Derna Academy Journal for Applied Sciences

E-ISSN: 3006-3159

DAJAS

Prevalence of anemia in patients with chronic kidney disease

Mustafa Rahouma[1], Omaro A. Aburas[2], Abtisam Miftah Dhaw[3], Aisha Maidon[4], Emhamed Boras[5],

[1]Higher Institute of Science and Medical Technology, Medical Laboratories Department, Tripoli/Abusalim.
[2, 3, 4] Higher Institute of Science and Medical Technology, Pharmacy Department, Tripoli/Abusalim.
[5]Libyan Academy of postgraduate Studies, Life Science Department, Tripoli/ Janzor.

*Corresponding author: E-mail addresses: Omaroaburas@gmail.com

Volume : **Issue:** **Page Number: 29 - 35**

Keywords:
Chronic kidney diseases, Anemia, Hemoglobin, Erythropoietin, Tripoli Cite.

Received: 15\12\2023
Accepted: 20\01\2024
Published: 25\01\2024

https://doi.org/...../.....vxix.xxx

ABSTRACT

Anaemia is a frequent side effect in individuals with chronic kidney disease (CKD). It is primarily caused by a decrease in the proportion of erythropoietin (EPO), which can happen when there is a decrease in the quantity of haemoglobin in the blood or in the number of red blood cells. The purpose of this study is to look into the severity and prevalence of anaemia in adult patients who are not on dialysis. Materials and Procedures: The kidney department laboratory data at Tripoli Hospital and the records of individuals aged 30 to 70 years old comprised the research sample. In this study, 80 persons in total were categorised into different stages of CKD based on the KDIGO guidelines. Individuals suffering from severe haemorrhage, acute renal failure, and those Ages under eighteen were not included. The study's findings revealed that the patients' ages varied from 22 to 85 years old, with an average age of 49 ± 13 years. Of these, forty were between 40 and 59 years old (50.0%), seventeen were 60 years of age or older (21.3%), and twenty-three were between the ages of 20 and 39 (28.7%). Because of this study, a little higher proportion of women than males. Of the 80 patients, 34 patients (42.5%) were male and 46 patients (57.5%) were female. Additionally, this resulted in the fourth quarter's prevalence of early-stage anaemia being in stage one (10.0), with 2.5% of patients in stage 0 and no patients in stage 4, and the bulk of patients in stage 0. Five (62.5%). 18% of the patients, or fifteen, were in stage two. At 6.2%, these rates were in the third stage. Finds that there are 65 patients (81.2%) with anaemia and 15 patients (18.8%) with normal haemoglobin levels. These numbers indicate the prevalence of anaemia. And I discovered that it related to a character of that kind, and I also discovered that some of those individuals are donors. About 76.5% of females had anaemia (haemoglobin levels below 12 g/dl), and approximately 23.5% had normal (haemoglobin levels exceeding 12 g/dl). Additionally, Figure 5 demonstrates that the percentage of men with anaemia (haemoglobin levels below 13 g/dl) was around 84.8%, whereas the percentage of men with normal haemoglobin levels above 13 g/dl was roughly 15.2%. Approximately 75% of the anaemic Nineteen anaemic patients were in stage two (15.4%), four anaemic patients were in stage three (6.2%), three anaemic patients were in the first stage (4.6%), and patients were in stage five (73.8%). In conclusion, the study's findings show that anaemia prevalence rises as kidney function deteriorates, demonstrating a direct correlation between anaemia frequency and declining kidney function.

