RESULTS

Cases of the current study (number = 50) were divided into two main groups :

Group I : Thirty patients with systemic lupus erythematosus.

Group II : Comprising 20 normal/healthy volunteers as a control group.

The SLEDAI score in all patients ranged between 2 and 84 (mean ± S.D = 14.8 ± 6.7). Group I was subdivided according to the SLEDAI into 3 subgroups :

I-A) Nine patients (30%) with SLEDAI grade I (Mean ± S.D = 4.4 ± 1.2).

I-B) Fifteen patients (50%) with SLEDAI grade II (Mean ± S.D = 13.4 ± 4.6).

I-C) Six patients (20%) with SLEDAI grade III (Mean ± S.D = 30 ± 9.7). **(Fig. 1).**

Age :

Ages of the patients in group I ranged between 16 years and 59 years (Mean ± S.D = 28.3 ± 7.5 years) with a statistically insignificant difference ($P > 0.05$) compared to ages of the controls (Mean ± S.D = 31.5 ± 6.3 years). **(Table 1).**

An insignificant difference ($P > 0.05$) was also observed between ages of the patients subgroups I-A, I-B and I-C. **(Table 2).**

Sex :

(Tables 3 and 4) reveal an insignificant difference ($P > 0.05$) between the sex of patients and controls as well as between the patients' subgroups I-A, I-B and I-C with predominance of the female sex in all groups.

Duration of the disease :

Duration of the disease in our patients ranged between 1 and 6 years (mean ± S.D = 2.6 ± 1.3 years). A longer duration of the disease was observed in patients of subgroup I-C (4.2 ± 1.4 years) versus subgroups I-A and I-B (2.1 ± 1.3 and 2.3 ± 0.7 years respectively). This difference was statistically highly significant ($P < 0.01$), **(Table 5; Fig. 2)**.

Joint Affection :

(Table 6) reveals 26 cases of thirty patients (86.7%) with joint affection (arthritis or arthralgia). They were distributed as 8/9 (88.9%) in subgroup I-A, 14/15 (93.3%) in subgroup I-B, and 4/6 (66.7%) in subgroup I-C with a statistical insignificant difference ($P > 0.05$) between the three subgroups, **(Fig. 3).**

(Table 7) reveals a non significant difference ($P > 0.05$) between patients with joint affection and patients without joint affection as regarding SLEDAI and laboratory parameters.

Skin Affection:

(Table 8) reveals 14 cases of 30 (63.3%) with skin affection (malar rash, alopecia or discoid rash). They were distributed as 7/9 (77.7%) in

subgroup I-A, 10/15 (66.7%) in subgroup I-B, and 2/6 (33.3%) in subgroup I-C, with a statistical significant difference ($P < 0.05$) between group I-C and both subgroups I-A and I-B, **(Fig. 4)**.

(Table 9) reveals a statistically significant difference ($P < 0.05$) between patients with skin affection and patients without skin affection as regarding SLEDAI and a statistically non significant difference ($P > 0.05$) between patients with skin affection and patients without, as regarding laboratory parameters.

Serositis :

(Table 10) reveals 10 cases of 30 (33.3%) with serositis (plural or pericardial effusion). They were distributed as 1/9 (11.1%) in subgroup I-A, 6/15 (40%) in subgroups I-B, and 3/6 (50%) in subgroup I-C with a statistical significant difference ($P < 0.05$) between subgroup I-A and both subgroups I-B and I-C, **(Fig. 5).**

(Table 11) shows a statistically significant difference ($P < 0.05$) between patients with serositis and patients without, as regarding MDA and vitamin E and a statistically non significant difference between patients with serositis and patients without, as regarding SLEDAI and other laboratory parameters.

Renal Affection:

Our study revealed 14 cases of 30 (46.7%) with renal affection (proteinuria > 0.5 g/day). They were distributed as 2/9 (22.2%) in subgroup I-A, 8/15 (53,3%) in subgroup I-B and 4/6 (66.7%) in subgroup

I-C with a statistical significant difference (P< 0.05) between subgroup I-A and other subgroups, table (12). **(Fig. 6).**

(Table 13) reveals a statistically significant difference (P < 0.05) between patients with renal affection and patients without, as regarding SOD and a statistically non significant difference (P > 0.05) between patients with renal affection and patients without, as regarding SLEDAI and other laboratory parameters.

CNS Affection:

(Table 14) reveals 6 cases (20 %) with CNS affection (convulsions or psychosis). They were distributed as 1/9 (11.1%) in subgroup I-A, 3/15 (20%) in subgroup I-B, and 2/6 (33.3%) in subgroup I-C, with a statistical insignificant difference (P > 0.05) between the three subgroups.

Comparison between patients with CNS affection and patients without, reveals a statistically highly significant difference (P < 0.01) as regarding SLEDAI and a statistically non significant difference (P > 0.05) as regarding laboratory parameters, **(Table 15)**.

Hematological affection :

(Table 16) reveals 21 cases (70%) with hematoloigcal affection (hemolytic anemia or leukopenia). They were distributed as 4/9 (44.4%) in subgroup I-A, 12/15 (80%) in subgroup I-B, and 5/6 (83.3%) in subgroup I-C, with a statistical significant difference (P < 0.05) between subgroup I-A and other subgroups.

