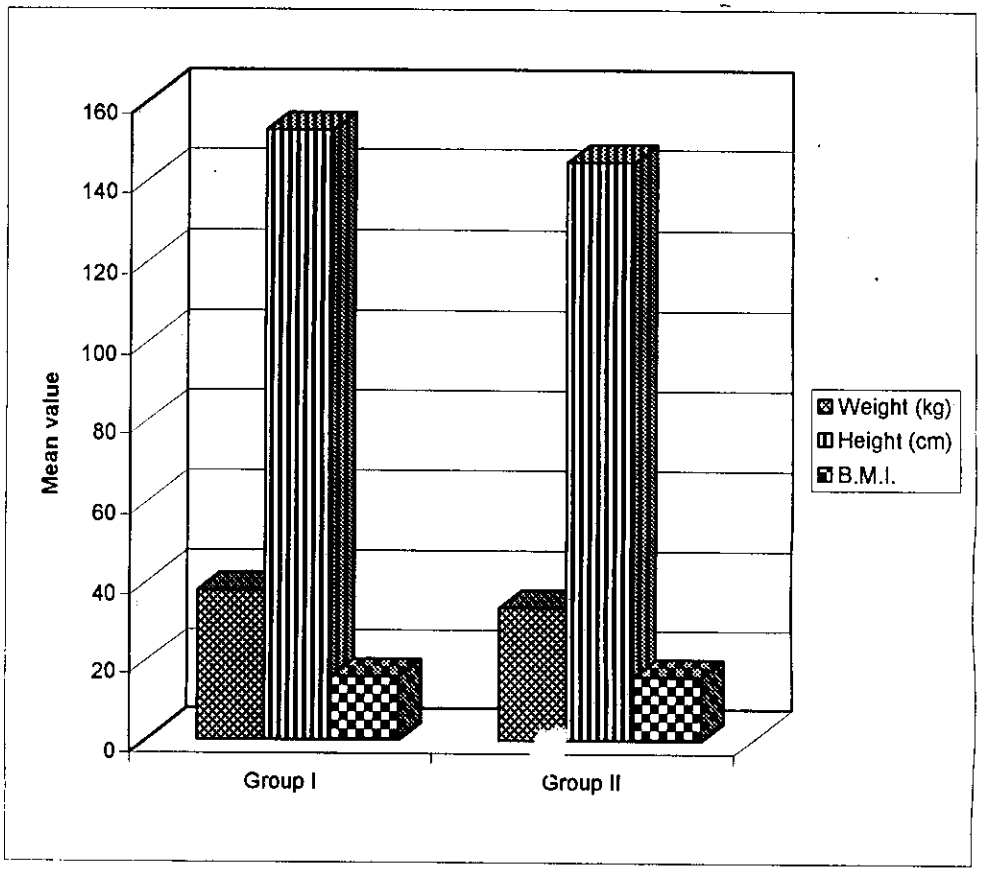


Table (4): Comparison between the studied children according to their resting pulse and blood pressure.

St. group	Group I	Group II	t	P
	$\overline{X}$ ± S.D.	$\overline{X}$ ± S.D.		
Resting HR beat/min	93.1 ± 5.8	86.5 ± 3.05	4.8288	<0.01*
Resting S.B.P. mmHg	112.1 ± 7.4	112.5 ± 7.6	0.1874	> 0.05
Resting D.B.P. mmHg	80.5 ± 3.8	75.0 ± 3.2	5.7430	< 0.01*

Fig. (5): Comparison between the studied children according to their resting pulse, systolic blood pressure and diastolic blood pressure

