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## The effects of balneotherapy on fibromyalgia patients

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**Abstract** Fibromyalgia syndrome (FMS) is a very common rheumatological diagnosis. There are various treatment modalities. This study was planned to investigate the effects of balneotherapy in the treatment of FMS. A total of 42 primary fibromyalgia patients diagnosed according to American College of Rheumatology criteria were included in the study. Their ages ranged between 30 and 55 years. Patients were randomly assigned to two groups. None of them had had a cardiovascular disease before. Group 1 ( $n=22$ ) received 20-min bathing, once a day and five times per week. Patients participated in the study for 3 weeks (total of 15 sessions). Group 2 ( $n=20$ ) was accepted as the control group. Patients were evaluated by the number of tender points, Visual Analogue Scale for pain, Beck's Depression Index for depression, and Fibromyalgia Impact Questionnaire for functional capacity. Measurements were assessed initially, after the therapy, and at the end of the 6th month. In group 1, there were statistically significant differences in numbers of tender points, Visual Analogue scores, Beck's Depression Index, and Fibromyalgia Impact Questionnaire scores after the therapy program ( $P<0.001$ ). Also, 6 months later in group 1, there was still an improvement in the number of tender points ( $P<0.001$ ), Visual Analogue scores, and Fibromyalgia Impact Questionnaire ( $P<0.005$ ). But there was not a statistical difference in Beck's Depression Index scores compared to the control group ( $P>0.05$ ). Patients with FMS mostly complain about pain, anxiety, and the difficulty in daily living activities.

This study shows that balneotherapy is effective and may be an alternative method in treating fibromyalgia patients.

**Keywords** Fibromyalgia · Balneotherapy

### Introduction

Fibromyalgia is a nonarticular rheumatologic syndrome characterized by fatigue, sleepiness, sleep disturbances, anxiety, and widespread musculoskeletal pain. Tender points are the only objective clinical signs used for diagnosis [1]. As the etiology is unknown, there is still no concept in the treatment of fibromyalgia syndrome (FMS). Several treatment modalities including nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroid injection, physical therapy, and exercise programs have been used before [2, 3]. Balneotherapy is known to be successful in the treatment of osteoarthritis and inflammatory rheumatologic disorders. Afyon is one of the spa centers in Turkey. There are many balneotherapy units and the properties of the natural spring waters differ. Therapy units are very close to the settlement area, and most of the people go there by themselves without any medical control. Also, in Afyon natural thermal springs are used to heat houses. In our center, the natural spring water contains mostly sodium (278 mg/L), bicarbonate (677 mg/L), and sulfate (96 mg/L). There are also calcium, magnesium, iron-aluminum cations, and chlorine and metasilicate anions. There are no known toxic effects. Thermal heat was between 36°C and 60°C. The purpose of this study was to examine the effectiveness of balneotherapy in treating patients with FMS.

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### Patients and methods

A total of 42 primary fibromyalgia patients (31 female, 11 male) participated in the study. Before inclusion, the patients were examined according to the 1990 American College of Rheumatology (ACR) classification criteria, according to which subjects should

have widespread pain in three quadrants of the body for more than 3 months and at least 11 of 18 tender points. Patients having a diagnosis of cervical radiculopathy or myelopathy, severe disc lesions, previous neck surgery, and inflammatory and tumoral disorders were excluded from the study. Also, patients taking regular antidepressive drugs and having other physical therapy modalities were excluded from the study. After physical examination, full blood count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor (RF), and biochemical markers were also evaluated for all patients. None of them had had ischemic heart disease, uncontrolled hypertension, or peripheral vascular disease before. Patients were randomly assigned into two groups. Group 1 ( $n=22$ ) received balneotherapy at the same center under the supervision of a physiotherapist. They received bathing for a total duration of 20 min once a day and five times per week. Thermal heat was 36°C. Patients participated the therapy program for 3 weeks (for a total of 15 sessions). They received the baths at different times of day, mostly in the morning. Because the therapy center was very close to homes, they were treated as outpatients. The rest of the time, the patients continued their daily activities. Group 2 ( $n=20$ ) was accepted as the control group and was told to continue their daily activities. Regular exercise or walking programs were not offered. During the therapy program, both groups were allowed to take the same NSAID, if needed. Additional medication such as antidepressive drugs were not permitted to either group. At the end of this program, patients were told to inform about their medication schedule. The assessment parameters were measured before, at the end, and 6 months after the balneotherapy.

