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Evaluation of Hematological Parameters of Thyroid Disorders in Patients with Rheumatoid Arthritis in Wasit Governorate

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Annotation: The study aims to find out the relationship between hypothyroidism, hyperthyroidism and rheumatoid disease in general in the individuals of the study sample, as well as to predict cases of hyperthyroidism and hypothyroidism in rheumatoid arthritis patients, predict the diseases that may result from this and find solutions to reduce them, as well as to study some hematological indicators that give a clear indication of hypothyroidism or hyperthyroidism in rheumatoid patients, and the influence of factors: smoking, genetic history of the disease, body mass index, age and gender of the patient on the levels of hematological indicators.

This study was conducted in Wasit governorate at Al-Karama educational hospital and in coordination with the Endocrinology Center at Al-Zahra educational hospital located in Kut city and in coordination with the medical rehabilitation, physiotherapy and arthroplasty Center in Kut, for the period from October 1-2023 to April 21-2024, the study included (94) samples as a total group

and included (61) female and (33) male, and included: (50) individuals as a control group and (44) individuals as a patient group, and included three age groups(21 - 29), (30 - 49) and (50-76) where they were divided into three groups as follows: 1-the first group: 37 patients: (25) female and (12) male with hypothyroidism aged (22-65) years. 2-the second Group: 7 patients: (4) females and (3) males with hyperthyroidism, aged (30-76) years. 3-the third group: 50 healthy individuals: (32) female and (18) male representing the control group, aged (21-75) years.

The results of the study showed, in general, when comparing the patient group with the control group, a significant increase in Esr and a significant decrease in Pcv, Hb, Wbc, Hct, where the p-value was less than or equal to (0.05), as for the effect of the smoking factor on Esr, where there was a significant increase and the p-value was less than (0.05), as for the effect of the smoking factor on the parameters: Pcv, Hb, Wbc, Hct the presence of a significant decrease and the p-value is less than (0.05). With regard to the influence of the genetic history factor of the disease on the mentioned blood parameters, it turns out that there is no significant effect on those parameters and the p-value is greater than (0.05). As for the Bmi effect on Esr, we find that there is a significant increase and the p-value is less (0.05), while we find from the Bmi effect on the blood parameters: Pcv, Hb, Wbc, Hct that there is a significant decrease and the p-value is less than (0.05).

As for the effect of the age factor on the ESR parameter, we find that there is a

significant increase and the p-value is less than or equal to (0.05), and from knowing the effect of age on the blood parameters: Pcv, Hb, Wbc, Hct, it turns out that there is a significant decrease and the p-value is less than (0.05). As for the effect of the sex factor on the mentioned blood parameters, there is no significant effect, and the p-value is greater than (0.05).

When we compare the control group with the group of Hashimoto's and Graves ' patients, we find that there is a significant decrease in Hashimoto's hematological parameters: Esr, Pcv, Hb, Wbc, Hct and that the p-value is less than (0.05), while we find that there is a significant increase in graves hematological parameters: Esr, Pcv, Hb, Hct and that the p-value is less than (0.05), while in Wbc we find a significant decrease in graves, the p-value is less than (0.05).

Conclusions: We conclude from the result of the current study the following: 1-the incidence of Hashimoto's disease of hypothyroidism in the study sample is 39%, while the incidence of Graves ' disease of hyperthyroidism is 0.07%. 2-the percentage of rheumatoid disease infection compared to the total sample is 47 %. 3-we conclude from this result that rheumatoid disease, due to its high incidence in the study sample, affects the occurrence of thyroid disorders. 4-the prevalence of Hashimoto's disease increases with age. 5-the occurrence of anemia in rheumatoid patients with hypothyroidism. 6-a high percentage of patients with pain, arthritis and vasculitis, especially in graves ' patients, as a result of the effects of smoking and obesity, and this is determined by increasing Esr levels as an

indicator of the level of inflammation of joints and tissues in the body. 7-an increase or decrease in the percentages and levels of Pcv, Hb, Wbc, Hct leads to an increase or decrease in blood density, which leads to an increase or decrease in blood pressure or the occurrence of anemia or a decrease in the body's immunity when the Wbc is low or inflammation of blood vessels. 8-low levels and ratios of blood parameters lead to lethargy, fatigue, headaches, a decrease in heart rate and lack of appetite for food. 9-the occurrence of hyperthyroidism in the study sample, specifically from the ages of (22-65) years, may be due to exposure to environmental pollution such as radiation or the consumption of iodine in large quantities, or the cause may be drinking alcohol, or as a result of mental disorders and diseases or following some harmful eating habits such as caffeine consumption or sugar through drinking coffee and soft drinks.

