Results

Age and weight

Tables (1 & 2) and Figures (1 & 2) show mean ± standard deviations of age and weight in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

In the control group mean ± SD age was 40.9±7.1 years and mean ± SD weight was 73.85±9.4 kg.

In group II mean ± SD age was 44.65±4.7 years and mean ± SD weight was 74.6±12.3 kg.

In group III mean ± SD age was 47.1±4.8 years and mean ± SD weight was 69.5±12..4 kg.

Therefore, the age of CRF patients matches the age of the control group. The weight of the patients in group III was less than the weight of the control group which is not significant ($p > 0.05$).

Table (1): Age in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Age (years)	40.9 ± 7.1	44.65 ± 4.7	47.1 ± 4.8
		p >0.05	p >0.05
			p_1 >0.05

p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (1): Age (years) in control group (group I) and patients groups (group II & III).

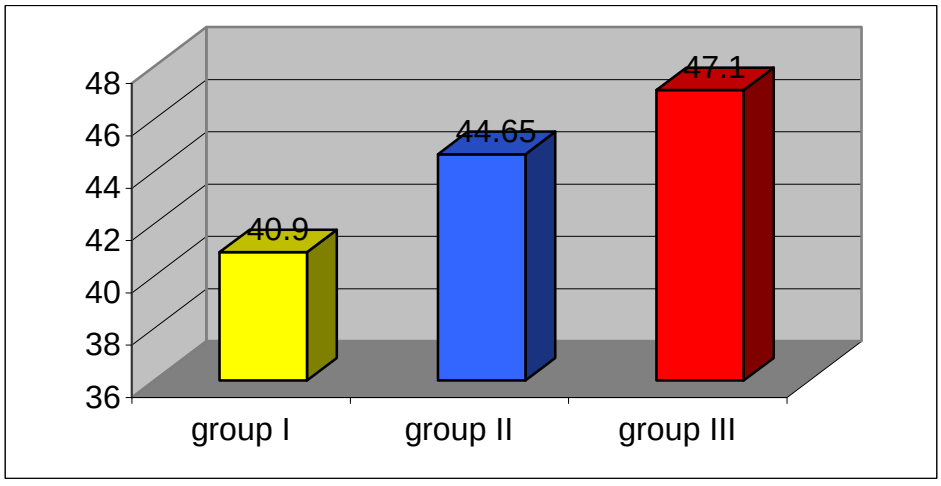


Table (2): Weight in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Weight (kg)	73.85 ± 9.4	74.6 ± 12.3	69.5 ± 12.4
		p >0.05	p <0.05*
			p_1 >0.05

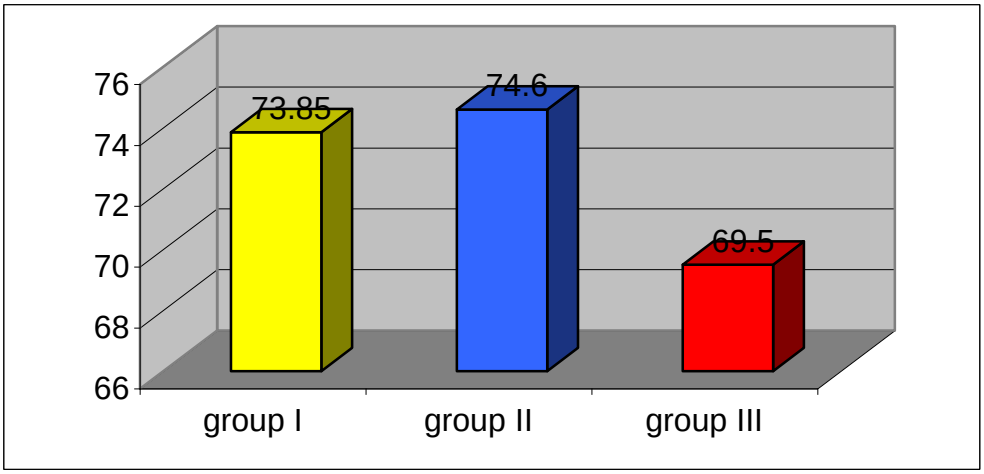
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (2): Weight (kg) in control group (group I) and patients groups (group II & III).



Glomerular Filteration Rate (GFR):

Table (3) and Figure (3) show mean ± standard deviations of GFR.

In group I (control) mean ± SD of GFR was 129.6±36.1 ml/min.

In group II (CKD stage 4) GFR was 17.56±2.23 ml/min.

In group III (CKD stage 5) GFR was 7.74±2.0 ml/min.

Therefore, GFR was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant decrease in group III as compared to group II ($p_1<0.05$).