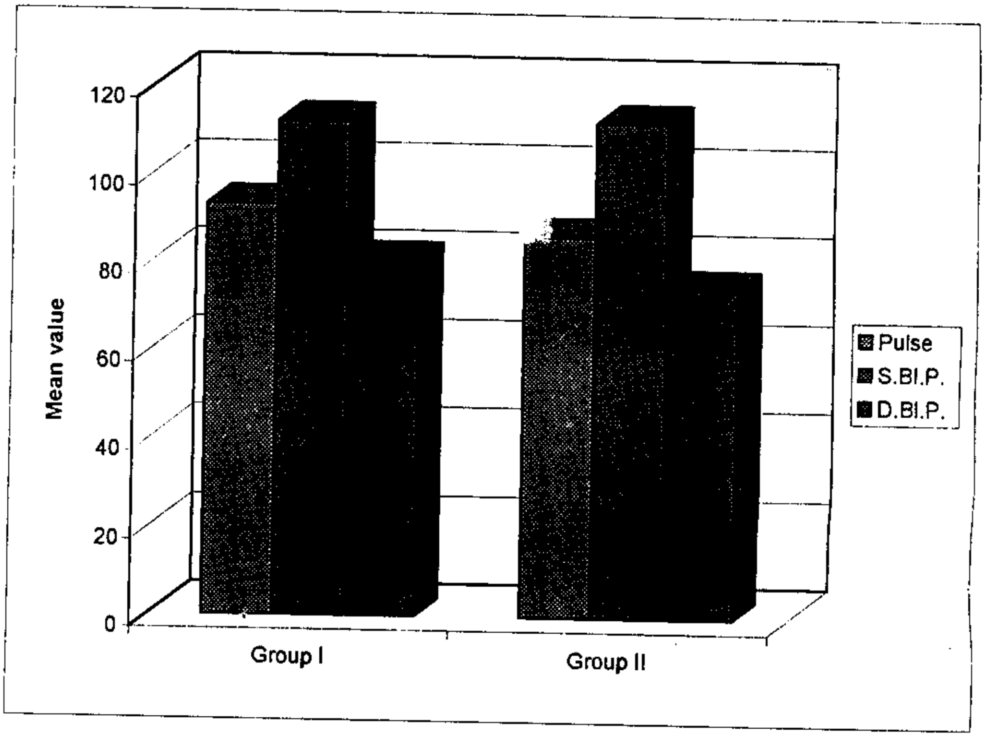


Table (5): Comparison between the studied children according to their echocardiographic parameters.

St. group / Echo. parameters	Group I	Group II	t	P
	$\overline{X}$ ± S.D.	$\overline{X}$ ± S.D.		
L.V.M. (gm)	99.67 ± 48.7	80.5 ± 12.5	1.931	< 0.05*
Diastolic function (E/A ratio)	1.48 ± 0.34	1.89 ± 0.37	4.467	< 0.05*
Systolic F. (EF)	642.4 ± 154.8	688.3 ± 83.9	1.2540	> 0.05

Fig. (6): Comparison between the studied children according to their echo cardiographic parameters