Keywords: Rheumatoid arthritis disease, hypothyroidism, hyperthyroidism, hematological parameters.

1. INTRODUCTION: Rheumatoid arthritis is an autoimmune disease and is a chronic inflammation, it damages joints and extra-articular organs, such as the heart, kidneys, lung, eye, skin, nervous and digestive systems. many types of it have been described and classified into: 1-to non - inflammatory arthritis (osteoarthritis) 2-inflammatory arthritis caused by crystal deposition (pseudogout, primary calcium phosphate disease, gout) by bacterial and viral infections such as: Staphylococcus aureus and enterovirus (1).

Some of the autoimmune rheumatic diseases also include systemic lupus erythematosus, Sjogren's Syndrome, adult onset scleroderma, spondylitis, psoriatic arthritis, polymyositis. Since these injuries may be similar in signs and symptoms, a differential diagnosis is necessary. The exact etiology of rheumatoid arthritis has not yet been clear, and the current hypothesis states that unregulated citrulline leads to the production of antibodies to the anti-citrulline protein and this leads to permanent joint damage. In addition, rheumatoid complications and concomitant diseases reduce the average life of patients by a few years (1).

Cases of arthritis are one of the most serious diseases that humans ever face, and this is even more worrying as there is no known cure for rheumatoid arthritis. Researchers have been looking for safer alternatives, such as herbal medicines, as traditional treatments used to treat severe arthritis have many side effects and negative (2). Rheumatoid arthritis represents a chronic and inflammatory disease of connective tissue that has specific clinical and laboratory characteristics. follow-up to rheumatoid arthritis requires multidisciplinary treatment that combines pharmacological and non-pharmacological measures. And this approach is being used in therapy recently, since most patients with rheumatoid arthritis can maintain their functional ability while alleviating their pain and suffering (3).

Furthermore, rheumatoid arthritis is a chronic inflammatory disease that is characterized by the unchecked growth of synovial tissue and is linked to numerous other illnesses.. various studies indicate that its prevalence worldwide is 0.8 percent, and women are twice as likely to get sick as men. If untreated, as well as 20 to 30 percent of people with rheumatoid arthritis become permanently incapacitated within two to three years after the diagnosis of the disease (4).Despite adequate medical treatment, joint destruction often results and the use of surgical treatment of joint deformities may be necessary to restore function (5).

2. MATERIAL AND METHODS:

2.1 Study design: The study was conducted at Al - Karama teaching hospital and Al-Zahra teaching hospital under the supervision of doctors specializing in surgery and treatment of joint diseases and doctors specializing in endocrine and thyroid disorders for the period from 1-10-2023 to 21- 4-2024 the study included the selection of (94) samples, including (50) individuals from the control group and (44) individuals from the patient group, and the sample was divided into three age groups: the first from (21-29) years and the second from (30-49) years and the third group of (50-76) years, and included a group of (37) patients with hypothyroidism and (7) patients with hyperthyroidism, the total number of males of the total sample was (33) male and the total number of females of the total sample was (61) female. Samples were collected and compared with the control group based on the presence of hypothyroidism or hyperthyroidism, the study of the effect of smoking factor, genetic history of the disease, body mass index, age and sex factors, and to find out the effect of these factors on blood parameters.

2.2 Blood sample: Blood samples were drawn from the control group and patients group by intravenous and using a 5 ml syringe, the blood sample is placed in the gel tube and then separated by a centrifuge under a speed of 3000 rpm for ten minutes about pcv.Draws 5 ml of venous blood samples from control and patients to measure Esr, Pcv, Hb, Wbc, Hct, where the ratios and levels of Pcv, Esr are calculated manually, while the measurement of Hb, Wbc, Hct is calculated using an German-made CBC system. **2.3 Statistical Analysis:** The data were analyzed statistically using SPSS vet.25, and the averages were compared using Chi-square under a probability level of 0.05. one way analysis of variance (ANOVA). Accepting or rejecting the test hypothesis based on the probability value method associated with by arithmetic mean, based on the statistical significance level of 5% or 1%.

3. RESULTS AND DISCUSSION:

Based on results of p-value and related to the hematological parameters of rheumatoid arthritis patients with thyroid disorder among the patient group and the control group, we find that p-value of these parameters is less than or equal to (0.05) and they represent a significant values.

Depending on p - value which is less than (0.05) for effect of the smoking factor on the Esr parameter, where it is shown that this factor has an impressive a significant value.