Table (3): GFR in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
GFR (ml/min)	129.6 ± 36.1	17.65 ± 2.23	7.74 ± 2.0
		p <0.05*	p <0.05*
			p_1 <0.05*

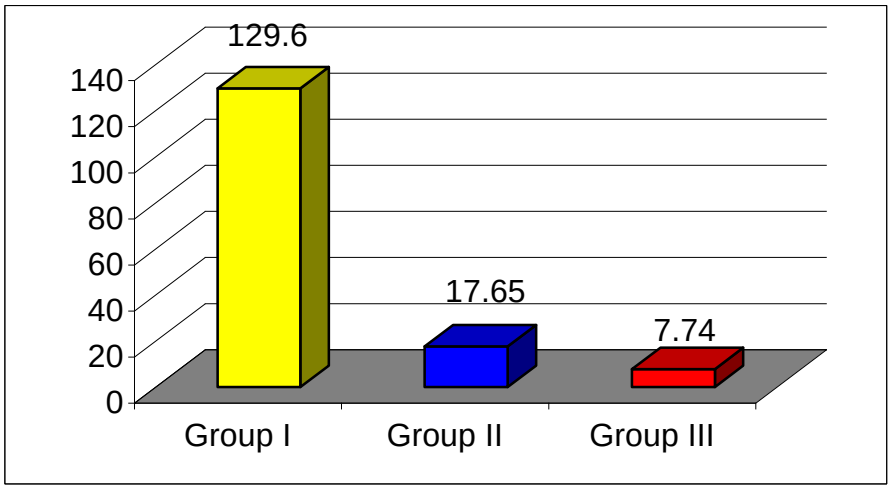
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (3): GFR (ml/min) in control group (group I) and patients groups (group II & III).



Blood urea nitrogen

Table (4) and Figure (4) show mean and standard deviations of blood urea nitrogen in studied groups.

In group I (control) mean ± SD of blood urea nitrogen was 20.1± 1.3 mg/dl.

In group II (CKD stage 4) it was 41.6±4.3 mg/dl.

In group III (CKD stage 5) it was 124.5±24.1 mg/dl.

Therefore, blood urea nitrogen was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (4): Urea nitrogen in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum urea nitrogen mg/dl Mean ± SD	20 ± 1.3	41.6 ± 4.3	124.5 ± 24.1
		p <0.05*	p <0.05*
			p_1 <0.05*

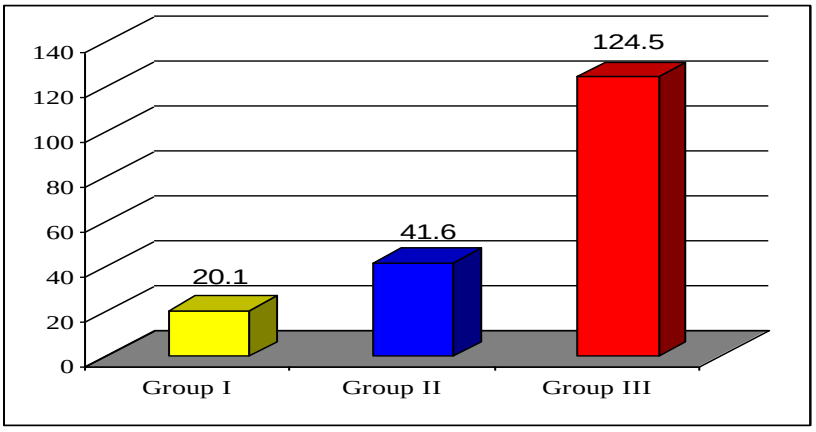
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (4): Urea nitrogen (mg/dl) in control group (group I) and patients groups (group II & III).



Serum creatinine

Table (5) and Figure (5) show mean and standard deviations of serum creatinine

In group I (control) mean ± SD of serum creatinine was 0.8±0.2 mg/dl.

In group II (CKD stage 4) it was 4.2±0.6 mg/dl.

In group III (CKD stage 5) it was 8.4±1.8 mg/dl.

Therefore, serum creatinine was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (5): Serum creatinine in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum creatinine mg/dl Mean ± SD	0.8 ± 0.2	4.2 ± 0.6	8.4 ± 1.8
		p <0.05*	p <0.05*
			p_1 <0.05*

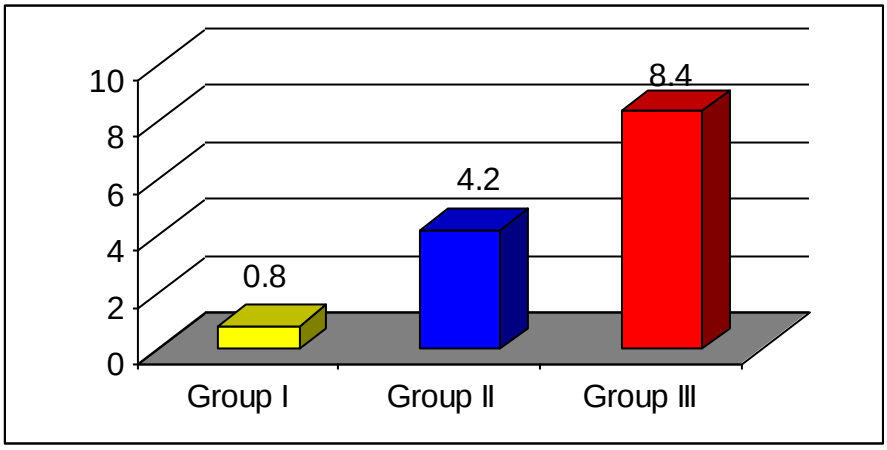
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (5): Serum creatinine (mg/dl) in control group (group I) and patients groups (group II & III).