1. INTRODUCTION

One typical side effect in individuals with chronic kidney disease (CKD) is anaemia. With chronic kidney disease (CKD), waste and fluid accumulate in the body as a result of the kidneys' progressive malfunction (Astor, B. C. et al. 2006). Reduced haemoglobin levels or a drop in the quantity of red blood cells in the blood can result in anaemia (Portolés, J. et al. 2021). As the condition worsens, anaemia becomes more common in CKD patients. Anaemia is very uncommon in the early stages of chronic kidney disease (CKD), but as kidney function deteriorates, it becomes more prevalent. Anaemia is thought to affect up to 90% of people with end-stage renal disease (ESRD). (Chaparro, C. M. et al. 2019), Low erythropoietin (EPO) production is the primary cause of anaemia in people with chronic kidney disease (CKD) (Pirker, R. 2008). a hormone that the kidneys make that encourages the bone marrow to produce red blood cells. Red blood cell production falls in response to a deterioration in kidney function, which also results in a decrease in EPO production (Provenzano, R. et al. 2007). Angiotensin receptor blockers (ARBs) and angiotensin-converting enzyme inhibitors (ACE inhibitors), which can interfere with the generation of erythropoiesis (EPO), as well as iron deficiency and inflammation are other factors that contribute to anaemia in chronic kidney disease (CKD) (Barpanda, S.S. 2013). Patients with CKD may experience major effects from anaemia on their health and quality of life (Tussing-Humphreys, L. et al. 2012). It may manifest as weakness, exhaustion, or shortness of breath. Of breath as well as vertigo. Additionally, it may exacerbate other CKD problems such cardiovascular disease (Chen, T. K. et al. 2019). Treating the underlying cause of anaemia in people with chronic kidney disease (CKD) usually entails using iron supplements or EPO-stimulating medications. Blood transfusions might be required in some circumstances to swiftly raise red blood cell levels (Zhang, Q. L. et al. 2008). In summary, anaemia is a frequent side effect that affects people with chronic renal disease, especially as the condition worsens. Its main reason is a reduction in erythropoietin production, which can have a serious effect on a patient's health and quality of life. For individuals with chronic kidney disease (CKD), appropriate anaemia management is crucial (Jha, V. et al. 2013).

2. METHOD

Place and Period of Study

This study was conducted in the city of Tripoli and targeted the Tripoli Central Hospital and lasted for a period of three months, starting from the end of August 2023 to November 2023, during which data were collected.

Study population

A total of 80 adults participated in this study and were classified into stages of chronic kidney disease (CKD) according to the Kidney Disease Improving Global Outcomes (KDIGO) guidelines.

Study tool

The research sample was taken from laboratory records at Tripoli Hospital, Kidney Department, and those aged between 30 and 70 years. Patients with severe renal insufficiency, severe bleeding, and those younger than 18 years were excluded.

Data management and statistical analysis

Data coding, entry, and analysis were performed by the Statistical Package for Social Science (SPSS) software version 25. Quantitative variables were analyzed using simple descriptive statistics (mean standard deviation) and categorized variables were analyzed using percentages.

3. RESULT

Demographic characteristic of participants

A total of 80 patients volunteers 46 were female (57.5%) and 34 were male (42.5%) participated in the study in the city of Tripoli and targeted the Tripoli Central Hospital as shown in fiqure 1.

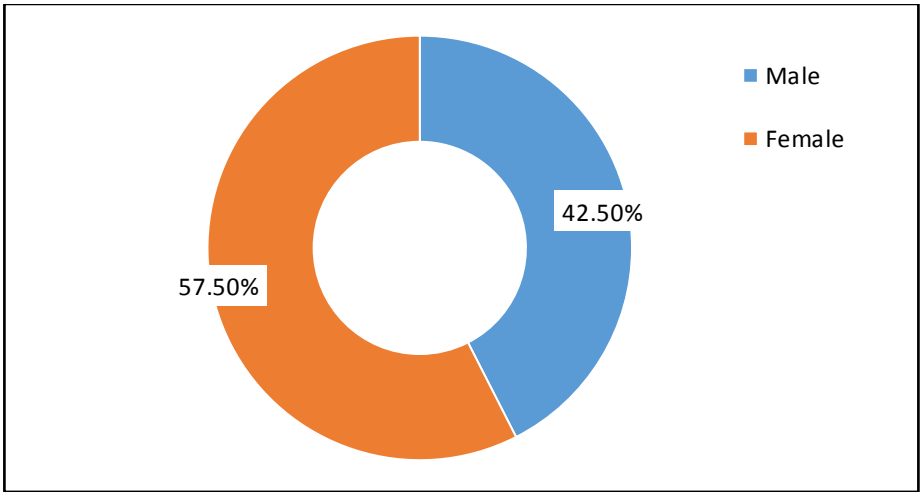

Figure 1: Distribution of Chronic kidney disease (CKD) patients according to gender.

