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BRIEF REPORT

Stanger bath therapy for ankylosing spondylitis: illusion or reality?

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Abstract We compared the short-term effects of Stanger bath therapy and conventional exercises on spinal mobility, functional capacity, disease activity, and quality of life with conventional exercise alone in ankylosing spondylitis (AS) patients. A total of 58 patients with a diagnosis of AS according to the modified New York criteria were included in this randomized prospective study. The patients were divided into two groups. Patients in group I (n=30) received Stanger bath therapy and an exercise program. Group II (n=28) patients were given the same exercise program but did not receive Stanger bath therapy. Patients were evaluated before (T0) and at the end of the treatments (T1). Evaluation parameters were the Bath AS Metrology Index (BASMI), Bath AS Functional Index (BASFI), Bath AS Disease Activity Index (BASDAI), and AS Quality of Life (ASQoL). In both patient groups, a significant improvement was determined in all clinical outcomes between T0 and T1 except for BASMI in group II. Comparison of the groups showed significantly superior results in group I parameters of BASMI, BASFI, BASDAI, and ASQoL. Stanger bath therapy showed beneficial effects in spinal mobility, functional capacity, disease activity, and quality of life in AS patients immediately after the treatment period. We recommend Stanger bath therapy for AS patients in the short-term, but further research is imperative to assess whether improvement is sustained over a long-term follow-up.

Keywords Ankylosing spondylitis · Exercise · Stanger bath therapy

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Introduction

Ankylosing spondylitis (AS) is a chronic, inflammatory disorder involving mainly the axial skeleton and the larger peripheral joints that progressively limits spinal mobility and may lead to functional disability [1, 2]. Based on available data, the progression is stronger in the first 10 years of the disease, but it is also clear that the disease continues to be active for further decades [3].

Although there is no definitive treatment for AS, the disease can be controlled with supportive approaches including exercise training, physical therapy, and balneotherapy in addition to medical treatment [4–7]. Exercise is strongly recommended and considered as basic therapy to increase the functional capacity and quality of life [8, 9]. Balneotherapy has been used traditionally in the treatment of musculoskeletal diseases, including chronic inflammatory joint diseases, since ancient times. Several studies have shown that balneotherapy has several beneficial effects in the treatment of AS lasting up to 6 months [7, 10–12].

Stanger bath, a combination of electrotherapy and hydrotherapy, is used to treat pain syndromes (muscle spasms, sprains) and musculoskeletal diseases such as osteoarthritis and spondyloarthropathies [13]. Heated water, providing warmth and buoyancy, decreases edema, muscle tone, and joint loading, and increases the removal of inflammatory mediators, pain thresholds, and tolerance [14]. Low-frequency

currents (diadynamic [DD]) or galvanic currents are applied in baths and the current is conducted to the bath through metal or carbon electrodes immersed in the water [15].

To our knowledge, our short-term study is the first study in the peer-reviewed literature analyzing Stanger bath therapy in patients with AS. The purpose of this trial was to clinically evaluate the short-term effects of Stanger bath therapy in conjunction with conventional exercise on spinal mobility, functional capacity, disease activity, and quality of life outcomes in AS patients and to compare with results in patients receiving conventional exercise alone.

Materials and methods

This prospective study included 58 patients diagnosed with AS according to the modified criteria of New York [16], selected randomly from the outpatients of our Physical Therapy and Rehabilitation Clinic. Exclusion criteria included patients with severe comorbidity of heart, lung, liver, or kidneys; total spinal ankylosis; those previously given hydrotherapy within 1 year; and those with an erythrocyte sedimentation rate (ESR) >50 mm/h or C-reactive protein (CRP) more than ten times the normal value. All patients were informed about the nature of the study and provided informed consent before beginning the trial, which was conducted in accordance with the Helsinki Declarations of 1975.

The patients were randomized by sealed opaque envelopes on a 1:1 basis to one of two groups. A demographic questionnaire was completed by all patients to assess personal and clinical data. The patients were allowed to continue their previous medication, but they were requested not to use supplementary drugs or change the usual dosages throughout the study period of 3 weeks.