Uric acid

Table (6) and Figure (6) show mean and standard deviations of serum uric acid.

In group I (control) mean ± SD of serum uric acid level was 4.8±0.7 mg/dl.

In group II (CKD stage 4) it was 6.5±0.8 mg/dl.

In group III (CKD stage 5) it was 8.3±0.7 mg/dl.

Therefore, Serum uric acid was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (6): Serum uric in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum uric mg/dl Mean ± SD	4.8 ± 0.7	6.5 ± 0.8	8.3 ± 0.7
		p <0.05*	p <0.05*
			p_1 <0.05*

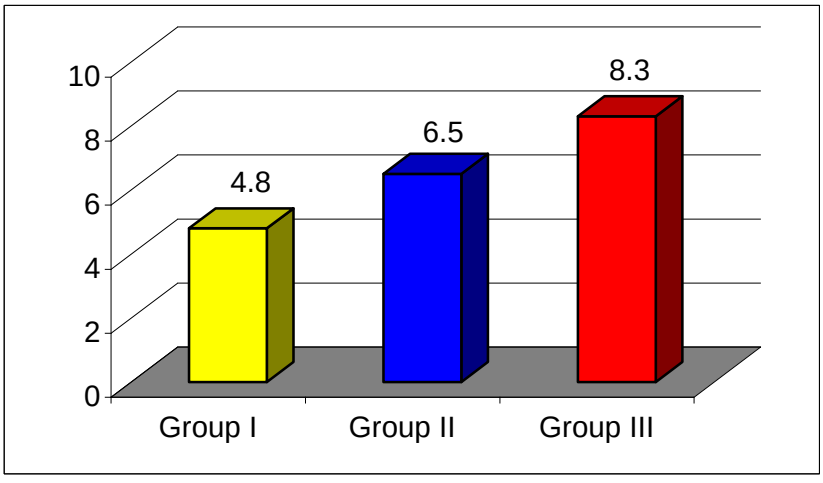
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (6): Serum Uric (mg/dl) in control group (group I) and patients groups (group II & III).



Blood hemoglobin

Table (7) and Figure (7) show mean and standard deviations of blood hemoglobin.

In group I (control) mean ± SD of hemoglobin was 13.1±0.95 g/dl.

In group II (CKD stage 4) it was 9.7±1.4 g/dl.

In group III (CKD stage 5) it was 9.2±0.96 g/dl.

Therefore, blood hemoglobin was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant decrease in group III as compared to group II ($p_1>0.05$).

Table (7): Hemoglobin in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Hemoglobin (g/dl) Mean ± SD	13.1 ± 0.95	9.7 ± 1.4	9.2 ± 0.96
		p <0.05*	p <0.05*
			p_1 >0.05

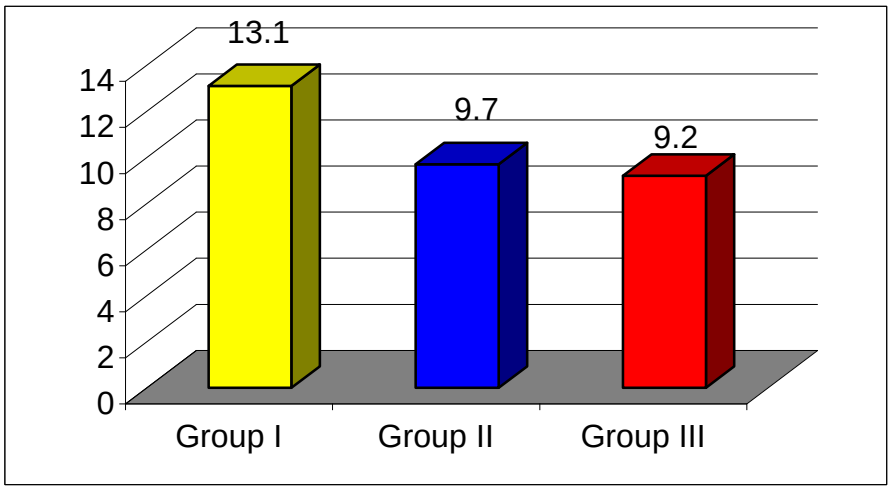
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (7): Hemogolin (g/dl) in control group (group I) and patients groups (group II & III).



