ÖZGÜN ARAŞTIRMA / ORIGINAL RESEARCH

DOI: 10.17944/mkutfd.843202
MKÜ Tıp Dergisi 2021;42(1):44-50

Effectiveness of Physical Therapy in Ankylosing Spondylitis: A Randomized Controlled Study

Uzm. Dr. Ayşe Ünal Enginar[1], Prof. Dr. Hatice Uğurlu[2]

[1] Ordu Devlet Hastanesi Romatoloji Kliniği, Ordu, Türkiye
[2] Necmettin Erbakan Üniversitesi, Meram Tıp Fakültesi Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı, Konya, Türkiye

Öz

Ankilozan Spondilitte Fizik Tedavinin Etkinliği: Randomize Kontrollü Bir Çalışma

Amaç: Ankilozan spondilit (AS) hastalarında fizik tedavinin ağrı, fonksiyon, hastalık aktivitesi, emosyonel durum ve yaşam kalitesi üzerine etkisininin değerlendirilmesi.
Materyal ve Metod: Çalışmaya AS tanısı alan 31 hasta dahil edildi. Hastalar randomize olarak fizik tedavi grubu ve kontrol grubu olarak ikiye ayrıldı. Fizik tedavi grubuna 15 seans fizik tedavi (sıcak paket, ultrason, transkutanöz elektriksel sinir stimülasyonu (TENS), hidroterapi), ev egzersiz programı verildi. Kontrol grubuna ev egzersiz programı verildi. Her iki gruba tedavi öncesi, 2. ve 6. haftalarda vizüel analog skala (VAS) gece ve günlük, Ankilozan Spondilit Fonksiyon İndeksi (BASFİ), Ankilozan Spondilit Hastalık Aktivite İndeksi (BASDAİ), modifiye schober, el parmak zemin mesafesi, lateral fleksiyon, servikal rotasyon, intermalleolar mesafe, tragus duvar mesafesi ve Ankilozan Spondilit Metroloji İndeksi (BASMİ), göğüs eksansiyonu, çene manubrium mesafesi ölçüldü. Tüm hastalara tedavi öncesi ve 6. hafta Beck Depresyon Ölçeği (BDI) ve Kısa Form (SF-36) doldurduldu.
Bulgular: Gruplar karşılaştırıldığında tedavi grubunda 2. haftada VAS (günlük), 6. haftada VAS (günlük) ve SF-36'nın genel sağlık parametrelerindeki düzelme istatistiksel olarak anlamlı idi ($p<0.05$). 0- 6. hafta karşılaştırıldığında fizik tedavi grubunda VAS günlük ($p<0.01$) ve gece ($p<0.01$), modifiye schober ($p<0.05$), göğüs ekspansiyonu ($p<0.05$), BASDAI ($p<0.01$), BASMI ($p<0.05$), SF 36'nın genel sağlık, mental sağlık ve sosyal fonksiyon parametrelerinde ($p<0.05$) düzelme saptandı.
Sonuç: Fizik tedavinin AS'li hastalarda ağrı ve yaşam kalitesi üzerine olumlu etkileri vardır.
Anahtar Kelimeler: Ankilozan Spondilit, Egzersiz, Fizik Tedavi, Hidroterapi

Abstract

Effectiveness of Physical Therapy in Ankylosing Spondylitis: A Randomized Controlled Study

Objective: To evaluate the effects of physical therapy on pain, disease activity, functional and emotional status and quality of life in patients with ankylosing spondylitis (AS).
Method: The study included 31 patients with a diagnosis of AS and were randomly separated into two groups as the physical therapy and the control group. The patients in the physical therapy group were applied with 15 sessions of physical therapy (hot-pack, ultrasound, transcutaneous electrical nerve stimulation (TENS), hydrotherapy) and home exercise program. The control group received the home exercise program. Evaluations were made of groups before treatment, then in the 2nd and 6th weeks. The Visual Analog Scale (VAS) daily and night, Ankylosing Spondylitis Function Index (BASFI), Ankylosing Spondylitis Disease Activity Index (BASDAI), modified Schober, fingertip to floor distance, lateral flexion, cervical rotation, intermalleolar distance, tragus-wall distance,Ankylosing Spondylitis Metrology Index (BASMI), chest expansion and the chin-manubrium distance were measured. The Beck Depression Inventory (BDI) and the Short-Form-36 (SF-36)were completed before treatment and in the 6th week.
Results: When the two groups were compared, the VAS (daily) score in the 2nd and 6th weeks and improvement in the general health parameters of the SF-36 at 6 weeks were seen to be statistically significant in the treatment group ($p<0.05$). In the comparison of the parameters between 0 and 6 weeks, statistically significant improvements were determined in the treatment group in the VAS day and night($p<0.01$), modified Schober, chest expansion ($p<0.05$), BASDAI ($p<0.01$), BASMI and the general health, mental health, social function parameters of the SF-36 ($p<0.05$).
Conclusion: Physical therapy has positive effects on pain and quality of life in patients with AS.
Keywords: Ankylosing spondylitis, Exercise, Hydrotherapy, Physical therapy

