Results

Table (1) Characteristics of the studied cases.

	Minimum	Maximum	Mean	SD
Age(y)	21.00	59.00	46.90	7.58
Height(m)	1.59	1.85	1.71	0.06
Weight(kg)	70.00	105.00	81.21	6.26
BMI	23.41	30.68	27.71	1.54
Fast blood sugar(mg/dl)	70.00	275.00	120.84	49.60
2hOGTT(mg/dl)	100.00	399.00	181.25	76.54
Creatinine(mg/dl)	0.8	1.20	1.04	0.08
Albumin(gm/dl)	3.50	5.00	4.22	0.39
Alk.pho(U/L)	94.00	196.00	108.18	16.60
AST(U/L)	10.00	53.00	22.53	9.59
ALT(U/L)	9.00	51.00	24.91	9.66
Bilirubin(mg/dl)	0.70	1.10	0.98	0.07
WBC(c/ µL)	3,520.00	7,160.00	5,253.23	2,542.70
ANC(c/ µL)	2,000.00	5,824.00	2,816.91	797.89
HB(gm/dl)	12.00	15.70	13.50	0.87
platelete(c/ µL)	130,000	395,000	205,155	45,048
INR	1.00	1.00	1.00	0.00
Alpha FP(ng/dl)	3.00	59.20	11.50	8.27
TSH(mIU/L)	2.10	4.10	3.13	0.38
Viral load(IU/ ml)	35,300	4,921,516	854,874	791,890

As shown in **table 1**,

The mean age of patients was 46.90±7.58.

The mean body mass index was 27.71±1.54.

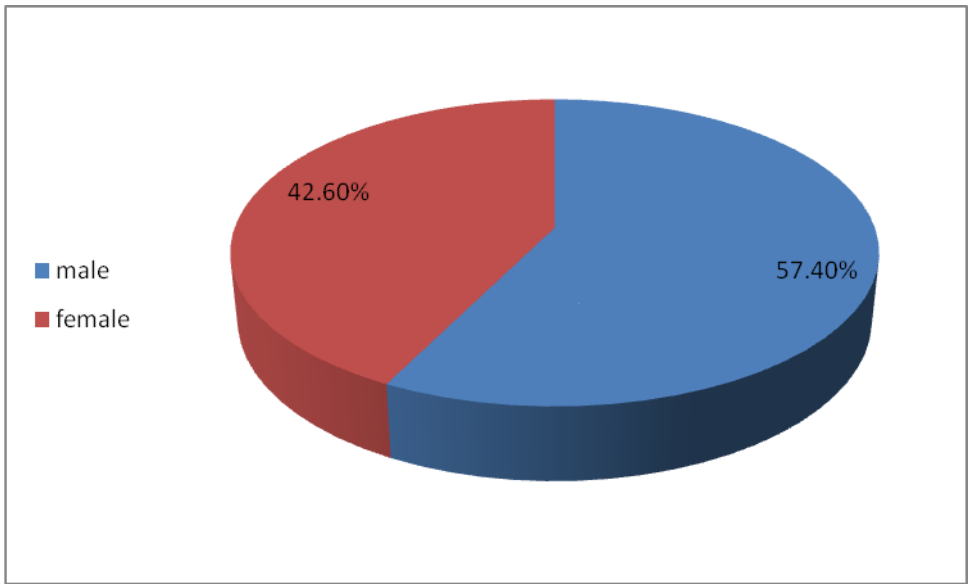
The mean PCR was 854.874±791.890 IU/mL.

The mean fasting blood sugar was 120.84±49.60 mg/dl.

The mean 2h.OGTT was 181.25±76.54 mg/dl.

Table(2) and figure(3) Percentage of male and female in studied cases.

	No.	%
Male	***147***	**57.40%**
Female	***109***	**42.60%**
Total	***256***	**100.00%**



The study was conducted on 256 patients, 147 males(57.4%)and 109 females (42.6%).

Table (3) and figure(4) METAVIR fibrosis stages of the studied cases.

