Original Article

The Effect of Increased Body Mass Index on Disease Parameters, Quality of Life and Damage Index in Patients with Systemic Lupus Erythematosus

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ABSTRACT

Objective: To study to the demographic, clinical and laboratory characteristics of patients with systemic lupus erythematosus (SLE) who present with increased body mass index (BMI) as well as to assess the effect of increased BMI on disease activity, quality of life (QoL) and damage. **Patients and Methods:** Sixty SLE patients were clinically examined, investigated and grouped according to their body mass index (BMI). Assessment of disease activity using Systemic Lupus Erythematosus Activity Measure (SLAM), damage by Systemic Lupus International Collaboration Clinics (SLICC)/American College of Rheumatology (ACR) damage index and QoL using QoL index were performed on all patients. **Results:** There were 56 female (93.33%) and 4 male (6.67%), their mean age was 32.37±7.12 years and their mean disease duration was 7.74±4.23 years. There was a significant association of increased BMI with older age, longer disease duration, lupus nephritis, thrombocytopenia, hypertension and dyslipidemia. Increased BMI also was positively correlated with damage (r=0.28, P<0.05), negatively correlated with QoL (r=-0.77, P<0.001) and non significantly with disease activity in SLE patients. **Conclusion:** In SLE patients, the increased BMI was associated with older age, longer disease duration, hypertension, nephritis, thrombocytopenia, altered lipid profile, increased damage and decreased QoL. It doesn't appear to have a role in disease activity. Therefore, interventions to reduce or reverse obesity could improve both symptoms and long-term outcomes of patients with lupus. **[Egypt J Rheumatology & Clinical Immunology, 2014; 2(1): 13-18]**

Key Words: excess weight, systemic lupus erythematosus, quality of life, damage.

INTRODUCTION

Obesity is a growing public health problem, and is associated with a variety of health problems such as increased risk of cardiovascular disease, osteoarthritis, and disability. Among the few studies that have examined obesity or body composition in systemic lupus erythematosus (SLE), rates of obesity appear to be higher than in the general population.[1–4] The percentage of people with lupus who are overweight, in the majority of studies, varies from 56 to 67 %.[2, 5–7] Many factors may increase the predisposition to accumulate body fat in patients with SLE as systemic inflammation, therapy with corticosteroids, and reduced physical activity.[8]

Obesity is a risk factor for cardiovascular disease and is associated with higher glycemic levels, higher rates of systemic high blood pressure and elevated levels of inflammatory markers in the blood of individuals with SLE, thus contributing toward an increase in morbidity and mortality in these patients.[5,9]

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Little is known about the effects of increased BMI on the clinical and laboratory characteristics of patients with SLE. Therefore, the objective of the current study was to determine the demographic, clinical and laboratory characteristics of patients with SLE who present with increased BMI and to assess the effect of increased BMI on disease activity, quality of life (QoL) and damage.

PATIENTS AND METHODS

Clinical assessment: Sixty SLE patients fulfilling the updated American College of Rheumatology (ACR) revised criteria for the classification of SLE[10] were recruited consecutively from the Rheumatology Clinic and internal medicine department, rheumatology division, Ain Shams University Hospital during the period from January 2012 to February 2013. The study was approved by Ain Shams ethical committee; all patients gave their informed written consent. The patients were divided according to body mass index (BMI) calculated as body weight adjusted for height [weight/height^2 (kg/m^2)][11] into three groups (20 patients each): Group

I – normal weight (BMI 18–24.9), Group II – overweight (BMI 25–29.9) and Group III – obese (BMI ± 30). Full history taking and clinical examination were performed. Assessment of disease activity was done using the Systemic Lupus Erythematosus Activity Measure (SLAM)[12], disease damage using the Systemic Lupus International Collaboration Clinics (SLICC)/ACR damage index[13], general well-being using the QoL index which is a concise instrument that evaluates a positive mood state, supportive relationships, and the absence of physical and psychological distress. Scores range from 0 to 10, with higher scores indicating better quality of life.[14]

Laboratory assessment: Complete laboratory investigations including complete blood count (CBC) and erythrocyte sedimentation rate (ESR; in mm/hour) was determined in the first hour by the Westergren method.), complete urine analysis, 24 hours proteinuria, serum creatinine, urea, triglyceride and total cholesterol were performed Antinuclear antibodies (ANA) and anti-ds-DNA antibodies positivity were retrospectively recorded.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) program version 17 was used for analysis of data. Data was presented as mean ± SD. One-way analysis of variance (ANOVA) was used to compare more than two quantitative data. Linear Correlation coefficient was used for detection of the relation between two quantitative variables. Chi-square test ($\chi 2$) was used for analysis of qualitative data. P-values were considered significant at < 0.05.

