

# Study of Blood Urea, Serum Creatinine and Serum Electrolytes in Azotemic Patients Undergoing Dialysis

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**Abstract:** To study the blood urea, serum creatinine, serum electrolytes in normal healthy subjects and comparing the results with azotemic patients undergoing dialysis so as to prevent advancing kidney diseases and to reduce morbidity and mortality. Objectives: Awareness of the abnormalities in the azotemic patients that can arise under various conditions and in order to prevent adverse outcomes by doing dialysis.

**Keywords:** CKD

## 1. Introduction

The elderly population has been growing rapidly over the past few decades. This rise is due to advancement in medical care<sup>(1,2)</sup>. This growth parallels the incidence of chronic kidney disease which is associated with diabetes and hypertension<sup>3</sup>. They are over more than 20 million persons with chronic kidney disease (CKD) stage 1-5 of which 8 millions have CKD stage 3-5 which are associated with various metabolic and electrolyte abnormalities that results from the decline in kidney function. These changes are expected to occur with advancing disease, unexpected blood urea, serum creatinine and electrolytes abnormalities may occur.

Therefore it is important to be aware of the potential abnormalities that can arise under various conditions and in order to prevent adverse outcomes, dialysis of chronic kidney disease (CKD) patients is important to decrease morbidity and mortality.

## 2. Materials and Methods

- Inclusion criteria : no. of patients : 20 patients (age range) of ckd undergoing dialysis selected for this study as cases 20 healthy subjects as controls (age) .
- Sample collection: Sample collection before dialysis, sample amount, collected in plain tubes. 10 ml of blood samples are collected from cases and controls, 5 ml of blood centrifuged for estimation of serum creatinine and electrolytes. Whereas from 5 ml of whole blood is used for the estimation of blood urea.
- Study centre: Shadan Institute of Medical Sciences, Teaching Hospital and Research Centre
- Exclusion criteria: Subjects suffering from liver diseases excluded in this study

## Estimation of Serum electrolytes

The electrolytes, Sodium, Potassium and chloride in serum were measured using Flame photometry method ( Make:) following the instructions provided along with the kit.

## Estimation of Urea and Creatinine

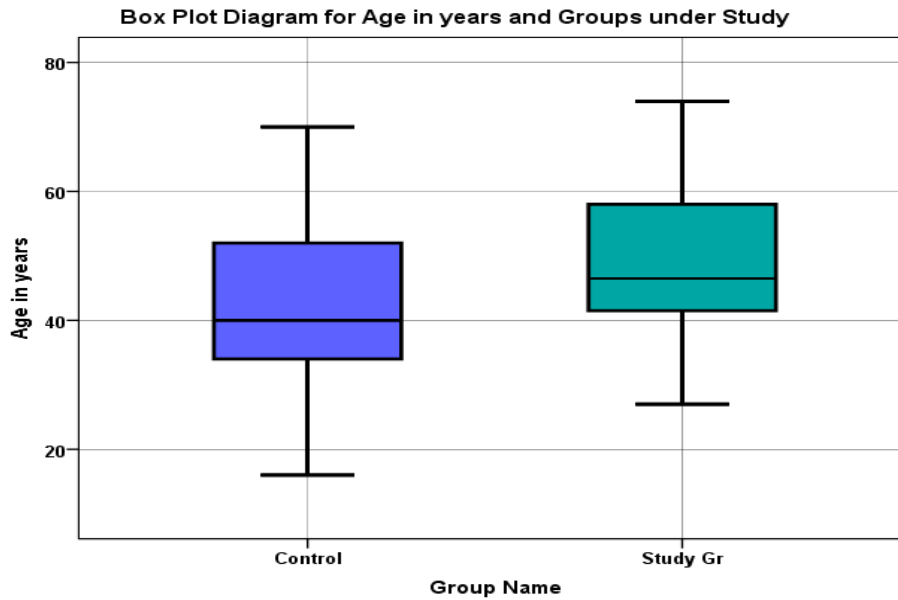
Blood Urea and Serum Creatinine were estimated using the standard kit by Berthelot, End Point Assay and Jaffe's method respectively. Data are expressed as mean±standard deviation (SD). The significant difference between the test group and the control group were analyzed using Anova. Data were analyzed using the SPSS software. A value of  $p < 0.05$  was set as the level of significance.

