

The Effect of Erythropoietin in Patients with Renal Insufficiency in Tikrit District

¹Dr . Ahmed Abdulameer Ibrahim M . B . Ch . B ,Ali Sami Mohammed²Ahmed Khaleel Abed³mohammed Ahmed Mustafa⁴⁻⁵

- 1- Ministry of Health , Department of Health Salah al-Din , Al- Dujail hospital, Iraq .
- 2- Ministry of Health , Department of Health Salah al-Din , Balad hospital, public, Iraq .
- 3- Ministry of Health , Department of Health Diyala , Al-Batoul General hospital, public, Iraq .
- 4- Department of pathological Analysis , College of Applied Sciences University of Samarra
- 5- Department of Medical Laboratory Techniques , College of Technology , University of Imam Ja far Al-Sadiq _ Dujail

[Email : Mohammed.alsad3@gmail.com](mailto:Mohammed.alsad3@gmail.com)

Abstract

The study was conducted for the period from October 2020 to May 2021, which included 60 people suffering from renal impairment disease and iron deficiency anemia. The studied samples were divided into three groups, which are: The first group: included 20 people (20-62 years) of those with renal impairment. And the second group: included 20 people (5 - 34 years) who had iron deficiency anemia, and the third group: included 20 healthy people (12-30 years old), represented by the control group. The study aimed to know the vital effect of erythropoietin and its role in anemia patients in patients with iron deficiency anemia, as well as anemia in patients with renal impairment.

Keywords: kidney , iron , anemia , hormone erythropoietin

Introduction

Physiologically, anemia is a decrease in the ability of red blood cells to carry oxygen due to their low or low number of hemoglobin, which leads to a deficiency in meeting tissue oxygen needs (Abbaspour *et al* .,2014) The oxygen supply to tissues is controlled by a balanced mechanism that depends The relative rate of oxygen supply and the need for it as the oxygen supply to tissues depends on hemoglobin concentration, degree of oxygen saturation, affinity for oxygen, degree and rate of change in blood volume, and the ability of the cardiovascular and lung systems to compensate (Rocha *et al.*, 2020).

Anemia is a common problem in patients with renal impairment and occurs as a result of damage to the kidney cells responsible for the production and regulation of the hormone erythropoietin, which leads to anemia, in addition, chronic infections, vitamin deficiencies, iron deficiency, hemolysis, urea poisoning, and insufficiency.

Dialysis, aluminum accumulation, thyroid hormones, and folate deficiency are factors associated with erythropoietin production that contribute to the development of anemia in patients with renal impairment. In an adult, erythropoietin is synthesized primarily by the kidneys, affects the bone marrow, and participates in controlling negative feedback mechanisms (Wuet *al.* , 2012; Mustafa et al.,2020).

Materials and working methods:

Collection of Blood Samples

The blood samples were withdrawn from the vein by means of a disposable syringe, and the volume of blood drawn was 10 ml for each person from the studied samples, where the blood was divided according to the need for the studied tests. For physiological blood tests. The remainder of the blood sample (8 ml) was placed in a plastic test tube with a cap and left at 25 ° C for 30 minutes, then placed in a centrifuge for 15 minutes at a speed of 3000 rpm. After that, the serum was withdrawn by a Pasteur pipette and then preserved. Directly in the freezer (-20 ° C) after it has been distributed into five Abendorf tubes for use in biochemical tests.

Determination of serum erythropoietin concentration

The concentration of erythropoietin in serum was determined using an ELISA ready-made analysis kit (Sawyer, 1989).

Results and discussion :

The level of the hormone erythropoietin. The results are shown in Figures (1) , Table (1).

There was a significant decrease ($0.01 > P$) in the level of the erythropoietin hormone in the two groups of patients with renal impairment and iron deficiency anemia, while there was a significant increase in the group of thalassemia patients with respect to males and the results did not record a significant difference for the group of female thalassemia patients when compared with A control group

Figure (1)The level of the hormone erythropoietin among groups of male patients compared with the control group