Age of volunteering patients in this study

The study included different ages, the age of the patients ranged from 22 to 85 years, with a mean of 49 ± 13 years. Twenty-three patients were 20–39 years old (28.7%), forty patients were 40–59 years old (50%), and seventeen were 60 years and older (21.3%) as shown on figure 2.

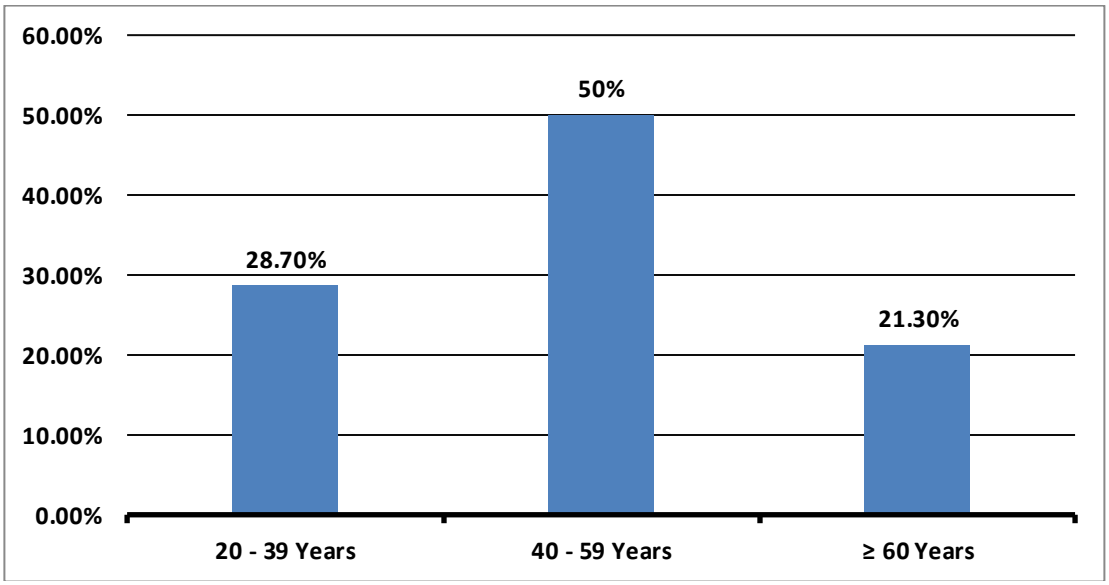

Figure 2: Distribution of patients according to age group.

Chronic kidney disease (CKD) stages

In the (figure 3) showed that eight patients were in the first stage (10%), two patients were in the zero stage (2.5%), no patients were in the fourth stage, and the majority of patients were in stage five (62.5%). Fifteen patients were in the second stage (18.8%).

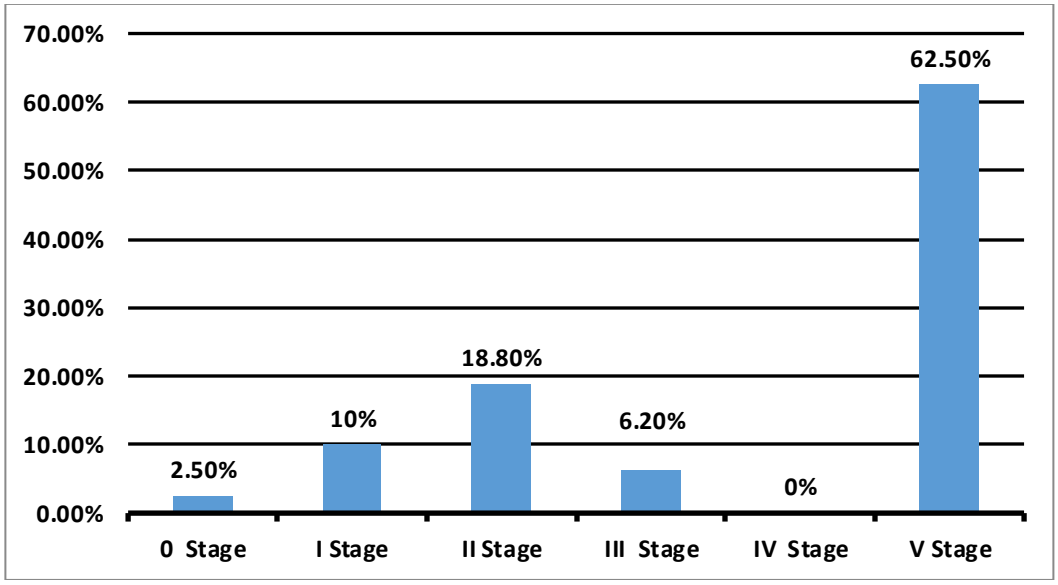

Figure 3: The distribution of patients according to chronic kidney disease (CKD) stages.

