Relationship Between Ions And Chronic Kidney Disease (CKD)

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Abstract

Backgrounds: chronic kidney disease is serious disease of kidney that may be threatening the life. It effect on ions in the body such as calcium, protein, glucose, phosphorus and bilirubin.

Aims of the study: to find the relationship between ions and chronic kidney disease.

Methodology: A cross sectional study, included chronic kidney disease patients (age range of 20-79 years) that attended at Baqubah teaching hospital and during period from November 2023 to march 2024. 70 patients taken as sample.

Results: -----

Conclusion: We conclude that chronic kidney disease increase with age especially than 50-70 years age group. In chronic kidney disease there a lot of changes in ions in the body such as low value of protein , high value of phosphorus, low value of calcium and low value of bilirubin.

Keywords: Ions , chronic kidney disease, CKD.

Introduction

Reduction in renal function is gradual in Chronic Kidney Disease (CKD). This disorder causes the kidneys to malfunction, particularly in their excretory and regulatory capacities. It can be brought on by infections, autoimmune illnesses, diabetes, high blood pressure, cancer, and exposure to hazardous substances. CKD is quickly escalating to epidemic levels over the world and is on its way to become a serious health issue.(1,2)

Finding modifiable risk factors for the advancement of chronic kidney disease (CKD) is crucial for the development, investigation, and use of preventative measures.(3)

Ion disturbances are common in advanced stages of chronic kidney disease (CKD) and have been proposed as both a cause and an effect of the disease, with a possible acceleration of the deterioration in kidney function.(4)

The advancement of CKD has been repeatedly linked to hyperphosphatemia.(5,6) excess FGF-23, and the calcium-phosphorus product.(7)

The relationship between calcium disturbances and the decline in kidney function is less clear, with two recent studies reporting contradictory and

counterintuitive findings: Lim et al. (8) reported that low serum calcium was linked to a faster decline in kidney function in a pooled cohort of patients with CKD stages 3-5, whereas Schwarz et al. (9) found no relationship between calcium and CKD progression in patients with CKD stage 1-4.

Blood examinations for blood The kidneys excrete urea nitrogen (BUN), a key nitrogenous end product of protein and amino acid catabolism, and creatinine, a byproduct of the breakdown of creatine phosphate in muscle.(10)

The blood urea nitrogen level (BUN) is a crude and indirect indicator of renal function that is directly correlated with the kidney's excretory activity. Tests for creatinine quantify the blood's level of creatinine phosphate and determine problems with renal function.(11)

Increases in blood creatinine and urea are signs of renal disease, while increases in urea are favorable markers of a healthy kidney. Serum creatinine and BUN are the most often used and broadly recognized metrics for evaluating renal function.(12,13)

Both copper and iron are essential trace metals in the human body. They are essential for sustaining biological processes, and disorders with their

metabolism can lead to a variety of illnesses, such as renal disease. A novel kind of cell death called ferroptosis is characterized by lipid peroxidation and iron buildup. (14)

Research has indicated a direct relationship between renal disease and ferroptosis. Uncertainty surrounds the involvement of aberrant copper metabolism in renal illness and how it relates to ferroptosis.(15)

Aims of the study

The aim of current research is to find the relationship between ions and chronic kidney disease.

Patients and methods

A cross sectional study, included chronic kidney disease patients (age range of 20-79 years) that attended at Baqubah teaching hospital and during period from November 2023 to march 2024. 70 patients taken as sample.

Statistical analysis

Manual statistical analysis were used for data entry, management, and analysis. Descriptive analyses of the variables were expressed as frequencies and percentage for categorical data.

Ethical approval

The necessary ethical approval from ethical committee Baquba Teaching Hospital was obtained. Moreover, all subjects involved in this work were informed and the agreement required for doing the experiments and publication of this work was obtained from each one prior the collection of samples.

Results

Data were collected from 70 patients with chronic kidney disease and the result divided according to the age, 20-30 age group 44.44% were low value of protein, 55.55% were high value of phosphorus, 77.77% were low value of calcium and 11.11% low value of iron and 100% were normal bilirubin. 30-40 age group 33.33% were low value of protein, 33.33% were high value of phosphorus, 50% were low value of calcium and 22.22% low value of iron and 90% were normal bilirubin, 40-50 age group 35.29% were low value of protein, 17.64% were high value of phosphorus, 66.66% were low value of calcium and 17.64% low value of iron and 88.28% were normal bilirubin, 50-60 age group 33.33% were low value of protein, 33.33% were low value of phosphorus, 60% were low value of calcium and 20% high value of iron and 20% were high value bilirubin, 70-80 age group 57.14% were low value of protein, 28.57% were high value of phosphorus, 57.14 % were low value of calcium and 100% were normal value of iron and 100% were normal value bilirubin, shown in this table.