## 3. Results

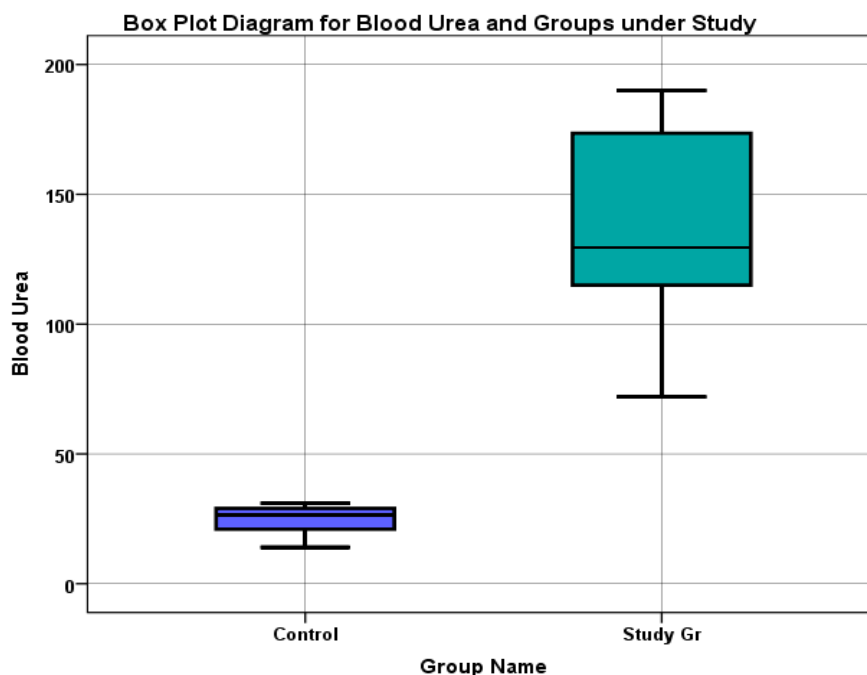
The mean age of patients in the control and test groups was  $41.9 \pm 14$  and  $49.20 \pm 12$  years respectively. The blood urea in the study group ( $136.9 \pm 36$  mg/dl) was significantly higher ( $p < 0.001$ ) as compared to the control group ( $24.5 \pm 4.8$  mg/dl). Similar results were obtained while evaluating serum creatinine. The levels were significantly higher in study group ( $9.29 \pm 2.9$  mg/dl) in contrast to the control group where the serum creatinine levels were  $0.94 \pm 0.1$  mg/dl.

The assessment of serum electrolytes was carried out in both the groups. The levels of sodium in serum of the patients in the study group ( $137.45 \pm 7.3$ ) showed a slight decrease as compared to the control group ( $139.6 \pm 3.1$ ) which was considered non significant ( $p > 0.05$ ). However the level of serum potassium varied in both the groups. There was significant difference in potassium levels ( $p < 0.05$ ) in control ( $3.9 \pm 0.2$ ) and study group ( $5.1 \pm 0.7$ ). Serum chloride did not show much difference ( $p > 0.05$ ). The level of serum chloride in control group was  $102.2 \pm 2.4$  whereas in the study group it was  $103.6 \pm 5.8$ .

