Results

The results of the present study are presented in the following tables and figures.

Group (1): All the diabetic patients before the supplementation.

Group (1a): The diabetic patients with neuropathy before the supplementation.

Group (1b): The diabetic patients without neuropathy before the supplementation.

Group (2): All the diabetic patients after the supplementation.

Group (2a): The diabetic patients with neuropathy after the supplementation.

Group (2b): The diabetic patients without neuropathy after the supplementation.

Table (3a): Fasting blood glucose level (mg/dl) in the studied groups.

FBG / Stud. Group	No.	Min.	Max.	Mean	± SD
Group (1)	60	108	498	246.08	88.59
Group (1a)	30	122	498	256.90	90.11
Group (1b)	30	108	380	226.13	83.82
Group (2)	60	79	369	190.22	65.35
Group (2a)	30	82	369	196.73	73.41
Group (2b)	30	79	287	183	56.67
Control group	20	79	120	95.35	13.31

Critical t for p = 0.05 2.571
Critical t for p = 0.01 4.032
Critical t for p = 0.001 6.859

Table (3b): Comparison between fasting blood glucose levels among the studied groups mg/dl

Groups	t	p
Group 1 & control group	- 8.08	< 0.001 *
Group 2 & control group	- 5.79	< 0.01 *
Group 1 & group 2	- 4.26	< 0.01 *
Group 1a & group 1b	- 2.16	> 0.05
Group 2a & group 2b	- 1.07	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of fasting blood glucose levels (mg/dl) in the studied groups.

- There is high significant increase in mean fasting blood glucose levels in both diabetic groups before and after supplementation when compared with the control group.
- There is high significant increase in mean fasting blood glucose levels in diabetic group before supplementation when compared with diabetic group after supplementation.
- There is no significant difference in the mean value of fasting blood glucose in patients with neuropathy before and after supplementation when compared with patients without neuropathy.

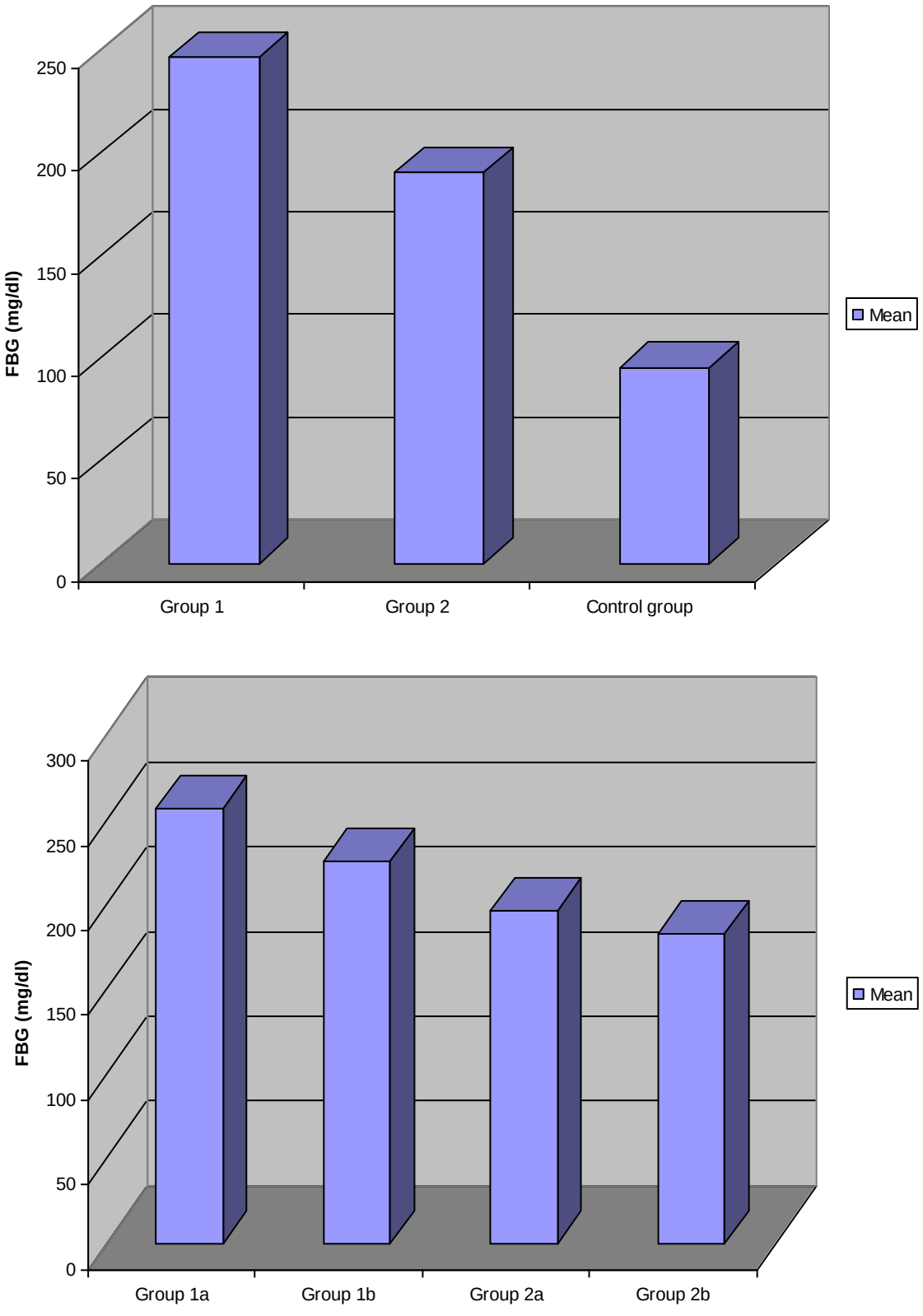


Figure (5): Mean fasting blood glucose levels in the studied groups.

Table (4a): Post prandial blood glucose level (mg/dl) in the studied groups.

Post prandial glucose **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	263	587	366.78	78.02
Group (1a)	30	272	587	381.63	78.98
Group (1b)	30	263	496	351.93	75.44
Group (2)	60	110	480	302.90	79.94
Group (2a)	30	187	457	315.35	66.89
Group (2b)	30	110	480	286.20	93.78
Control group	20	99	154	133.70	13.36

Table (4b): Comparison between post prandial blood glucose levels among the studied groups mg/dl

Groups	**T**	**p**
Group 1 & control group	- 14.01	< 0.001 *
Group 2 & control group	- 10.42	< 0.001 *
Group 1 & group 2	7.47	< 0.001 *
Group 1a & group 1b	1.94	> 0.05
Group 2a & group 2b	1.55	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of post prandial blood glucose (mg/dl) in the studied groups.

- There is high significant increase in mean post prandial blood glucose levels in both diabetic groups before and after supplementation when compared with the control group.
- There is high significant increase in mean post prandial blood glucose levels in diabetic group before supplementation when compared with diabetic group after supplementation.
- There is no significant difference in the mean value of post prandial blood glucose in patients with neuropathy before and after supplementation when compared with patients without neuropathy.