Total cholesterol

Table (8) and Figure (8) show mean and standard deviations of blood total cholesterol.

In group I (control) mean ± SD of total cholesterol was 178.4±24.4 mg/dl.

In group II (CKD stage 4) it was 197.6±23.5 mg/dl.

In group III (CKD stage 5) it was 196.7±23.7 mg/dl.

Therefore, serum cholesterol significantly increased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant decrease in group III as compared to group II ($p_1>0.05$).

Table (8): Serum total chlosterol in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum total cholesterol mg/dl Mean ± SD	178.4 ± 24.4	197.7 ± 23.5	196.7 ± 23.7
		p <0.05*	p <0.05*
			p_1 >0.05

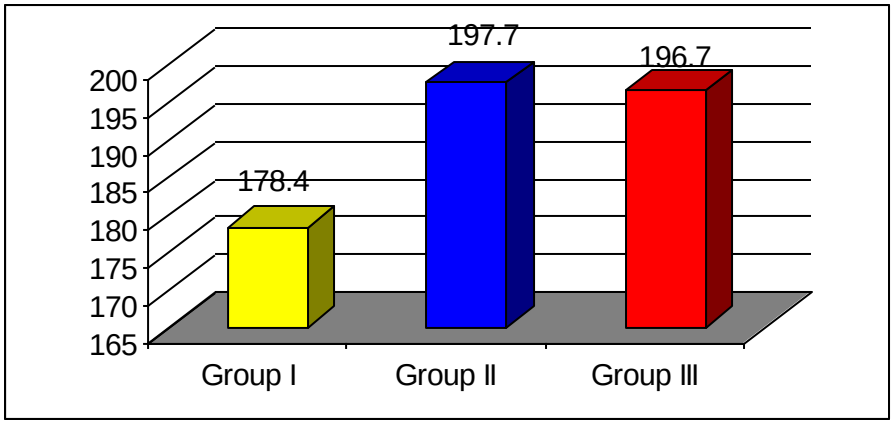
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (8): Serum total cholesterol (mg/dl) in control group (group I) and patients groups (group II & III).



HDL-cholesterol

Table (9) and Figure (9) show mean and standard deviations of blood HDL-cholesterol.

In group I (control) mean ± SD of HDL-cholesterol was 40.6±7.1 mg/dl.

In group II (CKD stage 4) it was 49.9±6.7 mg/dl.

In group III (CKD stage 5) it was 52.6±7.2 mg/dl.

Therefore, blood HDL-cholesterol was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant increase in group III as compared to group II ($p_1>0.05$).

Table (9): Serum HDL in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum HDL cholesterol mg/dl Mean ± SD	40.6 ± 7.1	49.9 ± 6.7	52.6 ± 7.2
		p <0.05*	P <0.05*
			P_1 >0.05

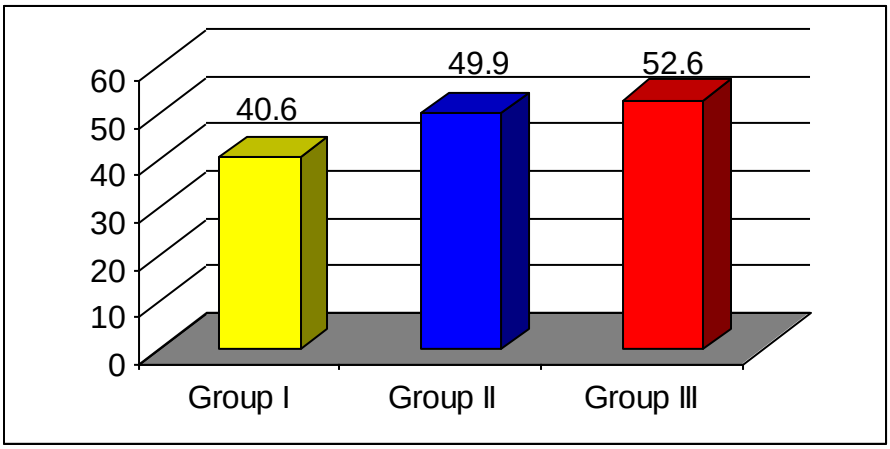
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (9) Serum HDL (mg/dl) in control group (group I) and patients groups (group II & III).



LDL-cholesterol

Table (10) and Figure (10) show mean and standard deviations of blood LDL-cholesterol.

In group I (control) mean ± SD of LDL-cholesterol was 88.96±10.3 mg/dl.

In group II (CKD stage 4) it was 112.1±12.9 mg/dl.

In group III (CKD stage 5) it was 110.6±18.2 mg/dl.

Therefore, blood LDL-cholesterol was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant decrease in group III as compared to group II ($p_1>0.05$).

