Evaluation of some Blood levels of Chronic Kidney Diseases Patients In Wasit Province Iraq

Nagham Abdul- Sattar AL-Awsi* and Mohammed R. S. AL-Attabi
Department of Biology, Collage of Science , Wasit University , Iraq
***Email: naghamabdnagham@gmail.com**

ABSTRACT: *Chronic kidney disease (CKD) is a condition of progressive loss of kidney function diagnosed when the estimated glomerular filtration rate (GFR) is less than 60 mL/min/1.73 m2, persisting for three months or longer. Epidemiological updates for 2022 indicate that the current total number of individuals with CKD at stages 1 to 5 worldwide is estimated at 843 million. Risk factors can be identified by studying blood components, where statistically significant differences are found in statistical analysis of some blood parameters (Red blood cells RBC , Hemoglobin Hb, Hematocrit PCV and Sedimentation rate ESR), in addition to decreased production of endogenous Erythropoietin (EPO), a hormone involved in the differentiation and maturation of red blood cells. Other contributing factors have been identified, such as poor bone marrow response to erythropoietin, decreased availability of iron for red blood cell formation, or Vitamin deficiencies (vitamin B12 or folic acid). Furthermore, the kidney is the main regulator. 90 subjects of both genders were collected, including 60 patients and 30 from the control group. The results showed that the level of blood parameters had significant differences compared to the control group at $p \leq (0.05)$. The studied parameters contribute as indicators of the development of health risks to the body and kidney health in chronic kidney disease patients.*

Keywords: *Chronic kidney disease; RBC; PCV and Sedimentation rate ESR.*

INTRODUCTION

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 GFR (1). CKD is a silent disease, as most people with it have no symptoms until their kidneys function It decreases to 15-20% of normal, (2). The main symptoms in the advanced stage of CKD are: Feeling exhausted and lack of energy, concentration problems, lack of appetite, sleep Problems, muscle cramps at night, swelling in the legs and ankles, swelling around eyes, dry skin with intense itching and frequent urination, especially at night(3).

The most important and effective parameter for evaluating renal function is eGFR, which measures the ability of the kidneys to filter blood. The glomerular filtration rate is the best measure of renal function and is usually assessed (eGFR) by the results of a creatinine blood test. The eGFR value refers to milliliters per minute per 1.73 m2 (mL/min/1.73 m2). Renal function can be classified into 5 stages according to eGFR. Chronic kidney disease includes five stages of kidney damage, from mild kidney impairment to complete failure. Generally, a person who has stage 3 or 4 CKD is considered moderate to severe kidney damage (4). In CKD anemia may occur in the early stages (CKD stages 2 and 3, from the KDIGO Guidelines). Hemoglobin levels drop when the estimated glomerular filtration rate (eGFR) is approximately 70 mL/min/1.73 m2 (for men) and 50 mL/min/1.73 m2 (for women). However, anemia is more common in stage 4 CKD (even in early diabetic patients) and gets worse as CKD progresses. In advanced stages of CKD and anemia in hemodialysis patients are present in up to 90% of patients (5).

MATERIALS AND METHODS

2.1 Study Subjects

This study was conducted at the Department of Biology - College of Science / Wasit University in cooperation with Al-Zahra Teaching Hospital / Dialysis Unit of the Wasit Health Department and some private clinics in the city of Kut - Wasit Governorate / Iraq, during the period from October 2022 - Until April 2023. The study included 90 samples, whose ages ranged from 18 to 85 years, 60 patients of both gender, who were clinically diagnosed with CKD (based on creatinine levels, age, gender) by a specialized physician and 30 healthy control. and verbal consent was obtained from the participants and they all agreed to contribute to the study. Samples (viral, immunological and hormonal diseases) were excluded.