	F1	F2	F3	F4	total
No.	89	93	74	0	256
%	34.80%	36.30%	28.90%	0%	100.00%

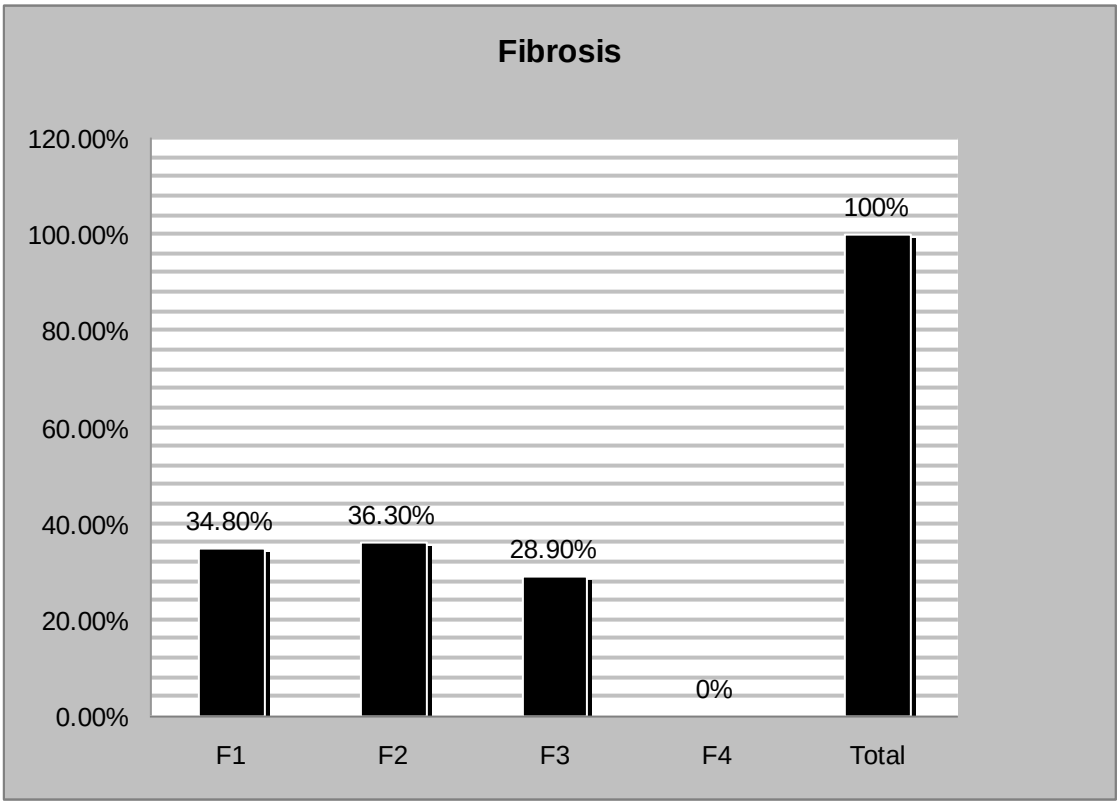
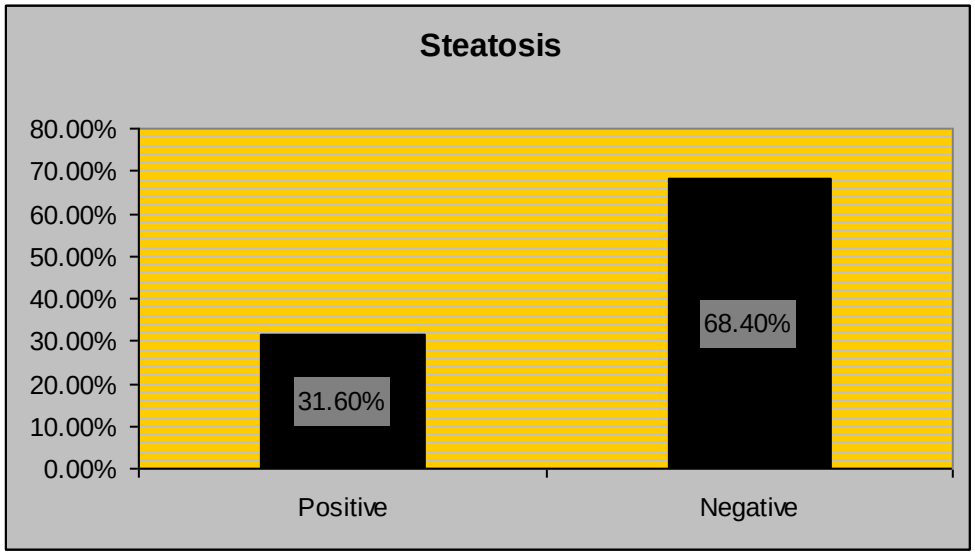


Table (4) and figure(5) Percentage of steatosis in studied cases.

