Results

This study was conducted upon 200 patients of hemolytic anemia , in outpatients clinic, in the period from May 2010 till April 2011. They were recruited from the outpatients hematology clinic, Benha Specialized Children Hospital.

Patients were divided into 5 groups according to the type of hemolytic anemia into beta thalassemia major group (n=80), sickle cell anemia group (n=8), hereditary spherocytosis group (n=6), auto immune hemolytic anemia group (n=6) and Glucose-6-phosphate dehydrogenase deficiency group (n=100).

Beta Thalassemia major group: They were 46 males (57.5%) and 34 females (42.5%). Poitive cosanguinty was present in 34 patients (42.5%)

Sickle cell anemia: This group included 7 patients with sickle cell anemia and 1 patients with sickle thalassemia they were 3 males (37.5%) and 4 females (42.5%). Poitive cosanguinty was present in 5 patients (62.5%)

Hereditary spherocytosis group: They were 4 males (66.7%) and 2 females (33.3%). Poitive cosanguinty was present in 3 patients (50%)

Auto immune hemolytic anemia group: They were 3 males (50%) and 3 females (50%). Poitive cosanguinty was present in 2 patients (33.3%)

Glucose-6-Phosphate Dehydrogenase Deficiency group: They were 87 male (87%) and 13 female (13%). Poitive cosanguinty was present in 15 patients (15%)

Table (1) Distribution of study group as regard dignosis.

Total number	200	100%
B-thalassemia major	80	40%
Sickle cell disease	8	4%
Spherocytosis	6	%3
Autoimmune hemolytic anemia	6	3%
Glucose-6-Phosphate Dehydrogenase Deficiency	100	50%

This table shows that 40% of the studied cases were diagnosed as B-thalssemia major , G6PD deficiency was present in 50% of the studied group.

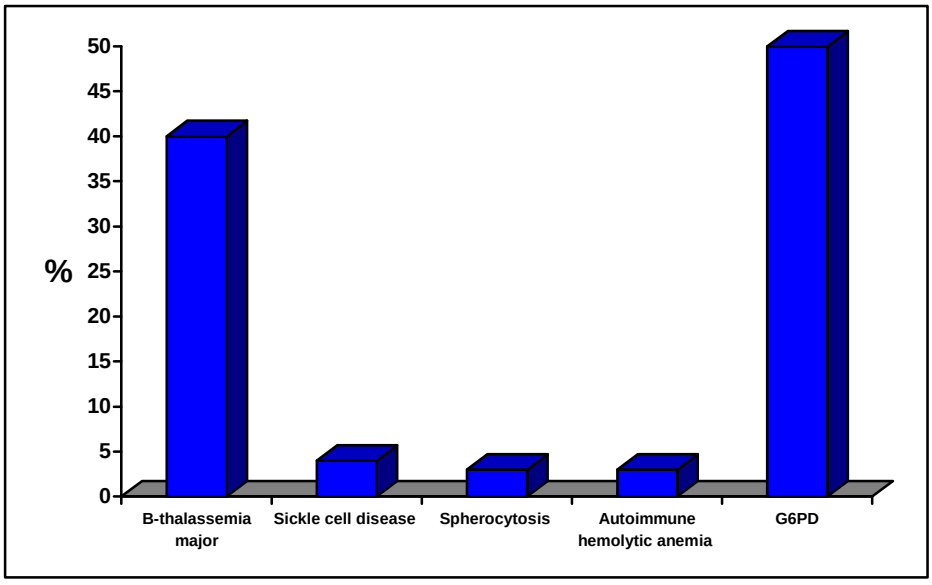

Figure (1) shows Distribution of study group as regard dignosis

Table (2) General characteristic data among different types of hemolytic anemias cases

variables		Beta Thalassemia (n=80)	Sickle cell anemia (n=8)	Hereditary spherocytosis (n=6)	Auto immune hemolytic anemia (n=6)	G6PD (n=100)	X^2 or f.test	value
Gender	Male	46 (57.5%)	3 (37.5%)	4 (66.7%)	3 (50%)	87 (87%)	2.695	0.052 NS
	Female	34 (42.5%)	5 (62.5%)	2 (33.3%)	3 (50%)	13 (13%)		
Consanguinity	+ve	34 (42.5%)	5 (62.5%)	3 (50%)	2 (33.3%)	15 (15%)	2.396	0.068 NS
	-ve	46 (57.5%)	3 (37.5%)	3 (50%)	4 (66.7%)	85 (85%)		
Age of onset (years) mean±SD)		0.6 ± 0.25	3.9 ±3.57	0.21± 0.15	3.5 ±3.26	0.9 ± 0.73	f- 2.325	0.536 NS