Prevalence of anemia in chronic kidney disease (CKD) patients

The hemoglobin level of chronic kidney disease (CKD) patients ranged from 5.7 to 16 g/dl, with a mean of 10.2 ± 2.2 g/dl. The overall prevalence of anemia was determined using a cutoff level of hemoglobin <13 g/dl in males and hemoglobin <12 g/dl in females. As in figure 4 showed that 65 patients (81.2%) had anemia, and 15 patients (18.8%) had a normal hemoglobin level.

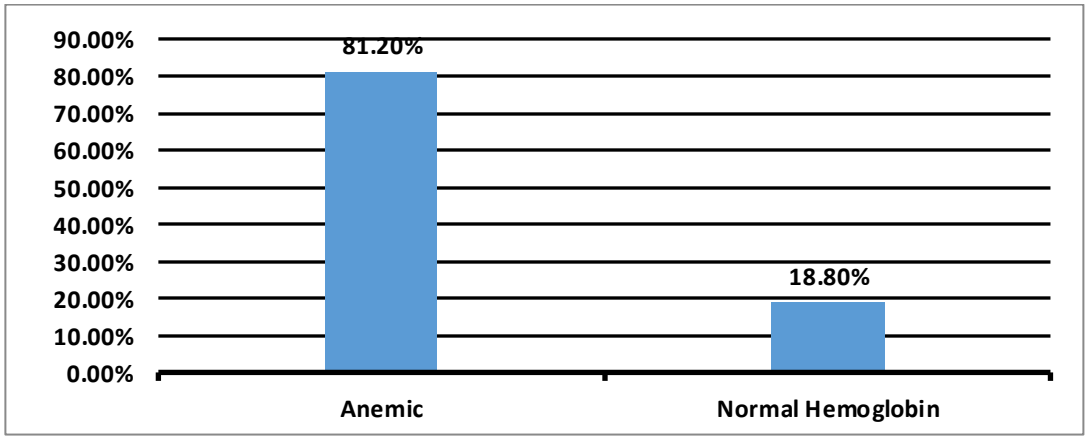

Figure 4: Prevalence of anemia among Chronic kidney disease(CKD) patients.

Prevalence of anemia according to gender

Hemoglobin levels below 12 g/dl (anemia) in females were about 39 patients (84.8%), while those with hemoglobin levels over 12 g/dl (normal) were approximately 7 patients (15.2%) , in addition, the proportion of men with hemoglobin levels below 13 g/dl (anemia) was about 26 patients (76.5%), while the proportion of males with hemoglobin levels above 13 g/dl (normal) was approximately 8 patients (23.5%) as shown in figure 5.

