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The Relationship of Kidney Functions in Regulating the Level of Fluids and Salts for Patients and Conducting Some Biochemical and Hormonal Variables

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ABSTRACT: The study of paper is basic functions of the kidney in the body are many, the most important of which is what is represented in the role of the kidney and how to balance and maintain the normal proportions of fluids and salts necessary for the body and what this continuous effort of the kidneys is of utmost importance to maintain the normal pressure, so when the efficiency of the kidney decreases, it will need a higher pressure to subtract the amount of salts and water required Subtracting it, then, the blood pressure level changes to its normal level when the positive movement of the glomerular arteries changes. Renin is secreted by the kidneys and it has the main and effective role in maintaining normal blood pressure and its important role in most cases of high blood pressure, the resonance is secreted from specialized cells in the kidney as it leads to stimulation of the Angiotensinogen hormone that works to convert Angiotensin I to Angiotensin II and is the last of the strongest hormones It is effective in increasing the contraction of blood vessels and increasing its concentration in the blood above the normal level leads to high blood pressure because it has an effect on the contraction of the peripheral blood vessels, and the contraction of the blood vessels of the kidney reduces the process of reabsorption, which leads to the progression of hypertension. Also, the hormone angiotensin II stimulates the adrenal cortex to produce the hormone Aldosterone, which forms a fundamental role in the absorption of fluids and salts through the kidneys and are the three regulators (Resonance, angiotensin, aldosterone) The primary control for maintaining normal blood pressure

INTRODUCTION

Potassium is found in the intracellular fluid (ICF), as the important ion in it is found in red blood cells at rates 25 times the level in the blood serum due to the lack of filtration through the cells (1). Potassium works to maintain the balance of water and electrolytes and the pH of body fluids and has an important role in the work of enzymes . Potassium is absorbed in the intestine and reabsorbed in the proximal convoluted tubule and some of it is excreted into the diuretic in the distal convoluted tubule, Acidoses Hyper kalamic metabolic.

An increase in the level of potassium occurs in patients with kidney failure when they develop oliguria, as the volume of urine reaches less than 250 ml per day, and this condition is difficult for patients with renal impairment (Za as well as the production of the hormone aldosteronism Hyper aldosteronism As for the lack of potassium Hypokalemia is It occurs as a result of heart failure and lack of food that contains it (2).

Potassium ions are the most lost ions, and its deficiency is related to high blood pressure, as many drugs used to treat blood pressure cause this deficiency, and osteoporosis (3) and its causes are: vomiting, diarrhea, burns, sweating. Taking diuretics, increasing aldosterone secretion, heart failure.

As for the increase in potassium, it is observed when the kidney function is disturbed, and its high is a strong indication for the initiation of the process of blood permeability in patients with chronic renal impairment and leads to changes in the ECG (4).

Most of the sodium is found in blood plasma, and there is little in red blood cells, which is the main ion in the extracellular fluid (EXF). It maintains the normal distribution of water in tissue cells and the level of osmotic pressure in the various liquid parts. Serum sodium concentration is regulated by the hormone Aldosterone. Adrenal cortex, which is excreted by the adrenal cortex, increases its absorption by the kidney tubules and reduces its sweat content. Increasing the sodium concentration in diuresis aids crystallization. When increased tubular sodium excretion results in a decrease in tubular re-absorption of calcium, the increase in sodium intake in foods increases calcium excretion according to its quantity in the diet (4). Sodium values decrease, or what is

called hyponatremia, in many diseases, such as Addison disease, and in chronic cases of this disease, it is accompanied by loss of fluids outside the cells and leads to a loss of a large amount of salts, and in other cases where sodium values decrease, such as vomiting and diarrhea And taking some medications that lead to increased sodium in the urine, either the case of hypernatremia in which sodium occurs when an imbalance in the amount of water to sodium results in thirst, dryness of the mucous membranes, and nervous irritability. Also, the sodium concentration increases in the case of heart failure when the heart is unable to divert blood from the venous side to the arterial side, which leads to poor blood flow to the kidneys and thus the sodium filtration decreases, and its concentration increases in kidney diseases in which a large amount of plasma protein is lost .

This hormone is made in the granular area of the adrenal gland, the Zone Granulosa, and falls into a specific class of hormones called the mineralocorticoid. It helps maintain blood pressure and the balance of water and salts in the body by helping the kidneys to retain sodium and potassium (5).

When aldosterone is low, the kidneys are unable to regulate the salt and water balance, causing an imbalance in the blood, blood pressure and volume to decrease (6). Its physiological role is to preserve sodium ions in exchange for the excretion of potassium and hydrogen ions from the distal tubes in the kidney and the mechanism for secretion of the hormone aldosterone is complex but depends (7): (Angiotensin-Renin) mainly on the resonance angiotens and the adrenal stimulating hormones Adreno-Corticotrophic Hormone (ACTH).