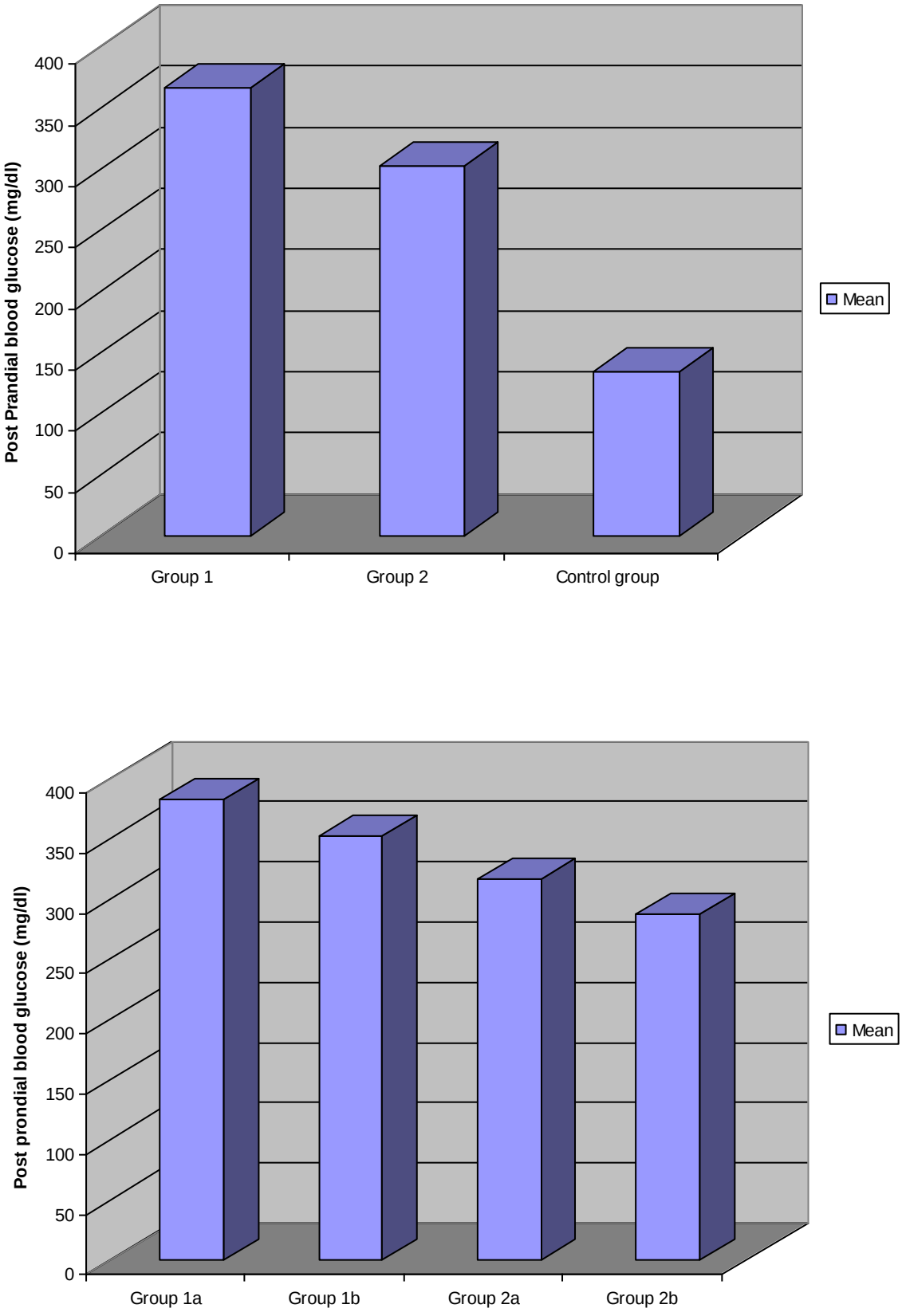


Figure (6): Mean post prandial blood glucose levels in the studied groups

Table (5a): Glycohaemoglobin A1c % level in the studied groups.

Hb A1c% **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	5.6	17.6	9.75	3.07
Group (1a)	30	5.8	17.6	10.36	3.31
Group (1b)	30	5.6	13.3	9.15	2.74
Group (2)	60	5.9	12.6	8.62	1.95
Group (2a)	30	5.9	12.6	8.95	2
Group (2b)	30	6.1	11.4	8.29	1.87
Control group	20	4.1	5.8	5.03	0.55

Table (5b): Comparison between Glycohaemoglobin levels among the studied groups %.

Groups	**t**	**p**
Group 1 & control group	- 6.89	< 0.001 *
Group 2 & control group	- 8.59	< 0.001 *
Group 1 & group 2	- 3.98	< 0.05 *
Group 1a & group 1b	1.49	> 0.05
Group 2a & group 2b	2.02	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of glycohaemoglobin % in the studied groups.

- There is high significant increase in mean glycohaemoglobin levels in both diabetic groups before and after supplementation when compared with the control group.
- There is significant increase in mean glycohaemoglobin levels in diabetic group before supplementation when compared with diabetic group after supplementation.
- There is no significant difference in the mean value of glyucohaemoglobin in patients with neuropathy before and after supplementation when compared with patients without neuropathy.

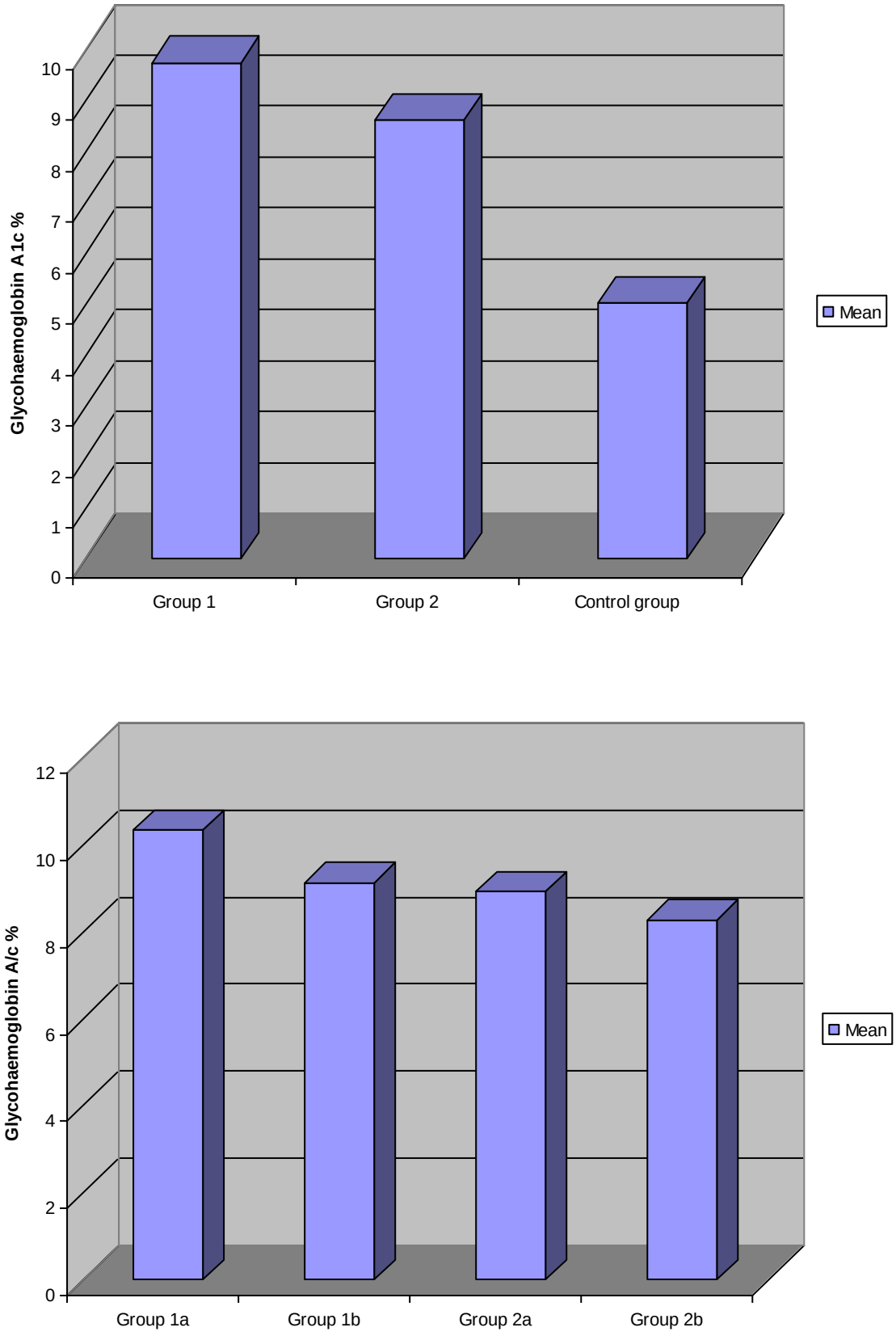


Figure (7): mean glycohaemoglobin levels in the studied groups.

Table (6a): Triglycerides level (mg/dl) in the studied groups.

