Systemic Correlative Study between Systemic Lupus Erythematosus, Osteoporoses And Dehydroepiandrosterone-S(DHEA-S)level In Premenoposal Egyptian Women

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Abstract

Systemic Lupus Erythematosus (SLE) is an autoimmune disease commonly occurs in of childbearing age, with connective tissue inflammation particularly joints and causes characteristic rashes.

Subjects & Methods: the present study includs30 premenopausal females, they were divided into 3 groups. Group I consists o ten premenopausal females without SLE, Group II include ten premenopausal females had SLE,disease duration less than three years, Group III include ten premenopausal females had SLE,disease duration more than three years. Bone mineral density (BMD) in the heel of right foot by Achilles Express in all groups had been performed. Estimation of the serum level of Dehydroepiandrosterone Sulphate (DHEA-S) hormone and serum level of calcium, phosphorous ,sodium and potassium.

Results: the results of the present study showed that in group II the BMD was 10% with osteoporotic , 40% with osteopenic and 50% with normal BMD, group III the BMD was 10% with osteoporotic , 60% with osteopenic and 30% with normal BMD. The correlations were done between BMD and serum minerals calcium, phosphorous, sodium and potassium in SLE patients ( Group II&III). Statistically high significant increase was found among osteopenic versus control women. Moreover a significant increase of serum calcium and sodium while there was a significant decrease in serum DHEA-S, phosphorous and potassium.

Conclusions: There is a relationship between level of DHEA and the progression of SLE. Moreover there is relation between the decline in serum levels of DHEA-S and phosphorous , and the elevation of serum levels of calcium and the occurrence of osteoporosis in SLE.

Treatment with DHE is beneficial in controlling of the disease activity in LES patients.

Introduction

Systemic lupus Erythematosus (SLE) is the prototypical autoimmune disease characterized by the production of numerous autoantibodies (Arkrachaisiri & lehman, 1999)

The particular etiology of SLE is unknown, but immunocomplexes autoantibodies , genetic ,environmental and endocrinal factors may play significant roles (Rubin,1999). About 98% pf SLE patients have positive antinuclear antibodies (ANA) test, which are circulating and playing a role in the damage of several organs involvement (Evans,1998).

Lupus Erythematosus has been classified into SLE , Discoid lupus Erythematosus (DEL) , chronic cutaneous lupus erythematosus , neonatal lupus erythematosus and drug-induced LE (Rubin,1999).

SLE affect female who is 20 to 40 years of age, it is a disease with multiorgan involvement. According to the American Rheumatism Association the diagnosis of SEL requires to fulfillment of four of eleven criteria (Dieppe et al.,1985) which are :Cutaneous malar rash, Discoid scaly rash , Alopecia ,Raynud's
Systemic Correlative Study between Systemic…..

phenomenon, Skin ulcer, Photosensitivity, Oral ulcers, Serositis, Renal disorder, musculoskeletal, Cardiopulmonary, Immunologic disorders, Neurologic disorders. Clinical manifestations: It is characterized by immunocomplex deposition causes small vessel vasculitis, which leads to multiorgan involvement such as renal (Moscik & Kipple 1996), Cardiac, hematologic, mucocutaneous and central nervous destruction (Bluestein, 1992).

Moreover, inflammation of the serous membranes results in joint, peritoneal and pleuroperticardial symptoms.

The oral lesions are in the form of nonspecific ulcerations, salivary gland disease, tempromandibular disorders, mucositis, glossitis (Rhodus & Johnson, 1990).

Osteoporosis is defined as parallel loss of both mineral and matrix that render residual quantities inadequate to withstand minor trauma without fracture. (Cooper and Hihie, 1994). It is classified into primary and secondary forms. (Leboff, 1997)

Several medications are prescribed in the management of SLE. The most common drug is systemic corticosteroids and antimalarial drugs such as chloroquine appear to be also effective.

One of the major drawbacks of glucocorticoid therapy is bone loss which characterized by exceed rate of bone resorption, the rate of bone formation, this may be caused by supraphysiologic levels leading to reduce formation and increase resorption (Adler and Rosen, 1994).

