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ORIGINAL ARTICLE

Evaluation The Kidney Failure Test in SLE Patients by Using SLEDAI and Cys.C Index

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ABSTRACT

Objectives: This study aims to explore the association of serum urea, creatinine and uric acid with clinical and laboratory characteristics in SLE patients, independent of lupus renal involvement.

Methods: Sixty of systemic lupus erythematosus patients that diagnosed by clinic specialists by using (SLEDAI) taken from (Al-Hussein Medical City/Kerbala / IRAQ). During the period from January 2015 to December 2016. thirty healthy persons who matched of gender and age with patients as a control group, and haven't history for this disease.

Results: The result shows that the biochemical test depend on Cys.C index significant increase in progressive SLE patient especial in lupus nephritis in the Cys. C test than SLEDAI and this increasing related with creatinine. The mean of Cys.C test in progressive and lupus nephritis (2.11 ±0.17 ; 3.72 ±0.72) compared with SLEDAI (2.17 ±0.70 ; 2.83 ±1.19). The mean of creatinine in progressive and lupus nephritis (0.78 ±0.22 ; 1.55 ±0.86) compared with SLEDAI (0.85 ±0.25; 1.35 ±0.65) respectively.

Conclusion: Cystatin C is a good marker for pre-diagnosis test of kidney failure to detection lupus nephritis and related with creatinine in SLE patients.

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INTRODUCTION

An autoimmune inflammatory disease (Systemic lupus erythematosus) characterized by the presence of incandesce of autoantibodies, particularly versus the components of nucleus . Although it is believed that the etiology of SLE is multifactorial, including immune dysfunction, genetic, hormonal and environmental the mechanisms of molecules implied this systemic autoimmune response remain largely unknown[1].

Autoantibodies play an important role in the pathogenesis of SLE, and the diverse clinical manifestations of the disease are caused by the deposition of antibody-containing immune complexes in blood vessels, leading to inflammation in the kidney, brain and skin. Direct pathogenic effects of the autoantibodies participate to hemolytic anemia and thrombocytopenia[2].

Cys-C is a low-molecular mass protein that is purified freely out of the glomerular membrane. Unlike creatinine, Cys-C is outcast almost exclusively from the circulation by the kidney and is influenced less by renal tubular secretion, theoretically action it an ideal marker of GFR[3]. A recent meta-analysis suggested raw Cys-C concentration was a better indicator of kidney function than raw Creatinine concentration[4].

Most cells of human body are created Cys-C. It is a good marker of (GFR) because it is filtered at the glomerulus level freely and then reabsorbed and catabolized in the proximal renal tubules. In contrast to serum creatinine concentrations, Cys-C is not affected by gender and muscle mass, and therefore supply an accurate measure of renal function[5].

It is particularly useful for early detection of renal impairment, a frequent complication of SLE[6]. This test could be beneficial to assess renal function in patients with lupus nephritis (LN) in whom various laborers associated with both disease (lupus) and the drugs used could modify the concentration of Cys-C[7].

MATERIALS AND METHODS

Patients and controls: This study has been performed on 60 patients suffering from SLE including (3 males and 57 females). Age range was (9-65) years old and apparently healthy control 30 were selected to participate as a normal group for comparison with age group and sex matching of patients. attending to the Imam Hussein Medical City in Karbala governorate during period from October 2015 to December -2016.

Sample's collection: Six milliliters of blood sample have been drown from each patients and healthy persons by vein puncture using disposable syringes under aseptic technique[8].

Blood of each sample has been divided to two part. one milliliters are transmit into vacuum EDTA tubes for measuring ESR . The remaining five milliliters has been transferred into vacuum gel and clot tubes left at room temperature for at least 30 minutes for clotting then centrifuge at 4000 rpm 4 minuts.

Then separated serum has been divided into four Eppendorff tubes and stored at -60° C until used to avoid repeated thawing and freezing**.** For measuring Biochemical test Cystatin C ELISA kit (Japan) (0.5 - 1.16 mg/L) urea (Randox/ United Kingdom) (20–45 mg dl) uric acid (Randox/ United Kingdom) (0-6 mg/dl) creatinine (Human/ Germany) (0.5- 0.9 mg/dl).

