A Study of Some Immunological and Biochemical Indicators for Patients with Osteoporosis

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Abstract

In this study, focused on effect immune cells on bone and directed effect on osteoblast and osteoclast, which are secreted from cytokines and C-reactive protein and express trigger to immune response to continue to cause osteoporosis. Role of humoral immune response to osteoporosis is demonstrated. Some immunological indicators are studies for Iraqi patients. Blood samples are collected from all people (patients and healthy controls) to determine calcium levels, alkaline phosphatase enzyme, Erythrocyte Sedimentation Rate (ESR), Immunoglobulin G (IgG), and Immunoglobulin M (IgM). Results showed an increase in erythrocyte sedimentation rate (48.45) compared with healthy controls (16) as the value of T=16.89. There is a significant difference between patients and healthy controls p<0.001. The high rate of IgG (+++) compared with IgM (+). It concludes that osteoporosis has a role in immune diseases and chronic diseases.

Keywords: Osteoimmunology; Immune system; Osteoclast calcium; Alkline phosphatase; ESR; IgG; IgM.

1. Introduction

Calcium is an essential mineral required by nearly every living organism. It is perpetually criminated from the body of skin cells, hair, nails, urination, sweat, and feces. If not replenished at adequate rates, the body will begin to scavenge the calcium it needs from the skeletal. Extensive studies on cross talk between immune and skeletal system in autoimmune disease give to rise to a new discipline of Osteoimmunology. The term "Osteoimmunology" used by Aaron Choi in the year 2000 the focus was on the relationship between the immune and skeletal system, especially in autoimmune diseases and other inflammatory [1]. The major discoveries and advances in this field led to the detection of molecular mechanisms as well as various cytokines and transducers refers to participate in the regulatory interaction between immune cells and bone cells. In addition, along with an arsenal of mutual signaling molecules, immune cells and bones also share a common site of origin, which is the bone marrow. Due to its proximity to the spatial development of the cells it suggests that they affect each other, not only after maturation and activation, as Kong and his colleagues already observed in 1999 [2,3], also at the beginning of its existence. Taichman and Emerson described the important role of osteoblasts in establishing outlets for hematopoietic stem cells, as well as in erosion and maintenance of Hematopoietic Stem Cells (HSC) in the bone marrow [4-8]. The development of bone cells has also been demonstrated to be supported by cells of the immune system; for instance, T cells are capable of influencing Osteoclastogenesis by the secretion of various cytokines such as interleukin-1, interleukin-6, interferon-γ or interleukin-4 [9,10], arose ideals Osteo immunological most prominent of note bone loss by osteoclast in various inflammatory diseases and autoimmune such as rheumatoid arthritis, diabetes, and lupus Erythematosus, and gum disease and viral infections, chronic (HIV) [2,11-15]. Kong et al. noticed that the carrying capacity of osteoclast activated T cells in rheumatoid arthritis Assistant brokered through activated RANKL/nuclear factor receptor kB (arrangement)/osteoprotegerin (OPG) axis [2]. RANKL is the main organizer for osteoclastogenesis, which contributes significantly to the process called bone remodeling. In this process, eating absorber old and damaged bone, which is replaced by new bone material deposited by osteoblasts? As normal physiological formation of bone remodeling is imperative to maintain bone strength, integrity, and imbalances lead to either increase or decrease bone mass of the latter it is often caused by inflammatory diseases. Cytokine regulating is the formation of osteoclast caused by lack of estrogen. Caused by estrogen deficiency bone loss is a complex effect of a large number of redundant passages of cytokines and work in a...
cooperative manner to regulate osteoclastogenesis. Causing a lack of estrogen in a global increase in IL-7 production, especially in the thymus, and bone marrow and spleen. The increase in the production of IL-7 in the bone marrow increases T cell population, which increases the activity of TNF production and import from blood cell progenitor’s origin mulberry in the thymus. The increase in IL-7 in the thymus gland increases production of the naïve CD4+ T cells in peripheral blood, which in turn expansion of T cells, which gathered led to increases production of TNF. As estrogen deficiency independently or cooperatively increases in the production of tissue cells cytokines such as IL-6, IL-1, RANKL and M-CSF, which promotes the proliferation and differentiation osteoclast precursors to the bone marrow [16]. This paper focused on study immunological response and effect it on bone mass during some changing immunological (ESR, IgG, and IgM) and biochemical (BAP and Ca) indicators for patients with osteoporosis on January to December 2014.

2. Materials and Method

100 samples were collected from people suffering from joint and bones pains, fatigue and debilitated. Where it was diagnosed 55 of the sample infected with osteoporosis. The study of the disease is not specific to sex, but in general, by taking random sample for the study of the disease immunologically for both sexes. 55 samples of blood collected from patients of osteoporosis (male and female) aged (35-75 years) from Al Kindi General Teaching Hospital in Baghdad city on January to December 2014. Also, 50 samples of blood collected from healthy controls. After conducting laboratories tests and clinical diagnosis by doctors’ competence in the field of joints and fractures, blood samples from the patient of 5 ml were collected from the blood of a vein from the arm. The samples are left for 15 minutes at room temperature where it was clotting. Tube of blood samples is placed in a centrifuge at speed (3000) rpm for 15 minutes and then blood serum is isolated. The blood samples are collected in the same time from the patients (fasting) in the morning, the patient did not give any medication (before treatment). Various tests conducted on the sample in the same day. It was measured calcium ion concentration (Ca++) by colorimetric methods [17]. Also, it was measured BAP enzyme secretion of patients and healthy controls in the same method [18]. The speed of erythrocyte sedimentation rates measurement for their immunological tests by traditional method (Westergren method) and Antibody plus Combo Rapid Test (APCRT) are used [19]. Immunological antibodies titer based on the principle of simple reaction (AB-AG REACTION) have been measured in the serum of patients and healthy controls. Effective protein titer rate depending on the CRP-index agglutination titter method have been measured [20]. Statistical analyses of data were conducted using SPSS software (2012) for Windows. Equality of several means was tested using one-way classification. The data were analyzed using T test. Various statistical analyses were performed for the data. Many published statistical analyses quote p-values as ≥ 0.05 (no significant), <0.05 (significant), and <0.01 (highly significant) [21].