Yazışma Adresi/Address for Correspondence: Uzm. Dr. Ayşe Ünal Enginar
Email: ftrdrayseenginar@gmail.com
ORCID iD: 0000-0003-0273-6268

Geliş/Received: 19 Aralık 2020
Düzeltme/Revized: 17 Şubat 2021
Kabul/Accepted: 8 Nisan 2021

INTRODUCTION

Ankylosing spondylitis (AS) is a chronic inflammatory disease associated with the human leukocyte antigen (HLA)-B27, the etiology of which is not fully known. The structures affected in AS are joint capsules, the entheses at the attachment sites of ligaments to bones, apophyses, and the synovium of sacroiliac joints (1,2). The main aims of AS treatment are to reduce pain and stiffness, correct and preserve mobility and function, prevent loss of ability, increase quality of life, and prevent structural damage (2).

Treatments used in AS are physical therapy, exercise, non-steroidal anti-inflammatory drugs (NSAIDs), tumor necrosis factor (TNF) α inhibitors, and interleukin 17-A inhibitors (3). The best treatment in AS is possible with a combination of pharmacological and non-pharmacological treatments, i.e., exercise, physical therapy modalities, hydrotherapy and thermal spa treatments. Physical therapy is very important to maintain and increase mobility, physical condition and strength (2,3). Physical therapy and regular exercise cannot replace pharmacotherapy but the two are complementary (4). In a Cochrane review, there was found to be less evidence related to non-pharmacological treatment approaches, but there is a strong positive specialist view (2,5). Patient education, exercise and physical therapy are recommended in the 2016 The Assessment of Spondylarthritis International Society (ASAS) and European League Against Rheumatism (EULAR) guidelines (3).

The number of studies conducted with physical therapy modalities in AS is few (6,7,8). The aim of our study is to evaluate the effectiveness of physical therapy modalities and hydrotherapy in patients with AS and to contribute to the literature.

Table 1. The demographic and clinical characteristics of the patients

	Physical therapy group (n:20)	Control group (n:11)	P value
Age (year)	39,3 ± 12,2	37,0 ± 12,2	0,583
BMI (kg/m²) (mean ± SD)	24,2 ± 4,31	25,9 ± 3,64	0,287
Disease duration in months (mean ± SD)	80,7 ± 59,7	72,0 ± 89,2	0,279
BASRI	7,82 ± 1,90	7,63 ± 3,61	0,298
NSAID	5 (% 25)	3 (% 27,3)	0,606
NSAID+Sulfasalazin	15 (% 75)	8 (% 72,7)	0,591

BMI: Body mass index, BASRI The Bath Ankylosing Spondylitis Radiology Index, NSAID non-steroidal anti-inflammatory drug

METHOD

The study included 31 patients who presented at our clinic and were diagnosed with AS according to the modified New York criteria. Informed consent was obtained from all the patients. Exclusion criteria were age >60 and <25 years, pregnancy, infection, recent history of surgery, the presence of any severe systemic disease, malignancy, mental retardation, severe emotional disorder, taking biological drug and / or steroid treatment. In addition, those who had a change in drug treatment in the last 6 months were not included in the study.

