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The Effects of Balneotherapy on Depression and Anxiety Scale Scores in Patients with Osteoarthritis

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Abstract

Background: Osteoarthritis is a chronic, degenerative condition that causes increased pain, decreased functioning, disability and also socioeconomic burden. It has a huge impact on patients' health, well-being and quality of life, and is associated with depressive and anxiety disorders. The aim of this study was to evaluate the effectiveness of balneotherapy and exercise on depression, anxiety and mental health scale scores, and their possible role in the management of patients with osteoarthritis.

Materials and Methods: A total of 131 patients with osteoarthritis were included the study. The following scales were assessed:Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and 36-item Short Form Survey (SF-36). Patients received standardized balneotherapy and an exercise schedule.

Results: Mean age was 57.99 ± 6.19 years and most of them had gonarthrosis (51.0%). The mean BAI and BDI scores were significantly decreased, while the SF-36 physical health and mental health scores were significantly increased following treatment. Negative correlations were found between pre-treatment BDI scores and SF-36 scores before and after treatment. Regression analysis revealed that pre-treatment BDI score was an effective factor on patients' pre-treatment and post-treatment health status.

Conclusions: In conclusion, a combination of balneotherapy and exercise improved psychological scale scores in addition to beneficial effects on osteoarthritis-related anxiety, depression and impaired quality of life. The efficacy of balneotherapy on psychological and physical health may show that utilizing a multi-dimensional, individualized and integrated perspective in the treatment of osteoarthritis provides important advantages.

Key words: *Anxiety, balneotherapy, depression, osteoarthritis, physical therapy*

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Introduction

Osteoarthritis (OA) is the most common form of musculoskeletal disease worldwide. It is characterized by progressive focal cartilage destruction, osteophyte formation, joint space narrowing, synovial inflammation and involvement of all joint tissues, causing activity-related chronic pain, functional impairment and disability, especially in the elderly population (1). The incidence of OA increases with age, and the symptoms associated with OA are reported in 25% of individuals aged 65 years and older, with a significant effect on quality of life and increased mortality and morbidity rates (2). Psychological factors including sleep disorders, fatigue, depression and anxiety are highly prevalent among patients with OA and are associated with clinical characteristics (3).

Current management of OA includes medications, non-pharmacological modalities and surgical treatment, but there is no definitive treatment. Non-pharmacological methods including physical therapy, exercise programs (strength training, stretching, aerobic activity, adjunctive range of motion), spa therapy, manual therapy, and acupuncture are becoming increasingly important for older patients due to increasing co-morbidities (4). Spa therapy is commonly used in many Middle-East and European countries and has been shown to be effective on pain, pain perception, disabilities and symptomatic drug consumption (5). Spa therapy involves balneotherapy, hydrotherapy, mud-therapy, massage and exercise programs and affects both physical and mental health, by positively affecting patients' pain, stress and fatigue levels.

The aim of the study was to evaluate effectiveness of balneotherapy with exercise treatment on depression, anxiety and mental health scale scores in patients with OA, and to determine the possible use in disease management.

Materials and Methods

Study Design

This prospective study was carried out from septmber 2010 to september 2012 in the clinic of physical therapy and rehabilitation. A total of 131 patients with OA who were admitted for physical therapy were selected randomly for inclusion into the study. A total of 29 patients were excluded according to exclusion criteria.A final group of 102 patients with knee, cervical or lumbo-sacral OA who were suffering from chronic pain were enrolled in the current study. The diagnosis of knee OA was based on the American College of Rheumatology criteria, and the diagnosis of cervical and lumbo-sacral vertebra OA was performed by physical examination and radiological evaluation of anterior-posterior and lateral graphs of the vertebra. Patients with inflammatory diseases including rheumatoid arthritis, systemic disorders including diabetes mellitus, thyroid conditions, uncontrolled hypertension, those with a history of trauma, cardiac failure, severe chronic obstructive pulmonary disease, stroke, severe osteoporosis, severe cerebral or peripheral neurological conditions, and individuals that reported drug use for psychiatric diseases including depression, anxiety disorders or schizophrenia were excluded from the study. Additionally, patients who had undergone knee and/or hip arthroplasty or received physical therapy and/or injection treatments in the disease area within the past 6 months, those who had a history of being a professional athlete or consistently took part in various sports as amateurs, and individuals who reported less than 6 months of chronic pain were also excluded from the study. Clinical information including age, education and

employment status, and the characteristics and course of disease were obtained from patients' medical files.

