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## Study the effect of rheumatoid arthritis on some hematological and biochemical standards in pregnant women

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## ORIGINAL STUDY

# Study the Effect of Rheumatoid Arthritis on Some Hematological and Biochemical Standards in Pregnant Women

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### Abstract

Arthritis is an autoimmune and inflammatory disease that may be due to genetic factors and some autoantibodies, It causes inflammation of the parts it affects, mainly attacks the joints, affects the feet and hands clearly, and can extend to the rest of the body organs such as the heart and lungs, and causes tissue damage, generating severe pain in the long term. It affects women more than men.

It was found from the results of the current research study that there are a number of significant differences between the patients group and the control group, and the results were as follows.

It was found that the patients had a high rate of rheumatoid arthritis estimated at 71 % compared to the control group, which was estimated at 29 %. Also, there was a significant variance estimated at  $p < 0.05$  in the WBC count between RA patients and control group, which was mean  $(8.34 \pm 1.12, 3.82 \pm 0.8 \text{ mm}/10^3)$ .

The results also indicated that there was a significant variance by increasing the concentration of Alkaline phosphatase (ALP) in the group of pregnant women with arthritis compared to the group of control group by  $(17.144 \pm 7.15, 5.412 \pm 3.75 \text{ (U/l)})$ , respectively. As for the Aspartate transaminase enzyme (AST), the results showed an increase in the concentration of this enzyme, which means that there is also a significant difference in the group of patients with the disease compared to the control group and it was  $(18.721 \pm 5.505, 64.23 \pm 8.8 \text{ (U/l)})$ , respectively, the results of Alanine transaminase enzyme (ALT) indicated a significant increase in the patients group compared with the control group of women with a rate of  $(85 \pm 2.42, 43.3407 \pm 7.08 \text{ (U/l)})$ , respectively.

It was also observed that there was a significant increase  $p < 0.05$  in the concentration of total cholesterol in the group of women suffering from generalized arthritis compared to the control group, with an estimated rate of approximately  $(18.8320 \text{ and } 11.336 \text{ (mg/dL)})$ , respectively. It was noted that there was a significant increase  $p < 0.05$  in the concentration of triglycerides in the group of women suffering from arthritis compared to the control group. The average was  $(47.891, 39.20 \text{ (mg/dL)})$ , respectively.

However, there was no significant difference  $(p > 0.05)$  in concentration of total proteins and albumin, between patients with arthritis between the control group. The proportions were for both of them and for the patients and control groups  $(82.5 \pm 1.03, 61.23 \pm 0.9)$ ,  $(45.65 \pm 1.9, 30.23 \pm 0.74)$  respectively.

Also, it was found that there was a significant decrease  $(p < 0.05)$  with serum (K) of RA patients compared to the control and the mean.  $(1.43 \pm 0.09, 5.6 \pm 0.22 \text{ (mm/l)})$  respectively, there were a significant variation  $(p < 0.05)$  in serum calcium (Ca) among patients and control and rate  $(2.37 \pm 0.12, 2.85 \pm 0.22 \text{ (mmol/L)})$  respectively, It was also observed that there was an increase at significant level  $(p < 0.05)$  of sodium ion concentration of patients when compared with value of (Na) in the control and rate  $157.5 \pm 1.04, 129.42 \pm 1.6 \text{ (mmol/L)})$  respectively.

In the current study, we provide a comprehensive perspective to study the criteria most affected by arthritis in pregnant women, with an emphasis on the importance of early diagnosis of the disease and taking appropriate treatment to limit its development and its access to the rest of the body and causing greater harm to the patient. We suggest through this study to carry out future research studies that contribute to the treatment of the disease. Arthritis or reduce the incidence of it, And the results of this study showed a significant increase in infected women with  $p < 0.05$  more than healthy women.