Triglycerides **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	81	373	169.48	51.78
Group (1a)	30	88	373	184.07	58.98
Group (1b)	30	81	276	157.10	40.43
Group (2)	60	64	257	146.52	42.79
Group (2a)	30	91	252	158.13	41.61
Group (2b)	30	64	257	134.90	41.41
Control group	20	60	151	90.90	32.09

Table (6b): Comparison between triglycerides levels among the studied groups mg/dl.

Groups	**t**	**p**
Group 1 & control group	6.57	< 0.01 *
Group 2 & control group	5.79	< 0.01 *
Group 1 & group 2	3.02	< 0.05 *
Group 1a & group 1b	2.51	> 0.05
Group 2a & group 2b	2.52	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of triglycerides mg/dl in the studied groups.

- There is high significant increase in mean triglycerides levels in both diabetic groups before and after supplementation when compared with the control group.
- There is significant increase in mean triglycerides levels in diabetic group before supplementation when compared with diabetic group after supplementation.

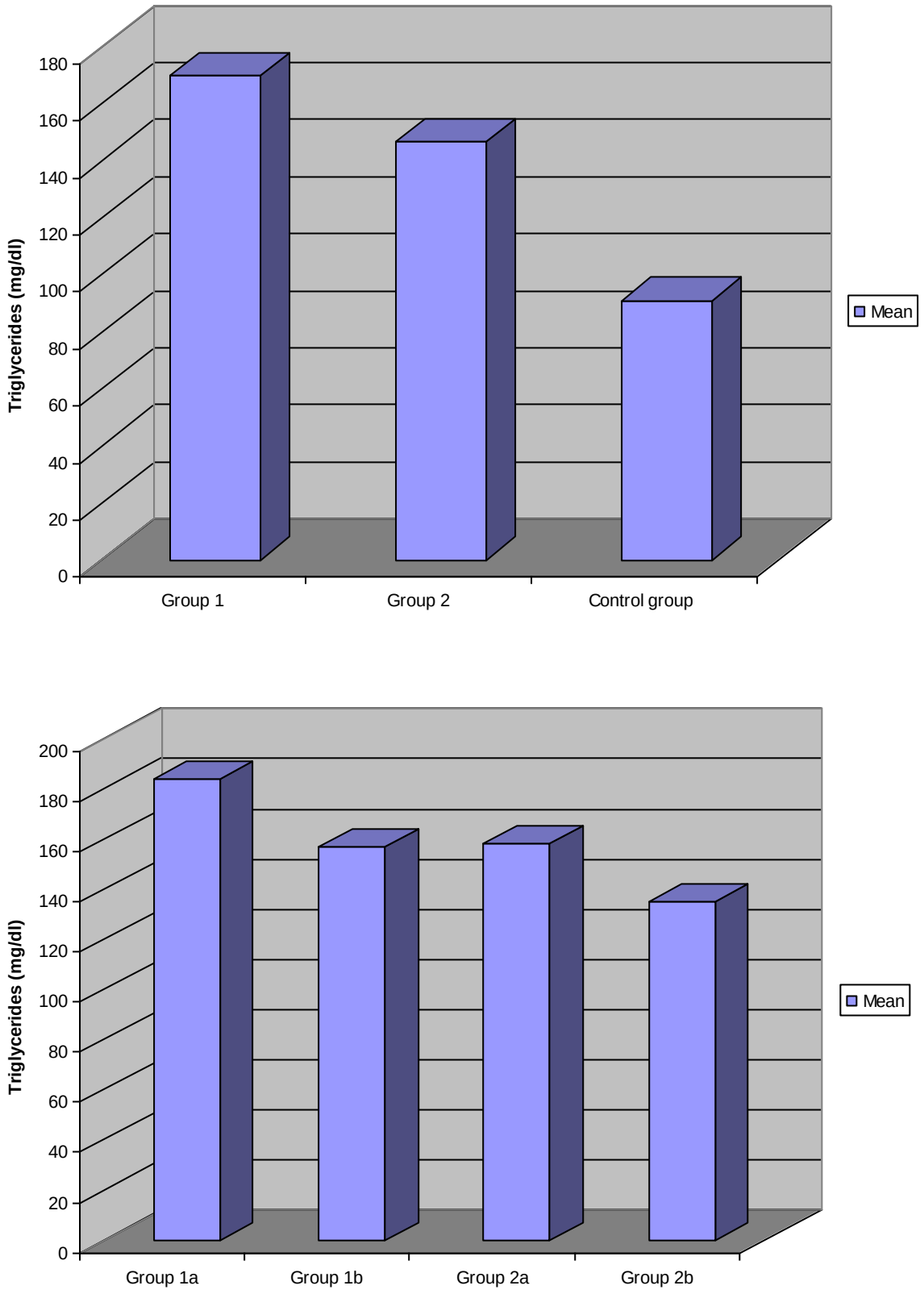


Figure (8): Mean triglycerides levels in the studied groups.

Table (7a): Cholesterol level (mg/dl) in the studied groups.

Cholesterol **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	143	276	219.62	33.02
Group (1a)	30	161	275	230.07	30.24
Group (1b)	30	143	276	209.77	33.67
Group (2)	60	151	257	200.33	29.79
Group (2a)	30	161	255	210.63	27.76
Group (2b)	30	151	257	190.03	28.55
Control group	20	110	200	175.65	22.42

Table (7b): Comparison between cholesterol levels among the studied groups mg/dl.

Groups	**t**	**p**
Group 1 & control group	- 6.64	< 0.01*
Group 2 & control group	- 2.46	> 0.05
Group 1 & group 2	3.31	< 0.05*
Group 1a & group 1b	2.32	> 0.05
Group 2a & group 2b	2.58	< 0.05*

This table shows the range, mean ± standard deviation, t test and p value of cholesterol (mg/dl) in the studied groups.

- There is high significant increase in mean cholesterol levels in diabetic group before supplementation when compared with the control group, while there is no significant difference in the mean value of cholesterol between the diabetic group after supplementation and the control group.
- There is significant increase in mean cholesterol levels in diabetic group before supplementation when compared with diabetic group after supplementation.
- There is also significant increase in mean cholesterol levels in diabetic group with neuropathy after supplementation when compared with the diabetic group without supplementation.