2.2: Methods

5 ml of venous blood was drawn for both healthy and sick patients, and each sample was directly divided into two parts, the first part 1 ml of blood was placed in an EDTA K3 tube for blood tests that includes a complete blood picture, and the second part 4 ml of blood was placed In gel tubes to obtain blood serum for measurement of indicators of renal function

Blood samples were examined using the German-made Ruby device, according to the manufacturer's instructions (Abbot).The values of blood parameters were calculated for both patients and healthy subjects,by and the readings is recorded. Where the levels of (Hb concentration, RBC rate, and P.C.V Packed Blood Cell Volume and Sedimentation rat ESR) were calculated.

Statistical analysis

The statistical analysis of the current study was based on (SPSS) version 19, which was based on the value of (Mean ± SD) to detect the effect of variation factors in the study parameters, using (ANOVA) method was used to find the least significant difference. (LSD) is used to compare the two groups (patients and control) within the tests studied under the probability level ($P \geq 0.05$),

RESULTS AND DISCUSSION

Anemia is a common complication in patients with CKD and has a wide range of adverse consequences including, reduced renal function and CKD progression, increased cardiac output, left ventricular hypertrophy, angina, congestive heart failure, and reduced survival, (6). Therefore, identifying risk factors and minimizing modifiable determinants may help prevent anemia and its adverse outcomes in CKD patients (7).

The results of the current study of blood components, as shown in Table 1 As for our results for red blood cells (RBC), there is a significant difference, as shown in Figure (1), and the readings were as follows, respectively, by comparing the control group with chronic kidney patients in stages 3, 4, and 5, (4.98 ±0.11), (4.54 ±0.21), (4.21 ±0.28) and (3.40 ±0.14).

Consistent with previous studies (8).Our analysis showed that the prevalences of anaemia and Hb <10 g/dL increased as the CKD stage increased, with anaemia observed in >50% of study participants with stage 4 or 5 CKD. This observation may be explained by the reduction in erythropoiesis and increase in inflammation, functional iron deficiency and erythropoietin

deficiency that occurs with the progressive loss of kidney function in patients with advanced-stage CKD,(9).

