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CHRONIC KIDNEY DISEASE

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ABSTRACT

This study was carried out on 30 patients (14males,16 females) with renal failure aged (50 -75) year, which compared with 20 healthy subjects as control group. The aim of this study is to investigate some biochemical parameters included urea, creatinine, uric acid, Glucose, Albumin, Hemoglobin and ferritin in the serum of patients with chronic renal failure to detect the effect of these parameters on the patients with renal disease. the results showed that there was significant increase in the serum urea, creatinine of 100 %, uric acid 53.3 %, Glucose 66.6 %, and ferritin 20 % while revealed significant decrease in the levels of Hemoglobin by 86 % compared to the control group.

INTRODUCTION

Chronic kidney disease (CKD) is a syndrome defined as persistent alterations in kidney structure, function or both with implications for the health of the individual. Examples of structural abnormalities include cysts, tumors, malformations and atrophy, which are evident on imaging. Figure 1. By contrast, kidney dysfunction can manifest as hypertension, growth delay in children and changes in output or quality of urine, these changes are most often recognized by Increased serum levels of creatinine, cystatin C or blood urea nitrogen. The most common pathological manifestation of CKD, regardless of the initiating insult or disease, is some form of renal fibrosis.[1] Chronic kidney disease (CKD) is a non-communicable disease that includes a range of different physiological disorders that are associated with an abnormal renal function and progressive decline in glomerular filtration rate (GFR).[2,3,4]

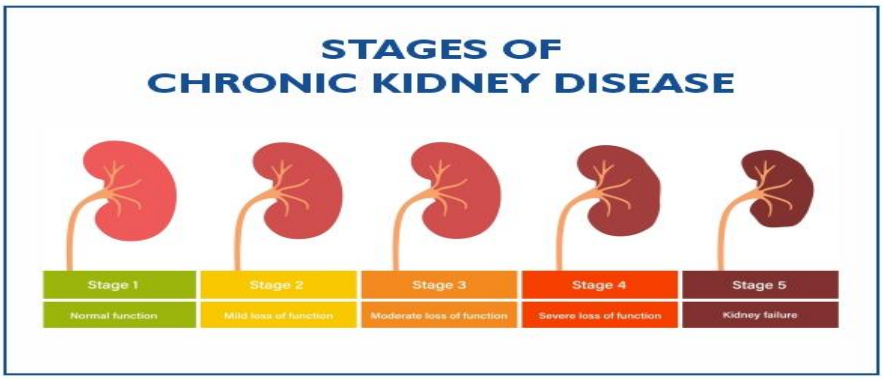


Figure 1

Chronic kidney disease includes five stages of kidney damage, from mild kidney dysfunction to complete failure.[5]

In general, a large number of risk factors including age, sex, family history of kidney disease, primary kidney disease, urinary tract infections, cardiovascular disease, diabetes mellitus, and nephrotoxins (non-steroidal anti-inflammatory drugs, antibiotics) are known as predisposing and initiating factors of CKD.[6,7,8]

Creatinine is the by-product of creatine phosphate in muscle, and it is produced at a constant rate by the body. For the most part, creatinine is cleared from the blood

entirely by the kidney. Decreased clearance by the kidney results in increased blood creatinine. The amount of creatinine produced per day depends on muscle bulk. Thus, there is a difference in creatinine ranges between males and females with lower creatinine values in children and those with decreased muscle bulk. Diet also influences creatinine values. Creatinine can change as much as 30% after the ingestion of red meat. As GFR increases in pregnancy, Figure 2 lower creatinine values are found in pregnancy. Additionally, Urea or BUN is a nitrogen-containing compound formed in the liver as the end product of protein metabolism and the urea cycle. About 85% of urea is eliminated via kidneys; the rest is excreted via the gastrointestinal (GI) tract. Serum urea levels increase in conditions where renal clearance decreases (in acute and chronic renal failure/impairment). Urea may also increase in other conditions not related to renal diseases such as upper GI bleeding, dehydration, catabolic states, and high protein diets. Urea may be decreased in starvation, low-protein diet, and severe liver disease. Serum creatinine is a more accurate assessment of renal function than urea; however, urea is increased earlier in renal disease.[9]

