Results

RESULTS

The results of the present study are summarized, statistically analyzed and presented in 24 tables and 5 figures.

In the present study: 95% of fracture group showed increase of ICTP level, 85% of bony aches group showed increase of ICTP level, and 90% of medical diseases group showed increase of ICTP level.

Table (4): Mean, SD and range of age (years) in the studied groups.

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	54	3.6	50	60	3.1	0.03
Group II (Fracture)	14	61.8	8	52	80		
Group III (Bony aches)	20	61.5	8.8	51	80		
Group IV (Medical diseases	13	57.1	6.3	49.00	70		
Total	57	59.2	7.8	45.00	80		

This table shows a statistically significant difference between groups as regarding the mean age in the studied groups. Comparison showed that the significant difference was found between group II and group III versus control group while the difference between control group and group IV was insignificant.

Table (5): The mean values ± SD of the studied parameters in the control group.

Parameters	Mean ± SD	Range
Age (year)	54 ± 3.6	50 – 60
ICTP (μg/L)	4.6 ± 0.5	3.6 – 5.1
Creatinine (mg/dl)	0.9 ± 0.1	0.8 – 1.2
Protein (g/dl)	6.8 ± 0.4	6.7 – 7.2
Albumin (g/dl)	4.1 ± 0.3	3.6 – 4.5
Alkaline phosphatase (u/L)	114.7 ± 10.8	100 – 130
Serum calcium (mmol/L)	2.1 ± 0.1	8.2 – 9.1
Urinary calcium (mmol/day)	7.7 ± 0.4	7 – 8.4
Ionized calcium (mmol /L)	1.9 ± 0.06	1.8 – 2

Table (6): Correlation between studied parameters and the ICTP levels μg/L in the control group.

Parameters	r	P value
Age (year)	0.152	0.7
Creatinine (mg/dl)	- 0.487	0.2
Protein (g/dl)	0.224	0.5
Albumin (g/dl)	0.063	0.9
Alkaline phosphatase (u/L)	0.788**	0.007
Serum calcium (mmol/L)	- 0.194	0.6
Urinary calcium (mmol/day)	0.341	0.3
Ionized calcium (mmol / L)	- 0.186	0.9

The correlation between ICTP and studied parameters revealed highly significant positive correlation between alkaline phosphatase and ICTP levels (r = 0.788, p value 0.007).

Table (7): Mean ± SD, range and 95% confidence interval of mean of ICTP levels (μg/L) in the three groups of patients in comparison with control group and analysis of variation between groups

Groups	Mean	Range	95% Confidence Interval for Mean		ANOVA	
			Lower Bound	Upper Bound	$F_{3,53}$	P value
Control N = 10	4.6 ± 0.5	3.6 – 5.1	4.27	4.99	3.2	0.02
Group II (Fracture) N = 14	9.2 ± 2	6.1 – 10.8	6.19	9.2		
Group III (Bony aches) N = 20	11.3± 8	4.4 – 31.6	7.51	15.04		
Group IV (Medical diseases) N = 13	12 ± 10	4.6 – 41.2	5.95	18.16		
Total	9.7 ± 7.3	3.6 – 41.2	7.36	11.21		

There was a statistically significant difference between groups as regarding the ICTP levels (P value 0.02). In control group, mean ± SD of ICTP was 4.6 ± 0.5 and the range was 3.6 to 5.1 μg/L. In group II, mean ± SD of ICTP was 9.2 ± 2 and range was 6.1 to 10.8 μg/L. In group III mean ± SD of ICTP was 11.3 ± 8 and range was 4.4 to 31.6 μg/L (95% confidence interval of the mean was 7.51 to 15.04 μg/L. In group IV mean ± SD of ICTP was 12 ± 10 and range was 4.6 to 41.2 μg/L (95% confidence interval of the mean was 5.95 to 18.16 μg/L).

Table (8): Comparisons between patients groups versus control group as regards ICTP level.

Patients group	Versus	Mean difference	P value
Group II (Fracture)	Control	4.57	0.05
Group III (Bony aches)	Control	6.65	0.03
Group IV (Medical disease)	Control	7.42	0.03

* The mean difference is significant at the 0.05 level

A highly significant difference was found between control group and group III (P value 0.03) and between control group and group IV (p value 0.03). While the difference between control group and group II was significant (p value < 0.05).

