

Study of some Physiological and Biochemical parameters of Rheumatoid Arthritis patients in Tikrit

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Abstract

This study include a serological, biochemical and hematological investigations for patients with Rheumatoid Arthritis (RA) who intended Tikrit teaching hospital and the out patient clinics from Oct.2007 to Aug. 2008. Forty blood samples were collected from patients with different age groups (20-60) years from each sexes and fifteen blood samples were collected from normal individuals as a control group. Data showed that the higher rate of disease was at the age group (40-49) years and the female /male ratio was (4:1). The study showed that (63.4%) of patients have positive results to genetic factors when compared with control healthy, also the study showed a significant statistical difference ($p < 0.05$) regarding the increase in ESR and WBCs. The results showed a non significant increase ($p > 0.05$) in serum total protein and serum albumin between patients (RA) and the control. Concerning electrolytes, data showed a significant decrease ($p < 0.05$) in potassium ion, and calcium ion concentrations among sera of patients compared with control group and a significant increase ($p < 0.05$) in sodium ion concentrations in patients when compared with control group. On the other hand, Aldosterone and cortisol hormones had been estimated in sera of patients and subjects. The results showed a significant decrease in the first conc. compared with the second conc. (control) of Aldosterone, while the cortisol conc. showed a significant increase in patients sera than subjects sera.

Introduction

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disorder that may affect many tissues and organ but principally attacks synovial joints. The process produce an inflammatory response of the synovium (synovitis) secondary to hyperplasia of synovial cells, excess synovial fluid, and the development of pannus in the synovium (1). The first known tracts of arthritis dated back at least as far as 4500 BC. A text dated 123 AD first describe symptoms very similar to rheumatoid arthritis (RA). It was noted in skeletal remains of Native Americans found in Tennessee. In the old world the disease is vanishingly rare before the 1600s and on this basis investigators believe it spread across the Atlantic during the age of exploration in 1859 the disease acquired its current name (2). The pathology of the disease process often leads to the destruction of articular cartilage and ankylosis of the Joints. And it can also produce diffuse inflammation in the lungs, pericardium, pleura and sclera and also nodular lesions, most common in subcutaneous tissue under the skin. Although the exact cause of (RA) is not known, autoimmunity plays a pivotal role in its chronicity and progression (3). About 1% of the world's population is afflicted by Rheumatoid arthritis, women three times more often affected at the ages of 40 and 50 years, but people of any age can be affected. It can be a disabling and painful condition, which can lead to substantial loss of functioning and mobility. It is diagnosed chiefly on symptoms and signs, but also with blood tests, Rheumatoid factor (RF) and x-rays (4). The available treatments for RA are non-pharmacological treatment includes physical therapy, orthose and occupational therapy. Analgesia (pain killers) and

anti-inflammatory drugs, including steroids which are used to suppress the symptoms, while disease modifying anti-rheumatic drugs are often required to inhibit or halt the underlying immune process and prevent long-term damage. In recent times, the newer group of biologics has increased treatment options (1,5). The clinical features of rheumatoid arthritis (RA) are early morning stiffness on the small Joints, symmetrical arthritis, low-grade fever (also a side effect of inflammation), limited range of motion due to loss of Joint mobility, deformities of the hands and feet from the swelling and deterioration to tissues and bones, nodules under skin, and pain and redness the Joints from chronic inflammation (6,7). There are many enzymes appear and develop with rheumatoid arthritis (RA) like: Matrix Metalloproteinases (MMP) Cysteine proteinases (Cathepsins B, H and L), Serine proteinase (Elastase, plasminogen, Activator, Cathepsin G) and Aspartic proteinases (Cathepsin D) (8). Also (RA) patient sera reveal some antibodies: HLA-DR (QKRAA), Heat shock proteins, Immunoglobulins (IgG), Cartilage antigens Type II collagen, GP39, Cartilage link protein and proteoglycans (9). This study designed to investigate the effect of (RA) on some physiological and biochemical parameters also to calculate the concentrations of aldosterone and cortisol hormones.

Materials and Methods The study samples :

(55) subjects were participated in this study (40 patients with RA & 15 healthy subjects as control), age 20-60 years who intended Tikrit teaching hospital and the out clinics from Oct.2007 to Aug. 2008. And (15) samples (10 female + 5 male) were collected from normal individuals as a control group. RA had been diagnosed due to the criteria which confirmed by the American rheumatoid association (10). The

sera were separated and frozen at -20° procedures of methods had been done as follow

1-Determination of packed cells volume (PCV) : had been estimated by the usage of capillary tubes and microcentrifuge (11).