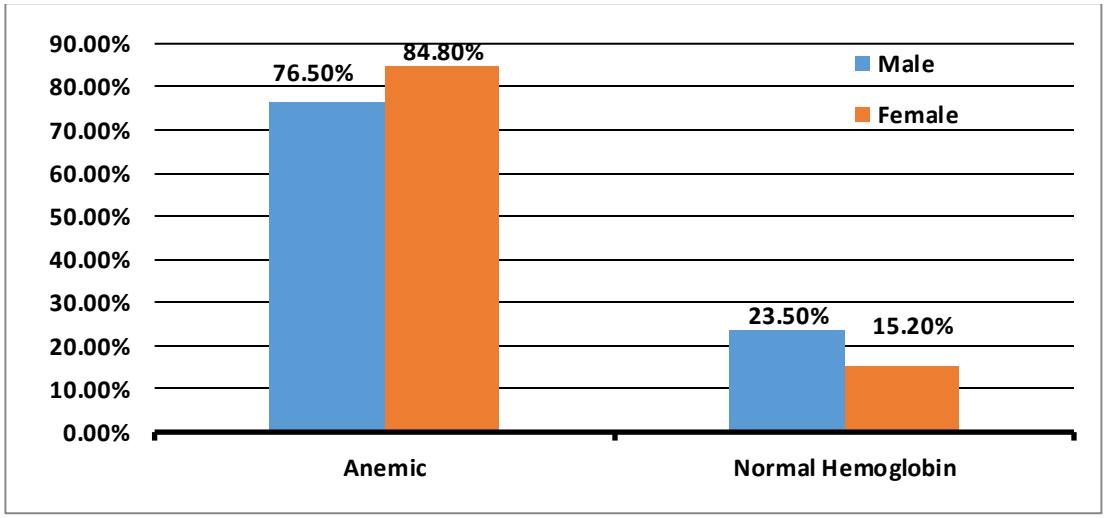

Figure 5: Prevalence of anemia among Chronic kidney disease (CKD) patients according to gender.

Anemia and Chronic kidney disease (CKD) stages

Nearly three-quarters of anemic patients were in the fifth stage (73.8%), ten anemic patients were in the second stage (15.4%), four anemic patients were in the third stage (6.2%), and three anemic patients were in the first stage (4.6%) and no patients in stages zero and four as shown in figure 6.

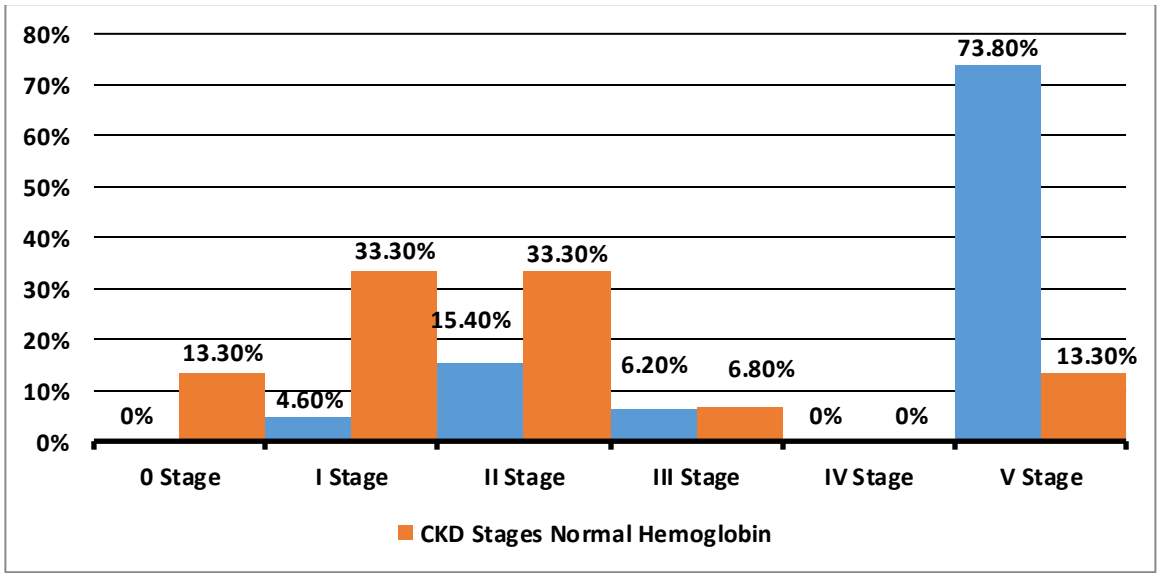

Figure 6: The distribution of the anemia based on chronic kidney disease (CKD) stages.

4. DISCUSSION

The results of this study showed that the ages of patients ranged from 22 to 85 years, with an average age of 49 49 ± 13 years 13 years. 23 were between 20 and 39 years old (28.7%), forty were between 40 and 59 years old (50.0%), and seventeen were 60 years old (21.3%). As a result of this study, a slightly larger percentage of women than men. Of the 80 patients, 46 patients were female (57.5%) and 34 patients were male (42.5%). This also led to the prevalence of early-stage anemia being that the fourth quarter was in stage one (10.0%), the patients were in stage 0 (2.5%), there was no patient in stage four, and the majority of patients were at stage five (62.5%). Fifteen patients (18.8%) were in stage two. These rates were in the third stage (6.2%). This study concludes that the prevalence of anemia is 65 patients with anemia (81.2%), and 15 patients have a normal haemoglobin level (18.8%).