Comparison between patients with hematological affection and patients without, reveals a statistically non significant difference ($P > 0.05$) as regarding SLEDAI and laboratory parameters, **(Table 17).**

Laboratory Parameters :

Oxidants :

Our study revealed a statistically highly significant difference ($P< 0.01$) between MDA (as an indicator of oxidation) in patients and in controls **(Table 18)**. On the other hand, there was an insignificant difference ($P > 0.05$) between MDA in the patients subgroups I-A, I-B and I-C (Mean ± SD = 2.6 ± 0.5, 2.8 ± 0.3, 2.8 ± 0.3 n mol/ml respectively), **(Table 19).**

(Table 20) reveals a non significant difference between male and female patients as regard MDA ($P >0.05$).

(Table 21) reveals a non significant correlation of MDA with clinical data and SLEDAI of our patients ($P > 0.05$).

(Table 22) reveals a non significant correlation of MDA with other laboratory parameters SOD, GSH-PX, Vit. E and Vit. A ($P > 0.05$).

Antioxidant enzymes :

There was a statistically highly significant difference ($P < 0.01$) between patients and controls as regards the antioxidant enzymes (SOD and GSH Px), **(Table 18),** while there was a statistically non significant difference ($P >0.05$) between patients' subgroups as regards SOD and GSH Px, **(Table 23).**

(Table 24) reveals a statistically non significant difference between male and female patients as regards antioxidant enzymes SOD and GSH-Px ($P > 0.05$).

(Table 21) shows a statistically highly significant negative correlation ($P < 0.01$) of SOD enzyme with SLEDAI score and a statistically non significant correlation ($P > 0.05$) with other clinical data.

(Table 21) also reveals a statistically non significant correlation ($P > 0.05$) of GSH-Px enzyme with clinical data and SLEDAI score.

(Table 22) reveals a statistically non significant correlation ($P > 0.05$) of the antioxidant enzymes (SOD and GSH-Px) with other laboratory parameters.

Antioxidant vitamins :

Our study revealed a statistically highly significant difference ($P < 0.01$) between patients and controls as regards vitamin E, but revealed a statistically non significant difference ($P > 0.05$) between patients and controls as regards vitamin A, **(Table 18)**.

(Table 25) reveals a statistically non significant difference ($P > 0.05$) between patients subgroups as regards antioxidant vitamins (vitamin E and vitamin A).

A statistically non significant difference ($P > 0.05$) was also observed between male and female patients as regards antioxidant vitamins, **(Table 26).**

Our study revealed a statistically significant negative correlation ($P< 0.05$) of vit. E with SLEDAI score, but the results were statistically non significant ($P > 0.05$) with other clinical data, **(Table 21).**

(Table 21) also reveals a statistically non significant correlation ($P> 0.05$) of vit. A with clinical data and SLEDAI score.

(Tables 22) reveal a statistically non significant correlation ($P > 0.05$) of antioxidant vitamins (vitamin E and Vitamin E) with other laboratory parameters (oxidant and antioxidants).

(Tables 27,28, and 29) reveal that the strongest predictors of SLEDAI were the age (inverse relation) (55.89%), vitamin E (34.68%) and CNS involvement (15.65%) (table 27). However, removal of the age results in appearance of the impact of SOD (inverse relation) (15.45%) , ESR 1^{st} hour (11.63%), duration of disease (18.87%) and CNS involvement (13.5%) (table 28). On the other hand, removal of the affected sites data from the regression analysis results in the appearance of impact of MDA (19.5%) and ESR 1^{st} hour (33.9%) **(Table 29).**

