Original Article

A Study on Prevalence, Clinical Features and Organ Damage in Systemic Lupus Erythematosus (SLE) with Special Reference to Metabolic Profile

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Introduction : Systemic Lupus Erythematosus (SLE) is an Autoimmune Disorder with broad spectrum of clinical presentation and is associated with increased prevalence of Atherosclerosis and Cardiovascular events. Metabolic Abnormality, when present in SLE patients increases proinflammatory condition and increased Cardiovascular and Cerebrovascular morbidity and mortality.

Objectives : The objectives of this study were to evaluate the prevalence of Metabolic Abnormality in SLE patients and to analyze the association with clinical and Demographic Factors.

Methods: The study was a single center, hospital based, prospective, observational study for a span of one and a half years over one hundred patients. SLE was diagnosed by revised American Rheumatology Association Criteria for SLE and Metabolic Syndrome by National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) Criteria. Data analyzed with SPSS 23.0 software.

Results : The Metabolic Syndrome (MetS) was prevalent in SLE patients (56%). A statistically significant association is detected between MetS and SLE related variables - Serositis, Cutaneous manifestations, Oral Ulcer, Arthralgia, but no significant association found between MetS and QoL (Quality of Life) related variables like Age, Sex. The MetS components, Hypertension, Diabetes and Hypertriglyceridemia were significantly more prevalent in SLE.

Conclusion : MetS contributes to long term Cardiovascular risk in SLE patients and thus identifying MetS can contribute to major benefit towards management of IHD risk.

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***Key words* : Ischemic heart disease, Metabolic syndrome.**

SLE is an Autoimmune Inflammatory Disease with multisystem involvement which affects predominantly female in their reproductive age. A bi-modal mortality pattern is observed in patients with SLE. Early mortality is more likely related to disease itself whereas late mortality is mainly associated with comorbidities - Coronary Artery Disease being most common causes of morbidity and mortality at all stages of disease. Five to sixfold increase in incidence of Myocardial Infarction (MI) found in SLE (Manzi S *et al*[1]) compare to Framingham Offspring Cohort. Subclinical generalized Atherosclerosis has also been demonstrated in few studies. The Toronto Risk Factor Study shown light on the fact that SLE patients more likely to develop Diabetes, Hypertension and Dyslipidemia compared to age matched control.

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Editor's Comment :

- Metabolic Syndrome is prevalent in SLE patients of thirty to fifty years age group and accelerates morbidity and mortality. So, Metabolic Syndrome components should be routinely investigated in SLE patients and if present ,early treatment to be initiated to prevent or to reduce Cardiovascular Risk.

However, it is not clear whether derangement of Metabolic Parameter in SLE is same as in general population and whether Steroid use in SLE is a major contributor for it. Inflammation and Metabolic Factor Interact in SLE but results in this aspect is confusing in different studies.

In our study we put an endeavor to elicit the prevalence of characteristic clinical feature and organ damage in SLE and associated Metabolic Profile with a focus to Metabolic Syndrome and its outcome on health in SLE.

Materials and Methods

Our study is a single center, observational, prospective study over one hundred patients (N =100) comprising both female and male diagnosed to have SLE, at Nil Ratan Sircar Medical College & Hospital, Kolkata during the period from February, 2019 to September, 2020. We aimed to study association of

Metabolic Abnormality especially Metabolic Syndrome in SLE and its influence on Cardiovascular System for a span of one and a half years. After proper explanation about the study, consent was taken from guardian and nearest relatives of the patients. Detailed history, clinical examination and relevant investigations were done. SLE were diagnosed by 1997 Update of the 1992 Revised American College of Rheumatology Classification Criteria for Systemic Lupus Erythematosus. Metabolic Parameters were studied such as Urea, Creatinine, eGFR (Estimated Glomerular Filtration Rate), ACR (Albumin Creatinine Ratio), ESR (Erythrocyte Sedimentation Rate), CRP (C Reactive Protein), HDL (High Density Lipoprotein), TGL (Triglycerides), TC (Total Cholesterol). Metabolic Syndrome cases were diagnosed by the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adult (Adult Treatment Panel, ATPIII) of 2001, modified in 2005 by American Heart Association and National Heart Lung and Blood Institute.

Statistical Methods :

The data has been analyzed by Chi-square test and student t test with 95% confidence level (CI 95%), ($p<0.05$) with the help of SPSS 23.0 software.

Ethical Clearance :

Taken from Institutional Ethical Committee as per memo No/NMC/10091, Dated 09/01/2019.