Bio-statistical Analysis: Statistical analysis was performed using statistical package for the social sciences (SPSS) statistical software for windows. The results are presented as means and standard deviation (SD). ANOVA, one way to compered between classes of patients (group 1,2) depended on the least significant difference (LDS) at level less than 0.05. P-values at levels ($p<0.05$) was considered to be statically significant. Correlation between parameter were determined using the pearson correlation coefficients**.**

Comparison of group differences on normally distributed numerical variables were assessed by using the students' T-test to compered between patients and healthy control (group1 and 2) and ANOVA, one way to compered between classes of patients (group 1,2) depended on the least significant difference (LDS) at level less than 0.05. P-value at levels ($p<0.05$) was considered to be statically significant. Correlation between parameter were determined using the pearson correlation coefficients.

RESULTS AND DISCUSSION

Sample distribution

SLE Disease Activity Index (SLEDAI): According to disease activity (SLEDAI), SLE patients can be divided into three groups, mild, progressive and lupus nephritis. The current data showed that 33 (55%) of patients has mild ranged from 16 – 65, 14 (23.3%) had progressive which ranged from 19 – 58 and 13 (21.6%) had lupus nephritis ranged from 7 – 55, Show in Figure 1**.**

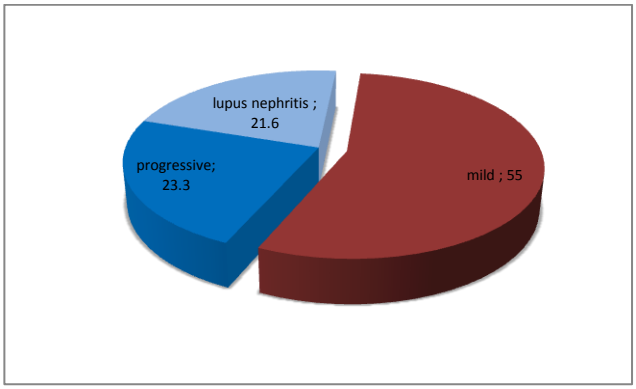

Figure 1. **The distribution of SLE patients depended on SLEDAI.**

Calculation of SLEDAI depended mainly on the initial primary symptom presentation that varied widely from patient to patient and essential diagnoses test to recognize active and inactive of SLE disease[9,10], and the third group is sub division from active group which lupus nephritis .

Biochemical test depended on SLEDAI: The mean concentration of cystatin C for SLE patients was 2.28 ±0.88 range 0.89 – 4.80 compared to average of healthy control was 0.60 ±0.20 range 0.39 – 1.35, this difference was statistically high significant at $p < 0.05$, (Table 1).

Biochemical investigations was done for measure the chemical substances carried by the blood. Urea ,uric acid and creatinine commonly used to assess kidney function as renal injury (glomerulonephritis). In current study the mean of urea in the SLE patients was 45.60 ±28.60 mg/dl ranged from 18.50 - 155.00mg/dl comperad with healthy control 31.07 ±6.05 mg/dl ranged 21.00 - 43.00mg/dl. There was significant difference between the urea in SLE patients and healthy control $p< 0.05$, as shown in Table 1.

Also, study found high concentration of both uric acid and creatinine in blood of SLE patient that mean 6.60 ±1.75) (0.92 ±0.54) rang (3.40- 11.30) (0.49-3.55) ; respectively, when compared to healthy control mean (4.55 ±0.89) (0.60 ±0.12) rang (2.90- 6.00)(0.38- 0.90) ; respectively. There was significant difference between

uric acid and creatinine in SLE patients and healthy control $p < 0.05$, as shown in Table 1.

Table 1: **Concentration of Cystatin C and Biochemical investigation in SLE patients and healthy control depend on SLEDAI.**