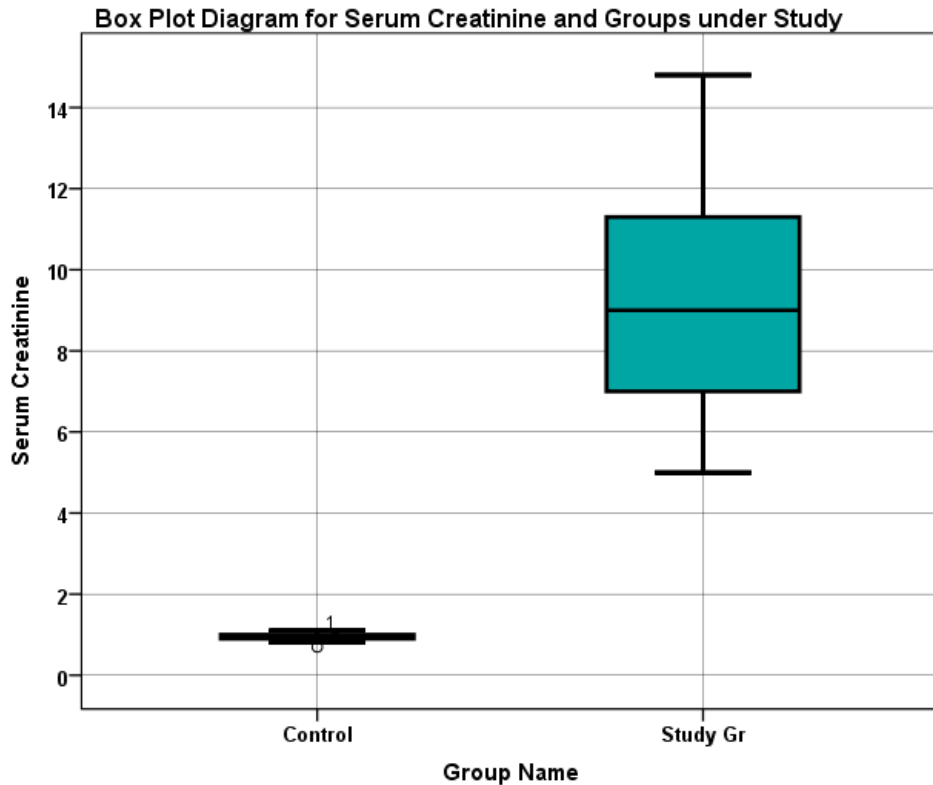
Distribution Age in years		
Statistical Measures	Control Group	Study Group
Mean	41.90	49.20
Variance	212.832	158.168
Std. Deviation	14.589	12.577
Minimum	16	27
Maximum	70	74
Std. Error	3.262	2.812



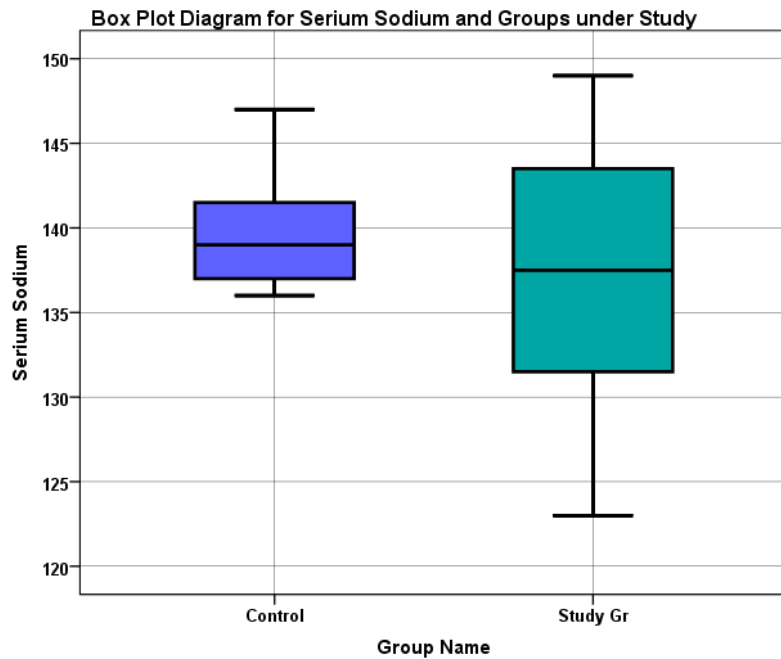
Distribution Blood Urea		
Statistical Measures	Control Group	Study Group
Mean	24.55	136.95
Variance	23.734	1340.261
Std. Deviation	4.872	36.610
Minimum	14	72
Maximum	31	190
Std. Error	1.089	8.186