Age	Patient No	Glucose	Urea	Creatinine	Albumin	Protein TPRO	Phosphorus PHO	Calcium CAL	Iron IRON	Bilirubin TBIL	Norma	%	High val	Low val.
20 - 30	9	61.70 - 250.71	115.68 - 177.35	4.57 - 14.15	3.38 - 40.02	5.56 - 9.03	3.19 - 8.42	6.82 - 10.55	20.7 - 154.3	0.20 - 0.60	TPRO	44.44%	11.11%	44.44%
											PHO	44.44%	55.55%	0%
											CAL	11.11%	11.11%	77.77%
											IRON	88.88%	0%	11.11%
											TPIL	100%	0%	%
30 - 40	7	77.58 - 138.99	103.62 - 186.63	4.24 - 9.93	3.33 - 4.04	5.01 - 7.78	2.39 - 5.65	6.66 - 9.97	47.7 - 159	0.20 - 0.99	TPRO	66.66%	0%	33.33%
											PHO	50%	33.33%	16.66%
											CAL	50%	0%	50%
											IRON	75%	25%	0%
											TPIL	100%	0%	0%
40 - 50	13	70.95 - 188.77	81.55 - 159.54	4.10 - 15.40	2.80 - 4.00	4.42 - 7.96	2.45 - 7.11	6.34 - 10.08	0.24 - 242.7	0.20 - 0.54	TPRO	50%	0%	50%
											PHO	58.33%	33.33%	8.33%
											CA	58.3	0%	41.6

											L	3%		6%
											IRON	66.66%	4.11%	22.22%
											TPIL	90%	0%	10%
50-60	18	74.41-201.53	81.07-189.56	2.83-11.25	3.04-3.83	4.83-8.25	2.21-5.80	7.61-9.71	8.89-108.5	020-1.00	TPRO	64.7%	0%	35.29%
											PHO	76.47%	17.64%	5.88%
											CAL	33.33%	0%	66.66%
											IRON	82.35%	0%	17.64%
											TPIL	88.28%	0%	11.71%
60-70	15	84.93-274.18	79.84-189.87	2.34-11.41	3.14-3.97	4.52-8.41	2.20-7.97	6.58-9.78	17.6-88.1	0.21-4.52	TPRO	66.66%	0%	33.33%
											PHO	66.66%	0%	33.33%
											CAL	40%	0%	60%
											IRON	80%	20%	0%
											TPIL	80%	20%	0%
70-80	8	80.0-171.37	86.5-157.57	2.83-7.00	2.66-3.25	5.0-6.70	3.00-4.64	7.33-8.89	71.9-80.7	0.4-0.99	TPRO	42.58%	0%	57.14%
											PHO	71.42%	28.57%	0%

											CAL	**42.85%**	**0%**	**57.14%**
											IRON	**100%**	**0%**	**0%**
											TPIL	**100%**	**0%**	**0%**

Discussion

Ion levels have been linked to both the development and mortality of chronic kidney disease (CKD) in several recent research; however, the results of other investigations have been less clear. It is still unknown if decreasing ions levels might be a sign of decreased renal function. (16)

In our study, we found that chronic kidney disease increase with age especially more than 50 years. Stevens et al.(17) the percentage of participants with CKD stages 3 to 5 among 65,126 individuals aged 18 to >85 years was 6.9% in those between the ages of 55 and 64 and 44.7% in those over 85.

We found that calcium was low value in chronic kidney disease patients due to the renal will be less able to make active vit D that will make less absorption of calcium, it also represent one of ions that indicated for CKD. Messa et al.(18) found that The majority of samples indicate that the Ca concentrations in certain CKDu prevalent locations are higher than the MPLs. The reference area's mean Ca concentrations, on the other hand, are stated to be 16.14 (±11.90) mg/L, which is lower than the values seen in CKDu prevalent regions. Long-term exposure to calcium ions by drinking

water may have a negative impact on renal dysfunctions, changing the risk of kidney stones and raising the chance of kidney stones containing calcium.

We also find that about half of the sample were have low value of protein due to the negative charge of protein will make it pass through the podocyes. Numerous studies have demonstrated the significance of protein as a predictive factor in chronic renal disease. Research indicates that serum albumin has the ability to predict clinical outcomes, particularly for patients with chronic kidney disease and end-stage renal disease (ESRD).(19)

In our study we found most of the patients were had high value of phosphorus serum this due to the renal can’t remove the phosphorus serum from the body. A lot of studies agree with our study and consider the high value of serum phosphorus is risk factor for renal disease.(20)

Conclusion

We conclude that chronic kidney disease increase with age especially than 50-70 years age group. In chronic kidney disease there a lot of changes in ions in the body such as low value of protein , high value of phosphorus, low value of calcium and low value of bilirubin.