

Results

Duration of diabetes mellitus(years) in studied groups (Table 1):

There was significant statistical difference between group I (5.88 ± 2.11), group II (8 ± 3.42), and group III (11.92 ± 4.28), and this difference is highly significant, $p < 0.001$

Blood pressure (mmHg) in studied groups (Table 2):

There was significant statistical difference in mean value of systolic blood pressure between group I (135.2 ± 8.48), group II (141.4 ± 7), group III (152 ± 6.92) and control group (131 ± 5.68), and this difference is highly significant, $p < 0.001$. Also there was significant statistical difference in mean value of diastolic blood pressure between group I (84 ± 5.2), group II (86.8 ± 6.44), group III (96.2 ± 6.96) and control group (82 ± 3.5), and this difference is highly significant, $p < 0.001$.

Blood sugar(mg/dl) in the studied groups (Table 3) :

There was significant statistical difference in mean value of fasting blood sugar between group I (153.28 ± 37.11), group II (175.12 ± 40.11), group III (193.24 ± 55.14) and control group (85.60 ± 4.06), and this difference is highly significant, $p < 0.001$.

Also there was significant statistical difference in mean value of postprandial blood sugar between group I (216.36 ± 56.65), group II (250.48 ± 52.45), group III (267.96 ± 75.02) and control group (112.5 ± 9.3), and this difference is highly significant, $p < 0.001$.

Glycated hemoglobin (%) in the studied groups(table 4): There was significant statistical difference in glycated hemoglobin between group I (7.38 ± 0.77), group II (7.39 ± 1.14), group III (8.48 ± 0.63) and

control group (5.28 ± 0.70), and this difference is highly significant, $p < 0.001$.

Urinary albumin excretion (UAE)(mg/day) in the studied groups (table 5): There was significant statistical difference in mean value of UAE between group I (14.16 ± 7.41), group II (123.8 ± 66.63), group III (851.2 ± 126.96) and control group (11 ± 3.46), and this difference is highly significant, $p < 0.001$.

Blood urea(mg/dl) in the studied groups (table 6):

There was significant statistical difference in mean value of blood urea between group I (33.86 ± 5.41), group II (34.96 ± 8.93), group III (53.67 ± 17.99) and control group (25.2 ± 4.54), and this difference is highly significant, $p < 0.001$.

Serum creatinine(mg/dl) in the studied groups (table 7):

There was significant statistical difference in serum creatinine between group I (1.06 ± 0.24), group II (1.05 ± 0.27), group III (1.81 ± 0.76) and control group (0.53 ± 0.15), and this difference is highly significant, $p < 0.001$.

Blood lipids(mg/dl) in the studied groups (table 8):

There was non significant statistical difference in mean value of serum cholesterol between group I (172.82 ± 38.63), group II (178.4 ± 25.43), group III (181.72 ± 29.65) and control group (160.58 ± 22.27) $F=1.259$, $P= 0.294$. Also there was non significant statistical difference in mean value of serum LDL -cholesterol between group I (122.64 ± 22.22), group II (126.2 ± 5.99), group III (122.92 ± 36.26) and control group (111.2 ± 21.1) $F=0.282$, $P > 0.05$.

However there was significant statistical difference in mean value of serum triglyceride between group I (99.38 ± 12.82), group II (122.96 ± 16.03), group III (125.82 ± 20.15) and control group (101.5 ± 15.14), and this difference is highly significant, $p < 0.001$. Also there was significant statistical difference in mean value of serum HDL - cholesterol between group I (39.1 ± 7.26), group II (37.2 ± 4.72), group III (31.06 ± 5.44) and control group (38.8 ± 4.7), and this difference is highly significant, $p < 0.001$.

CRP (mg/l) in diabetic patients as a whole and control group (table 10): CRP was significantly higher in diabetic patients as a whole (15.95 ± 8.59) compared with control group (4 ± 1.53), $p < 0.001$.

CRP (mg/l) between group I, group II and group III versus control group (table 11): CRP was significantly higher in group I (8.86 ± 3.45), group II (16.24 ± 6.20), group III (20.48 ± 8.72) and control group (4 ± 1.53), and this difference is highly significant, $p < 0.001$.

CRP (mg/l) in group II and group III versus group I (table 12): showed that CRP was significantly higher in group II (16.24 ± 6.20), group III (20.48 ± 8.72) compared with group I (8.86 ± 3.45), $p < 0.001$.

CRP (mg/l) in group III and group II (table 13):

CRP was significantly higher in group III (20.48 ± 8.72) compared with group II (16.24 ± 6.20), $p < 0.001$.

Serum TNF- α (pg/ml) in diabetic patients as a whole and control group (table 14):

Serum TNF - α was significantly higher in diabetic patients as a whole (5.52 ± 3.93) compared with control group (2.18 ± 1.85), $p < 0.001$.

Serum TNF- α (pg/ml) in group I ,group II and group III versus control group (table 15) : Serum TNF- α was significantly higher in group II (6.79 ± 3.52) and group III(7.39 ± 4.24) compared with control group (2.18 ± 1.85), $p < 0.001$. However there is no significant statistical difference in serum TNF between group I (2.53 ± 1.65) and control group (2.18 ± 1.85) , $p > 0.05$.

Serum TNF- α (pg/ml) in group II and group III versus group I (table 16):Serum TNF- α was significantly higher in group II (6.79 ± 3.52) and group III (7.39 ± 4.24) compared with group I (2.53 ± 1.65) , $p < 0.001$.

Serum TNF- α (pg/ml) in group II and group III (table 17) :

There was no significant statistical difference in serum TNF- α between group II (6.79 ± 3.52) and group III (7.39 ± 4.24), $p = 0.551$.

Urinary TNF- α (pg/mg) in diabetic patients as a whole and control group table (18):Urinary TNF- α was significantly higher in diabetic patients as a whole (13.63 ± 3.77) compared with control group (3.77 ± 3.32), $p < 0.001$.

Urinary TNF- α (pg/mg) in group I, group II and group III versus control group (table 19) :Urinary TNF- α was significantly higher in group I (7.91 ± 3.65), group II (13.36 ± 4.88), group III(19.63 ± 6.67) compared with control group (3.77 ± 3.32) , $p < 0.001$.

Urinary TNF- α (pg/mg) in group II and group III versus group I (table 20): Urinary TNF was significantly higher in group II (13.36 ± 4.88) and group III (19.63 ± 6.67) compared with group I (7.91 ± 3.65), $p < 0.001$.

Urinary TNF- α (pg/mg) in group II and group III (table 21) :

Urinary TNF was significantly higher in group III (19.63 ± 6.67) compared with group II (13.36 ± 4.88), $p < 0.001$.

Correlation between CRP and studied variables (table 22):

There was no significant correlation between CRP and age ($r = 0.031$, $p > 0.05$), diastolic blood pressure ($r = 0.172$, $p > 0.05$), cholesterol ($r = -0.050$, $p > 0.05$), LDL ($r = 0.021$, $p > 0.05$), and HDL ($r = 0.028$, $p > 0.05$).

