

Study of hematological parameters in patients with renal failure

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ABSTRACT: - This study was conducted in Al-Imam Al-Sadiq Teaching Hospital in Babil Governorate. The study included (80) samples, their ages were between (14-82) years. distributed as follows: group of patients with Renal failure (16) samples, group of patients with Renal failure and pressure (18) samples, and group of patients with Renal failure, pressure and diabetes (16) A sample in addition to the control group (30) samples. The results showed a significant decrease at ($P < 0.01$) in the mean of red blood cells, white blood cells, and hematocrit, and a significant decrease at ($P < 0.05$) in the mean hemoglobin, while the results of the statistical analysis did not show any significant differences in the mean values of platelets. The results of the statistical analysis did not show any significant differences between groups of patients. The statistical analysis showed that the rate of infection was 62% for males and 38% for females, and it also showed that the highest percentage of patients was in rural areas with 58%, while the rate of infection in the city was 42%. The ages of the patients were also divided into three categories: the first category is >25 years at a rate of 16%, the second category is 50-25 years, and the rate is 24%, and the third category is <50 years, which is the highest category of patients with a percentage of 60%.

Keyword: Renal failure, red blood cells, hemoglobin, age, residence and gender.

1- INTRODUCTION

Renal failure represents the stage of failure and deterioration of the kidney's work, as well as its inability to filter impurities from the blood, which causes a general imbalance in the body [1]. The human body has many diseases such as diabetes, blood pressure, or acute or chronic kidney infection, as well as genetic diseases Such as renal cysts and chronic bacterial tract infections, in addition to some medications such as painkillers, as well as excessive use of some antibiotics. All of the above are important reasons for the occurrence of kidney failure. As for the symptoms of kidney failure, which are high blood pressure, nausea, vomiting, swelling around the face and feet and change The color of the urine to red, the presence of a lot of foam in the

urine, frequent urination during sleep, weight loss, loss of appetite, and pallor of the face[2].

A device that partially performs the function of the kidneys should be used in case the kidneys stop working. The device works to purify the blood. Otherwise, the patient will be exposed to complications that may end his life within a few days. This is called dialysis, which works to rid the body of toxic substances and fluids that more than needed, There are two types of dialysate, the first type is called hemodialysis and the second type is called proton dialysate, the hemodialysis is based on the idea of filtering the blood by pumping blood through tubes from the patient's arm to a special filter, then the blood returns to the patient's body again, and the process of dialysing is repeated at a level An average of three times a week, and the dialysis period is about 4 hours [3]. This deficiency leads to a general imbalance in the body, due to the accumulation of nitrogenous waste, and harmful substances resulting from metabolic reactions, and thus other kidney functions, including fluid and electrolyte regulation [4], may be affected. "It was an excretory, regulatory or hormonal function [5], as there will be a destruction of the renal units (nephrons), and a continuous decrease in the glomerular filtration rate (GFR) and secretory capacity, and reabsorption, and this leads to uremia syndrome [6] and this leads to a disorder in the body's physiology. And thus affect the balance of water and minerals (sodium, potassium, chloride, calcium, phosphorous, and magnesium) as well as an imbalance in the disposal of toxic nitrogenous wastes. Kidney failure disease in its early stages affects many people and this effect is reflected in an increase in mortality and length of stay In hospitals, it is called acute renal failure, and the latter may lead to a danger to the patient by turning to the second type of the disease, which is chronic renal failure [7]. In patients with renal failure and knowing the effect of age on the disease and the population distribution of patient groups, as well as knowing the percentage of its prevalence among males and females.

2- working methods

(5) ml of venous blood was withdrawn from the control group and the hemodialysis group from the artificial kidney unit at Imam Al-Sadiq Teaching Hospital and placed from the blood in tubes containing an anticoagulant substance EDTA tubes, used directly without storage to take a CBC blood image by Sysmex device and diagnose blood type using the method The glass slide The reagents and samples are prepared at a temperature of (25-18) Celsius before use, then the glass slides are prepared.