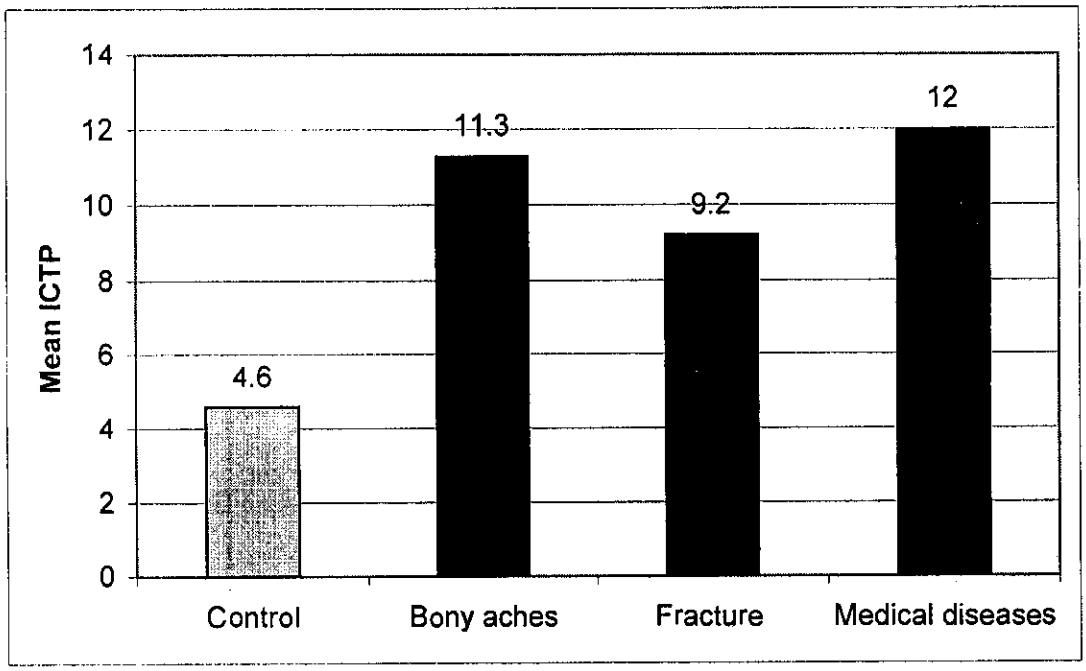

Figure 2: Mean ICTP levels in the studied groups

Table (8): Comparisons between patients groups versus control group as regards ICTP level.

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A highly significant difference was found between control group and group III (P value 0.03) and between control group and group IV (p value 0.03). While the difference between control group and group II was significant (p value < 0.05).