Dehydroepiandosterone (DHEA) is most abundant steroid in the blood stream produced mainly by the zone reticularis of the adrenal gland. It is a parahormone that produced another hormones. Possible therapeutic applications of DHEA supplementation include the prevention and/or treatment of heart disease, diabetes, obesity, osteoporosis and arthritis (Barrett et al., 1986). Rogers et al (2000) found that woman with higher levels of DHEA had greater bone mass than those with lower DHEA levels.

Robinson & Cutulo (1999) found that the level of DHEA was below normal level in those people with SLE and DHEA supplementation may be therapeutic.

The present study was carried out to assess the correlation of SEL, osteoporosis and Dehydroepiandosterone-S (DHEA-S) level in premenopausal Egyptian women.

**Subjects and Method**

**Patients selection:**

The present study comprised thirty premenopausal females which selected from the outpatient clinic of internal medicine department of Ain Shams University hospital, their ages ranged from 18-45 years.

They are classified into three groups:

- **Group I:** ten premenopausal women free from any systemic disease (control group)
- **Group II:** ten premenopausal women with SLE for less than three years
- **Group III:** ten premenopausal women with SLE for more than three years

The diagnosis of SLE in group II & III was done according to the revised criteria of American College of Rheumatology (ACR).

The abovementioned groups were subjected to the following:

1. Careful medical history
2. SLE disease index (SLEDAI):

   SELDAI is a valid model of experienced physicians global assessment of disease activity in lupus.

   It experts in the 24 “most important” description of disease activity (Bombardier et al., 1992)

3. Radiological investigation:

   Densitometry for heel.
   - Bone mineral density measurement
   It was performed by Achilles Express. The machine used in the present study was using ultrasound source and the data were analyzed by special software for analyzing the densities of examined part. The data received were automatically compared with age, sex, and normal reference population. It was compared with normal peak bone mass for same sex and race. Bone mass deficit is quantitated as gm/cm2 or approximate standard deviation above or
below age matched normal means (Z-Score). It was also correlated to deviation from normal peak bone mass (T-Score). The heel was examined and analyzed to get the absolute bone density in gm/cm² and the percentage of bone density relative to Z and T scores.

4- Measurement of Dehydroepiandosterone level (DHEA-S):
   Serum DHEA-S has been determined by using ELISA Kit.()

5- Estimation of serum calcium (Ca+2) and serum phosphorus (P+3):
   Serum Ca and serum phosphorus were detected according to Teitz method (1983)

6- Estimation of serum sodium (Na+):
   Serum sodium (Na+) was carried out according to Trinder (1951) method

7- Estimation of serum potassium (k+):
   Serum potassium (k+) was carried out according to Henry, 1974 method. Statistical analysis was performed using student t-test.

Results

Assessment of the disease activity:
Using SLEDAI, the disease was active in 30% of patients of group II (disease duration less than 3 years) and the disease was inactive in 70% of patients of the same group. However in group III (disease duration more than 3 years) the disease was active in 40% of patients, and inactive in 60% of patients of the same group. (Table 1)

Table (1) show disease activity of SLE patients

<table>
<thead>
<tr>
<th>Group</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group II</td>
<td>6-10</td>
<td>0-3</td>
</tr>
<tr>
<td>Activity score</td>
<td>30% of patients</td>
<td>70% of patients</td>
</tr>
<tr>
<td>Group III</td>
<td>6-18</td>
<td>0-3</td>
</tr>
<tr>
<td>Activity score</td>
<td>40% of patients</td>
<td>60% of patients</td>
</tr>
</tbody>
</table>

Achilles express results in SLE women (group II&III) on one site (Heel of Right Foot):

As regard the bone mineral density assessment by Achilles express for heel of right foot, it was found that: In group II, the bone mineral density (BMD) range from -3.3 to 0.7 (mean ± SD -0.99 ± 0.41). While in group III, the BMD ranged from -3.1 to 0.3 (Mean ± SD -1.21 ± 0.28). From the present results the pattern of bone has been affected in SLE patients table 2.