The patients were divided into two groups. Group I (n=30) patients were prescribed an exercise program and Stanger bath therapy for 20 min daily for 15 sessions over a 3-week period. The bath has three 40×20 cm electrodes on both the left and right sides, two 20×20 cm electrodes at the foot, and one 20×20 cm electrode at the head, which can be activated in transverse, longitudinal, or transverse–diagonal form [17, 18]. The bath is made from a synthetic material and measures approximately 185×80×60 cm. NaCl at a ratio of 0.2–0.5% can be added to increase water conductivity. DD current was used in the Stanger bath and the intensity was assigned according to the patient's tingling sensation on the body surface; tap water at 36–37°C was used. The same physiotherapist applied all Stanger bath therapies. These treatments were conducted at the hydrotherapy unit of our Physical Therapy and Rehabilitation Department. The exercise program included range of motion, muscle strengthening, respiration, and postural exercises. The patients were requested to repeat this home-based exercise program for 30 min daily, 5 days a week, for 3 weeks. An experienced physical therapist taught the exercises to each of the patients individually. Group II (n=28) patients were given the same exercise program but did not receive Stanger bath therapy.

In group I, the assessment parameters were measured before the Stanger bath (T0) and at the end of the 3-week Stanger bath therapy (T1). In group II, these parameters were examined before (T0) and at the end of the 3-week exercise program (T1).

Changes in spinal mobility, functional capacity, disease activity, and quality of life were evaluated by the Bath AS Metrology Index (BASMI) [19], Bath AS Functional Index (BASFI) [20], Bath AS Disease Activity Index (BASDAI) [21], and AS Quality of Life (ASQoL) scale [22].

The clinical outcome measures were examined by the same physician who was blinded to the patients' group allocation to avoid interrater differences. No physical therapy modalities were applied to these patients during the 3-week period.

One patient from group I withdrew before completion of the study for personal reasons, thus 57 patients completed the study. The patient flow chart is shown in Fig. 1.

Statistical analyses

Data analysis was performed using the SPSS for Windows, version 11.5. Data are shown as the mean±SD for continuous variables and scales. Categorical variables are given as percentages. Ninety-five percent confidence intervals (95%CI) for the mean differences and size effects were calculated. Means were compared using Student's t test or Mann–Whitney U test where appropriate. The differences between pretreatment and posttreatment values were evaluated by using Wilcoxon sign rank test within groups. For categorical comparisons, chi-square or Fisher's exact test was used where appropriate. P values of <0.05 were accepted as statistically significant.

Results

The groups were homogeneous for age, gender, education duration, working status, disease duration, clinical type, and baseline values of outcome measures, except for the BASDAI and ASQoL scores. Demographic data corresponding to each group are presented in Table 1.

The intragroup comparison showed an improvement from T0 to T1 in outcomes of all indexes in both groups with the exception of the BASMI index for group II (Table 2). Intergroup comparison determined superior