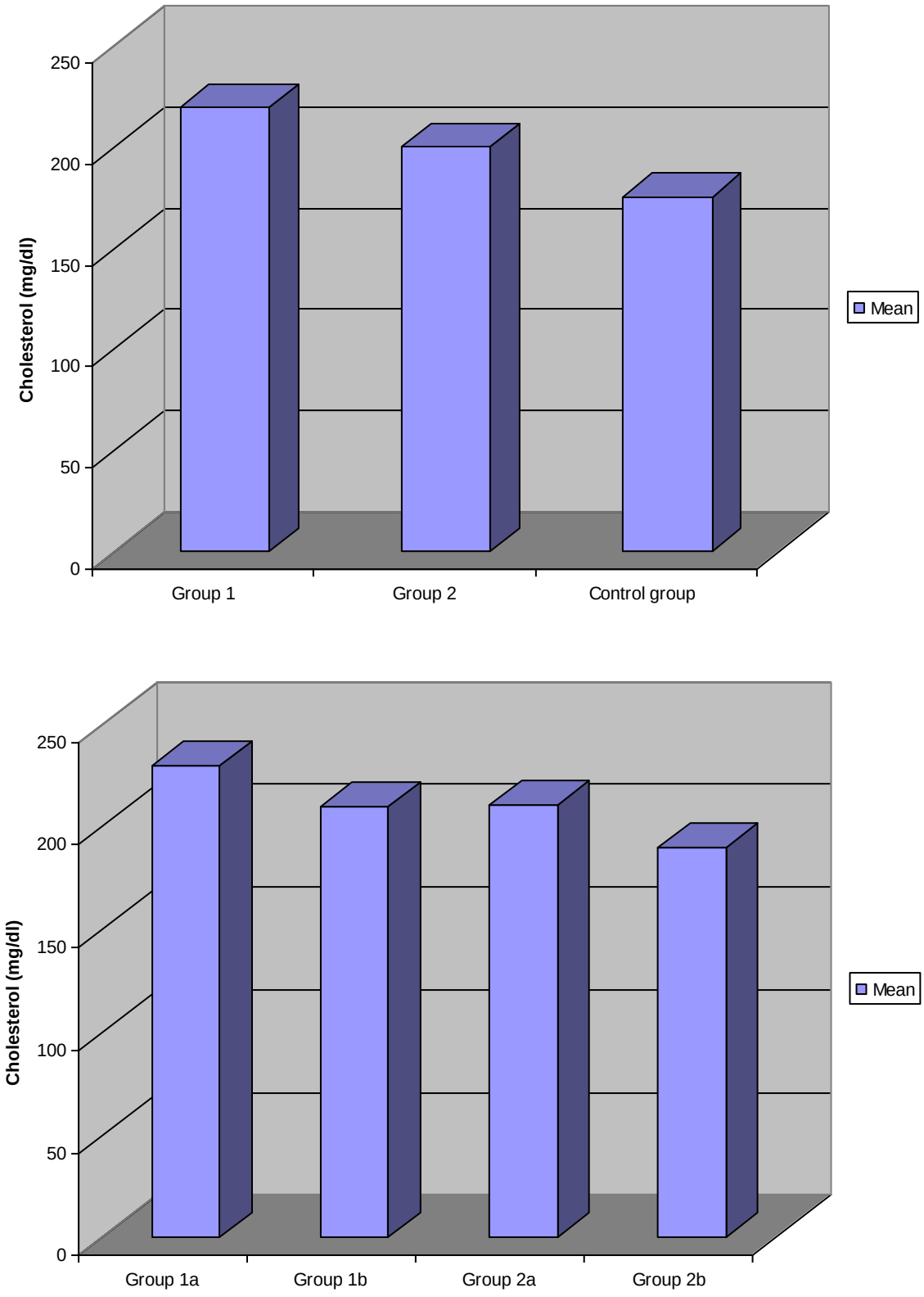


Figure (9): Mean cholesterol levels in the studied groups.

Table (8a): HDL-C level (mg/dl) in the studied groups.

HDL-C **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	31	59	43.85	7.91
Group (1a)	30	31	59	47.00	7.48
Group (1b)	30	31	55	40.70	7.13
Group (2)	60	34	65	48.10	7.69
Group (2a)	30	35	61	49.80	7.31
Group (2b)	30	34	65	46.40	7.79
Control group	20	31	72	48.65	9.20

Table (8b): Comparison between HDL-C levels among the studied groups mg/dl.

Groups	**t**	**p**
Group 1 & control group	0.58	> 0.05
Group 2 & control group	0.15	> 0.05
Group 1 & group 2	- 4.24	< 0.01*
Group 1a & group 1b	2.01	> 0.05
Group 2a & group 2b	1.53	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of HDL-C mg/dl in the studied groups.

- There is high significant increase in mean HDL-C levels in diabetic group after supplementation when compared with the diabetic group before supplementation.

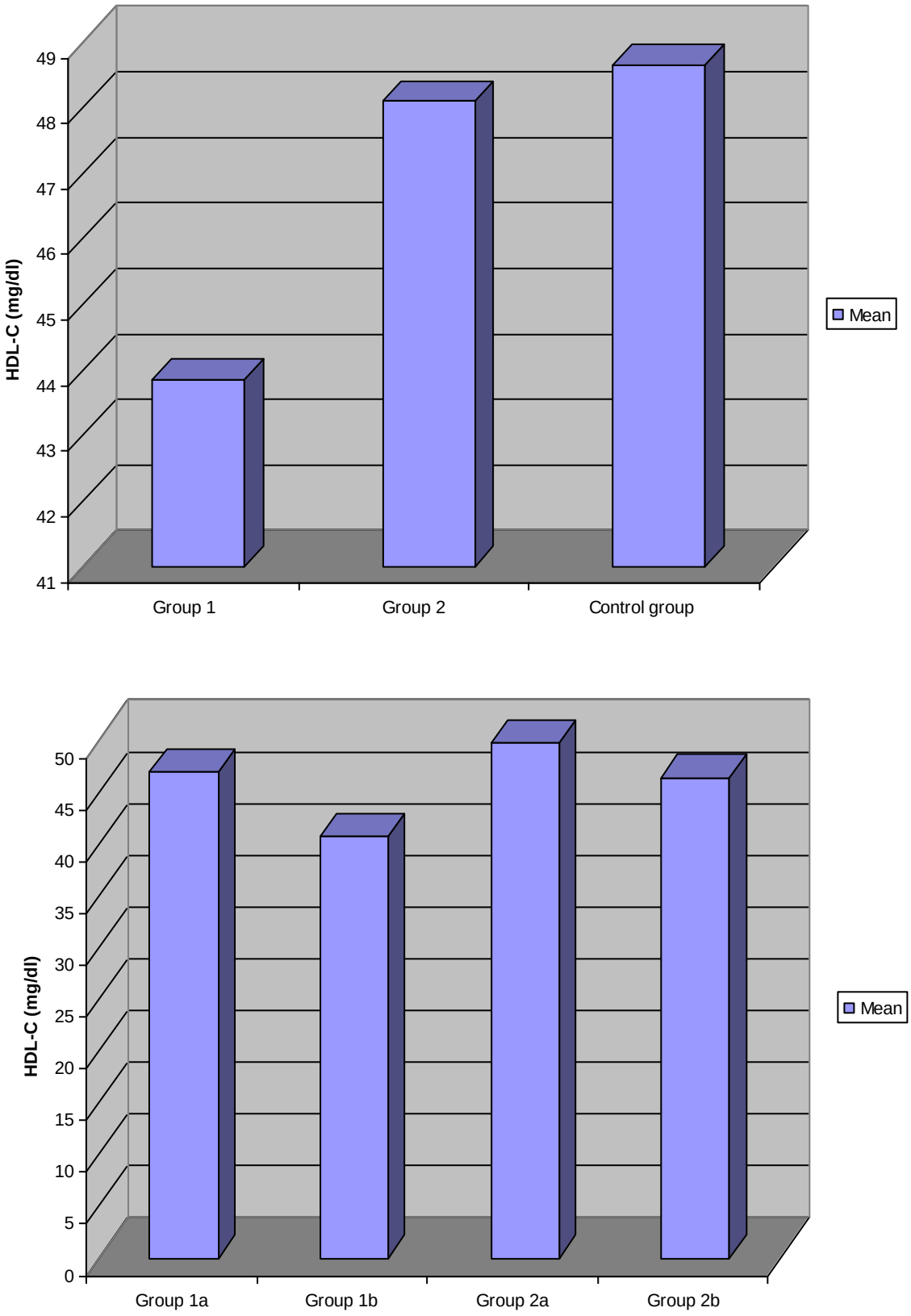


Figure (10): Mean HDL-C levels in the studied groups.

Table (9a): LDL-C level (mg/dl) in the studied groups.

LDL-C Stud. Group	No.	Min.	Max.	Mean	± SD
Group (1)	60	68.6	199.4	142.01	31.37
Group (1a)	30	68.6	199.4	146.72	29.74
Group (1b)	30	78.7	194.2	137.30	32.74
Group (2)	60	73	191.6	122.78	29.05
Group (2a)	30	73.8	178.8	128.57	28.26
Group (2b)	30	73	191.6	116.65	29.44
Control group	20	47.4	141.4	109.92	20.98

Table (9b): Comparison between LDL-C levels among the studied groups mg/dl.

Groups	t	p
Group 1 & control group	- 3.32	< 0.05*
Group 2 & control group	- 0.93	> 0.05
Group 1 & group 2	- 3.27	< 0.05*
Group 1a & group 1b	1.08	> 0.05
Group 2a & group 2b	1.65	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of LDL-C (mg/dl) in the studied groups.

- There is significant increase in mean LDL-C levels in patients before supplementation when compared with the control group while thee is no significant difference in the mean value of LDL-C between the patients after supplementation and the control group.
- There is also significant increase in mean LDL-C levels in patients before supplementation when compared with the patients after supplementation.

