Results

This study included 56 fullterm neonates (36 study group & 20 control group). They were born in the Obstetrics department in Benha University Hospital and Al Menshawy (Tanta) Hospital.

Study group subdivided according to sarnat staging into two groups**.** Mild group with sarnat stage 1(no=10) and moderate and severe group with sarnat stage 2&3 (no=26).

A neonatal venous sample was withdrawn on admission for the following laboratory tests: (CBC, CRP & cTnI).

Table (1) &figure (1) show the range mean and standard deviation of gestational age (weeks) among all studied groups which ranged from 37 week to 40 week in all groups with mean value and standard deviation**(38.1±1.44, 38.80±1.54 & 38.53±1.13**) weeks in control, mild and moderate &severe groups respectively. The p.value was > 0.05.

No statically significant difference was observed among studied groups as regarding gestational age.

Table (2) &figure (2) show the Sex distribution among the studied and control groups. The control group was composed of 20 cases 12 males(60%) and 8females(40%).The mild group was composed 10 cases of 6 males(60%) and 4 females (40%).The moderate and severe group was composed of 26 cases 15 males (57.7%) and 11females (42.3%) The p.value was>0.05.

No statically significant difference was observed among studied groups as regarding sex.

Table (3) &figure (3) show the range mean and standard deviation of body weight (kg) among all studied groups. The range was **(2.6-4, 2.5-3.8&2.5-4.2)kg** in control, mild and moderate &severe groups respectively with mean value and standard deviation**(3.17±0.49, 2.87±0.47& 3.12±0.50**)kg in control, mild and moderate &severe groups respectively. The p.value was > 0.05.

No statically significant difference was observed among studied groups as regarding body weight.

Table (4) &figure (4) show the mode of delivery among the studied and control groups. The control group was composed of 20 cases 10 delivered by normal vaginal delivery (50%) and 10 delivered by caesarian section (50%).The mild group was composed 10 cases 5 delivered by normal vaginal delivery (50%) and 5 delivered by caesarian section (50%).The moderate and severe group was composed of 26 cases 16 delivered by normal vaginal delivery (56.5%) and 10 delivered by caesarian section (43.5%) The p.value was > 0.05.

No statically significant difference was observed among studied groups as regard mode of delivery.

Table (5) &figure (5) show the range mean and standard deviation of Apgar score at the 1st minte among all studied groups. The range was **(5-9, 4-7&1-3)** in control, mild and moderate &severe groups respectively. With mean value and standard deviation **(7.30±1.15, 5.20±1.13& 1.96±0.66)** in control, mild and moderate &severe groups respectively. The p.value was < 0.001.

Table (6) &figure (6) show the range mean and standard deviation of Apgar score at the 5th minute among all studied groups. The range was **(6-10, 5-8&2-4)** in control, mild and moderate &severe groups respectively. With mean value and standard deviation **(7.40±1.26, 6.50±0.97& 3.50±0.84)** in control, mild and moderate &severe groups respectively. The p.value was < 0.05.

Table (7) &figure (7) show the range mean and standard deviation of Apgar score at the 10th minute among all studied groups. The range was **(7-10, 7-9&4-8)** in control, mild and moderate &severe groups respectively. With mean value and standard deviation **(8.90±0.99, 8.20±0.78& 5.96±0.99)** in control, mild and moderate &severe groups respectively. The p.value was =0.05.

From tables 5, 6&7 we observed that there is **highly significant** correlation between the Apgar score at the 1st minute and the severity of HIE (p.value < 0.001) and there is **significant** correlation at the 5th minute (p. value <0.047) and **near significant** correlation at the 10th minute (p.value = 0.05) which detect the highly importance of good resuscitation and early intervention with the cases of suspected perinatal asphyxia which decrease the severity of HIE.

All studied groups were negative CRP and with normal CBC range which was important point for exclusion of neonatal sepsis.

Table (8) &figure (8) show the range mean and standard deviation of level of cardiac Troponin I (ng/ml) among all studied groups which the range was **(0-0.83, 0.70-2.50 & 1.17-5.87)** in control, mild and moderate &severe groups respectively. With mean value and standard deviation **(0.138±0.09 , 1.33±0.17& 2.99±0.26)** in control, mild and moderate &severe groups respectively. The p.value was < 0.001.

There is **highly significant** correlation between level of troponin I and severity of HIE with p.value < 0.001.

Table (9) &figure (9) show correlation between the level of cardiac Troponin I (ng/ml) and the Apgar score at the 1st minute among all studied groups which show that p.value was **(<0.001, <0.001 & 0.049)** in control, mild and moderate &severe groups respectively.