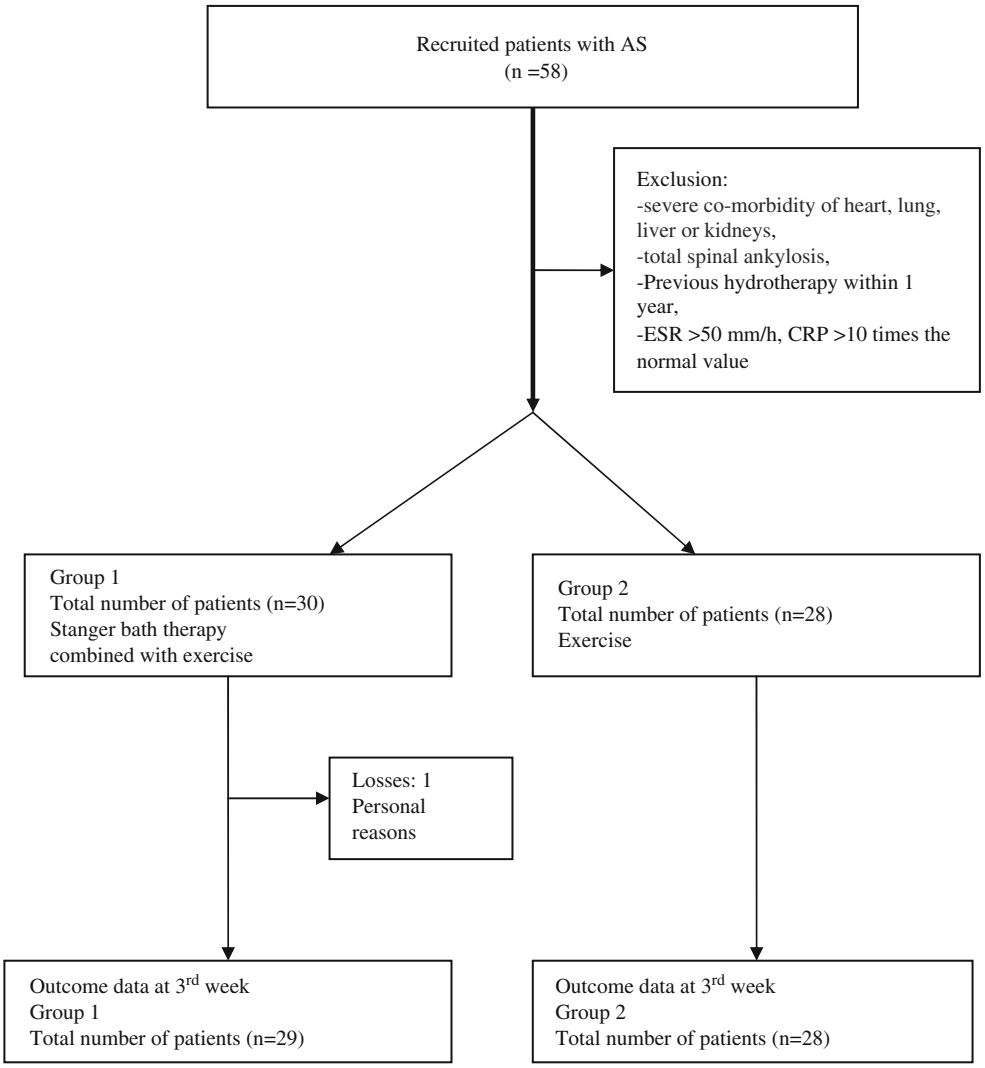

Fig. 1 Flow diagram for patient assignment

results in group I from T0 to T1 for each clinical measure. Table 3 summarizes the intergroup comparison of these differences during the short-term study. No side effects occurred in either group and all therapies were performed as planned.

Discussion

In previous studies, mainstays of treatment in AS were reported as medical treatment, physical therapy, exercise, spa therapy, and balneotherapy [4–12]. We aimed with this

Table 1 Demographic data of the two groups

		Group I (n=29)	Group II (n=28)	P value
Age (years, mean±SD)		40.2±10.38	41.3±8.59	0.528
Gender	Female, n (%)	2 (6.9)	6 (21.4)	0.114
	Male, n (%)	27 (93.1)	22 (78.6)	
Education duration (years, mean±SD)		8.21±3.29	6.96±2.63	0.138
Working status	Employed, n (%)	22 (75.9)	20 (71.4)	0.704
	Unemployed, n (%)	7 (24.1)	8 (28.6)	
Disease duration (years, mean±SD)		16.21±10.22	13.53±9.33	0.308
Clinical type	Peripheric, n (%)	6 (20.7)	2 (7.1)	0.323
	Axial, n (%)	15 (51.7)	17 (60.7)	
	Peripheric and axial, n (%)	8 (27.6)	9 (32.1)	

Table 2 Results of BATH indexes and ASQoL scale before (T0) and at the end of 3 weeks (T1) and intragroup comparison

	Group I				Group II			
	T0	T1	Mean difference (95%CI)	*P* value	T0	T1	Mean difference (95%CI)	*P* value
BASMI	4.69±2.46	3.94±2.42	0.74 (0.40–1.08)	<0.001	4.46±3.08	4.29±3.05	0.17 (−0.03–0.39)	0.102
BASFI	4.72±1.76	2.87±1.78	1.84 (1.44–2.25)	<0.001	3.70±2.43	3.22±2.19	0.48 (0.20–0.77)	0.002
BASDAI	4.96±1.88	2.75±1.56	2.20 (1.67–2.73)	<0.001	3.20±1.63	2.61±1.41	0.59 (0.31–0.87)	<0.001
ASQoL	10.17±3.02	6.96±2.80	3.21 (2.34–4.08)	<0.001	8.11±.05	6.96±3.71	1.14 (0.71–1.57)	<0.001

preliminary examination to investigate the effect of Stanger bath therapy on clinical parameters in AS patients. It is difficult to compare our study with previous studies because of differences in patient populations and in cointerventions apart from bathing. The present study showed that the combination of Stanger bath therapy and exercise showed greater improvements immediately after treatment in spinal mobility, functional capacity, disease activity, and quality of life when compared to results with exercise alone.