The level of sodium and potassium ion in the blood plays an important role in that excretion. Cases of high aldosterone level occur naturally. Especially in cases where sodium intake is reduced with adequate potassium intake, after heavy sweating, and in pregnancy in the last three months of it, and cases of low levels of the hormone aldosterone naturally appear after lack of potassium in food and after drinking lots of fluids and water.

MATERIALS AND WORKING METHODS

After collecting the study samples (50 samples) from the patients, the serum was obtained by placing a few milliliters of the previously drawn blood in a plastic tube with an airtight cover and free of anticoagulation, where it was placed in a centrifuge for 15 minutes at a speed of 3000 rpm and the serum was withdrawn (Filtrate) with a micropipet and kept at freezing (-20 ° C) until the analysis of the chemical and hormonal tests.

DETERMINATION OF THE LEVEL OF POTASSIUM ION IN THE BLOOD SERUM:

The basic principle:

The potassium ion was measured in serum according to the method mentioned in the kit supplied by the French company Biomerieux, bearing the number 1011801 (8).

solution used

Reagent(1) precipitant (white cap) 50 ml-:*

PREC Trichlora cetic acid (TCA) 0.3 mmol/l

* Reagent(2) TPB- Na-Reagent(black cap) 50 ml

TPB Sodium tetraphehyl boron 0.2 mmol/l

NaOH Reagent(Red cap) 50 ml (3) Reagent*

NaOH sodium hydrolide 2.0mmol/l

*STD standard potassium (k+) 5.0 mmol/l

Procedure

	Semi_micro	Macro
Specimen	100ml	50 ml
PREC	1000ml	500 ml

Pipette in to centrifuge tubes :-

The tubes were carefully and carefully mixed and placed in a centrifuge at a speed of 3000 rpm for a period of (5-10) minutes, after which the tubes were removed from the centrifuge and other additions were made as follows:

Piptte in to cuvetts

	STD	Sample	STD	Sample
Working reagent	2000ml	2000ml	1000ml	1000ml
STD	200ml	/	100 ml	/
Supernatant	/	200ml	/	100ml

The tubes were left to maintain a little stability after mixing them, then they were left for 30 minutes at a temperature of (25-20) C and I read their absorption on a spectrophotometer at a wavelength of 578 nanometers. I read the first reading and after 5 minutes I read the second reading and it is calculated as in the following equation:

Second reading - first reading = reading the pattern

Potassium concentration = Second reading * 5

m mol/l Read Standard

Determination of the sodium ion level in blood serum:

The basic principle:

The sodium ion concentration of the serum was measured using the standard method and as shown in the kit supplied by the French company Biomerieux, bearing the number 57335101 (9).

Solution´s used

*Reagent(1)	Precipitating solution	60 ml
PREC	Uranylacetate	19mmol/l
	Magnesium acetate	140 mmol/l
Reagent(2)	Colour reagent	60 ml*
RGT	Ammonium thioglycolate	550 mmol/l
	Ammonia	550mmol/l
*Reagent(3)	Standard of	150 mmol/l
STD	Sodium(Na+)	

RB_reagent Blank STD:standard	RB ml	STD ml	Sample ml	RB ml	STD ml	Sample ml
STD	/	50	/	/	20	/
Serum	/	/	50	/	/	20
PREC	/	3000	3000	/	1000	1000

The tubes were closed, mixed well and placed in a centerfuge centrifuge at a speed of 3000 rpm for a period of (5-10) minutes, after which the following was done: -

	Blank	STD ML	Sample ml	Blank ml	STD ml	Sample ml
PREG	50	/	/	20	/	/
Clear Shpernatant	/	50	50	/	20	20
RGT	3000	3000	3000	1000	1000	1000

The tubes were mixed well and left for 30 minutes at a temperature of (20-25) 0 C and their absorption was calculated on a Spectro phottometer at a wavelength of 410 nm. The first reading was read and after 5 minutes the second reading was read and was calculated according to the following equation: -

Sample reading = first reading - second reading

Sodium concentration = Sample reading * 150

m mol/l Read Standard

Determination of serum aldosterone level:

The basic principle:

Aldosterone was measured using the standard method and as shown in the measuring kit provided by the German company Human, which carries the number 1664 (10).