Table (2) Show Achilles express results in SLE women (group II&III) on one site (Heel of Right Foot):

<table>
<thead>
<tr>
<th>Groups</th>
<th>Heel of right foot</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group II</td>
<td>Minimum</td>
<td>-3.3</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>0.7</td>
</tr>
<tr>
<td>Group III</td>
<td>Minimum</td>
<td>-3.1</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>0.3</td>
</tr>
</tbody>
</table>
According to the BMD of the site of heel group II were classified into:

Non osteopenic group with low risk of osteoporosis with value ranged from 0.2 to 0.8. This group included 50% of patients.

Osteopenic group with moderate risk of osteoporosis with value ranged from -2.0 to -1.4. This group included 40% of patients.

Osteoportic group (osteoporosis) with value ranged from -3.4. It included 10% of patients.

According to the BMD of the site of heel group III were classified into:

1-Non osteopenic group with low risk of osteoporosis with value ranged from -0.9 to 0.3. This group included 30% of patients.

2-Osteopenic group with moderate risk of osteoporosis with value ranged from -1.5 to -1.3. This group included 60% of patients.

3-Osteoportic group (osteoporosis) with value ranged from -3.1. It included 10% of patients. (table 3)

### Table 3: The BMD Affecting in the Site of Heel of SLE Patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>% of Non Osteopenic Patients</th>
<th>% of Patients with Osteopenia</th>
<th>% of Patients with Osteoporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group II</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
</tr>
<tr>
<td>Group III</td>
<td>30%</td>
<td>60%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Statistical analysis of bone mineral density assessment by Achilles express for heel of right foot reveals an insignificant change in SLE patients of group II as compare to control group (group I). However in group III there was a significant decrease (P< 0.05) when compare to group I table 4 & fig 1.

### Table 4: Statistical Analysis of BMD of Heel of Right Foot in Control and SLE Patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group I (Control)</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.033</td>
<td>-0.99</td>
<td>-1.21</td>
</tr>
<tr>
<td>± SD</td>
<td>±0.34</td>
<td>±0.41</td>
<td>±0.28</td>
</tr>
<tr>
<td>Probabilities</td>
<td>N.S</td>
<td>S</td>
<td>P&lt; 0.05</td>
</tr>
</tbody>
</table>

NS: Non significant  
S: Significant  
STIFFNESS INDEX  

<table>
<thead>
<tr>
<th>AGE (Years)</th>
<th>100</th>
<th>74</th>
<th>48</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>2</td>
<td>0</td>
<td>-2</td>
<td>-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Age 40  
Sex Female  
% Young Adult 93.9  
T Score -0.52  
% Age Matched 106.4  
Z Score 0.48
Non osteopenic of heel of right foot for some of control women (group 1)

Non osteopenic of heel of right foot for SLE patients in group II (disease duration less than three years)

Osteopenia (Medium risk for osteoporosis) of heel of right foot for SLE patients in group II (disease duration less than three years)
Osteoporosis of heel of right foot for SLE patients in group II (disease duration less than three years)

Non osteopenic of heel of right foot for SLE patients in group III (disease duration more than three years)

Osteopenia of heel of right foot for SLE patients in group III (disease duration more than three years)
Osteoporosis of heel of right foot for SLE patients in group III (disease duration more than three years)

Hormonal analysis:

Serum DHEA-S level

The result showed notified decrease in serum DHEA-S level in SLE patients with osteoporosis, statistical analysis showed slightly significant decrease (P<0.05) in SLE patients of both group II and group III (table 5 & fig 2)

Table (5): Show the Serum DHEA-S level (mg/dl) in control & SLE patients:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group I (control)</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.23</td>
<td>0.17</td>
<td>0.15</td>
</tr>
<tr>
<td>± SD</td>
<td>±0.02</td>
<td>±0.015</td>
<td>±0.031</td>
</tr>
<tr>
<td>probabilitis</td>
<td>S</td>
<td>P&lt; 0.05</td>
<td>S</td>
</tr>
</tbody>
</table>