Based on p - value for Pcv parameter which is less than (0.05) as for smoking factor, it also represent a significant value and statistical significance.

We observe P - value which it is less than (0.05) for parameter Hb as for smoking factor, we find that it represents a significant value.

When observing p-value of WBC parameter as for smoking factor, we find it represent a significant value and statistical significance.

When we observe p-value of Hct parametr as for smoking factor, we find its represent a significant value and statistical significance.

We observe by the results of p-values which is more than (0.05) to the blood parameters for genetic history factor of Esr, Pcv, Hb, Wbc, Hct, and that these parameters have no significant value.

By value of P - value which is less than (0.05) relate to Esr parameter for Bmi, it turns out that it represent a significant value.

Based on P - value where is less than (0.05) for parameter Wbc for Bmi factor, its represent a significant value.

Based on P-value where is less than (0.05) for Pcv for Bmi factor, its represents significant value.

When observing result of P - value which is less than (0.05) of the parameter Hb for Bmi factor, this indicates that it has asignificant value.

Based on result of P - value which is less than (0.05) of Hct for Bmi, we find that it has a significant value.

Table (1) effect of risk factors on blood parameters of rheumatoid arthritis patients with thyroid disorders

BMI	Genetic history	Smoking	P-value	Mean ± SD		parameters
P-value	P-value	P-value		Patient (n=44)	Control (n=50)	
0.032	0.152	0.013	0.032	35.93 ± 4.15	21.36 ± 3.12	ESR ml-h
0.001	0.318	0.042	0.050	30.66 ± 2.18	36.79 ±2.22	PCV %
0.003	0.253	0.012	0.012	9.48 ± 1.51	14.00 ± 1.53	Hb g-dL
0.046	0.721	0.031	0.047	32.6 4± 2.50	45.92 ± 6.50	WBC cell-µl
0.001	0.141	0.037	0.031	33.91 ± 3.11	40.72 ± 2.21	HCT %

When observing P- value, which is less than or equal to (0.05) when comparing the control group with the patient group for parameters: Esr, Pcv, Hb, Wbc, Hct, we find that these parameters represent a significant value.

Based on P - value which is less than (0.05) for Esr as for Age factor, it is clear that this parameter is represent a significant value.

Based on P - value which is less than or equal to (0.05) for Pcv, Hb, Hct, for the Age factor, it turns out that these represent a significant value.

Depending on p- value which is less than (0.05) for the Wbc parameter relative to the Age factor, it turns out that it represents a significant value.

Table (2) effect of age factor on blood parameters of rheumatoid arthritis patients with thyroid disorders

Age (21-29, 30-49, 50-76) P-value	P-value	Mean ± SD		Parameters
		Patients (n= 44)	Control (n= 50)	
0.005	0.032	35.93±4.15	21.36±3.12	ESR ml-h
0.013	0.050	30.66±4.18	36.79±4.22	PCV %
0.001	0.012	9.48±1.51	14.00±1.53	Hb g-dL
0.020	0.047	32.64±2.50	45.92±6.50	Wbc cell-µl
0.018	0.031	33.91±3.11	40.72±2.21	Hct %

Ns: non-significant P>0.05 // S: significant P≤0.05

When observing P- value which is less than or equal to (0.05) when comparing the control group with the patient group for parameters: Esr, Pcv, Hb, Wbc, Hct, we find that these parameters represent a significant value.. Based on p-value that is greater than (0.05) for the following blood parameters: (Esr, Pcv, Hb, Wbc, Hct) for the sex factor, we find that it does not represent a significant value or statistical significance.

Table (3) effect of sex factor on blood parameters of rheumatoid arthritis patients with thyroid disorders

sex P-value	P-value	Mean ± SD		Parameters
		Patients (n= 44)	Control (n= 50)	
0.652	0.032	35.93±4.15	21.36±3.12	ESR ml-h
0.267	0.050	30.66±4.18	36.79±4.22	PCV %
0.293	0.012	9.48±1.51	14.00±1.53	Hb g-dL
0.720	0.047	32.64±2.50	45.92±6.50	Wbc cell-µl
0.131	0.031	33.91±3.11	40.72±2.21	Hct %

Ns: non-significant P>0.05 // S: significant P≤0.05

Depending on P - value which is less than (0.05) for Esr in hashimoto, we note that there is represent a significant value, whereas in graves it is p-value is less than (0.05), where it is represent a significant value.

Based on P - value which is less than (0.05) for the Pcv, Hb, Hct parameters in hashimoto patients, it becomes clear that those represents a significant value, as for graves ' patients where the p-value is less than (0.05) for those parameters which has a significant value.