**Keywords:** Rheumatoid, Pregnancy, Liver enzymes, Total cholesterol, Total protein

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## 1. Introduction

**R**heumatoid Arthritis (RA) is a chronic disease or inflammatory disorder. It affects many parts of the body, but its main target is the synovial joints [15].

The disease often leads to damage or destruction of the articular cartilage as well as joint stiffness in patients. This can also cause inflammation in the lungs. Also, the infection of nodular tissue lesions under the skin, which is one of the things accompanying the symptoms of the disease. However, the exact cause of the disease is not yet known, as

Table 1. Determination of the percentage of rheumatoid factor in rheumatoid arthritis and control patients.

Standards	Patient group M ± SD	Control group M ± SD
Rheumatoid Factor (RF)	71%	29%

Table 2. Effect of rheumatoid arthritis on some blood parameters in pregnant women and control (healthy) group.

Standards	Patient group M ± SD	Control (healthy) group M ± SD
WBC mm/ 10 <sup>3</sup>	*8.34 ± 1.12	3.82 ± 0.87
Hb g/l	12.11 ± 0.27	12.44 ± 0.88
PCV%	29.34 ± 1.13	29.76 ± 1.02
ESR mm/hr.	*25.5 ± 1.04	9.67 ± 1.07

\* Significant difference (P < 0.05).

Table 3. The effect of generalized arthritis on concentration of liver enzymes.

Standards	Patient group M ± SD	Control (healthy) group M ± SD
ALP (U \ l)	*17.144 ± 7.15	54.12 ± 3.75
AST (U \ l)	*18.721 ± 5.505	64.23 ± 8.8
ALT (U \ l)	*85 ± 2.42	43.3407 ± 7.08

\* Significant difference (P < 0.05).

Table 4. Effect of generalized arthritis in women on blood lipid content.

Standards	Patient group M ± SD	Control (healthy)group M ± SD
Total Cholesterol (mg/dl)	*18.8320 ± 9.80	11.336 ± 1.01
Triglycerides (mg/dl)	*47.891 ± 19.97	39.20 ± 10.95

\* Significant difference (P < 0.05).

Table 5. Effect of arthritis on total protein and albumin concentration.

Standards	Patient group M ± SD	Control (healthy) group M ± SD
Total protein	82.5 ± 1.03	61.23 ± 0.9
Albumin	45.65 ± 1.9	30.23 ± 0.74

Table 6. The effect of arthritis on the concentration of some ions between the affected women and the control (healthy) group.

Standards	Patient group M ± SD	Control (healthy) group M ± SD
K	*1.43 ± 0.09	5.6 ± 0.22
Ca	2.37 ± 0.12	2.85 ± 0.22
Na	*157.5 ± 1.04	129.42 ± 1.6

\* Significant difference (P < 0.05).

autoimmunity plays a role in its progression [6]. Women are 3 times more likely to get disease than men, between the ages of 40 and 50 [16]. and the infection can occur in the rest of the ages as well. The joint can be disfiguring and painful for the patient, which can also lead to difficulty performing and moving around. Initial diagnosis is based on clinical signs, symptoms and in addition to rheumatoid factor (RF) blood tests and x-rays that show the extent of the deformity and damage [17]. Clinical manifestations of RA, which is considered one of the important factors in the diagnosis process, are joint stiffness in the early morning and at rest times, low-grade fever, limited movement and deformities in the hands and feet in addition to swelling and deterioration in tissues and bones, severe pain and redness of the joints [18].

[23] suggested use of calcitonin with some calcium supplements has its place in the treatment or reduction of osteoporosis.

[4] reported that long-term treatment with oral bisphosphonates overcomes the loss or prevention of osteoporosis and increases overall bone mass. This result may be of importance with regard to the treatment of this disease. On the other hand, the study of some minerals, alkaline phosphatase and its balancing enzymes play an effective role in the treatment of postmenopausal osteoporosis in RA.