Results

In this study out of 100 patients 92% patients belonged to age above 25 years. Female patients comprise 69%. Smoking habit found in 31% overall. As per clinical parameter, Serositis found in 70%, Hair loss in 59%, Cutaneous manifestation in 70%, Oral Ulcer in 46%, Arthralgia in 70%. Hypertension present in 56% cases, Diabetes Mellitus in 70%, h/o of IHD in 65%, Thyroid Disorder in 58%, Renal Disorder 67% cases, h/o Stroke in 42%, h/o intake of other drugs in 42% cases and intake of Prednisolone (>10 mg/ day) in 55% of cases. The prevalence of abnormal Metabolic parameters in these patients were 56%. Serological test positivity for ANA, Anti ds- DNA, Anti-sm Ab are 79%, 69% and 65% respectively. From Tables 1 & 2 it is observed that statistically there is no significant association between components of MetS (Metabolic Syndrome) and the various independent variables (P Value 0.05) but the Odds Ratio with respect to ESR, CRP, HDL having some positive impact on Metabolic Syndrome. From correlation Table 2, eGFR have moderate correlation with Creatinine, ESR and Triglycerides whereas, Table 4 reveals a statistically significant association between Metabolic Syndrome with SLE related variables – Serositis, Cutaneous

Table 1 — *Association of Metabolic parameters in SLE with Metabolic Syndrome (n=56)*

Variables in the equation	Beta Power	Standard Error	Wald	Degree of Freedom	P-Value	Odd Ratio
TLC	-0.358	0.509	0.496	1	0.481	0.699
PLT	0.000	0.000	1.498	1	0.221	1.00
Urea	-0.048	0.038	1.549	1	0.213	0.953
Creatinine	-0.719	0.693	1.076	1	0.300	0.487
eGFR	-0.016	0.037	0.191	1	0.662	0.984
ACR	0.001	0.003	0.040	1	0.842	0.999
ESR	0.055	0.091	0.362	1	0.547	1.056
CRP	0.044	0.371	0.014	1	0.907	1.044
HDL	0.010	0.048	0.044	1	0.834	1.010
TGL	-0.058	0.052	1.234	1	0.267	0.944
TC	-0.046	0.040	1.322	1	0.250	0.955

Table 2 — *Correlation of parameters in SLE among Metabolic Syndrome positive patient population (n=56)*

	Correlation Matrix											
	Constant	**TLC**	**PLT**	**Urea**	**Creatinine Mg/dl**	**eGFR**	**ACR**	**ESR**	**CRP**	**HDL**	**TGL**	**TC**
Constant	1	-0.36	-0.32	-0.43	-0.258	-0.58	-0.01	0.06	-0.17	-0.02	-0.51	-0.54
TLC	-0.359	1	0.05	0.18	-0.043	-0.11	0.21	0.02	0.07	0.12	0.14	0.09
PLT	-0.32	0.05	1	0.05	-0.211	-0.14	0.14	-0.14	0.11	-0.15	-0.02	0.15
Urea	-0.433	0.18	0.05	1	0.003	0.103	-0.19	-0.15	0.15	-0.05	0.05	0.4
Creatinine	-0.258	-0.04	-0.21	0	1	0.618*	-0.04	0.09	0.01	-0.02	0.27	-0.1
e GFR	-0.581	-0.11	-0.14	0.1	0.618	1	-0.17	0.41	0	-0.25	0.45	0.09
ACR	-0.011	0.21	0.14	-0.19	-0.039	-0.17	1	0	-0.04	0.08	-0.13	-0.07
ESR	0.059	0.02	-0.14	-0.15	0.089	0.407*	0	1	0	-0.09	-0.31	-0.25
CRP	-0.174	0.07	0.11	0.15	0.014	0.001	-0.04	0	1	-0.02	-0.01	0.04
HDL	-0.017	0.12	-0.15	-0.04	-0.017	-0.25	0.08	-0.09	-0.02	1	0.13	-0.14
TGL	-0.511	0.14	-0.02	0.05	0.265	0.448*	-0.13	-0.31	-0.01	0.13	1	-0.21
TC	-0.544	0.09	0.15	0.4	-0.1	0.086	-0.07	-0.25	0.04	-0.14	-0.21	1

TLC -Total Leukocyte Count, PLT -Platelet Count, e GFR- Estimated Glomerular Filtration Rate, ACR -Albumin Creatinine Ratio, ESR- Erythrocyte Sedimentation Rate, CRP- C Reactive Protein, HDL -High Density Lipoprotein, TGL Triglycerides, TC- Total Cholesterol.

manifestation, Oral Ulcer, Arthralgia (P Value <0.01) but no significant association found between Metabolic Syndrome with QoL (Quality of Life) - related variables like age, sex. Table 3 reveals statistically significant association of TLC, PLT, Urea, Creatinine, eGFR, ACR, ESR, HDL, Triglycerides with MetS with P Value <0.001 but not with CRP where P Value was 0.389.