The study was conducted in accordance with the ethical standards stated in the Declaration of Helsinki and was approved by local committee. Written informed consent was obtained from individuals prior to their participation in this study.

Measures

All patients participating in the study received and completed the self-reported questionnaires that are explained in detail below. Each questionnaire was applied before and after balneotherapy.

The Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) were applied patients (6). The BDI and BAI are both 21-item questionnaires. Responses to each item are graded on a three-point scale, while the maximum score is 63 points for each subscale. Scores ranging from 0 to 9 were defined as 'normal', 10 to 18 were accepted to show borderline or mild anxiety/depression, 18 to 29 was moderate anxiety/depression, while a score of 30 or higher was considered to demonstrate severe anxiety or depression.

The 36-item Short Form Survey (SF-36) is a shortened health evaluation form used to assess the general health status of patients through scoring of eight health-related quality of life dimensions, including physical functionality (PF), physical pain (BP), social functionality (SF), mental health (MH), role limitation due to physical problems (RP), role limitation due to emotional problems (RE), general health perception (GH), and energy and vitality (VT) (7). These can be grouped into two specific dimensions as physical health and mental health. For each quality of life domain, the score is calculated and converted into a scale with points ranging from 0 (worst score) to 100 (best score).

Interventions

All patients received a total of 10 sessions of the standardized balneotherapy that involved the immersion of one part of the patient's body in mineral water baths or pools. Balneotherapy was applied for twenty minutes a day and one session per day by experienced physiotherapists and hydrotherapists. The output temperature of our hospital baths used in the study was 36 to 38 °C, and the acro-thermal mineralized water contained fluoride, sulfate, calcium bicarbonate and carbon dioxide.

A standardized exercise program was also applied to all patients by the same experienced physiotherapists with regard to the characteristics and course of disease, including exercise for joint movement with 2 sets of 10 repetitions in a day. Similarly, progressive resistant exercise programs with weights were also utilized for 2 sets of 10 repetitions per day.

Statistical Analysis

All analyses were performed on SPSS v15 (SPSS Inc., Chicago, IL, USA). The continuous variables were evaluated using the Kolmogorov-Smirnov test to determine whether or not they exhibited normal distribution. In descriptive statistics, the data were expressed as mean ± standard deviation for continuous variables, and as frequencies and percentages (%) for nominal variables. Statistically significant differences in repeated measurements within the groups were evaluated with *T* test. Correlations between the anxiety and depression scores and health status scores were examined using the Pearson correlation coefficient. Linear regression analysis was performed for significant correlations. Values of $p<0.05$ were considered statistically significant.

Results

A total of 102 patients with OA suffering from chronic pain were included in the study. The mean ages of patients were 57.99 ± 6.19 years and a great majority of them were female (*n*=94; 92.2%). The study group included 52 (51.0%) patients with gonarthrosis, 43 (42.1%) with lumbar spondylosis and 7 (6.9%) with cervical spondylosis. Demographic and clinical characteristics including co-morbidity, education and employment status and their frequency are shown in Table 1.

Table 1. Demographic characteristics of patients.