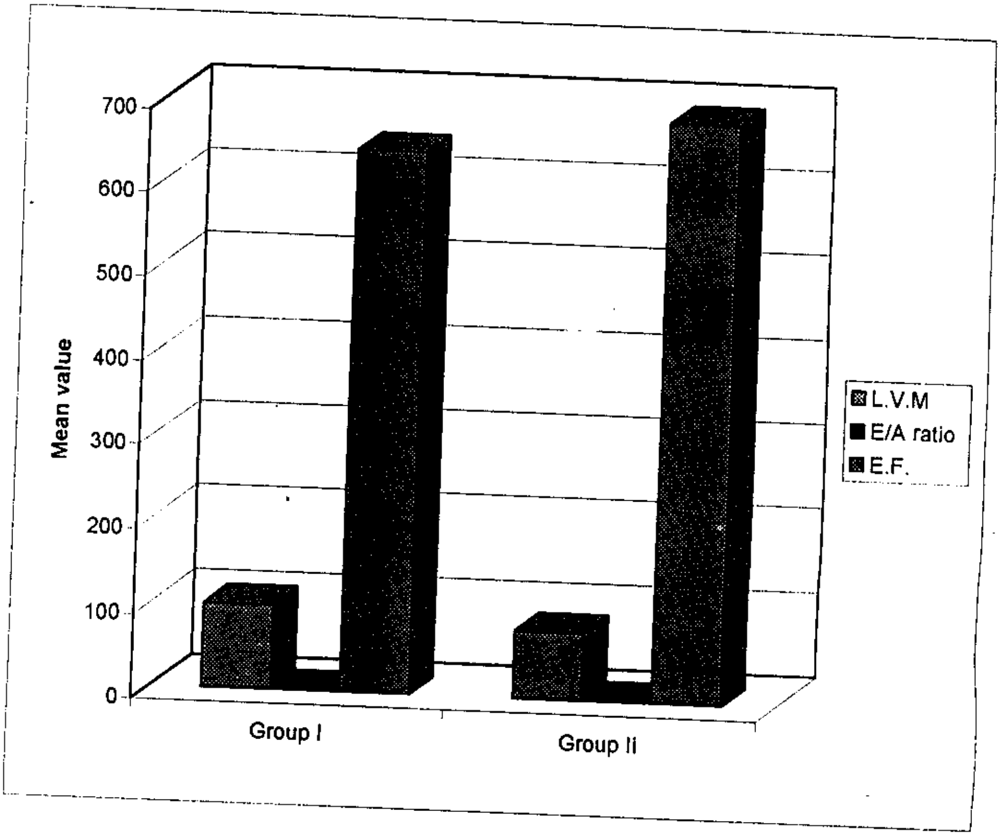


Table (6): Comparison between the studied children according to their H.R. & S.B.P. & D.B.P. at mid exercise test.

St. group	Group I	Group II	t	P
	$\bar{X}$ ± S.D.	$\bar{X}$ ± S.D.		
Mid exercise HR beat/min	126.1 ± 13.2	114.5 ± 10.8	3.5180	< 0.05*
Mid exercise S.B.P. mmHg	122.7 ± 6.8	118.0 ± 4.1	2.9252	< 0.05*
Mid exercise D.B.P. mmHg	83.2 ± 3.7	79.0 ± 5.0	3.9072	< 0.05*

Fig. (7): Comparison between the studied children according to heart rate, systolic blood pressure and diastolic blood pressure at mid exercise test.

