

The Relationship Between Serum Creatinine, Serum Urea And Blood Sugar Of Patients In Diyala City In Iraq.

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Abstract: *The present comparative study was done between normal and patients with diabetes and kidney disease in Diyala city in Iraq. The studied ages were ranged between 40 and more than 69. Serum samples were collected from hospitals in Diyala province. The result revealed that the serum sugar values behave in different manner than that of urine and creatinine values. The result showed that male patients percentage (50.0%) was less than male controls percentage (56.0%), while female patients percentage (50.0%) was more than female controls percentage (44.0%) With no significant differences ($P > 0.05$) among groups according to gender. Blood sugar, blood urea, and serum creatinine were higher in males compared to females. in males blood sugar was higher According to age, the highest age periods in patients was (50-59 year) and in control was (40-49 year), while the lowest age period in patients was (30-39 year) and in control was (>69 year) with high significant different between groups according to age periods.*

The mean value of serum sugar was high in the patients than control group with high significant differences between groups. The mean values of serum urea were high in patients from the control group with significant differences between groups. Besides, the mean values were significantly higher in Serum Creatinine in patients than controls. the mean value of Blood Sugar was higher in male patients than female with non-significant differences ($P > 0.05$) among patients. So, the mean value of Blood Urea parameters was high in male patients than female with non-significant differences ($P > 0.05$) among patients. Besides, the mean values of Serum Creatinine were higher in males patients than females with non-significant differences ($P > 0.05$) between patients.

Blood sugar did not settled, it goes up and down between the age forty to the age over 69. The least mean values of Blood Sugar were between (50-59) year and the highest values were between (60-69) year with non-significant differences among patients age. On the other hand, the least mean values of Blood Urea were between (40-49) year and the highest values were more than 60 years with non-significant differences among patients age. Besides, the least mean values of blood urea and Serum Creatinine lied between (40-49) years. With age, these values were elevated.

Key words: *serum urea, Serum creatinine, Serum sugar*

1. INTRODUCTION

Diabetes mellitus is the third leading cause of death (after heart disease and cancer) in many developed countries. It affects about 2 to 3% of the general population. The complications of diabetes affect the eye, kidney and nervous system. Diabetes is a major cause of blindness, renal failure, amputation, heart attacks and stroke. (The term diabetes, whenever used, refers to diabetes mellitus. It should, however, be noted that diabetes insipidus is another disorder characterized by large volumes of urine excretion due to antidiuretic hormone deficiency). Diabetes mellitus is a clinical condition characterized by increased blood glucose level (hyperglycemia) due to insufficient or inefficient (incompetent) insulin. In other words, insulin is either not produced in sufficient quantity or inefficient in its action on the target tissues. As a consequence, the blood glucose level is elevated which spills over into urine in diabetes mellitus. Insulin is a polypeptide hormone produced by the β -cells of islets of Langerhans of pancreas. It has profound influence on the metabolism of carbohydrate, fat and protein. Insulin is considered as anabolic hormone, as it promotes the synthesis of glycogen, triacylglycerols and proteins. This hormone has been implicated in the development of diabetes mellitus. Insulin is produced by the β -cells of the islets of Langerhans of pancreas. C-peptide has no biological activity, however its estimation in the plasma serves as a useful index for the endogenous production of insulin. In the β -cells, insulin (and also proinsulin) combines with zinc to form complexes. In this form, insulin is stored in the granules of the cytosol which is released in response to various stimuli by exocytosis.. (1)

Diabetic nephropathy is diagnosed by total albuminuria of more than 300 mg (proteins particularly albumin) at a 24 hour urine group or significant albuminuria and abnormal renal function represented by an imbalance of serum creatinine and serum urea. Clinically, diabetic nephropathy is demonstrated by proteinuria, decreased glomerular function rate (GFR), hypertension, and risk cardiovascular disease and mortality.(2) In diabetic nephropathy, vital signs. The S.creatinine and S.urea are known to increase with hyperglycemia in uncontrolled diabetics, usually associated with severe kidney damage. The measurement of serum creatinine and urea are easily available for this purpose that can help detect the kidneys affected by diabetes and prevention at an early stage and can limit the progress to end stage kidney disease. (2,3) Creatinine is the result of breakdown creatinine phosphate, which is released from skeletal muscle at a constant rate. The serum creatinine correlates perfectly well with the percent of the body that are a skeletal muscle. It is purified by the glomerulus, and a small amount is also excreted into the glomerular filtration by the proximal tubules (and then when the low glomerular filtration rate, break down the usual mutual relationship tends creatinine to reduce the extent of decline in glomerular filtration rate (GFR)).(4,5)