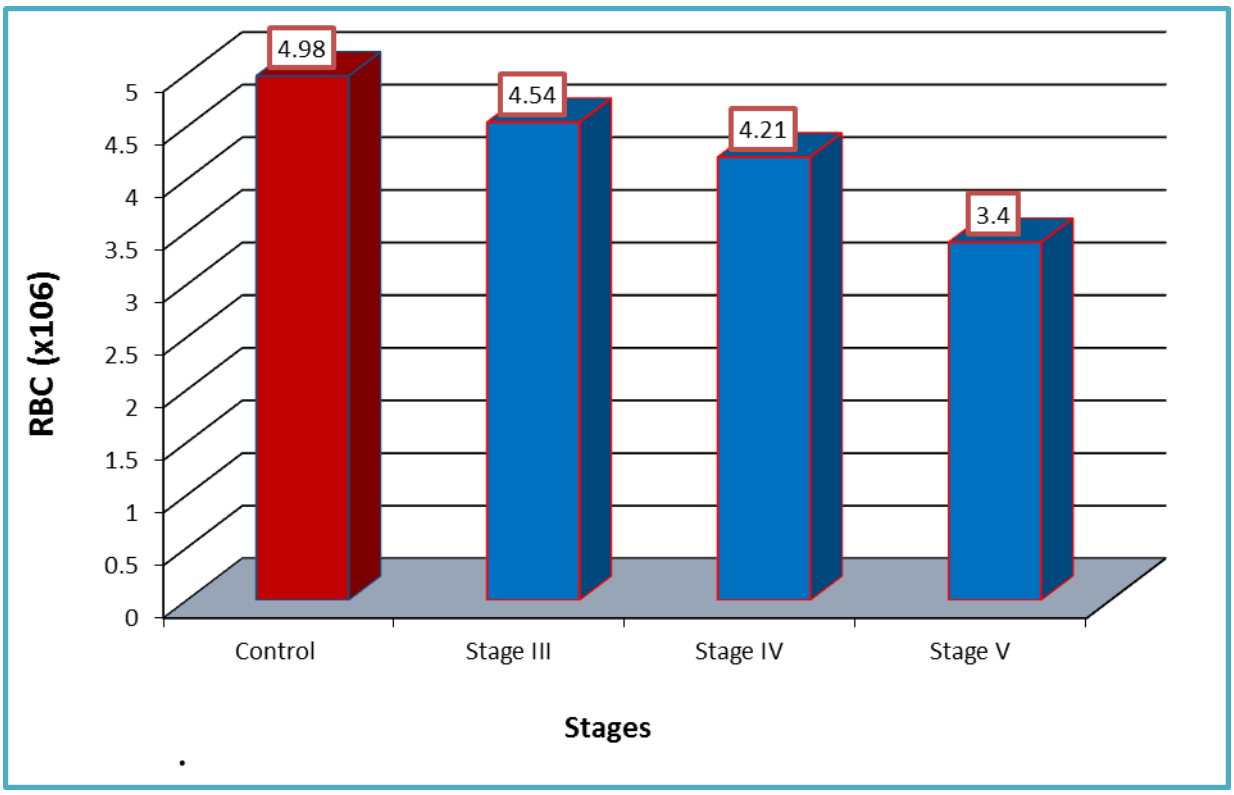

Figure (1): Serum (RBC) in different Stages of CKD and control group

In addition, the results of the current study of hematological variables showed high significant changes and differences regarding blood hemoglobin.For the control group and the rest of the patients in the last stages of kidney failure 3, 4, 5, as shown in the Figure (2), (12.42 ±0.26), (11.07 ±0,49), (10.11±0.38) and (8.83±0.39) respectively.

In this study, patients on dialysis had two times higher odds of developing anemia compared to patients without dialysis which is similar to the study conducted at the University of Gondar, Ethiopia (10). This is because dialysis requires patients with advanced kidney disease, where anemia was prevalent. The current study showed that females were twice as likely to develop anemia compared to their counterparts. This finding is supported by previous studies conducted in the World Journal of Nephrology, Nepal, and Nigeria ,(11). This would indicate that these female patients have lower concentrations of Hb compared to male patients, which likely explains why females have a greater risk of developing cancer anemia. However, gender was not significantly associated with anemia as reported in the Korean study,(12). his was confirmed by the current study, as shown in the Figure (2).