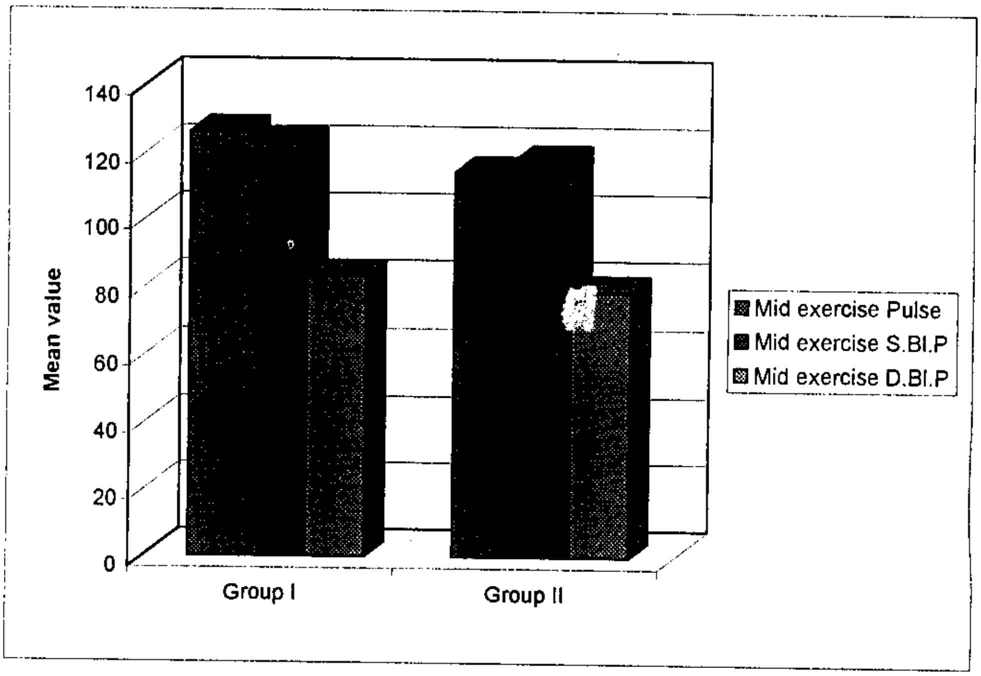


Table (7): Comparison between the studied children according to their H.R. & D.B.P. & S.B.P. at peak exercise test.

St. group	Group I $\bar{X} \pm$ S.D.	Group II $\bar{X} \pm$ S.D.	t	P
Peak exercise HR	152.3 ± 15.3	142.0 ± 10.0	2.7814	< 0.05*
Peak exercise S.Bl.P.	132.4 ± 9.2	127.0 ± 4.7	2.520	< 0.05*
Peak exercise D.Bl.P.	87.3 ± 3.9	81.5 ± 3.2	5.9087	< 0.01*

Figure (9)

Scatterplot showing the relation between age (years) and left ventricular mass among the studied children

