Estimating complete blood count in women with osteopenia

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Abstract

To estimate complete blood count test of women suffering from osteopenia, it's a state of less mineralized bone, generally effect on a bone lysis rate. Blood was drawn from (120) women with osteopenia and healthy women, the age of women ranged from 30 to 45 years; Osteopenia was diagnosed by use of x-ray absorptiometry. Calcium, alkaline phosphatase also phosphate measurement by using procedure of AGAPPE diagnostic Switzerland. Vitamin D3 was measure by ELISA; also complete blood count was measured by complete blood count device. The result revealed decreasing high significant in RBC in patients (4.38 ± 0.17 ) comparing with healthy women (5.17 ± 0.14), but no significant effect of platelets in patients (247.80 ± 27.06) while in healthy women (348.60 ± 55.10) and WBC between patients (6.86 ± 1.10) while in healthy women (9.52 ± 0.72). The women with less body mass density have decreasing in circulating cell such as erythrocytes and lymphocytes

Key word: Osteopenia, bone, erythrocytes, platelets, leukocytes, women

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Introduction

Osteopenia is condition which mineral density of bone is become lesser from typical [1], also osteopenia is well-known as mineral density of bone T-score (−1.0 to −2.5) [2]. Osteopenia occurs in high frequently of women in post-menopausal when loss of estrogen concentration. It may be increased by routine condition like overload alcohol utilization, smoking, exercise lack, or lengthened use of glucocorticoid medication [3,4,5]. Osteopenia is furthermore called pre-osteoporosis because it occasionally leads to osteoporosis. Many factors include endocrine factors, genetic variations and way of life actions, like mineral deficiency because reduced nutritional intake and reduced nutrients absorption, physical activity thought to participate essential role in osteopenia or osteoporosis [6,7]. The vitamin D importance of bone health and avoidance of rickets. Also calcium is dynamically absorbed in the small intestine by vitamin D presence. Phosphorus form hydroxyapatite crystals to mineralize and strengthen bones. Therefore, food consist vitamin D and calcium is significant for suitable mineralization of bone [8]. Other many factors influence body mineral density, especially gender, heredity age, and medications [9].

Materials and methods
Blood was drawn from women with osteopenia and healthy women via vein puncture by disposable syringes (10 ml) between 8:00 to 1:00 pm in hospital in Baghdad from November to January. The age of women ranged from 30 to 45 years. The blood sample divided into two parts, the first one put in EDTA for complete blood count test, the second part put in tube without anti-coagulant left to clot for 20-30 minute at 25°C. The serum was separated by centrifugation at 3000 rpm for 10 minute and used then to biochemistry tests. Osteopenia was diagnosed by used a dual-energy x-ray absorptiometry. Also calcium, alkaline phosphatase and Phosphate measurement used procedure of AGAPPE diagnostic Switzerland. Vitamin D3 was measure by ELISA (DRG, Germany), it is based on the competitive binding enzyme immunoassay technique from Boditech. A complete blood count test was procedures for many components and features measurement in blood, including: Red blood cell indices, white blood cells, Hemoglobin, and Platelets indices.

**Statistical study:**

All data were calculated for final parameters, the statistical analysis system SAS (2004) program was used for data analysis as mean ± standard error. Least significant different –LSD test was used to the significant comparison among means. Groups were compared with each other on the level 0.05 to detect the significant of the complete blood count in women with osteopenia

**Results**

The result in this study showed that no significant effect of age between Control( healthy women) (36.20 ± 2.01) and patients with osteopenia (38.60 ± 2.01) also the same effect of weight between Control (63.34 ± 3.08) and patients (58.80 ± 1.39) Table 1

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SE</th>
<th>T-Test</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Patients</td>
</tr>
<tr>
<td>Age (year)</td>
<td>36.20 ± 2.01</td>
<td>38.60 ± 2.01</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>63.34 ± 3.08</td>
<td>58.80 ± 1.39</td>
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NS: Non-Significant

The result of calcium concentration revealed high increasing significant (P<0.01) between control (7.98 ± 0.36) while in patients (9.90 ± 0.11), at the same time high decreasing significant (P<0.01) of the concentration of vitamin D3 between control (38.40 ± 1.91) while in patients (13.66 ± 0.86). The Phosphate concentration exposed high increasing significant (P<0.01) between control (2.68 ± 0.18) while in patients (3.88 ± 0.09), while the alkaline phosphatase concentration revealed high increasing significant (P<0.01) between control (90.16 ± 2.60) while in patients (105.20 ± 4.68) Table 2