Parameter	Healthy control n= 30	Total SLE n= 60	Mild n= 33	Progressive n=14	Lupus nephritis n= 13
Cystatin C (0.5 – 1.2)mg/l					
Mean ±SD	0.60 ±0.20	2.28 ±0.88	2.11 ±0.73	2.17 ±0.70	2.83 ±1.19
Range	0.39-1.35	0.89 – 4.80	0.89-4.32	1.23-3.80	1.60-4.80
P-value	0.00			0.00	
Urea (20-45) mg/dl					
Mean ±SD	31.07 ±6.05	45.60 ±28.60	39.80 ±23.02	45.57 ±33.26	60.36 ±32.88
Range	21.00–43.00	18.50-155.00	18.50-142.00	29.00-155.00	35.00-148.00
P-value	0.002			0.003	
Uric acid (0-6) mg/dl					
Mean ±SD	4.55 ±0.89	6.60 ±1.75	6.23 ±1.74	6.71 ±1.83	7.40 ±1.52
Range	2.90- 6.00	3.40- 11.30	3.40-11.20	3.60-11.30	5.40-10.50
P-value	0.023			0.000	
Creatinine (0.5-0.9) mg/dl					
Mean ±SD	0.60 ±0.12	0.92 ±0.54	0.79 ±0.51	0.85 ±0.25	1.35 ±0.65
Range	0.38- 0.90	0.49-3.55	0.49-3.55	0.60-1.50	0.63-2.80
P-value	0.004			0.000	

In the kidney failure, machines are needed to cleaning the blood of accumulated waste products in a process called dialysis. This may explained why the concentration of urea , uric acid and creatinine in the blood of SLE patients increased[11,12].

This study show to be the first study to scout about the association of serum urea, creatinine and uric acid with clinical and laboratory characteristics in SLE patients, separate of lupus renal involvement. Of particular interest, although these three components in serum are all common marker of renal function, they showed nearly fully different associations with different clinical lineaments in SLE patients.

Biochemical test deepened on Cys.C

The mean of cystatin C in SLE patients is 2.28 ±0.88 rang 0.89-4.8 with kidney failure test urea , uric acid and ceriatinine 45.6 ±28.5 ; 6.5 ±1.7 ; 0.92 ±0.53 rang 18.5-155 ; 3.4-11.3; 0.94-3.5 ; respectively, compared with healthy control 0.6 ±0.2 rang 0.39-1.35 ; 31.07 ±6.05 ; 4.55 ±0.89 ; 0.6 ±0.12 rang 21-43 ; 2.9-6 ; 0.38-0.9 respectively , as show in Table 2.

Early investigations explain that serum Cys-C was indeed a marker of GFR, fully in fact serum creatinine level in the populations investigated[13.14], Fugure 2.

The results in Figure 3 of Urea show that the control and mild was no significant in two index but in progressive and lupus nephritis the significant increase in Cys.C index more than SLEDAI.

Table 2: **Concentration of Cystatin C and Biochemical investigation in SLE patients and healthy control depend on Cys.C index.**

Parameter	Healthy control n= 30	Total SLE n= 60	Mild n= 33	Progressive n=14	Lupus nephritis n= 13
Cystatin C (0.5 – 1.2)mg/l					
Mean ±SD	0.60 ±0.20	2.28 ±0.88	1.57 ±0.29	2.7 ±0.17	3.72 ±0.72
Range	0.39-1.35	0.89-4.80	0.89-1.84	1.85-2.71	2.56-4.8
P-value	0.000			0.000	
Urea (20-45) mg/dl					
Mean ±SD	31.07 ±6.05	45.6 ±28.5	33.42 ±4.31	36.84 ±9.58	2.28 ±43.75
Range	21-43	18.5-155	25 -41	18.5-69	31-155
P-value	0.000			0.000	
Uric acid (0-6) mg/dl					
Mean ±SD	4.55 ±0.89	6.50 ±1.7	5.97 ±1.18	6.49 ±1.73	7.75 ±2.04
Range	2.9-6	3.4-11.3	3.7-8.4	3.4-11.3	3.6-11
P-value	0.92			0.014	
Creatinine (0.5-0.9) mg/dl					
Mean ±SD	0.60 ±0.12	0.92 ±0.53	0.70 ±0.13	1.1 ±0.22	1.95 ±0.86
Range	0.38-0.9	0.94-3.5	0.49-0.9	0.49-1.5	0.67-3.55
P-value	0.000			0.000	