2.1- Blood groups and Rh factor test

Blood groups are tested based on the principle of the presence of several types of antigens present on the surface of the blood corpuscles membrane, where they

interact with the antibodies of the corpuscles, causing a clear clumping (granulation). These antigens are of two types: B and A: if the red blood cells contain The A antigens on the surface of its membrane are type A blood, and if the red blood cells contain a B antigen, they are type B. If the blood cells contain two AB antigens, then the blood type is AB, and if there are no two antigens, the blood is type O. This is called the ABO system, and there is another system called the (Rh (Rhesus blood group) system, to contain the surface of blood cells another type of glycoproteins (antigens), and the classification of people is based on the presence of these antigens, so the carriers of this antigen on the surface of the cell membranes are Rh positive, And their percentage is 85% of the world's population, while people whose cell surfaces do not contain this antigen are Rh negative, and their percentage is 15% of the world's population. It is very important to know these things to maintain the integrity of the cell membrane and in blood transfusion. The membrane, as well as in marriage, is a receptor that combines with different substances such as enzymes [8].

2.2- Blood cell count

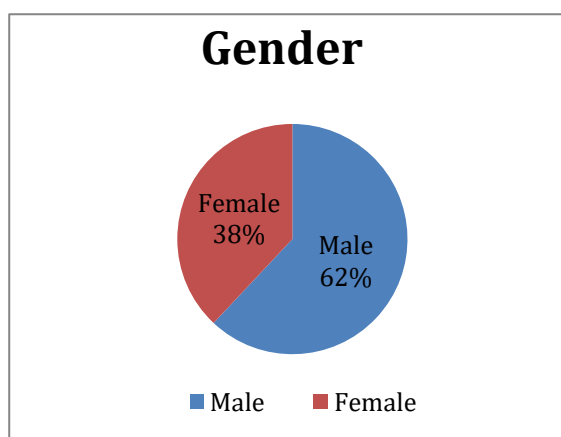
The auto-analysis device manufactured by the Japanese company Sysmex was used to examine the number of blood cells in the samples and detect blood diseases. The autolysis device for blood diseases consists of three main parts and is based on the use of two types of reagents when analyzing the blood sample.

Where white blood cells WBC are prepared by the special part of these cells using the direct current method, and the red blood cells RBC and platelets are PLT by the part of the RBC using the direct current method, while the concentration of hemoglobin is carried out in the part of the HGB using the non-cyanide hemoglobin method [9] method. As for the components, measuring them and counting their proportions is done in a mathematical way using equations saved in the device.

3- Results and Discussions

3.1- Gender

The results of this study showed that the percentage of male patients is higher than female patients, where the number of male patients reached (31) patients by (62%) of the patients, and the number of female patients reached (19) patients by (38%) of the patients, as shown in Figure (1). The results of this study agreed with the study [10], with the study [11] The difference in gender is of great importance in most diseases, including chronic kidney disease, where males differ from females with chronic kidney disease due to physiological and morphological differences between males and females. Perhaps the reason for the high incidence of infection in males compared to females is because



males work outside the home, which makes them More vulnerable to environmental pollutants and more daily effort, as well as eating fast foods and soft drinks ,which have proven negative impact on the kidneys [12].[13] indicated that kidney failure is more common in men than in women in developing countries.

Figure (1) shows the distribution of patients by gender

3.2- Age

The results of the study showed that after dividing the patients with renal failure into three age groups, the first age group (<25 years) reached 16% of patients, and the second category was between 25-50 years, which constituted 24% of patients, and the third category (>50) (62%) of the patients, as shown in Figure (2). These results agreed with the study of [14], and also agreed with the study of [15], which found that most patients are a year (>40).

From Figure (2), it is clear that Renal Failure affects all ages, but patients increase with age, where 62% of patients are over 50 years old, as the kidney with age cannot renew its nephrons, which leads to a decrease in the number of those cells.