Based on p - value which is less than (0.05), for hashimoto and graves patients for the Wbc parameter, we note that is represent a significant value in both diseases.

Table (4) comparison between two groups of hyperthyroidism and hypothyroidism for rheumatoid arthritis patients with thyroid disorder on blood parameters.

Mean ± SD					Parameters
P.value	Graves (n=7)	P.value	hashimoto (n=37)	Control (n=50)	
0.002	50.41±1.25	0.005	10.68±1.43	21.36±3.12	ESR ml-h
0.031	52.10±5.51	0.001	30.98±1.12	36.79±4.22	PCV %
0.011	17.04±1.22	0.019	9.10±3.21	14.00±1.53	Hb g-dL
0.022	13.00±1.52	0.003	31.16±2.33	45.92±2.50	Wbc cell-µl
0.041	51.57±4.33	0.026	32.57±2.62	38.72±2.21	Hct %

Ns: non-significant P>0.05 // S: significant P≤0.05

4. DISCUSSION:

Result of this study shows that there is a significant increase in Esr when comparing the control group with the patients group this corresponds to the following study (6). and the reason is that rheumatoid disease as an immune inflammatory disease leads to an increase in the proportion of inflammatory proteins in the blood such as fibrinogen and Crp, and does not correspond to the following study by (7).

Considering the result this study shows that there is a significant decrease in Pcv and the reason that rheumatoid patients with thyroid disorder have a decrease in the production of erythrocytes due to a decrease in the stimulation of the blood-producing hormone (erythropoietin), and this corresponds to the following study (8). and does not correspond to the following study (9).

During observation of result of the study shown, we find that there is a significant decrease in the Hb, Hct, as this corresponds to the following study (10). and this is explained by the fact that patients with hypothyroidism, the level of stimulating hormone for the production of red blood cells decreases, this leads to a decrease in the levels of Hct, Hb. the following study does not agree (11).

Considering the result of the Wbc parameter, we find that it represents a significant decrease and this corresponds to the following study (12). and is explained by a decrease in thyroid hormones (hypothyroidism) or low levels of zinc, vitamin d, b12, which all lead to a decrease in leukocyte production and do not correspond to the following study (13).

Through result of study shown, which relates to the Esr parameter for the smoking factor, we find that there is a significant increase, this corresponds to the study (14). this is explained by the fact that smoking causes chronic infections and raises the proportion of inflammatory proteins such as Crp, and fibrinogen, which cause an increase in blood sedimentation rate, but we find that the following study does not correspond to above study (15).

By reviewing result of study shown, which relates to the Pcv parameter relative to the smoking factor, we find that there is a significant decrease and this corresponds to the study (16). and this is explained by the fact that smoking causes a decrease in the production of erythrocyte stimulating hormone and therefore the concentration level of Pcv decreases, the following study does not correspond (17).

Considering result of study related to the Hb parameter for the smoking factor, we find that there is a significant decrease this coincides with the following study (18). this is explained by the fact that smoking causes an increase in the concentration of (co) in the blood, the (o2) decreases, the iron decreases, and then the Hb decreases, this result does not match the following study (19).

Depending on result of Wbc parameter relative to the smoking factor, we find that there is a significant decrease this corresponds to the following study (20). this is explained by the fact that smoking causes oxidation and breakdown of white blood cells, above study does not match the following study (21).

Result of Hct parameter relative to the smoking factor, we find that there is a significant decrease this corresponds to the following study (22). this is explained by the fact that smoking causes oxidation and destruction of blood cells, which leads to a decrease in their number and thus a decrease in the percentage of Hct, this study does not match the result of the researcher, namely (23).

Based on result of hematological parameters relative to the patient's genetic history factor, we find that there is no significant value in them, and this is explained by the absence of a pathological genetic history of the study sample, and this corresponds to the following study (24). this study does not match the result of the researcher, namely (25).

Due to result of Esr parameter relative to the Bmi factor, we find that there is a significant increase and this is explained by the fact that obesity leads to increased oxidation and chronic inflammation and the production of free radicals that damage blood cells and raise the level of Esr, this coincides with the following study (26). this study does not match the result of the researcher, (27)

Based on result of Pcv parameter relative to the Bmi factor, we find that there is a significant decrease this is explained by the fact that obesity leads to chronic infections and hypothyroidism and therefore leads to a decrease in the production of red blood cells and leads to a decrease in Pcv, and this coincides with the following study (28). this study does not match the researcher's result (29).