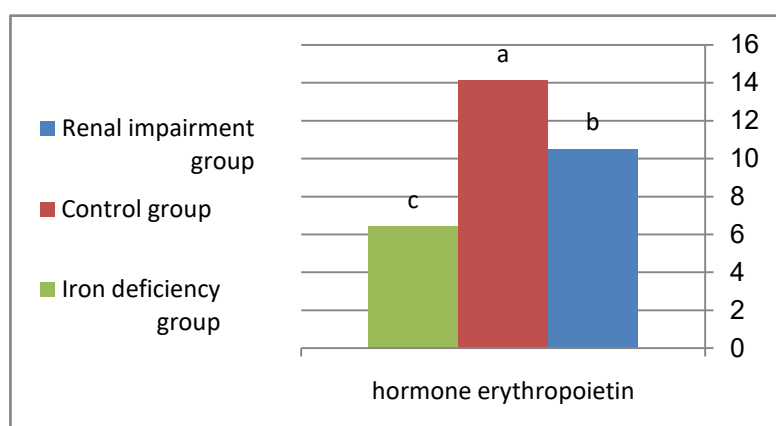


Table (1) The level of the hormone erythropoietin among groups of male patients compared with the control group

	N	erythropoietin
Renal impairment group	20	10.5 ± 2.18 b
Control group	20	14.1 ± 3.12 a
Iron deficiency group	20	6.4 ± 2.65 c

The significant decrease in the concentration of the hormone erythropoietin in the serum of male renal impairment patients for all ages was observed in the results of the current study, as it was found that there was a significant decrease in this hormone responsible for the production and development of red blood cells, which led to anemia for these patients, and this is similar to what he found. Whoever: The low level of the hormone erythropoietin in the serum of patients with renal impairment may be fibrosis of kidney tissues, replacement of the urinary tubules with fibrous tissue and fibrosis of surrounding capillaries

The low level of the hormone erythropoietin in the serum of patients with renal impairment may be fibrosis of kidney tissues, replacement of the urinary tubules with fibrous tissue and fibrosis of surrounding capillaries. In the renal tubules, they form an automatic barrier between the hormone-secreting epithelial cells and the blood in the capillaries, preventing hypersensitivity to oxygen to produce and release erythropoietin into the blood. Or perhaps the reason is due to some factors that affect the production and release of the erythropoietin hormone, such as being affected by the signals sent from the bone marrow, such as androgens, angiotensin, and insulin hormone similar to growth factor.

The study indicated deficiency of the hormone erythropoietin (Bielez *et al* .,2020; Mustafa& AL-Samarraie.,2020). Erythropoietin is the main cause of anemia and is an indicator of the occurrence of anemia. Marsden (2006) confirmed that the level of the hormone erythropoietin decreases in the serum of impotence patients. Renal level of its level in normal persons indicated that chronic lack of oxygen to the kidney hypoxia leads to a lack of stimulation of the cells surrounding the tubules to produce and release erythropoietin from the kidney (Bertoli *et al* .,2007).

References

1. Abbaspour, N., Hurrell, R., & Kelishadi, R. (2014). Review on iron and its importance for human health. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, 19(2), 164.
2. Bertoli, A. M., Vila, L. M., Apte, M., Fessler, B. J., Bastian, H. M., Reveille, J. D., ... & LUMINA Study Group. (2007). Systemic lupus erythematosus in a multiethnic US cohort LUMINA LI: anaemia as a predictor of disease activity and damage accrual. *Rheumatology*, 46(9), 1471-1476.

3. Bielesz, B., Reiter, T., Hammerle, F. P., Winnicki, W., Bojic, M., Gleiss, A., ... & Marculescu, R. (2020). The Role of Iron and Erythropoietin in the Association of Fibroblast Growth Factor 23 with Anemia in Chronic Kidney Disease in Humans. *Journal of clinical medicine*, 9(8), 2640.
4. Marsden, J. T. (2006). Erythropoietin-measurement and clinical applications. *Annals of clinical biochemistry*, 43(2), 97-104.
5. Mustafa, M.A., AL-Samarraie M.Q., Ahmed M. T. (2020). Molecular techniques of viral diagnosis, *Science Archives*, 1(3), 89-92 <http://dx.doi.org/10.47587/SA.2020.1303>
6. Mustafa, M.A & AL-Samarraie, M.Q . (2020) .SECONDARY MENOPAUSE and its RELATIONSHIP to HORMONAL LEVELS AMONG WOMEN at SALAH AL-DIN HOSPITAL . *European Journal of Molecular & Clinical Medicine* . Volume 7, Issue 09, PP 96-104.
7. Rocha, M. P., Campos, M. O., Mattos, J. D., Mansur, D. E., Rocha, H. N., Secher, N. H., ... & Fernandes, I. A. (2020). KATP channels modulate cerebral blood flow and oxygen delivery during isocapnic hypoxia in humans. *The Journal of Physiology*, 598(16), 3343-3356.
8. Wu, H., Klingmüller, U., Besmer, P., & Lodish, H. F. (1995). Interaction of the erythropoietin and stem-cell-factor receptors. *Nature*, 377(6546), 242-246.