2. METHOD AND MATERIAL

The present study was conducted at the Baquba Teaching Hospital in Baquba province for diabetic patients, and started from April (2018) to February (2019). (50) blood samples were collected from diabetes patients, (25) males and (25) females with an age group (40-70) years, and (25) blood samples were collected from healthy individuals that were approved as a control group. The number of males (14) and females (11) in the age group (30-70) years. 5 ml of blood were collected 5 ml of blood and leave them at room temperature 20-25 ° C to allow her clot, then serum separation centrifuge for 5-10 minutes, and the Serum was split into three tubes (250 μ l) and stored at -20 °C. the assay continues.

Biochemical parameters (B. urea, S. creatinine, blood sugar) were measured by Cobas 400.

analysis statistical

The current study data analysis using Chi-square (X² test) to compare percentages. Sensitivity and specificity of the measured diagnostic tests (detection of the best test for diagnosis) showed ROC curve. The Numeric date is described by (mean ± SD). T test is used to compare two variables numeric, while the test is used F (ANOVA) to compare three or more numeric variables. The Pearson correlation account (R) to explain the type and strength of the relationship between the variables. The application of the level of significance $\alpha = 0.05$ for the test. Software (SPSS v.22 and excel 2013) for analyzing current data.

3. RESULTS

Result of current study shows the male patients percentage (50.0%) was less than male controls percentage (56.0%), while the female patients percentage (50.0%) was more than female controls percentage (44.0%) with no significant different (P>0.05) between groups according to sex as shown in table (1).

According to age periods between groups, the highest age periods in patients was (50-59 year) and in control was (40-49 year), while the lowest age periods in patients was (30-39 year) and in control was (>69 year) with high significant different between groups according to age periods as shown in table (1).

Table (1) comparison between gender and age periods within study groups by using chi-square test.

			Groups		Total	P value
			Patients (N=50)	Controls (25)		
Sex	Male	N	25	14	39	0.624
		%	50.0%	56.0%	52.0%	
	Female	N	25	11	36	
		%	50.0%	44.0%	48.0%	
Age periods (Years)	30-39	N	0	4	4	0.004**
		%	0.0%	16.0%	5.3%	
	40-49	N	12	12	24	
		%	24.0%	48.0%	32.0%	
	50-59	N	18	5	23	
		%	36.0%	20.0%	30.7%	
	60-69	N	12	2	14	
		%	24.0%	8.0%	18.7%	
	>69	N	8	2	10	
		%	16.0%	8.0%	13.3%	
Mean of age			56.26	46.60		
SD of age			9.38	11.15		

gender and the effects of biological sex causing many diseases, including representational disorders such as diabetes diet. Diabetes is more prevalent in men than in women in most parts of the world, particularly in middle-aged populations where males are more affected by obesity , insulin resistance and hyperglycemia compared to females. (Blandine et al., 2020). For women, insulin sensitivity is higher, Those who also have higher insulin-secreting capacities and incretin responses than men; Despite these sex benefits all go to pieces when

glucose tolerance towards diabetes deteriorates. Differences in lifestyle associated with sex may lead to differences in the risk of diabetes, and thus to differences in the prevalence of this situation among women and men (BeLue et al., 2009). Although, the relationship among a famed risk factor for diabetes as obesity, and the evolution of symptoms diabetes it may not be easy. Although documented wide variations in the distribution of diabetes by sex in several review articles (Tuei *et al.*, 2017) It is not examined possible reasons for this discrepancy in detail.

The study found that this age group 50-59 years was severely affected by diabetes, and this is somewhat consistent with the findings of its findings (Cho et al., 2018) and (Miloudi et al., 2020), Adults aged 50-59 were the most commonly diagnosed age group for diabetes. Diabetic mellitus affects both the elderly and the young and is closely related to morbidity, mortality and high health cost for patients, their families and countries (Nwaokoro *et al.*, 2014). About 25% of the population of the United States of America over the age aged ≥ 65 years suffers from diabetes (Centers for Disease Control and Prevention, 2011), and The aging of the population in general is the main driver of the diabetes pestilential. though the a onus of diabetes is often prescribed in terms of its effect on adults working-age, diabetes in the elderly is associated with a higher mortality rate, decreased functional status, and an increased risk of institutionalization (Brown et al., 2013). Elderly adults with diabetes are at high risk of developing acute and chronic complications in the microvascular and cardiovascular levels of the disease. diabetes affects Type 2 both the elderly and the youths and is associated with significantly higher morbidity and mortality for patients, health cost and their families and countries. In the world, the increase of the type I of economic development are linked, and the aging of the populations, increased civilization, diet changes and reduced physical activity, and other lifestyle changes (Srivastava and Singh, 2013). The number of people aged 20 to 79 with diabetes in the world is estimated at men 8% 4225 million in 2017 and is projected to reach 552 million in 2030 (Al-Quwaidhi et al., 2014).