This table shows that no statistically significant difference regarding general charchtristic data among the study group.

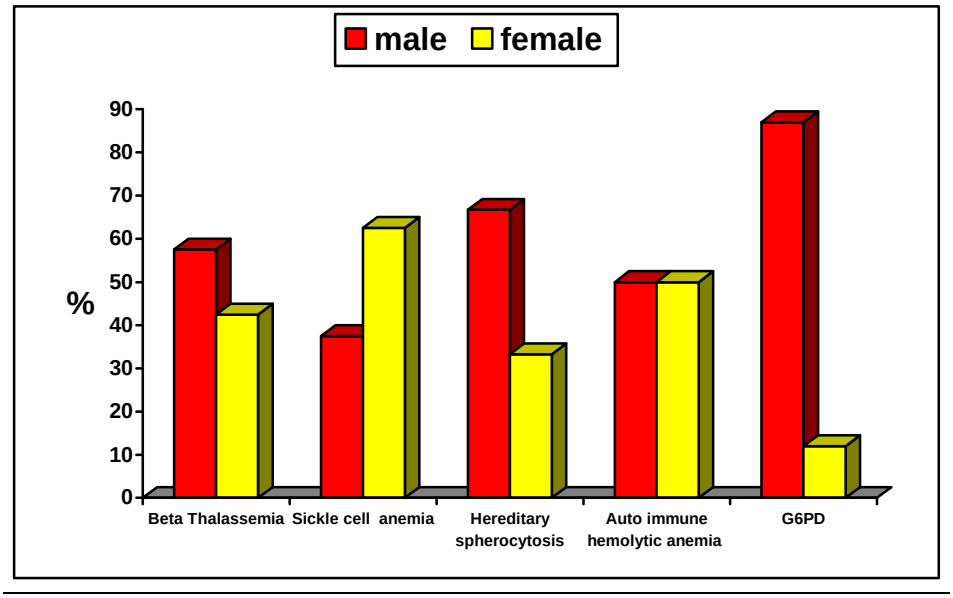

Figure (2) shows Distribution of the gender charchtristic data among the study groups.

Table (3) Anthropometric data in the study group.

Variables		Beta Thalassemia major (n=80)	Sickle cell anemia (n=8)	Hereditary spherocytosis (n=6)	Auto immune hemolytic anemia (n=6)	G6PD (n=100)	X^2	p. value
Height (cm)	Normal corresponding to age	11 (13.75%)	4 (50%)	5 (83.4 %)	2 (33.4%)	100(100%)	2.632	0.011 sig
	Not corresponding to age (stunted)	69 (86.25%)	4 (50%)	1 (16.6%)	4 (66.6 %)	0		
Weight (kg)	Normal corresponding to age	34 (42.5%)	4 (50%)	4 (66.6 %)	3 (50%)	100(100%)	3.636	0.027 sig
	Not corresponding to age (under weight)	46 (57.5%)	4 (50%)	2 (33.4%)	3 (50%)	0		

This table shows a statistically significant decrease in anthropometric measures in all cases groups except G6PD deficiency cases which had normal anthropometric measures.