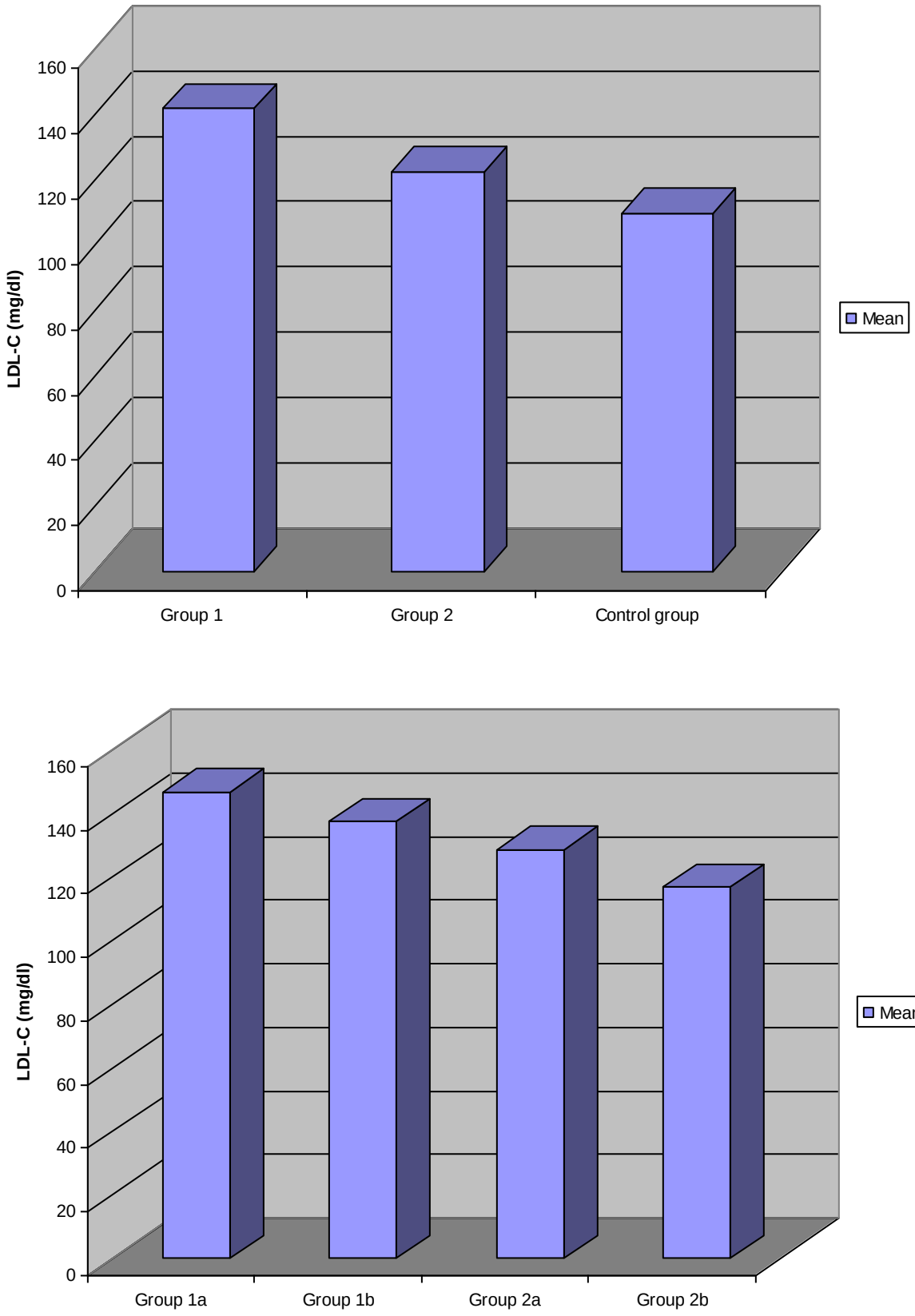


Figure (11): Mean LDL-C levels in the studied groups.

Table (10a): Cholesterol/HDL ratio in the studied groups.

Chol./HDL **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	2.7	8.2	5.11	1.22
Group (1a)	30	2.7	8.1	4.95	1.12
Group (1b)	30	2.9	8.2	5.27	1.30
Group (2)	60	2.7	7.5	4.20	0.93
Group (2a)	30	3	7	4.27	0.91
Group (2b)	30	2.7	7.5	4.12	0.97
Control group	20	2.2	5.1	3.67	0.84

Table (10b): Comparison between cholesterol/HDL ratio among the studied groups.

Groups	**t**	**P**
Group 1 & control group	- 4.78	< 0.01*
Group 2 & control group	- 1.21	> 0.05
Group 1 & group 2	- 4.30	< 0.01*
Group 1a & group 1b	- 1.49	> 0.05
Group 2a & group 2b	0.57	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of cholesterol/HDL ratio in the studied groups.

- There is high significant increase in mean cholesterol/HDL ratio in patients before supplementation when compared with the control group.
- There is high significant increase in mean cholesterol/HDL ratio in patients before supplementation when compared with patients after supplementation.

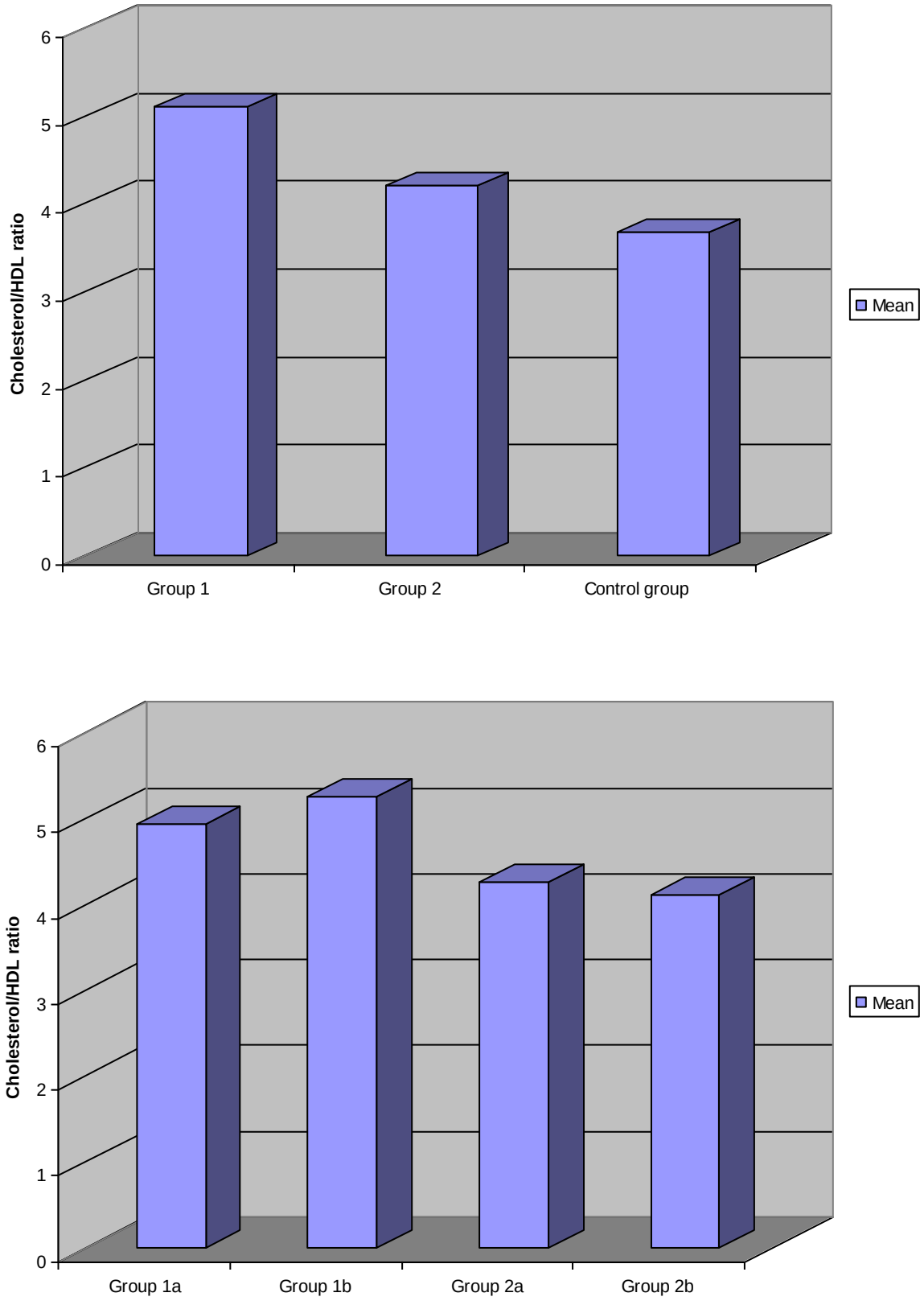


Figure (12): Mean cholesterol/HDL ratio in the studied groups.