	Patients(*n*=102)
Age (years)	57.99±6.19
Sex	
Female	94 (92.2)
Male	8 (7.8)
Educational Status	
Illiterate	19 (18.6)
Primary School	62 (60.8)
Secondary School	17 (16.7)
High School	4 (3.9)
Employment Status	
Housewife	94 (92.2)
Desk-job	3 (2.9)
Heavy-worker	5 (4.9)
Co-morbidity	
None	87 (85.3)
Hypertension	9 (8.8)
Hyperlipidemia	8 (7.8)
Diagnosis	52 (51.0)
Gonarthrosis	43 (42.1)
Lumbar spondylosis	7 (6.9)
Cervical spondylosis	

The mean BDI scores were significantly lower after treatment (18.40 ± 9.29 vs. 11.79 ± 7.80, p=0.001). The mean Beck Anxiety scores were significantly decreased with balneotherapy (11.08 ± 9.31 vs. 6.66 ± 5.29, p=0.001). The mean SF-36 physical health status scores before the treatment was 39.72 ± 6.75, while it had increased to 45.49 ± 6.95 after treatment. The mean of SF-36 mental health status scores were 44.53 ± 6.27 before treatment and 47.69 ± 7.91 after treatment. There were significant differences between pre-treatment and post-treatment scores obtained from the SF-36 physical and mental health sections (all, p<0.05) (Table 2).

Table 2. Comparisons of questionnaire scores of patients before and after treatment.

	Before Treatment	After Treatment	*p* value
Beck Depression Scores	18.40±9.29	11.79±7.80	**0.001**
Beck Anxiety Scores	11.08±9.31	6.66±5.29	**0.001**
Short Form-36			
Physical Health	39.72±6.75	45.49±6.95	**0.001**
Mental Health	44.53±6.27	47.69±7.91	**0.001**

We found significant negative correlations between pre-treatment Beck Depression scores and SF-36 scores before and after treatment (all, p<0,001). We did not observe a relationship between pre-treatment Beck anxiety scores and SF-36 scale scores (Table 3).

Table 3. Relationship between questionnaire scores.

		SF-36 Physical health (BT)	SF-36 Mental Health (BT)	SF-36 Physical health (AT)	SF-36 Mental Health (AT)
Beck Depression scores (BT)	*r*	-0.244	-0.292	-0.362	-0.333
	p	**0.013**	**0.003**	**0.001**	**0.001**
Beck Anxiety scores (BT)	*r*	-0.063	-0.270	-0.116	-0.147
	p	0.528	0.052	0.245	0.140

SF-36: Short form 36, : BT: Before Treatment, AT: After treatment

The pre-treatment Beck Depression score was found to be an effective factor on the patients' pre-treatment and post-treatment health status in regression analysis (Table 4).

Table 4. Regression Analysis of Beck Depression Scores and SF-36.

	B	SE	95%CI	*p value*
SF-36 Physical health (BT)	0.739	0.162	0.418, 1.060	**0.001**
SF-36 Mental health (BT)	-0.788	0.144	-1.075, -0.502	**0.001**
SF-36 Physical health (AT)	0.750	0.152	0.455, 1.058	**0.001**
SF-36 Mental health (AT)	-0.835	0.134	-1.099, 0.570	**0.001**

SF-36: Short form 36, : BT: Before Treatment, AT: After treatment, B:beta, CI: coefficient interval, SE: Standard error.

Discussion

The study was aimed at assessing the effectiveness of balneotherapy on psychological status through self-reported questionnaires, and its possible role in the management of patient with OA. We found decreased anxiety and depression scale scores with treatment which suggest that balneotherapy may have positive effects on physical and mental health status and quality of life in patients with OA.