There is **highly significant** correlation between Apgar score at the 1st minute and level of troponin I in mild and control groups and also **significant** correlation in moderate and severe group.

Table (10) &figure (10) show correlation between the level of cardiac Troponin I (ng/ml) and the Apgar score at the 5th minute among all studied groups which show that p.value was **(<0.001, <0.001& 0.059)** in control, mild and moderate &severe groups respectively.

There is highly significant correlation between Apgar score at the 5th minute and level of troponin I in mild and control groups but less significant correlation in moderate and severe group.

Table (11) &figure (11) show correlation between the level of cardiac Troponin I (ng/ml) and the Apgar score at the 10th minute among all studied groups which show that p.value was **(<0.001, <0.001 & 0.011)** in control, mild and moderate &severe groups respectively.

There is **highly significant** correlation between Apgar score at the 10th minute and level of troponin I in mild and control groups and also significant correlation in moderate and severe group.

Table (12) show non-survival number for studied cases and control group. Nine (25%) of the 36 infants in the hypoxia groups died. Three deaths occurred on the 2nd day of life, 4 babies died on the 3rd day, and 2 died on the 6th day. All 9 babies from the moderate and severe group and died with cardiorespiratory failure related to severe HIE**.**

Table (13) show comparative analysis between some clinical data and Troponin I level of survivors(n=٢7) and non survivors(n=9) of hypoxia groups of studied cases we found that :

- All cases of the survivors and non-survivors had statistically similar gestational ages and birth weights so that there was **no significant** difference of these factors on mortality with p value > 0.05.

- The Apgar score in the 1st minute was (**3.33 ± 1.76 & 1.44+0.72)** in survivors and non survivors respectively and there is **no significant** correlation between mortality rate of hypoxic group and Apgar score in 1st minute with (p value >0.05).

- The Apgar score in the 5th minute was (**4.74 ± 1.53 & 3.11+0.78)** in survivors and non survivors respectively and there is **significant** correlation between mortality rate of hypoxic group and Apgar score at the 5th minute with (p. value <0.05).

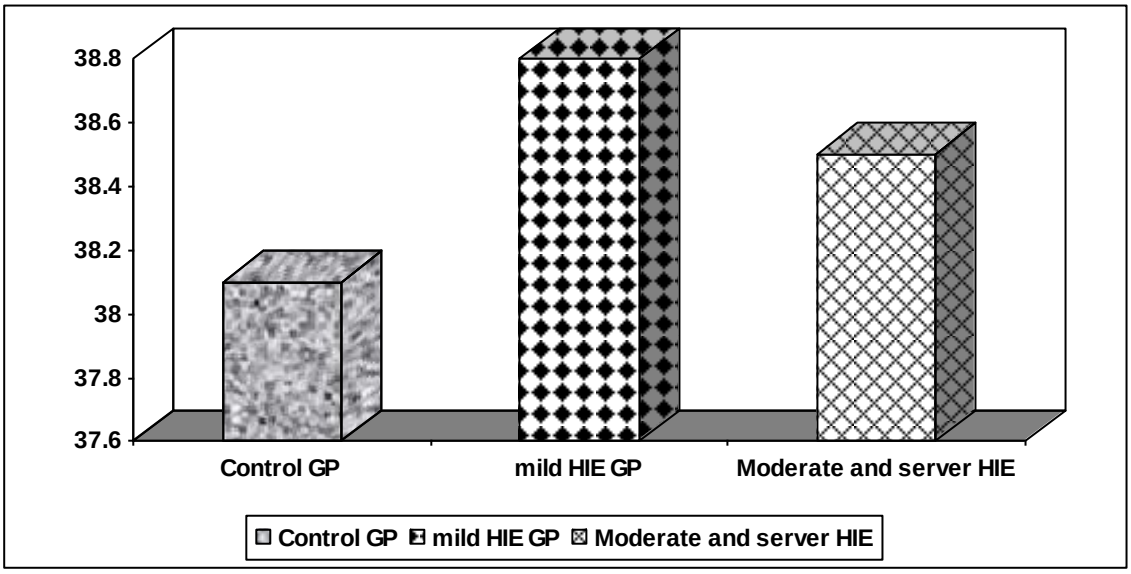
- The Apgar score in the 10th minute was with mean and standard deviation (**7.03 ± 1.16 & 5.22 ± 1.09)** in survivors and non survivors respectively and there is **significant** correlation between mortality rate of hypoxic group and Apgar score at the 10th minute with (p. value < 0.05).

