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Original Research Article

Evaluation of Underlying Factors of Back Pain in Patients with Depression and Psychosis

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Abstract: Back pain is a common complaint in depression, anxiety and somatoform disorders. In this prospective study, we aimed to evaluate the underlying factors for back pain in patients with depression and psychosis. 129 patients aged ≥18 years with anxiety disorder and somatoform disorder, including 78 patients with back pain and 51 controls without back pain who presented to our clinic. Visual Analog Score (VAS), tender point count, blood levels of vitamin D, calcium, phosphor, magnesium, and thyroid stimulating hormone (TSH), and thoracolumbar magnetic resonance imaging (MRI) were performed in all subjects to evaluate the possible underlying causes of pain. There were significant differences in weight, VAS score, tender point count, Schmorl's node, Modic's degeneration and blood levels of vitamin D, Ca, P, Mg and TSH between study group and controls. We recommend to perform thoracolumbar MR imaging and to evaluate blood chemistry for vitamin D deficiency and other osteomalacia risk factors in psychiatric patients presenting with back pain and to revalue treatment based on results obtained.
Keywords: Low-back pain, depression, psychosis, magnetic resonance imaging, Modic degeneration, endplate degeneration.

INTRODUCTION

Low-back pain is very common compliant in general population. Its global point prevalence is 9.4% [1]. Although performing many studies about this subject, only a few large representative multinational studies have considered the mental health status of people with back pain [2]. Depression and psychosis is a common and steadily increasing pathology around the world [1, 2].

Osteomalacia is a metabolic bone disease characterized by insufficient or delayed osteoid bone mineralization and lower rate of bone formation, which causes back pain [3]. Vitamin D deficiency is observed to be most common cause of osteomalacia. In psychiatric patients, causes of osteomalacia include decreased vitamin D production, impaired vitamin D absorption from intestine, excessive degradation of vitamin D or 25(OH) vitamin D and phosphate losses [5]. Thyroid hormones are essential for normal skeletal growth and maintenance of bone mass. Hypothyroidism leads growth retardation and disruption in bone formation whereas hyperthyroidism leads reduction in bone mass, advanced bone age, accelerated growth and increased risk for osteoporotic fracture [6]. Osteomalacia can develop in hypocalcemia, primary hyperparathyroidism and hypercalcemia resulting from malignant disorders [5]. There is a negative feedback mechanism between serum PTH and Mg levels. Moreover, the relationship between bone metabolism and androgens, estrogens or both have been showed in different studies [7, 8].

Endplate abnormalities on lumbar spinal MR imaging were first classified by Modic. Primarily, 3 types of endplate Modic abnormalities can be characterized by T1- and T2-weighted images. Many studies showed that there is a strong association between Modic endplate changes and back pain [9]. Several epidemiological studies showed that incidence of back pain were higher in patients with Schmorl nodules when compared to normal population [10].

Herein, we aimed to investigate the underlying causes of back pain in patients with depression and psychosis.

MATERIALS AND METHODS

After approval of local ethics committee of Bozok University (date: 08.04.2014; number: 08/33), patients were divided into two groups. Group I was included the patients having depression and/or psychosis and back pain. However, group II included the patiets having depression and/or psychosis without back pain. The weight, height, age and other demographic data of the patients were recorded. Patients younger 18 years of age were excluded from the study. Also, patients with diabetes mellitus, hypertension, hypo/ hyperthyroidism, hypo/ hyperparathyroidism, chronic liver and kidney diseases were excluded. Heavy smokers and patients with heavy alcohol consumption were also excluded from the study. The patients with conditions that can be cause of back pain such as congenital anomaly, previous history of trauma, osteoarthritic degeneration, cardiovascular disorders and drug use were excluded.

In all patients, complete blood count**,** AST, ALT, creatinine, TSH, estradiol, testosterone, vitamin D, Ca, P and Mg levels were measured. VAS scores and body mass index (BMI) and tender point counts were recorded. The pain was assessed by using visual analog scale (VAS). VAS is a linear scale with a continuous line between 2 end points: 0, no pain and 10, worst possible pain. The patients were asked to mark mean severity of pain within prior week. Tender point count was performed in back region at 17 vertebral levels (12 thoracic and 5 lumbar). The tender points can be best assessed by applying 4 kg pressure with thumb which is the pressure that allow fading of nail bed when thumb was compressed on a though layer.