While there was significant positive correlation between CRP and duration of diabetes ($r = 0.296$, $p < 0.05$), systolic blood pressure ($r = 0.296$, $p < 0.05$), fasting blood glucose ($r = 0.409$, $p < 0.05$), Postprandial blood glucose ($r = 0.433$, $p < 0.05$), glycated Hb ($r = 0.409$, $p < 0.05$), triglycerides ($r = 0.334$, $p < 0.05$), UAE ($r = 0.591$, $p < 0.05$), serum TNF- α ($r = 0.439$, $p < 0.05$) and urinary TNF- α ($r = 0.718$, $p < 0.05$).

Correlation between serum TNF- α and studied variables (table 23) : There was no Significant correlation between serum TNF and age ($r = 0.103$, $p > 0.05$), diastolic blood pressure ($r = 0.070$, $p > 0.05$), fasting blood glucose ($r = 0.189$, $p > 0.05$), postprandial blood glucose ($r = 0.185$, $p > 0.05$), cholesterol ($r = -0.200$, $p > 0.05$), LDL ($r = 0.083$, $p > 0.05$), HDL ($r = 0.043$, $p > 0.05$), and urinary TNF- α ($r = -0.121$, $p > 0.05$).

While there was significant positive correlation between serum TNF- α and duration of diabetes ($r = 0.232$, $p < 0.05$), systolic blood pressure ($r = 0.232$, $p < 0.05$),

=0.398, $p < 0.05$), glycated Hb ($r = 0.272$, $p < 0.05$), triglycerides ($r = 0.393$, $p < 0.05$) and UAE ($r = 0.426$, $p < 0.05$).

Correlation between urinary TNF- α and studied variables(table 24): There was no Significant correlation between urinary TNF- α and age ($r = 0.096$, $p > 0.05$), diastolic blood pressure ($r = 0.168$, $p > 0.05$) Cholesterol ($r = 0.126$, $p > 0.05$), LDL ($r = 0.021$, $p > 0.05$), HDL ($r = 0.092$, $p > 0.05$) serum TNF ($r = -0.121$, $p > 0.05$). While there was significant positive correlation between urinary TNF- α and duration of diabetes ($r = 0.419$, $p < 0.05$), systolic blood pressure ($r = 0.588$, $p < 0.05$) fasting blood glucose ($r = 0.296$, $p < 0.05$), Postprandial blood glucose ($r = 0.280$, $p < 0.05$), glycated Hb ($r = 0.413$, $p < 0.05$), triglycerides ($r = 0.422$, $p < 0.05$) and UAE ($r = 0.657$, $p < 0.05$).

Correlation between UAE and CRP, Serum TNF- α and Urinary TNF- α in the studied groups Table (25): There was significant correlation between UAE and CRP ($r = 0.476$, $p < 0.05$), ($r = 0.610$, $p < 0.05$), serum TNF- α ($r = 0.521$, $p < 0.05$), ($r = 0.762$, $p < 0.05$), and urinary TNF- α ($r = 0.350$, $p < 0.05$), ($r = 0.813$, $p < 0.05$) in group II and group III respectively. While there was non significant correlation between UAE and CRP ($r = 0.168$, $p > 0.05$) and serum TNF- α ($r = 0.260$, $p > 0.05$) in group I.

Table (1): Duration of diabetes mellitus (years)in the studied groups:

Duration of diabetes	Group I	Group II	Group III	F	P
Range	2-10	2-15	7-20	13.445	0.001*
Mean \pm S.D.	5.88 \pm 2.11	8.00 \pm 3.42	11.92 \pm 4.28		

*Significant

Scheffe test:

Group III significantly different from groups I & II

Table (2): Blood pressure (mmHg)in the studied groups:

	Control group	Group I	Group II	Group III	F	p
SBP					30.180	0.001*
Range	125-140	120-150	130-150	140-160		
Mean \pm S.D.	131.00 \pm 5.68	135.20 \pm 8.48	141.40 \pm 7.00	152.00 \pm 6.92		
DBP					22.895	0.001*
Range	75-85	75-95	80-100	85-110		
Mean \pm S.D.	82.00 \pm 3.50	84.00 \pm 5.20	86.80 \pm 6.44	96.20 \pm 6.96		

*Significant

Scheffe test:

Systolic blood pressure:

- Group III significantly different from control group
- Group III significantly different from groups I & II

Diastolic blood pressure:

- Group II&III significantly different from control group
- Group II&III significantly different from group I

Table (3): Blood sugar(mg/dl) in the studied groups:

	Control group	Group I	Group II	Group III	F	p
FBG						
Range	80-93	90-240	90-260	120-360	16.559	0.001*
Mean±	85.60±	153.28±	175.12±	193.24±		
S.D	4.06	37.11	40.11	55.14		
PPG:						
Range	97-127	130-369	160-369	150-445	18.302	0.001*
Mean	112.50±	216.36±	250.48±	267.96±		
± S.D.	9.30	56.65	52.54	75.02		

*Significant

Scheffe test:

Fasting blood sugar:

- Control group significantly different from groups I, II & III
- Group III significantly different from group I

Postprandial blood sugar:

- Control group significantly different from groups I, II & III
- Group III significantly different from group I

Table (4): Glycated hemoglobin (%) in the studied groups:

HbA1c	Control group	Group I	Group II	Group III	F	p
Range	4.2-6.3	6.3-9.5	5.6-10.2	7.7-10.0	35.048	0.001*
Mean ±	5.28±0.70	7.38±0.77	7.93±1.1	8.48±0.6		
S.D.			4	3		

*Significant

Scheffe test

- Control group significantly different from groups I, II & III
- Group III significantly different from group I

Table (5): Urinary albumin excretion (UAE)(mg/day) in the studied groups:

UAE	Control group	Group I	Group II	Group III	F	P
Range	6-18	2-28	40-280	500-1000		
Mean± S.D.	11.00± 3.46	14.16± 7.41	123.80± 66.63	851.20± 126.96	613.509	0.001*

*Significant

Scheffe test:

- Control group significantly different from groups II & III
- Group III significantly different from groups I & II
 - Group II significantly different from groups I

Table (6): Blood urea(mg/dl)in the studied groups:

Blood urea	Control group	Group I	Group II	Group III	F	P
Range	20-32	24-40	22-60	30-103		
Mean± S.D.	25.20± 4.54	33.68± 5.41	34.96± 8.93	53.76± 17.99	21.633	0.001*

*Significant

Scheffe test:

- Control group significantly different from group III
- Group III significantly different from groups I&II

Table (7): Serum creatinine(mg/dl) in the studied groups:

Serum creatinine:	Control group	Group I	Group II	Group III	F	P
Range	0.38-0.80	0.6-1.4	0.45-1.60	0.88-3.50		
Mean ± S.D.	0.53± 0.15	1.06± 0.24	1.05± 0.27	1.81± 0.76	23.02	0.001*

*Significant

Scheffe test:

- Control group significantly different from groups I, II & III
- Group III significantly different from groups I&II

Table (8): Blood lipids(mg/dl) in the studied groups:

Blood lipids	Control group	Group I	Group II	Group III	F	P
Cholesterol:						
Range	130-185	82-220	140-220	135-238		
Mean \pm S.D.	160.58 \pm 22.27	172.82 \pm 38.63	178.40 \pm 25.43	181.72 \pm 29.56	1.259	0.294
Triglyceride:						
Range	75-120	81-140	95-160	95-167		
Mean \pm S.D.	101.50 \pm 15.14	99.38 \pm 12.82	122.96 \pm 16.03	125.82 \pm 20.15	15.271	0.001 *
LDL						
Range	85-145	80-157	68-216	75-216		
Mean \pm S.D.	111.20 \pm 21.10	122.64 \pm 22.22	126.20 \pm 55.99	122.92 \pm 36.26	0.282	0.838
HDL						
Range	32-48	30-55	29-50	30-42		
Mean \pm S.D	38.8 \pm 4.7	39.10 \pm 6.27	37.20 \pm 4.72	31.06 \pm 5.44	14.884	0.001 *

*Significant

Scheffe test:

Triglyceride:

- Control group significantly different from groups II& III
- Group I significantly different from groups II& III

HDL:

- Control group significantly different from group III
- Group III significantly different from groups I&II

Table (9): Comparison of means of studied variables in the studied groups

	Control group	Group I	Group II	Group III
Duration of diabetes (years)		5.88±2.11	8.00±3.42	11.92±4.28 †‡
SBP (mmHg)	131.00±5.68	135.20±8.48	141.40±7.0	152.00±6.92 * †‡
DBP (mmHg)	82.00±3.50	84.00±5.20	86.80±6.44*	96.20±6.96 * †
FBG(mg/dl)	85.60±4.06	153.28±37.11*	175.12±40.11*	193.24±55.14 * †
PPG(mg/dl)	112.50±9.30	216.36±56.65*	250.48±52.54 *	267.96±75.02 * †
HbA1c (%)	5.28±0.70	7.38±0.77*	7.93±1.14 *	8.48±0.63 * †
UAE(mg/day)	11.00±3.46	14.16±7.41 *	123.80±66.63 * †	851.2±126.9 * †‡
Urea(mg/dl)	25.20±4.54	33.68±5.41	34.96±8.93	53.76±17.99 * †‡
Creatinine (mg/dl)	0.53±0.15	1.06±0.24*	1.05±0.27*	1.81±0.76 * †‡
Cholesterol (mg/dl)	160.58±22.27	172.82±38.63	178.40±25.43 *	181.72±29.56 *
Triglyceride (mg/dl)	101.50±15.14	99.38±12.82	122.96±16.03 * †	125.82±20.15*†
LDL(mg/dl)	111.20±21.1	122.64±22.22	126.20±55.99	122.92±36.26
HDL(mg/dl)	38.8±4.7	39.10±6.27	37.20±4.72* †	31.06±5.44* †

* p<0.05 versus control

† p<0.05 versus group I

‡ p<0.05 versus group II

Table (10): CRP (mg/l) in diabetic patients as a whole and control group :

CRP	Diabetic	Control group
Range	4-41	1-6
Mean± S.D.	15.95±8.59	4.00±1.53
T	-7.73	
P	0.001*	

*Significant

Table (11): CRP(mg/l) between group I ,group II and group III versus control group :

CRP	Group I	Group II	Group III	Control group
Range	4-16	8-30	10-41	1-6
Mean± S.D.	8.86±3.45	16.24±6.20	20.48±8.72	4.00±1.53
T	-5.12	-8.23	-9.24	
P	0.001*	0.001*	0.001*	

*Significant

Table (12): CRP(mg/l) in group II and group III versus group I:

CRP	Group II	Group III	Group I
Range	8-30	10-41	4-16
Mean± S.D.	16.24±6.20	20.48±8.72	8.86±3.45
T	-5.03	-7.27	
P	0.001*	0.001*	

*Significant

Table (13): CRP(mg/l) in group III versus group II :

CRP	Group III	Group II
Range	10-41	8-30
Mean \pm S.D.	20.48 \pm 8.72	16.24 \pm 6.20
T	-3.82	
P	0.001*	

*Significant

Table (14): Serum TNF- α (pg/ml) in diabetic patients as a whole and control group :

Serum TNF	Diabetic	Control group
Range	1-20	0.7-6.0
Mean \pm S.D.	5.52 \pm 3.93	2.18 \pm 1.85
T	-8.52	
P	0.001*	

*Significant

Table (15): Serum TNF- α (pg/ml) in group I ,group II and group III versus control group :

Serum TNF	Group I	Group II	Group III	Control group
Range	1-7	1-15	2-20	0.7-6.0
Mean \pm S.D.	2.53 \pm 1.65	6.79 \pm 3.52	7.39 \pm 4.24	2.18 \pm 1.85
T	-1.45	-3.73	-4.45	
P	0.15	0.001*	0.001*	

*Significant

Table (16): Serum TNF- α (pg/ml) in group II and group III versus group I :

Serum TNF	Group II	Group III	Group I
Range	1-15	2-20	1-7
Mean \pm S.D.	6.79 \pm 3.52	7.39 \pm 4.24	2.53 \pm 1.65
T	-5.75	-5.34	
P	0.001*	0.001*	

*Significant

Table (17): Serum TNF- α (pg/ml) in group II versus group III :

Serum TNF	Group II	Group III
Range	1-15	2-20
Mean \pm S.D.	6.79 \pm 3.52	7.39 \pm 4.24
T	-0.605	
P	0.551	

*Significant

Table (18): Urinary TNF- α (pg/mg) in diabetic patients as a whole versus control group :

Urinary TNF	Diabetic	Control group
Range	1-30	1-12
Mean \pm S.D.	13.63 \pm 7.88	3.77 \pm 3.32
T	-8.877	
p	0.001*	

*Significant

Table (19): Urinary TNF- α (pg/mg) in group I, group II and group III versus control group :

urinary TNF	Group I	Group II	Group III	Control group
Range	1-14	6-21	8-30	1-12
Mean \pm S.D.	7.91 \pm 3.65	13.36 \pm 4.88	19.65 \pm 6.76	3.77 \pm 3.32
T	-4.883	-7.405	-9.550	
p	0.001*	0.001*	0.001*	

*Significant

Table (20): Urinary TNF- α (pg/mg) in group II and group III versus group I :

urinary TNF	Group II	Group III	Group I
Range	6-21	8-30	1-14
Mean \pm S.D.	13.36 \pm 4.88	19.65 \pm 6.76	7.91 \pm 3.65
T	-5.345	-8.121	
P	0.001*	0.001*	

*Significant

Table (21): Urinary TNF- α (pg/mg) in group II and group III:

Urinary TNF	Group II	Group III
Range	6-21	8-30
Mean \pm S.D.	13.36 \pm 4.88	19.65 \pm 6.76
T	-4.454	
p	0.001*	

*Significant

Table (22): Correlation between CRP and studied variables:

Variables	CRP	
	r	p
Age in years	0.031	0.778
Duration of diabetes	0.296	0.010*
Systolic blood pressure	0.492	0.001*
Diastolic blood pressure	0.172	0.116
Fasting blood glucose	0.409	0.001*
Postprandial blood glucose	0.433	0.001*
Glycated Hb	0.409	0.001*
Cholesterol	0.050	0.648
Triglycerides	0.334	0.002*
LDL	0.021	0.847
HDL	0.028	0.802
UAE	0.591	0.001*
Serum TNF- α	0.439	0.001*
Urinary TNF- α	0.718	0.001*