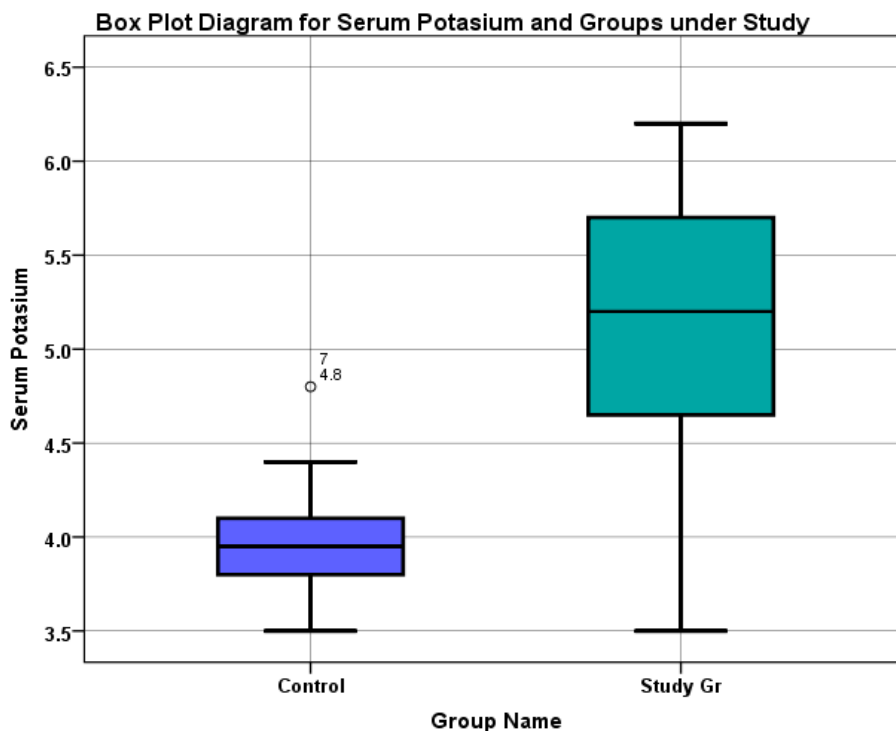
Distribution Serum Creatinine		
Statistical Measures	Control Group	Study Group
Mean	.94	9.29
Variance	.009	8.888
Std. Deviation	.093	2.981
Minimum	1	5
Maximum	1	15
Std. Error	0.21	0.667



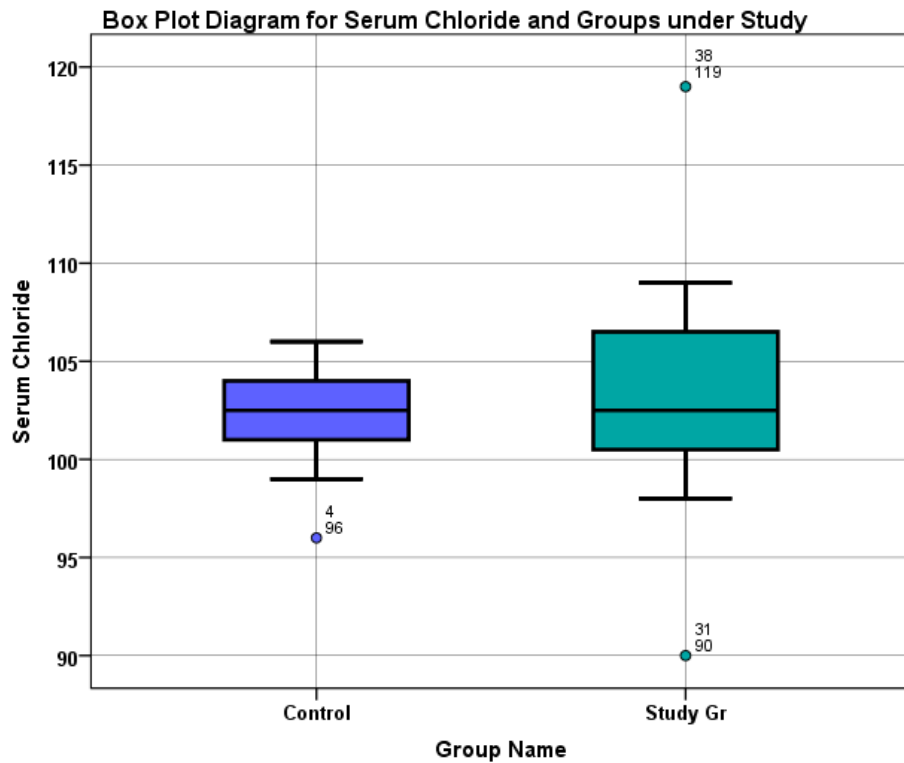
Distribution Serum Sodium		
Statistical Measures	Control Group	Study Group
Mean	139.65	137.45
Variance	9.924	53.524
Std. Deviation	3.150	7.316
Minimum	136	123
Maximum	147	149
Std. Error	0.704	1.636