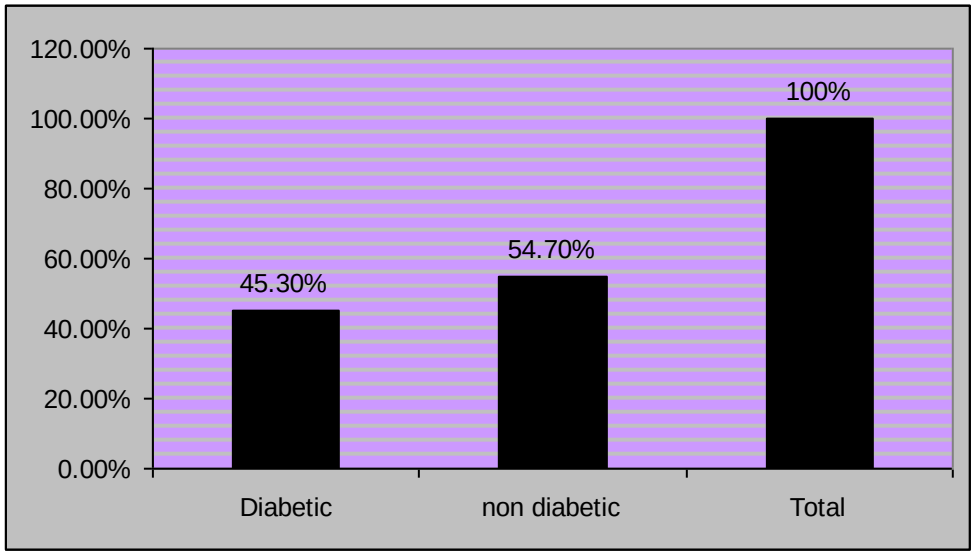
Steatosis	No.	%
Positive	81	31.60%
negative	175	68.40%
total	*256*	100.00%



In this study 81 patients had steatosis (31.6%) and 175 patients did not have steatosis (68.4%).

Table (5) and figure(6) Percentage of diabetic and non diabetic patients in studied cases.

	No.	%
Diabetic	**116**	**45.30%**
Non Diabetic	**140**	**54.70%**
total	***256***	**100.00%**



One hundred and sixteen patients were diabetic (45.3%) and 140 patients (54.7%) were non diabetic**.**

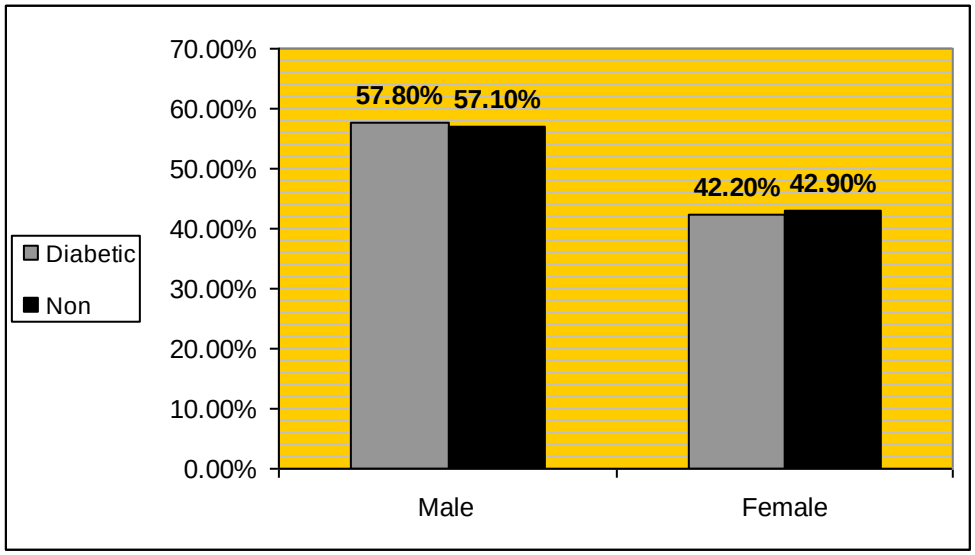
Table (6) Factors associated with presence of DM in chronic hepatitis C patients before treatment.

	Group 1 Diabetic(n= 116) Mean ± SD	Group II Non Diabetic(n=140) Mean ± SD	P
Age(y)	49.84 ± 5.82	44.46 ± 8.02	<0.001***
Height(m)	1.71 ± 0.05	1.72 ± 0.06	0.237
Weight(kg)	82.57 ± 6.10	80.08 ± 6.20	0.001
BMI	28.32 ± 1.36	27.20 ± 1.50	<0.001***
Creatinine (mg/dl)	1.05 ± 0.08	1.03 ± 0.08	0.144
Albumin (gm/dl)	4.18 ± 0.37	4.25 ± 0.41	0.132
Alk.pho(U/L)	110.82 ± 19.79	108.99 ± 13.06	0.09
AST(U/L)	22.46 ± 11.34	22.59 ± 7.89	0.91
ALT(U/L)	27.55 ± 9.27	22.72 ± 9.45	<0.001***
Bilirubin (mg/dl)	0.97 ± 0.07	0.99 ± 0.07	0.23
WBC(c/ µL)	5422 ± 3627	5113 ± 3170	0.334
ANC(c/ µL)	2910 ± 885	2739 ± 711	0.088
HB(gm/dl)	13.53 ± 0.71	13.47 ± 0.98	0.593
Platelete (c/ µL)	204,857 ± 49,696	205,401 ± 40,982	0.924
INR	1.00 ± 0.00	1.00 ± 0.00	1.00
Alpha FP(ng/dL)	11.76 ± 9.69	11.29 ± 6.89	0.65
TSH(mIU/L)	3.09 ± 0.39	3.17 ± 0.36	0.114
Viral load(IU/ ml)	884,499 ± 737,161.65	830,327 ± 836,358	0.587

Prior to antiviral treatment,diabetes mellitus was associated with advanced age (49.84±5.82 vs. 44.46±8.02) , high BMI (28.32±1.36 vs. 27.2±1.5) and high ALT level (27.55±9.27 vs. 22.72±9.45).