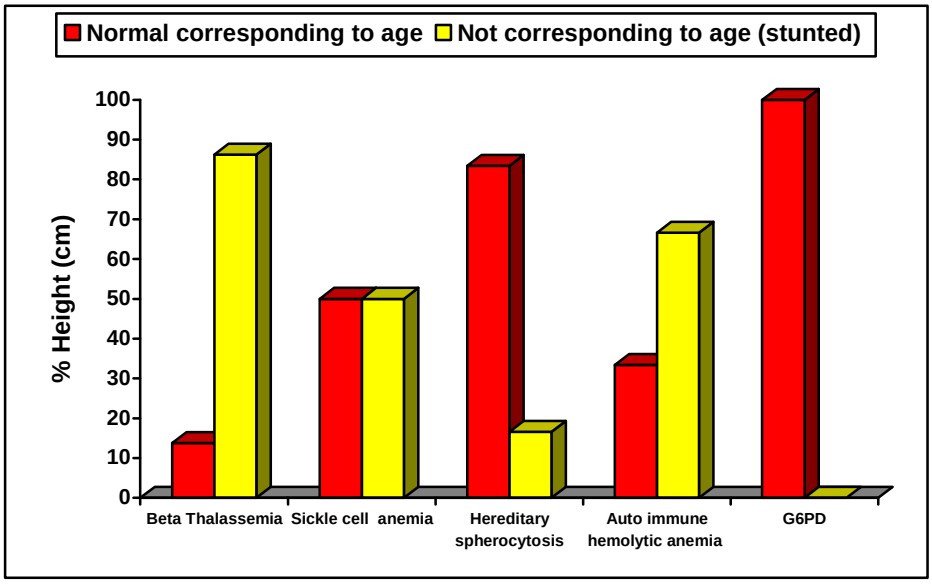

Figure (3) shows height Distribution among the study groups

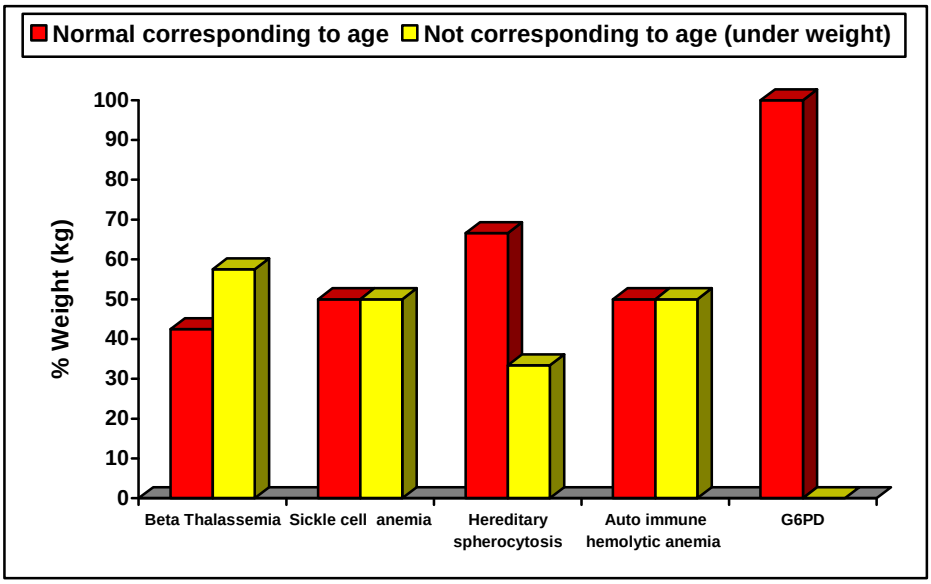

Figure (4) shows weight Distribution among the study groups.

Table (4) All groups of hemolytic anemia as regard puberty

variables		Beta Thalassemia major (n=30)	Sickle cell anemia (n=4)	Hereditary spherocytosis (n=4)	Auto immune hemolytic anemia (n=3)	G6PD (n=45)	X^2	p. value
Puberty	Normal puberty	14 (46.6%)	2(50%)	3(75%)	1(33.4%)	45 (100%)	3.698	0.022 sig
	Delayed Puberty	16 (53.4%)	2 (50%)	1 (25%)	2(66.6 %)	0		

This table shows a statistically significant delayed puberty in the study groups of chronic hemolytic anemias.