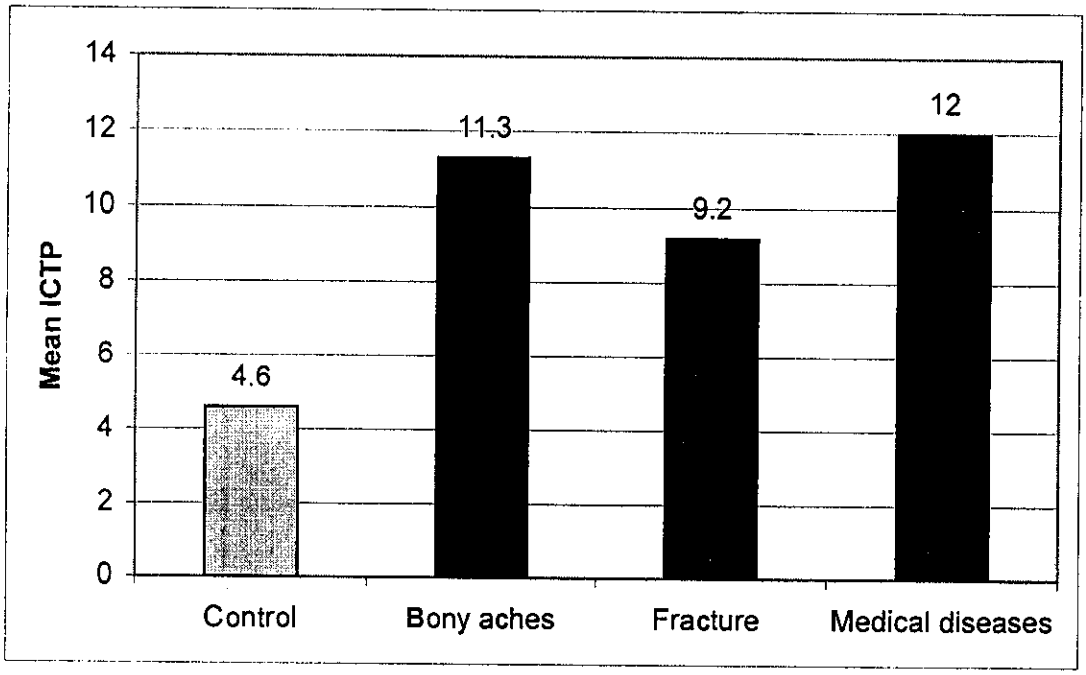

Figure 2: Mean ICTP levels in the studied groups

Table (9): Mean, SD and range of serum creatinine (mg/dl) in the studied groups.

	N	Mean ± SD	Minimum	Maximum	ANOVA	
					$F_{3,53}$	P value
Control	10	0.95 ± 0.1	.80	1.20	0.7	0.5
Group II	14	0.9 ± 0.2	.50	1.30		
Group III	20	0.9 ± 0.3	.50	1.80		
Group IV	13	0.8 ± 0.2	.60	1.20		
Total	57	0.9 ± 0.3	.50	1.80		

This table shows insignificant difference between groups as regarding serum creatinine (P value > 0.05).

Table (10): Mean, SD and range of serum total protein (g/dl) in the studied groups.

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	6.8	0.4	6.7	7.20	0.2	0.8
Group II (Fracture)	14	6.7	0.9	5.80	9.10		
Group III (Bony aches)	20	6.5	1.1	4.10	8.20		
Group IV (Medical diseases)	13	6.5	0.6	5.60	7.90		
Total	57	6.6	0.8	4.10	9.10		

This table shows a statistically insignificant difference between groups as regarding the mean serum total protein (P value > 0.05).

Table (11): Mean, SD and range of serum albumin (g/dl) in the studied groups.

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	4.1	0.3	3.60	4.50	0.7	0.5
Group II (Fracture)	14	3.95	0.5	3.00	4.60		
Group III (Bony aches)	20	4.2	0.9	2.40	5.60		
Group IV (Medical diseases	13	4.3	0.7	3.00	5.60		
Total	57	4.1	0.7	2.40	5.60		

This table shows a statistically insignificant difference between groups as regarding the mean serum albumin (P value > 0.05).

Table (12) : Mean, SD and range of serum alkaline phosphatase (u/L) in the studied groups.

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	114.7	10.8	100.00	130.00	3.5	0.02
Group II (Fracture)	14	128.9	20.4	87.00	154.00		
Group III (Bony aches)	20	101.5	25.9	41.00	150.00		
Group IV (Medical diseases	13	118.6	33.9	46.00	166.00		
Total	57	114.5	26.6	41.00	166.00		

This table shows statistically significant difference between groups as regarding the mean serum alkaline phosphatase (p value < 0.05).

Table (13): Comparisons between the studied groups as regarding serum alkaline phosphatase.

		Mean difference	P value
Control	Group II (Fracture)	-14.2286	> 0.05
	Group III (Bony aches)	13.2000	> 0.05
	Group IV (Medical disease)	-3.9154	> 0.05
Group II (Fracture)	Group III (Bony aches)	27.4286	0.02
	Group IV (Medical diseases)	10.3132	> 0.05
Group III (Bony aches)	Group IV (Medical disease)	-17.1154	> 0.05

* The mean difference is significant at the 0.05 level.

This table shows that the significant difference as regarding the serum alkaline phosphatase in the studied groups was found between group II and group III.