Fig. (1) : Mean values of SLEDAI in patients' subgroups

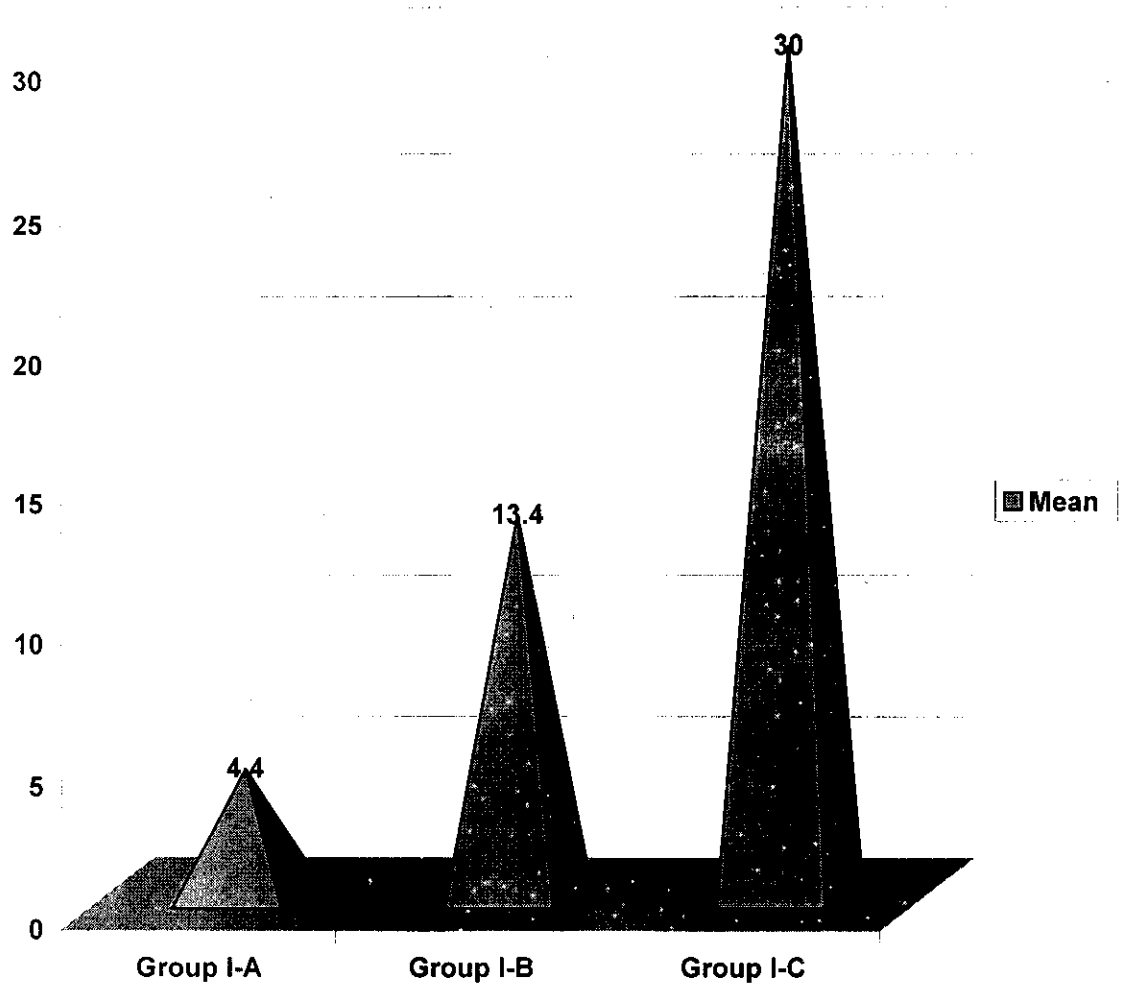

Table (1) : Statistical comparison between ages of the patients and controls

	Group I	Group II	T-test	P-value
Range / years	16-59	20-52	0.681	> 0.05 NS
$\bar{X}$ ± SD	28.3 ± 7.5	31.5 ± 6.3		

NS = non significant

$\bar{X}$ = mean

SD = Standard deviation

Table (2) : Statistical comparison between ages of the patients subgroups by ANOVA test

	Subgroup I-A	Subgroup I-B	Subgroup I-C	P-value
Range/years	21-37	18-32	16-59	> 0.05 NS
$\bar{X}$ ± SD	28.7 ± 5.7	26.5 ± 3.4	31.2 ± 14.5	

NS = Non Significant

$\bar{X}$ = mean

SD = Standard deviation

Table (3) : Comparison between sex of cases in the studied groups by Chi-squre test

	Group I	Group II	P-value
Males/n (%)	2 (6.7%)	1 (5%)	> 0.05 NS
Females/n (%)	28 (93.3%)	19 (95%)	

n = Number of cases
NS = Non significant

Table (4): Comparison between sex of cases in the patients' subgroups by Chi-squre test

	Subgroup I-A	Subgroup I-B	Subgroup I-C	P-value
Males/ n(%)	1 (11.1%)	0 (0%)	1 (16.7%)	> 0.05
Females/ n (%)	8 (88.9%)	15 (100%)	5 (83.3%)	NS

n = Number of cases
NS = Non Significant

Table (5) :Comparison between duration of the disease in patients' subgroups by ANOVA test

	Subgroup I-A	Subgroup I-B	Subgroup I-C	P-value
Range/years	1-4	1-3	2-6	> 0.05
$\bar{X} \pm SD$	2.1 ± 1.3	2.3 ± 0.7	4.2 ± 1.4	HS

*** HS = Highly significant

$\bar{X}$ = mean

SD = Standard deviation

Fig. (2) : The mean duration of SLE disease in different subgroups.