Reagents provided

anti _aldosterone antibody_ coated tubes 2 x 50 tubes.1-

/-/ 1252-labeled aldosterone teracer: one 55 ml vial

3-calibrators: six vials

Control serum: one vial4-

Steps	Calibrators and control	Serums	Tubes for total count
Additions To antibody_ coated tubes, add successively			
Calibrators or control	50 ml	/	/
Serum samples	/	50 ml	/
Tracer	500ml	500 ml	500 ml

The tubes were mixed well for three hours at a temperature between 18-25 C and inserted into the (ELISA) device and read according to the following equation:

Cross_ reactivity (y) = Aldosterone concentration x 100 at 50 y .

binding of the zero calibrator Steroid concentration

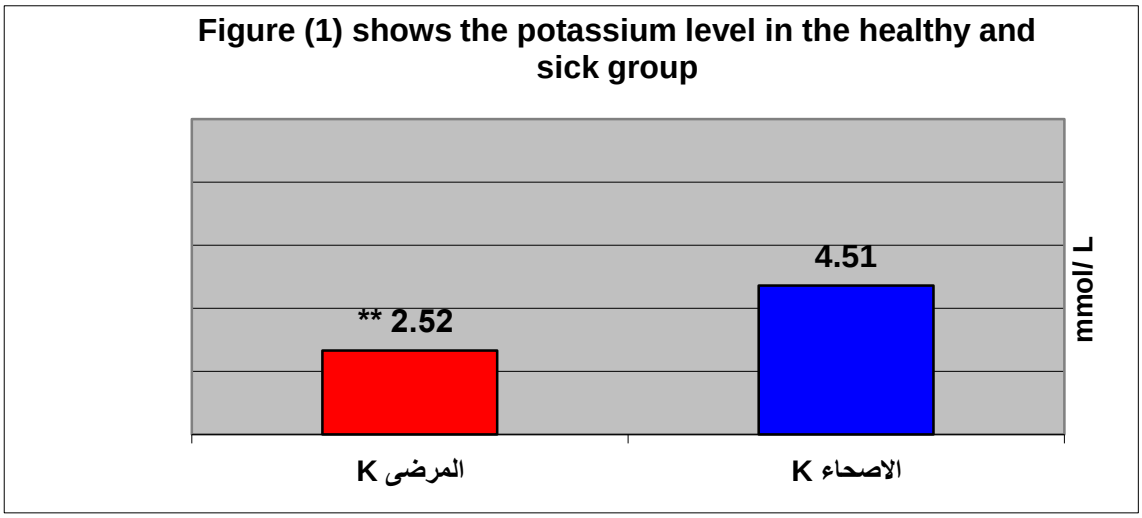
Pg/ml

RESULTS AND DISCUSSION

The concentration of potassium in the blood serum

Figure (1) showed that there were high significant significant differences in the potassium level between the healthy group and the patient group at the level (P <0.05). We find that the average potassium level in the healthy group was 4.51 ± 0.21 mmol / L compared to the patient group as it was mmol / L 2.58 ± 0.08.

Among the tests is a test of the level of potassium in the blood. The results of a decrease in the level of potassium have appeared as a result of the disease, and this causes hormonal effects on potassium as well as a defect in the work of glomerular filtration in the kidney as it works to excrete large quantities of potassium and its excretion with the urine and the lack of potassium is due to physiological disorders It results in increased potassium as a result of adrenaline released by disease, which leads to release of the released potassium into the plasma (11).



The sign (*) indicates the existence of significant differences at (P <0.05) level.

Sodium concentration in blood serum

The results in Fig. (2) indicate that there are significant significant differences in the sodium level at (P <0.05) between the healthy group and the patient group. The average sodium level in the healthy group had reached mmol / L 139.40 1.4 ± Compared to the patient group, it was mmol / L148.15 ± 1.0. As there is a significant increase in the level of sodium, as the level of potassium was low in patients, while the level of sodium increased due to the retention of the amount of sodium in the body.