*Significant

Table (23): Correlation between serum TNF- α and studied variables:

Variables	Serum TNF- α	
	r	P
Age in years	0.103	0.349
Duration of diabetes	0.232	0.046*
Systolic blood pressure	0.398	0.001*
Diastolic blood pressure	0.070	0.527
Fasting blood glucose	0.189	0.083
Postprandial blood glucose	0.185	0.090
Glycated Hb	0.272	0.012*
Cholesterol	0.200	0.066
Triglycerides	0.393	0.001*
LDL	0.083	0.450
HDL	0.043	0.694
UAE	0.426	0.001*
Urinary TNF- α	0.121	0.265

*Significant

Table (24): Correlation between urinary TNF- α and studied variables;

Variables	Urinary TNF- α	
	r	P
Age in years	0.096	0.385
Duration of diabetes	0.419	0.001*
Systolic blood pressure	0.588	0.001*
Diastolic blood pressure	0.168	0.0124
Fasting blood glucose	0.296	0.006*
Postprandial blood glucose	0.280	0.010*
Glycated Hb	0.413	0.001*
Cholesterol	-0.126	0.249
Triglycerides	0.422	0.001*
LDL	0.021	0.846
HDL	0.092	0.405
UAE	0.657	0.001*
Serum TNF- α	0.121	0.265

*Significant

Table (25):Correlation between UAE and CRP, Serum TNF- α and Urinary TNF- α in the studied groups:

	Group I		Group II		Group III	
	r	p	r	p	r	p
CRP	0.168	0.492	0.476	0.001*	0.610	0.001*
Serum TNF- α	0.260	0.286	0.521	0.001*	0.762	0.001*
Urinary TNF- α	0.596	0.001*	0.350	0.001*	0.813	0.001*

*Significant

Figure (1): The duration of diabetes(years) in studied groups

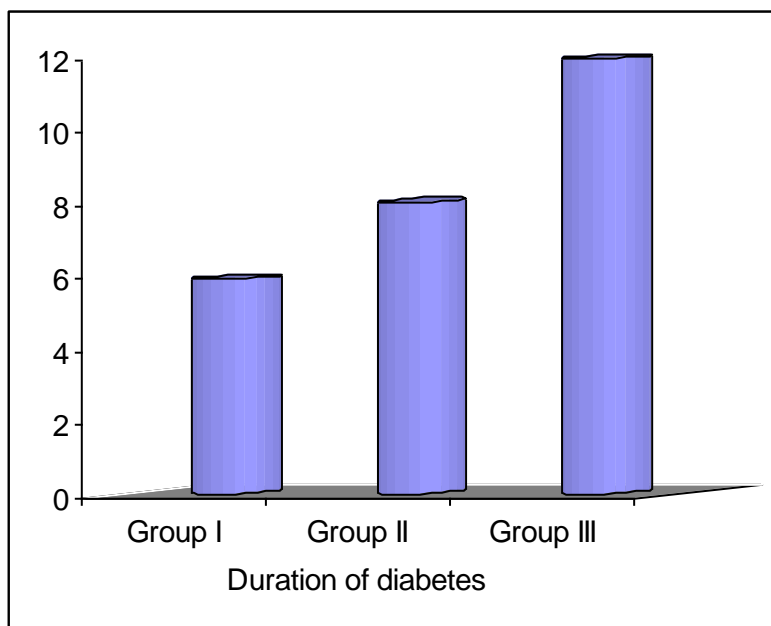
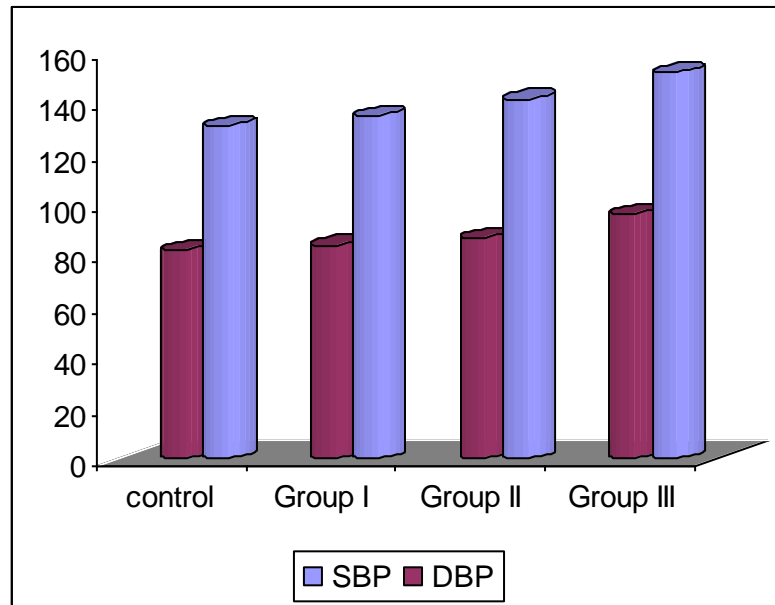
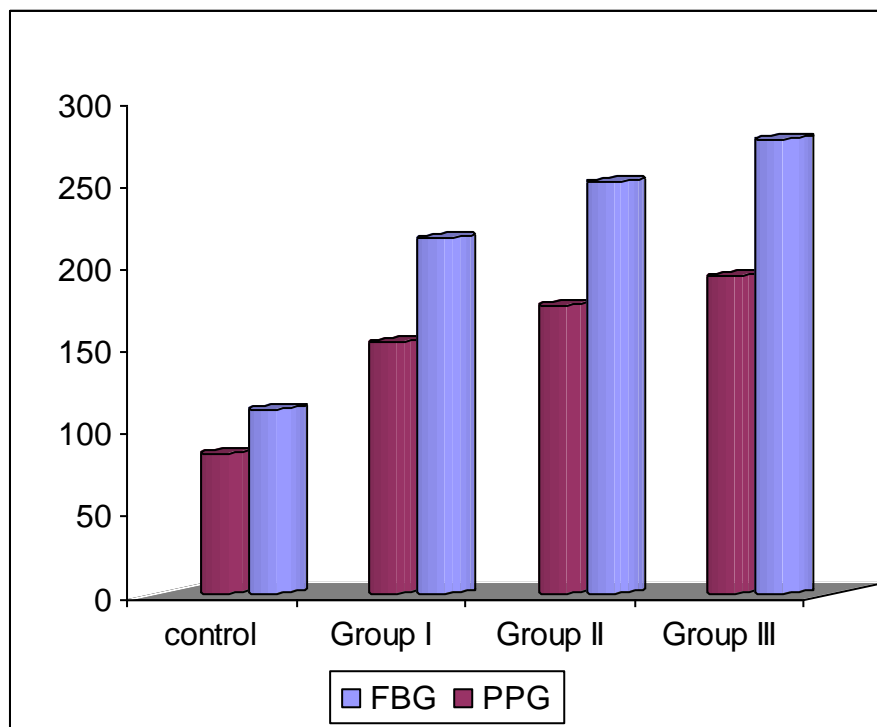


Figure (2): Blood pressure(mmHg) in studied groups**Figure(3): Fasting and postprandial blood sugar (mg/dl)in studied groups**