<b>Distribution Serum Potasium</b>		
<b>Statistical Measures</b>	<b>Control Group</b>	<b>Study Group</b>
Mean	3.99	5.09
Variance	.081	.622
Std. Deviation	.285	.789
Minimum	4	4
Maximum	5	6
Std. Error	0.064	0.176



<b>Distribution Serum Chloride</b>		
<b>Statistical Measures</b>	<b>Control Group</b>	<b>Study Group</b>
Mean	102.20	103.65
Variance	5.853	33.924
Std. Deviation	2.419	5.824
Minimum	96	90
Maximum	106	119
Std. Error	.541	1.302



t-test for Equality of Means between Study and Control Group			
	t	df	Sig. (2-tailed)
Age in years	-1.695	38	.098
Blood Urea	-13.611	38	.000
Serum Creatinine	-12.527	38	.000
Serum Sodium	1.235	38	.224
Serum Potassium	-5.864	38	.000
Serum Chloride	-1.028	38	.310

ANOVA - Serum Chloride					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.025	1	21.025	1.057	.310
Within Groups	755.750	38	19.888		
Total	776.775	39			

ANOVA - Blood Urea					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	126337.600	1	126337.600	185.246	.000
Within Groups	25915.900	38	681.997		
Total	152253.500	39			

ANOVA - Serum Creatinine					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	698.060	1	698.060	156.920	.000
Within Groups	169.044	38	4.449		
Total	867.104	39			

ANOVA - Serum Sodium					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.400	1	48.400	1.526	.224
Within Groups	1205.500	38	31.724		
Total	1253.900	39			

ANOVA - Serum Potassium					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.100	1	12.100	34.388	.000
Within Groups	13.371	38	.352		
Total	25.471	39			

#### 4. Discussion

The present study was carried out to compare renal function in patients undergoing dialysis and normal individuals. The renal function was assessed by evaluating the concentration of blood urea, serum creatinine and electrolytes (Sodium, Potassium and Chloride).

Urea is used for managing dialysis in end stage renal failure. The level of urea in blood is used as a marker to measure the accumulation of poor renal excretory metabolites leading to the symptoms of uremia. In the present work, the concentration of urea in blood was found to be significantly higher in study group as compared to the control group ( $p < 0.001$ ). Serum Creatinine is used to study the filtration function of the kidney. There was tremendous increase in the creatinine levels in patients on dialysis whereas the control group individuals showed normal levels. In normal human body, the most abundant extracellular ion is the Sodium whereas the most abundant intracellular ion is Potassium. Both ions play a key role in muscle contraction.

The decrease in Sodium levels in patients on dialysis revealed the occurrence of hyponatremic condition in renal dysfunction. The levels of sodium in serum of dialysis patients were low as compared to that of individuals in the control group. The study group has higher levels of potassium in comparison to the control group ( $p < 0.001$ ). The levels of serum chloride in both the groups were

comparable. A study has demonstrated a significant reduction in mortality rate (36%) in patients undergoing dialysis as compared to patients on conventional therapy (Mehta RL<sup>4</sup>). In another study it has been revealed that there was a significant decrease in hemorrhage event in patients on dialysis when compared to the conventional therapy (Metnitz PG<sup>5</sup>). An improvement in control of azotemia in the early course of the renal insufficiency in critically ill patients will be promising. This may result in decline in the mortality rate. The symptoms of azotemia were relieved by dialysis and patients have been maintained longer than three decades on dialysis but unfortunately average mortality rates and hospitalization are high.

## 5. Acknowledgement

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