## 2. Materials and methods

### 2.1. Sample collection

The required samples were collected from the women who attended some hospitals, health centers and private clinics in Najaf province for the period of time (November 2022–March 2023), They are estimated to be between 18 and 40 years old, 230 pregnant women participated in this study, who attended some hospitals (Al-Zahraa Teaching Hospital, Al-Sadr Teaching Hospital, and Al-Hakim Hospital, in addition to some primary health care centers in the city). An appropriate amount of the patient's blood was taken, in an amount of 5 ml, and placed in sterile tubes, especially according to the

test for which they were collected. The samples were transferred and the tests required to be examined in this study were performed on them.

### 3. Test methods

The levels of blood parameters were estimated in different ways depending on the type of standard being dealt with as follows

Determination of rheumatoid factor (RF): This is done using a special kit to detect rheumatoid factor from Maxin Corporation, Whereas, the packed cell volume (PCV) was quantified using capillary tubes. While the hemoglobin percentage was estimated using the coulometric method, where (2 % ml blood) was added to (5 ml drabkin's solution) and read at 590 nm by a spectrophotometer (The kit is from Olympus, Japan).

The total number of white blood cells (WBCs) was estimated using a blood cell counting slide after the sample was diluted. (The kit is from Himedia, India).

Determination of the percentage of total protein in the blood was estimated using a special kit for this purpose and the reading is done at a wavelength of (550) nanometers, The determination of serum albumin was estimated using a special kit for this purpose, and the reading is done at a wavelength of (628) nanometers (The kit is from Stermite, Japan).

Determination of calcium, potassium, and sodium in the serum: it was estimated using a special kit for this purpose, and the reading is done at a wavelength that differs from one ion to another (The kit is from Mast, England).

To investigate the levels of ESR, it was done by taking blood and my hands from the patient and working on it with a special ESR device for this purpose, and calculating from it the erythrocyte sedimentation rate (The kit is from Himedia, India).

The estimation of total cholesterol in the blood was adopted in the usual way based on taking serum from the patient and then reading the result at a specific wavelength. Using enzymatic method of [10], Triglycerides of patients' samples were also estimated using the enzymatic method of both Prenci and Fassati [5] (The kit is from Memert, Germany).

The activity of ALP was estimated based on the estimation of activity of phenol released [2], Estimation of enzyme activity ALT and AST was based on method of Reitman and Frankel, (1957) which is based on estimation of oxaloacetate and pyruvate liberators during the reaction process (The kit is from GFL, Germany).

### 3.1. Statistical analysis

The statistical analysis of the results of the current study was carried out by relying on SPSS system, and  $p < 0.05$  was considered a factor for distinguishing significant variance.

## 4. Results and discussion

Where the test results showed in the patients' serum a positive percentage of (RA), which is estimated as 71 % compared to the control group, which is estimated at about 29%, as in Table 1 and this agrees with [9]. Also, this factor has a not weak relationship with other inflammatory diseases such as SLE Sjogren's syndrome and other.

Results of current study, as shown in Table 2, showed the change in some parameters of affected patients, as shown in the following.

The results in this study showed that there was a significant variation ( $p < 0.05$ ) in the number of white blood cells between patients with RA and the control group, with level of probability ( $P < 0.05$ ), increase in WBCs, This is likely because the immune system's response to counter inflammatory effects in tissues. These results agree with [20].

Also, no significant difference ( $p > 0.05$ ) were found in Hb ratio between the patients and the control group,. People with arthritis are at risk of developing anemia. This is likely because iron deficiency, but the use of NSAIDs by people can contribute to iron deficiency anemia in patients who use this type of drugs [13,14]. There was no significant difference ( $p > 0.05$ ) for PCV index of patients compared with control group, These results agree with [9].