Table (14): Mean, SD and range of serum calcium (mmol/L) in the studied groups:

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	2.1	0.1	2	2.2	2.1	0.1
Group II (Fracture)	14	2	0.3	1.7	2.3		
Group III (Bony aches)	20	2	0.2	1.6	2.2		
Group IV (Medical diseases	13	2.1	0.3	1.7	2.4		
Total	57	2	0.2	1.6	2.4		

This table shows a statistically insignificant difference between groups as regarding the mean serum calcium (p value > 0.05).

Table (15): Mean, SD and range of urinary calcium (mmol/day) in the studied groups.

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	7.7	0.4	7.00	8.40	1.7	0.1
Group II (Fracture)	14	7.2	1.09	5.00	9.00		
Group III (Bony aches)	20	8.3	1.8261	5.00	12.00		
Group IV (Medical diseases	13	7.9	1.3	6.00	10.00		
Total	57	7.9	1.4	5.00	12.00		

This table shows statistically insignificant difference between groups as regarding the mean urinary calcium (P value > 0.05).

Table (16): Mean, SD and range of ionized calcium (mmol / L) in the studied groups:

	N	Mean	SD	Minimum	Maximum	ANOVA	
						$F_{3,53}$	P value
Control	10	1.9	0.06	1.80	2.00	1.2	0.3
Group II (Fracture)	14	1.8	0.2	1.50	2.05		
Group III (Bony aches)	20	1.8	0.2	1.40	2.10		
Group IV (Medical diseases	13	1.9	0.3	1.00	2.20		
Total	57	1.8	0.2	1.00	2.20		

This table shows a statistically insignificant difference between groups as regarding the mean ionized calcium (P value > 0.05).

Findings in the three groups of patients

Table (17) : Mean ± SD and range of serum alkaline phosphatase (u/L) level in patients groups.

	Mean ± SD	Range	ANOVA	
			$F_{2,44}$	P value
Group II (Fracture)	128.9 ± 20.4	87 – 154		
Group III (Bony aches)	101.5 ± 25.9	41 – 150	4.5	0.01
Group IV (Medical diseases)	118.6 ± 33.9	46 – 166		
Total	114.4 ± 28.9	41 – 166		

This table shows that there was a statistically significant difference between groups as regarding the serum alkaline phosphatase in the three groups. The significant difference was between group II and group III (p value 0.02).

Table (18) : Mean ± SD, and range of serum calcium (mmol/L) urinary calcium, (mmol/ day) and ionized calcium (mmol/L) in patients groups.

		Mean ± SD	Range	ANOVA	
				$F_{2,44}$	P value
Serum calcium	Group II (Fracture)	2 ± 0.3	1.7 - 2.3	1.4	0.2
	Group III (Bony aches)	2 ± 0.2	1.6 – 2.2		
	Group IV (Medical diseases)	2.1 ± 0.3	1.7 – 2.4		
	Total	2.05 ± 0.2	1.6 – 2.4		
Urinary calcium	Group II (Fracture)	7.2 ± 1.1	5 – 9	2.2	0.1
	Group III (Bony aches)	8.3 ± 1.3	5 – 12		
	Group IV (Medical diseases	7.9 ± 1.3	6 – 10		
	Total	7.9 ± 1.5	5 – 12		
Ionized calcium	Group II (Fracture)	1.8 ± 0.2	1.5 – 2.05	0.7	0.5
	Group III (Bony aches)	1.8 ± 0.2	1.4 – 2		
	Group IV (Medical diseases	1.9 ± 0.3	1 – 2.2		
	Total	1.8 ± 0.2	1 – 2.2		

This table shows that there was a statistically insignificant difference between groups as regarding the mean serum calcium, urinary calcium and serum ionized calcium (p value > 0.05).

There was a statistically insignificant difference between groups as regarding the mean of age, the mean value of ICTP, the mean of serum creatinine, the mean of serum total protein and the mean of serum albumin.

Table (19): Correlations between ICTP levels (μg/L) and the studied parameters in patients groups.