Table (11a): Malondialdehyde level (umol/ml) in the studied groups.

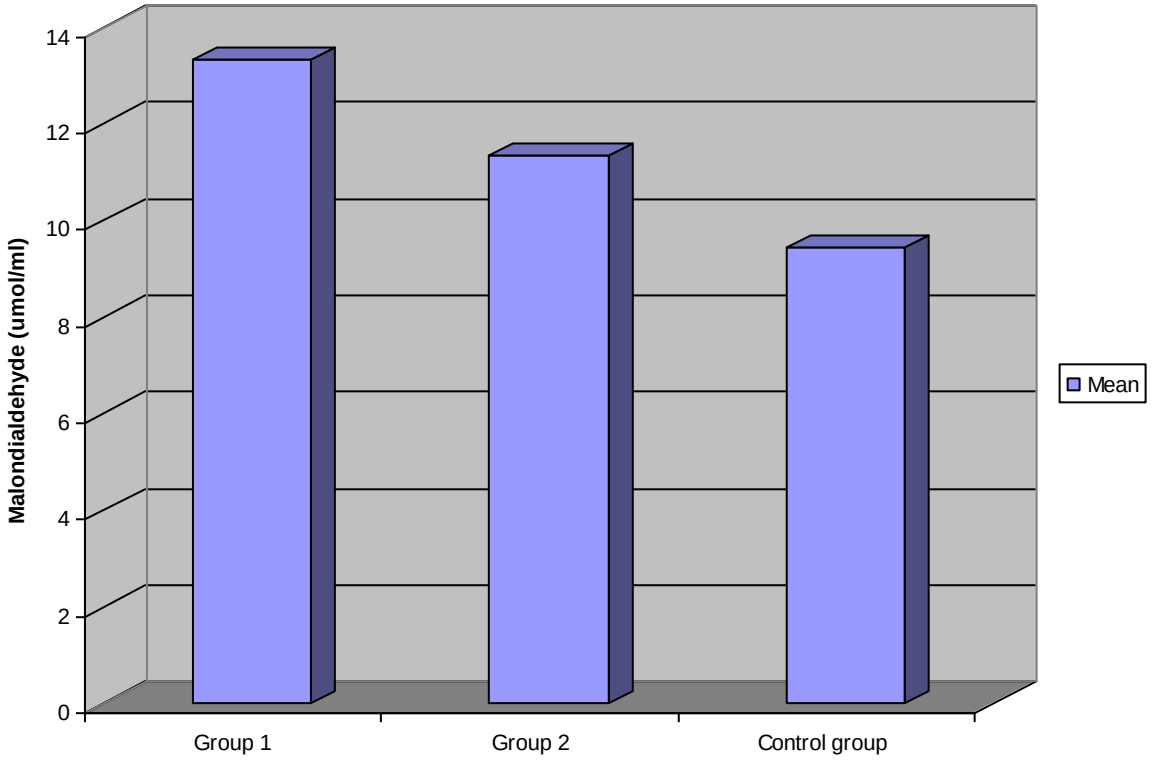
Malondialdehyde **Stud. Group**	**No.**	**Min.**	**Max.**	**Mean**	**± SD**
Group (1)	60	8.3	21.2	13.33	2.84
Group (1a)	30	8.3	21.2	14.56	2.85
Group (1b)	30	8.7	19.5	12.10	2.28
Group (2)	60	7.3	16.7	11.33	2.10
Group (2a)	30	8.2	16.7	11.68	2.03
Group (2b)	30	7.3	15.5	10.94	2.17
Control group	20	7.8	11.2	9.43	1.22

Table (11b): Comparison between malondialdehyde levels among the studied groups umol/ml.

Groups	**t**	**P**
Group 1 & control group	- 9.92	< 0.001*
Group 2 & control group	- 4.58	< 0.01*
Group 1 & group 2	- 5.08	< 0.01*
Group 1a & group 1b	3.36	< 0.05*
Group 2a & group 2b	1.46	> 0.05

This table shows the range, mean ± standard deviation, t test and p value of malondialdehyde (umol/ml) in the studied groups.

- There is high significant increase in mean malondialdehyde levels in diabetic groups before and after supplementation when compared with the control group.
- There is high significant increase in mean malondialdehyde levels in diabetic group before supplementation when compared with diabetic group after supplementation.
- There is also significant increase in mean malondialdehyde levels in diabetic group with neuropathy before supplementation when compared with the diabetic group without neuropathy.



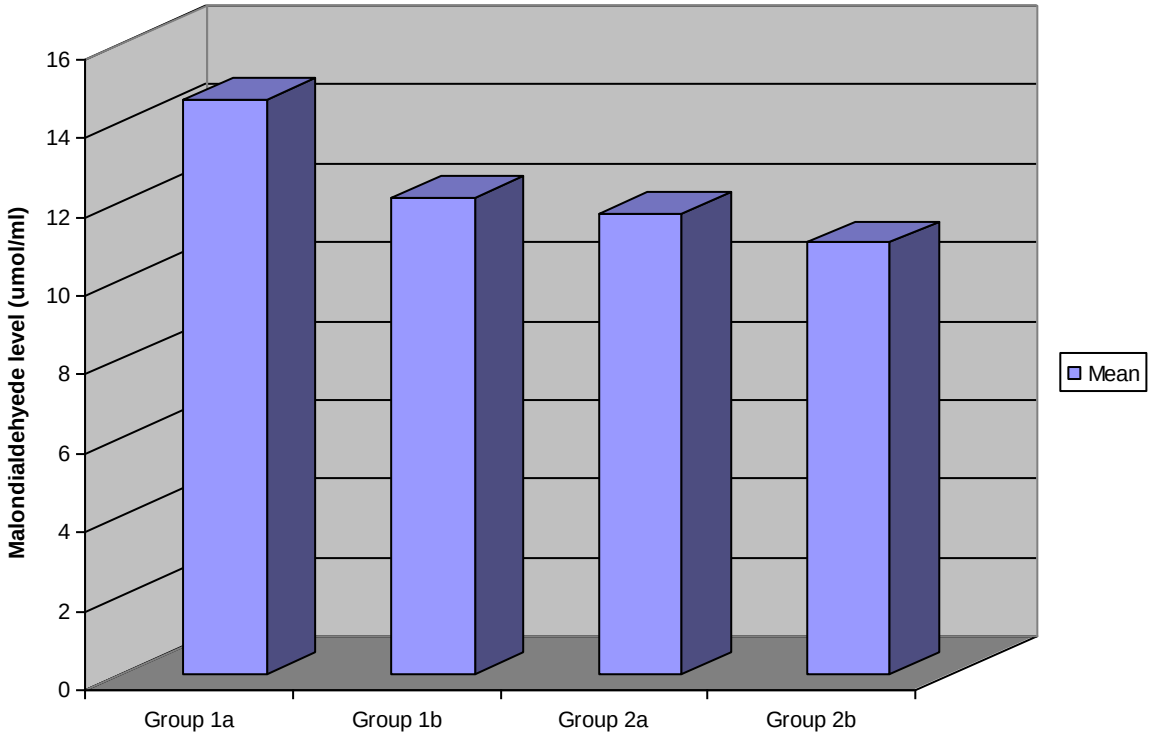


Figure (13): Mean malondialdehyde levels in the studied groups.