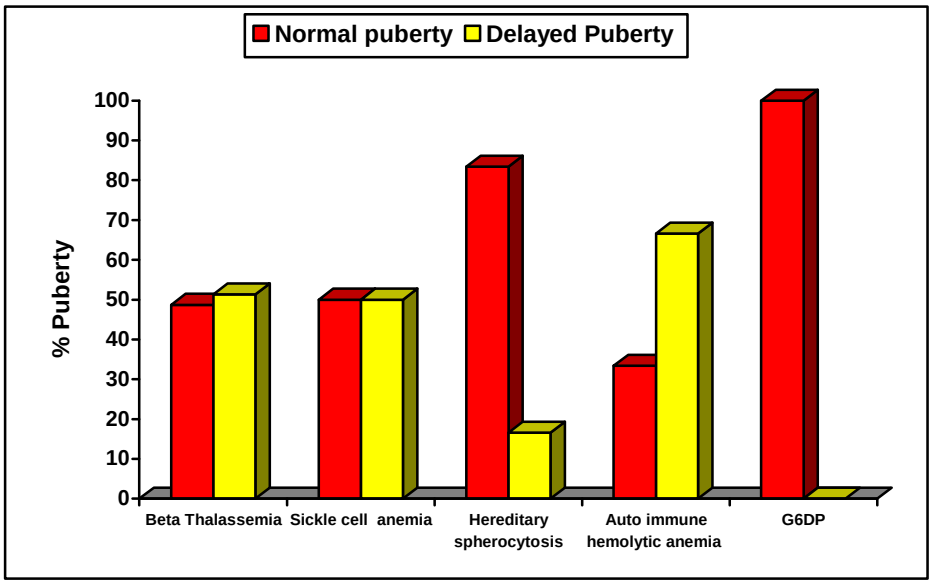

Figure (5) shows puberty Distribution among the study groups

Table (5) Serum ferritin among the study groups

variabl	Beta Thalassemia major (n=80)		Sickle cell anemia (n=8)		Hereditary spherocytosis (n=6)		Auto immune hemolytic anemia(n=6)		G6PD (n=100)		F. test	p. value
	X±SD	range	X±SD	range	X±SD	range	X±SD	range	X±SD	range		
Serum ferritin	2507.7 ± 2575.2	525 - 8018	1354.2 ± 1078.4	182 - 2700	1433 ± 549	1030 - 2600	945.8 ± 210	170 - 2500	---	---	1.589	0.634 NS

This table shows that no difference in the serum ferritin level That it was found to be high among all patients with chronic hemolytic anemia.

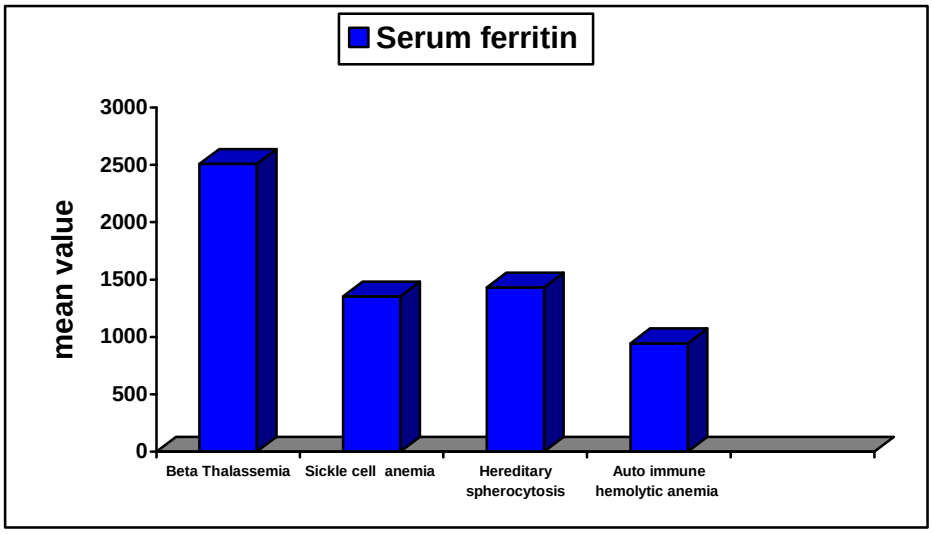

Figure (6) shows serum ferritin level among the study groups.