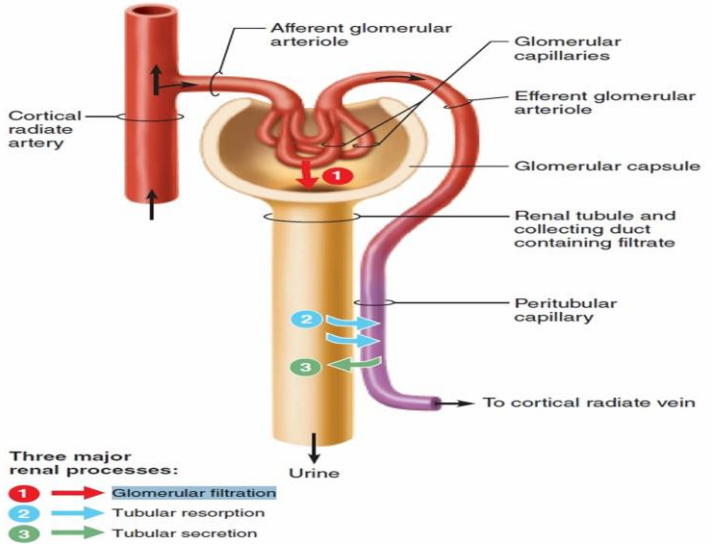


Figure 2

Uric acid, the end-product of purine metabolism in humans, is excreted largely by the kidneys. In chronic kidney disease (CKD), plasma uric acid levels rise due to reductions in glomerular filtration rate (GFR). Hyperuricemia is a hallmark of gout, Uric acid can cause acute kidney injury, most notably in tumor lysis syndrome through precipitation and obstruction in tubules. Uric acid may also lead to CKD and its progression by causing endothelial dysfunction, Several studies have suggested that higher uric acid levels are associated with the development of CKD.[10]

Hemoglobin: Anemia is one of the most common complications of CKD, and the reported prevalence of anemia in patients with CKD ranges from 8.4% in stage 1 to 5 3.4% in stage 5 Anemia in CKD is associated with sleep disturbance, cognitive impairment, cardiovascular comorbidities, CKD progression, and higher mortality It has been well demonstrated among non-dialysis CKD patients, that anemia may be a risk factor for progression of kidney dysfunction not only to end-stage kidney disease (ESKD) or decrease of 50% of eGFR, but also to a faster decline of eGFR, a more significant renal outcome Hemoglobin concentration is related to the risk of cardiovascular disease and mortality in patients with and without diabetes Some studies suggest that low hemoglobin concentrations may be associated with an increased risk of poor kidney disease outcomes in people with type 2 diabetes, and IgA nephropathy [11]

DM is a metabolic disease that causes renal failure, and renal failure increases the need for insulin in diabetic patients, The accumulation of uremic toxins and increased parathyroid hormone levels in patients with chronic renal failure (CRF) cause insulin resistance in tissues, Figure 3. particularly skeletal muscle tissues, Insulin secretion is also reduced in patients with CRF, which appears to be due to metabolic acidosis, It should be noted that despite the decreased insulin secretion and impaired tissue sensitivity to insulin that occurs in patients with CRF, most nondiabetic CRF patients do not have hyperglycemia unless they are genetically predisposed.[12]