RESULTS

The study included 60 SLE patients; 56 female (93.33%) and 4 male (6.67%) patients, their mean age was 32.37±7.12 years and their mean disease duration was 7.74±4.23 years. Five patients had amenorrhea, one with normal BMI, two overweight and two obese. Diabetes was present in 5 patients, three overweight and two obese. Steroids were received by all the patients.

The clinical manifestations of the studied groups in SLE patients are shown in Table 1. There was a significant difference between the three groups regarding hypertension, thrombocytopenia, lupus nephritis and pleuritis (P<0.05). The demographic features, the disease activity (SLAM), QoL and damage (SLICC) in the studied groups in SLE patients are presented in Table (2). Older Age and longer disease duration and decreasing QoL were significantly present in overweight and obese patients than normal weight (P=0.000 regarding both age and QoL and P<0.001 regarding disease duration) while no statistical differences regarding sex, SLAM and SLICC were detected (although mean SLICC was higher in overweight and obese patients than normal weight) (P>0.05). The laboratory features of the SLE patients according to their BMI are shown in Table 3. There was significant decrease in hemoglobin level (P=0.007) and increase in total cholesterol and triglycerides in overweight and obese patients than normal weight patients (P=0.000). The correlations of BMI with different parameters are presented in Table 4 and Figure 1. There were significant positive correlations between BMI and age, disease duration, SLICC, cholesterol, triglycerides and significant negative correlation between BMI and QoL, hemoglobin and platelets.

Table 1. Clinical manifestations among SLE patients according to BMI.

Clinical Manifestations	SLE patients (n = 60; 20 in each group)			P-value
	Normal weight n (%)	Overweight n (%)	Obese n (%)	
Malar rash	5 (25)	7 (35)	7 (35)	0.70
photosensitivity	10 (50)	11 (55)	12 (60)	0.81
oral ulcers	11 (55)	5 (25)	7 (35)	0.11
Alopecia	11 (55)	13 (65)	11 (55)	0.70
Arthralgia	6 (30)	7 (35)	6 (30)	0.91
Arthritis	7 (35)	11 (55)	10 (50)	0.42
Myalgia	3 (15)	4 (20)	2 (10)	0.67
Pleuritis	0	0	3 (15)	0.03*
Pericarditis	0	2 (10)	1 (5)	0.23
Nephritis	3 (15)	5 (25)	10 (50)	0.04*
Hypertension	0	3 (15)	6 (30)	0.009*
Neuropsychiatric Manifestations	1 (5)	3 (15)	3 (15)	0.47
Thrombocytopenia	0	7 (35)	5 (25)	0.003*
GIT manifestations	9 (45)	9 (45)	8 (40)	0.93

* P <0.05.

Table 2. Demographic features, disease activity (SLAM), damage (SLICC) and QoL in the studied groups in SLE patients.

Parameter	SLE patients (60 patients; 20 in each BMI group)			P-value
	Normal weight Mean±SD	Overweight Mean±SD	Obese Mean±SD	
	20.92±2.02	26.52±1.06	32.68±1.83	
Age, mean ± SD (years)	26.95±5.21	35.1±6.88	35.05±6.03	0.000*
Sex, n (%) female	17(85)	19 (95)	20 (100)	0.10
Disease duration, mean±SD (years)	4.9±3.27	9.1±3.59	9.20±4.38	0.001*
SLAM, mean ± SD	5.4±1.98	5.7±2.55	5.85±2.27	0.818
SLICC, mean ± SD	4.9±2.36	5.25±1.943	5.6±1.5	0.534
QoL, mean ± SD	8.05±1.14	6.0±1.25	5.3±1.6	0.000*

* *P*<0.05, ***SLAM*** Systemic Lupus Erythematosus Activity Measure ***SLICC,*** Systemic Lupus International Collaboration Clinics/American College of Rheumatology Damage Index, ***QoL*** Quality of Life.

Table 3. Laboratory features of SLE patients according to BMI.