Table (7) and figure(7) Factors associated with the presence of DM in chronic hepatitis C patients before treatment (cont.).

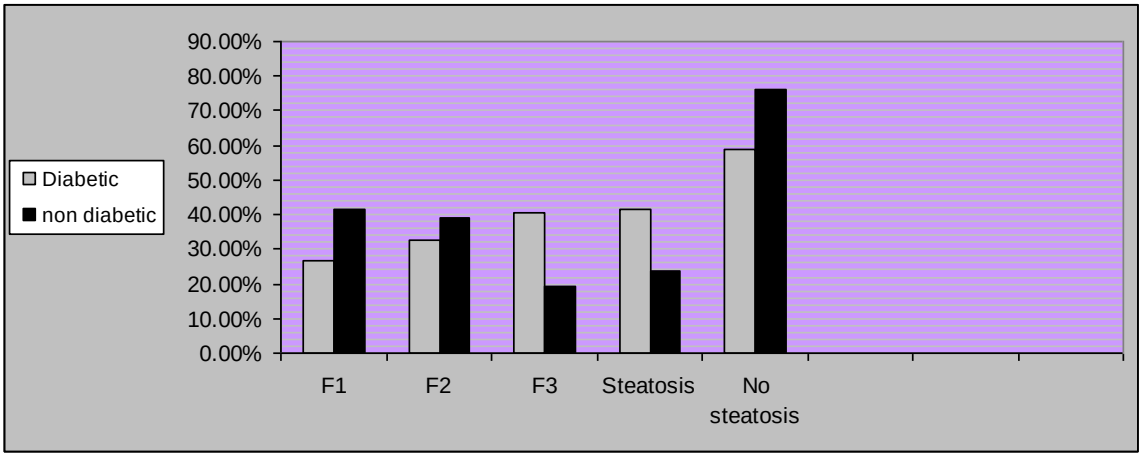
		Group 1 Diabetic(n=116) No. (%)	Group II Non Diabetic(n=140) No. (%)	P
Sex	MALE	67(57.8%)	80(57.1%)	.921
	FEMALE	49(42.2%)	60(42.9%)	



Prior to treatment there was no difference between both groups regarding sex of the patients.

Table(8) and figure (8) Pathological features of both groups before treatment.

		Group 1 Diabetic(n=116) No. (%)	Group II Non Diabetic(n=140) No. (%)	P
Fibrosis	F1	31(26.70%)	58(41.40%)	0.001**
	F2	38(32.80%)	55(39.30%)	
	F3	47(40.50%)	27(19.30%)	
Steatosis	Positive	48(41.40%)	33(23.60%)	0.002**
	Negative	68(58.60%)	107(76.40%)	



About 41.40% of diabetic patients had steatosis and 40.50% of them had sever fibrosis(F3) with a significant difference compared to the other group.

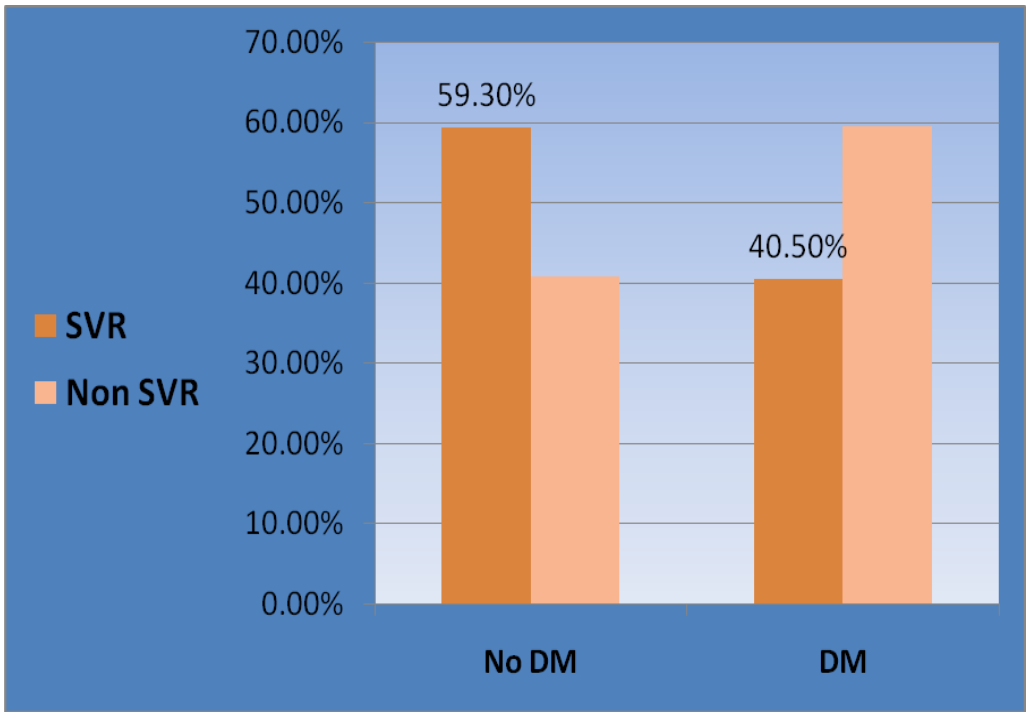
Table (9) Factors related to the presence of DM in chronic hepatitis C patients before treatment by multivariate analysis.