And I found that it connected with a character like that, and I also found that there are people among those people who donate. Haemoglobin levels below 12 g/dl (anemia) in females were about (76.5%), while those with haemoglobin levels over 12 g/dl (normal) were about (23.5%). Figure 5 shows that, in addition, the proportion of men with haemoglobin levels below 13 g/dl (anemia) was about (84.8%), while the proportion of males with haemoglobin levels above 13 g/dl (normal) was approximately (15.2%). Nearly three-quarters of the anaemic patients were in stage five (73.8%), ten anaemic patients were in stage two (15.4%), four anaemic patients were in stage three (6.2%), and three anaemic patients were in the first stage (4.6%). We also found that the mean levels of Hb level HCT were significantly reduced due to the gradual loss in kidney function. People with chronic kidney disease (CKD) have a high prevalence of anaemia, which may be explained by this notable drop. Because the kidneys' inability to function properly results in a decrease in erythropoietin (EPO) production. The bone marrow would thus be unable to produce red blood cells. People will eventually become anaemic as a result of the production of fewer blood cells over time. This is also shown in the HCT values, which accurately reflect the degree of red cell mass loss in CKD. Among the groups of CKD patients, additional blood measures including MCV, MCH, MCHC, and PLT counts were also evaluated, along with some covariates like age. However, no statistically significant link was established between these parameters and the the stage of renal failure. The study notes that on the primary topic of assessing the prevalence of anaemia in patients with chronic renal disease, the current study concurs with other research (Stauffer, M. E. et al. 2014 and McFarlane, P. A. et al. 2010). It does, however, vary in a few significant ways. This study fills a scientific gap by focusing on assessing the prevalence and severity of anaemia in particular among CKD patients who are not on dialysis. Prior research (Zhang, Y. et al. 2004 and Milovanov, Y. S. et al. 2017) has not been limited to this non-dialysis population. Haemoglobin levels and CKD staging data were gathered for this investigation through the examination of laboratory records and patient data from a single centre (Alagoz, S. et al. 2020, Almoznino-Sarafian, D. et al. 2010 and Palaka, E. et al. 2020). This differs from previous larger-scale epidemiological studies or reviews that synthesized data across populations (Nakatani, S. et al. 2021, Hsu, C. Y. et al. 2000and Toft, G. et al. 2020). The study sample consisted of 80 adult CKD patients from one hospital in Libya. Many previous studies examined larger or more diverse cohorts across multiple sites, often thousands of patients. Similar to previous research, this study analyzed anemia rates across CKD stages, showing increased prevalence with worsening kidney dysfunction. Rates reached over 80% of the population overall.

5. CONCLUSION

The results of this study indicate that the prevalence of anemia increases with increasing deterioration of kidney function, which means that there is a clear relationship between the prevalence of anemia and decreased kidney function. This can be caused by several different factors associated with the development of anemia in chronic kidney diseases, such as iron and vitamin deficiency, poor daily nutrition, platelet imbalance, low red blood cells, and hemolysis.

6. REFERENCES

Alagoz, S., Dincer, M. T., Eren, N., Bakir, A., Pekpak, M., Trabulus, S., & Seyahi, N. (2020). Prevalence of anemia in predialysis chronic kidney disease: Is the study center a significant factor?. *PloS one*, *15*(4), e0230980.

Almoznino-Sarafian, D., Shteinshnaider, M., Tzur, I., Bar-Chaim, A., Iskhakov, E., Berman, S., Efrati, S., Modai, D., Cohen, N., & Gorelik, O. (2010). Anemia in diabetic patients at an internal medicine ward: clinical correlates and prognostic significance. *European journal of internal medicine*, *21*(2), 91–96.

Astor, B. C., Coresh, J., Heiss, G., Pettitt, D., & Sarnak, M. J. (2006). Kidney function and anemia as risk factors for coronary heart disease and mortality: the Atherosclerosis Risk in Communities (ARIC) Study. *American heart journal*, *151*(2), 492–500.

Barpanda, S.S. (2013). Use of Image Processing Techniques to Automatically Diagnose Sickle-Cell Anemia Present in Red Blood Cells Smear.