Fig (2): Show serum DHEA-S levels in control and SLE patients
Table (6): Show different treatment modalities in SLE groups & its effect on BMD

<table>
<thead>
<tr>
<th>Group treatment</th>
<th>Noticeable effect on BMD</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corticosteroids</td>
<td>Had osteopenia</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>DHEA</td>
<td>All values are normal with decrease in disease activity in group II treated with DHEA</td>
<td>10% of patients are treated with DHEA</td>
<td>--</td>
</tr>
<tr>
<td>Corticosteroids, osteal calcium &amp; Antimalarial</td>
<td>BMD within normal</td>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Had osteoporosis</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Results of Minerals analysis:

Serum calcium levels:

The result showed that serum calcium level of osteoporotic women had increased value, but non osteoporotic SLE women had normal value. Statistical analysis showed significant increase (p<0.05) in group II (disease duration less than 3 years), but there is highly significant increase (p<0.01) in group III (disease duration more than 3 years) when compared to normal group (table 7 & fig. 3.)

Table (7): Show Serum calcium levels in the three groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SE</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>9.3 ± 0.73</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>14.212 ± 1.62</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Group III</td>
<td>17.163 ± 1.867</td>
<td>P &lt; 0.01</td>
</tr>
</tbody>
</table>

Fig 3 show Serum calcium levels in normal and SLE patients

Serum phosphorous levels:

Statistical analysis showed slightly significant decrease (p< 0.05) in group II, but there was highly significant decrease (P< 0.01) in group III as compared to normal group (table 8 & fig 4)

Table (8): Show serum phosphorous levels in normal and SLE patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SE</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>3.49±0.395</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>2.35± 0.134</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Group III</td>
<td>1.87± 0.0187</td>
<td>P &lt; 0.01</td>
</tr>
</tbody>
</table>
Serum phosphorous level (mg/dl) in normal & SLE

Fig (4): Shows serum phosphorous levels in normal and SLE patients

Table (9): Show serum sodium level (mmol/l) in normal and SLE patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SE</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>138.51± 1.26</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>148.3± 3.32</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Groups III</td>
<td>147.48± 3.41</td>
<td>P &lt; 0.05</td>
</tr>
</tbody>
</table>

Serum sodium level:
The result showed that serum sodium level was significantly increase (p< 0.05) in both group II (disease duration less than 3 years ) and group III ( disease duration more than 3 years ) as compared to normal group (table 9, fig.4)

Table 10 show serum potassium levels (mmol/l) in normal and SLE patients

Table (10): Shows serum potassium levels (mmol/l) in normal and SLE patients

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SE</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>5.54±0.22</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>4.06± 0.32</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Groups III</td>
<td>4.04± 0.54</td>
<td>P &lt; 0.05</td>
</tr>
</tbody>
</table>

Serum potassium level:
The result of the present study showed that serum potassium level was significantly decreased (p< 0.05) in both group II (disease duration less than 3 years ) as compared to normal group (table 10, fig.5)

Table 10 show serum potassium levels (mmol/l) in normal and SLE patients

Serum potassium level (mmol/l) in normal & SLE

Fig (5) : Show serum sodium level in normal and SLE patients

Serum potassium level (mmol/l) in normal & SLE

Fig (5) : Show serum potassium level in normal and SLE patients
Comparison between non osteopenic and osteopenic groups II & III (SLE patients) and group I (normal)
-Regarding to the serum calcium level (fig.7) there is a high significant increase among osteopenic Vs non osteopenic SLE patients, while there is a high significant decrease in serum phosphorous level (fig.8) in both osteopenic Vs non osteopenic SLE patients.