Variable		Diabetic group	Non Diabetic group	OR(95%CI)	P-value
AGE		49.84 ± 5.82	44.46 ± 8.02	1.064(1.016-1.114)	0.008
BMI		28.32 ± 1.36	27.20 ± 1.50	1.204(1.020-1.422)	0.03
ALT		27.55 ± 9.27	22.72 ± 9.45	0.98(0.608-1.537)	0.18
F3		47(40.50%)	27(19.30%)	1.167(0.827-1.643)	0.37
Steatosis	Positive	48(41.40%)	33(23.60%)	1.565(1.211-2.202)	0.001
	Negative	68(58.60%)	107(76.40%)		

Multivariate analysis revealed that, the variables associated with development of DM were age (p=.008) , BMI (p=0.03) and steatosis (p=.001).

Table (10) and figure(9) SVR in Diabetic and non Diabetic groups.

		Group1 DM	Group11 NON DM	Total	P value
SVR	POSITIVE SVR	47(40.50%)	83(59.30%)	130(50.78%)	0.003**
	NEGATIVE SVR	69(59.50%)	57(40.70%)	126(49.22%)	
Total		116(100%)	140(100%)	256(100%)	



SVR was higher in non diabetic patients, 83 cases (59.3%) compared to diabetic patients, 47 cases (40.5%) with a significant difference between both groups.

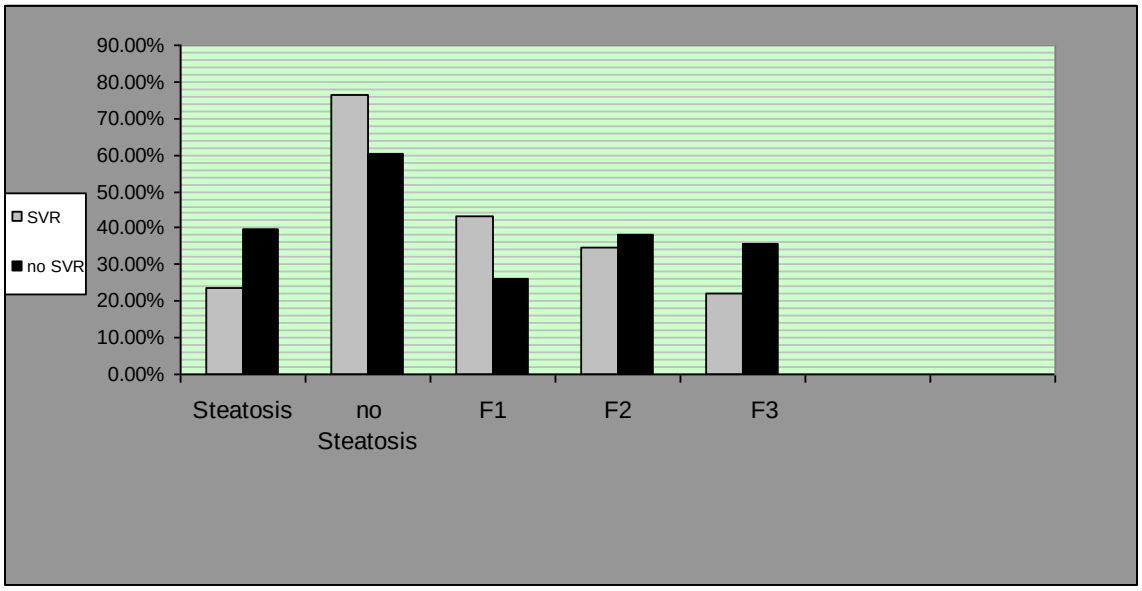
Table (11): Baseline characteristics of studied cases according to SVR.