2-Hemoglobin determination : Hb% had been estimated by using the colometric method when (0.02) ml of blood (with EDTA) added to (5)ml of Drabkin solution and competed to I L and read at 590nm by the spectrophotometer(12).

3-Total leukocytes count(WBCs) : The blood diluted by using Turke's fluid (prepared from Gentian violet stain) and estimated directly(11).

4- Rheumatoid factor(RF) determination : We used (13) singer and Reinthaler (1956) which depended on the agglutination occurring.

5-Determination of serum total protein : Total protein had been estimated by using kit manufactured by Biomerieux (France co.) , No. 02160 Read at wave length (550)nm(14).

6-Determination of serum albumin : serum albumin had been estimated by using kit manufactured by Biomerieux (France co.) , No. 02160 Read at wave length (628)nm(14).

7-Determination of serum calcium : serum calcium ions conc. had been estimated by using kit manufactured by Biomerieux (France co.) , No. 1011801 Read at wave length (570)nm(14).

8-Determination of serum potassium : serum potassium ions conc. had been estimated by using kit manufactured by Biomerieux (France co.) , No. 1011801 Read at wave length (578)nm(14).

9-Determination of serum sodium : serum sodium ions conc. had been estimated by using kit manufactured by Biomerieux (France co.) , No. 5735101 Read at wave length (410)nm(15).

10-Determination of serum Aldosterone hormone : Kit produced by Human Co.(German company) to determination the concentration of Aldosterone hormone . (No.1664) This test had been performed by ELISA technique methods(16).

11-Determination of serum Cortisol hormone: Kit produced by Human Co.(German company) to determination the concentration of cortisol hormone (No.1664) This test had been performed by ELISA technique methods(16).

Results and Discussion :

1-The relation between the (RA) disease and age groups:

The results showed high rate of the disease among patients (40-49) years than among (50-59) years, and the least ratios were in patients (20-29) years . In Kasper study (17) the patients (40-50) years had the highest ratio of disease than other age groups. Mahon (18) agreed with our study. This disease increase parallelly with the increase in the age until (70-85) years (19).

2- The effect of RA on haematological parameters .

Table(1) Shows No.of hematological parameters in patients and subjects .

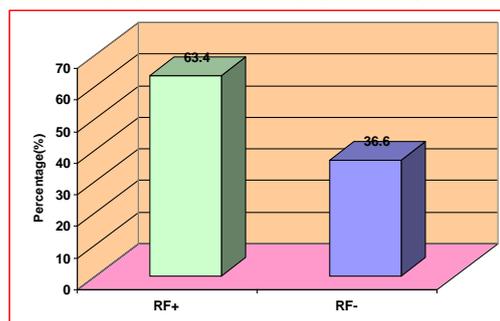
Group s	Parameters				
	N o.	PCV%	Hb g/l	WBC mm/10 ³	ESR mm/hr.
Subjects (control)	15	37.80±2.0	12.30±0.67	5.80±0.60	8.93±1.0
Patients	40	37.22±0.83	12.04±0.27	10.22±0.65*	21.5±2.6*

The results showed no significant($p>0.05$) decreasing in PCV of patients compared with PCV of the (control) (37.60±0.67) , (37.22±0.83) respectively. Also there were no significant variations ($p>0.05$) in Hb% between patients and the control (12.04±0.27) , (12.30±0.67) respectively .This results agree with(19 ,20). On the other hand there was a significant variation($p<0.05$) in the WBCs count between RA patients and the control (10.22±0.65), (5.80±0.60) respectively .The increase in WBCs may be due to the response of the immune system to face the inflammatory effects in the tissues(21) Comparison of ESR values (table 1) appeared significant ($p<0.05$) between patients and the control (21.5±2.6), (8.93±1.0) mm/hr respectively .The increasing in ESR of patients may be related to the increase in tissue damage and cell precipitation to decrease in Zetu-potential forces

3-Effect of sex in RA disease:

The results showed 82.5% females and 17.5% male whom affected by RA .This results agree with(9) which revealed that RA was a common inflammatory disease in females when compared with male and the ratio always about (4:1) (females: males), while another study (20) in India appeared (9:1) and the causes of this variations may be related to the hormonal effects, especially estrogen or genetics factors related with x-chromosome.