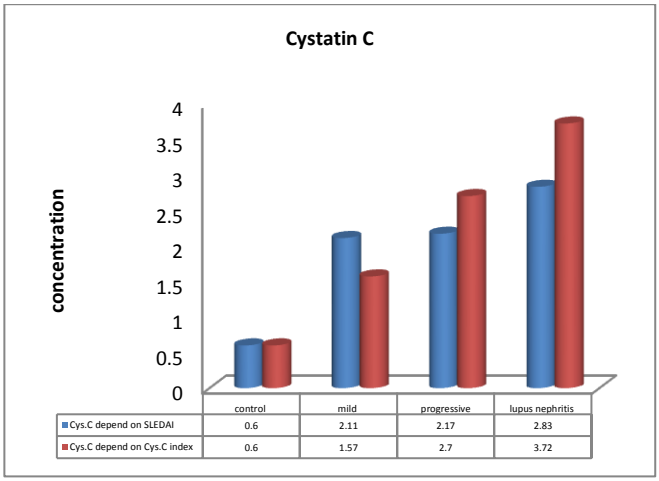

Figure 2. **Correlation between SLEDAI and Cys.C index to evaluation the kidney failure (Cyc.C).**

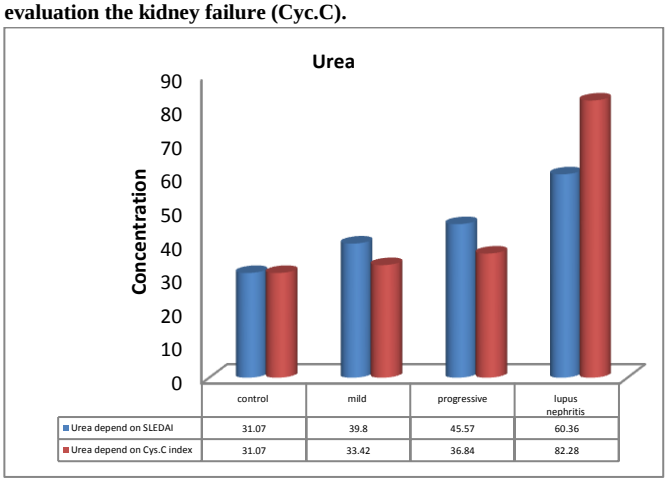

Figure 3. **Correlation between SLEDAI and Cys.C index to evaluation the kidney failure (Urea).**

The results of uric acid show that the control , mild and progressive were no significant in two index but in lupus nephritis the significant increase in Cys.C index more than SLEDAI, (Figure 4).

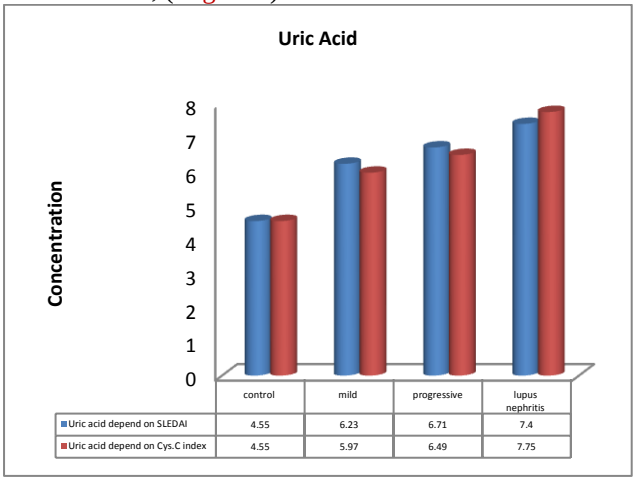

Figure 4. **Correlation between SLEDAI and Cys.C index to evaluation the kidney failure (Uric acid)**.

The results of creatinine show that the control and mild was no significant in two index but in progressive and lupus nephritis the significant increase in Cys.C index more than SLEDAI (Figure 5).

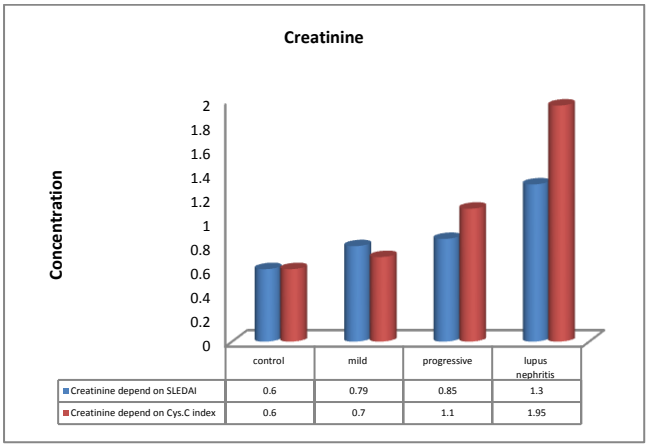

Figure 5. **Correlation between SLEDAI and Cys.C index to evaluation the kidney failure (Creatinine)**.