Table (6) All groups of hemolytic anemia as regard Age of first blood transfusion..

variables	Beta Thalassemia major(n=80)		Sickle cell anemia (n=8)		Hereditary spherocytosis (n=6)		Auto immune hemolytic anemia (n=6)		G6PD (n=100)		F. test	value
	X±SD	range	X±SD	range	X±SD	range	X±SD	range	X±SD	range		
Age of 1st transfusion	**0.6 ± 0.2**	**0.5-1**	**3.9 ± 3.5**	**1-9**	**0.4 ± 0.2**	**0.2 - 0.9**	**3.5 ± 3.2**	**1-5**	**0.9 ± 0.6**	**0.5 - 1.5**	**5.583**	**0.005 sign**

This table shows a significant decrease in age of first transfusion in hereditary spherocytosis in comparison to the other four groups.

Table (7) Distribution of HCV infection in multi transfused groups.

variables		Beta Thalassemia major (n=80)	Sickle cell anemia (n=8)	Hereditary spherocytosis (n=6)	Auto immune hemolytic anemia (n=6)	X^2	p. value
HCV	**-ve**	22 (27.5%)	6(75%)	3(50%)	1(16.6%)	5.582	0.019 **sig**
	+ve	58(72.5%)	2(25%)	3(50%)	5(83.3%)		

This table shows a significant increase in HCV infection in beta thalassemia major and auto immune hemolytic anemia rather than other types of chronic hemolytic anemias.

Table (8) Comparison between cases with positive and negative HCV cases as regard blood transfusion

Variables	HCV		t.test	P
	Negative	Positive		
Transfusion number	12±2.5	15±3.6	**2.674**	**<0.05 S**
Age of 1st transfusion (mon.)	12.5±2	13.7±4	**1.954**	**>0.05 NS**

This table shows that positive cases had a higher average of transfusion times compared to negative cases, on the other hand there is no significant difference as regard age of first transfusion.

Table (9) Distribution of the study groups as regard splenectomty

variables		Beta Thalassemia major (n=80)	Sickle cell anemia (n=8)	Hereditary spherocytosis (n=6)	Auto immune hemolytic anemia (n=6)	G6PD (n=100)	X^2 or F.test	p. value
Splenectomy	-ve	671(83.7%)	7(87.5%)	2(33.4%)	4(77%)	100 (100%)	3.692	0.025 sig
	+ve	13 (16.25%)	1(12.5%)	4(66.6%)	2(33%)	0		
Age of splenectomy (years) Mean ± SD		5-10 7.14±1.81	3-4 3.56±0.40	3-5 4.11±0.76	4-7 4.91±1.67	-	f- 1.365	0.124 NS

This table shows a significance increase splenectomy rate in all types of chronic hemolytic anemias. While, Age of splenectomy had no significance difference in all types of studied groups.

Table (10) Comparison between cases with ferrtin below 1000 and above 1000 as regard blood transfusion

Transfusion	Serum Ferritin		test	P
	<1000	**≥1000**		
Transfusion number	13.3+3.2	18+3.9	3.651	**<0.001 HS**
Age of 1st transfusion (mon.)	13.9+2.5	16.1+4.7	2.926	**<0.05 S**

This table shows a significant difference that cases with higher ferritin level had higher average of transfusion times and also earlier age of first transfusion

Table (11) Comparison between cases as regard serum ferrtin level in relation to the age of diagnosis and age of starting chelation therapy.

Variables	Serum Ferritin		Test	P
	<1000	**≥1000**		
Age (Mean±SD)	10.2±37	13±4.8	**t=2.84**	**<0.05 S**
Age of diagnosis (months)	14.5±8.3	19.7±7.96	**t=1.68**	**>0.05 NS**
Age of starting Chelation therapy (yr.)			**t = 5.634*** **p <0.001 sig**	
Range	0.60-25.00	1.00-21.00		
Mean ± SD	4.57 ± 3.84	7.09 ± 4.65		

This table shows a significantly higher age at starting chelation in subjects with serum ferritin≥ 1000 ng/ml.