-Statistical analysis showed non significant difference between group I(normal) and group II & III (non osteopenic SLE patients)
- However there was highly significant increase (p<0.01) in serum calcium and a highly significant decrease (p <0.01) in serum phosphorus level between group I(normal) and groups II &III osteopenic SLE patients (table 11, fig 6)

Table (11): Shows comparison between non osteopenic and osteopenic group II & III (SLE patients) and group I (normal women)

<table>
<thead>
<tr>
<th>varibles</th>
<th>Group I (mean±SE)</th>
<th>Group II</th>
<th>Group III</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non osteopenic</td>
<td>osteopenic</td>
<td>Non osteopenic</td>
<td>osteopenic</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>9.415±0.138</td>
<td>10.345±0.58</td>
<td>15.37±1.125</td>
<td>10.896±2.59</td>
</tr>
<tr>
<td>Phosphorous (mg/dl)</td>
<td>3.665±0.225</td>
<td>2.59±0.159</td>
<td>1.31±0.001</td>
<td>3.3±0.158</td>
</tr>
</tbody>
</table>

Fig (6) : Shows comparison between non osteopenic and osteopenic group II & III (SLE patients) and group I (normal women)
Discussion

The life expectancy of patients with systemic lupus erythematosus (SLE) has been improved (Reveille et al., 1990). This raises new concerns about the side effect of the drugs used in management of SLE which includes premature menopause, late malignancy, accelerated atherosclerosis, and osteoporosis. Several risk factors for osteoporosis are contributed in SLE patients such as; the inflammatory nature of the disease itself, disease related co-morbidity and its treatment. Bone loss is apparent early in the disease and this may be confounded primarily by corticosteroid treatment. (Devogelaer & Nagant, 1993).

Measurement of BMD should be considered in SLE patients who are at risk for osteoporosis, particularly those starting corticosteroid and in premenopausal women (Sen & Keen, 2004).

In the present study, BMD in SLE patients of group II (disease duration less than 3 years) classified as 10% with osteoporosis, 40% with osteopenia and 50% with normal BMD. However in group III (disease duration more than 3 years) 10% with osteoporosis, 60% with osteopenia and 30% with normal BMD. This is in accordance with Formiga et al (1995), Ramsey et al. (1999), Teichmann et al. (1999) and Redlich et al. (2000) who noticed a high incidence of osteoporosis, in premenopausal women with SLE and this seems to be attributable, at least in part, to decreased bone formation.

Correlation between BMD and clinical parameters was calculated. It was found that BMD in SLE patients was lower (p<0.01) than in the control group. So according to WHO criteria 30% had normal BMD, 40% had osteopenia and 30% had osteoporosis.

Lahita et al. (1987) and Dhullon et al (1990), suggested that the normal BMD in SLE patients may be due to increased rates of 16-α hydroxylation of estradiol in lupus patients with formation of oestrogenic metabolites such as 16-α hydroxyoestrone and oestriol, with possible protection of Lupus patients from osteoporosis. Another explanation for normal BMD could be related to their balanced diet with suitable amount of vitamin c which is necessary for sufficient protein matrix formation and intercellular substance secretions (Guyton and hall, 2000). Moreover, it may be due to treatment with osteal calcium, where in the present study 50% of SLE patients in group II and 20% of group III were treated with it. Significant lower BMDs were found in those not on calcium supplements in SLE patients, this result was in agreement with Lie et al. (1998).

Ten percent of SLE patients in the present study showed osteoporosis in both groups (II &III). These patients were treated with corticosteroids only. Prolonged steroid therapy which known to increase the development of osteoporosis and fractures is the possible explanation as reported in other investigations (Lukert & Raisz, 1990 and Sambrook et al., 1990). Disease duration is associated with an increased risk for osteoporosis, but the role of glucocorticoid treatment related variable exerting an influence on the development of osteoporosis. It also may be due to lack of estrogen secretion because estrogens have an osteoplast stimulating activity and/or lack of physical stress on the bones because of inactivity of osteoplast (Guyton and Hall, 2000). On the other hand decreased vitamin D metabolism, decrease in weight-bearing exercise, ovarian dysfunction related to medications or disease activity and direct effect of inflammation on bone turnover all of these are contributed to increase osteoporosis risk in SLE (Pettita et al., 2002). The present study showed significant decrease in the mean serum levels of DHEA-S in SLE patients especially osteoporotic and osteopenic women. Dehydroepiandosterone sulphate (DHEA-S) was the major adrenal hormone whose serum levels were significantly lower in SLE patients (Vogl et al., 2003). Straub et al. (1996) reported that, DHEA-S was lower in patients compared to controls. Moreover Formig et al (1997) found a significant positive relationship between DHEA-S and BMD in premen-
opausal SLE women. Observational clinical studies and in vitro experiments have suggested that DHEA treatment might have a significant impact on immunological function and bone density (Merrill, 2003).