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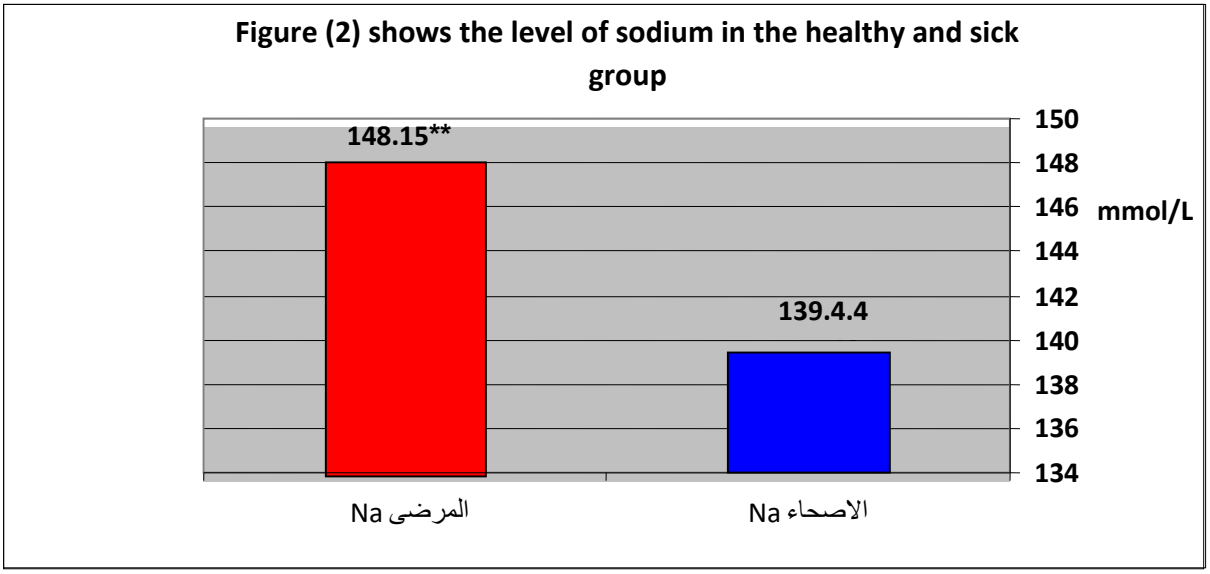
To compensate for the lost potassium, as there is a correlation between the level of potassium and sodium in order to regulate body fluids. (12).

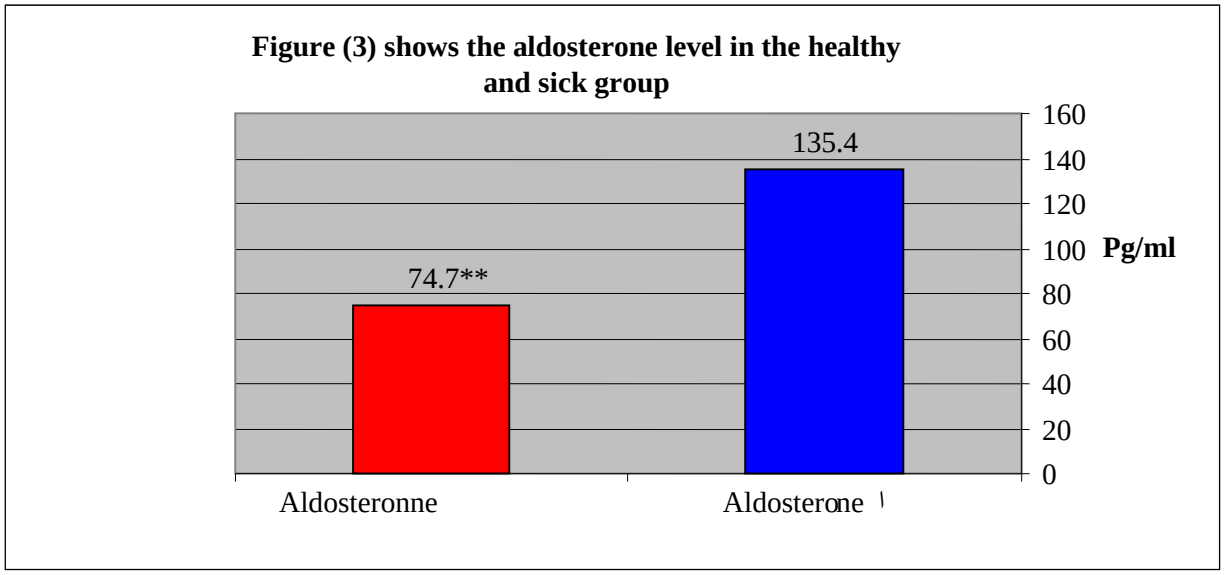


The sign (*) indicates the existence of significant differences at (P <0.05) level.

Serum aldosterone level

Figure (3) shows that there are significant differences between the healthy and the patient group in the concentration of aldosterone in the blood at (P <0.05). The aldosterone concentration was in the blood of the healthy group pg / ml 135.4 ± 12 Comparison with the patient group rate pg / ml 74.7 ± 7.1.

The reason for a significant decrease in aldosterone (p>0.05) This is due to the negative feedback state, which occurred due to the depletion of more potassium ions through the distal convoluted tubules, the site of action of the hormone, and accordingly the picture of the presence of this hormone or its secretion was reversed to a lower extent in the normal state for non-patients (12).



The sign (*) indicates the existence of significant differences at (P <0.05) level.

Statistical Analysis

The results were analyzed statistically using (13) program and according to the F-test. Arithmetic averages of the coefficients were tested using the Duncun Multiple Range Test with a significant level (P <0.05) to determine the significant significant differences between the groups.

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