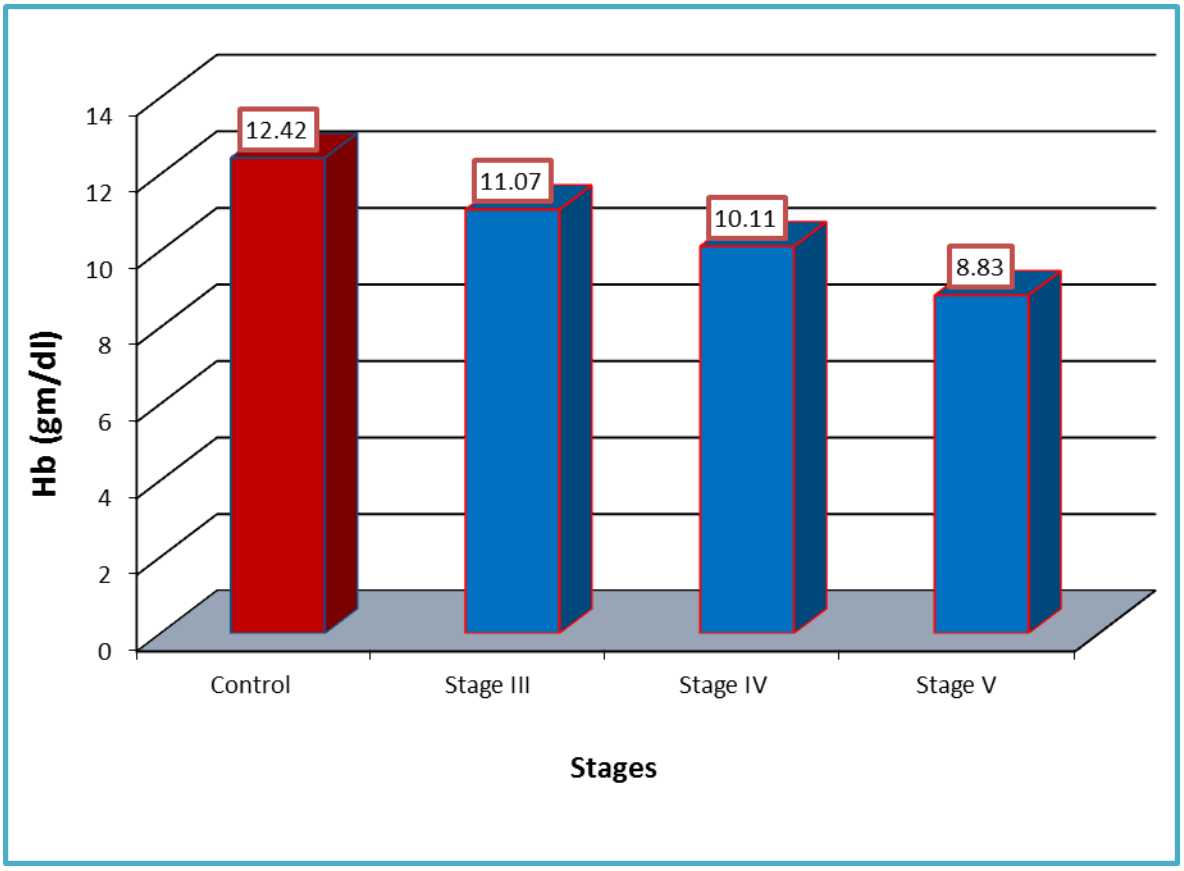

Figure (2): Serum (Hb) in different Stages of CKD and control group

The results of this study of blood components revealed significant differences in the statistical analysis of hematocrit as shown in Figure (3), a decrease in PCV after comparing CKD patients and the control group for disease stages. The readings were as follows (38.09 ± 0.74), (34.63 ± 1.51), (31.95 ± 1.25), and (27.84 ± 1.22), respectively. This study agreed with (13) that chronic kidney disease (CKD) is a global public health problem that can develop into end-stage renal failure. This study was conducted to investigate the packed cell volume (PCV). In CKD patients, PCV was studied and PCV was determined using centrifugation. The PCV index was significantly lower among people with a longer history and severity of kidney disease. In this current study, we observed that severe anemia associated with low PCV cell count is a common feature among patients with CKD. There is a need to provide erythropoietin to patients with CKD and there is a need for regular monitoring of vital signs, including PCV.

