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## Serum, saliva and erythrocyte membrane sialic acid of patients with Rheumatoid arthritis

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### Abstract

The aim was to determine the level of serum, saliva and erythrocyte membrane sialic acid in rheumatoid arthritis patients.

Fifty subjects were incorporated in this study, 25 were rheumatoid arthritis patients with mean age  $34.6 \pm 7.5$  years, the other 25 subjects were healthy control with no signs and symptoms of any systemic disease, the mean age was  $33.88 \pm 6.0$ .

Five ml of blood with 5 ml of unstimulated whole saliva was taken from each subject. After centrifugation of both blood and saliva, the supernatant of saliva and serum was isolated and the red blood cells were used to prepare erythrocyte membrane for the determination of sialic acid.

The results revealed that the mean serum sialic acid of rheumatoid arthritis patients was  $0.932 \pm 0.317$ , the mean saliva sialic acid was  $0.141 \pm 0.005$  and the mean erythrocyte membrane sialic acid was  $0.145 \pm 0.035$  statistically using t-test the results showed that the mean serum, saliva and erythrocyte membrane sialic acid was significantly higher in rheumatoid arthritis group than that in the control.

Significant correlation has been found between serum and saliva sialic acid in both the control and rheumatoid arthritis patients.

The elevation of sialic acid in serum, saliva and erythrocyte membrane in rheumatoid arthritis patients indicate that sialic acid considered as an important inflammatory marker for determination the activity of the disease.

The significant correlation between serum and saliva sialic acid indicate the importance of saliva to be used in different investigations.

**Key words: Sialic acid, Rheumatoid arthritis, serum, saliva, erythrocyte membrane**

### Introduction

Rheumatoid arthritis (R.A) is the most common form of chronic inflammatory joint disease. It is a symmetrical, destructive and deforming polyarthritis affecting small and large synovial joints, with associated systemic disturbances<sup>(1)</sup>

Sialic acid S.A is a terminal component of the non reducing end of carbohydrate chains of glycoproteins and glycolipids including hormones and enzymes present in serum and tissues, 99% of S.A in serum is bond to glycoproteins and lipids<sup>(2)</sup>. S.A in saliva is mostly bond to mucin and not

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free solution <sup>(3)</sup>.

A number of reports describe elevated S.A levels in various other diseases, suggesting broader clinical utility for S.A markers. Increased S.A concentration has been reported during inflammatory process, probably resulting from increased levels of richly sialyated acute-phase glycoproteins <sup>(4)</sup>.

## Materials and methods

Fifty subjects were incorporated in this study. Twenty-five patients were with R.A attending the rheumatology clinic at Al-Kadhumia teaching hospital. They were already diagnosed as R.A patients. All patients proved to have active disease clinically (pain, swelling of their joints with morning stiffness for more than one hour). They were 10 males and 15 females with mean age of  $34.6 \pm 7.5$  years.

The other 25 subjects were healthy control with no signs and symptoms of any systemic disease. They were 9 males and 16 females with mean age of  $33.88 \pm 6.0$  years.

A sample of 5 ml venous blood was drawn from each subject with 5 ml of unstimulated saliva was collected. After centrifugation, the supernatant of saliva was aspirated, also serum was isolated and the remaining sediment of red blood cells was used to prepare erythrocyte membrane according to Reinila, 1982 <sup>(5)</sup>.

The determination of sialic acid was according to Sydow, 1985 <sup>(6)</sup>.

## Results

The mean age of the control group was  $33.88 \pm 6.0$  years and the mean age of rheumatoid arthritis patients was  $34.6 \pm 7.5$  years.

The results showed that the mean serum S.A ( serum, saliva and erythrocyte membrane ) was significantly higher in patients with

R.A ( highly significant )  $p < 0.0001$  than that of the control group using student t-test. ( Tab. 1,2), ( Fig. 1,2,3 ).

The results revealed that there is a significant correlation between serum and saliva S.A ( $p < 0.001$ ) in both the control and R.A patients group.

No significant correlation was found between membrane and saliva S.A in both groups, and between membrane and serum S.A in R.A group, while a significant correlation was found between membrane and serum S.A in the control group  $p < 0.001$  (Tab. 3).

## Discussion

The elevation of S.A in R.A patients was explained by the fact that S.A is a constituent of serum glycoproteins which are elevated in response to injury or tissue proliferation. Two possibilities were proposed for this elevation in serum glycoproteins; <sup>(1)</sup> the increased release of glycoproteins from injured, inflamed or altered tissue, <sup>(2)</sup> the increased biosynthesis by the liver. Moreover in rheumatic disorders where bones are affected there may be an excess release of sialoprotein from the bone into the blood which may contribute to the elevation of S.A.

The mean serum S.A level in R.A patients was significantly elevated from the control values. Our study is in agreement with previous reports <sup>(7,8,9)</sup> and confirm that raised levels of S.A do exist in R.A whether moderate-sever active disease or in active-mild disease.

Maury et al., 1982 found that serum and urinary S.A were significantly increased in R.A patients than that of the control. A close positive correlation between serum S.A and C-reactive protein levels in R.A and SLE patients. Patients with very active R.A had

higher urinary sialylated oligosaccharide excretion.<sup>(10)</sup>

The previous study was about serum and urinary S.A but no studies were found on saliva and erythrocytes membrane S.A in R.A patients.