		Positive SVR (n= 130)	Negative SVR (n=126)	P
Sex	Male	75(57.69%)	72(57.14%)	0.9292
	Female	55(42.31%)	54(42.86%)	
Age(y)		44.51 ± 7.75	49.37 ± 6.58	<0.001***
Height(m)		1.72 ± 0.06	1.70 ± 0.05	0.42
Weight(kg)		79.97 ± 6.35	82.49 ± 5.93	0.001**
BMI		27.05 ± 1.39	28.39 ± 1.39	<0.001***
Fast blood sugar(mg/dl)		113.47 ± 46.63	135.45 ± 51.57	0.001**
2h OGTT (mg/dl)		166.67 ± 66.97	196.30 ± 82.90	0.000***
Creatinine(mg/dl)		1.05 ± 0.08	1.04 ± 0.08	0.568
Albumin(gm/dl)		4.22 ± 0.4	4.21 ± 0.3	0.882
Alk.pho(U/L)		108.20 ± 17.7	108.16 ± 15.44	0.984
AST(U/L)		22.80 ± 9.31	22.25 ± 9.90	0.65
ALT(U/L)		24.57 ± 9.27	25.26 ± 10.06	0.567
Bilirubin(mg/dl)		0.97 ± 0.07	0.99 ± 0.07	0.126
WBC(c/ µL)		5,199.60 ± 1,045.93	5,308.57 ± 3,471.92	0.732
ANC(c/ µL)		2,812 ± 744.12	2,821 ± 852.79	0.934
HB(gm/dl)		13.47 ± 0.99	13.53 ± 0.72	0.625
platelete(c/ µL)		205,306 ± 41,052	204,999 ± 48,996	0.957
INR		1.00 ± 0.00	1.00 ± 0.00	1.00
Alpha FP(ng/dL)		11.58 ± 7.60	11.42 ± 8.93	0.88
TSH(mIU/L)		3.18 ± 0.41	3.09 ± 0.34	0.07
Viral load(IU/ ml)		662,415 ± 641,912	1,053,442 ± 880,771	<0.001***

Patients with SVR were younger (44.51±7.75 vs. 49.37±6.58), had lower BMI (27.05±1.39 vs. 28.39±1.39) , lower viral load (662.415±641.912 vs. 1.053.442±880.771), lower 2h.P.P(166.67±66.97 vs. 196.30±82.90) and lower fasting blood sugar(113.47±46.63 vs. 128.45±51.57)

Table(12) and figure(10) Pathological features of studied cases according to SVR(cont.).

		Positive SVR (n= 130) No. %	Negative SVR (n=126) No. %	P
Fibrosis	F1	56(43.10%)	33(26.20%)	0.009**
	F2	45(34.60%)	48(38.10%)	
	F3	29(22.30%)	45(35.70%)	
Steatosis	Positive	31(23.80%)	50(39.70%)	0.006**
	Negative	99(76.20%)	76(60.30%)	



As shown in **table 12**and **figure 10** , patients who lacked SVR had advanced grades of fibrosis (F2,F3) with significant difference between both groups. Also 39.7% of patients with negative SVR had steatosis with significant difference between both groups.

Table (13) Independent predictors of sustained response identified by multivariate analysis.

variable	OR(95%CI)	P-value
AGE	3.568(.899-14.161)	.071
WT	0.962(0.907-1.019)	0.186
BMI	0992(.977-1.009)	.355
VIRAL- LOAD	1.000(1.000-1.000)	0.001
FIBROSIS GRADE 3	1.491(1.020-2.178)	0.039
STEATOSIS	0.48(0.24-0.98)	0.04
Fasting blood sugar	1.863(1.445-2.401)	.000
2h OGTT	0.57(0.35-0.92)	.02

Multivariate analysis revealed that, the independent variables related to SVR were viral load (P=0.001), ,fasting blood sugar(P=0.000), 2h OGTT (P=0.02), fibrosis grade 3 (P=0.039) and steatosis (p=0.04).