All patients' age, gender, body mass index (BMI), duration of disease, medications they used and The Bath Ankylosing Spondylitis Radiology Index (BASRI) were recorded. Using a computer-generated randomization list, the patients were randomly separated into two groups as the physical therapy group (n:20) and the control group (n:11). The physical therapy group were given a program of 15 sessions of physical therapy, hydrotherapy and home exercises. The control group was given the home exercise program only. There was no change in the current drug therapy of both groups. All patients continued to receive NSAIDs. Fifteen patients in the physical therapy group and 8 patients in the control group were using sulfasalazine. The physical therapy modalities applied were surface heating, ultrasound, TENS, and hydrotherapy. For the surface heating, a hot pack was applied to the back and neck for 20 mins. Ultrasound was applied as 2w/cm2 to the cervical and lumbar regions for 6 mins. TENS was applied as conventional type to the paravertebral muscles for 30 mins. The applications were made once a day for a total of 15 sessions.

Hydrotherapy was applied as 5 sessions per week for 3 weeks. The pool water was at a temperature of 37 ° C. The patients in the physical therapy group practiced water exercises for 60 minutes in company with a physiotherapist. Aquatic exercises including aerobic exercise, active ROM, stretching, strengthening, postural, respiratory and relaxation exercise.

Exercises were shown to both groups by the physiotherapist at the beginning. It was given to all patients as 30 minutes a day as a home exercise program. These exercises are postural exercises; they were strengthening exercises (such as hip adduction and abduction, knee flexion and extension, and upper limb muscles) and stretching and breathing exercises. Before starting the treatment, then at the end of 2 and 6 weeks, all the patients were evaluated with a VAS for pain at night and at daily, with the BASFI for function, the BASDAI for disease activity and for spinal mobility, modified Schober, finger floor distance (FFD), lateral flexion of the lumbar spine, cervical rotation, intermalleolar distance, tragus wall distance, chest expansion, chin manubrium distance and BASMI measurements were taken.

Table 2. Statistical comparison of clinical evaluation parameters before and after treatment in groups

	Physical therapy group			Control group			p value		
	Baseline	Week 2	Week 6	Baseline	Week 2	Week 6	Baseline	Week 2	Week 6
VAS daily	6.1 ± 1.3	3.7 ± 2.3*[a]	2.7 ± 2.2*[b]	6.4 ± 1.3	6.1 ± 2.0	4.9 ± 2.9	0.583	0.008 *	0.04*
VAS night	5.4 ± 2.4	2.8 ± 2.7[a]	2.5 ± 3.0[b]	5.0 ± 3.0	4.1 ± 3.2	4.0 ± 3.3	0.919	0.261	0.279
Modified Schober (cm)	19 ± 2.1	20 ± 2.2[a]	20 ± 2.1[b]	20 ± 2.3	20 ± 2.6	20 ± 2.6	0.376	0.601	0.888
Fingertip-to-floor distance (cm)	20 ± 16	15 ± 16[a]	15 ± 17	17 ± 12	16 ± 13	16 ± 14	0.528	0.761	0.761
Lumbar side flexion (cm)	8.0 ± 3.1	8.1 ± 3.7	8.6 ± 2.9	11 ± 8.1	10 ± 8.5	10.7 ± 8	0.317	0.528	0.670
Tragus to wall distance (cm)	19.5 ± 2.6	18.6 ± 3	19 ± 3	20.5 ± 4	20.5 ± 4.6	20.5 ± 4	0.389	0.165	0.291
Chin-manubrium sterni distance (cm)	3.6 ± 2.3	2.8 ± 2[a]	3 ± 2.1	1.9 ± 2	2.1 ± 2.5	2.1 ± 2.4	0.060	0.381	0.338
Cervical rotation (degree)	47 ± 16	50± 16[a]	51.5 ± 16	58 ± 19	60± 14	61 ± 14	0.113	0.123	0.123
Chest expansion (cm)	4.1 ± 1.3	4.5 ± 1.2[a]	4.5 ± 1[b]	4.88 ± 1	4.7 ± 1	4.6 ± 1	0.108	0.607	0.834
Intermalleolar distance (cm)	96.4 ± 15	102 ± 18[a]	98.7 ± 13	91 ± 29	97 ± 20	97 ± 22	0.497	0.450	0.826
BASFI	4.2 ± 2.4	3.2 ± 2.5[a]	3.3 ± 2.6	3.3 ± 2.1	3.4 ± 2.1	3.3 ± 2.2	0.338	0.670	0.699
BASDAI	5.1 ± 2.1	3.6 ± 2.3[a]	3.3 ± 1.9[b]	4.0 ± 1.6	3.8 ± 2.1	4.2 ± 2.0	0.145	0.670	0.169
BASMI	4.4 ± 1.2	3.9 ± 1.4[a]	3.8 ± 0.9[b]	3.5 ± 2.1	3.8 ± 2.0	4± 2.3	0.104	0.670	0.555
BDI	17 ± 10.2		15.3 ± 11.5	15.7 ± 7.96		16.7 ± 8.1	0.887		0.427
Short form 36									
Physical function	40.2 ± 12		41 ± 11.5	42.5 ± 11.2		43.7 ± 11	0.104		0.990
Social function	39.4 ± 11.9		49.3 ± 12.1[b]	50 ± 12.5		50 ± 11.1	0.064		0.933
Physical role limitation	55 ± 12.2		56.5 ± 11.1	54.5 ± 11.2		55 ± 12.5	0.20		0.120
Emotional role limitation	62.8 ± 11.2		61 ± 10.5	63.4 ± 10.1		63.6 ± 10.4	0.120		0.800
Mental health	42.2 ± 10.8		47.5 ± 13.6[b]	48.1 ± 14.4		50.2 ± 14.3	0.328		0.471
Energy	43.1 ± 15.2		45 ± 14.3	47.5 ± 12.3		47.8 ± 15.1	0.320		0.210
Pain	68 ± 11.5		66.5 ± 12	64.4 ± 13.2		63.0 ± 12.6	0.150		0.200
General health	56.3 ± 14.3		59.2 ± 9.6*[b]	52.2 ± 11.2		50.9 ± 11.3	0.120		0.047