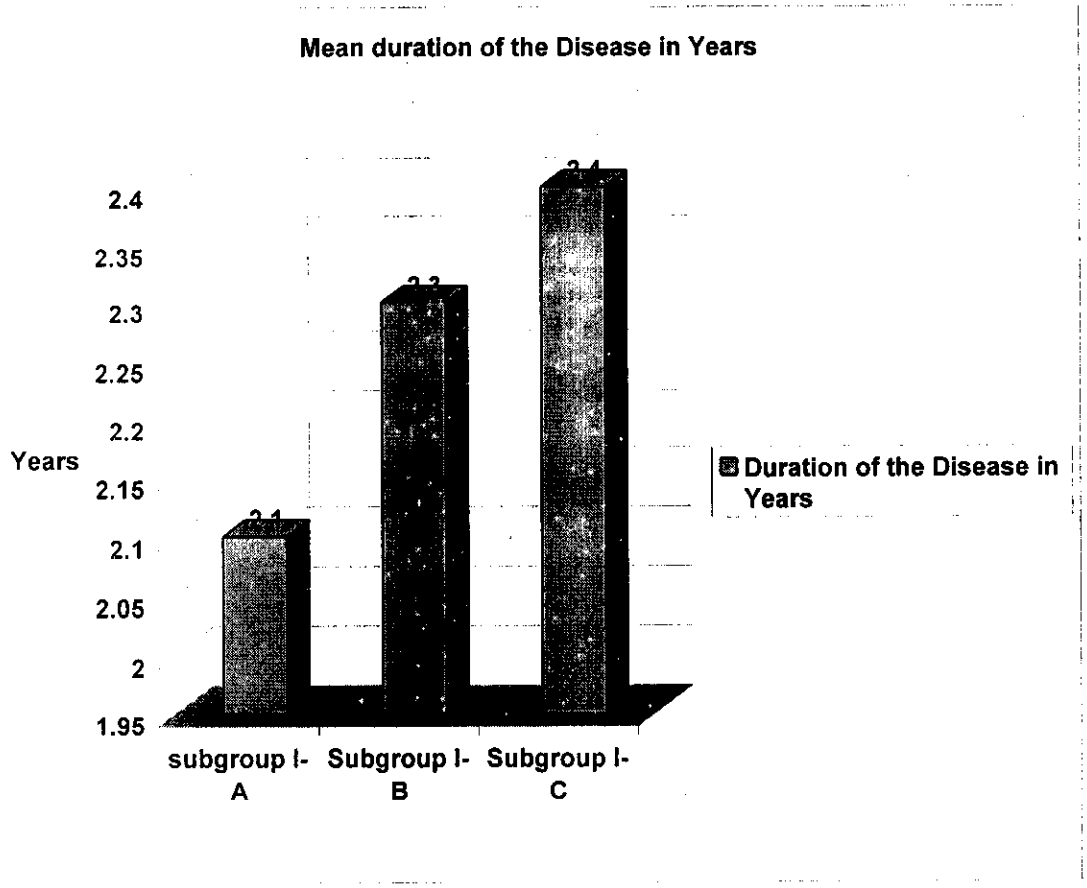

Table (6) : Comparison between joint affection in patients' subgroups by ANOVA test

	I-A	I-B	I-C	P-value
Number	8/9	14/15	4/6	> 0.05
(%)	(88.9%)	(39.3%)	(66.7%)	NS

NS = Non significant

Fig. (3) Joint Affection in patients' subgroups

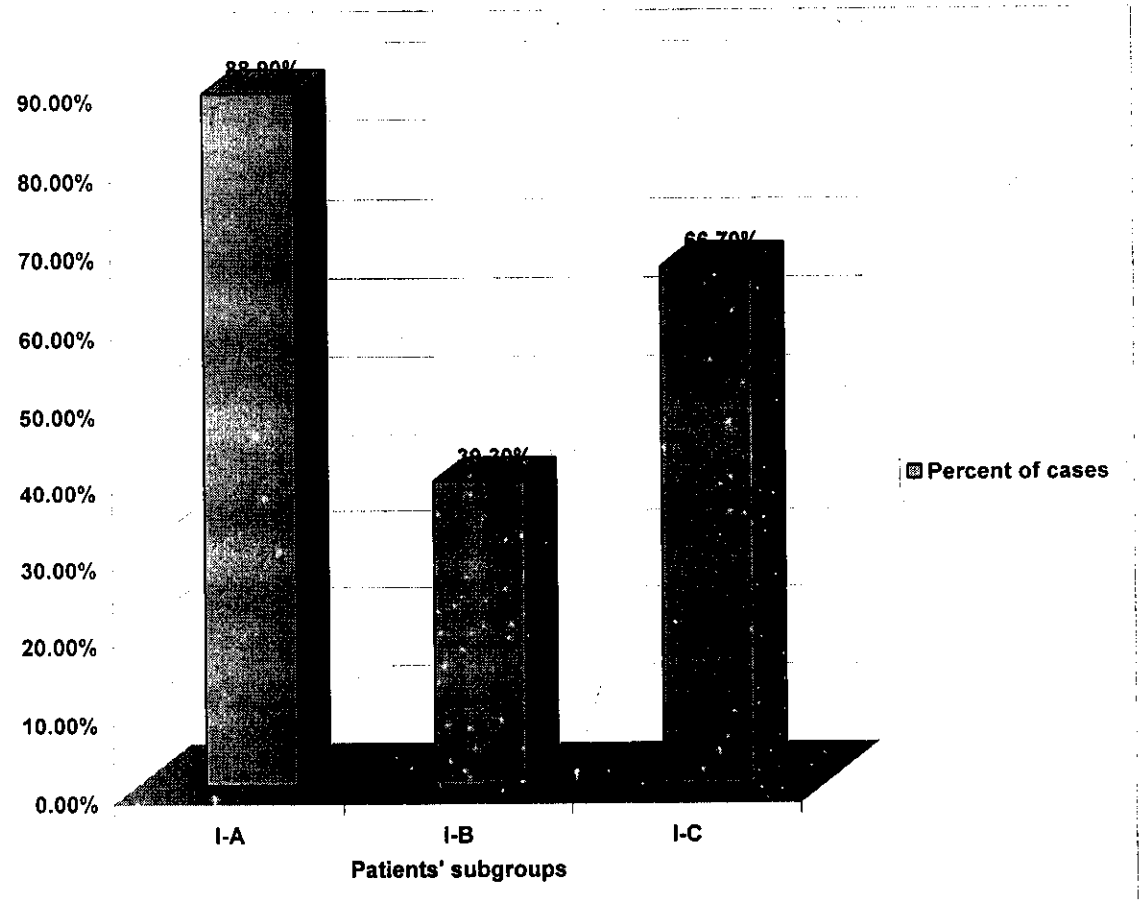

Table (7) : Comparison between patients with joint affection and patients without joint affection as regarding SLEDAI and laboratory parameters