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<tr>
<td></td>
<td>Control</td>
<td>Patients</td>
</tr>
<tr>
<td>Calcium (mg/ml)</td>
<td>7.98 ± 0.36</td>
<td>9.90 ± 0.11</td>
</tr>
<tr>
<td>Vit D3 (ng/ml)</td>
<td>38.40 ± 1.91</td>
<td>13.66 ± 0.86</td>
</tr>
<tr>
<td>Alkaline Phosphatase</td>
<td>90.16 ± 2.60</td>
<td>105.20 ± 4.68</td>
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In study, the result showed high decreasing significant (P<0.01) of red blood cell (RBC) count between control (5.17 ± 0.14) and patients (4.38 ± 0.17) and hemoglobin (Hb) revealed high decreasing significant (P<0.01) between control (12.80 ± 0.34) and patients (9.74 ± 0.28), also mean corpuscular hemoglobin concentration (MCHC) showed high decreasing significant (P<0.01) between control (33.16 ± 0.46) and patients (29.96 ± 0.30) and red cell distribution width (RDW %) revealed high decreasing significant (P<0.01) between control (13.88 ± 0.24) and patients (12.48 ± 0.28). in addition of decreasing significant (P<0.01) of mean corpuscular volume (MCV) between control (88.44 ± 2.98) and patients (79.06 ± 2.58) while no significant effect of mean corpuscular hemoglobin (MCH) between control (27.72 ± 1.96) and patients (24.44 ± 0.79). the study appeared high increasing significant of erythrocyte sedimentation rate (ESR) between control (16.20 ± 2.43) and patients (67.80 ±10.96) Table 3.

The results revealed no significant decreasing of platelet (PLT) between control (348.60 ± 55.10) and patients (247.80 ± 27.06), also no significant decreasing of mean platelet volume (MPV) between control (9.66 ± 0.69) and patients (8.44 ± 0.23), while no significant increasing of platelet large cell corpuscle (P-LCC) comparing between control (59.40 ± 2.03) and patients (62.20 ± 7.55) and no significant increasing of platelet large cell ratio (P-LCR) comparing between control (23.82 ± 2.56) and patients (25.76 ± 4.57) Table 4.

The results showed in this study that no significant decreasing of white blood cell (WBC) between control (9.52 ± 0.72) and patients (6.86 ± 1.10) also no significant decreasing lymphocyte (%) between control and patients.
control (27.00 ± 4.42) and patients (23.72 ± 2.14) and no significant decreasing of eosinophile (%) between control (2.06 ± 0.60) and patients (1.87 ± 0.27) while significant decreasing (P<0.05) of monocyte (%) between control (8.74 ± 0.70) and patients (6.19 ± 0.91) also significant decreasing (P<0.05) of neutrophile (%) between control (64.00 ± 2.08) and patients (54.18 ± 3.12) and significant decreasing (P<0.05) of basophile (%) between control (0.91 ± 0.12) and patients (0.074 ± 0.01) Table 5.

Table 5. Comparison between control and patients in white blood cells

<table>
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<th>T-Test</th>
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<td>WBC</td>
<td>9.52 ± 0.72</td>
<td>6.86 ± 1.10</td>
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<tr>
<td>Lymphocyte (%)</td>
<td>27.00 ± 4.42</td>
<td>23.72 ± 2.14</td>
</tr>
<tr>
<td>Monocyte (%)</td>
<td>8.74 ± 0.70</td>
<td>6.19 ± 0.91</td>
</tr>
<tr>
<td>Neutrophil (%)</td>
<td>64.00 ± 2.08</td>
<td>54.18 ± 3.12</td>
</tr>
<tr>
<td>Eosinophil (%)</td>
<td>2.06 ± 0.60</td>
<td>1.87 ± 0.27</td>
</tr>
<tr>
<td>Basophil (%)</td>
<td>0.91 ± 0.12</td>
<td>0.074 ± 0.01</td>
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</table>

Discussion

The of osteopenia and osteoporosis incidence persist increasingly, particularly of elder [10]. One of the majority main factors for osteoporosis are advanced age and low body mass index also family incidence of the disease. [11]. Calcium is absorbed in small intestine by the vitamin D3 in addition to calcium and phosphorus form hydroxyapatite crystals to mineralize and strengthen bones. [12]. Alkaline phosphatase (ALP) is an ubiquitous membrane-bound glycoprotein that catalyzes the hydrolysis of phosphate monooesters at basic pH values. [13]. The formation of blood cellular components depend on Hematopoiesis, obvious studies have confirmed that osteoblasts effect on maturity of blood cells, chiefly RBC, neutrophils and B lymphocytes. On the other hand, it is indefinite osteoblast numbers and functions make contact with blood cell counts in humans [14]. The blood cells creation depends on of hematopoietic and non-hematopoietic cells In the bone marrow [15]. Non-hematopoietic cells comprise osteoblasts and their precursors, that effect on the separation of hematopoietic stem cells altered to mature or adult hematopoietic ancestry [16, 17]. Disorders as thalassemia and sickle cell anemia, which have an effect on the skeletal system including osteopenia, osteoporosis, fractures, a vascular necrosis and joint pain [18]. Thalassemia is related with chronic hyperplasia of bone marrow which decrease of bone density and increase hazard of fractures [19]. Signaling mediated during control devices of osteoblast function in osteoblast lineage cells normalize numbers of hematopoietic stem cells, neutrophils, B lymphocytes in mice [20,21,22]. Recently, the studies descriped that increases in hematopoietic stem cells in postmenopausal patients with osteoporosis during management of parathyroid hormone, which medications that may be effect on hematopoietic niche [23]. This study support that low bone mass and loss of bone mineral density are related with altered numbers of blood count, WBC specifically lymphocyte and erythrocytes with platelet count [14]. Other the studies observed that high BMD loss was related with increased neutrophil, decreased monocyte and lymphocyte counts, many causes have been
proposed, as inflammation, intrinsic bias of hematopoietic stem cells support myeloid over lymphoid lineage commitment [24,25].

References