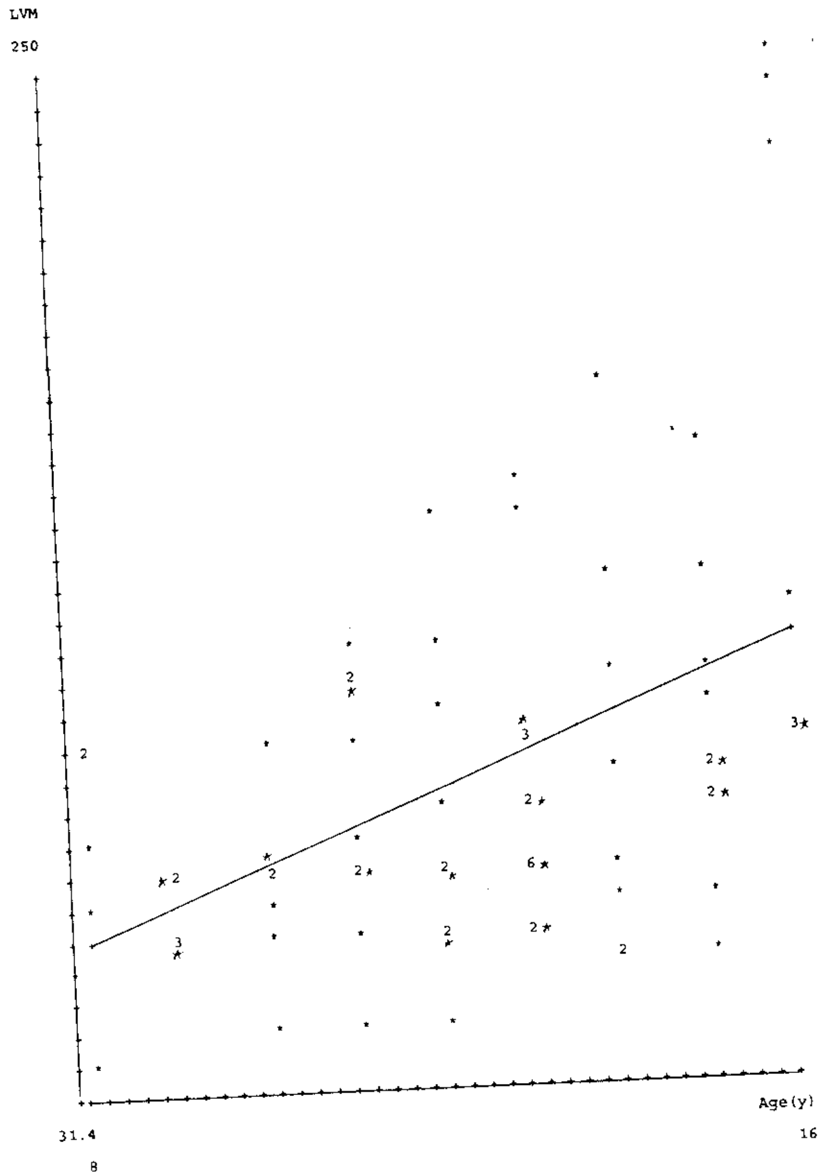
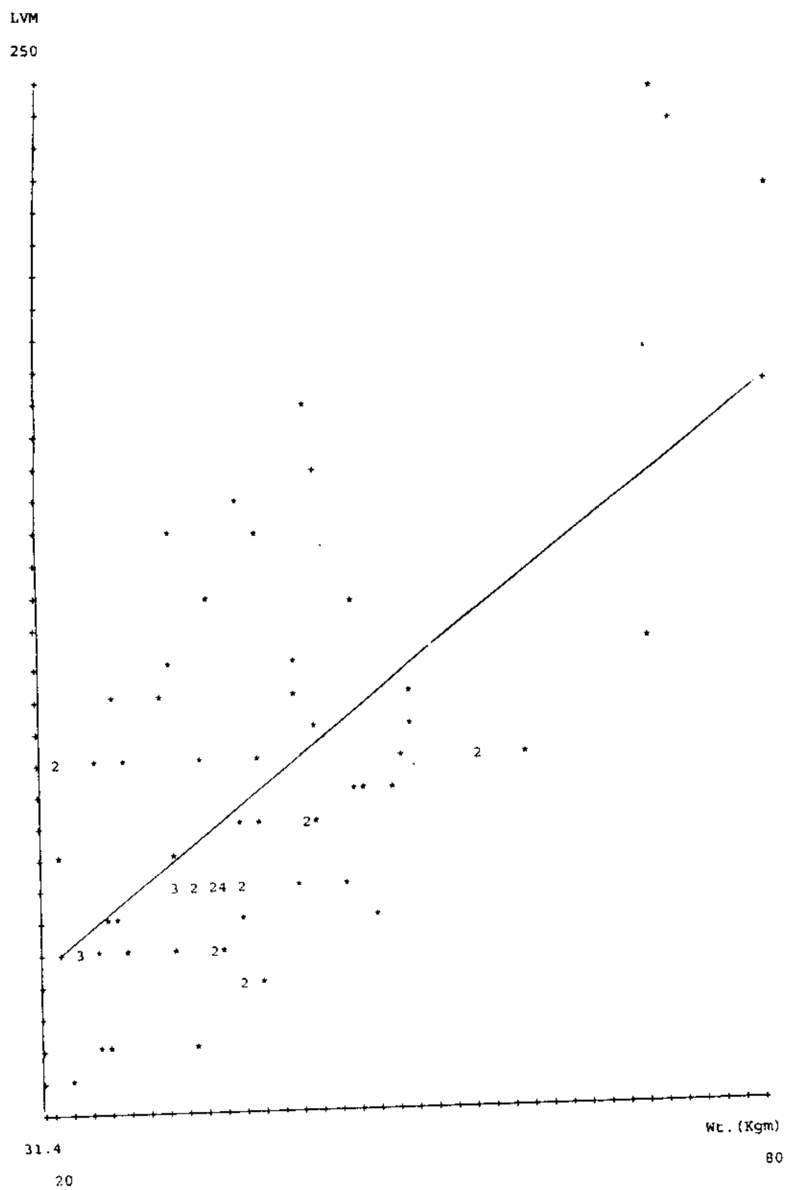


Figure (11)

Scatterplot showing the relation between left ventricular mass and weight (kgm).



DISCUSSION

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Hypertension is clearly established as a major risk factor for cardiovascular illness *(Kannel, 1984)*.