- The level of troponin I was with mean and standard deviation (**1.87 ± 0.71 & 4.51 ±1.02 ng/ml)** in survivors and non survivors respectively and there is **highly significant** correlation between mortality rate of hypoxic group and level of Troponin I with (p. value < 0.001). So that we suggest that the optimal cut-off value for Troponin I as a predictor for mortality was 4.51ng\ ml which is the mean value of non survivors group.

Table (1): Gestational age among the studied groups and control group:

Studied gp / GA	Control GP	mild HIE GP	Moderate and severe HIE
Range	37 - 40	37 - 40	37 - 40
Mean ± SD	38.1 ± 1.44	38.80 ± 1.54	38.53 ± 1.13
t. test	**0.748**		
p. value	**0.479**		

Figure (1): Gestational age among the studied groups and control group:



Key of significance level p.value:

P>0.05 = Non significant
P = 0.05 = Near significant
P<0.05 = Significant P<0.01 = Highly significant

Table (2) : Sex distribution among studied groups and control group :

Study Groups \ sex		male	female	total
Control GP	N	12	8	10
	%	60	40	100
mild HIE GP	N	6	4	10
	%	60	40	100
Moderate and severe HIE GP	N	15	11	26
	%	57.7	42.3	100
Total	N	27	19	46
	%	58.7	41.3	100
Chi-Square	X^2	**0.025**		
	P-value	**0.988**		

Figure (2) : Sex distribution among studied groups and control group :

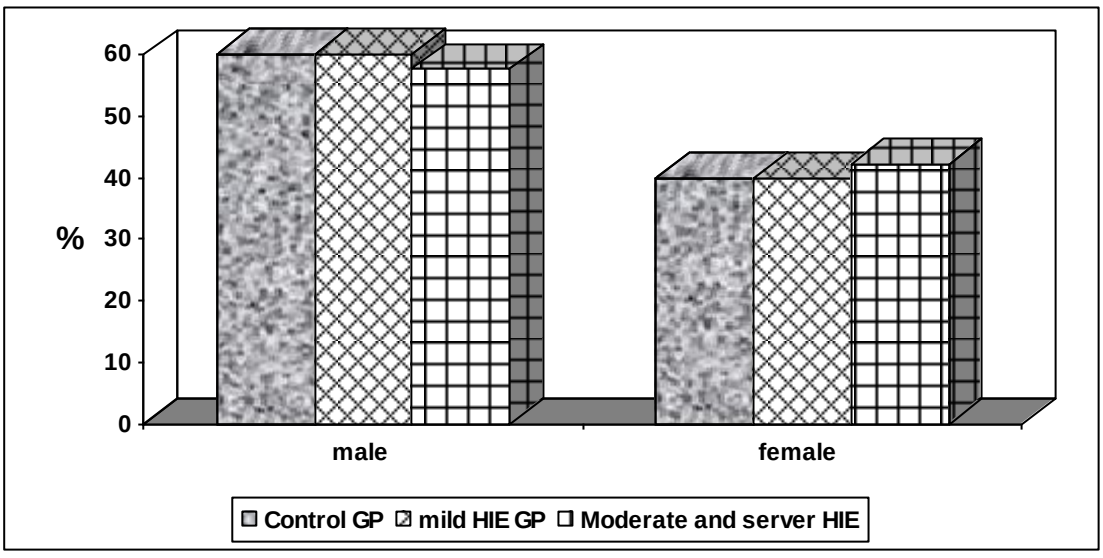


Table (3) : Body wight of studied groups and control group :

Studied gp / BW	Control GP	mild HIE GP	Moderate and severe HIE GP
Range	2.6 - 4	2.5 - 3.8	2.5 - 4.2
Mean ± SD	3.17 ± 0.49	2.87 ± 0.47	3.12 ± 0.50
t. test	**0.417**		
p. value	**0.661**		

Figure (3) : Body Wight of studied groups and control group :