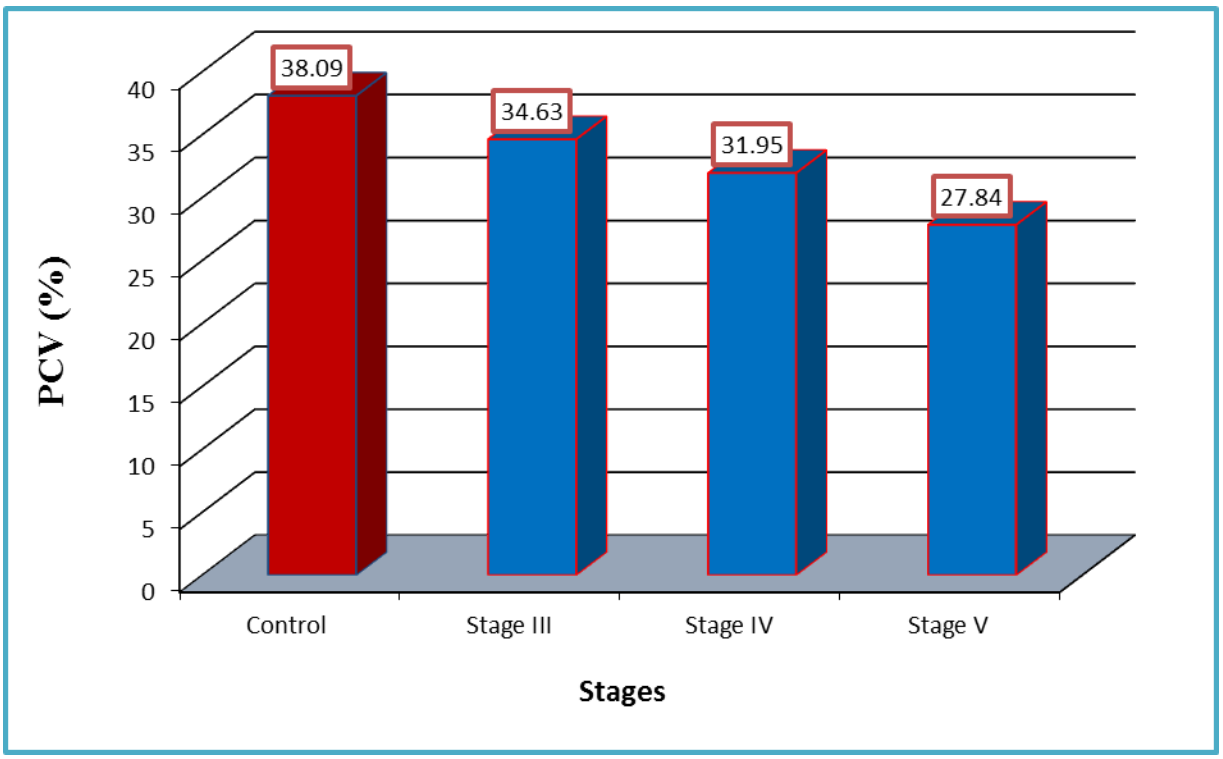

Figure (3): Serum (PCV) in different Stages of CKD and control group

The results showed that ESR levels have high significant differences for patients with CKD in the stages of the disease compared to healthy people, as shown in the statistical analysis through the Figure (4), (18.03 ±2.61) , (63.61 ±1.51), (74.40 ±7.19) and(94.62 ±9.49) respectively.

The results of the current study agreed with (14), emphasized that the ESR test can be used without restrictions in patients suffering from chronic kidney disease and in patients undergoing dialysis and those who have received a kidney transplant (15). Determination of erythrocyte sedimentation rate (ESR) is a simple diagnostic tool to estimate systemic inflammation. Whether ESR is affected by kidney disease or RRT. The incidence of ESR elevations in patients with CKD (16). We conducted a single-center retrospective study on inpatients with and without kidney disease and on patients with of inverse radiotherapy, by comparing ESR levels and other laboratory and clinical information. Results: On average, the ESR was high. They showed a marked increase in erythrocyte sedimentation rate.

In addition (17) confirmed an increase in ESR values and most red cell indicators in the blood after dialysis for all age groups compared to the value in the blood before dialysis and the normal range at P < 0.05 as shown in Table (1) comparison. With values found in the blood before dialysis for people over 50 years of age.