* p<0.05 a baseline and week 2 comparison (p<0.05) b baseline and week 6 comparison (p<0.05)
VAS Visual Analog Scale BASDAI Bath Ankylosing Spondylitis Disease Activity Index.BASFI Bath Ankylosing Spondylitis Functional Index. BASMI Bath Ankylosing Spondylitis Metrology Index. BDI Beck Depression Inventory. SF-36 Short Form 36

Quality of life was evaluated by SF-36, emotional status was evaluated by BDI. SF-36 and BDI were completed by all patients at baseline and after 6 weeks.

Statistical Analysis

Data obtained in the study were analyzed statistically using SPSS for Windows v13.0 software. Power analysis was 0.75. Results were shown as number (n) and percentage (%), arithmetic mean ± standard deviation (SD) and median values. In the comparison of categorical data, the Chi-square test was applied. In the comparison of continuous variables showing normal distribution, the Student's t-test was used in independent groups, and for parameters not conforming to normal distribution, the Mann Whitney U-test was applied. Repeated measurements One-Way Variance Analysis (ANOVA) and Bonferroni correction as the post hoc test were applied in the comparison according to time for each group of continuous variables with normal distribution, and in dependent groups, the Student's t-test was used. In the comparison according to time for each group of continuous variables not showing normal distribution, the Friedman test was applied and the Wilcoxon Signed Rank test with Bonferroni correction as the post hoc test. A value of $p<0.05$ was accepted as statistically significant.

RESULTS

The physical therapy group comprised 17 (85%) males and 3 (15%) females, and the control group comprised 9 (81.8%) males and 2 (18.2%) females. There was no difference in gender between the groups.

No difference was determined between the groups in respect of age, BMI, disease duration, BASRI score, and the drugs used ($p>0.05$) (Table 1).

Pre-treatment, there was no difference between the groups in respect of VAS daily and night, modified schober, fingertip-to-floor distance, lomber lateral flexion, tragus to wall distance, chin-manubrium sterni distance, cervical rotation, chest expansion, intermalleolar distance, BASFI, BASDAI, BASMI, BDI, SF 36 values ($p>0.05$).