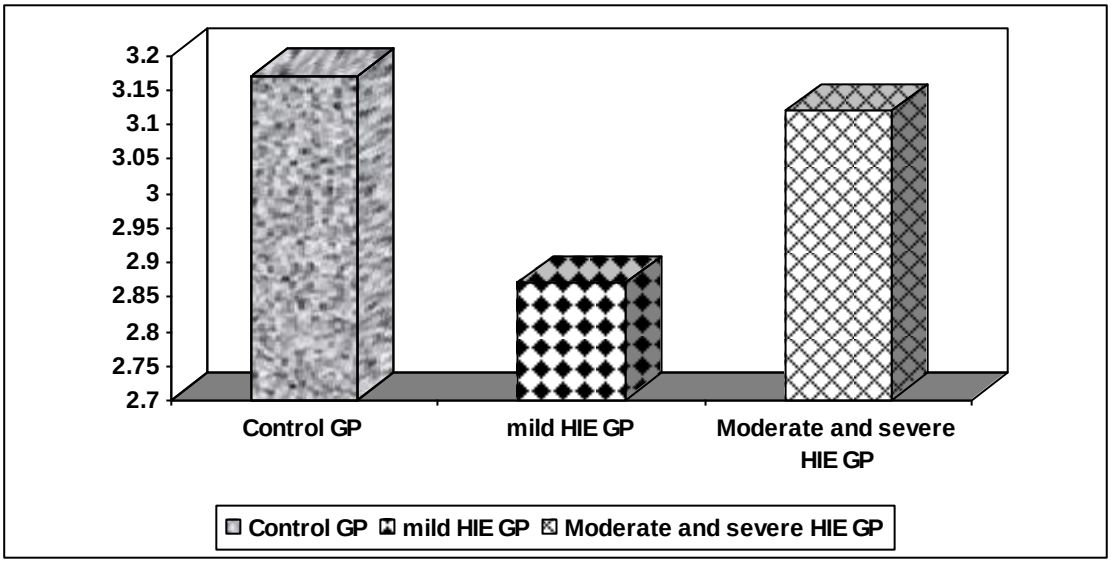


Table (4): mode of delivery of studied groups and control group:

studied GP \ mode of delivery		V	C.S	total
Control GP	N	١٠	١٠	٢٠
	%	50	50	100
mild HIE GP	N	5	5	10
	%	50	50	100
Moderate and severe HIE GP	N	16	10	26
	%	61.5	38.5	100
Total	N	26	20	46
	%	56.5	43.5	100
Chi-Square	X^2	**0.612**		
	P-value	**0.736**		

V= vaginal C.S = cesarean section

Figure (4): mode of delivery of studied groups and control group:

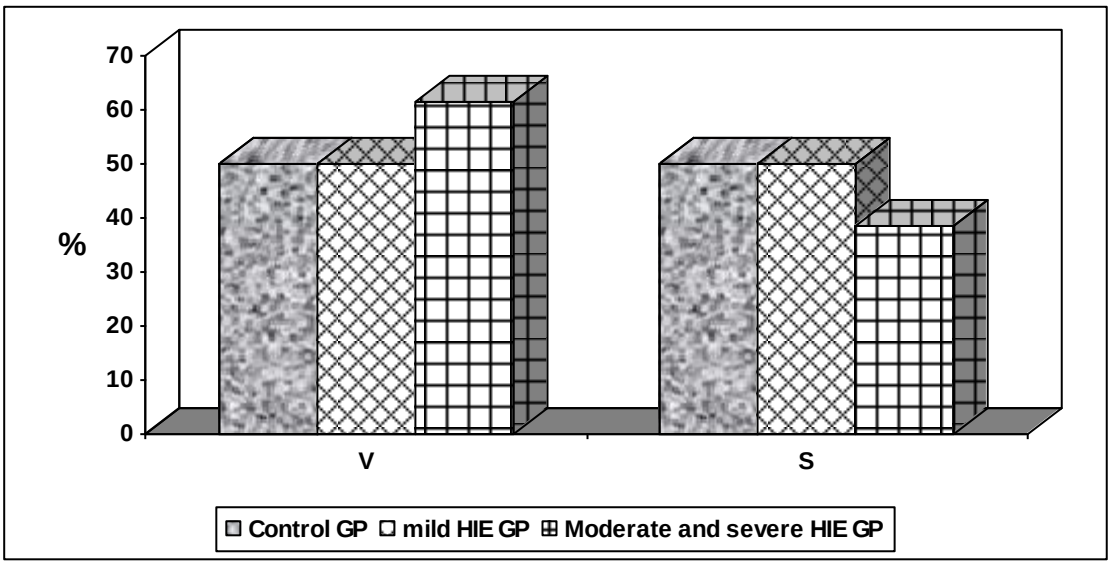


Table (5)Apgar score at 1 min of studied groups and control group:

Studied gp / Apgar in I	Control GP	mild HIE GP	Moderate and severe HIE GP
Range	5 - 9	4 - 7	1 - 3
Mean ± SD	7.30 ±1.15	5.20 ±1.13	1.96 ±0.66
t. test	**32.253**		
p. value	**0.001***		

Figure (5)Apgar score at 1 min of studied groups and control group:

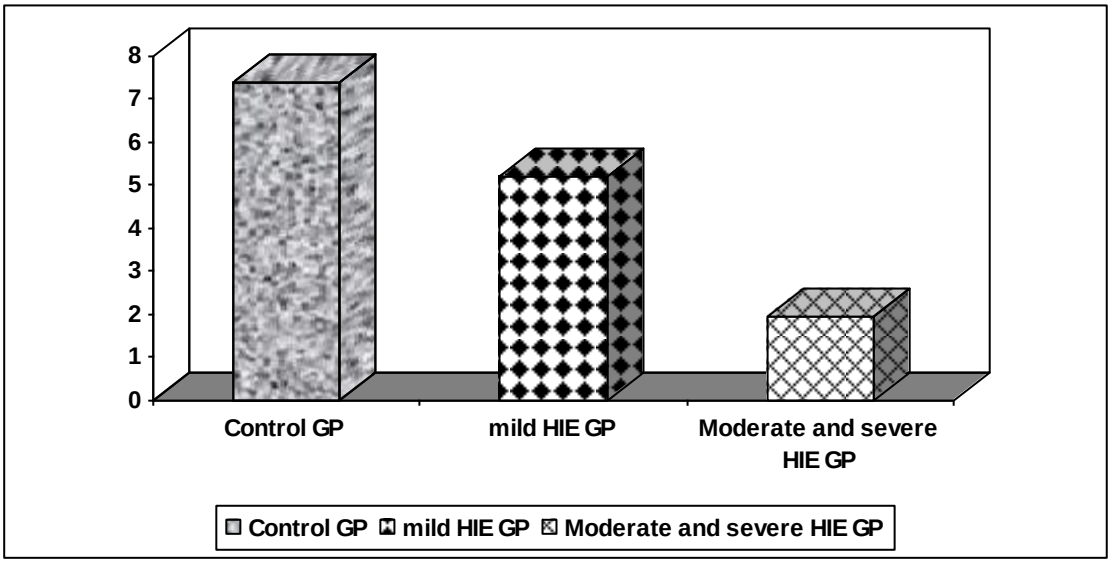


Table (6) Apgar score at 5 min of studied groups and control group:

Studied gp / Apgar in 5	Control GP	mild HIE GP	Moderate and severe HIE GP
Range	6 - 10	5 - 8	2 - 4
Mean ± SD	7.40±1.26	6.50±0.97	3.50±0.84
t. test	**12.582**		
p. value	**0.047***		

Figure (6) Apgar score at 5 min of studied groups and control group:

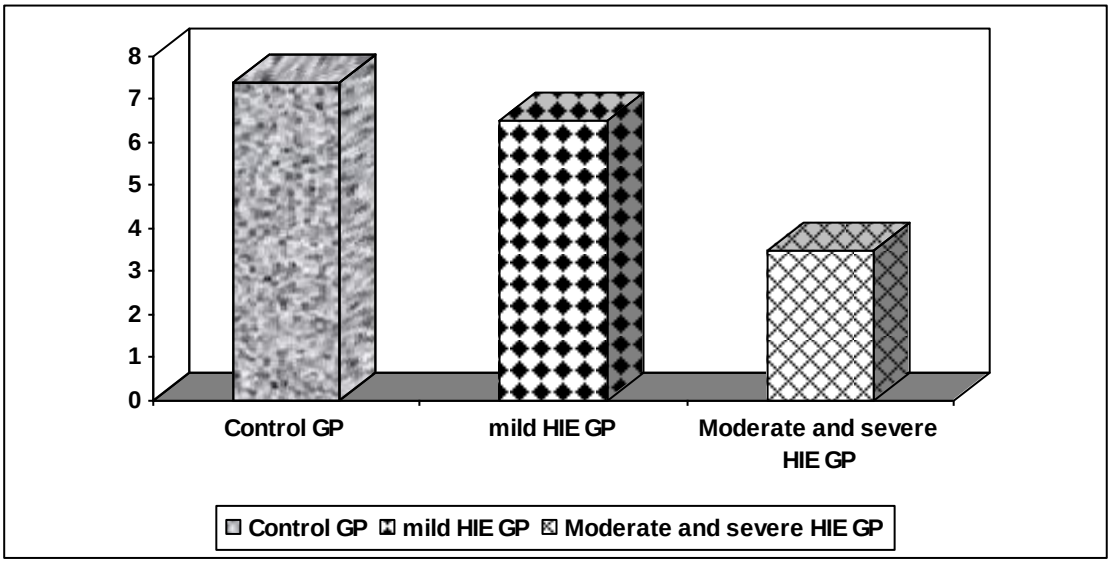


Table (7) Apgar score at 10 min of studied groups and control group:

Studied gp / Apgar in 10	Control GP	mild HIE GP	Moderate and severe HIE GP
Range	7 - 10	7 - 9	4 - 8
Mean ± SD	8.90 ±0.99	8.20 ±0.78	5.96 ±0.99
t. test	**3.365**		
p. value	**0.05**		