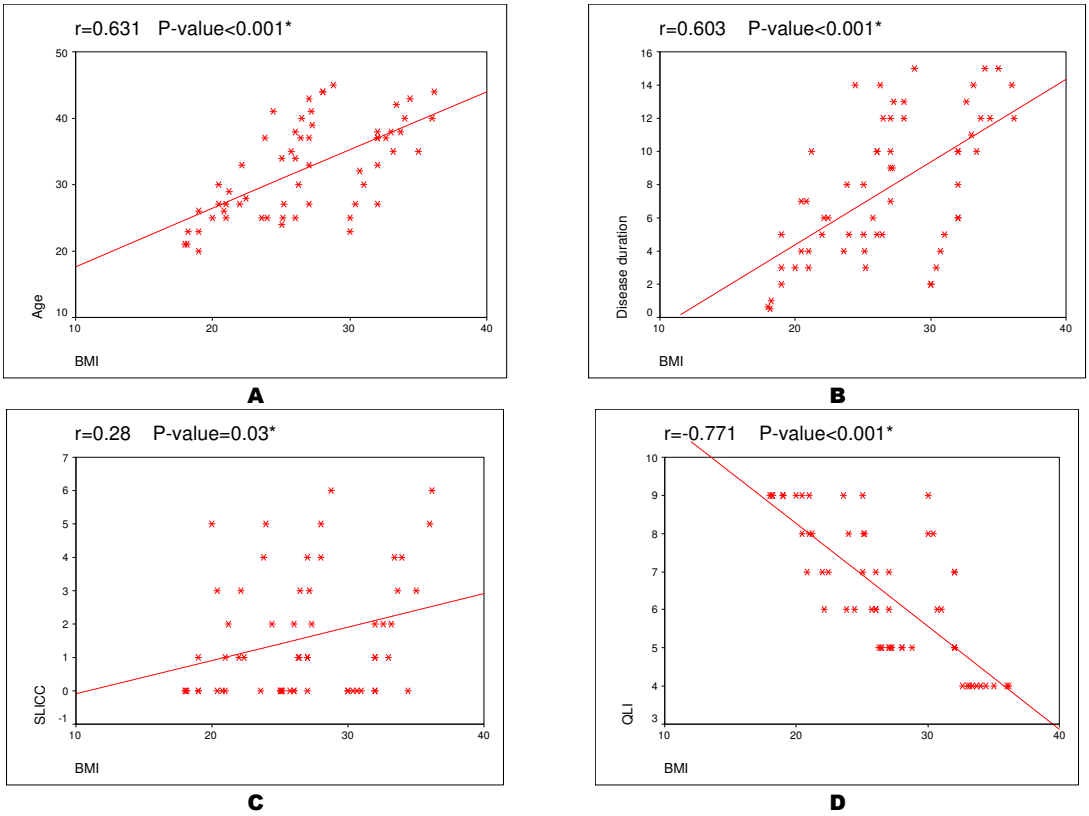
	SLE patients (60 patients; 20 in each BMI group			P-value
	Normal weight	Overweight	Obese	
Hb (g/dL)	11.26±1.14	10.19±0.73	10.74±1.14	0.007*
WBC (x10^3/mm3)	8.30±2.0	6.77±2.40	7.59±2.70	0.139
Platelets (x10^3/mm3)	248.55±69.93	210.50±91.41	198.33±77.50	0.127
ESR (mmHg/1st h)	53.30±16.89	59.58±18.14	49.85±19.71	0.242
Cholesterol (mg/dL)	178.31±32.61	216.57±33.19	218.75±34.75	0.000*
Triglycerides(mg/dL)	109.55±27.46	170.90±32.48	187.55±39.96	0.000*
Proteinuria (g/24 h)	0.39±0.16	0.47±0.15	0.43±0.25	0.401
Creatinine (mg/dL)	0.68±0.16	1.31±2.76	0.70±0.23	0.375
Urea (mg/dL)	52.45±16.79	42.45±12.28	58.90±10.91	0.001*
ANA, n (%)	19(95)	20 (100)	18 (90)	0.201
Antids-DNA, n (%)	10 (50)	9 (45)	10 (50)	0.910

* *P* <0.05. ***Hb***, Hemoglobin, ***WBC*** White Blood Cells, ***ESR*** erythrocyte sedimentation rate.

Table 4. Correlations of BMI with different parameters in patients with SLE**.**

Parameter	BMI	
	r	P-value
Age	0.63	<0.001
Disease duration	0.60	<0.001
SLAM	0.25	0.053
SLICC	0.28	0.03
QoL	-0.77	<0.001
Hb	-0.35	0.005
WBCs	-0.25	0.047
Platelets	-0.38	0.003
ESR	0.001	0.99
Cholesterol	0.55	<0.001
Triglycerides	0.74	<0.001
Proteinuria	0.18	0.167
Creatinine	0.02	0.87
Urea	0.15	0.23

SLAM Systemic Lupus Erythematosus Activity Measure, ***SLICC*** Systemic Lupus International Collaboration Clinics/American College of Rheumatology damage index, ***QoL*** quality of life, ***Hb*** hemoglobin, ***WBCs*** White Blood Cells, ***ESR*** Erythrocyte Sedimentation Rate



SLICC Systemic Lupus International Collaboration Clinics/American College of Rheumatology damage index; ***QoL*** quality of life.

