Association of Mean Platelet Volume with Bone Mineral Density in Fibromyalgia

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BACKGROUND/AIMS

We aimed to evaluate the mean platelet volume levels in patients with fibromyalgia and to determine whether there is a relationship between mean platelet volume and bone mineral density.

MATERIAL and METHODS

One hundred female patients with the diagnosis of fibromyalgia included in the study. The age, gender, weight, height, body mass index, mean platelet volume, fibromyalgia impact questionnaire score, bone mineral density (g/cm²), and T-score of L1-4, femoral neck, and femur total were recorded.

RESULTS

The mean age of the patients was 48.29±10.53 years. The mean platelet volume level and fibromyalgia impact questionnaire score were 10,45±1.87 fL and 61.71±17.16, respectively. The mean L1-L4 T-score was -1.52±1.26, mean femoral neck T-score was -0.89±0.99, BMD was 0.86±0.13 for L1-4, 0.89±0.13 for the total femur, and 0.75±0.09 for femoral neck. We found increases in the BMD, total, and femoral neck score when MPV decreased. MPV was found higher in osteoporotic fibromyalgia patients compared to normal BMD. No significant correlation was found between MPV and these parameters.

CONCLUSION

The mean platelet volume is meaningful for osteoporosis in fibromyalgia patients. Higher MPV may be related to the reason that osteoporosis is affected by inflammatory processes in fibromyalgia patients.

Keywords: Fibromyalgia, bone mineral density, mean platelet volume

INTRODUCTION

Fibromyalgia is a multi-symptom disorder, characterized mainly by chronic widespread musculoskeletal pain, chronic widespread pain, fatigue, sleep disturbances, and many other symptoms that impair the quality of life (QoL) (1). It is found in 2–4% of the population. Pain is the predominant symptom with allodynia and hyperalgesia being common signs (2). On physical examination of soft tissue tenderness, the presence of at least 11 of 18 defined tender points is observed (3). There are no specific laboratory abnormalities and they have a limited role in the evaluation of fibromyalgia (4). The multidisciplinary approach and patient self-management are important keys for the treatment of fibromyalgia. Successful management of fibromyalgia includes patient education, cognitive behavioral therapy, exercise, and drug therapy. Tricyclic antidepressants, serotonin-norepinephrine reuptake inhibitors, gabapentin, pregabalin, pramipexole, tramadol, or other opioids are some of the pharmacological therapies effective in fibromyalgia (2). Somatic and psychological symptoms lead to poor health-QoL (5). Therefore, the approach to treating fibromyalgia should focus on maintaining or improving function, improving QoL, and managing symptoms (3).

With the aging population and longer life span, osteoporosis (OP) has become an epidemic, making this a major public health problem (6). Primary OP is most often related to either postmenopausal estrogen loss or age. Glucocorticoids, diabetes mellitus, rheumatoid arthritis, liver diseases, and hematological malignancies such as multiple myeloma are some of the etiological factors of secondary OP (7). OP is often called a “silent disease” or “silent thief” without warning signs or symptoms. Falls, fractures, and functional decline are important complications of OP, affecting QoL in patients (6, 8). OP in fibromyalgia has
Main Points:

- Osteoporosis is affected by inflammatory processes in fibromyalgia patients.
- Mean platelet volume is a simple and available blood parameter to evaluate activated platelets.
- Mean platelet volume elevation may be related to osteoporosis in fibromyalgia patients.

The inclusion criteria were age over 18 years and a diagnosis of fibromyalgia according to the ACR/EULAR 2010 criteria. Exclusion criteria were the presence of a spinal implant, pregnancy, lactation, use of drugs which may cause OP and affect inflammation, MPV, and additional comorbidities (especially diseases affecting thrombocytes).

**Statistical Analysis**

Data were analyzed using Statistical Package for the Social Sciences version 19.0. Descriptive statistics were given as number (n), frequency (%), mean±standard deviation, and median [25-75p] according to the distribution analysis. The Kolmogorov-Smirnov test was used to determine whether the quantitative variables were normally distributed or not. One-Way ANOVA test was used to determine differences between independent groups. Pearson’s and Spearman’s correlation tests were used to determine the relationship between variables according to the normality distribution. A p-value of less than 0.05 was considered statistically significant.

**RESULTS**

One hundred fibromyalgia patients were enrolled in our study. All patients were female. The mean age of the patients was 48.29±10.53 years. The patients included in our study were divided into 3 groups based on DEXA as follows: normal, osteopenic, and OP. Among these patients, 49% were osteopenic and 16% were osteoporotic. There were no significant differences in age and gender between groups. The mean LI-4 T-score was -1.52±1.26 in all patients. The median T-score of total femur and femoral neck was -0.5 [-1.0-0.3] and -0.9 [-1.5-0.1], respectively. The mean BMD was 0.86±0.13 for LI-4, 0.89±0.13 for total femur, and 0.75±0.09 for femoral neck.