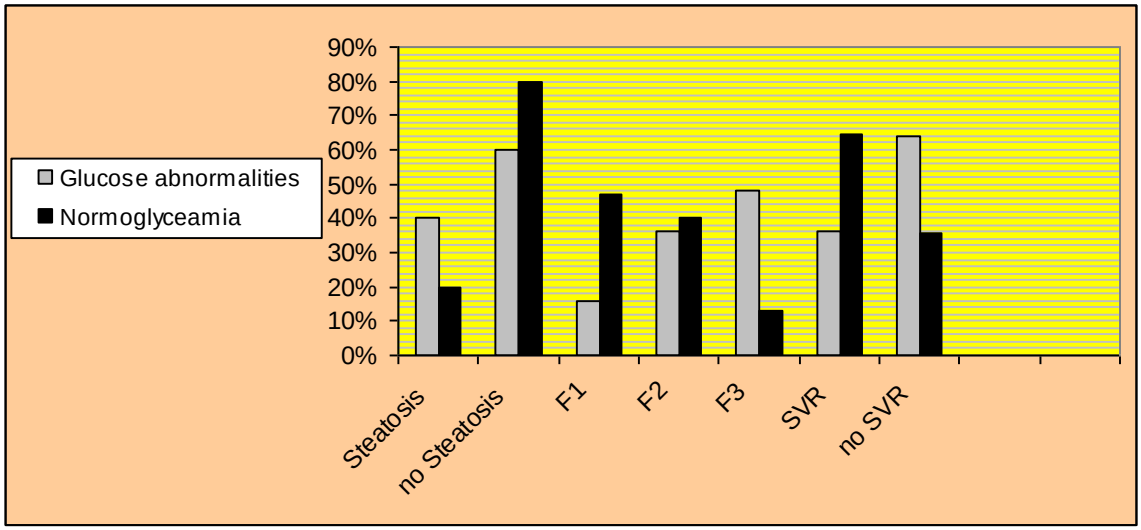
Table (14) Baseline characteristics of normoglyceamic patients who developed glucose abnormalities after antiviral treatment and those who remained normoglyceamic.

		Glucose abnormalities (n= 25)	Normoglyceamic (n=115)	P
Sex	Male	14(56.0%)	66(57.4%)	.899
	Female	11(44.0%)	49(42.6%)	
Age(y)		51.20 ± 4.70	43.00 ± 7.85	<0.001***
Height(m)		1.71 ± 0.05	1.72 ± 0.06	0.598
Weight(kg)		83.28 ± 5.39	79.38 ± 6.16	0.004**
BMI		28.47 ± 1.14	26.92 ± 1.43	0<0.001***
Fast blood sugar(mg/dl)		83.24 ± 5.93	82.53 ± 8.10	0.68
2h OGTT(mg/dl)		125.80 ± 7.34	124.37 ± 8.77	0.448
Creatinine(mg/dl)		1.03 ± 0.09	1.04 ± 0.08	0.674
Albumin(gm/dl)		4.31 ± 0.42	4.24 ± 0.40	0.397
Alk.pho(U/L)		105.36 ± 8.32	106.13 ± 13.90	0.79
AST(U/L)		22.20 ± 8.20	22.68 ± 7.85	0.785
ALT(U/L)		21.32 ± 9.59	23.03 ± 9.44	0.415
bilirubin(mg/dl)		0.96 ± 0.08	0.98 ± 0.06	0.148
WBC(c/ µL)		5,327 ± 881.08	5,066 ± 980.74	0.223
ANC(c/ µL)		2,777 ± 678.02	2,731 ± 720.86	0.771
HB(gm/dl)		13.47 ± 0.59	13.45 ± 1.05	0.978
platelete(c/ µL)		203,792 ± 31,091	205,751 ± 42,937	0.829
INR		1.00 ± 0.00	1.00 ± 0.00	1.00
Alpha FP(ng/dL)		12.60 ± 7.85	11.00 ± 6.67	0.29
TSH(mIU/L)		3.19 ± 0.33	3.16 ± 0.37	0.76
Viral load(IU/ ml)		732,982 ± 750,006	851,489 ± 855,535	0.523

According to **table 14**, factors associated with development of glucose abnormalities in normoglyceamic group after antiviral treatment were old age(51.2±4.7 vs. 43.00±7.85), higher BMI (28.47±1.14 vs. 26.92±1.43)and increase in body weight(83.28±5.39 vs. 79.38±6.16).

Table (15) and figure(11) Baseline characteristics of non diabetic patients who developed glucose abnormalities after antiviral treatment and those who remained normoglyceamic(cont.).

		Glucose abnormalities (n= 25) No. %	normoglyceamic (n=115) No. %	P
Steatosis	Positive	10(40.00%)	23(20.00%)	0.03*
	Negative	15(60.00%)	92(80.00%)	
Fibrosis	F1	4(16.00%)	54(47.00%)	<0.001***
	F2	9(36.00%)	46(40.00%)	
	F3	12(48.00%)	15(13.00%)	
SVR	Positive	9(36.00%)	74(64.30%)	0.009**
	Negative	16(64.00%)	41(35.70%)	



According to **table 15** and **figure 11**, factors associated with development of glucose abnormalities in non diabetic patients after antiviral treatment were: steatosis 40.00%(10cases), negative SVR 64%(16 cases) and fibrosis score. 16.00%(4 cases)of patients who developed glucose abnormalities had F1 in liver biopsy , 36.00%(9 cases) had F2 and 48.00%(12 cases) had F3.