Figure 1. Significant positive correlation between BMI and age (a), disease duration (b), SLICC (c) and significant negative correlation between BMI and QoL (d).

DISCUSSION

Systemic inflammation, therapy with corticosteroids, and reduced physical activity may increase the predisposition to accumulate body fat in patients with systemic lupus erythematosus.[8] On the other hand, obesity, which triggers systemic inflammation, can modify the individual's response to a particular disease.[15] However, the causes and consequences have not yet been established.[6]

In our study, the mean age of SLE patients was higher among patients with higher BMI. This finding is also observed in the general population and in other studies that assessed obesity and variations in BMI in patients with SLE.[5,6,16,17] Hormonal factors and reduction of daily energy expenditure are related to age and may contribute to weight gain in these patients.[18]

In the present study, higher BMI in the SLE patients was associated with longer disease duration, presence of lupus nephritis and thrombocytopenia. This may be due to longer duration of steroids use or receiving higher doses of steroids either oral or intravenous pulse methylprednisolon in the previous two presentations as significant corticosteroids induced weight gain has been reported to occur in up to one third of patients with SLE[19] although other authors recently reported that developing obesity at the end of corticosteroids therapy was associated with cumulative dose of corticosteroids, but not duration of corticosteroids therapy.[20] Other studies didn't found such association.[5,6,17] Santos et al, didn't found any significant association of BMI with clinical characteristics of SLE but it may be due to its non significant association with disease duration in their study.[21]

In the present study, there was a statistically significant association between BMI in the SLE patients and the presence of hypertension. The association of higher BMI with hypertension has been

recognized previously in the general population[22-24] and in SLE patients.[17,25-26] Hypertension has been described to be associated with worse renal outcomes in patients with lupus nephritis[27] and it is a strong risk factor for cardiovascular disease, which is one of the major causes of death in SLE.[9] Body weight should be optimised to prevent the occurrence of hypertension and its deleterious consequences in patients with SLE.

The autoimmunity and inflammatory process of SLE are related to the presence of dyslipidemia. Patients with both active and inactive disease show those lipid changes, which are aggravated by the higher inflammatory activity of the disease and by chronic corticosteroids use, demonstrating that SLE by itself promotes a proatherogenic profile.[28,29] Obesity is associated with a high prevalence of dyslipidemia in patients with lupus.[17,26,30] In our study, higher BMI was significantly associated with elevated levels of total cholesterol and triglycerides and there were significant positive correlations between BMI and both total cholesterol and triglycerides levels.

In this study, BMI did not correlate with disease activity which was found in most studies discussing the relation between obesity and SLE.[5,6,17,21,26]

In this work, BMI correlated with damage index (SLICC). This finding was in accordance with that of Santos et al.[17] On the other hand, many authors did not show this association between the damage index and BMI[5,6,26] although some of them observed high concentrations of inflammatory markers in patients with a higher mean BMI, suggesting greater inflammatory activity in patients with adipose tissue accumulation.[5] The severity of inflammatory activity determine the burden of disease and the resultant organ damage.[13]

SLE is a chronic autoimmune disease that has major implications for health-related quality of life. Improvement of quality of life remains important to decrease one of the major causes of morbidity in SLE.[31] Increased BMI also has profound effects on quality of life. In the general population, an increased BMI was associated with impaired physical function, pain, low vitality, and poor quality of life.[32-35] In the current study, quality of life was significantly worse among overweight and obese lupus patients compared to normal weight patients and quality of life negatively correlated with BMI. A similar relationship between obesity and a lower QoL score in SLE patients was reported by some authors.[5,26]

As the true role of steroids on the etiology of obesity in SLE patients is not yet completely understood, we recommend further prospective studies to evaluate the association between variations in BMI and the use of steroids in addition to evaluation of the relationship between other medications taken by SLE patients and BMI.

In conclusion, overweight and obese patients with SLE present socio-demographic, clinical and laboratory characteristics that are different from those found in normal BMI patients with lupus. The increased BMI was associated with older age, longer disease duration, hypertension, nephritis, thrombocytopenia, altered lipid profile, increased damage and decreased QoL. It doesn't appear to have a role in disease activity. Therefore, interventions to reduce or reverse obesity could improve both symptoms and long-term outcomes of patients with lupus.

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