Table (12a): sFas level (ng/ml) in the studied groups.

sFas Stud. Group	No.	Min.	Max.	Mean	± SD
Group (1)	60	1	6.9	3.52	1.38
Group (1a)	30	1.5	6.9	4.25	1.29
Group (1b)	30	1	4.6	2.79	1.05
Group (2)	60	1	5.2	2.85	0.94
Group (2a)	30	1	5.2	3.16	1.01
Group (2b)	30	1.1	4.2	2.54	0.76
Control group	20	0.7	1.8	1.22	0.35

Table (12b): Comparison between sFas levels among the studied groups ng/ml.

Groups	T	P
Group 1 & control group	- 6.67	< 0.01*
Group 2 & control group	- 6.82	< 0.01*
Group 1 & group 2	- 3.04	< 0.05*
Group 1a & group 1b	4.36	< 0.01*
Group 2a & group 2b	2.91	< 0.05*

This table shows the range, mean ± standard deviation, t test and p value of sFas (ng/ml) in the studied groups.

- There is high significant increase in mean sFas levels in diabetic groups before and after supplementation when compared with the control group.
- There is also high significant increase in mean sFas levels in diabetic group with neuropathy before supplementation when compared with diabetic group without neuropathy.
- There is significant increase in mean sFas levels in diabetic group before supplementation when compared with the diabetic group after supplementation.

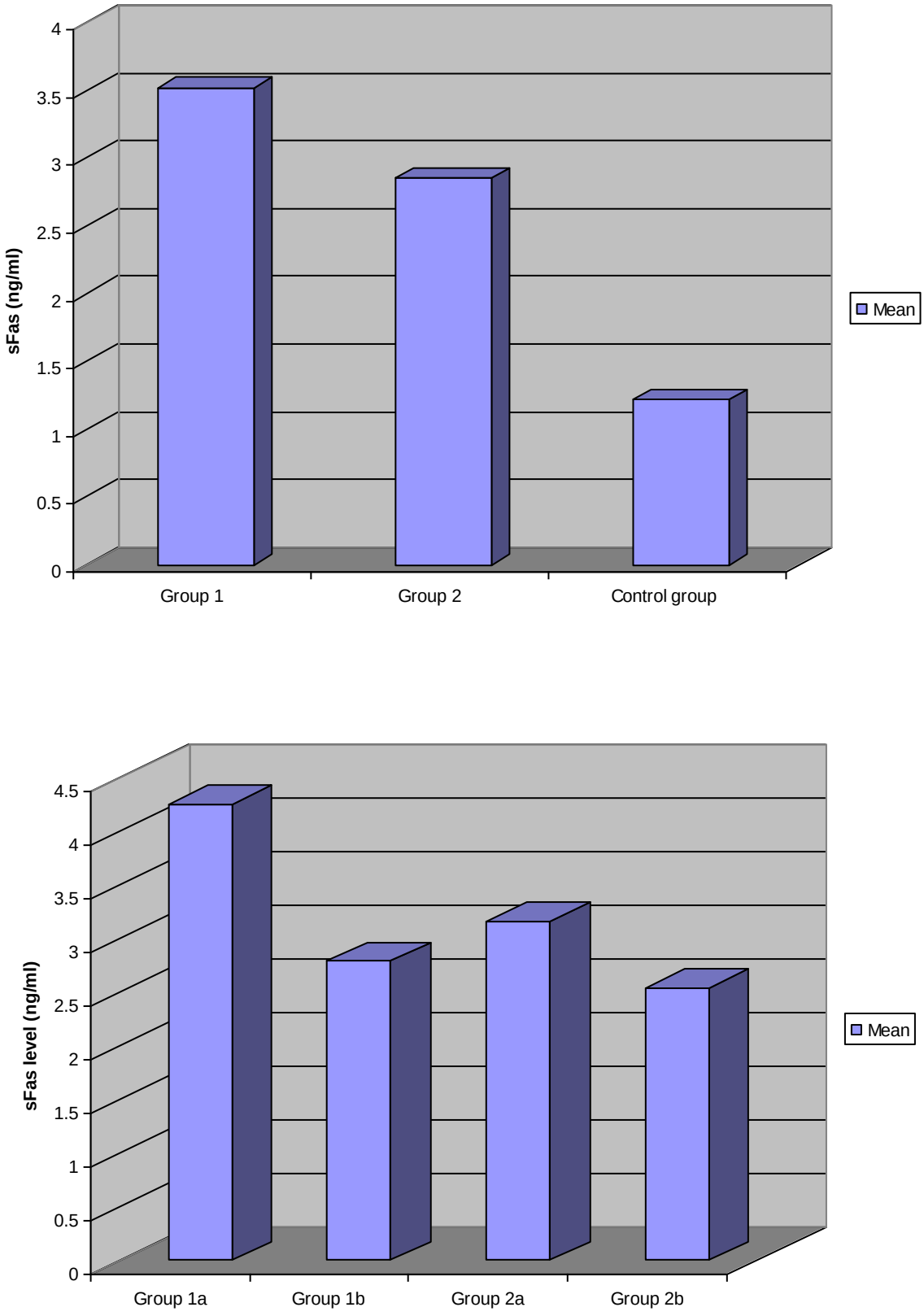


Figure (14): Mean sFas levels in the studied groups.

Table (13): Correlation coefficient (r) and probability value (p) of fasting blood glucose and other tested parameters in diabetic group before supplementation.

Parameter	Post prandial glucose	Triglycerides	Cholesterol	HDL-C	LDL-C	Chol./HDL	HbA1c	Malond.	sFas
r	0.918*	-0.035	0.041	0.154	-0.211	-0.0007	0.100	0.164	0.010
p	< 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05

Critical value = + or – 0.25

- There is positive significant correlation between fasting blood glucose and post prandial blood glucose.
- There is no significant correlation between fasting blood glucose and the other parameters.

Table (14): Correlation coefficient (r) and probability value (p) of glycohaemoglobin A1c and other tested parameters in diabetic group before supplementation.

Parameter	Fasting blood glucose	Post prandial glucose	Triglycerides	Cholesterol	HDL-C	LDL-C	Chol./HDL	Malond.	sFas
r	0.100	- 0.044	0.057	0.117	0.042	0.269*	0.322*	0.056	- 0.094
p	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	< 0.05	< 0.05	> 0.05	> 0.05

Critical value = + or – 0.25

- There is positive significant correlation between glycohaemoglobin A1c and LDL-C, chol./HDL ratio.
- There is no significant correlation between glycohaeoglobin A1c and the other parameters.

Table (15): Correlation coefficient (r) and probability value (p) of Malondialdehyde and other tested parameters in diabetic group before supplementation.

Parameter	Fasting blood glucose	Post prandial glucose	Triglycerides	Cholesterol	HDL-C	LDL-C	Chol./HDL	HbA1c	sFas
r	0.164	0.174	0.118	- 0.027	-0.267*	- 0.114	- 0.007	0.056	- 0.210
p	> 0.05	> 0.05	> 0.05	> 0.05	< 0.05	> 0.05	> 0.05	> 0.05	> 0.05

Critical value = + or – 0.25

- There is negative significant correlation between malondialdehyde and HDL-C.
- There is no significant correlation between malondialdehyde and the other parameters.

Table (16): Correlation coefficient (r) and probability value (p) of sFas and other tested parameters in diabetic group before supplementation.

Parameter	Fasting blood glucose	Post prandial glucose	Triglycerides	Cholesterol	HDL-C	LDL-C	Chol./HDL	HbA1c	Malond.
r	0.010	0.060	0.027	0.365*	- 0.305*	-0.014	-0.082	-0.094	-0.210
p	> 0.05	> 0.05	> 0.05	< 0.05	< 0.05	> 0.05	> 0.05	> 0.05	> 0.05

Critical value = + or – 0.25

- There is positive significant correlation between sFas and cholesterol, there is negative significant correlation between sFas and HDL-C.
- There is no significant correlation between sFas and fasting glucose, post prandial glucose, triglycerides, LDL-C, cholesterol/HDL ratio, HbA1c, Manlondialdehyde.