There was increase in rate of ESR in patients with RA compared to control group with level of probability ( $P < 0.05$ ), The increase could be related to the high percentage of tissue damage and chronic and acute inflammation. And if ESR levels are greatly affected, for example, not only as a result of arthritis, but it can also be the result of other factors such as infection, malignant tumors, and red blood cells of abnormal shape or size, as it has been shown in some studies that they tend to be higher in females Arthritis women compared to males with this disease [11].

Results of the current study indicated that there was a significant increase in the concentration of the enzyme alkaline phosphatase (ALP) in group of pregnant females with arthritis compared to the group of control women. As for AST enzyme, results showed a significant increase in it for the group of women with the disease compared to the control

group, while the results for ALT enzyme showed a significant increase in the control group when compared to the control group in women. Thus, we notice higher concentrations of liver enzymes in infected women compared to control group, in [Table 3](#).

Where the activity of the above enzymes changes as a result of the destruction of the liver cells, and this in turn causes the liberation of these enzymes and an increase in their effectiveness. Also, this liberation and effectiveness is related to the incidence of various liver diseases, and that is, there is a relationship between the elevation of these three enzymes and the disease of arthritis [8]. It has been found that rheumatoid arthritis affects the liver and its functions, as the disease affects liver enzymes [7].

Results of our current study indicated that there was a significant increase ( $P < 0.05$ ) in concentration of total cholesterol in group of women with general arthritis compared to control group, while study indicated that significant increase ( $P < 0.05$ ) in concentration of triglycerides for group of women with arthritis compared to control group, as shown in [Table 4](#). The rise in concentration of both cholesterol, and triglycerides can be attributed to an increase in the activity of Hepatoglobulin and that this substance is closely linked with Apolipoprotein A1 which in turn inhibits the esterification of cholesterol and its transfer to the liver and thus increases its concentration in the blood. This is consistent with a study [24]. and other studies showed that the rise in the rate of triglycerides and a decrease in HDL leads to an increase in rate of atherosclerosis in patients with RA [12].

Results of this study found that there was no significant difference ( $p > 0.05$ ) in the concentration of total proteins and albumin between patients with arthritis between the control group. The proportions were for both of them and for the patients and control group, and this result corresponds to the result ([Table 5](#)) [1].

Results of current study found that some changes at some ions in arthritis patients compared to control group in the [Table 6](#) and as shown below:

- Results showed significant decrease ( $p < 0.05$ ) in the serum (K) of RA patients compared the control, the massive decrease in potassium concentration may be due to the effect of some hormones such as aldosterone, adrenaline, and (ADH) on glomerular filtration in the kidneys, thus decreasing the percentage of potassium in the patient's serum, and this is consistent with results of some study [1].

- There were a variation in serum calcium (Ca) among patients and control. The decrease in calcium concentration may be due to increased glomerular filtration and an increase in serum phosphate, since phosphate metabolism has a strong binding to calcium, also This decrease in calcium may be due to an increase in metabolism, an increase in extracellular fluid content, or an increase in glomerular filtration of CA because calcium and phosphate metabolism are closely related and regulated by the level of vitamin D and the control of parathyron hormone secretion., this is consistent with results of the study [3].
- The results showed an increase at significant level ( $p < 0.05$ ) at sodium (Na) rate of patients when compared with values of (Na) in the control, this may be due to effect of RA on reducing concentration of K in the serum also as a compensatory mechanism an increase in the concentration of sodium in order to balance and regulate body fluid concentrations. These results are consistent with what was found in study [22].

## 5. Conclusion

In our study, we noticed an increase in the rate of rheumatoid factor in affected women, as well as an increase in WBC and ESR, a clear increase in the rate of liver enzymes (ALP, AST, ALT), an increase in total cholesterol and triglycerides and low in potassium, as well as some differences in some other parameters that were addressed in this research study.

At the end of this study, it is recommended to see a doctor as soon as one of the symptoms of arthritis is felt, as well as paying attention to the quality of the foods that are eaten, as foods rich in potassium, magnesium and vitamin D should be eaten.

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