Louro et al., 2000 found that the increase of serum ceruloplasmin in R.A group doesn't appear to have a beneficial effect upon the activity of the illness as evaluated by means of the biological inflammatory markers, C - reactive protein, erythrocyte sedimentation rate and sialic acid<sup>(11)</sup>.

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Table (1): Mean  $\pm$  S.D of age, serum, and saliva and erythrocyte membrane sialic acid of both groups.

	age	Serum gm/dl	Saliva gm/dl	Membrane gm/dl
Control mean $\pm$ S.D	33.88 $\pm$ 6.0	0.541 $\pm$ 0.044	0.0274 $\pm$ 0.0078	0.0884 $\pm$ 0.0061
R.A patients mean $\pm$ S.D	34.6 $\pm$ 7.5	0.932 $\pm$ 0.031	0.141 $\pm$ 0.005	0.145 $\pm$ 0.035

Table (2): student t-test (p-value) with significant level of serum, saliva and erythrocyte membrane S.A between the control and R.A patients group.

	p-value	Significant level
Serum S.A	4.3 E -15***	P<0.0001
Saliva S.A	6.09 E -19***	P<0.0001
Membrane S.A	9.4 E -08***	P<0.0001

\*\*\* highly significant.

Table (3): correlation coefficient (r) with the significant level of serum, saliva and erythrocyte membrane S.A in both groups.

	Control		Rh.A	
	r	Sig. level	r	Sig. Level
Serum and saliva S.A	0.65	P < 0.001	0.68	P < 0.001
Membrane and saliva S.A	0.33	NS	0.13	NS
Membrane and serum S.A	0.57	P < 0.001	0.21	NS

NS : Non significant.

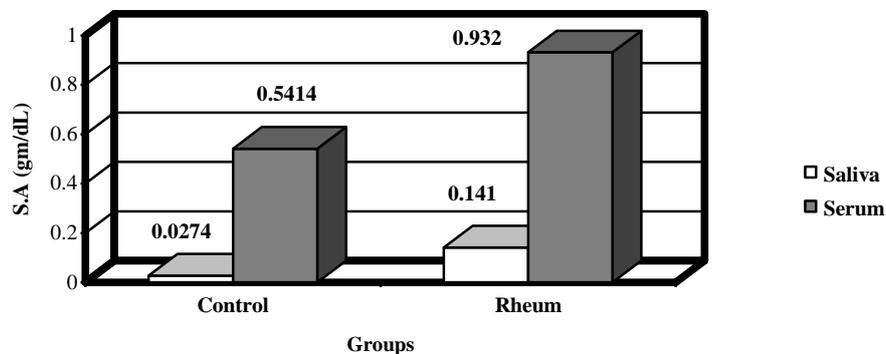


Fig. (1): Mean serum and saliva S.A of both control and R.A groups.

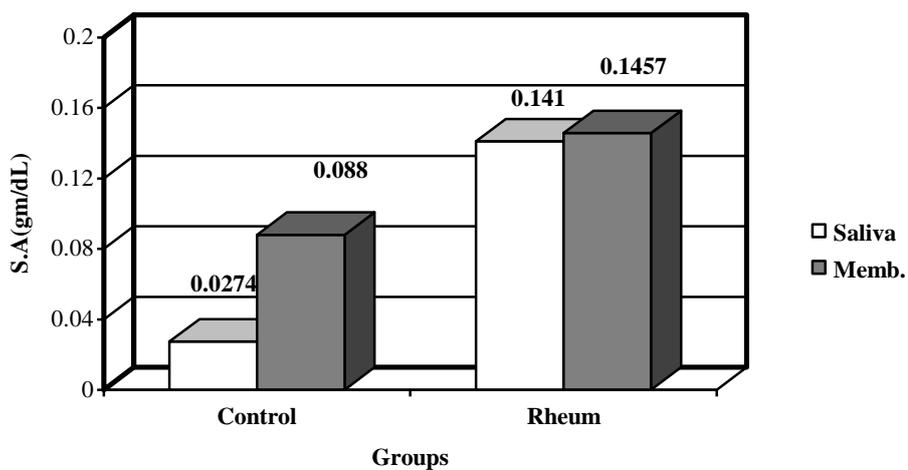


Fig. (2): Mean saliva and membrane S.A of both control and R.A groups.

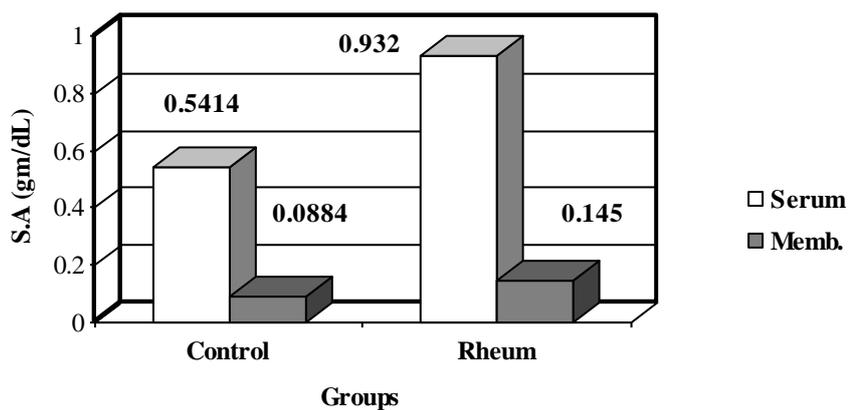


Fig. (3): Mean serum and membrane S.A of both control and R.A groups.