Table (10): Serum LDL in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum LDL cholesterol mg/dl Mean ± SD	88.96 ± 10.3	112.1 ± 12.9	110.6 ± 18.2
		p <0.05*	p <0.05*
			p_1 >0.05

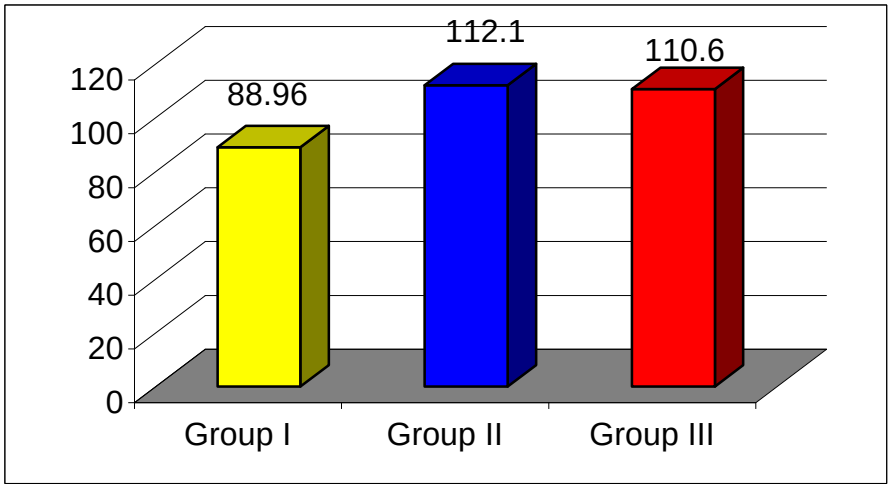
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (10): Serum LDL (mg/dl) in control group (group I) and patients groups (group II & III).



Blood calcium

Table (11) and Figure (11) show mean and standard deviations of blood calcium.

In group I (control) mean ± SD of serum calcium was 10.3±0.9 mg/dl.

In group II (CKD stage 4) it was 8.3±0.7 mg/dl.

In group III (CKD stage 5) it was 7.9±0.5 mg/dl.

Therefore, blood calcium was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant decrease in group III as compared to group II ($p_1<0.05$).

Table (11): Serum calcium in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum calcium mg/dl Mean ± SD	10.3 ± 0.9	8.3 ± 0.7	7.9 ± 0.5
		p <0.05*	P <0.05*
			p_1 <0.05*

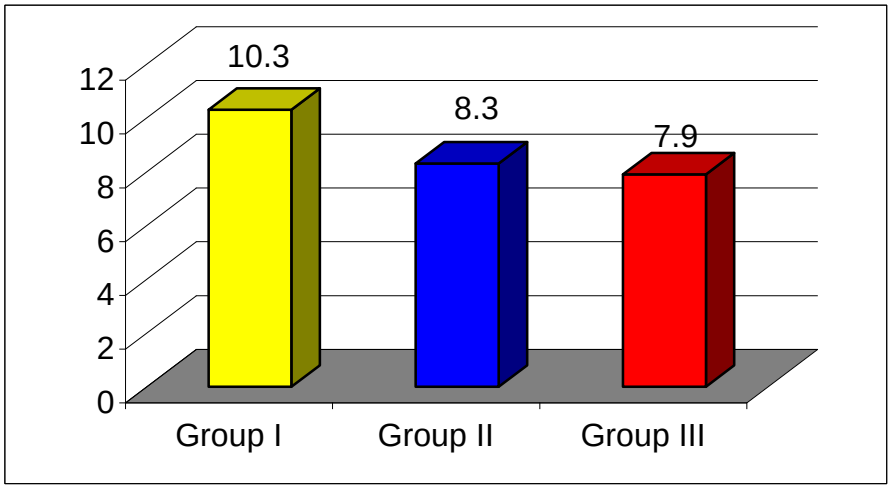
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (11): Serum calcium (mg/dl) in control group (group I) and patients groups (group II & III).



Serum phosphorus

Table (12) and Figure (12) show mean and standard deviations of serum phosphorus.

In group I (control) mean ± SD of phosphorus was 4.3±0.9 mg/dl.

In group II (CKD stage 4) it was 4.6±0.7 mg/dl.

In group III (CKD stage 5) it was 5.3±0.5 mg/dl.