It commonly underlies the onset of heart failure, cerebrovascular accidents, and end stage renal disease. Cardiac hypertrophy is one of the earliest clinical manifestations of sustained hypertension ***(Soto et al., 1997)***.

Increased left ventricular thickness can be found in patients with only borderline elevation of blood pressure, indicating that left ventricular changes can occur early in the course of hypertension ***(Drayer et al., 1991)***. Left ventricular hypertrophy is an independent predictor for cardiovascular morbidity and mortality in patients with hypertension as it is associated with a worse prognosis than high blood pressure alone ***(Casale et al., 1990)***.

Vittolio et al.(1992) suggested that a genetic predisposition in some people with family history of essential hypertension may facilitate the development of cardiovascular changes at normal pressure loads.

This study was conducted on 74 children and they were divided into 2 groups:

Group I: Consisted of 54 normotensive children with family history of essential hypertension.

Group II: Included 20 normotensive children without family history of hyeprtension.

lower arterial compliance may be the underlying mechanisms of increased diastolic pressure with exercise in children with family history of hypertension ***(Weber et al., 1991).***

Hooft et al. (1996) found high SBP in children of hypertensive parents during physical exercise. This may be due to that in early or borderline young hypertensive an increased cardiac output has been reported in sizable proportion of these children ***(Lung, 1986).***

Our results disagreed with ***Neutel et al. (1993)*** who reported that hypertensive prone subjects had lower SBP during exercise, perhaps as a result of the associated left ventricular diastolic dysfunction.

Blood pressure responses during exercise testing and mental stress have been identified as an important predictor of subsequent hypertension in adolescent and young adult ***(Criqui et al., 1993).***

Preliminary studies suggested that there may be cardiovascular and hemodynamic abnormalities present before the clinical detection of hypertension. For example the incidence of hypertension in subjects with normal blood pressure, but who demonstrate exaggerated blood pressure response to exercise is 2.06 to 3.39 times higher than in subjects with normal response ***(Benbassat and Froom, 1986).***

De Visser et al. (1996) found that the blood pressure response on dynamic exercise test in young adults is reported to predict the development of hypertension within a period of 3-6 years. This dynamic stress test is claimed to trigger cardiovascular regulatory mechanism, a disturbance of which result in hypertension.

Our results showed significant correlation as regard BMI and weight with resting, mid, peak exercise HR and SBP but not statistically correlated with resting mild and peak DBP.

These findings were agreed with ***Soergel et al. (1997)*** who reported that ambulatory SBP was increased propotionally with increasing height.

Also ***Pela et al. (1990)*** showed higher SBP in obese children compared with normal children. ***Jonas et al. (1998)*** also reported that adiposity and other authropometric variables were all significantly correlated with resting blood pressure.

In our study age was significantly correlated with resting SBP and (HR, SBP and DBP) at mid and peak exercise.

Our results agreed with that of ***Jonas et al. (1998)*** who demonstrated that resting SBP and DBP were significantly correlated to the corresponding future arterial blood pressure measured 2.5 years later.

In study of ***Larry et al. (1998)*** on normal school aged children, they found high correlation of blood pressure with age and body size.

In our study left ventricular mass (LVM) showed statistical significant difference between group I with mean value 99.6 ± 48.7 gm and group II with mean value 80.5 ± 12.5 gm.

This was in agreement with the results of ***Soto et al. (1997)*** who studied children with normal pressure levels but with family history of essential hypertension. They reported that there was increase in LVM in them.

Also our results agreed with results of ***Hooft et al. (1997) and Lund Johansen (1995)*** who reported that left ventricular mass was higher in offspring of hypertensive parents compared to offspring of normotensive parents.