Patients were evaluated by the number of tender points, pain, depression, and physical functional capacity. Tender points were determined by digital pressure [4]. Pain was assessed by 10 cm Visual Analogue Scale (VAS) (0 no pain, 10 worst pain). Functional capacity in daily living activities were evaluated by the Fibromyalgia Impact Questionnaire (FIQ), which includes ten items in a self-administered instrument that measures physical functioning, work status, anxiety, pain, fatigue, sleep, depression, stiffness, and well-being [5]. Beck's Depression Index (BDI) was used to assess the mood of the subjects with FMS. This index is a well established and validated instrument which includes 21 items measuring depression. Scores above 13 are believed to indicate the presence of depression and scores above 21 to indicate major depression [6].

Before treatment, all participants gave written, informed consent.

Statistical analysis

The means and standard deviations were given as descriptive statistics. To test continuous variables comparison between the two groups, the Mann-Whitney U test and repeated measurements of variance analysis were used.

Results

The difference for demographic properties between the two groups was not significant at the beginning of the study. Demographic properties of the patients are shown

in Table 1. The results of ESR, CRP, RF, and other biochemical parameters were in normal ranges for both groups. Initially, no one was in major depression according to Beck's Depression Index. Nonsteroidal anti-inflammatory drug usage was higher in the control group. All patients completed the study, and no side effects were observed.

In group 1, after the therapy, there were statistically significant differences in the number of tender points (NTP), Visual Analogue Scale (VAS), Beck's Depression Index (BDI), and Fibromyalgia Impact Questionnaire (FIQ) values, when compared to the control group ( $P < 0.001$ ). At the end of 6 months, despite a decrease in treatment effects during the follow-up period, in the treatment group there was still significant improvement in NTP ( $P < 0.001$ ), VAS, and FIQ values over baseline scores ( $P < 0.005$ ). For BDI scores, we could not find any statistical difference at the end of 6 months ( $P > 0.05$ ). The results of NTP, VAS, and FIQ are given in Table 2. The BDI scores for both groups are shown in Table 3.

Discussion

Fibromyalgia syndrome is characterized by chronic diffuse musculoskeletal pain and associated symptoms. As the etiology is not clear, its treatment regimens still remain unknown. The only drugs reported to be effective are antidepressants [7]. Researchers are investigating alternative therapeutic modalities for FMS.

In daily practice, additionally to NSAIDs and exercise therapy, balneotherapy is widely used in Turkey for the treatment of osteoarthritis. In this study we examined the effects of balneotherapy in FMS patients and observed a significant improvement in FMS-related symptoms.

Table 1. Demographic properties of the treatment and control groups

	Group 1	Group 2
N patients	22	20
Age	42.0 ± 6.8	41.5 ± 7.1
Gender (F/M)	16/6	15/5
Disease duration (months)	15.5 ± 7.2	14.1 ± 8.7
Married	20	20
Employed (%)	32	30

Table 2. The results of the inquiries on pain, functional capacity and the number of tender points initially, after 3 weeks, and at the end of 6 months (24 weeks) of the therapy program for both groups (mean ± standard error). VAS visual analogue score, FIQ fibromyalgia impact questionnaire

	VAS(cm)		FIQ		Number of tender points	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Week 0	7.2 ± 1.6	7.3 ± 1.3	48.5 ± 8.8	48.4 ± 8.9	13.5 ± 2.0	13.8 ± 2.6
Week 3	2.7 ± 1.3	6.1 ± 1.2	12.8 ± 5.6	46.6 ± 9.4	5.9 ± 2.7	12.7 ± 2.3
P	< 0.001	> 0.05	< 0.001	> 0.05	< 0.001	> 0.05
Week 24	3.5 ± 1.0	6.1 ± 1.2	29.5 ± 4.8	48.1 ± 8.8	6.2 ± 2.2	12.9 ± 2.3
P	< 0.05	> 0.05	< 0.05	> 0.05	< 0.001	> 0.05