Therefore, serum phosphorus was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (12): Serum phosporous in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum phosphorous meq/L Mean ± SD	4.3 ± 0.9	4.6 ± 0.7	5.3 ± 0.5
		p <0.05*	p <0.05*
			p_1 <0.05*

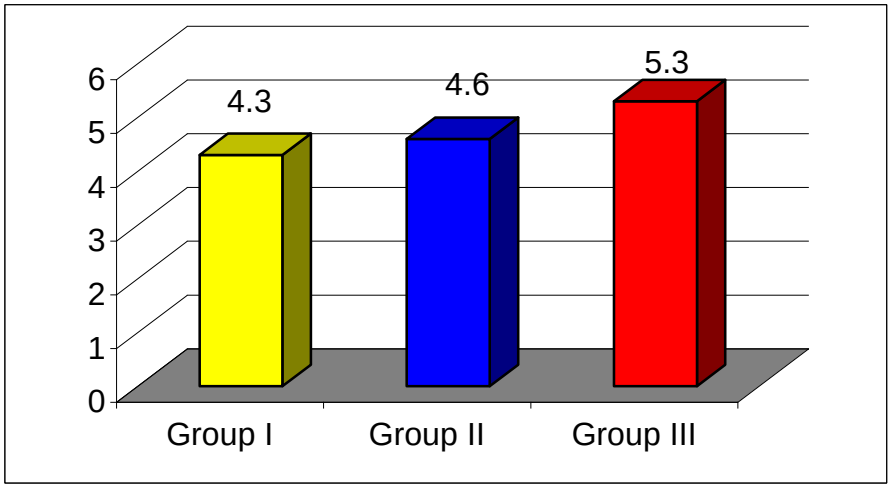
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (12): Serum phosphorous (meq/L) in control group (group I) and patients groups (group II & III).



Serum sodium

Table (13) and Figure (13) show mean and standard deviations of serum sodium.

In group I (control) mean ± SD of serum sodium level was 144.7±4.8 mmol/l.

In group II (CKD stage 4) it was 138.6±5.1 mmol/l.

In group III (CKD stage 5) it was 131.1±1.8 mmol/l.

Therefore, serum sodium was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant decrease in group III as compared to group II ($p_1<0.05$).

Table (13): Serum Na+ in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum Na+ meq/L Mean ± SD	144.7 ± 4.8	138.6 ± 5.1	131.1 ± 1.8
		p <0.05*	p <0.05*
			p_1 <0.05*

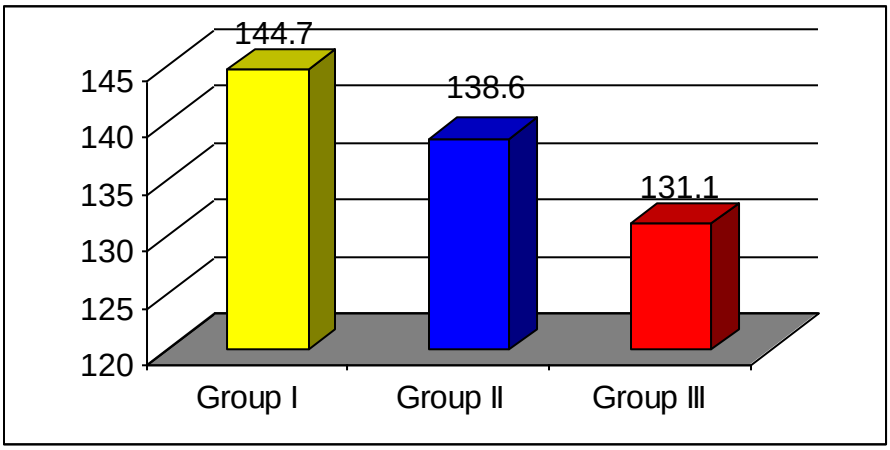
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (13): Serum Na+ (meq/L) in control group (group I) and patients groups (group II & III).



Serum potassium

Table (14) and Figure (14) show mean and standard deviations of plasma potassium.

In group I (control) mean ± SD of serum potassium was 3.9±0.5 mmol/l.

In group II (CKD stage 4) it was 5.1±5.1 mmol/l.

In group III (CKD stage 5) it was 5.74±0.2 mmol/l.

Therefore, serum potassium was significantly increased in group II & group III of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (14): Serum K+ in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum K+ meq/L Mean ± SD	3.9 ± 0.5	5.1 ± 0.4	5.7 ± 0.2
		p <0.05*	p <0.05*
			p_1 <0.05*

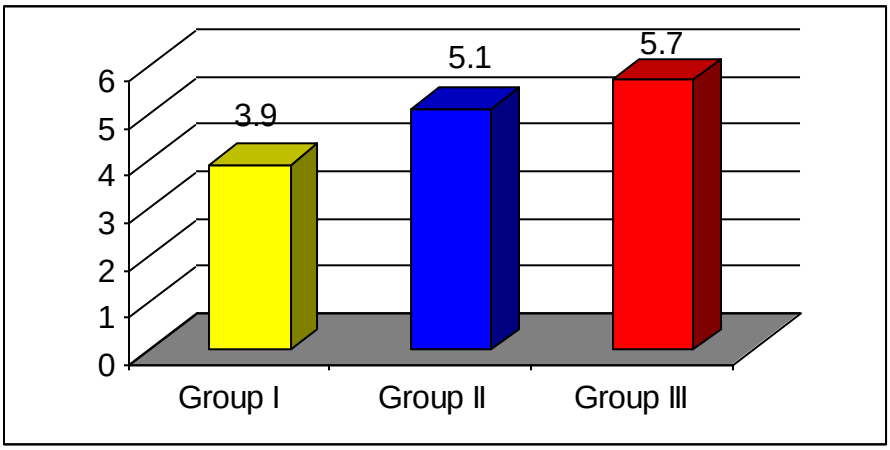
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p value >0.05 is not significant

Figure (14): Serum K+ (meq/L) in control group (group I) and patients groups (group II & III).