3. Results and Discussion

Table 1 show that the percentage of men has the disease in osteoporosis (bone necrosis), it was (23.6%) for men compared to women whose percentage (76.4%) as the samples collected after diagnosis ages ranging from 40 y to 60 y. The results showed that women are more susceptible to osteoporosis than men, especially women with postmenopausal for the collected samples. In this study Nelson et al. and Olszynski et al. [22,23] showed that osteoporosis in women at postmenopausal are more than men in Canada.

Table 2 showed that low calcium rate in patients with osteoporosis (8.28) compared with healthy controls, where the rate of calcium (10.16) which is within normal limits (T=11.199) and there is statistically significant (p<0.001). This means that calcium levels in the blood of patients goes down, so the hardness of bones is few. Where, calcium is a key element in myeloid mass components [24]. Arnaud and Sanchez [25] showed the reason for the low rate of calcium ratio of patients to an imbalance in the absorption of calcium from food as a result of hormonal imbalance. Then renal function less in production 1.25 (OH)D3, which has a role in the body’s fluid balance (electrolytic) in the blood then the body begins to withdraw calcium from the bone marrow by an estimated (1500-2500 mg/day). This
amount is difficult to compensate and therefore osteoporosis occur.

Table 3 shows the increase in enzyme secretory for patients at a rate of (84.26) compared with healthy controls, where it was observed that the enzyme secretory within normal limits (40.38) at T=14.606.

Table 3. Enzyme rate (BAP).

<table>
<thead>
<tr>
<th>Sample type</th>
<th>Average (IU/l)</th>
<th>T-Test</th>
<th>Sig(2-taild)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>84.2636</td>
<td>14.606</td>
<td>0.000</td>
</tr>
<tr>
<td>Controls</td>
<td>40.3891</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is a significant difference between patients and healthy controls p<0.001. These results indicate an imbalance in the cellular secretory of this enzyme located on the cell surface. Kress [26] showed an imbalance in the secretion of the cells of the bone, which increases the secretion of this enzyme in order to keep the basal case that must be available for the continuity of calcium to build bone.

Results showed an increase in erythrocyte sedimentation rate (48.45) compared with healthy controls (16.0) as the value of T=16.89. There is a significant difference between patients and healthy controls p<0.001 as shown in Table 4.

Table 4. Red blood cell sedimentation rate.

<table>
<thead>
<tr>
<th>Sample type</th>
<th>Average (mm/hr)</th>
<th>T-Test</th>
<th>Sig(2-taild)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>48.45</td>
<td>16.892</td>
<td>0.000</td>
</tr>
<tr>
<td>Controls</td>
<td>16.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Erythrocyte sedimentation rate is an indication of the presence of inflammation in the body and stimulates the immune system. Pisetsky [27] explained that the examination of the ESR increases in inflammatory conditions of autoimmune diseases and inflammation of the tonsils and bone inflammation and cancer.

Table 5 shows the high rate of IgG (++) compared with IgM (+).

Table 5. Antibody titer rate (IgM, IgG).

<table>
<thead>
<tr>
<th>Sample type</th>
<th>IgM</th>
<th>IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Controls</td>
<td>NEGATIVE</td>
<td>NEGATIVE</td>
</tr>
</tbody>
</table>

with IgM (+). It concludes that osteoporosis has a role in immune diseases and chronic diseases.

Table 6 illustrates the high effective rate of protein in patients (1094.73) compared with healthy controls (4), as the value of T=15.955. There is a significant difference between patients and healthy controls p<0.001. Where, protein is a means of inflammatory and defense produced by cells during inflammation (the immune attack) as well as secreted by the liver as an indicator of the occurrence of an immune attack [28,29]. Results show the role of the immune system in inflammatory conditions such as TNF, RF, CRP, and IL1-2-6 in the production of inflammation in the bone tissue and the occurrence of bone necrosis as shown in Tables 4-6. Goldering and Siggelkow et al. [30,31] showed the existence of a biological overlap between bone disease and inflammation of the immune. Manolagas [32] showed that Cytokines have a key role in osteoporosis. Where, IL 6 works on creating, activating, and stimulating the cells of the bones cationic Osteoclast where secreted interleukin of immune cells (neutrophils and monocytes), which is one of the pro-immunity cells. The role of interleukin with so much of bone diseases such as Patyets disease and osteoporosis. Wei et al. [33] explained that interleukin has a role in reducing the absorption of bone for mineral materials for building bone material and thus works on osteoporosis.

4. Conclusion

Low calcium rate in patients with osteoporosis (8.28) compared with healthy controls. The rate of calcium (10.16) within normal limits (T=11.199). It was observed that the enzyme secretory within normal limits (40.38) at T=14.606. There is a significant difference between patients and healthy controls p<0.001. These results indicate an imbalance in the cellular secretory of this enzyme located on the cell surface. Effective rate of protein in patients (1094.73) found to be high compared with healthy controls (4), as the value of T=15.955. There is a significant difference between patients and healthy controls p<0.001.

Reference