The mean MPV level was 10.45±1.87 fl in patients with fibromyalgia. It was 10.57±1.93 in osteopenic, 10.43±0.83 in osteoporotic, and 10.29±2.14 in normal patients with fibromyalgia. MPV was higher in osteopenic and osteoporotic patients compared with normal patients. However, no significant differences in MPV were found between groups. We found an increase in the BMD, total, and femoral neck score when MPV decreased. However, there was no significant correlation between MPV and these

**TABLE 1. The demographic features and laboratory findings of the patients with fibromyalgia**

| Age (years)            | Gender (Female/Male) | Body Mass Index (kg/m²) | Mean Platelet Volume (fl) | T-score/Lumbar | Bone Mineral Density (g/cm²) |
|------------------------|----------------------|-------------------------|---------------------------|----------------|-------------------------------|
| 48.29±10.53            | 100/0                | 31.47±7.12              | 10.45±1.87                | -1.52±1.26     | LI-4 0.86±0.13, Femur Neck 0.75±0.09 |

*median [25-75p]
The mean FIQ score was 61.71±17.16. The demographic features and laboratory findings of the patients with fibromyalgia are shown in Table 1.

The association between MPV and OP was reported in 175 Turkish postmenopausal women (16). In this study, 20 patients were normal, 37 patients were osteopenic, and 126 patients were osteoporotic. They found a positive correlation between MPV and femoral neck BMD in the normal weight osteoporotic group, and a significant negative correlation in the overweight-obese osteoporotic group. In our study, we evaluated 100 fibromyalgia patients. All the patients were female, with 49% of osteopenic and 16% of osteoporotic patients. With regards to BMI, there was no correlation between MPV and both femoral and LI-4 T-score in patients with normal BMI. The results were similar in the group with BMI above normal. Also, the association between MPV and BMD (30 normal vs 20 osteopenic) has been investigated in ankylosing spondylitis patients (15).

In a study, MPV was high in osteoporotic patients than the normal group (16). The T-score of LI-4, femoral neck, total femur, and BMD (g/cm2) of the femur and lumbar vertebrae were evaluated in all patients included in our study. The mean BMD was 0.86±0.13 for LI-4, 0.89±0.13 for total femur, and 0.75±0.09 for femoral neck. The mean total lumbar T-score was -1.52±1.26. The median T-score of total femur and femoral neck was -0.5 [-1.1-0.3] and -0.9 [-1.5-0.1], respectively in all patients.

The mean MPV was 10.57±1.93 in osteopenic and 10.43±0.83 in osteoporotic patients. We found an increase in the BMD of LI-4 and femoral neck score when MPV decreased. However, there was no significant correlation between MPV and T-scores and BMD of these regions (Table 2).

OP in fibromyalgia has (9, 10). Aging is a well-known risk factor for OP. Also, MPV was found to be investigated in various studies increase with aging (1). Moreover, megakaryocytes in the bone marrow increase with age, leading to an imbalance between osteoblastic and osteoclastic functions (13). There was a statistically significant correlation between age and both LI-4 and femoral neck T-score. There were 5 geriatric patients in our study. Psychological factors, physical, and emotional distress have been frequently identified in fibromyalgia (28). Fibromyalgia has a greater impact on daily life; patients have more difficulties adjusting to the disease and generally use poor strategies to cope with pain (29). Erdal et al. (9) evaluated depression with the Beck scale and its correlation with BMD in fibromyalgia. They found a negative correlation between Beck’s scale and BMD (9). In another study, pain and degree of physical activity in daily life were evaluated in premenopausal fibromyalgia (10). It
showed that self-reported pain and FIQ-activities of daily living among fibromyalgia patients were correlated with BMD. In our study, the mean FIQ score was 61.7±17.16. MPV increased with the FIQ score. No significant correlation was found between MPV and FIQ score (p>0.05). To the best of our knowledge, the association between FIQ score and BMD in fibromyalgia has not been previously investigated. In our study, the FIQ score was higher in osteopenic patients compared to patients with normal BMD (65.32±16.69 vs 59.18±17.98). However, there were no significant differences between groups and correlation for FIQ scores. This result shows that bone mass affects the health status of fibromyalgia patients. Also, no correlation was found between FIQ score and T-scores and BMD of the areas (Table 2). The limitations of our study were that we evaluated the association between MPV and BMD in a small number of fibromyalgia patients. Also, the study was designed as a cross-sectional-retrospective study. However, to the best of our knowledge, our study was the first to assess the association between MPV, FIQ score, and BMD in fibromyalgia.

Consequently, MPV is a simple and available blood parameter to evaluate activated platelets. According to our study, MPV was higher in osteoporotic fibromyalgia patients compared to normal BMD. This may be related to the fact that OP is affected by inflammatory processes in fibromyalgia patients. However, the difference was not significant. If there is no other condition to explain MPV elevation, it may be thought that this condition may be related to OP in the differential diagnosis for patients with fibromyalgia. More studies with more patients are warranted to elucidate the association between MPV and BMD in fibromyalgia.

Ethics Committee Approval: N/A

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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