Highly sensetive CRP

Table (15) and Figure (15) show mean and standard deviations of serum highly sensetive CRP.

In group I (control) mean ± SD of serum highly sensetive CRP level was 0.45±0.15 mg/L.

In group II (CKD stage 4) it was 2.98±0.34 mg/L.

In group III (CKD stage 5) it was 3.27±0.53 mg/L.

Therefore, serum highly sensetive CRP was significantly increased in both groups of CRF patients as compared to control ($p<0.05$). Also there was significant increase in group III as compared to group II ($p_1<0.05$).

Table (15): Serum Highly sensetive CRP in control group (Group I), chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum Highly sensetive C-reactive protein (mg/L)	0.45 ± 0.15	2.98 ± 0.34	3.27 ± 0.53
		p <0.05*	p <0.05*
			p_1 <0.05*

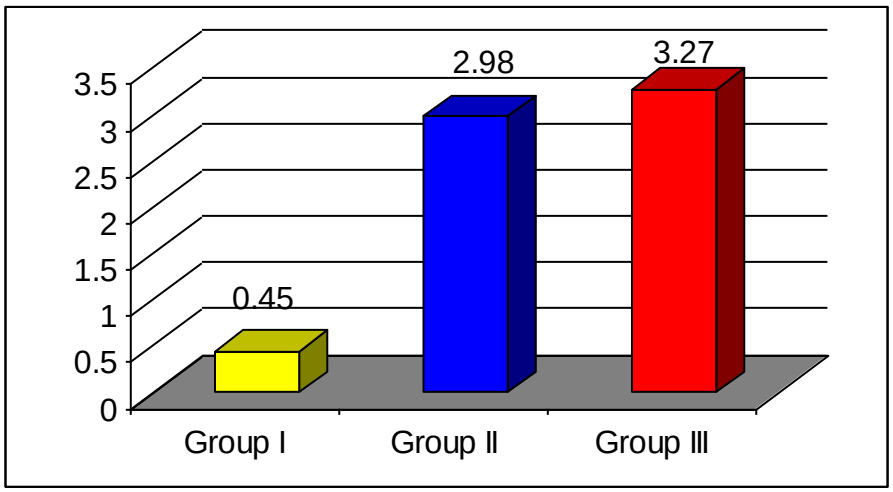
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

*p_1 value <0.05 is significant

Figure (15): Serum Highly sensetive C-reactive protein (mg/L) in control group (group I) and patients groups (group II & III).



Serum albumin

Table (16) and Figure (16) show mean and standard deviations of serum albumin.

In group I (control) mean ± SD of serum albumin level was 4.58±0.49 g/dl.

In group II (CKD stage 4) it was 3.77±0.21 g/dl.

In group III (CKD stage 5) it was 3.68±0.16 g/dl.

Therefore, serum albumin was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant decrease in group III as compared to group II ($p_1>0.05$).

Table (16): Serum albumin in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Serum Albumin (g/dl) in patients and control groups.	4.58 ± 0.49	3.77 ± 0.21	3.68 ± 0.16
		p <0.05*	p <0.05*
			p_1 >0.05

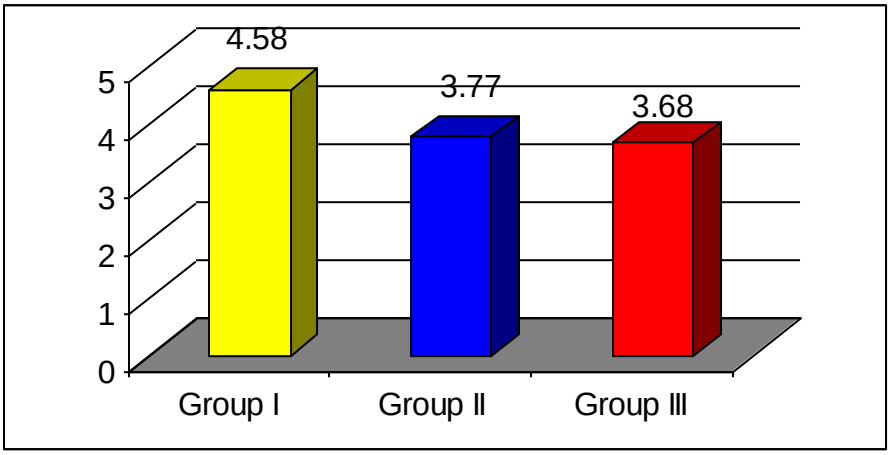
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p_1 value >0.05 is not significant

Figure (16): Serum albumin (g/dl) in control group (group I) and patients groups (group II & III).