Variable	Patients with joint affection Mean ± SD	Patients without joint affection Mean ± SD	T-test	p-value
SLEDAI	13.5 ± 2.9	17.3 ± 3.1	1.23	> 0.05 *
MDA n mol/ml	2.82 ± 0.44	2.18 ± 0.53	1.82	> 0.05 *
SOD µ/mg/Hb.	27.74 ± 5.22	26.17 ± 4.30	0.69	>0.05 *
GSH-P_x µ/g/Hb	26.40 ± 4.33	24.87 ± 5.20	1.74	> 0.05 *
Vit.E µ mol/L	6.92 ± 1.52	6.80 ± 2.10	0.09	> 0.05 *
Vi. A µ mol/L	1.3 ± 0.15	1.13 ± 0.07	1.99	>0.05 *

SLEDAI = Systemic lumpus crythematosus disease activity index.
MDA = Malon dialdehyde
SOD = Superoxide dismutase
GSH-P_x = Glutathion peroxidase
Vit = Vitamin.
* = Non significant

Table (8) : Prevalence of skin affection in patients' subgroups and comparison by ANOVA test

	I-A	I-B	I-C	P-value
Number	7/9	10/15	2/6*	< 0.05
(%)	77.8%	66.7%	33.3%	S

** S = Significant

Fig. (4) : Prevalence of skin affection in patients' subgroups

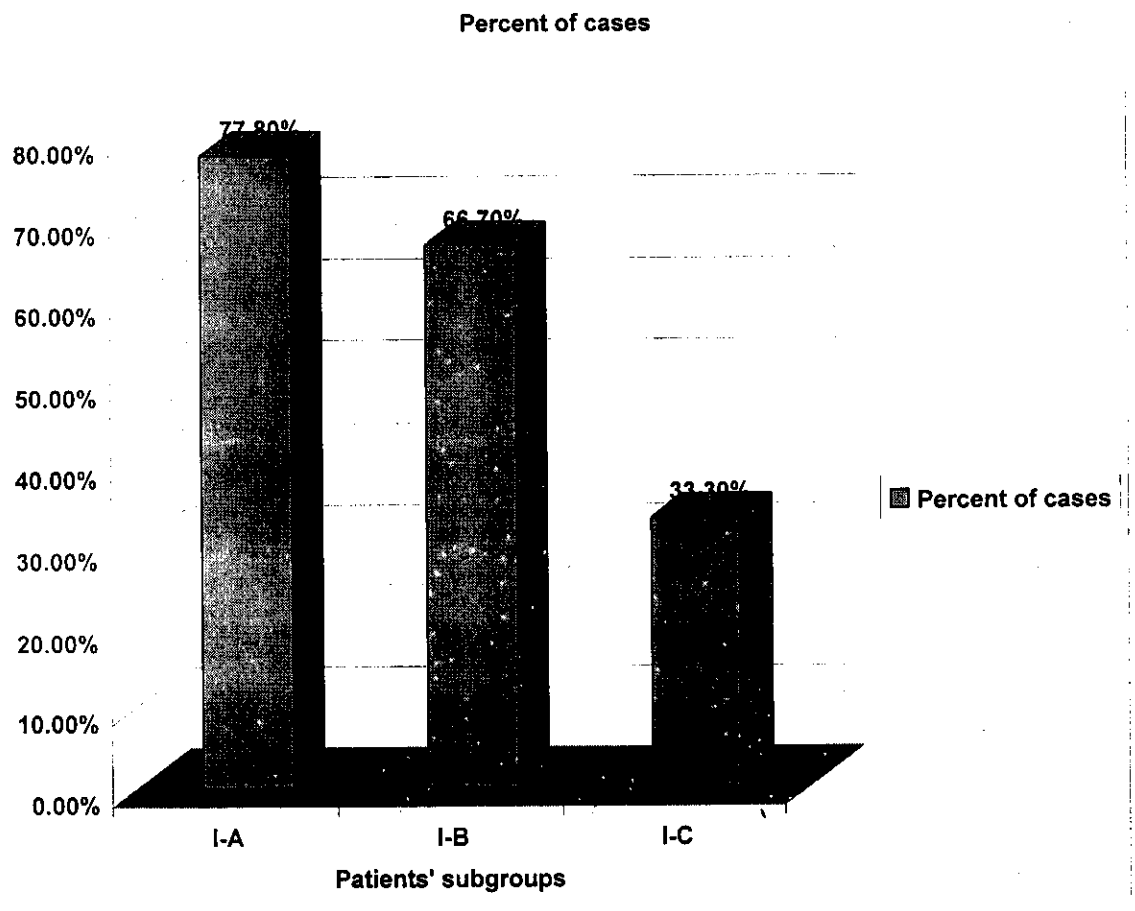

Table (9) : comparison between patients with skin affection and patients without skin affection as regarding SLEDAI and laboratory parameters