Table 3 Comparison of the two groups on the basis of the post-treatment mean difference scores relative to baseline values

	PT group	Control group	PT group	Control group	PT group	Control group
	baseline		0-2 week		0-6 week	
VAS daily	6.1 ± 1.3	6.4 ± 1.3	2.4±1.7**	0.3±1.6	3.4±1.9**	1.5±2.1
VAS night	5.4 ± 2.4	5.0 ± 3.0	2.6±2.1	0.9±2.7	2.9±2.8	1±2.9
Modified Schober (cm)	19 ± 2.1	20 ± 2.3	0.1±1.8	0.1±2.0	-1±1.9	0.01±2.1
Fingertip-to-floor distance (cm)	20 ± 16	17 ± 12	4.9±14 -	1.0±13	5±15	1±13.2
Lumbar side flexion (cm)	8.0 ± 3.1	11 ± 8.1	0.1±2.4	1.0±7.2	-0.6±2.7	0.3±8
Tragus to wall distance (cm)	19.5 ± 2.6	20.5 ± 4	1.4±2.3	0.01±2	0.5±2.4	0.01±4
Chin-manubrium sterni distance (cm)	3.6 ± 2.3	1.9 ± 2	0.8±1.9	-0.2±2.1	0.8±1.9	-0.2±2.1
Cervical rotation (degree)	47 ± 16	58 ± 19	-3.2±0.7	-2±15	-3±16	-3±15
Chest expansion (cm)	4.1 ± 1.3	4.88 ± 1	0.4±1.2	1.18±2	-0.4±1.2	0.28±1
Intermalleolar distance (cm)	96.4 ± 15	91 ± 29	-5.6±12	-6±4.2	-2.3±14	-6±25
BASFI	4.2 ± 2.4	3.3 ± 2.1	1.0±1.9	-0.1±1.9	0.9±2.1	0.1±2
BASDAI	5.1 ± 2.1	4.0 ± 1.6	1.5±2.1	0.2±1.7	1.8±2.0	-0.2±1.9
BASMI	4.4 ± 1.2	3.5 ± 2.1	0.5±1.1	0.3±1.9	0.6±0.9	-0.5±2.1
BDI	17 ± 10.2	15.7 ± 7.96			1.7±9.7	-1±6.9
Short form 36						
Physical function	40.2 ± 12	42.5 ± 11.2			-0.9±1.9	-1.2±11
Social function	39.4 ± 11.9	50 ± 12.5			-9.9±12	0.1±11.5
Physical role limitation	55 ± 12.2	54.5 ± 11.2			-1.5±11.9	-0.5±12
Emotional role limitation	62.8 ± 11.2	63.4 ± 10.1			1.8±11	-0.2±10
Mental health	42.2 ± 10.8	48.1 ± 14.4			-5.3±12.2	-2.1±14
Energy	43.1 ± 15.2	47.5 ± 12.3			-1.9±13	-0.3±12.9
Pain	68 ± 11.5	64.4 ± 13.2			1.5±11.7	1.4±12
General health	56.3 ± 14.3	52.2 ± 11.2			-2.9±11,2 *	1.3±11

* $p < 0.05$; ** $p < 0.01$ PT Physical therapy VAS Visual Analog Scale BASDAI Bath Ankylosing Spondylitis Disease Activity Index. BASFI Bath Ankylosing Spondylitis Functional Index. BASMI Bath Ankylosing Spondylitis Metrology Index. BDI Beck Depression Inventory. SF-36 Short Form 36

In the comparison between pre-treatment and the 2nd week in the treatment group, with the exception of tragus wall distance and lateral flexion of the lumbar spine, all the other parameters were statistically significant ($p<0.05$). No statistically significant difference was determined in any of the parameters in the control group ($p>0.05$) (Table 2).

In the comparison between pre-treatment and the 6th week in the treatment group, with the exception of fingertip-to-floor distance, lateral flexion of the lumbar spine, tragus to wall distance, chin-manubrium sterni distance, cervical rotation, intermalleolar distance, BASFI, and BDI ($p>0.05$), all the other parameters were determined to be statistically significant ($p<0.05$). In the SF-36 sub-dimensions of general health, social function and mental health, a statistically significant increase was determined in the physical therapy group from pre-treatment to the 6th week. In the other sub-dimensions of the SF-36, no significant differences were determined (Table 2).

In the comparisons between the groups, a statistically significant improvement was determined in the 2nd week in the

VAS (daily) score, and in the 6th week in the VAS (daily) score and the general health parameters of the SF-36 in the treatment group ($p<0.05$). No significant difference over time was determined in any of the parameters in the control group ($p>0.05$) (Table 3). We found no statistical difference in all parameters between the groups when the 2nd and 6th weeks were compared.

We did not observe any complication nor an adverse effect during the study.