In all patients, thoracolumbar sagittal MRI was obtained to assess Schmorl nodules and endplate degeneration, and other pathologies. T1- and T2-weighted thoracolumbar sagittal MRI sequences were performed by using 1.5 Tesla Inginia MR Device (Philips Medical Systems, Tilburg, Netherlands). The MR imaging parameters used were as follows: FOV, 180; TR, 2300-2600 and section thickness, 4-mm. All images were assessed by a single radiologist to avoid subjective assessment.

Biochemical analysis

All the blood samples were centrifuged for 10 min at 3000 RPM, and the serum samples were frozen at –80°C until the assays were performed by an investigator who was blind to each patient’s status. Commercial enzyme-linked immunosorbent assay (ELISA) kits were used for the measurement of human Vitamin C levels (Elabscience, Wuhan, PRC) using appropriate wavelengths on a micro-plate reader (Biotech Instruments, EL×800 TM, Winooski, USA) following the assay instructions. Serum levels of routine biochemistry parameters were measured using an Architect ci2800 integrated system (Abbott Diagnostics, Abbott Park, IL).

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS package program (Version 18.0 for Windows, SPSS Inc., Chicago, IL, USA). An analysis of normality of the continuous variables was performed with the Kolmogorov-Smirnov test for multivariate analysis; only variables with a P-value < 0.05 were entered into the model and selected using a stepwise selection procedure.

Continuous variables were expressed as mean ± standard deviation (SD) or median while categorical variables were expressed as a percentage. A p value < 0.05 was considered statistically significant. The $\chi 2$-test was used to compare proportions. Continuous variables were compared using an independent-groups Student’s t-test if normality assumptions were met; otherwise, groups were compared using the Wilcoxon rank-sum test. Pearson correlation analysis was performed.

RESULTS

The study population included 129 patients (aged ≥18 years≤65) Of these, 78 patients consisting study group had back pain while 51 patients consisting control group had no back pain. Mean age was 45.95±14.78 years (range: 18-65 years) in the study group whereas 41.86±13.57 years (range: 20-65 years) in the control group.

There were significant differences in weight (p=0.011), VAS score (p=0.001), tender point count (p=0.001), Schmorl nodule (p=0.001), Modic degeneration (p=0.000), levels of vitamin D (p=0.001), Ca (p=0.017), P (p=0.028(, Mg (p=0.001) and TSH (p=0.001) in between two groups. However, no significant difference was found in height (p=0.592), age (p=0.116), levels of estradiol (p=0.154) testosterone (p=0.387) ALT (p=0.378) AST (p=0.338) creatinine (p=0.257), PTH (p=0.348), vitamin C (p=0.234), hemoglobin (p=0.995) WBC (p=0.834), platelet count (p=0.854) and erythrocyte count (p=0.690) (Table 1).

Table 1: Showing the data of the patients.

Parameter	Control (n=51)	Back pain (n=78)	P value
Height	167.80 ± 5.86	167.19 ± 6.95	0.592
Weight	82.49 ± 8.14	85.97 ± 6.18	**0.011**
Age(Years)	41.86 ± 13.57	45.95 ± 14.78	0.116
VAS score	0.04 ± 0.28	3.97 ± 1.98	**0.001**
Tender Point Counts	0.04 ± 0.28	5.45 ± 2.17	**0.001**
Schmorl nodule	0.37 ± 0.63	3.65 ± 1.51	**0.001**
Modic degeneration	0.51 ± 0.80	4.65 ± 2.14	**0.001**
Vit. D (ng/ml)	22.62 ± 9.26	8.07± 2.31	**0.001**
Estradiol (pg/ml)	69.32 ± 80.01	52.07 ± 56.40	0.154
Testosterone (ng/ml)	2.00 ± 3.77	1.50 ± 2.01	0.387
Ca (mg/dl)	10.07 ± 2.58	9.09 ± 1.60	**0.017**
P (mg/dl)	4.19± 2.86	3.14 ± 2.10	0.028
Mg (mg/dl)	1.89 ± 0.52	1.58 ± 0.39	**0.001**
ALT (U/L)	13.22 ± 12.78	11.29 ± 11.58	0.378
AST (U/L)	22.14 ± 13.18	20.10 ± 10.72	0.338
TSH (U/ml)	3.28 ± 2.25	1.23 ± 0.56	**0.001**
Parathyroid Hormone (pg/ml)	22.78 ± 13.19	20.79 ± 10.75	0.348