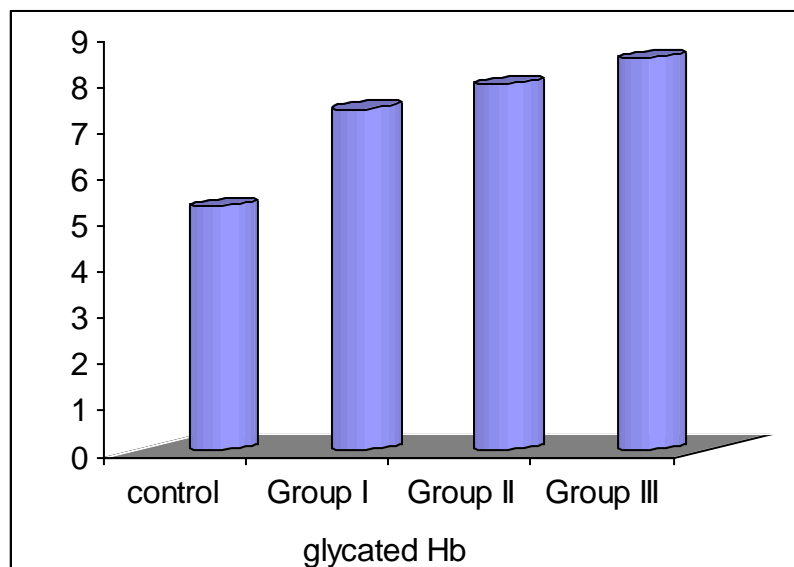
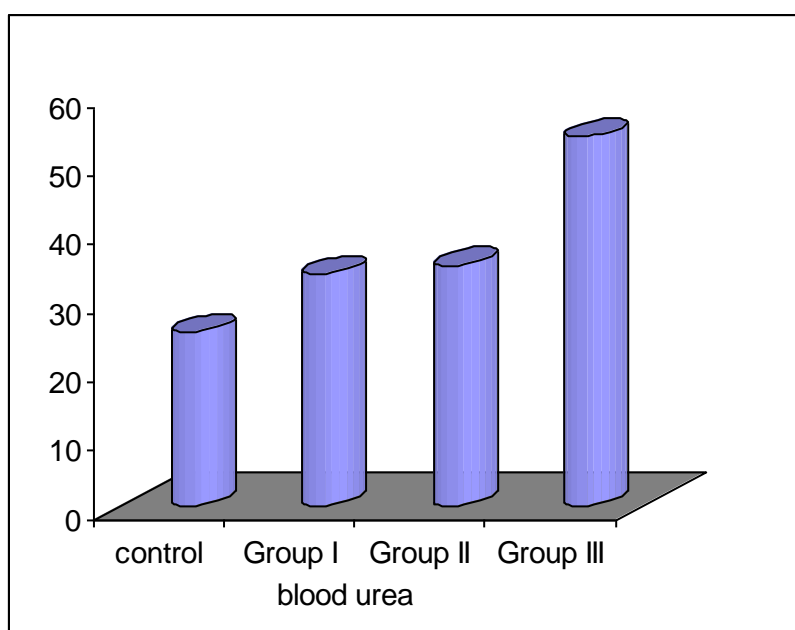
Figure(4): Glycated hemoglobin (%)in studied groups**Figure (5): Blood urea(mg/dl) in studied groups**

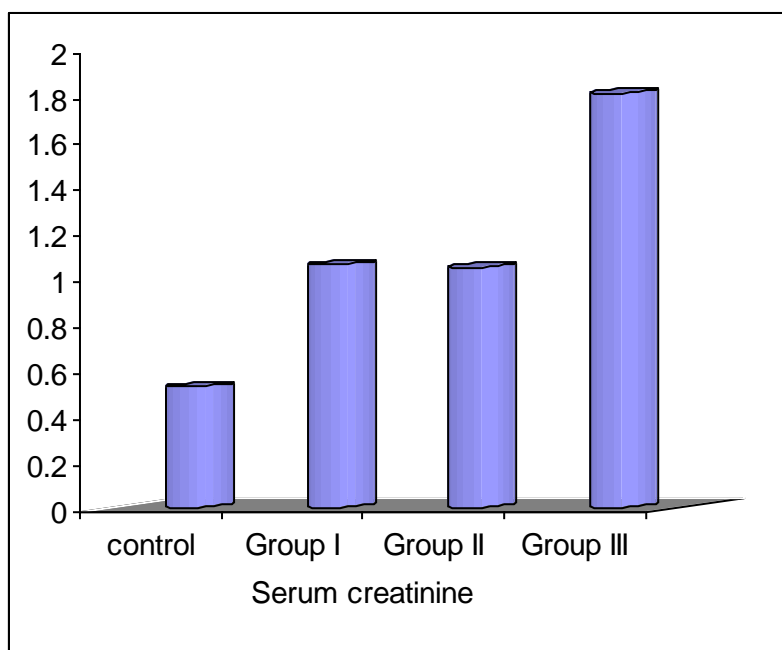
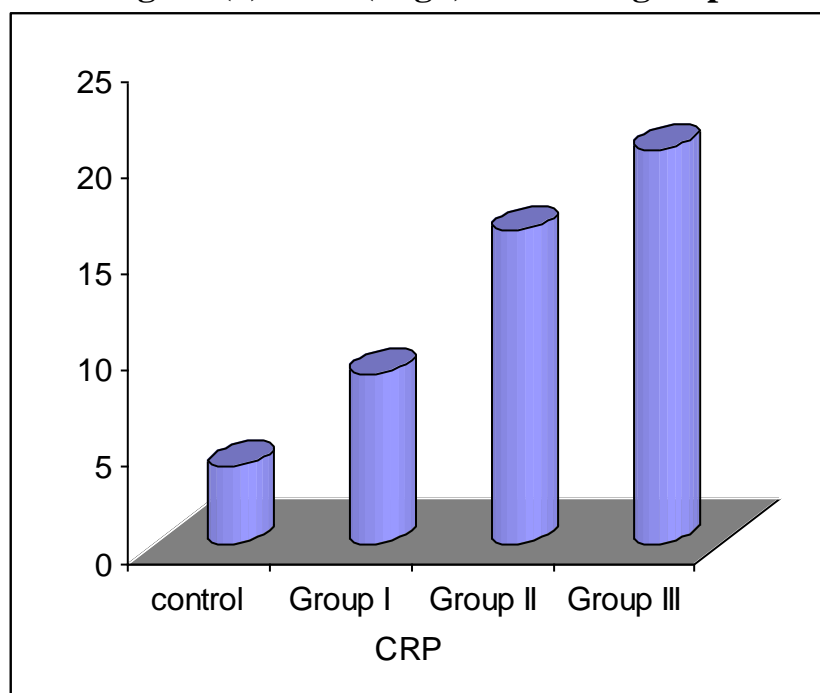
Figure (6): Serum creatinine (mg/dl)in studied groups**Figure (7): CRP(mg/l)in studied groups**