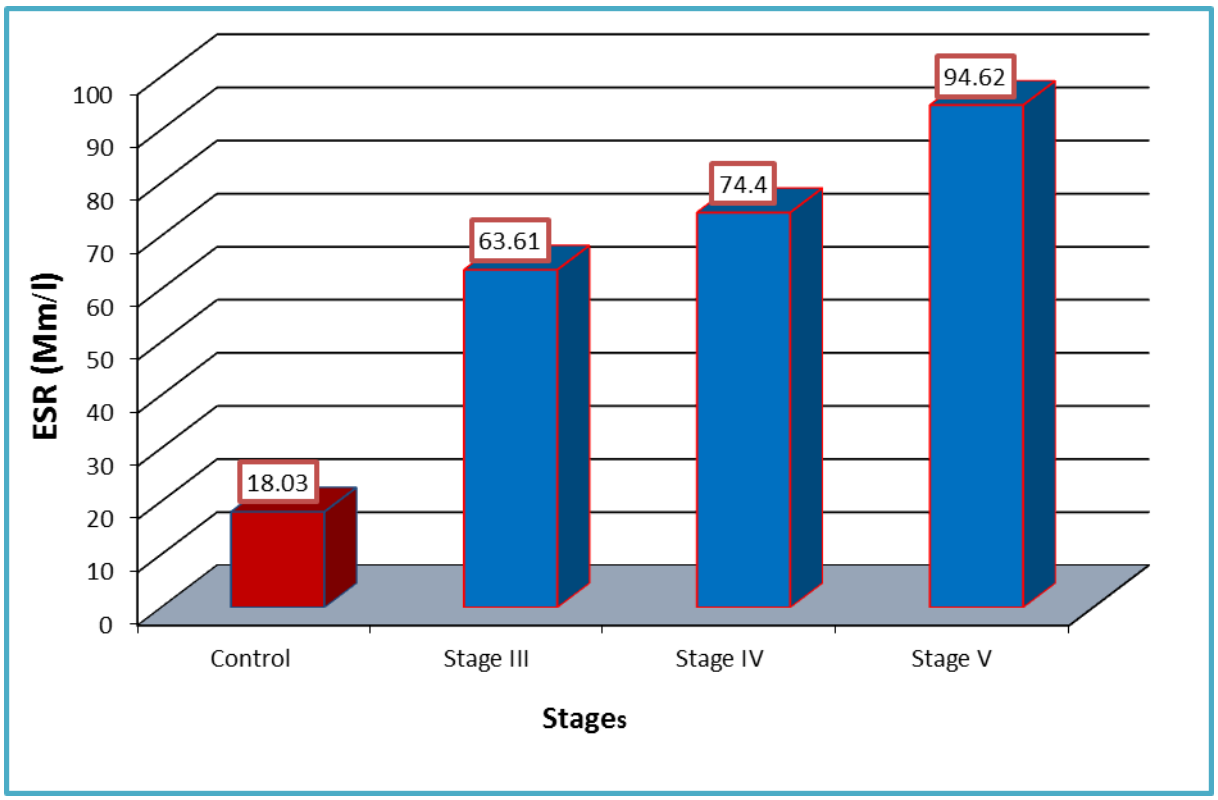

Figure (4): Serum (ESR) in different Stages of CKD and control group

Table (1): Serum (RBC, Hb, PCV, ESR) in difference stages of CKD

Stage	Mean ± SE (mg/dl)			
	RBC (x10^6)	Hb (gm/dl)	PCV (%)	ESR (Mm/l)
Control	4.98 ±0.11 a	12.42 ±0.26 a	38.09 ±0.74 a	18.03 ±2.61 c
Stage III	4.54 ±0.21 ab	11.07 ±0.49 b	34.63 ±1.51 b	63.61 ±1.51 b
Stage IV	4.21 ±0.28 b	10.11 ±0.38 b	31.95 ±1.25 b	74.40 ±7.19 b

Stage V	**3.40 ±0.14, c**	**8.83 ±0.39 c**	**27.84 ±1.22 c**	**94.62 ±9.49 a**
LSD value	**0.538 ****	**1.085 ****	**3.317 ****	**19.116 ****
P-value	**0.0001**	**0.0001**	**0.0001**	**0.0001**

CONCLUSION

The present study revealed that the levels of some blood parameters (ESR, RBC, Hb, PCV) changed significantly from the normal average. RBC, Hb, PCV decreased in patients suffering from chronic kidney disease of all stages, while the ESR level rose above the normal limit.

REFERENCES

1- Mahajan, C.; Tiwari, V.; Divyaveer, S.S.; Patil, M.R.; Banerjee, A.; Bagur, V. (2020). Spectrum of renal biopsies; a three-year data from a tertiary care Centre of eastern India. J Nephropharmacol.;9(2):e20–e.