DISCUSSION

In the present study, we aimed to evaluate whether there is a correlation between MR imaging findings and cause of back pain in patients presented with depression and psychosis. We assessed biochemical values and thoracolumbar MR imaging results in patients with back pain in order to investigate the underlying causes of pain in these patients. N our study, biochemical results and thoracolumbar MR imaging findings compatible with osteomalacia were detected in patients with back pain. There were significant differences in weight, VAS score, tender point count, Schmorl nodule, Modic degeneration and vitamin D, Ca, P, Mg and TSH values between patient and control group. The patients with back pain had higher body weight, VAS score, tender point count, number of Schmorl nodule and endplate degeneration while lower vitamin D, Ca, P, Mg and TSH values.

There is limited number of studies on this topic. However, several authors have long been suggested that back pain is commonly presented in psychotic and depressive patients. Back pain can be related to various factors in patients with psychiatric disorders. In many studies, an association was shown between psychiatric disorders and neck or back pain [11]. In an epidemiology study in United Kingdom, it was found that the incidence is 16.9% for association of chronic pain and psychiatric diagnosis [12]. In a study from Unites States, back pain was detected in 23% of the patients with psychiatric disorder [13].

There is a strong relationship between depression and neck/back pain in developed and developing countries in the studies [14-19]. Jain reported that back pain could be associated with mood and anxiety symptoms [20]. It was reported that back pain is common in major depression in addition to pain at other body regions [21, 22].

Okamoto *et al.;* reported that psychiatric disorders and decreased bone mineral density (BMD) were encountered in patients with mild hypercalcemia related to primary hyperparathyroidism [23]. Joborn *et al.;* reported that anxiety, depression and cognitive complaints are common in patients with primary hyperparathyroidism and mild hypercalcemia [24]. Driesen *et al.;* found a relationship between secondary hyperparathyroidism and depressive symptoms or cognitive dysfunction [25].

Many studies indicate a relationship between back pain and stress and anxiety [26-28]. It has been reported that psychological distress can be both reason and consequence of neck and back pain [29]. Incidence of depression is 5-8% in general population while it varies from 22% to 78% in patients with chronic pain [30]. However, the rate was found to be 5-50% in studies using strict criteria and techniques of structured interview [31]. Pain prevalence was found to be 65% in patients with depression [32]. In a study on 11 patients (mean age: 55 years) with hypoparathyroidism for more than 9 years Kowdley *et al.;* found cognitive dysfunction in 65%, motor dysfunction in 45% and intracranial calcification in 60% of the patients [33].

More than two decades, efforts to develop a psychological model of multi-disciplinary approach has gained acceptance for better understanding of pain. In recent years, psychological factors have become focus of interest in pain studies and pain therapy [34]. In back pain, psychological factors are generally more significant than biomedical or biomechanical factors [35]. In a previous study, it was observed that severe depression, anxiety, somatization, avoidance behavior and coping capacity differed between individuals with or without pain. In consistent with previous studies, these results showed significance of psychological variables as risk factor for back and neck pain. It has been reported that chronic back pain is more frequently seen in individuals who are unable to cope with helplessness and hopelessness [36].

CONCLUSION:

In conclusion, we found a significant relationship between abnormal values that may cause osteomalacia and endplate degenerations and Schmorl nodule formation in the patients with back pain who were diagnosed as depression and/or psychosis. We recommend to perform thoracolumbar MR imaging and to evaluate blood chemistry for vitamin D deficiency and other osteomalacia risk factors in these patients.

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