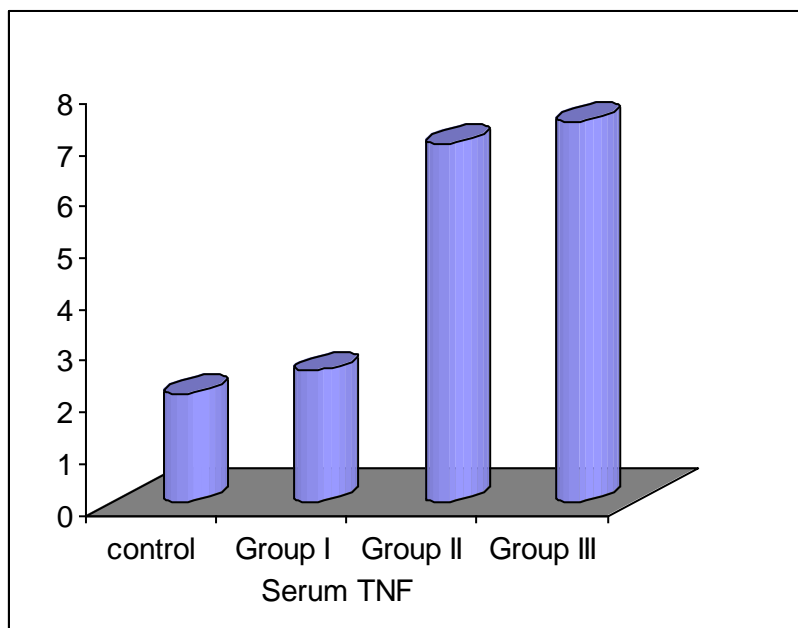
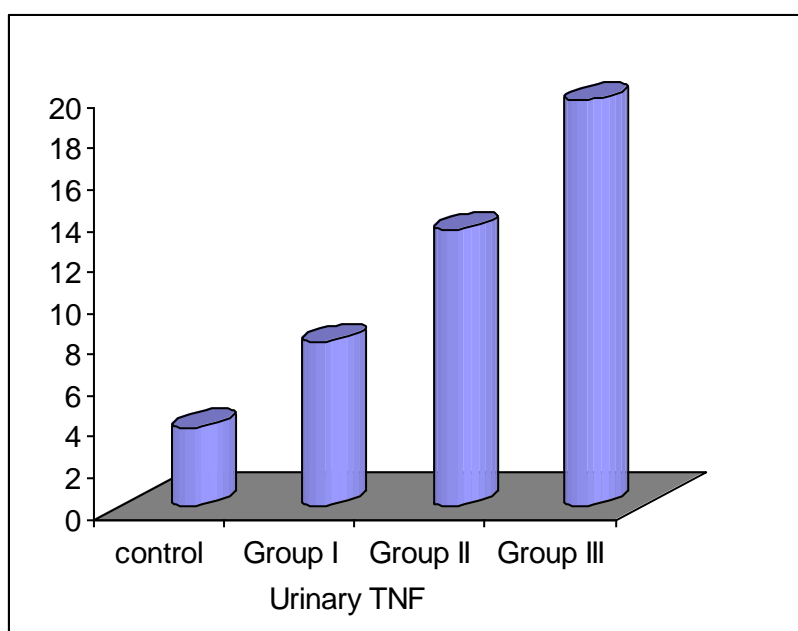
Figure (8): Serum TNF α (pg/ml) in studied groups**Figure(9): Urinary TNF- α (pg/mg)in studied groups**