Osteoarthritis is a chronic, degenerative condition that causes increased pain, decreased functioning, disability, and also socioeconomic burden. It has a huge impact on patients' health, well-being and quality of life, and has been shown to be associated with depressive and anxiety disorders. Sharma et al. showed in a review of 38 studies that both depression and anxiety were highly common in OA patients; furthermore, those with these co-morbidities reportedly experienced more pain, had more frequent hospital visits, used a higher number of medications, and less optimal clinical results (3). Stubbs et al., in a meta-analysis of 49 studies comprised of 15855 OA patients, demonstrated that pooled prevalence was %19.9 for depressive symptoms and %21.3 for anxiety-related symptoms (8). In agreement with these studies, we found moderate depression and mild anxiety scale scores before treatment. We also demonstrated decreased quality of life through mental and physical health scores on the SF-36 scale before balneotherapy. Our results confirm that psychological symptoms including anxiety and depression were common in OA patients, and suggest that these characteristics play a significant role in the progression of disease, leading to impaired quality of life. Decreased physical and mental health scores in OA indicate that OA impairs patients' social and work-related lives, which may lead to decreased functioning, limited mobility, lack of energy, decreased memory and concentration. Low SF-36 scores in OA patients may be dependent on the presence of chronic pain and disability, which are common symptoms in OA.

Many different treatment approaches can be used for the management of OA, including pharmacological treatments (analgesics, opioids and corticosteroid or hyaluronic acid injections into the joint), surgical interventions (joint replacement surgery), and non-pharmacological interventions (physical activity and exercise, acupuncture, electro-stimulation techniques, spa therapy and psychological management) (9). The focus of OA management is to facilitate the reduction of pain, stiffness and disability, to preserve and improve of joint mobility, and to increase quality of life (4). It is recommended that pharmacological and non-pharmacological approaches be used together in management guidelines for OA (10). In our study, we performed balneotherapy with exercise therapy to all patients. After the treatment, psychological scale scores were improved, indicating benefit from balneotherapy. The assessment of BDI and BAI scores showed that anxiety and depression scores were reduced and quality of life scores were increased after treatment. These improvements were consistent with the literature. Ozkuk et al. demonstrated in 150 patients with generalized OA that spa therapy may positively affect pain, anxiety and quality of life in the elderly population, regardless of receiving these treatments as outpatients or inpatients (11). Gaal and colleagues showed in 76 elderly patients with OA and chronic degenerative low back pain that a 15-day balneotherapy treatment improved functional capacity and quality of life, reduced the intensity of pain, analgesic consumption and researcher-graded disease activity (12). They also observed that these effects continued for 3 months after the treatment. Zwolinska et al. revealed

prospectively in 70 patients with generalized OA with a 1-year follow-up period that a total of 15 days (120 to 150 minutes per day) of spa therapy reduced the level of pain and improved quality of life (13). Matsumoto et al. demonstrated in a meta-analysis that balneotherapy decreased pain and joint stiffness and improved functional capacity in patients with knee OA (14). Dilekçi et al. showed in 305 elderly patients with knee OA that a combination of balneotherapy and physical therapy were more effective than physical therapy alone for reducing pain and improving fatigue, functionality and quality of life (4). Antonelli et al. showed in a meta-analysis that spa therapy and balneotherapy could significantly improve quality of life and algofunctional indexes, and reduced drug consumption in patients with knee OA (15). In the present study, we showed significant enhancements on the mental and physical health status of OA patients after combination treatment with balneotherapy and standardized exercise. Our findings indicate that patients have better health profile and functional abilities with balneotherapy plus physical therapy. Therefore, it can be found that balneotherapy can provide beneficial effects on OA-related emotional status changes, pain and restriction for daily life activities.

The first limitation of the current study concerns the use of self-reported data, as scales are carried out on the assumption that patients will respond correctly. Secondly, the study was completed in a relatively small sample size. Thirdly, the study was conducted without any control groups and the lack of long-term follow up.

Conclusion

Psychological scales including the BDI and BAI scales and the SF-36 health scale were altered in OA patients. A combination of balneotherapy and exercise improved the scores obtained from these scales and provided relief in OA-related anxiety and depression, while increasing quality of life. Physicians may choose a multi-dimensional, individualized and integrated perspective in the treatment of OA and may benefit from utilizing balneotherapy in the management of OA.

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