Several recent echocardiogaphic studies had reported increase of left ventricular mass in children with blood pressure levels at or above 95th percentile and with family history of essential hypertension, suggesting that increase in LVM occur early in the course of disease ***(Schieken et al., 1998 and Culpepper et al., 1997).***

Increased left ventricular mass index in offspring of hypertensive parents could indicate the presence of structural changes of the heart in the early phase of primary hypertension. This could suggest that cardiac hypertrophy occur due to stimuli other than increased after load only ***(Hofft et al., 1993).***

It has suggested that an increase of interinsic growth factor due to genetic predisposion o due to increased adrenergic stimulation or sensitivity might cause cardiac hypertrophy ***(Bohm et al., 1986).*** These different stimuli as well as an increased after load would increase intracellular calcium, which triggers the induction of protooncogenes, thereby stimulating protein synthesis. These factors may be similar factors that give rise to vascular hypertrophy ***(Morban and Koretsune, 1990).***

Our results disagreed with the results of ***Snider et al. (1996)*** as they found no statistical significant difference between children with family history of hypertension and without family history of hypertension as regarding LVM.

LVM significantly added to the prediction of future blood pressure level ***(Larry et al., 1998).***

Sen et al. (1992) reported that increased LVM preceed the development of hypertension.

In our study left ventricular mass was significantly correlated with age, resting DBP, BMI and E/A ratio. But not correlated with resting SBP.

In a study of ***Devereux et al. (1996)*** LVM corrected for body mass index in adults with normal blood pressure showed little correlation with either resting SBP and DBP.

Larry et al. (1998) reported that LVM was significantly correlated with resting and exercise SBP and DBP. Also there was correlation of LVM and E/A ratio with age and body size in children with family history of hypertension.

In the study of ***Culpepper et al. (1997)*** LVM was greater in children with borderline hypertension as compared with values in controls. They were noted poor correlation between exercise SBP, and DBP with LVM.

Sudhir et al. (1996) reported that hypertensive prone subjects had a strong association of LVM with BMI, SBP response to exercise and at rest. Diastolic blood pressure at rest and during dynamic exercise were not related significantly to LVM.

Our study disagreed with ***Daniel et al. (1990)*** who reported that a positive significant correlation of LVM and systolic blood pressure to maximum exercise in hypertensive prone subjects.

In this study regarding diastolic functions (E/A ratio) it is the ratio between the peak velocity of early rapid filling (E) and the peak velocity of ventricular filling with atrial contraction (A), showed statistical significant difference between group I and group II, group I showed mean value 1.48 ± 0.34 and the mean value of group II was 1.89 ± 0.37.

Our results agreed with the results of ***Macor et al. (1991),*** who reported that diastolic filling is impaired in mild to moderate hypertension, when systolic function is still normal.

It also agreed with the results of ***Alli et al. (1992),*** who reported that impaired diastolic function represents an early marker of cardiac involvement in systemic hypertension.

Our results also agreed with ***Ren et al. (1994)*** who reported that increased LVM, diastolic filling abnormalities, with or without LVH have been described in borderline hypertensives.

Beside that, the normotensive children with a family history of hypertension have been noted to have L.V. diastolic alternations *(Craettinger et al., 1991).*

Our results agreed also with the results of ***De-Simone et al. (1993),*** who reported that in the presence o. .normal systolic function, diastolic filling abnormalities are described in children with hypertensive parents.

It also agree with the results of ***Marco et al. (1993),*** who reported that established hypertension leads to abnormalities in LV diastolic function which can be detected by Doppler echocardiography. In borderline hypertension, the left ventricular diastolic abnormalities are predominantly related to the passive process of early diastole.

Kapukw et al. (1993) reported that borderline hypertension appears to be predictive of early filling impairment, and a late filling compansative mechanism is not yet apparent.

Regarding systolic function (EF) our result demonstrated that no statistical significant difference in EF between (group I) and group (II).

Our result agree with the result of ***Inouye et al. (1994)*** who reported that systolic function assessted by EF was normal in patients with mild to moderate hypertension and children of hypertensive parents.

These results also agree with the result of ***Kapuker et al. (1993),*** who reported that borderline hypertensive subjects had normal left ventricular systolic function.