Variable	Patients with skin affection Mean ± SD	Patients without skin affection Mean ± SD	T-test	p-value
SLEDAI	10.52 ± 2.3	18.55 ± 3.2	5.14	< 0.05 **
MDA n mol/ml	2.72 ± 0.34	2.78 ± 0.48	1.34	> 0.05 *
SOD μ/m/Hb.	29.69 ± 6.10	25.40 ± 5.22	1.74	>0.05 *
GSH-P_x μ/g/Hb	27.60 ± 4.26	24.56 ± 3.82	0.96	>0.05 *
Vit.E μ mol/L	6.65 ± 1.33	6.61 ± 1.34	0.85	> 0.05 *
Vi. A μ mol/L	1.15 ± 0.14	1.24 ± 0.13	1.44	>0.05 *

SLEDAI = Systemic lumpus crythematosus disease activity index.
MDA = Malon dialdehyde
SOD = Superoxide dismutase
GSH-P_x = Glutathion peroxidase
Vit = Vitamin.
* = Non significant ** = significant

Table (10) : Serositis in patients' subgroups and comparison by ANOVA test

	I-A	I-B	I-C	P-value
Number	1/9**	6/15	3/6	< 0.05
(%)	11.1%`	40%	50%	S

** S = Significant

Fig. (5) : Serositis in patients' subgroups

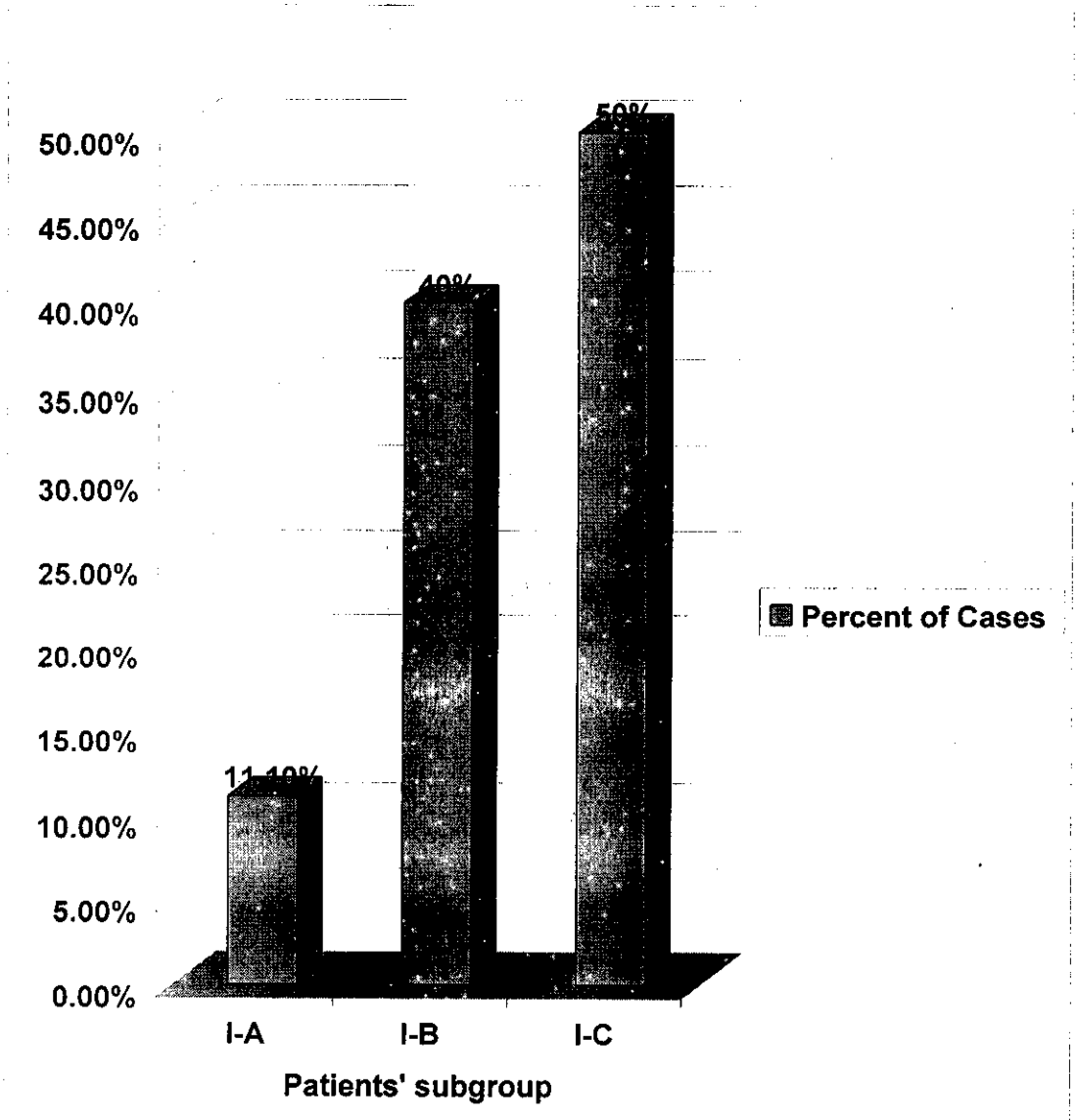

Table (11) : Comparison between patients with serositis and patients without serositis as regarding SLEDAI and laboratory parameters