Figure (15): Correlation between fasting blood glucose and post prandial glucose in diabetic patients before supplementation (r = 0.918).

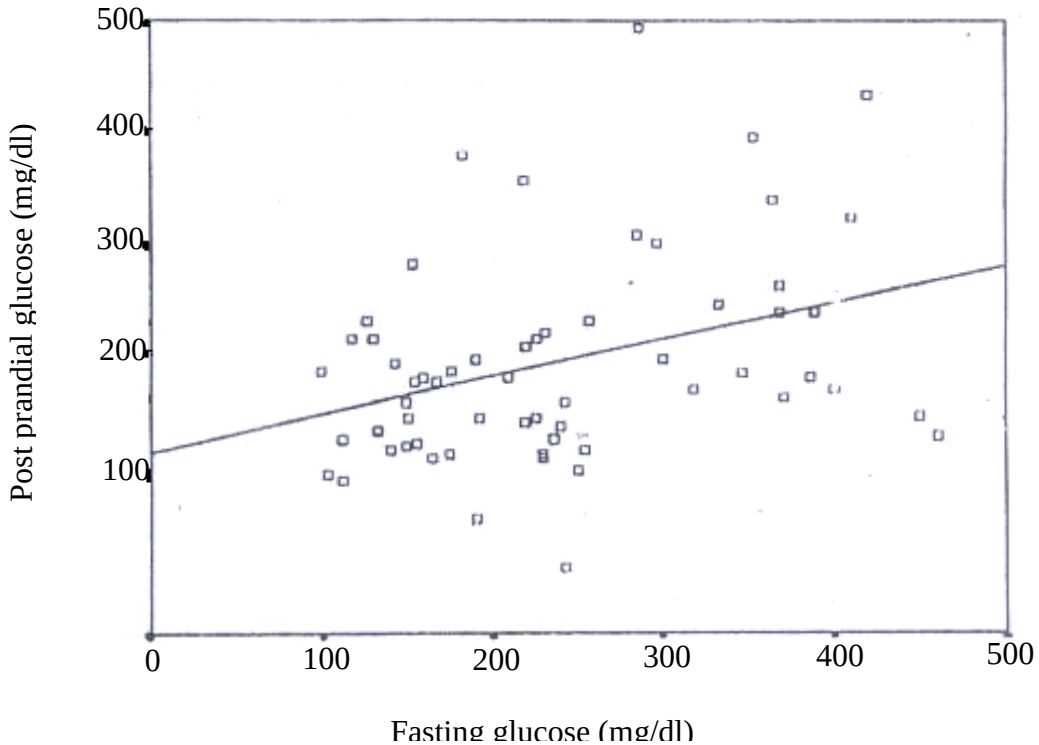


Figure (16): Correlation between Glycohaemoglobin and LDL-C (r = 0.269).

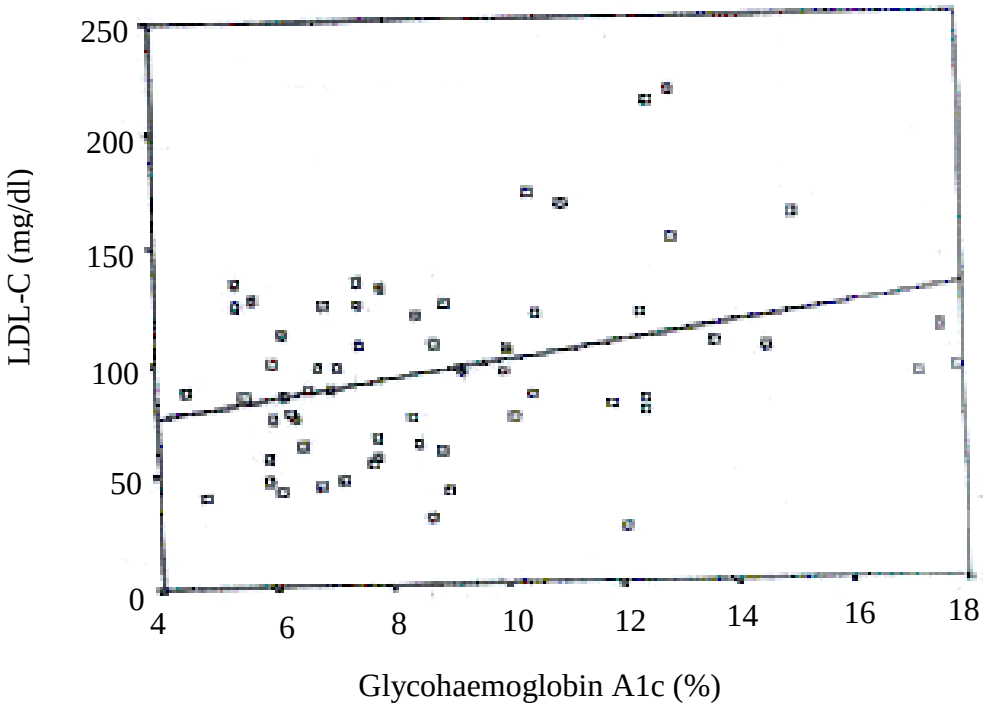


Figure (17): Correlation between malnodialdehyde and HDL-C (r = -0.267)

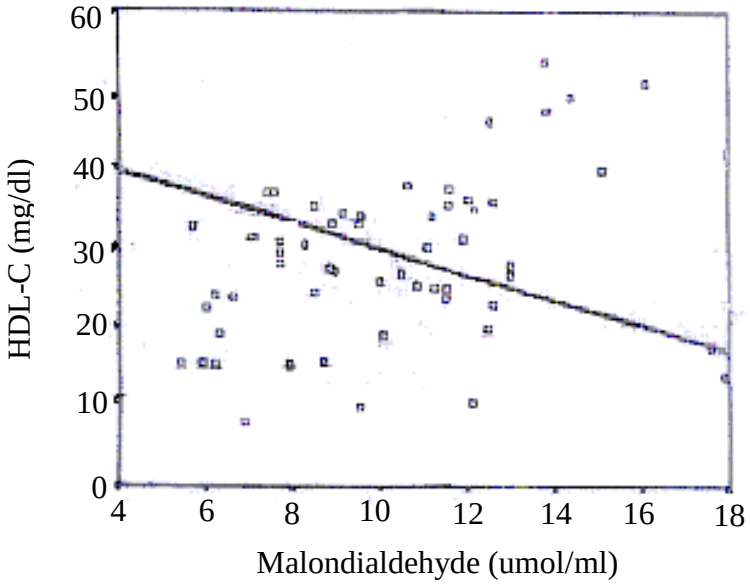


Figure (18): Correlation between sFas and cholesterol (r = 0.365).

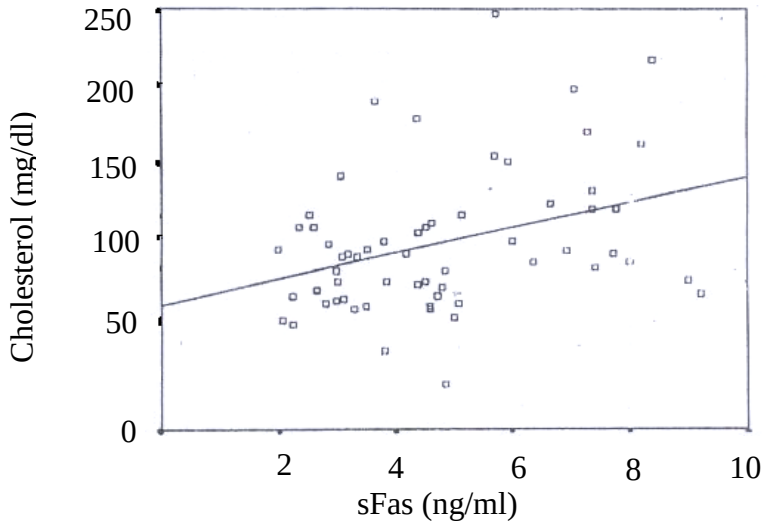


Figure (19): Correlation between sFas and HDL-C (r = - 0.305).