Studied parameters	Correlation Coefficient	P value
Age (year)	- 0.143	0.3
Creatinine (mg/dl)	0.301*	**0.04**
Protein (g/dl)	0.077	0.6
Albumin (g/dl)	- 0.383**	**0.008**
Alkaline phosphatase (u/L)	- 0.005	0.9
Serum calcium (mmol/L)	- 0.244	0.09
Urinary calcium (mmol/day)	0.519**	**<0.001**
Ionized calcium (mmol/L)	- 0.262	0.07

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

This table shows that there was a statistically significant positive correlation between the ICTP levels and serum creatinine, ICTP increased significantly with increasing serum creatinine (p value < 0.05). Also a highly significant positive correlation with urinary calcium levels was found (p value < 0.001).

While there was a statistically significant negative correlation between the ICTP levels and serum albumin in patients groups, ICTP increased significantly with decreasing serum albumin (p value 0.008).

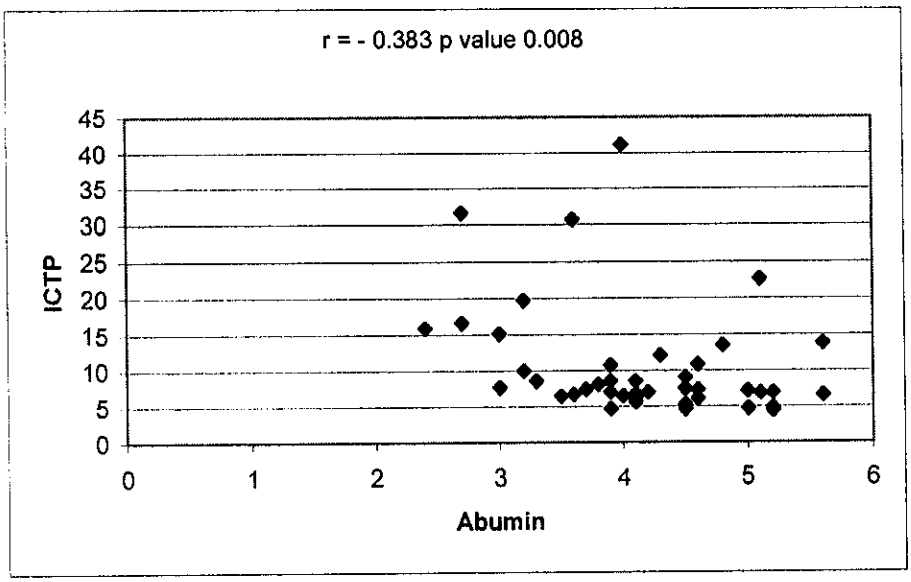

Figure 3: Correlation between ICTP and Creatinine

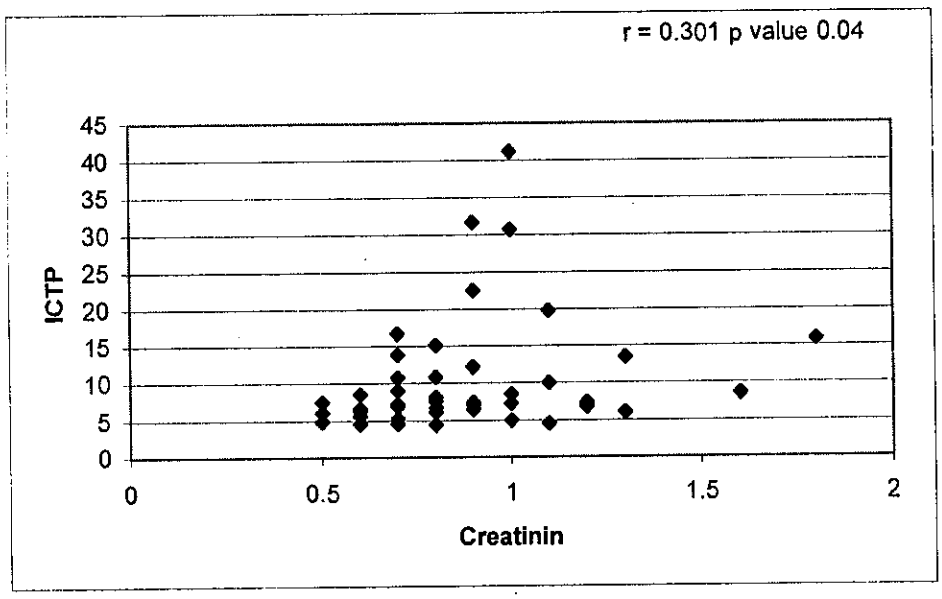

Figure 4: Correlation between ICTP (µg/L) and serum albumin

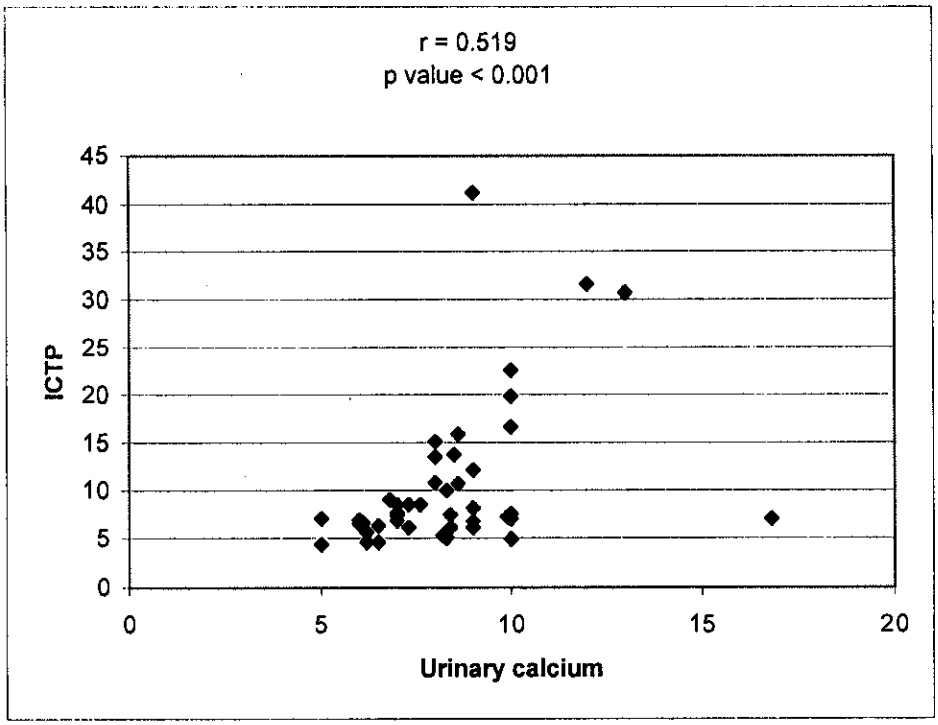

Figure 5: Correlation between ICTP and Urinary calcium

Variables that showed significant correlation with ICTP level were entered in univariate analysis of variance to detect the predictors of the ICTP levels in the diseased groups.