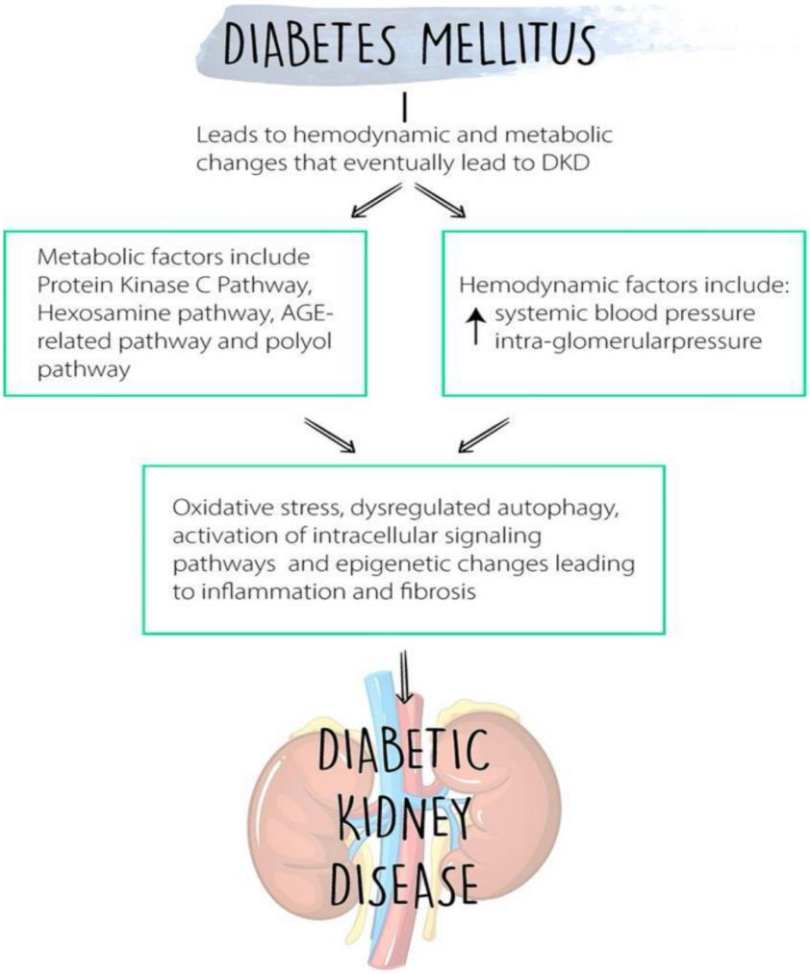


Figure 3

Objectives

The aim of this study was determine the causes of chronic renal failure in patients.

MATERIALS AND METHODS

Over period of (3 months) 2022 the patients aged (50 - 75) years were studied the criteria for inclusion in this study was the findings of (B.Urea, S. Creatinine, Glucose, Uric acid, Albumin, Hemoglobin and Ferritin) and other reasons.

A - Laboratory equipment

The device name	Origin- The manufacture company
Centrifuge	**China- Zenith Lab**
Chemistry analyzed Biochemical parameters test device	**USA- Genotek smart-150**
Hormone test deviceVidas	**French- Biomerieux**
Micro Hematocrit centrifuge	**USA**

Laboratory instruments

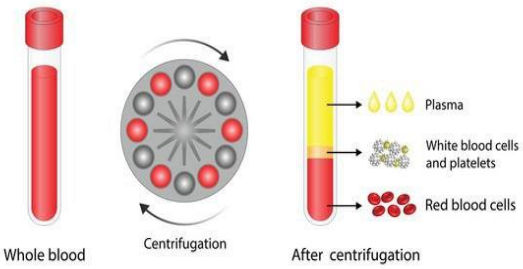
Tool name	**The manufacture company**
Disposable syringes	Green Rose-china
Gel tube	Firatmed- Turkey
EDTA tube	Firatmed- Turkey
Micropipette	Dragon Lab
Capillary tubes	China
Pipette Tip	Citotest- china
ethanol alcohol %75	Lina

Examination kit

Chemical	Origin- The manufacture company
Urea measuring kit	Italy- Giesse-diagnostics
Creatinine measurement kit	
Uric acid measuring kit	
Glucose test kit	
Albumin measuring kit	
Ferritin measuring kit	French- Biomerux

B - Sample processing

Medical syringes of 5 ml were used to collect blood samples from patients and healthy people. The samples were placed in special gel tubes to extract serum from them using a centrifuge at a speed of 3000 rpm for a quarter of an hour, The serum for each sample was divided into three replicates and kept in an Eppendorf tube at -20 degrees to conduct tests on it. Sugar and hemoglobin tests were also performed immediately after collecting samples.



C - Biochemical Test

(Urea, creatinine, uric acid, glucose, albumin, Ferritin, hemoglobin)

The Chemistry Analyzer originating in USA (Smart-150) was used in all biochemical examinations as shown in picture (1) by using a measuring kit (Kit) prepared by the Italian company (Giesse Diagnostics) according to the following method

Method of work

1. The machine and its computer are powered on from the power supply.
2. The samples are placed in the stone assigned to them in the machine.
3. Determine the number and name of the sample and the tests required for it on the computer.
4. The Start button has been pressed.
5. Each scan took 20 minutes.
6. The results appeared in the program designated for it on the attached computer.

Hemoglobin test

The hematocrit device was used to measure the level of hemoglobin in the blood using anticoagulant capillary tubes.