Figure (10): Serum triglyceride (mg/dl) and HDL (mg/dl) in studied groups

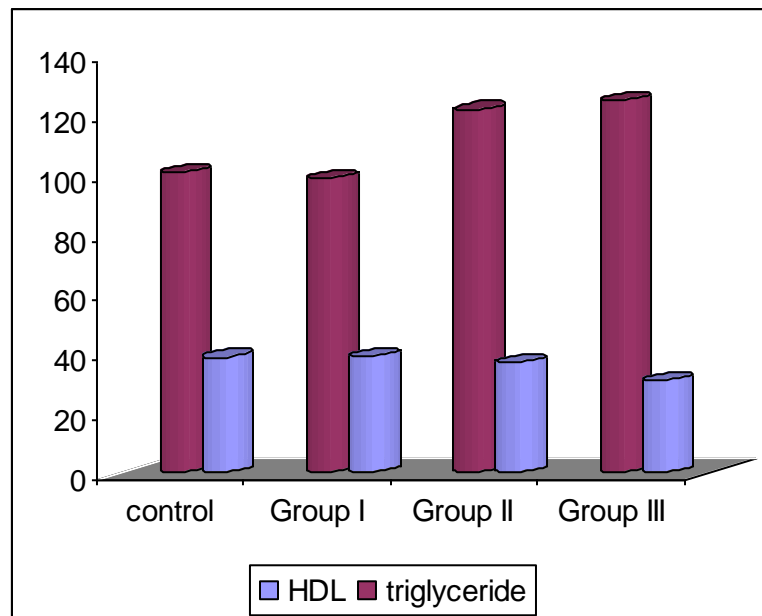


Figure (11): Serum Cholesterol(mg/dl) and LDL(mg/dl) in studied groups

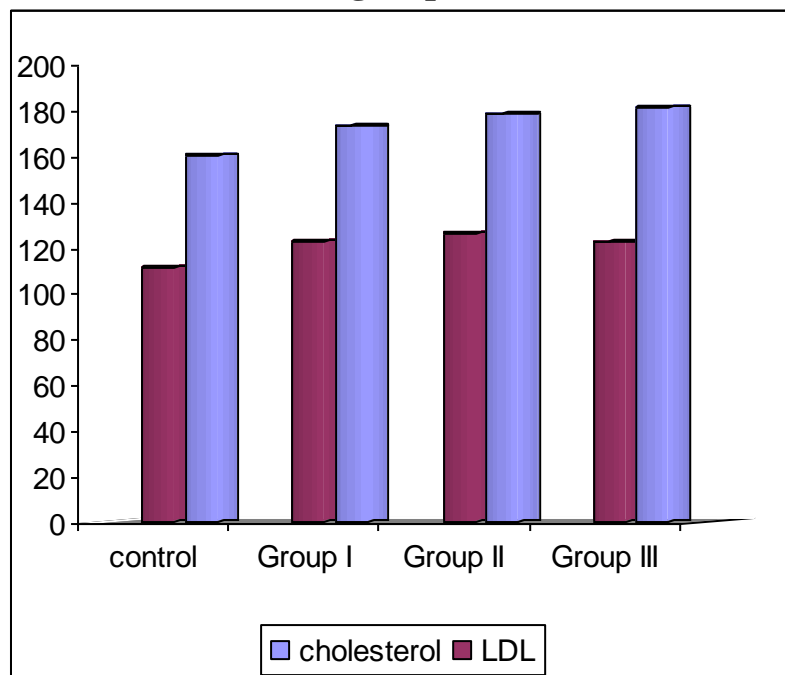


Figure (12) Correlation between serum TNF- α and duration of diabetes mellitus

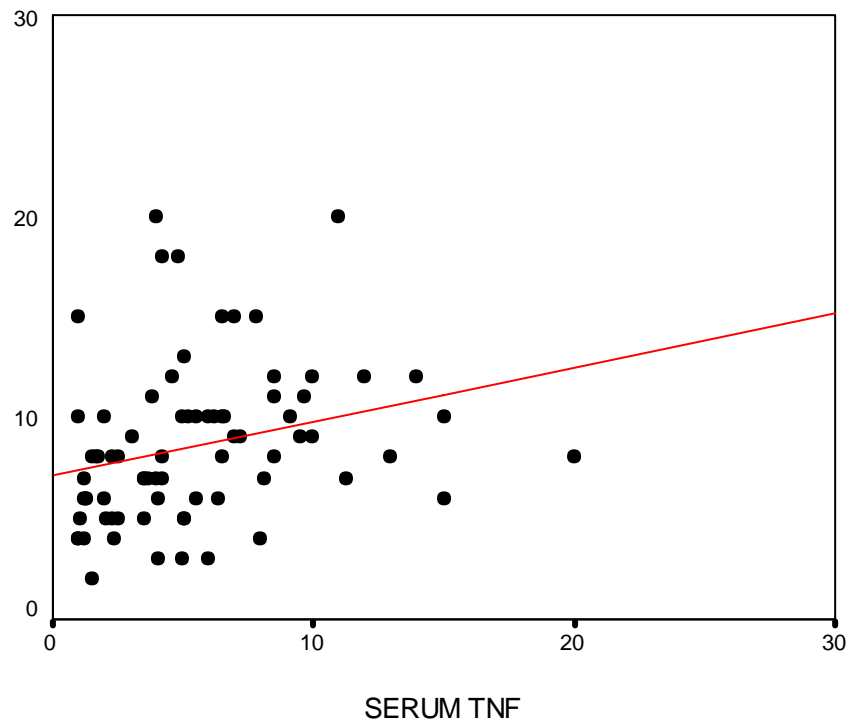


Figure (13) Correlation between urinary TNF- α and duration of diabetes mellitus

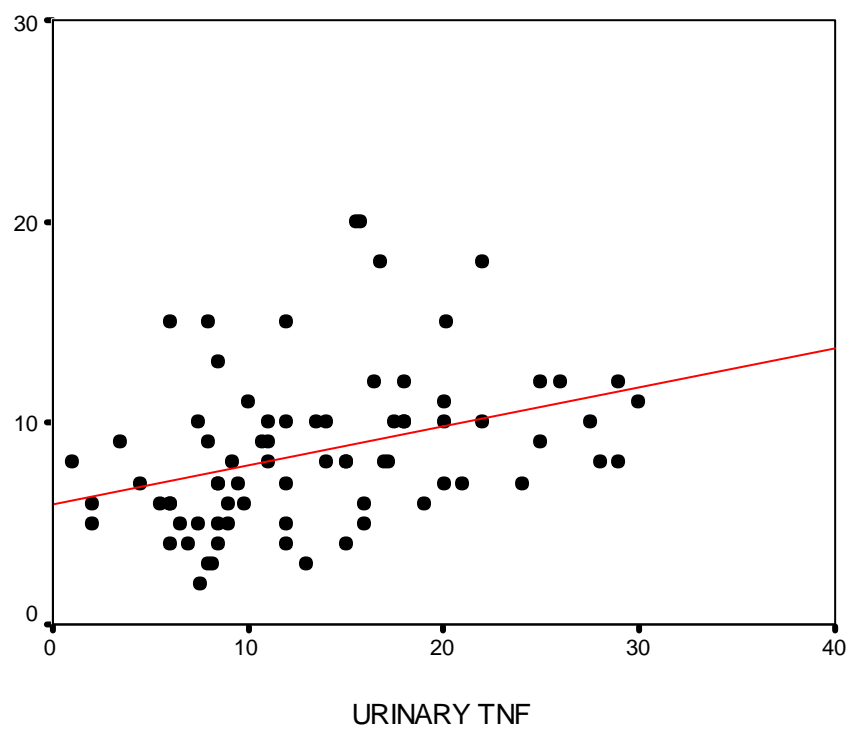


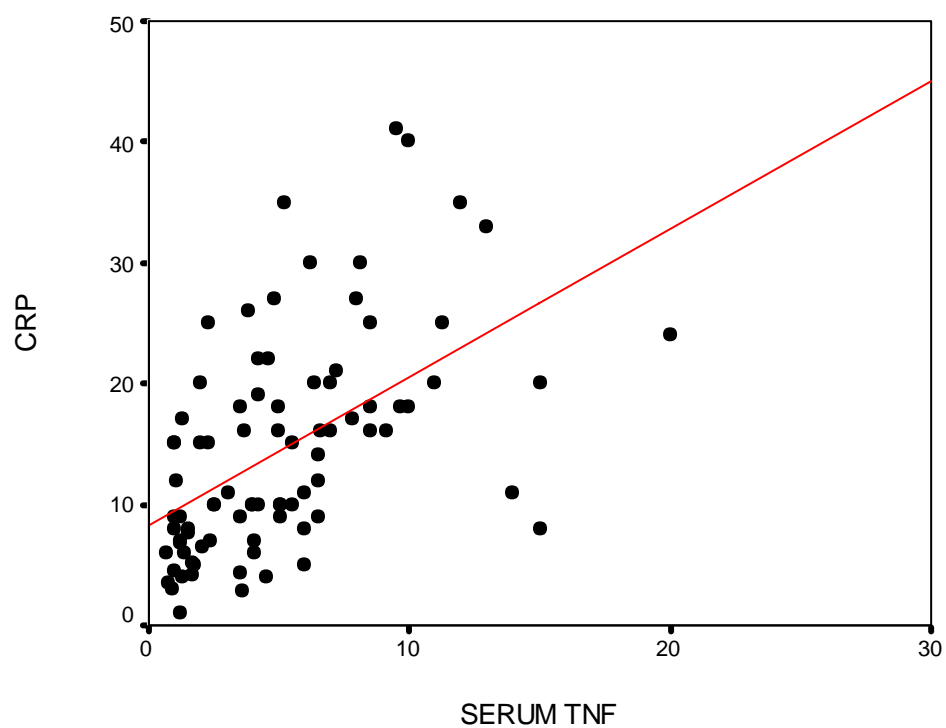
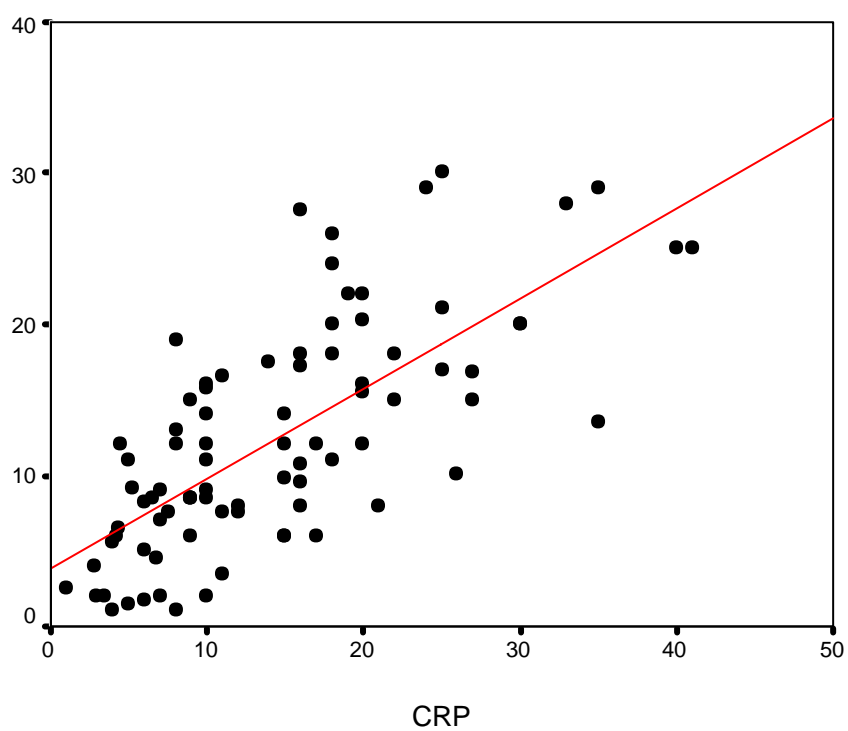
Figure (14) Correlation between serum TNF- α and CRP**Figure (15) Correlation between urinary TNF- α and CRP**