By result of Hb parameter for the Bmi factor, we find that there is a significant decrease this is explained by the fact that obesity leads to chronic infections and the formation of free radicals that lead to the destruction of red blood cells and cause anemia and iron deficiency and thus lead to a decrease in Hb, and this coincides with the next study (30). study that does not match the researcher's result, which is (31).

Through result of Wbc parameter for the Bmi factor, we find that there is a significant decrease this is explained by the fact that obesity leads to the production of inflammatory cytokines and increased oxidation, causing a decrease in leukocyte production, and this corresponds to the following study (32).this study does not match the result of the researcher, namely (33).

When we observe the result of the Hct parameter for the bmi factor, we find that there is a significant decrease this is explained by the fact that obesity leads to the production of inflammatory cytokines and increased oxidation, both of which lead to the breakdown of red blood cells and their low number leads to a decrease in the percentage of hct, and this coincides with the following study (34). this study does not match the researcher's result, which is (35).

Depending on result of Esr parameter relative to age factor, we find that there is a significant increase this is explained by the fact that as the patient ages, the Esr increases due to an increase in the rate of oxidation and inflammatory production of cytokines in rheumatoid patients, which leads to damage to red blood cells and increase, and this corresponds to the following study (36). this study does not match the researcher's result, which is (37).

Based on result of parameters: Pcv, Hb, Hct relative to age factor, we find that there is a significant decrease this is explained by the fact that the patient ages when advancing, these blood parameters mentioned levels decrease due to the increased rate of oxidation and inflammatory production of cytokines in rheumatoid patients with thyroid disorder, which leads to damage to red blood cells and a decrease in their number and production, and this corresponds to the following study (38). this study that does not match the researcher's result (39).

Considering result of Wbc parameter relative to the age factor, we find that there is a significant decrease, this is explained by the fact that when the patient ages when advancing, the leukocyte count decreases due to an increase in the rate of oxidation and inflammatory cytokines in rheumatoid patients with thyroid disorder, which leads to deterioration of bone marrow function and reduced production of white cells, and this corresponds to the following study (40). this study that does not match the researcher's result, which is (41).

When observing result of the following hematological parameters: Hct, Wbc, Hb, Pcv, Esr, for sex factor, we see that there was no significant difference in their levels and ratios, this is explained by the fact that the study samples from the patient and control groups are similar in their number for both sexes in addition to the limited number of samples, and this coincides with the following study (42). while we find another study that does not match the researcher's result (43).

The result of Esr parameter for hashimoto's patients, we see that there is a significant decrease in its level, this is explained by the fact that the Esr decreases in hashimoto as a result of a decrease in thyroid hormones, which causes a decrease in the production of red cells and sometimes

erythrocytes break down due to the inflammatory production of rheumatoid, and this corresponds to the following study (44). while there we find a significant rise in Esr in graves ' patients this is explained by the increased inflammatory production of rheumatoid and the formation of inflammatory proteins in the blood such as fibrinogen and Crp or the effect of anti-rheumatoid drugs, this corresponds to following study (45). the following study does not correspond to the above results for Esr in the two diseases (46).

Depending on result of parameters: Pcv, Hb, Hct, for hashimoto's patients, we see that there is a significant decrease in their levels, this is explained by the fact that a decrease in thyroid hormones leads to a decrease in the production of the hormone erythropoietin, which stimulates the production of erythrocytes and thus a decrease in their number and production, in addition to the effect of the inflammatory effectiveness, and this match with the following study (44). as for Graves ' patients, we find that there is a significant increase in the Esr result, this study matches the researcher's result (47). and this is explained by hyperthyroidism and increased inflammatory activity of rheumatoid leads to an increase in the production of erythropoietin and stimulate the production of erythrocytes, the following study does not match the researcher's results on the moral rise and decrease of Pcv, Hb, Hct (48).

Result of Wbc parameter for hashimoto's patients, we see that there is a significant decrease in the number of Wbc, this is explained by the fact that hypothyroidism reduces the production of erythropoietin responsible for the production of blood cells and also decreases the effectiveness of the bone marrow, leading to a decrease in the number of leukocytes, and this coincides with the following study (43)., We find that there is a significant decrease of the Wbc parameter in graves ' patients, we find that the following study supports the researcher's result (49). and this is explained by hyperthyroidism, increased inflammatory activity and oxidative stress in rheumatoid patients, which leads to the breakdown of blood cells and a decrease in the number of Wbc, while we find that following study does not match the researcher's findings on the moral decline of Wbc in both diseases (50).

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