Result of current study shows the mean value was high for Blood Sugar (241.24 ± 85.86) parameters in patients than controls (97.56 ± 10.19) with high significant difference ($P < 0.05$) between study groups. As well the mean value was high for Blood Urea (32.98 ± 4.68) parameters in patients than controls (15.96 ± 5.18) with high significant difference ($P < 0.05$) between study groups. And also, the mean value was high for Serum Creatinine (1.69 ± 1.12) parameters in patients than controls (0.82 ± 0.32) with high significant difference ($P < 0.05$) between the study groups as shown on the table (2) and the figure (1).

Table (2) comparison between biochemical parameters within study groups by using student t- test.

Groups (Patients=50 , Controls= 25)		N	Mean	SD	P value
Blood Sugar	Patients	50	241.24	85.86	0.001***
	Controls	25	97.56	10.19	
Blood Urea	Patients	50	32.98	4.68	0.001***
	Controls	25	15.96	5.18	
Serum_Creatinine	Patients	50	1.69	1.12	0.001***
	Controls	25	0.82	0.32	

Thus, the mean blood urea and S.creatinine levels were higher significant ($p \leq 0.05$) in the diabetes subjects over non-diabetic control group. Various studies showed that the blood urea levels increased proportionally to the increase in serum creatinine . These results are in

agreement with different studies that have show that raised S.creatinine and blood urea levels in patients with diabetes may indicate a pre-kidney problem (Aldler AI, Judykay T).