4-Determination the Rhaumatoid Factor:



Figure(1) Percentage of RF in patients with RA

The results showed that patients who appeared positive test of (RA) in their sera were 63.4% and this agreed with (19,21). Also this disease has a relationship with other inflammatory conditions like , systemic Lupus Erythematosus , Sjogrens syndrome and Scleroderma(23) Figure (1).

5-Concetrations of total protein and albumin:

The results (table 2) showed that there were no significant variation ($p>0.05$) between patients and subject in the concentration of the total proteins and albumin this evidence indicated that RA may had no effect on that parameters (tables 2) and this result agreed with(24,25).

Table(2) The concentration values(g/L) of total protein and albumin in RA patients and the control

Samples	Total protein	Albumin
Control	66.93±1.8	39.53±0.75
Patients	70.03±1.2	41.95±1.1

6-Potassium ion concentrations :

The results showed a significant decrease ($p<0.05$) in the serum K^+ of RA patients compared with the control. The results were (2.58±0.08),(4.5±0.21) mm/l in patients and control respectively .This significant decrease in serum k^+ may be due to the effect of certain hormones like aldosterone, Antidiuretic hormone (ADH) and Adrenaline which affect the glomerular filtration in the kidney and lead to increase k^+ excretion. (26,27) figure (2).

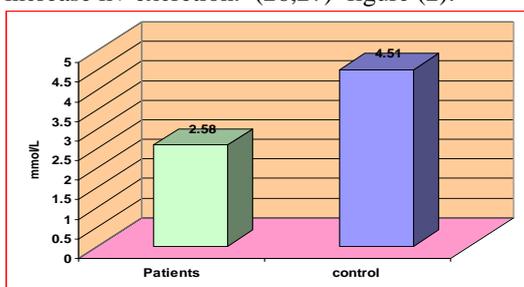


Figure (2) Potassium ion conc. in RA patients and control

7-Calcium ion concentrations:

There were a significant variation ($p<0.05$) in serum calcium among patients and control (2.29±0.06) , (2.65±0.16) mmol/L respectively .The significant decrease in serum ca^{++} in patient group may be due to increase in ca^{++} metabolism , increase in extracellular fluid compartment , or increase in glomerular filtration of ca^{++} and increase in serum phosphate , because ca^{++} and phosphate metabolism is closely related and regulated by vitamin D and Parathormone hormone . This study agreed with (28,29) figure (3).

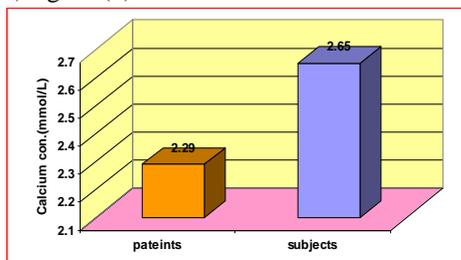
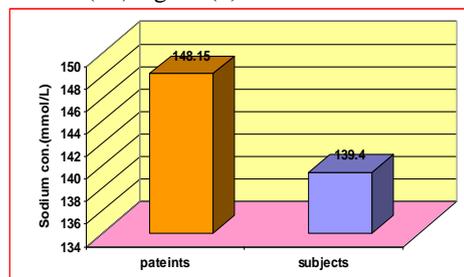


Figure (3) calcium ion concentrations of patients and control

8-Sodium ion concentrations :

The results showed an increase at significant level ($p<0.05$) in sodium ion concentration of patients

when compared with the values of Na^+ in the control which were (145.5±1.0), (139.40±1.4) mmol/L respectively .This is may be due to the effect of RA on decreasing serum k^+ and as a compensatory mechanism there will be an increase in serum Na^+ to compensate for decrease in serum k^+ to balance and regulate body fluids concentrations. This results agreed with (30) figure (4).



Figure(4) Sodium ion concentration of patients and the control

9-Serum Aldosterone hormone concentrations:

The figure (5) showed a significant variations ($p<0.05$) between serum aldosterone hormone concentrations in patients and control (74.7±7.1) , (135.4±12) pg/ml respectively. The causes of decrease the aldosterone hormone concentrations in patients with(RA) related to physiological and hormonal disorders occurred in the kidney induced by RA disease which increased the cortisol hormone conc., retained sodium ions conc. (figure 4) and depleted of potassium ions conc., which lead to negative feedback mechanism. That happened because of increase in k^+ excretion in distal convoluted tubule, the site where the aldosterone hormone act . This results agreed with (26,31).