Fernandez-de-Las-Penas et al. evaluated the impact of a 4-month comprehensive protocol of exercises versus conventional exercise for patients with AS on functional and mobility outcomes and showed that the experimental group obtained a greater improvement than the control group in all clinical measures, except in tragus to wall distance and in the functional index [5]. When the effectiveness of group versus individualized therapies is compared, it was found that group exercise therapy had more positive impacts on global health and functions, but did not cause a significant difference in spinal mobility [8]. Calin et al. observed an obvious increase in functional capacity evaluated with BASFI after an intensive physiotherapy for 3 weeks in patients with AS [20]. We observed significant improvement with exercise alone in functional capacity, disease activity, and quality of life, but not in spinal mobility. It is generally accepted that exercise is an essential component of AS treatment that maintains spinal mobility and improves functional capacity, disease activity, and quality of life for the short-term in addition to its analgesic effect, although there remains doubt as to whether this improvement is sustained in the long-term.

The role of balneotherapy in AS treatment has been investigated in several studies. Altan et al. concluded that balneotherapy has a supplementary effect on improvement in disease activity and functional parameters in AS patients immediately after a 3-week treatment period, although its positive effects were not found to be significantly superior to exercise alone in the midterm [7]. In another study involving 53 AS patients using an individualized program of hydrotherapy, massage, and occupational therapy, 60% of the patients showed improvement at the end of 1 month; however, no long-term results were given [10]. In Turkey, there are a number of thermal and mineral springs, and spa therapy and balneotherapy are used widely, particularly in the treatment of rheumatic disease [23, 24]. In our study, the Stanger bath therapy group showed significant results for the parameters of BASMI, BASFI, BASDAI, and ASQoL at 3 weeks.

The beneficial effects of Stanger bath therapy may be attributed to the intervention itself. The heat effect and buoyancy of the water may be real facets of Stanger bath therapy producing many physiologic effects, such as muscle relaxation and increased joint mobility [14]. Application of heat repairs the inflamed tissue by fresh oxygen brought in after the removal of the free oxygen radicals. On the other hand, buoyancy provides a suitable atmosphere in which the arms and legs can move freely without skeletal loading; thus exercises can be done more easily. According to the gate control mechanism, thermal stimulus contributes to blocking of pain perception at the dorsal horn level, thereby providing a general sedation effect [25]. These findings support the improvements obtained in this study.

The limitations of our study were its short duration, small sample size, and the absence of a control group without any physical therapy intervention. It is thus recommended to repeat the same procedure in the long-

Table 3 Intergroup comparison of differences in outcome measures between groups

	Group I mean difference (95%CI)	Group II mean difference (95%CI)	Effect size (95%CI)	*P* value
BASMI	−0.74±0.89 (−1.08 to −0.40)	−0.18±0.55 (−0.39 to 0.03)	−0.56 (−0.96 to −0.17)	0.003
BASFI	−1.84±1.07 (−2.25 to −1.44)	−0.48±0.73 (−0.77 to −0.20)	−1.36 (−1.84 to −0.87)	<0.001
BASDAI	−2.20±1.39 (−2.73 to −1.67)	−0.59±0.71 (−0.87 to −0.31)	−1.61 (−2.20 to −1.02)	<0.001
ASQoL	−3.21±2.29 (−4.08 to − 2.33)	−1.14±1.11 (−1.57 to 0.71)	−2.06 (−3.02 to −1.10)	<0.001

term with a greater number of patients including a control group without any therapeutical intervention. Because all patients had been taking nonsteroidal antiinflammatory drugs (NSAIDs) and were asked not to modify their pharmacological treatment, we did not take into consideration NSAID effects based on the assumption that the obtained improvement(s) would affect both groups similarly.

This preliminary study raises many questions that remain to be answered. Is the positive effect of Stanger bath therapy in AS an illusion or reality? How long can the improvement(s) be sustained? We suggest Stanger bath therapy in AS patients for the short-term. However, in view of the chronic nature of AS, it is imperative to also assess the long-term effects. Although we reported impressive short-term effects, the value of Stanger bath therapy must be taken into account in future studies using larger populations with a long-term follow-up to further enlighten its efficacy.

Conflict of interest statement Eda Gurcay, Serdil Yuzer, Emel Eksioglu, Ajda Bal, and Aytul Cakci declare no conflicts of interest.

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