DISCUSSION

In our study, we found significant improvement in the treatment group in VAS daily at the 2nd week, VAS daily and SF-36's general health parameters on the 6th week. We found significant improvements in VAS daily and night, modified schober, FFD, jaw manubrium distance, cervical rotation, chest expansion, intermalleolar distance, BASFI, BASDAI, BASMI values between pre-treatment and 2nd weeks. Among these parameters, the improvement in VAS daily and night, modified schober, chest expansion, BASDAI, BASMI was significant in the 6th week compared to the pre-treatment. There was no significant improvement in BDI. In SF 36, we found a significant improvement in general health, social function and mental health between pre-treatment and week 6. In a disease such as AS, which affects a young population and can lead to loss of function, disability and workforce loss, obtaining an improvement in function, disease activity and emotional status with physical therapy is important. Physical therapy modalities are an effective treatment method for suitable patients as there are no side-effects and costs are low. Exercise, patient education and physical therapy modalities should be applied in addition to medical treatment. Regular exercise improves the results in AS, but this effect is moderate (6). Exercise is still an important building block in the treatment of AS (7).

In the study conducted by Chen et al., 72 patients with AS with chronic pain were included and its effect on pain and function was not found between the groups that were given TENS and not given (8).

Karamanlioğlu et al. reported from the results of a randomized controlled study that a significant improvement was obtained in BASMI, BASDAI, Ankylosing Spondylitis Disease Activity Score (ASDAS), and quality of life with the use of ultrasound in AS (9).

Sari et al conducted a study on 23 male and 7 female patients, and two groups were randomly formed as medical treatment (MT) and physical therapy (PT). Medical treatment and exercise were applied to the first group and to the second group, physical therapy agents (ultrasound and infrared) were added. The patients in both groups were evaluated before treatment, at 2 weeks and at the end of 4 weeks using the SF-36 acute form and Nottingham Health Profile (NHP) for quality of life, and the BDI for emotional status. The BDI, NHP and pain, general health, and functional role difficulty parameters of the SF-36 were determined to be statistically significantly better in the PT group than in the MT group. It was concluded that the use of physical therapy agents in AS treatment has a positive effect not only on pain but also on quality of life and emotional status (10). In the current study, the physical therapy modalities were determined to have a positive effect on pain and quality of life. Unlike our study, TENS and hydrotherapy are not available in this study. In SF-36, an improvement was found in general health, social function and mental health parameters when the pre-treatment and 6th week were compared in our study.

In the Cochrane review there were six randomized controlled studies that investigated the effect of physiotherapy (11).

In a study of 53 AS patients by Kraag et al, 26 patients received physiotherapy and education and the other 27 patients formed the control group. The physiotherapy group were applied with hot and cold modalities and were shown correct posture and exercises. At the end of the 4-week treatment program, FFD and function were compared and significant improvements were determined in the treatment group of 42% in FFD and 23% in function. It was concluded that physiotherapy (hot, cold modalities, exercise) and patient education primarily improved FFD and spinal mobility in AS patients. However, no statistically significant improvement was determined in pain, sleep or morning stiffness (12). In contrast, ultrasound, TENS and hydrotherapy were applied in our study.

Hidding et al applied a home exercise program to 76 patients for 9 months, and home exercises plus weekly group physical therapy (hydrotherapy, exercise) to 68 patients. In the treatment group, a 28% improvement was determined in general health compared to the control group, but there was no effect on patient symptoms (pain, stiffness, function) although the effect was more evident on mobility (13). In our study, we found a significant improvement in VAS daily and night when comparing the pre-treatment and the 6th week in the physical therapy group.

In another study by Hidding et al, 34 patients received a home exercise program for 9 months and 34 patients received weekly group physical therapy of 3 hours per week (1 hour each of sports activities, exercises and hydrotherapy). A significant improvement was determined in general health and function in the physical therapy group (14). In our study, there were also ultrasound and TENS.

Analay et al randomly separated 51 patients into two groups of 27 patients receiving group therapy for 50 mins 3 days a week, and 24 patients receiving a home exercise program. All the patients were given 1 hour of patient education. At the end of the 6-week treatment program, significant improvements were determined in function, morning stiffness, mobility, physical vitality and level of depression, but there was no improvement in pain. With the exception of the depression points, the improvements continued for 3 months (15). On the contrary, we found no improvement in depression in our study. We found an improvement in pain.