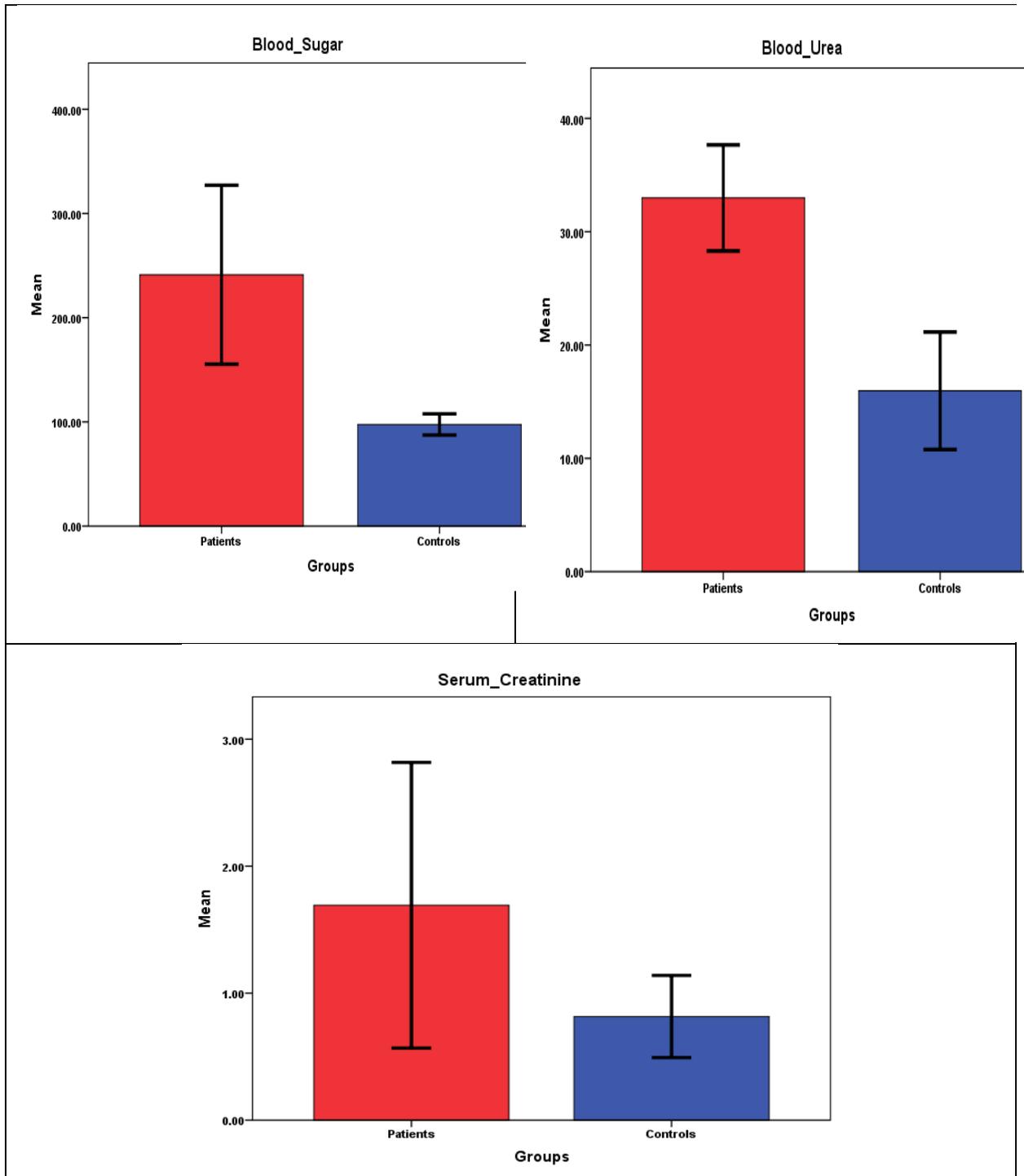


Figure (1) comparison between biochemical parameters within study

Result of current study shows the mean value of Blood Sugar parameters was high for male patients (255.00 ± 95.39) than female (227.48 ± 74.55) with no significant different ($P > 0.05$) between patients sex. So, the mean value of Blood Urea parameters was high for male patients (33.04 ± 4.11) than female (32.92 ± 5.28) with no significant different ($P > 0.05$) between patients sex. Also, the mean value of Serum Creatinine parameters was high for

male patients (1.81±1.22) than female (1.58±1.04) with no significant different (P>0.05) between patients sex as shown on the table (3).

Table (3) comparison between biochemical parameters of patients with gender by using student t- test.

	Sex	N	Mean	SD	P value
Blood Sugar	Male	25	255.00	95.39	0.26
	Female	25	227.48	74.55	
Blood Urea	Male	25	33.04	4.11	0.92
	Female	25	32.92	5.28	
Serum Creatinine	Male	25	1.81	1.22	0.47
	Female	25	1.58	1.04	

Result of current study shows the least mean value of Blood Sugar parameters was for period (50-59 year) and highest mean value was for period (60-69 year) with non-significant different (P>0.05) among patients age. So, least mean value of Blood Urea parameters was for period (40-49 year) and highest mean value was for period (>69 year) with no significant different (P>0.05) between patients age. Also, least mean value of Serum Creatinine parameters was for period (40-49year) and highest mean value was for period (50-59 year) with high significant difference (P<0.05) among patients age as shown on the table (4).

Table (4) comparison between biochemical parameters of patients with age periods by using F- test.

		N	Mean	SD	P value
Blood Sugar	40-49	12	262.08	117.16	0.27
	50-59	18	210.94	49.28	
	60-69	12	266.33	101.14	
	>69	8	240.50	62.25	
Blood Urea	40-49	12	30.50	2.65	0.07
	50-59	18	32.72	4.76	
	60-69	12	33.92	4.96	
	>69	8	35.88	5.17	
Serum Creatinine	40-49	12	0.86	0.30	0.006 **
	50-59	18	2.28	1.21	
	60-69	12	1.63	1.04	
	>69	8	1.71	1.17	

Result of current study shows the correlation relationship between Blood Sugar and Blood Urea is negative (r = -0.139), while the correlation relationship among B.Sugar and S.creatinine is positive (r = 0.004). so, the correlation relationship between Serum Creatinine and Blood Urea is strong positive as shown in table (5)

Table (5) correlation relationship between biochemical parameters.

		Blood Urea	Serum_Creatinine
Blood Sugar	R	-0.139	0.004
Serum_Creatinine	R	0.519**	1

Result of current study shows the highest Sensitivity was for Blood Sugar is (Sn.=100%) then for Blood Urea (Sn.=99%) and finally for Serum Creatinine (Sn.=74%). While the

highest the highest was for Blood Urea (Sp.=70%) then for Blood Sugar (Sp.=60%) finally for Serum Creatinine (Sp.=32%) as shown in table (1) and figure (2).