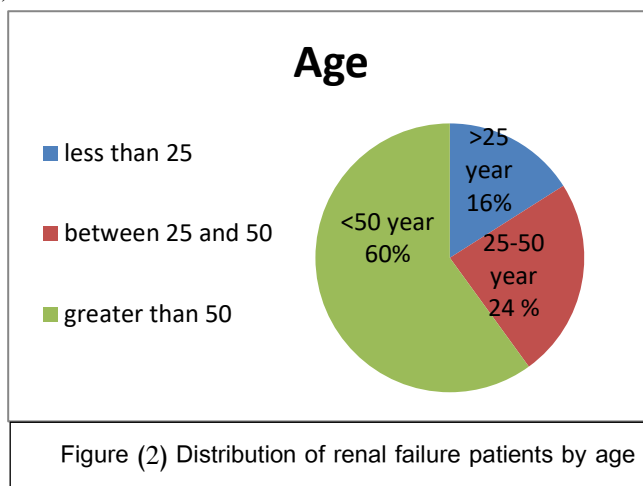


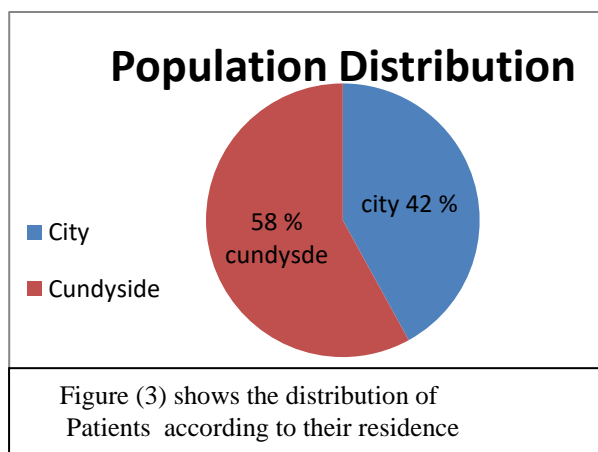
Figure (2) Distribution of renal failure patients by age

This leads to an imbalance in the kidney function, as every (10) years decreases (10%) of the functional nephrons, meaning that people at the age of eighty possess only (40%) of the functional nephrons [17], and thus glomerular filtration decreases with age.

3.3- Address

The results of the study showed that the number of patients who live in the countryside is (29) with a percentage of (58%) of the patients, while the number of patients who live in the city is (21) with (42%) as shown in Figure (3). These results agreed with the study [18]. It also agreed with [19] The reason is attributed to the high incidence of renal failure in the rural population, due to the difficult life conditions in all its aspects,

including the harsh conditions of life. Work, and also due to their use of river water polluted with industrial waste, as well as river water containing heavy metals, which causes damage to body organs, especially the kidneys [19].



3.4- hematological parameters

Group	Mean \pm SE				
	WBC	RBC	HGB	HCT	PLT
Renal failure	11.74 \pm 0.26 a	3.50 \pm 0.19 b	10.09 \pm 0.16 b	35.31 \pm 0.19 b	207.06 \pm 9.39
Renal failure and pressur	11.59 \pm 0.23 a	2.84 \pm 0.15 b	10.02 \pm 0.16 b	35.30 \pm 0.19 b	210.61 \pm 10.76
Renal failure, pressure and diabetes	11.76 \pm 0.25 a	3.19 \pm 0.12 b	10.16 \pm 0.16 b	35.78 \pm 0.17 b	210.18 \pm 13.62
Control	7.73 \pm 0.32 b	4.65 \pm 0.09 a	18.02 \pm 5.33 a	43.98 \pm 0.72 a	185.08 \pm 9.74
LSD	1.063 **	0.771 *	2.065 **	4.216 **	0.0882 NS
P-value	0.0001	0.0217	0.0001	0.0001	29.572

Means having with the different letters in same column differed significantly. * ($P \leq 0.05$), ** ($P \leq 0.01$).

Table 1: Comparison between difference groups in Hematological Parameters

3.4.1- Red Blood cells

Table (1) showed a significant decrease at ($P \leq 0.01$) in the number of RBC red blood cells in Group Patients when compared with Group Control group, and this is consistent with what was found by [20] and also agreed with the study [21]. The results of the statistical analysis showed that there was no significant difference in RBC values when comparing between groups of patients.

The main reason for the decrease in red blood cells in people with renal failure is caused by a defect in the manufacture of the hormone erythropoietin, which is produced by the kidney by (90%) in the normal state, and a group of other factors reduce the production of red blood cells RBC due to diseases, in addition Therefore, the average lifespan of red blood cells decreased from the normal 120 per day by (30-60%) due to the accumulation of urea toxins [22].

The regulating factor for the production of red blood cells is the hormone erythropoietin (EPO), and it also preserves the red blood cells (RBC) by delaying the fission of the DNA strand that occurs naturally. The shorter the average life of red blood cells depends on the concentration of urea in the blood of patients, as the higher the urea concentration, the shorter the survival period RBC, and for this reason the length of stay after dialysis [23].

Previous studies showed that blood urea leads to an increase in the expression of phosphatidylserine on the outer membrane of red blood cells, and this in turn distinguishes the RBC of phagocytic cells, and this leads to their destruction and lack of survival [24] and [25] indicated in his study that the increase in oxidative stress has a negative impact on the life of erythrocytes. When the level of oxidative stress rises, the life of red blood cells decreases and the hemolysis increases.