Method of work

1. Fill the capillary tubes three-quarters with blood
2. The end of the capillary tubes shall be closed with a burner or special synthetic clay. Figure 4
3. Capillary tubes are placed in the designated areas of the hematocrit apparatus
4. The device operates at a time of 5 to 7 minutes
5. You read the results using their graduated ruler.

Figure 4

Ferritin test

The Vidas device, of French origin, was used using a special test kit with the device to measure the ferritin level in the blood.

Method of work

1. The device has been turned on from the source, the special program has been run, and the necessary information has been entered
2. Putting 100 microliters of serum into the test slides
3. The slides have been placed in the designated places
4. Use the Start button to command the device to start the test, which takes 20 minutes per sample. Figure 5
5. The results appear on the device screen

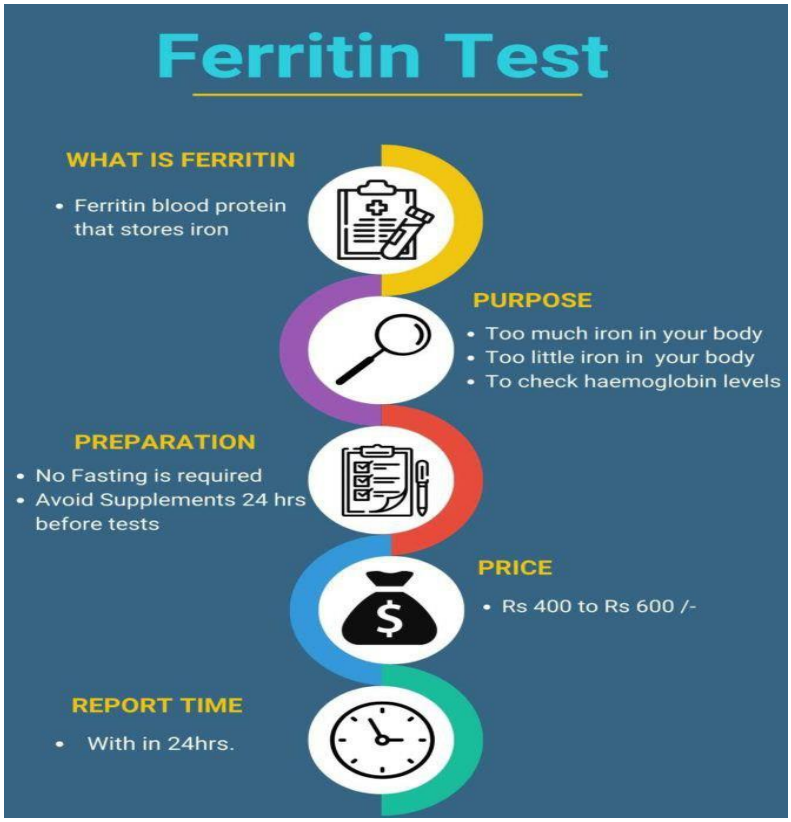


Figure 5

RESULTS

30 patients samples were included all of them measured this parameter (B.Urea, creatinine, Glucose, Uric acid, Albumin, Hemoglobin and Ferritin).

Table 1: Patients Samples.

Gender	Urea	Creatinine	Glucose	Uric Acid	Albumin	Hb	Ferritin
Male	212	5.8	86	6.8	3	8.3	615.6
Female	156	3.6	131	6.2	3.2	9.4	300
Female	126	2.9	172	6.4	3.8	10.2	199
Female	80	2.6	118	7.2	3.7	10.6	270
Female	66	2	268	8.2	2.9	9.9	301
Female	88	1.98	136	6.8	3.8	10.3	272
Female	69	2.1	325	6.4	4.1	9.3	120
Female	99	2.6	143	7.4	3.7	10.6	255
Female	88	2.2	152	5.9	3.6	10	1048
Female	123	2.4	116	7.9	4.3	9.3	374
Male	67	1.82	111	6.9	4.2	11	319
Female	167	6.4	136	7	3.8	10	303
Female	155	6.2	110	7.6	3.3	12.6	218
Male	89	5.2	115	6	4.1	12	300
Male	105	1.7	176	6.7	3.7	11.6	198
Female	63	1.9	209	8.1	4.3	10.6	273
Male	274	6.1	107	11.9	3.7	7.9	309
Female	147	2.5	175	12.4	4.1	8.8	290
Male	80	3	291	7.2	4.1	10.6	366
Male	66	2.2	148	5.6	3.4	10	306
Female	91	3.8	166	9.8	4.3	9.9	160
Male	82	2.9	143	7.7	4.2	10	100
Male	137	5	140	11	4.1	9.3	190
Male	82	1.9	85	7.3	4.3	10	302