As regard serum minerals level the results of the present study revealed significant increase in serum calcium and significant decrease in serum phosphorous level among osteopenic SLE patients as compared with control women. This may be raised from mobilization of ca+ from bone, increased renal ca+ reabsorption by kidney. Moreover increase in formation of 1.25 dihydroxycholecalciferol, which increases ca+ absorption from the intestine and mobilizes the ions from the bones, however the plasma phosphorus level usually decreases as the plasma calcium level rise (Ganong, 2003).

In the present study the serum sodium level in SLE patients increased when compred to healthy patients. This may be due to a decrease in aldosterone secretion, which leads to an increase in sodium reabsorption. The increased sodium reabsorption is also associated with increased water reabsorption and potassium secretion (Ganong 2003).

In the present study, 10% of SLE patients treated with DHEA, had normal BMD. This means that DHEA reduced the activity of disease. This is in agreement with Kurt et al. (2000), who reported that the treatment of osteoporosis with DHEA had possible beneficial effect upon BMD. Miklos (1995) reported a significant positive correlation between DHEA-S and BMD and stated that it is useful indicator for low bone mineral density in peri- and postmenopausal women. Van Vollenhoven et al. (1998) and Robinzon & Cutulo (1999) stated that even if DHEA is not strong enough to control completely symptoms of SLE on its own, it might allow a reduction in dosage of the more harmful standard therapy. DHEA may be useful as a therapeutic agent for the treatment of mild to moderate SLE Ronald et al. (1995). Further studies of DHEA in the treatment of SLE are warranted

**Conclusion**

From the present study it is clear that there’s a relationship between the BMD and the duration of the disease, relationship between level of DHEA and the progression of SLE and there is a decline in serum DHEA-S and the occurrence of osteoporosis in SLE patients.

**References**

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المجموعة الثالثة و تضم عشر سيدات يعانين من مرض الذببة الحمراء لمدة أكثر من ثلاث سنوات

وقد تم قياس كثافة العظام للسيدات السابق ذكرهن، كما تم أيضا قياس بعض العيير الفسيولوجية مثل: 
1- تحديد نسبة كبريتات الديهيدروابينادروستيرون.
2- قياس بعض المغذيات مثل الكالسيوم والفسفور والصوديوم والبوتاسيوم.

وقد أوضحت هذه الدراسة كثافة العظام في مرضى الذببة الحمراء في المجموعة الثالثة (عيانين من مرض الذببة الحمراء لمدة أقل من ثلاث سنوات) قسم كالآتي:
10% مصابات بأشكال العظام. 40% لديهم استعداد للإصابة بأشكال العظام. 50% لديهم كثافة العظام طبيعية بينما كانت نتائج المجموعة الثالثة (عيانين من مرض الذببة الحمراء لمدة أكثر من ثلاث سنوات) قسم كالآتي:
10% يعاني من هشاشة العظام، 60% لديهم استعداد للإصابة بأشكال العظام، 30% الباقين فكثافة العظام طبيعي.

كما أظهرت النتائج الإثاث:
زيادة في نسبة الكالسيوم والصوديوم كما وجد نقص في نسبة كبريتات الديهيدروابينادروستيرون والفسفور والبوتاسيوم.

وبناء على النتائج المستخلصة من هذا البحث ننصح بقياس كثافة العظام بشكل دوري لمريضي الذببة الحمراء وكذلك المرضى المعاقين للكورتيزون ينصح باستخدام هرمون الديهيدروابينادروستيرون كعلاج مع تخفيف جرعة الكورتيزون المستخدمة كلما أمكن و ذلك لتقليل الإصابة بأشكال العظام كما أثبت فعالية في ضبط نشاط هذا المرض عند مرضى الذببة الحمراء.