Estimation of Erythrocytes sedimentation rate with Liver function in Rheumatoid Arthritis patients

Moatasem Alsalih[1], Syakirah Samsudin[1] and Siti Suri Arshad[2]

[1]University Pendidikan Sultan Idris, Malaysia
[2]University Putra Malaysia, Malaysia

Abstract:

The current investigation was carried out in the research laboratory of College of Medicine / University of Thiqar from Feb. - 2020 to end April - 2020. It was conducted to verify the changes of liver function test parameters in patients with rheumatoid arthritis. Eighty five patients complained of rheumatoid arthritis and 43 sex and age matched healthy individual were enrolled. The effects of ESR values, the duration of the disease, the duration of treatment and the treatment with methotrexate on the parameters of liver function tests were examined. It was found several influences of these factors on the liver function tests of rheumatoid arthritis patients.

The results suggested the implication of the relevant factors of rheumatoid arthritis in directing the liver function tests of patients afflicted with this disease.

Research Highlights: Liver is the largest organ in the body and has a wide variety of functions. Three of its basic functions are; production and secretion of bile, which is passed into the intestinal tract; involvement in many metabolic activities related to carbohydrate, fat, and protein metabolism; and filtration of the blood, removing bacteria and other foreign particles that have gained entrance to the blood from the lumen of the intestine.

In the current study, the liver functions of patients complained of RA are evaluated, hoping that this evaluation may highlight the changes in liver functions of the patients. In addition such approach of studies may improve the planning regime of the treatment.

Research Objectives

1. To verify the differences in the values of liver function test parameters in patients and the control subject.

2. To demonstrate the relationship between the ESR values and the liver function tests parameters in patients with rheumatoid arthritis.

3. To evaluate the influence of duration of disease on the liver function test parameters in patients with rheumatoid arthritis.

4. To estimate the effect of treatment on liver function test in patients with rheumatoid arthritis.

Materials and Methods: Subject Eighty five rheumatoid arthritis patients and 43 healthy age matched individuals (control group) were included in this study.

The patients attended the Al Hussain Teaching hospital, Rheumatoiology Dept. for management. Their ages ranged from 20 to 60 years. The ratio of females to males was (12:1). Subjects suffered from any disease which interferes with the data obtained were excluded.

Estimation of erythrocytes sedimentation rate (ESR): Erythrocytes sedimentation rate was calculated according to westergren method (Zhou et al., 2020)

1. 1.6 ml of patient's blood was mixed with 0.4 ml (109 mmol/l) trisodium citrate (anticoagulant), then mixed well.

2. The mixture was placed in the vertical position by means of westergren pipette in the ESR rack, allowed to stand for one hour.

3.The result was read after 60 minutes and expressed as mm/h.

Results: To determine the effect of ESR on the parameters of liver function tests, patients and control individuals were categorized into four groups. Group 1 included the healthy individuals, group 2 consisted patients whose ESR were up to 30 mm/h, group 3 contained those with ESR of more than 30 mm/h and up to 60 mm/h, group 4 comprised those with ESR of more than 60 mm/h. The analysis of variance (ANOVA) was used to evaluate the results.

Groups	Parameters		
	Total protein	Albumin	Globulin
1 with 2	$P<0.005$	$P<0.005$	N.S
1 with 3	$P<0.05$	$P<0.005$	N.S
1 with 4	$P<0.05$	$P<0.005$	N.S
2 with 3	N.S	N.S	N.S
2 with 4	N.S	N.S	$P<0.05$
3 with 4	N.S	N.S	N.S

1: Control, 2: Patients who had ESR value1-30 mm/h, 3: Patients who had ESR value 30-60 mm/h, 4: Patients who had ESR value >60 mm/h.