Table (12): Comparison between cases with normal puberty and delayed puberty regarding serum ferritin level and age of first transfusion.

	Serum ferritin (ng/ml)	Age at 1st transfusion (mon.)	P value
Normal puberty			t = 2.484*
Range	900.00-5500.00	4.00-72.00	p = 0.02٦
Mean ± SD	2895.44 ± 1352.24	25.50 ± 20.12	
Delayed puberty			t = 2.236*
Range	1050.00-8500.00	1.00-96.00	p = 0.03٠
Mean ± SD	3984.09 ± 1759.10	17.98 ± 20.47	

This Table shows significantly high serum ferritin and significantly lower age at first transfusion of subjects with delayed puberty.

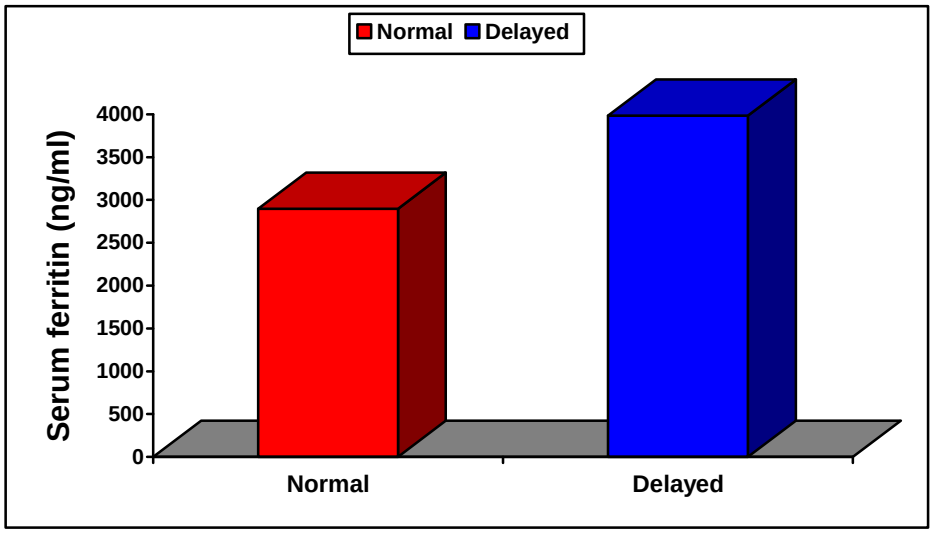

Figure (7) shows the Comparison between cases with normal puberty and delayed puberty regarding mean serum ferritin level.

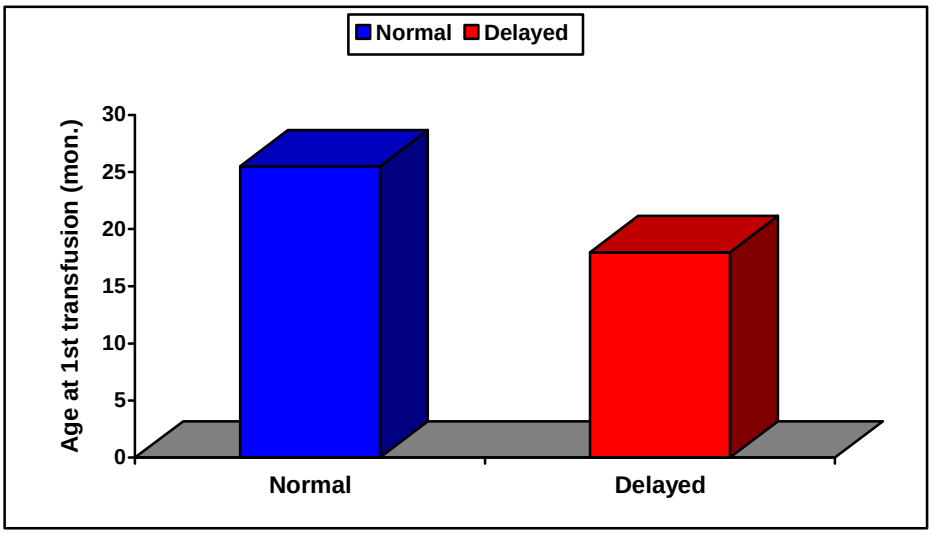

Figure (8) shows the Comparison between cases with normal puberty and delayed puberty regarding mean age of first transfusion.