2- Dritsas, E. and Trigka, M. (2022). Machine learning techniques for chronic kidney disease risk prediction. Big Data and Cognitive Computing, 6(3), 98.

3- Abdel-Kader, K.(2022). Symptoms with or because of Kidney Failure? Clin. J. Am. Nephrol. 17, 475–477 .

4- Kimura, K.; Hosoya, T.; Uchida, S.; Inaba, M.; Makino, H.; Maruyama, S. (2018).Febuxostat therapy for patients with stage 3 CKD and asymptomatic Hyperuricemia: a randomized trial. Am J Kidney Dis.;72(6):798–810.

5- Stauffer, M.E. and Fan, T.(2014). Prevalence of anemia in chronic kidney disease in the United States,9:e84943.

6- Mikhail, A.; Brown. C.; Williams, J.A. (2017).Renal association clinical practice guideline on anaemia of chronic kidney disease. BMC Nephrol.;18:345.

7- Yin, P.; Wu, Q.; Shou, L.(2021). Risk factors for anemia in patients with chronic kidney disease: a protocol for systematic review and meta-analysis. Medicine (Baltim) .100:e273711–3.

8- Wong, M.M.Y.; Tu, C.; Li, Y. (2020). Anemia and iron deficiency among chronic kidney disease stages 3-5ND patients in the Chronic Kidney Disease Outcomes and Practice Patterns Study: often unmeasured, variably treated.;13:613–24.

9- Fishbane, S.; Spinowitz, B. (2018).Update on anemia in ESRD and earlier stages of CKD.71:423–35.

10- Adera, H.; Hailu, W.; Adane, A.; Tadesse, A.(2019). Prevalence of anemia and its associated factors among chronic kidney disease patients at university of Gonder hospital, northwest Ethiopia: a hospital-based cross-sectional study ,12:219–228.

11- Poudel, B.; Yadav, B.K.; Jha, B.; Raut, K.B.(2019). Prevalence and association of anemia with CKD: a hospital-

based cross-sectional study from Nepal Prevalence and association of anemia with CKD. protein: impact of dialysis procedures. Artif Organs. 2020;44(6):647–54.

12- Kang, E.; Han, M.' Kim, H. (2017). Baseline general characteristics of the Korean chronic kidney disease: report from the Korean cohort study for Outcomes in Patients With Chronic Kidney Disease (KNOW-CKD).;32(2):221–230.

13- Abdulrahaman, Y.; Osaro, E.; Uko, E. K.;Isaac, I. Z.; Bello, Z.; Liman, H. M. (2013). Packed cell volume, Reticulocyte count and index among patients with chronic kidney disease in Sokoto, North-western Nigeria. Journal of Medical and Health Sciences, 2319-9865.

14- Buckenmayer, A.; Dahmen, L.; Hoyer, J.; Kamalanabhaiah, S. and Haas, C. S. (2022). Erythrocyte sedimentation rate in patients with renal insufficiency and renal replacement therapy. Laboratory Medicine, 53(5), 483-487.

15- Etim, E. A. (2018). Effect of maintenance hemodialysis on red cell indices and erythrocyte sedimentation rate in northeast Nigeria. Age (years), 50(58), 0-01.

16-Ahmed, T. H., & Al-Mousawi, N. H.. Post-Hospitalization, Levels of D-dimer, C-Reactive Protein, Ferritin, And Lactate Dehydrogenase in Recovered COVID-19 Iraqi Patients. Systematic Reviews in Pharmacy, 12.1 2021.

17-AL-Rubaie, S. A., AL-Attabi, M. R., & AL-Kinani, A. A.. Study the Inflammatory Biomarkers of Acute Coronary Syndrome Patients in Wasit Province. Indian Journal of Public Health Research & Development, (2019), 10 (10). 2352. 0976-0245. DOI: 10.5958/0976-5506.2019.03210.8.