3. 4.2. - Hematocrit

In Table (1), the decrease in hematocrit HCT in patients with group patients when compared with the control group shows a high level of significance at ($P \leq 0.01$) and this agrees with the study [26] and also with the study carried out by [27] where the results showed Statistical analysis There is no significant difference in HCT values when comparing groups of patients as shown in Table (1).

Hematocrit (HCT) is one of the tests associated with blood tests (red blood cells, white blood cells, platelets, hemoglobin), as this test expresses the ability of red blood cells to carry out their function (oxygen transport). This study showed a decrease in the number of red blood cells and the level of hemoglobin in the blood.

And the low indicators of RBC, HGB, and HCT in patients with renal failure, this is an indication of the presence of anemia among [13] in his study, the percentage of anemia in patients with renal failure (87%), and [28] indicated that the percentage of anemia reaches 90%.)) in patients with renal failure due to high urea and low urine. In his study, [20] found that the percentage of anemia in his study amounted to (96%).

3.4. 3- Hemoglobin

In Table (1), a significant decrease in hemoglobin HGB appears in Group Patients when compared with the control group at the level of significance at ($P \leq 0.05$). These results agreed with the study [29] and agreed with what was found by [30]. The results of the statistical analysis showed that there was no significant difference in HGB values when comparing between groups of patients.

And the low hemoglobin HGB in patients with renal failure is associated with several reasons, including malnutrition, and iron deficiency inside the body is one of the main causes, lack of folic acid and vitamin B12 deficiency, and one of the reasons may be the large number of blood taken from patients for the purpose of conducting studies [31]. In addition, inflammation resulting from chronic diseases reduces the availability of iron from the sites in which it is stored, which leads to a lack of transferrin saturation (Fe + sat) as well as hemolysis. [32]

3.4.4- white Blood cells

In Table (1), a significant increase in the number of white cells appears in Group Patients when compared with the group control group with a high level of significance at ($P \leq 0.01$). These results agreed with the study [33] and this study agreed with the study [34] and agreed with the study [35] What has been achieved. The results of the statistical analysis showed that there was no significant difference in the values of RBC when comparing between groups of patients (Table 1).

Inflammation increases in patients with renal failure, causing an increase in white blood cells [36]. One of the causes of infections is the succession of patients on the same equipment during the washing process, which causes the transmission of some diseases. And the reason for the increase in neutrophil cells is the body's efficiency to resist diseases [37]. The explanation for the rise in lymphocytes in the bloodstream is the presence of viral and bacterial infections and the release of cortisol as a result of constant stress [38].

3.4.5- platelets

In Table (1), there is no significant relationship at ($P \leq 0.01$) in the number of PLT platelets in Group Patients when compared with the Control Group. These results agreed with the study [39]. This study is in agreement with the study [40].

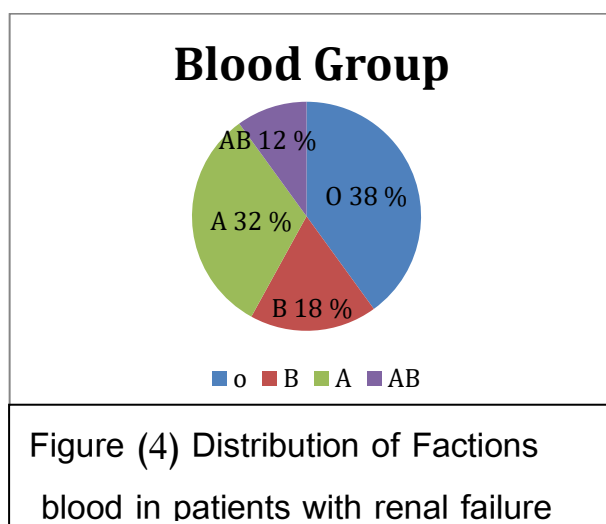
Table (1) shows that there are no significant differences at ($P \leq 0.01$) in the case of comparison between groups of patients for PLT values. This study agreed with the study [41] where they believed that platelets remain relatively constant in number

over time during dialysis. Dialysis improves platelet abnormalities and removes uremic toxins accumulated in patients' blood that affect platelet function [42]

3.5 - Blood types

The results of the study showed the distribution of species in patients with renal failure as follows: the number of patients with type O 19 samples (38%), the number of patients with type A 16 samples (32%), the number of patients with type B 9 samples (18%), and finally the number of AB patients 6 Samples (12%) as in Figure (3).

And this study was similar with the study [43], and it was O type (50.1%). And a study [44] in Babylon Governorate, and type O was the highest infected with a percentage of (44%). Prevalence in Iraq and the world at 44% [45].



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