Table (20):Univariate analysis to find the predictors of serum ICTP levels (μg/L).

Parameter	B	Std. Error	t	P Value
Serum creatinine	5.206	3.784	1.376	0.1
Albumin	-1.111	1.421	-.781	0.4
Urinary calcium	2.478	0.660	3.754	0.001

From this table, univariate analysis revealed that urinary calcium was found to be the significant predictor of the serum ICTP (p value 0.001) while serum creatinine and serum albumin were insignificant predictors of the serum ICTP (p value > 0.05).

Linear regression analysis of ICTP with urinary calcium

Linear regression analysis was done to detect best prediction of the ICTP serum ICTP level (μg/L) from urinary calcium levels (mmol / day).

Table (21) : Coefficients of regression

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	Intercept	-10.369	5.081		-2.041	0.04
	Urinary calcium	2.617	.632	.525	4.138	< 0.001

A Dependent Variable: ICTP

Table (22) : Master sheet of control group

`Age	Cr	Prot	Alb	Alk.ph	S.ca	Urinary Ca	Ionized Ca	ICTP
52	1.1	7	4.1	105	2.2	7.5	1.95	3.6
55	1	6.7	4.2	115	2	7	1.8	4.2
50	0.9	6.9	3.9	100	2.2	8.4	2	4.3
56	1.2	7.2	3.6	115	2.2	8	1.9	4.7
50	0.8	7	4.5	120	2.2	8	1.99	5
50	0.9	6.9	4	130	2.1	7.6	1.9	5.1
53	1	7	3.9	112	2.1	7.8	1.9	5
56	0.8	7	4.5	120	2.2	8.1	1.99	5
58	0.9	6.8	4	130	2.1	7.6	1.9	5.1
60	0.9	6.8	3.9	100	2.2	7.2	2	4.3