Discussion

In our study, the SLE population associated with Metabolic Syndrome belong to age group above 25 years (92% cases) and most are female (69%). Most frequent clinical manifestations found to be Serositis, Cutaneous manifestation and Arthralgia, all in 70% cases. Abnormal Metabolic parameters or Diabetes Mellitus are also found in 70% followed by Renal Disorder, IHD, Thyroid Disorder and Stroke. History of Prednisolone intake (>10 milligram/ day) present in 55 SLE patients out of 100. The prevalence of Metabolic Syndrome among our SLE patients is 56% which is more as compared to few African[14] and European[15] studies where it was 40% and 45.2% respectively and one study from South Indian which is 32.5%[12] invoking further study in this field. The prevalence of Metabolic Syndrome is much higher over pooled prevalence of MetS among adult general population in India which is 30% and also pooled prevalence of MetS in Eastern India which is 33% (95% CI : 23%-43%)[16]. This implies Metabolic Abnormality is frequently associated with SLE and may be a cause for Organ Damage but, this high prevalence in compare to other studies may be due to our convenience sample population attending the Tertiary Care Center with long duration of active disease or high disease magnitude. The serological test positivity rate with respect to ANA, Anti - ds DNA, Anti-sm Antibody found to be 79%, 69% & 65%, similar to study by William Maidhof *et al*[11]. No statistically significant association found between MetS and various independent variables like Total Leukocyte Count, Platelet Count, Urea, Creatinine, eGFR, Albumin creatinine ratio but the odd ratio with respect to ESR, CRP, HDL revealed some positive impact. The eGFR reveals moderate correlation with Creatinine, ESR and Triglycerides.

Table 4 — *Analysis of SLE related and Quality of life (QoL) related variables in patients with and without Metabolic Syndrome (N=100)*

Factor	Patients associated with MetS	Patients not associated with MetS	ODDS Ratio with 95% CI	P-Value
Age	6	2	2.52(0.483-13.148)	p>0.05
	50	42		
Sex :				
Female	43	26	2.90(0.965-5.465)	0.058
Male	13	18		
Smoking :				
No	43	26	2.9(0.965-5.465)	0.058
Yes	13	18		
Serositis :				
Absent	3	27	0.036(0.010-0.132)	P<0.001*
Present	53	17		
Cutaneous Manifestation :				
Absent	3	27	0.036(0.010-0.132)	P<0.001*
Present	53	17		
Hair loss :				
No	25	16	1.41 (0.629- 3.170)	0.403
Yes	31	28		
Oral Ulcer :				
No	20	34	0.163(0.067-0.399)	P<0.001*
Yes	36	10		
Arthralgia :				
No	3	27	0.036(0.010-0.132)	P<0.001*
Yes	53	17		

Our study shows significant association between Metabolic Syndrome with SLE related variables Serositis, Cutaneous manifestation, Oral Ulcer, Arthralgia (P Value <0.01) but not with QoL related variables like Age, Sex. The Parameters TLC, Platelet, Urea, Creatinine, eGFR, ACR, ESR, HDL, TGL with the exception of CRP in SLE patients shown statistically significant relation with Metabolic Syndrome.

However, the data from this study cannot be extrapolated to all section of people as this patient population is taken those who attended in the tertiary Care Center in Kolkata, West Bengal, India and the sample size in this study is not representative of general population. Information related to role of Steroids on Metabolic Syndrome in the study have not been evaluated due to constrains in our study design.

Table 3 — *Mean and standard deviation of Metabolic & haematological parameters in SLE patients (N=100) with(MetS+) and without(MetS-) Metabolic syndrome and its significance*

Parameter	MetS+(n=56) patients	MetS- (n=44 patients)	P-Value
TLC (WBCs /microliter)	3.3570.587	4.0660.925	p<0.001
PLT (platelets/microliter)	95808.70±6535.341	102426.16±9934.511	p<0.001
UREA (mg/dL)	49.05± 6.855	42.89± 11.098	p = 0.001
Creatinine(mg/dL)	2.5839	1.5934	p<0.001
eGFR(ml/min/1.73m^2)	33.52	78.14	p<0.001
ACR	426.59	360.61	p<0.001
ESR (mm/hr)	47.16	34.70	p<0.001
CRP (microgram/ml)	3.34	3.461	p= 0.389
HDL (mg/dL)	30.13	38.11	p<0.001
TGL (mg/dL)	163.43	137.00	p<0.001

Conclusion

Metabolic Syndrome is a set of

cardiovascular risk factors in SLE patients, which may lead to a proinflammatory condition and increased morbidity and mortality. Metabolic Syndrome is prevalent in SLE patients The SLE patients with age between 30 to 50 years are usually affected by Metabolic Syndrome. There is a significant association between Metabolic Syndrome with SLE related variables -Serositis, Cutaneous Manifestation, Oral Ulcer, Arthralgia. So Metabolic Syndrome components should be routinely investigated in patients with SLE to initiate early treatment in order to prevent/ reduce Cardiovascular Risk.

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