Figure (7) Apgar score at 10 min of studied groups and control group:

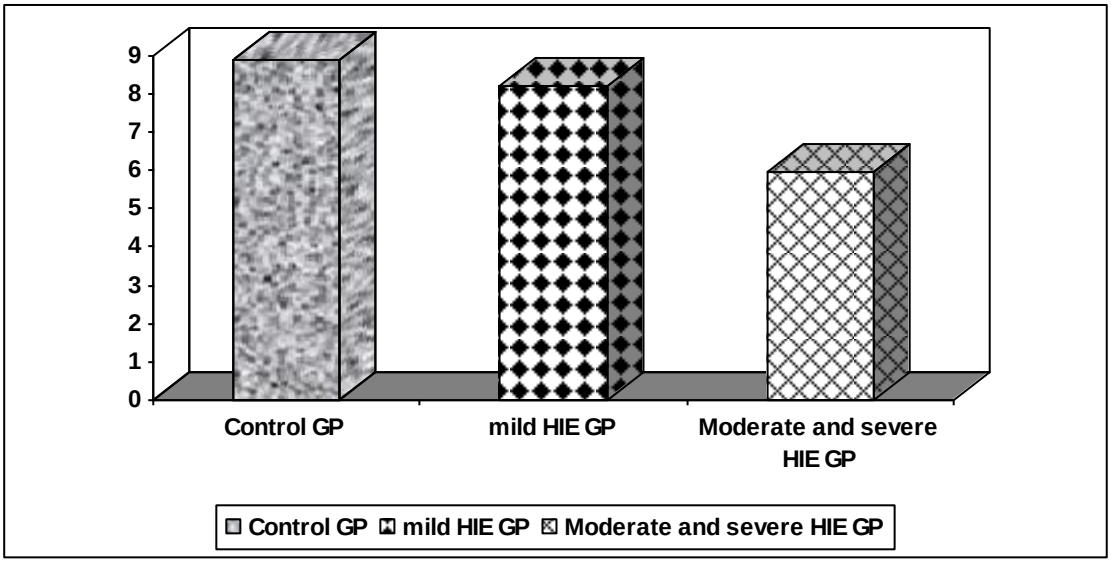


Table (8) Troponin I level in studied groups and control group:

Studied gp / cTn I level	Control GP	mild HIE GP	Moderate and severe HIE GP
Range	0 - 0.83	0.70 - 2.50	1.17 - 5.87
Mean ± SD	0.138 ± 0.09	1.33 ± 0.17	2.99 ± 0.26
t. test	**28.179**		
p. value	**0.001***		

Figure (8) Troponin I level in studied cases and control group:

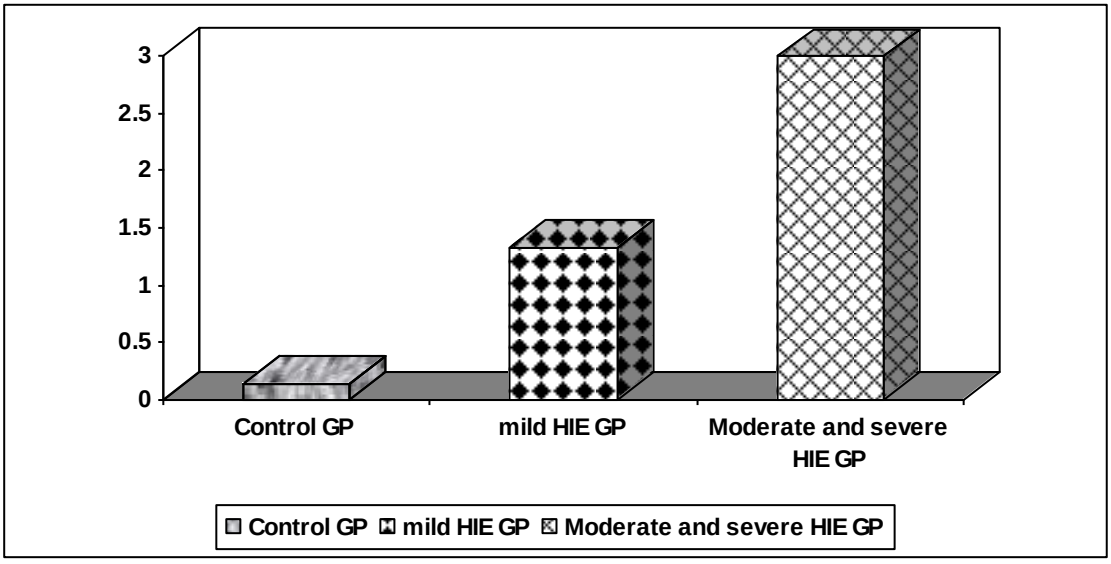


Table (9) Correlation between Apgar score at 1 minute and Troponin I level in studied groups and control group:

	Control GP	mild HIE GP	Moderate and severe HIE GP
Apgar in I	7.40 ±1.26	5.20 ± 1.13	1.96 ± 0.66
TROPONIN	0.138 ± 0.09	1.33 ± 0.17	2.99 ± 0.26
t. test	**16.533**	**14.25**	**2.365**
p. value	**0.001***	**0.001***	**0.049***

Figure (9) Correlation between Apgar score at 1 minute and Troponin I level in studied groups and control group:

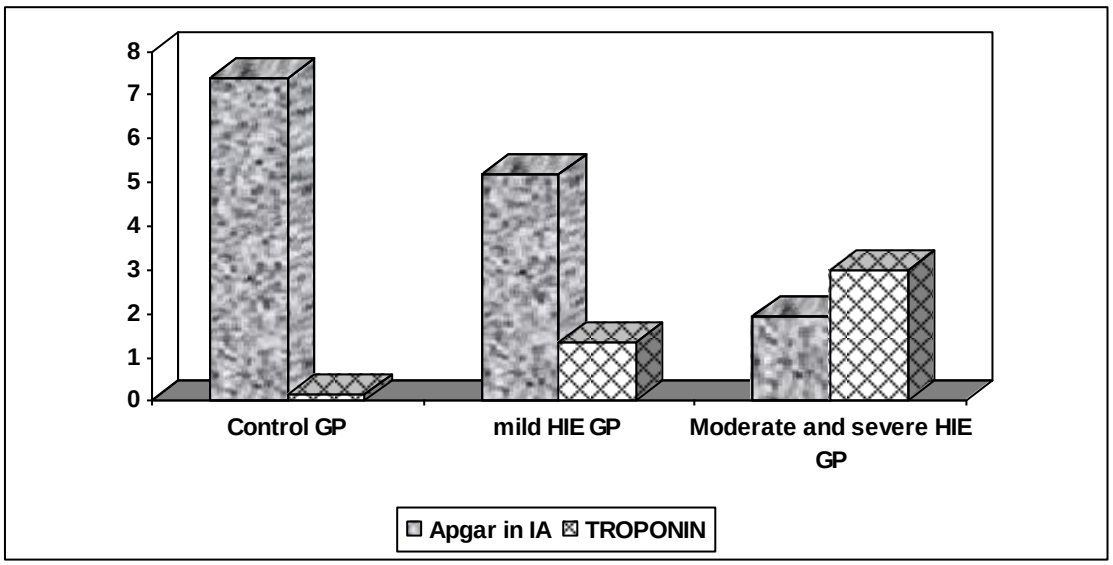


Table (10) Correlation between Apgar score at 5 minute and Troponin I level in studied groups and control group:

	Control GP	mild HIE GP	Moderate and severe HIE GP
Apgar in 5	7.40 ± 1.26	6.50 ± 0.97	3.50 ± 0.84
TROPONIN	0.138 ± 0.09	1.33 ± 0.17	2.99 ± 0.26
t. test	**12.365**	**14.589**	**2.114**
p. value	**0.001***	**0.001***	**0.059**

Figure (10) Correlation between Apgar score at 5 minute and Troponin I level in studied groups and control group:

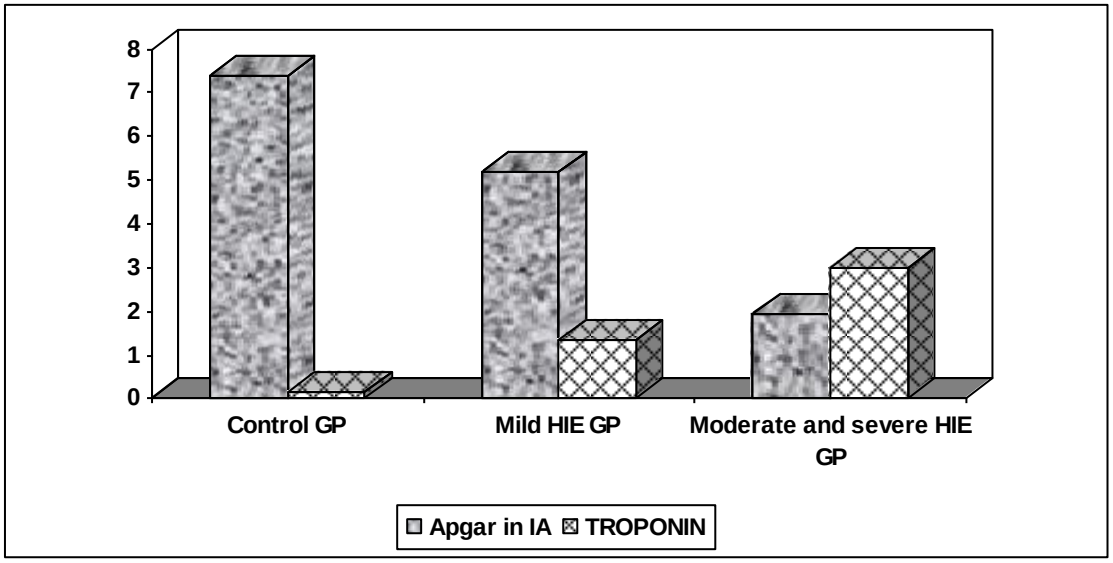


Table (11) Correlation between apgar score at 10 minute and Troponin I level in studied groups and control group:

	Control GP	mild HIE GP	Moderate and severe HIE GP
Apgar in 10	8.90 ± 0.99	8.20 ± 0.78	5.96 ± 0.99
TROPONIN	0.138 ± 0.09	1.33 ± 0.17	2.99 ± 0.26
t. test	**13.253**	**15.853**	**5.698**
p. value	**0.001***	**0.001***	**0.011***

Figure (11) Correlation between apgar score at 10 minute and Troponin I level in studied groups and control group:

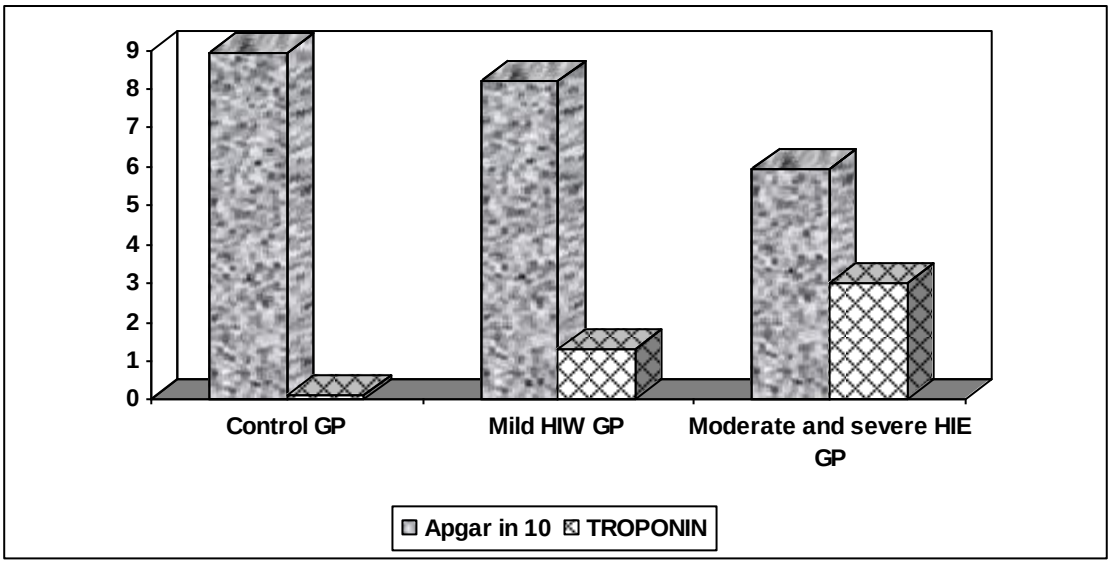


Table (12) Non- survival number for studied groups and control group:

Studied gp / Died no	Control GP	mild HIE GP	Moderate and severe HIE GP
number	0	0	0-9
Mean ± SD	0	0	2.07 ± 0.60
t. test	**4.445**		
p. value	**0.001***		

Table (13): Comparative analysis between some clinical data and Troponin I value of survivors and non –survivors of hypoxia group of studied groups :-

	survivors (n=27)	**non – survivors(N=9)**	**P. value**
GA	38.62 ± 1.21	38.44 ± 1.23	>0.05
BW	3.14 ± 0.52	3.08 ± 0.49	>0.05
Apgar in I	3.33 ± 1.76	1.44 ± 0.72	>0.05
Apgar in 5	4.74 ± 1.53	3.11 ± 0.78	<0.05
Apgar in 10	7.03 ± 1.16	5.22 ± 1.09	<0.05
TROPONIN	1.87 ± 0.71	4.51 ± 1.02	<0.001