Table (23) : Master sheet of fracture group

Age	Cr	Prot	Alb	Alk.ph	S.ca	Urinary Ca	Ionized Ca	ICTP
58	1.1	7.1	3.9	140	2.2	6.2	2	6.2
80	0.7	6.1	4.5	140	2.2	8.2	2.02	6.3
55	0.5	7.2	4.1	145	2	9	1.8	6.1
73	1.3	6.6	4.6	140	2.3	8.4	2.05	6.1
60	0.6	5.9	4.1	103	1.7	6.5	1.5	6.3
57	0.9	5.8	3.5	120	1.8	7	1.6	6.5
65	0.9	6.3	4	132	2	6.1	1.8	6.5
62	1.2	6.1	4.2	145	1.7	5	1.5	7.5
68	0.9	6.1	4.2	87	1.7	6.8	1.5	7.9
68	0.8	6.3	3	110	2	7	1.75	7.6
52	1	9.1	3.3	145	2.2	7.3	1.9	8.5
57	0.6	6.2	4.1	104	2.1	7.6	1.8	8.5
55	1.1	6.8	3.2	154	1.9	8.3	1.7	10
55	0.8	8.2	4.6	140	2.2	8	1.9	10.8

Table (24) : Master sheet of bony aches group

Age	Cr	Prot	Alb	Alk. ph	S.ca	Urinary Ca	Ionized Ca	ICTP
62	0.8	6.1	5.2	110	2.2	5	1.99	4.4
60	0.7	6.9	5	65	2.2	6.2	1.98	4.6
56	0.5	6.1	5.2	110	2	10	1.8	4.9
57	0.8	5.9	4.1	90	2.2	7.3	2.02	6.1
65	0.6	7.7	5.6	84	2.2	6.1	1.9	6.6
72	1.2	7.4	4.1	109	2	7	1.8	6.8
60	0.7	6.7	5.2	76	2.2	6	1.9	6.9
50	0.9	7.3	3.9	106	2.1	10	1.9	7
75	0.7	7.1	5	130	2.2	9.9	1.7	7.2
70	1	7.2	4.6	102	2	7	2	7.3
51	0.9	7.1	3.7	120	2.2	8.4	2	7.4
55	0.5	8.2	4.5	150	2	10	1.8	7.5
65	1.6	6.3	3.9	101	2	7	1.8	8.5
51	0.9	6.2	4.3	110	1.9	9	1.7	12.1
60	1.3	6.8	4.8	69	1.6	8	1.4	13.5
52	1.8	6.8	2.4	140	2	8.6	1.8	15.9
65	0.7	5.1	2.7	99	2.2	10	2.1	16.7
62	1.1	4.1	3.2	41	2	10	1.8	19.8
80	1	7.5	3.6	120	2.2	9	2	30.7
67	0.9	4.1	2.7	98	1.7	12	1.6	31.6

Table (25) : Master sheet of Medical disease group

Age	Cr	Prot	Alb	Alk. ph	S.Ca	Urinary Ca	Ionized Ca	ICTP
55	1	6.1	4	135	1.9	9	1.7	41.2
60	0.6	6	4.5	88	2.2	6.5	2	4.6
66	1	5.6	4.5	102	2	8.3	1.8	5
50	0.6	6.4	4.1	150	2.3	6.2	2.07	5.6
49	0.8	6.8	3.6	130	2.2	9	2	6.7
70	0.7	6.1	5.1	120	2.2	6	2	6.9
60	1.2	7.2	4.5	89	2.3	7	1.8	7.4
55	0.8	7.9	3.8	140	2	9	1.98	8.1
49	0.7	6.5	4.5	147	2.4	6.8	2.2	9
55	0.7	6.5	3.9	142	2.3	8.6	2	10.7
58	0.7	6.7	5.6	46	2.4	8.5	2.07	13.8
55	0.8	6.5	3	166	1.7	8	1.6	15.1
60	0.9	6.3	5.1	87	1.8	10	1	22.6