Variable	Patients with serositis	Patients without serositis	T-test	p-value
SLEDAI	15.9 ± 3.2	15.2 ± 3.1	1.80	> 0.05 *
MDA n mol/ml	3.04 ± 0.49	2.71 ± 0.33	1.04	>0.05 *
SOD μ/ mg/Hb.	25.79 ± 4.70	31.33 ± 6.22	8.43	< 0.05 **
GSH-P_x μ/g / Hb	30.10 ± 5.65	30.52 ± 4.7	0.08	> 0.05 *
Vit.E μ mol/L	5.17 ± 1.87	6.85 ± 1.01	5.2	< 0.05 **
Vi. A μ mol/L	1.01 ± 0.11	1.15 ± 0.15	1.96	> 0.05 *

SLEDAI = Systemic lumpus crythematosus disease activity index.
MDA = Malon dialdehyde
SOD = Superoxide dismutase
GSH-P_x = Glutathion peroxidase
Vit = Vitamin.
* = Non significant ** = significant

Table (14) : CNS affection in patients subgroups and comparison by ANOVA test

	I-A	I-B	I-C	P-value
Number	1/9	3/15	2/6	> 0.05
(%)	11.1%	20%	33.3%	NS

NS = Significant

Table (15) : Comparison between patients with CNS affection and patients without CNS affection as regarding SLEDAI and laboratory parameters

Variable	Patients with CNS affection	Patients without CNS affection	T-test	p-value
SLEDAI	19.22 ± 2.3	12.38 ± 3.2	9.54	< 0.01 ***
MDA n mol /ml	2.93 ± 6.71	2.66 ± 0.64	1.90	>0.05 *
SOD μ/ mg/ Hb.	27.30 ± 4.9	25.90 ± 6.2	1.65	>0.05 *
GSH-P_x μ/ g/Hb.	29.69 ± 6.1	24.55 ± 4.9	1.24	>0.05 *
Vit.E μ mol/L	6.95 ± 1.44	6.20 ± 1.66	1.37	>0.05 *
Vi. A μ mol/L	1.04 ± 0.20	1.14 ± 0.11	1.33	> 0.05 *

SLEDAI = Systemic lumpus erythematosus disease activity index.
MDA = Malon dialdehyde
SOD = Superoxide dismutase
GSH-P_x = Glutathion peroxidase
Vit = Vitamin.
* = Non significant ** = significant *** highly significant

Table (16) :Hematological affection in patients' subgroups by comparison by ANOVA test

	I-A	I-B	I-C	P-value
Number	4/9*	12/15	5/6	< 0.05
(%)	44.4%	80%	83.3%	S

*S = Significant

Table (17) : Comparison between patients with hematological affection and patients without hematological affection as regarding SLEDAI and laboratory parameters

Variable	Patients with hematological	Patients without hematological	T-test	p-value
SLEDAI	13.46 ± 2.9	14.56 ± 3.1	0.86	> 0.05 *
MDA n mol /ml	3.1 ± 0.84	2.89 ± 0.57	1.09	> 0.05 *
SOD µ/ mg/ Hb.	28.32 ± 4.1	29.18 ± 3.9	1.44	> 0.05 *
GSH-P_x µ/ g/Hb.	30.38 ± 5.30	27.33 ± 4.85	1.68	> 0.05 *
Vit.E µ mol/L	6.45 ± 1.70	7. 56 ± 1.63	1.91	>0.05 *
Vi. A µ mol/L	1.02 ± 0.36	1.2 ± 0.56	1.18	> 0.05 *

SLEDAI = Systemic lumpus crythematosus disease activity index.
MDA = Malon dialdehyde
SOD = Superoxide dismutase
GSH-P_x = Glutathion peroxidase
Vit = Vitamin.
* = Non significant

Table (18) : Comparison between patients and controls as regard laboratory parameters (oxidants and antioxidants)

	Group I	Group II	T- test	P-value
MDA n mol/ml	2.74 ± 0.32	1.58 ± 0.38	5.43	< 0.01 HS
SOD μ /mg/ Hb	28.4 ± 5.2	39.2 ± 5.2	6.65	< 0.01 HS
GSH.Pxμ/g/Hb	26.74 ± 4.33	41.84 ± 8.77	8.48	< 0.01 HS
Vit. E μ mol/L	6.63 ± 1.34	12.96 ± 0.66	8.20	< 0.01 HS
Vit. A μ mol/L	1.2 ± 0.13	1.88 ± 0.07	6.73	>0.05 NS

MDA = Malondialdehyde.
SOD = Superoxid dismutase
GSH.Px = Glutathion peroxidase
HS = highly significant
S = Significant

Table (19) Oxidants (MDA) in the patients' subgroups

	Subgroup I-A	Subgroup I-B	Subgroup I-C	P-value
Range/n mol/ml	2.1 – 2.9	2.1 – 3.3	2.4 – 3.4	> 0.05
$\bar{X} \pm$ SD	2.6 ± 0.5	2.8 ± 0.3	2.8 ± 0.3	NS

NS = Non Significant $\bar{X}$ = mean SD = Standard deviation

Table (20) Comparison between male and female patients' as regard MDA

Sex %	Range/ n mol/ml	Mean ± SD	P- value
Males (6.7%)	2.9 – 2.9	2.9 ± 0.3	> 0.05 NS
Females (93.3%)	2.1 – 3.4	2.6 ± 0.4	