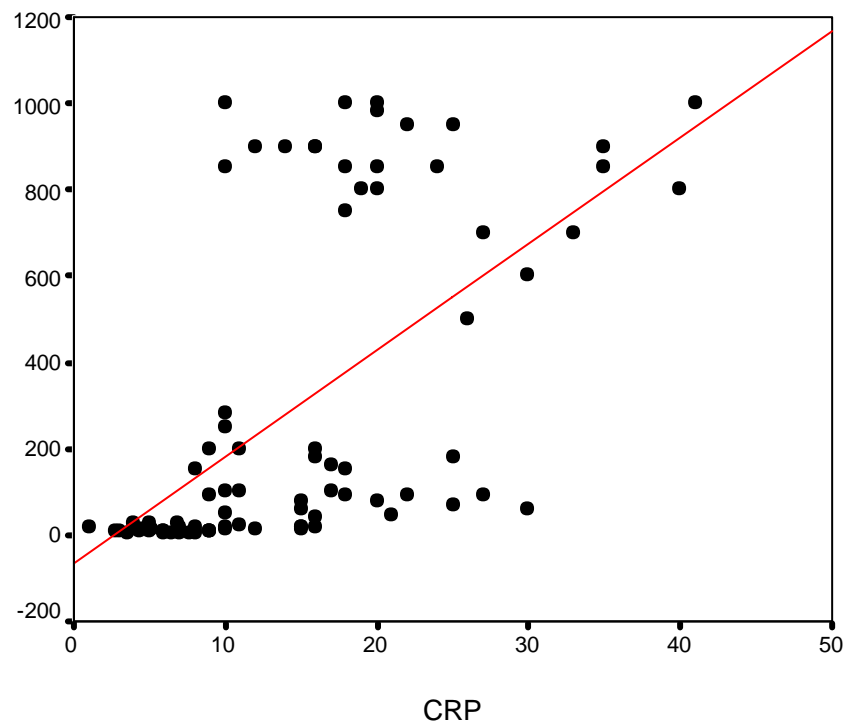
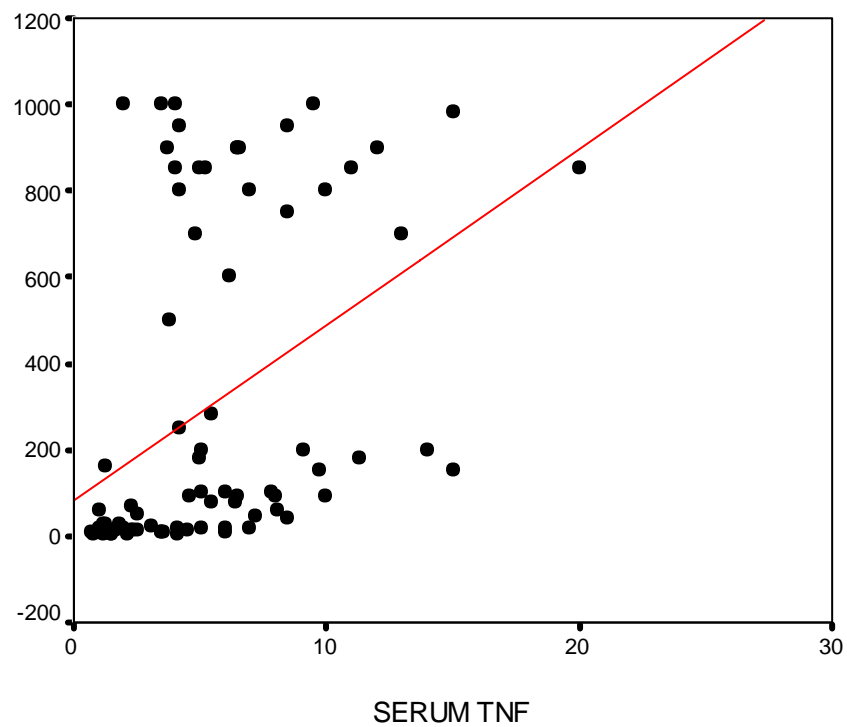
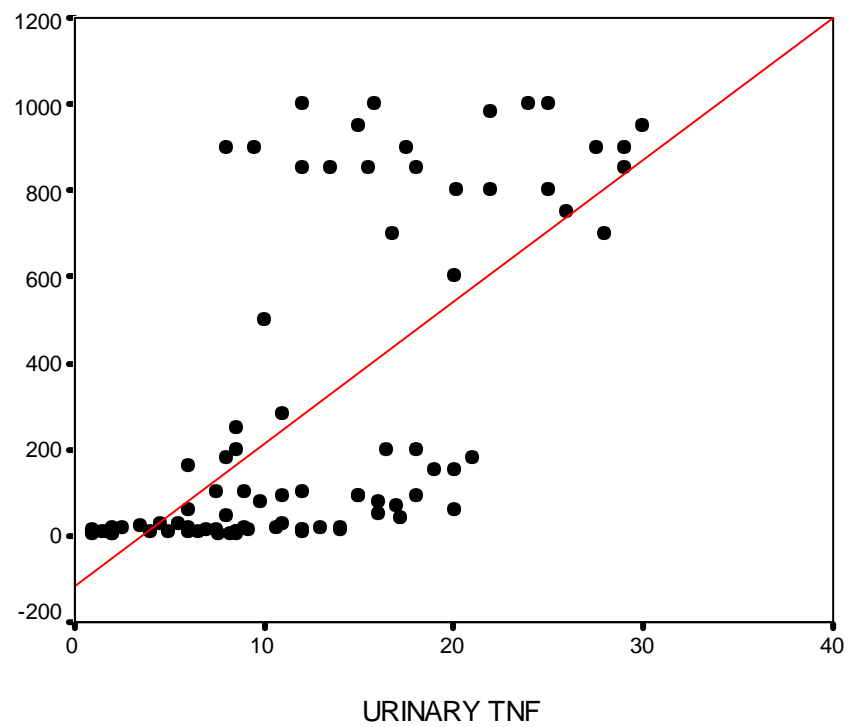
Figure (16) Correlation between CRP and proteinurea**Figure (17) Correlation between serum TNF- α and proteinurea**

Figure (18) Correlation between urinary TNF- α and proteinurea**Figure (19) Correlation between serum TNF- α and urinary TNF- α** 