Table (1): Results of analysis of variance (ANOVA) for protein concentration with ESR

Groups	Parameters			
	ALT	AST	5¯-NT	ALP
1 with 2	P<0.05	P<0.05	P<0.005	N.S
1 with 3	P<0.05	P<0.05	P<0.005	N.S
1 with 4	P<0.005	N.S	P<0.005	P<0.05
2 with 3	N.S	N.S	N.S	N.S
2 with 4	N.S	N.S	N.S	N.S
3 with 4	N.S	N.S	N.S	N.S

1: Control, 2: Patients group (≤ 1 year), 3: Patients group (1-5 years), 4: Patients group (>5 years)

Table (2): Results of analysis of variance (ANOVA) for liver enzymes activities with the duration of disease

Groups	Parameters		
	Total protein	Albumin	Globulin
1 with 2	P<0.005	P<0.005	N.S
1 with 3	P<0.005	P<0.005	N.S
2 with 3	N.S	N.S	N.S

1: Control, 2: Patients group (< 1 year), 3: Patients group (≥ 1year)

Table (3): Results of analysis of variance (ANOVA) for protein concentration with the duration of treatment
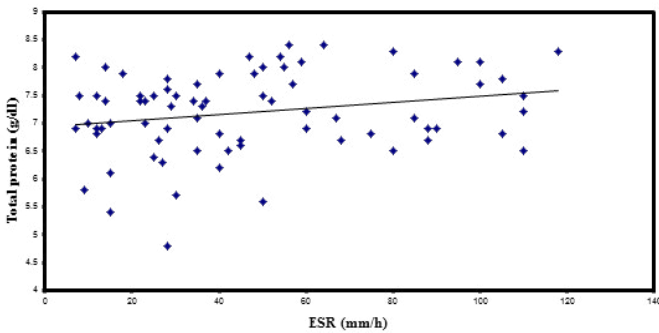

Fig 1: Correlation of serum total proteins concentration with ESR values in patients
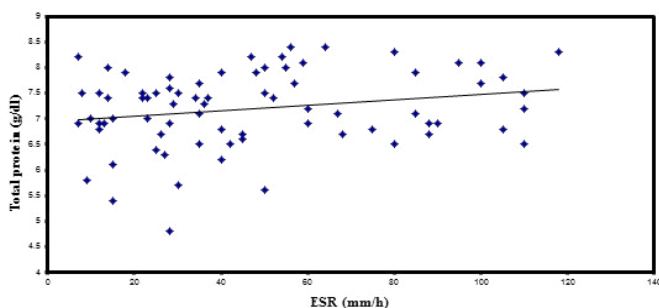

Fig 2: Correlation of serum duration of disease concentration with ESR values in patients

The relationship of ESR and the variation of liver function test parameters was evaluated. The result of liver enzyme measurement, serum proteins and bilirubin concentration revealed significant changes between the control and the patients group. However such changes didn't appear when the patient's groups were compared together. On the other hand the linear regression analysis indicated several significant correlations for most of the parameters with the ESR values. These results suggested relationship between the onset of the inflammatory process with the parameters of the liver function test.

Regarding the changes of serum enzyme values with ESR, the variation was significant between the controls and the patients group. These changes were associated with significant positive correlations of 5¯-NT and ALP with ESR values and a significant negative correlation for AST. These results could be explained by that active inflammatory process may involve an active transport on the cell membrane which is initiated by the elevated 5¯-NT and ALP activities. The significant negative correlation of AST with the ESR values remains without remarkable interpretation and need farther investigation.

The result of protein determination demonstrated decreases of total protein, albumin and globulin concentrations in the patients when compared with controls group. This decrease is associated with significant positive correlations of total protein and globulin levels with the ESR values. These data are interpreted by that active inflammatory process are coupled with active globulin synthesis in particular the gamma fraction.

Findings

1. There is a remarkable relationship between the inflammatory process of rheumatoid arthritis and the active transport in liver.

2. There is a close relationship between the activity of the disease and changes of serum protein in patients with rheumatoid arthritis.

3. ALP activity may be considered as an index of the outcome of the disease in rheumatoid arthritis.

4. Treatment by methotrexate or other drugs have minimal or no effect on the parameters of liver functions tests of the patients.

The future works

1. The estimation of GGT in addition to the determined liver enzymes activities.

2. The evaluation of the acute phase proteins in relevance to the change of liver enzyme activity in rheumatoid arthritis patients.

3. The fractionation of ALP and 5¯-NT isoenzymes in rheumatoid arthritis patients.

4. In vitro studies of Methotrexate effect on liver enzyme activities in cultured hepatocytes.