NS = Non Significant

Table (21) : Correlation (*r*-value) of all laboratory parameters with some clinical data and SLEDAI

Variable	MDA	SOD	GSH-Px	Vit. E	Vit. A
Age	0.138*	-0.325*	-0.271*	0.214*	0.229*
Disease duration	0.240 *	-0.037 *	-0.098 *	- 0.054 *	- 0.257 *
No. of systems affected	0.002 *	- 0.183 *	0.269 *	0.178 *	- 0.183 *
SLEDAI	0. 290 *	- 0.482 ***	- 0.276 *	- 0.415 **	- 0.050 *

MDA = Malondialdehyde.
SOD = Superoxid dismutase
GSH.Px = Glutathion puoxidas
Vit. = Vitamin.
SLEDAI = systemic lupus erythematosus disease activity index.
*= Non significant.
** = Significant.
*** = highly significant.

Table (22) : Correlation (r-value) between all laboratory parameters

Variable	MDA	SOD	GSH-Px	Vit. E	Vit. A
MDA	-	-0.292	-0.044	-0.158	-0.096
SOD	-0.292	-	0.309	0.124	-0.119
GSH-Px	-0.044	0.309	-	-0.112	-0.112
Vit. E	-0.158	0.124	-0.112	-	-0.091
Vit. A	-0.096	-0.119	-0.242	-0.091	-

MDA = Malondialdehyde.
SOD = Superoxid dismutase
GSH.Px = Glutathion peroxidase
Vit. = Vitamin.
All variables had a non significant correlation.

Table (23) : Antioxdiant enzymes in the patients' subgroups

		I-A	I-B	I-C	P.value
SOD	Range µ/mg Hb	22-39	22.80 – 36	18- 30.1	> 0.05 NS
	$\bar{X}$ ± SD	30.9 ± 6.1	28.8 ± 3.6	23.6 ± 4.4	
GSH-Px	Range µ/g Hb	21-31	20.6 – 31.2	19.2 – 30	> 0.05 NS
	$\bar{X}$ ± SD	28.3 ± 4.9	26.5 ± 3.8	24.9 ± 4.5	

SOD = superoxide dismutase
GSH-Px = glutathion peroxidase
NS = Non significant
$\bar{X}$ = mean
SD = standard deviation

Table (24) : Comparison between male and female patients as regards antioxidant enzymes

	Sex (%)	Range/unit	$\bar{X}$ ± SD	P.value
SOD	Males (6.7%)	24.8 – 38 µ/mg Hb	31.4 ± 6.7	> 0.05 NS
	Females (93.3%)	22-38 µ/mg Hb	29.3 ± 5.6	
GSH-Px	Males (6.7%)	24-27.9 µ/g Hb	25.95 ± 8.7	> 0.05 NS
	Females (93.3%)	19.2 – 34.9 µ/g Hb.	26.13 ± 6.5	

SOD = superoxide dismutase
GSH-Px = glutathion peroxidase
NS = Non significant
$\bar{x}$ = mean
SD = standard deviation

Table (25) : Antioxdiant vitamins in the patients' subgroups

		I-A	I-B	I-C	P.value
Vit. E	Range μ mol/L	5.2 – 7.8	4.4-9.9	5.1-6.8	> 0.05 NS
	$\bar{X}$ ± SD	6.6 ± 0.9	6.8 ± 1.7	6.1 ± 0.8	
Vit. A	Range μ mol/L	0.69 – 1.42	0.99-1.3	0.89-1.34	> 0.05 NS
	$\bar{X}$ ± SD	1.17±6.16	1.1±0.1	1.15±0.13	

Vit. = Vitamin
NS = Non significant
$\bar{x}$ = mean
SD = standard deviation

Table (26) : Comparison between male and female patients as regards antioxidant vitamins

	Sex (%)	Range μ mol/L	$\bar{X}$ ± SD	P.value
Vit. E	Males (6.7%)	6.7 – 7.2	6.95 ± 1.31	> 0.05 NS
	Females (93.3%)	4.4 – 9.9	5.9 ± 1.01	
Vit. A	Males (6.7%)	1.1 – 1.22	1.77 ± 0.3	> 0.05 NS
	Females (93.3%)	0.89-1.34	1.3 ± 0.7	

Vit. = Vitamin
NS = Non significant
$\bar{X}$ = mean
SD = standard deviation

Table (27) : Predictors of the SLEDAI

Factor	Slope (β)	R2	P
Age	-0.402	5.89%	<0.00001
Vitamin E	0.1210	34.68	<0.001
CNS involvement	0.2117	15.65	<0.05

CNS = Central nervous system.

Table (28) : Predictors of the SLEDAI after removal of the age

Factor	Slope (β)	R2	P
SOD	-0.0408	15.45%	<0.05
ESR1	0.0158	11.63%	=0.05
Duration	0.187	18.87%	<0.02
CNS	0.441	13.50%	<0.05

SOD = superoxide dismature.

ESR = Elythrocyte sedmentation rate.

CNS = Central nervous system.

Table (29) : Predictors of the SLEDAI after removal of the age and affected sites

Factor	Slope (β)	R2	P
MDA	0.8523	19.5%	<0.01
ESR	0.0323	33.9%	<0.00001

MDA = Malondioldhyete

ESR = Erythocyte sedmentation rate.