

Study of Serum Electrolytes in Acute Renal Failure; Pre and Post Dialysis

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Abstract:

Measurement of the concentration of electrolytes in serum levels of sodium, potassium, calcium, magnesium and chloride is important in acute renal failure (ARF). The level of these electrolytes in serum was analyzed in predialysis and post dialysis. The data obtained revealed that decrease in serum level of sodium, potassium, magnesium and chloride while increase in serum level of calcium was seen in post dialysis as compared to predialysis.

Keywords: Acute renal failure (ARF), sodium, calcium, magnesium, chloride, and potassium, pre-dialysis, post-dialysis.

Introduction

Renal means related to kidney and acute means severe, so acute renal failure (ARF) means kidney has failed suddenly, which may be due to severe blood loss, toxins or trauma.^[1] It is the second largest disorder after the myocardial infarction. Out of one million people in America, 777 experienced kidney failure in 2005.^[2] ARF is loss of renal function that develops rapidly over a period of days or weeks. Dialysis therapy or renal transplantation is essential, as renal function deteriorates to a point where conservative management cannot maintain life.^[3] The dialysis therapy corrects water, electrolytes, acid-base imbalance and removes metabolic waste products. Administration of potassium through fluid is important in hypocalcemia. Electrolyte imbalance is frequently present both before and after dialysis. The treatment of pre-dialysis to post dialysis is limited to serum sodium and potassium.^[4,5]

Pseudogout syndrome has been described in patients undergoing repeated dialysis, which is due to calcium phosphate deposition. Sodium depletion by dialysis gradually reduced the blood pressure to normal.^[6] Potassium, calcium chloride and magnesium were found to be controlled by dialysis.^[7] The prospective work was undertaken to study the concentration of serum sodium, potassium, calcium, magnesium and chloride during pre and post-dialysis. The severe biochemical abnormalities initially seen were controlled by dialysis.

Materials and Methods

The present study was carried out in the department of Biochemistry, Government medical college, Aurangabad. The study comprised of 50 subjects of age group 17 to 65 years of either sex, which were divided into three groups. Group I (n = 25) consists of healthy individuals (Diabetic patients were completely ruled out), Group II (n = 33) consists of individual having blood urea between 50 to 100 mg % and group III (n = 17) consists of individual having blood urea above 100mg%.

The serum sodium and potassium of above subjects was estimated using flame photometer.^[8] The serum magnesium and calcium was estimated by Clark and Collip method^[9] and serum chloride was estimated by Scales and Schales method.^[10]

Observations

The study of serum electrolytes in ARF patients was carried on some 50 subjects of age group 17 to 65 years of both sex and dividing them into three groups. Table no.1 shows that there was decrease in serum sodium and chloride levels in-group III as compared to group II (P<0.01). Serum potassium levels was seen to be increased in-group III as compared to group II (P<. 001), where as serum calcium was found to decreased in-group III as compared to group II (P<0.01). The serum magnesium was found to be significantly increased in-group III than group II (P<0.001).

Table No.1: Study of Serum Electrolytes in ARF (Group II and Group III)

Group (N=)	Sr. Sodium (mEq/l)	Sr. Potassium (mEq/l)	Sr. Calcium (mg %)	Sr. Magnesium (mg %)	Sr. Chloride (mg %)
Control (I) (N=25)	140.12 + 1.96	04.02 +0.19	10.71 +0.75	02.02 +0.38	101.96 +3.22
Group (II) (N=33)	130.43 +1.14	04.31 +0.12	09.23 +0.19	03.50 +0.24	110.00 +0.78
Group (III) (N=17)	129.57 +0.95	04.41 +0.10	08.11 +0.18	04.80 +0.20	107.00 +1.21

Table No.2: Study of Serum Electrolytes in ARF: Pre-dialysis & Post-dialysis

Group (N=)	Sr.Sodium (mEq/l)	Sr.Potassium (mEq/l)	Sr.Calcium (mg %)	Sr.Magnesium (mg %)	Sr. Chloride (mg %)
Control (I) (N=25)	140.12 + 1.96	04.02 +0.19	10.71 +0.75	02.02 +0.38	101.96 +3.22
Pre-dialysis	130.6 +1.43	04.33 +0.42	08.01 +0.91	03.81 +1.26	107.63 +5.31
Post-dialysis	129.16 +1.94	04.13 +0.43	08.97 +0.86	03.59 +1.32	106.10 +5.39

Result & Discussion

The present study has shown that in pre-dialysis, the levels of serum sodium and calcium was low in all cases of ARF and it was further decreased in post-dialysis which may be due to salt restricted diet.^[5] The serum potassium was seen to be high in all cases of ARF, which may be dangerous and can cause early complication of renal failure. Dialysis removes potassium effectively and prevents above complications.^[7]

Hypocalcaemia was observed in all cases of ARF in pre-dialysis, which was further increased in post-dialysis. The cause may be due to insensitivity of the bone to the parathyroid hormone, which can hamper the release of calcium from the bone.^[11,12] The serum magnesium level was seen to be high in all cases of ARF in pre-dialysis and the level decreased in post-dialysis. The plasma magnesium was found to show an inverse correlation with parathyroid hormone secretion, similar to that of calcium. High magnesium dialysate fluid or high magnesium content of tap water or both may be responsible for hyper magnesium.^[13]

Conclusion: Thus it was found that in post-dialysis there was decrease in serum sodium, potassium, magnesium and chloride as compared to pre-dialysis, while serum calcium was found to be increased in post-dialysis as compared to pre-dialysis.

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