Table (6) Sensitivity, Specificity, and Cut off for comparison parameters of current study ROC curve.

Parameters	Sensitivity %	Specificity %	Cut off	AUC
Blood Sugar	100%	60%	>97	0.99
Blood Urea	99%	70%	>15	0.97
Serum Creatinine	74%	32%	>0.80	0.75

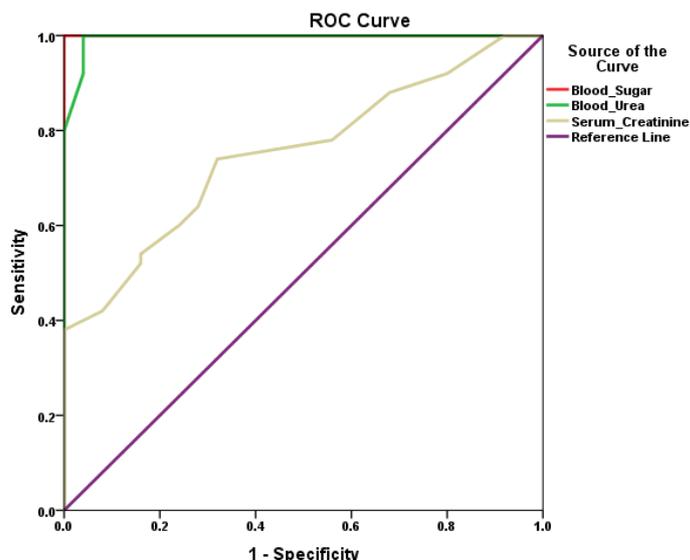


Figure (2) Sensitivity, Specificity, and Cut off for comparison parameters of current study ROC curve.

4. DISCUSSION

Adaptation among young people is at its beginning, while adaptation is completed in the middle ages, the Beta cells responsible for secreting insulin are getting old and tired in the elderly. Unable to replace the damaged nephrons in the adult human, So that with advanced ages, as the weakened nephrons increased, the total number of nephrons was reduced and the urine and creatinine values were also increased. Nadia et al 2017 recorded that is prevalence of type II diabetes has significantly increase among teens and young adults. As with older-onset type II diabetes, family history, obesity, and sedentary lifestyle are the main predisposing risk factors. Associated with the onset of diabetes at a younger age (defined here as up to the age of 40 years) exposure to a longer period of the disease and increase the risk of complications of chronic. Type II diabetes that appears at a young age affects many people of working- age, To accentuate the negative impacts of this disease on culture. Additionally, there is proof that type II diabetes that begins at a young age has a more violent phenotype of the disorder, contribute to the early evolution of complications, detrimental impacts on the quality of the life and long-term consequences are undesirable, Boost the risk for a possible public health disaster. Within this Analysis, we identify the current epidemiology and awareness of adolescents and young people with regard to patients pathophysiology, complications, risk factors, and management type II diabetes . The Beta cells attain their development in the middle ages, then this behavior was diminishing with the

risk of obesity. On the other hand, urea and creatinine increased at an advanced age because the nephrons of the kidney were wearing out and getting old.

The reason for the high prevalence of males with diabetes and the lower incidence of females is that the hormone of estrogen in females activates beta cells and therefore decreases the concentration of sugar in the blood. (Christine M. Grimaldi et al 2002). The second explanation for high sugar in males is that they experience more stress and psychological distress than females, and this is different from the findings of (Singh, p. et al 2014), That says increased men's sugar is due to increased male muscle mass. Singh, p. et al 2014 confirmed that there is no substantial difference between diabetics male and female. In comparison to our diabetes results, females were less affected than males.

Hypertension causes diabetes, and because males are more vulnerable to diabetes than females due to stress and psychological distress, this is true. (Debpasad Chattopadhyay et al 2012).

This study showed the pattern in diabetics between blood sugar and blood urea levels with a weak relationship, as indicated by the value of "r". The B.Sugar and urea level "r" value was -0.139. The association between serum urea and serum creatinine levels was high (r= 0.519) This is no identical to (SA Bamanikar et al 2016).

Result of ROC curve showed the highest sensitivity for blood sugar (100%), then blood urea (99%) and lowest sensitivity for serum creatinine (74%).

5. CONCLUSIONS

It was concluded that Beta cells were at its activity at middle ages, then declines at elders. on the other hand, urea and creatinine were increased with advanced ages.

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