Table (13): Anthropometric measures of the studied cases according to serum ferritin

	S. ferritin <1000(ng/ml)	S. ferritin ≥1000(ng/ml)	P value
Height			t = 6.770* p <0.001
Range	-2.56 – 1.20	-4.92 – 1.79	
Mean ± SD	-0.49 ± 0.91	-1.75 ± 1.40	

This table shows significant delay of anthropometric measures of patients with serum ferritin ≥ 1000 ng/ml.

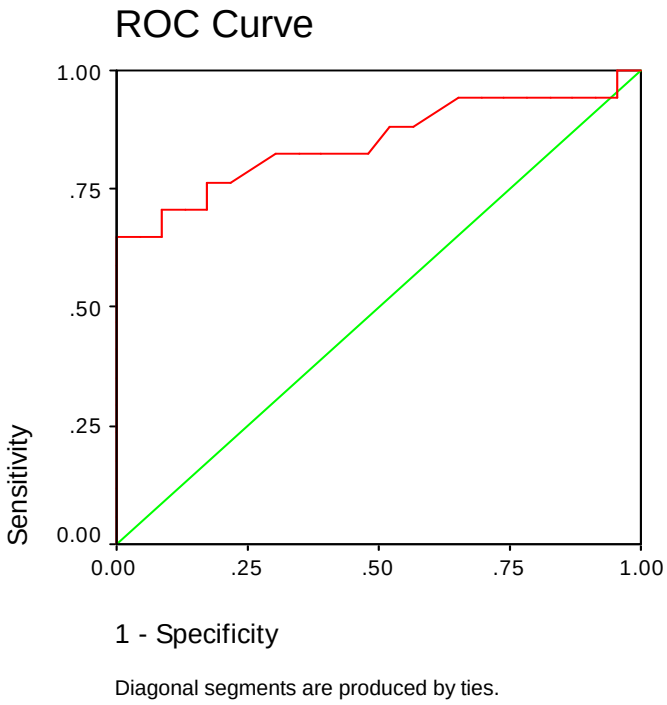

Figure (9) Mean ferritin level of 2560 ng/mL during puberty was the cut-off for hypogonadim.

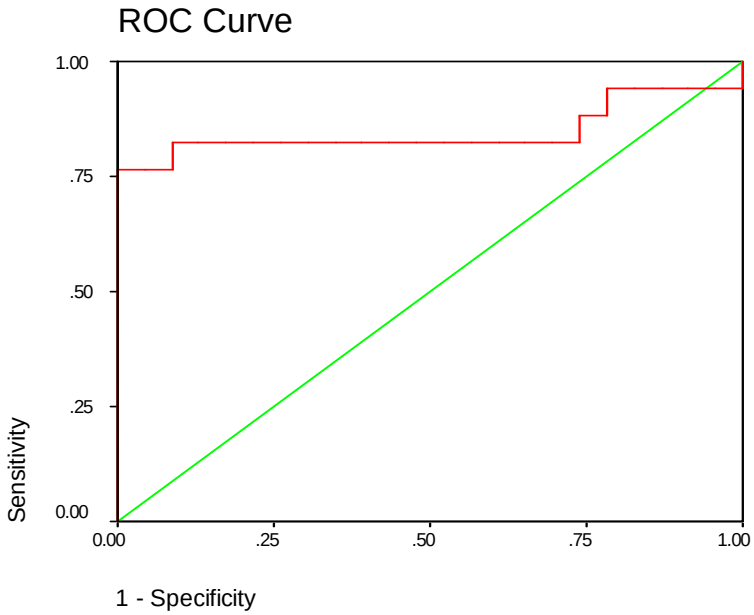

Figure (10) Mean ferritin level of 2800 ng/mL during prepuberty was the cut-off for final short stature .