In the kidney failure, machines are needed to cleaning the blood of accumulated waste products in a process called dialysis. This may explained why the concentration of urea , uric acid and creatinine in the blood of SLE patients increased[11.12].

The most commonly used laboratory parameter to estimate GFR is serum creatinine. The limitations of serum creatinine as an ideal marker of GFR in children and adolescents are well established. Creatinine production depends on muscle mass[15].

Conclusions

Cystatin C is a good marker for pre-diagnosis test in kidney failure to detection lupus nephritis and related with creatinine in SLE patients.

REFERENCES

1. Wang G., Pierangeli S.S., Papalardo E., Ansari G.A. and Khan M.F. "Markers of Oxidative and Nitrosative Stress in Systemic Lupus Erythematosus: Correlation with Disease Activity". Arthritis Rheum. 2010; 62(7): 2064–2072. DOI:10.1002/art.27442.
2. Graham R.R., Ortmann W. and Rodine P. *et al.* "Specific combinations of HLA-DR2 and DR3 class II haplotypes contribute graded risk for disease susceptibility and autoantibodies in human SLE". Eur J Hum Genet. 2007; 15(8):823-830. DOI:10.1038/sj.ejhg.5201827.
3. Filler G., Bokenkamp A., Hofmann W., Le Bricon T., Martinez-Bru C. and Grubb A. "Cystatin C as a marker of GFR History, indications, and future research". Clin Biochem. 2005; 38(1):1-8. https://doi.org/10.1016/j.clinbiochem.2004.09.025.
4. Dharnidharka V.R., Kwon C. and Stevens G. "Serum cystatin C is superior to serum creatinine as a marker of kidney function: A meta-analysis". Am J Kidney Dis. 2002; 40(2):221-226. DOI:10.1053/ajkd.2002.34487.
5. Chew J.S., Saleem M., Florkowski C.M. and Goerge P.M. "Cystatin C a paradigm of evidence based laboratory medicine". Clin Biochem Rev. 2008; 29(2): 47-62.
6. Waldman M. and Appel G.B. "Update on the treatment of lupus nephritis". Kidney Int. 2006; 70(8): 1403-1412. DOI:10.1038/sj.ki.5001777.
7. Kazama K., Kutsuwada K., Ataka H., Maruyama H. and Gejyo F. "Serum cystatin C reliably detects renal dysfunction in patients with various renal diseases". Nephron. 2002; 91(1):13-20. DOI:10.1159/000057599.
8. Barenfanger J., Sauter R., Lang D., Collins S.M., Hacek D.M. and Peterson L.R. "Improving Patient Safety by Repeating (read-back) Telephone Reports of Critical Information". American Journal of Clinical Pathology. 2004; 121(6):801-803. DOI:10.1309/9DYM-6R0T-M830-U95Q.
9. Urowitz M.B. and Gladman D.D. "Measures of disease activity and damage in SLE". Baillieres Clin Rheumatil. 1998; 12(3): 405-413.
10. Narayanan K., Marwaha V., Shanmuganandan K. and Shankar S. "Correlation between systemic lupus erythematosus disease activity index, C3,C4 and anti-dsDNA antibodies". MJAFI. 2010; 66(2):102-107.
11. Parslow T.G., Stites D.P., Terr A.I. and Imboden J.B. "Medical immunology". The McGraw-Hill companies. 2001; 10th edition. 481-495.
12. Waldman M. and Madio M.P. "Pathogenic autoantibodies in lupus nephritis". Lupus. 2005; 14(1):19-24. DOI:10.1191/0961203305lu2054oa.
13. Simonsen O., Grubb A. and Thysell H. "The blood serum concentration of cystatin C (gamma-trace) as a measure of the glomerular filtration rate". Scand J Clin Lab Invest.1985; 45(2): 97-101. DOI:10.3109/00365518509160980.
14. Lffberg H. and Grubb A.O. "Quantitation of g-trace in human biological fluids: indications for production in the central nervous system". Scand J Clin Lab Invest. 1979; 39:619-26.
15. Vinge E., Lindergard B., Nilsson-Ehle P. and Grubb A. "Relationship among serum cystatin C, serum creatinine, lean tissue mass and glomerular filtration rate in healthy adults". Scand J Clin Lab Invest. 1999; 59:587-92.