**Table 3.** Comparison of Beck's Depression Index between groups before and at the end of the 3rd and 24th weeks. In group 1, there was a statistical improvement at the end of the 3rd week, but after 6 months it was very close to baseline scores. Data are expressed as means  $\pm$  SD

	Beck depression index				
	Week 0	Week 3	<i>P</i>	Week 24	<i>P</i>
Group 1	13.9 $\pm$ 3.8	7.0 $\pm$ 1.9	<0.001	11.3 $\pm$ 2.5	>0.05
Group 2	14.3 $\pm$ 3.8	13.1 $\pm$ 3.3	>0.05	13.3 $\pm$ 3.4	>0.05

Balneotherapy has been reported to be effective in the treatment of noninflammatory rheumatologic disorders, especially in osteoarthritis [8]. Recently, some studies also demonstrated its positive effects on inflammatory arthritis forms such as psoriatic arthritis, rheumatoid arthritis, and ankylosing spondylitis [9, 10, 11]. There are many studies about the Dead Sea baths. The effects of Dead Sea bathing on patients with psoriatic arthritis and rheumatoid arthritis are well documented [11, 12, 13]. It was also found to be effective in chronic pain management. Improvement in pain, functional capacity, and quality of life in patients with osteoarthritis or low back pain were demonstrated in various studies [14, 15, 16]. Also, balneotherapy is accepted to improve general well-being and is one way of treatment for various kinds of chronic disorders. Mostly it was effective against pain, vegetative complaints, fatigue, and emotional well-being. Well-being improved from the beginning, and in some cases it was still present 12 months after the therapy [17].

Studies about the beneficial effects of thermotherapy on FMS are limited. Samborski et al. observed an improvement in pain in FMS after hot mud pack therapy [18]. Sukenik et al. examined the role of balneotherapy in both fibromyalgia and psoriatic arthritis patients at the Dead Sea. They observed a reduction in the number of tender points [19]. It was demonstrated that after Dead Sea bathing, there were improvements in fibromyalgia-related symptoms, number of tender points, pain, and physical functional capacity which persisted for 3 months [20]. Similarly, we observed a statistical decrease in the number of tender points in the FMS group at the end and even 6 months after the therapy program. Neumann et al. assessed the positive effects of balneotherapy on the quality of life of patients with FMS and found improvement in most of the symptoms. They reported that improvements in quality of life lasted approximately 3 months, whereas the improvements in psychological measurements were shorter [21]. In our study, improvement in FIQ scores persisted for 6 months, but BDI scores remained very close to the baseline. Psychological factors are well known to be important in FMS. But our patients were treated as outpatients and continued their activities the rest of the time. This may effect the 6-month results of the BDI scores. The time they spent in the spa center was limited and this was not a vacation for them, so the improvement in symptoms seems to be independent from the relaxing effect of a holiday.

After 3-week therapy, we observed improvements in the symptoms of FMS. This may depend on the relaxing effects of balneotherapy on ligaments and muscles. The treatment mechanism is known to be via multipathways and complex. Thermotherapy mostly produces analgesia on nerve endings by increasing the pain threshold [22]. It causes relief of muscle spasms through the gamma fibers of muscle spindles and activates the descending pain inhibitory system. In joints and connective tissue, it causes an increase in tendon extensibility. By causing peripheric vasodilation, it helps to wash out pain mediators. These may play a role in the painful symptoms of fibromyalgia. Balneotherapy also activates the parasympathetic system. Increased accumulation of acetylcholine in the central nervous system may be a factor of its sedative effect [23]. Furthermore, during the balneotherapy, changes in the release of beta endorphin and cytokines such as interleukins 1 and 6, tumor necrosis factor-alpha, and interferon-gamma may play a role in the humoral response of the body [24, 25].

As a result, the treatment of fibromyalgia is complex and there are no obvious therapeutic modalities. Balneotherapy seems to be effective against fibromyalgia symptoms. Further investigations would be helpful in confirming the therapy mechanism of balneotherapy in FMS.

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