Serum fetuin-A

Table (17) and Figure (17) show mean and standard deviations of serum fetuin-A.

In group I (control) mean ± SD of serum fetuin-A level was 70.1±10.7 mg/dl.

In group II (CKD stage 4) it was 58.7±10.4 mg/dl.

In group III (CKD stage 5) it was 53.5±8.6 mg/dl.

Therefore, serum fetuin-A was significantly decreased in both groups of CRF patients as compared to control ($p<0.05$). But there was not significant decrease in group III as compared to group II ($p_1>0.05$).

Table (17): Serum fetuin A in control group (Group I) , chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

Groups / Parameters	Group I	Group II	Group III
Fetuin A Mean ± SD (mg/dl)	70.1 ± 10.7	58.7 ± 10.4	53.5 ± 8.6
		p <0.05*	p <0.05*
			p_1 >0.05

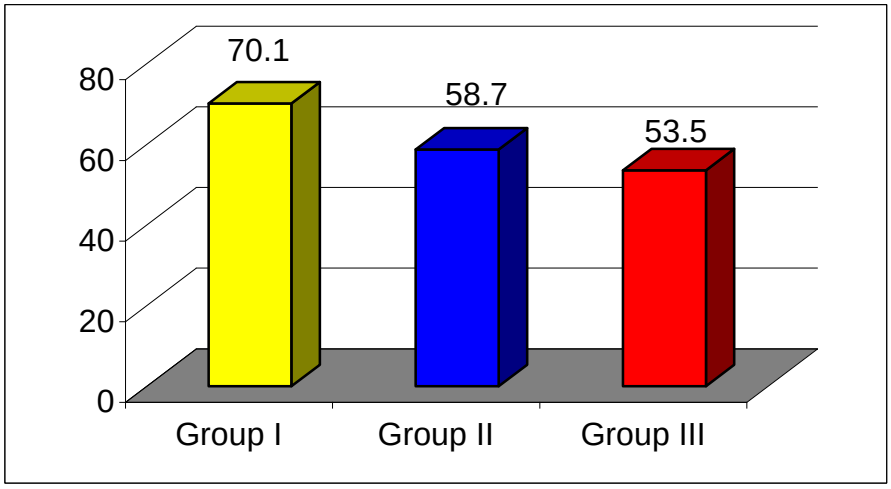
p comparison between diseased groups (II&III) and control group (I)

p_1 comparison between group II & group III

*p value <0.05 is significant

p_1 value >0.05 is not significant

Figure (17): Serum fetuin (mg/dl) in control group (group I) and patients groups (group II & III).



Tables (18) show the correlation between serum fetuin-A level and serum all parameters.

There was a negative correlation between the level of fetuin-A and serum urea nitrogen , serum creatinine and Highly sensetive CRP.

On the other hand there was a positive correlation between fetuin-A and creatinine clearance, GFR and serum albumin

Table (18): Correlation coefficient (r value) between Fetuin A and all parameters in chronic kidney disease stage 4 (Group II) and end stage renal disease stage 5 (Group III).

	Group II		Group III	
	r	p	r	p
Weight	0.151	> 0.05	-0.115	> 0.05
Age	0.078	> 0.05	-0.35	> 0.05
GFR	0.619	< 0.05*	0.197	> 0.05
Creatinine clearance	0.533	< 0.05*	0.066	> 0.05
Urea	-0.273	> 0.05	0.130	> 0.05
Creatinine	-0.581	< 0.05*	-0.132	> 0.05
Uric acid	0.372	> 0.05	0.134	> 0.05
Heamoglobin	0.020	> 0.05	-0.258	> 0.05
Cholesterol	-0.082	> 0.05	0.213	> 0.05
HDL	0.115	> 0.05	0.172	> 0.05
LDL	-0.172	> 0.05	0.231	> 0.05
Calcium	0.323	> 0.05	-0.085	> 0.05
Phosphrous	-0.093	> 0.05	-0.204	> 0.05
Soduim	0.130	> 0.05	-0.188	> 0.05
Potasuim	0.190	> 0.05	-0.104	> 0.05
Albumin	0.129	< 0.05*	0.606	< 0.05*
High sensetive CRP	-0.160	< 0.05*	-0.026	< 0.05*

Positive correlation if r value lies between 1 & 0.

Negative correlation if r value lies between – 1 & 0.

Correlation is significant if $p < 0.05$