Female	74	2.3	97	7.1	4.2	10.6	276
Male	62	2.5	178	6.5	3.9	10	66
Male	133	9.7	183	7.9	4.1	7.6	94
Male	166	6.4	133	7.7	4.6	8.6	600
Female	78	2.3	166	5.8	3.8	9.6	82
Male	114	3.6	164	5.3	3.9	8.9	191
Normal range	15 – 45	0.5- 1.3	70 -110	M: 3.5 -7.0 F:2.6 -6.0	2.5 - 5.2	M:13.5 -16.5 F: 12 -15	M: 70 - 435 F:15 -160
Units	mg/dl	mg/dl	mg/dl	mg/dl	g/dl	g/dl	ng/ml

20 control samples were included all of them measured this parameter (B.Urea, creatinine, Glucose, Uric acid, Albumin, Hemoglobin and Ferritin).

Table 2: Control Samples.

Gender	Urea	Creatinine	Glucose	Uric Acid	Albumin	Hb	Ferritin
Male	21	0.89	100	3.7	3.2	13.4	68
Male	33	0.96	96	4.1	3.6	15	82
Male	38	1	91	4.9	3.7	14.6	56
Male	40	1.04	95	5.1	4.1	14.3	63
Male	27	0.88	93	4.6	3.5	15.3	54
Male	31	0.97	101	4	4	14.6	63
Male	29	0.84	90	3.8	4.3	13.6	89
Female	22	0.76	99	3.4	4.1	13.3	57
Female	39	0.99	97	4.7	3.9	12.6	63
Female	24	0.85	102	4.12	3.4	13	59
Male	35	1.07	91	4.65	4.6	14.3	72
Female	21	0.78	89	3.5	3.4	13.6	49
Male	27	1	95	5.1	2.9	15.3	61
Female	22	0.96	91	4.25	3.1	12.3	55
Male	32	0.92	105	3.98	3.4	15.6	63
Female	17	0.81	94	4.88	4.1	13.3	59
Male	20	0.93	108	5.21	4.7	14.6	62
Female	17	0.79	94	3.78	3.6	12.6	54
Male	21	0.93	101	3.66	4.3	15.3	101
Male	19	0.86	93	4.6	3.9	136	90

DISSECTION

In this study we found the 100 % An elevated urea and creatinine indicates. the kidneys are not working and the levels of it can be further increased by excess Protein intake. Serum Creatinine level is considering as an Indirect measure of glomerular filtration rats in this Study all the patient has 100% of high of Creatinine levels, Diabetes mellitus are considered as the most Common Causes of renal disease. the high levels of sugar in the blood damage the millions of ting filtering unit within each kidney in this study, it was found that there are the 66%, kidney Patients. who have diabetes, Uric acid the end-product of purine. metabolism in humans and excreted by kidneys in chronic kidney disease plasma uric acid Level rise due to reductions in filtration.in this study it was found that there are 53.3% of patients who have risen in uric acid, Serum Albumin showed no significance change in this patients group, about 86 % of this group the patients showed decrease of hemoglobin, excess iron causes oxidative stress and Induces inflammation, leading to renal disease. Serum ferritin levels correlated with body iron storage and systemic inflammation in this study the 15% is equal to 20%. that means the elevated. Serum ferritin level is associated with insulin resistance.

Table 3: The percentage and variation of biochemical parameter in the patients

Parameter	Percentage %
Urea	100 %
Creatinine	100 %
Glucose	66.6 %
Uric Acid	53.3 %
Hemoglobin	86 %
Ferritin	20 %

CONCLUSION

Notes from the above results showed that increase in urea, creatinine, and glucose levels and decreased in hemoglobin levels in patients with chronic renal failure and hemodialysis process may play an important role in improving kidney function for some biochemical variables for patients with chronic renal deficit less than

year and patients therapy by regular hemodialysis more than year may be increased weight loss.

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