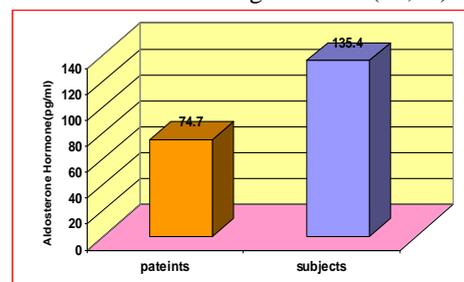


Figure (5) Serum aldosterone levels in patients and the control

10-Serum Cortisol hormone concentrations:

The results showed a significant increase ($p<0.05$) in the cortisol concentrations of patients when compared with the control (663±50), (427±38) pg/ml respectively .This increase related to the effect of RA disease which was a chronic systemic inflammatory disorder that may affected many tissues so the cortisol hormone reflect a protection agent against an inflammations. This response correlated with extra-articular manifestations and disease severity(32).Cortisol hormone acts always as a stress hormone increases suitable with the situation of the patients (31). figure(6).

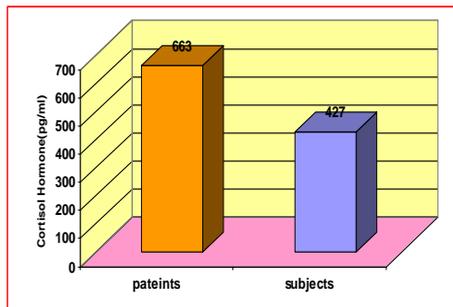


Figure (6) Serum Cortisol levels in patients and the control

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دراسة بعض المعايير الفسيولوجية والكيموحيوية في مرضى الروماتزم الرثواني في مدينة تكريت

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الملخص

تضمنت هذه الدراسة عدد من الاختبارات السيرولوجية والكيموحيوية والدموية لمرضى مصابين بمرض الروماتزم الرثواني Rheumatoid Arthritis الذين ادخلوا الى مستشفى تكريت التعليمي وبعض العيادات الخارجية من تشرين الاول 2007 ولغاية آب 2008. تم جمع (40) عينة من المرضى ذوي اعمار تراوحت (20-60) سنة من كلا الجنسين وخمسة عشر عينة جمعت من أفراد طبيعيين كسيطرة. أظهرت المعلومات بان اعلى معدل انتشار للمرض كان عند مستوى العمر (40-49) سنة وان نسبة الاناث الى الذكور من المصابين كانت (4:1). أظهرت الدراسة ان (63.4%) من المرضى كانت نتائجهم ايجابية للعوامل الوراثية عند المقارنة مع السيطرة وأظهرت الدراسة ايضا وجود تباين احصائي ($p < 0.05$) في ارتفاع معدل ترسيب كريات الدم الحمر ESR وكذلك عدد خلايا الدم البيض WBCs بشكل معنوي ($p < 0.05$) لدى المرضى عن ما عليه الاصحاء . كما بينت الدراسة عدم وجود زيادة معنوية ($p > 0.05$) في مستوى البروتين الكلي ومستوى الالبومين في مصل الدم عند مقارنة دم المرضى مع دم السيطرة. وبخصوص الكهارل electrolytes فقد أظهرت المعلومات حدوث انخفاض معنوي ($p < 0.05$) في تراكيز أيونات البوتاسيوم وأيونات الكالسيوم ضمن امصال دم المرضى مقارنة مع السيطرة وحدثت زيادة معنوية ($p < 0.05$) في تراكيز ايونات الصوديوم في المرضى مقارنة مع الاصحاء. من جانب آخر تم حساب تراكيز هرموني الالدوستيرون والكورتيزول في أمصال دم المرضى و الاصحاء (السيطرة) وقد دلت النتائج الى ان تركيز هرمون الالدوستيرون قد انخفض بشكل معنوي ($p < 0.05$) في المرضى مقارنة مع السيطرة او الاصحاء بينما ارتفع تركيز هرمون الكورتيزول في المرضى مقارنة مع السيطرة.