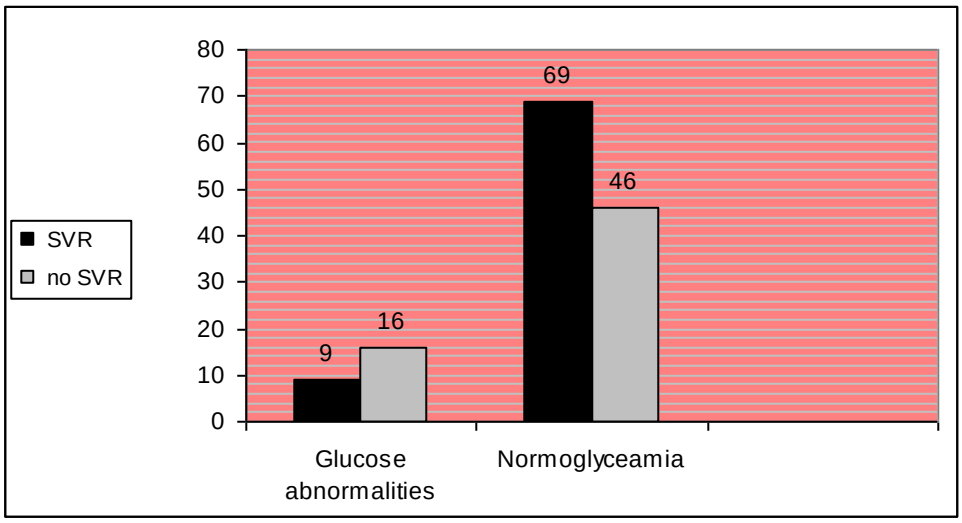
Table (16) **(**Multivariate analysis of variables assessing the occurance of glucose abnormalities during follow up).

Variable	OR(95%CI)	P-value
AGE	1.837(0.952-1.931)	0.001
BMI	1.565(1.211-2.202)	0.001
GRADE 3 FIBROSIS	4.43(2.49-8.30)	0.001
STEATOSIS	1.035(0.289-3.706)	0.958
SVR(yes/no)	0.472(0.295-0.756)	0.002

Multivariate analysis revealed that, the independent variables associated with development of glucose abnormalities during follow up period were age(p=.001), BMI(p=0.001) , grade 3 fibrosis(p=.001) and SVR(p=0.002).

Table (17) The relation between glucose abnormalities and SVR in non diabetic group after antiviral treatment.

glucose abnormalities development	SVR		Total
	Non SVR	SVR	
DM	7 (11.3%)	0	7
IGT	9 (14.5%)	9 (11.5%)	18
Normal glucose levels	46(74.2%)	69(88.5%)	115
Total	62	78	



Figure(12) The relation between glucose abnormalities development and sustained virological response in non diabetic group after antiviral treatment.

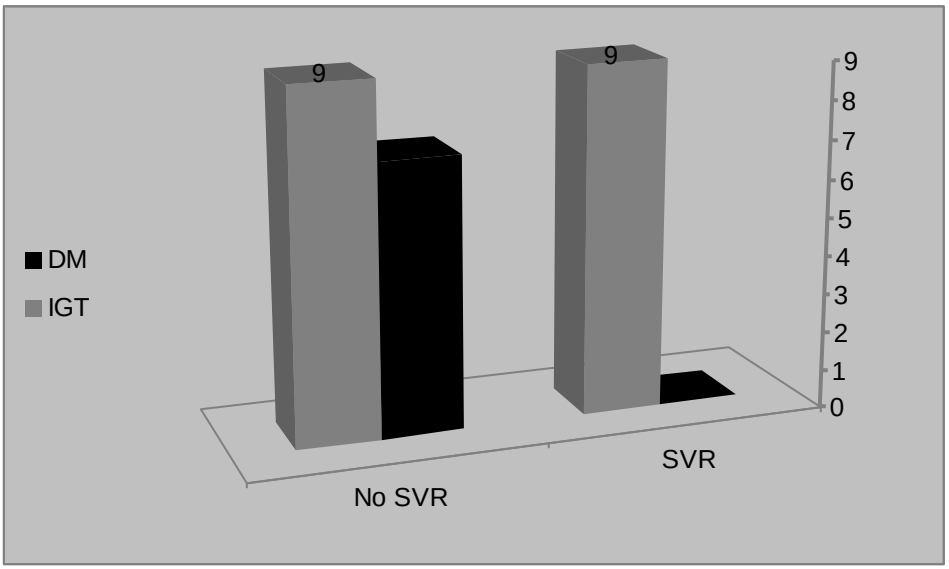


Figure (13) The relation between glucose abnormalities development and sustained virological response in non diabetic group after antiviral treatment.

As shown in **table 17** , **figure 12** and **figure 13**, during follow up, 9 of 78 patients with SVR(11.5%) and 16 of 62 patients with non SVR(25.7%) developed glucose abnormalities ,7 cases developed diabetes and 18 cases developed IGT.