Chaparro, C. M., & Suchdev, P. S. (2019). Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. *Annals of the New York Academy of Sciences*, *1450*(1), 15–31.

Chen, T. K., Knicely, D. H., & Grams, M. E. (2019). Chronic Kidney Disease Diagnosis and Management: A Review. *JAMA*, *322*(13), 1294–1304.

Hsu, C. Y., Bates, D. W., Kuperman, G. J., & Curhan, G. C. (2000). Diabetes, hemoglobin A(1c), cholesterol, and the risk of moderate chronic renal insufficiency in an ambulatory population. *American journal of kidney diseases : the official journal of the National Kidney Foundation*, *36*(2), 272–281.

Jha, V., Garcia-Garcia, G., Iseki, K., Li, Z., Naicker, S., Plattner, B., Saran, R., Wang, A. Y., & Yang, C. W. (2013). Chronic kidney disease: global dimension and perspectives. *Lancet (London, England)*, *382*(9888), 260–272.

McFarlane, P. A., Pisoni, R. L., Eichleay, M. A., Wald, R., Port, F. K., & Mendelssohn, D. (2010). International trends in erythropoietin use and hemoglobin levels in hemodialysis patients. *Kidney international*, *78*(2), 215–223.

Milovanov, Y. S., Kozlovskaya, L. V., Milovanova, L. Y., Markina, M. M., Kozlov, V. V., Taranova, M. V., & Fomin, V. V. (2017). Faktory riska razvitiia anemii na rannikh stadiiakh khronicheskoĭ bolezni pochek [Risk factors for anemia in the early stages of chronic kidney disease]. *Terapevticheskii arkhiv*, *89*(6), 41–47.

Nakatani, S., Mori, K., Shoji, T., & Emoto, M. (2021). Association of Zinc Deficiency with Development of CVD Events in Patients with CKD. *Nutrients*, *13*(5), 1680.

Palaka, E., Grandy, S., van Haalen, H., McEwan, P., & Darlington, O. (2020). The Impact of CKD Anaemia on Patients: Incidence, Risk Factors, and Clinical Outcomes-A Systematic Literature Review. *International journal of nephrology*, *2020*, 7692376.

Pirker, R. (2008). Symptoms of anemia. In: Nowrousian, M.R. (eds) Recombinant Human Erythropoietin (rhEPO) in Clinical Oncology. Springer, Vienna.

Portolés, J., Martín, L., Broseta, J. J., & Cases, A. (2021). Anemia in Chronic Kidney Disease: From Pathophysiology and Current Treatments, to Future Agents. *Frontiers in medicine*, *8*, 642296.

Provenzano, R., Besarab, A., Macdougall, I. C., Ellison, D. H., Maxwell, A. P., Sulowicz, W., ... & Dougherty, F. C. (2007). The continuous erythropoietin receptor activator (CERA) corrects anemia at extended administration intervals in patients with chronic kidney disease not on dialysis: results of a phase II study. *Clinical nephrology*, *67*(5), 306-317.

Stauffer, M. E., & Fan, T. (2014). Prevalence of anemia in chronic kidney disease in the United States. *PloS one*, *9*(1), e84943.

Toft, G., Heide-Jørgensen, U., van Haalen, H., James, G., Hedman, K., Birn, H., Christiansen, C. F., & Thomsen, R. W. (2020). Anemia and clinical outcomes in patients with non-dialysis dependent or dialysis dependent severe chronic kidney disease: a Danish population-based study. *Journal of nephrology*, *33*(1), 147–156.

Tussing-Humphreys, L., Pusatcioglu, C., Nemeth, E., & Braunschweig, C. (2012). Rethinking iron regulation and assessment in iron deficiency, anemia of chronic disease, and obesity: introducing hepcidin. *Journal of the Academy of Nutrition and Dietetics*, *112*(3), 391–400.

Zhang, Q. L., & Rothenbacher, D. (2008). Prevalence of chronic kidney disease in population-based studies: systematic review. *BMC public health*, *8*, 117.

Zhang, Y., Thamer, M., Stefanik, K., Kaufman, J., & Cotter, D. J. (2004). Epoetin requirements predict mortality in hemodialysis patients. *American journal of kidney diseases: the official journal of the National Kidney Foundation*, *44*(5), 866–876.