The effects of bedside physiotherapy have only been reported in one controlled study. Halliwell et al randomly separated 44 patients into 3 groups. Group A (n:15) was applied with intense bedside physiotherapy for 3 weeks. Group B (n:15) was applied with hydrotherapy twice a week and performed exercises at home twice a day. Group C (n:14) performed home exercises only. At the end of 6 weeks, significant improvements were recorded in pain, stiffness and cervical rotation in Groups A and B, but these differences were not maintained by the 6th month (16). In our study, we observed the improvement in cervical rotation in the physical therapy group compared to the pre-treatment and the second week. However, this did not continue in the 6th week. The improvement in pain continued in the 6th week.

In a randomized controlled study by Van Tubergen et al, a 3-week program of combined thermal water exercises and weekly group physical therapy was added to the medical treatment. The patients were randomly separated into two groups of 40 for two different thermal spa treatments. The control group of 40 patients remained at home and were applied with physiotherapy for 40 weeks. The thermal spa treatment included physical exercises, walking, postural correction, hydrotherapy, sports, and thermal water baths or saunas. Following the thermal spa treatment, all the patients continued with weekly group physical therapy for a further 37 weeks. From the 4th week onwards, significant improvements were seen in the thermal spa group compared to the control group. Up to the 28th week, there was seen to be significant benefit compared to the control group, but this was not obtained in the 40th week. The maximum differences between the groups were determined to be 30% for pain, 24% for function and 33% for general health (17). We cannot distinguish whether the improvements we saw in the treatment group in our study were due to hydrotherapy or other modalities.

In another study, 60 AS patients were recruited and one group was given balneotherapy, and the other group was given only exercise, and although positive effects were seen, no superiority was found to exercise (18).

In the study conducted by Dündar et al., It was determined that aquatic exercises were more effective in improving pain scores and quality of life compared to exercises performed at home (19). In our study, we applied it together with other modalities, and we achieved improvement in pain and disease activity parameters.

In the meta-analysis conducted by Liang et al., 8 studies were included and positive effects of water therapy on pain and disease activity in patients with AS were determined (20).

The limitations of our study are the small number of patients, the short follow-up period (6 weeks), the combination of physical therapy modalities and hydrotherapy, so it is difficult to distinguish which modality is effective.

In our study, we found significant results between the groups at the 2nd and 6th weeks in vas daily. There was no significant improvement for vas night. We think that this is because the disease causes pain at rest. We found a weak significance in the SF-36 general health subunit at week 6. Hydrotherapy may also have been effective in improving overall health in both the VAS daily and SF-36.

In conclusion, although anti-TNF drugs and IL-17 inhibitors are widely used in AS, physical therapy modalities and exercise treatments should not be forgotten at every stage of the disease. Physical therapy in AS treatment is effective on pain and quality of life. Pharmacological and non-pharmacological treatments should be applied together in AS treatment. Nevertheless, there is a need for further evidence and studies related to physical therapy modalities.

ACKNOWLEDGEMENT

Peer-Review
Externally/Internally Peer Reviewed
Conflict of Interest
The authors declare that they have no conflict of interests regarding content of this article..
Financial Support
The Authors report no financial support regarding content of this article.
Ethical Declaration
Ethical approval was obtained from Selçuk University Meram Medical School Clinical Research Ethical Committee with number 2009/267, and Helsinki Declaration rules were followed to conduct this study.
This study was prepared by rearrangement of the speciality thesis by of the first author, entitled as “Ankilozan Spondilitte Fizik Tedavinin Etkinliği” with date 2009.

REFERENCES

1. Sieper J, Poddubnyy D. Axial spondyloarthritis. Lancet. 2017;390(10089):73-84. https://doi.org/10.1016/S0140-6736(16)31591-4
2. Braun J, Sieper J. Ankylosing spondylitis. Lancet 2007;369:1379-

90 https://doi.org/10.1016/S0140-6736(07)60635-7

3. Van Der Heijde, Désirée, et al. 2016 update of the ASAS-EULAR management recommendations for axial spondyloarthritis. Annals of the rheumatic diseases, 2017, 76.6: 978-991. https://doi.org/10.1136/annrheumdis-2016-210770
4. Dougados M, Dijkmans B, Khan MA et al. Conventional treatments for ankylosing spondylitis. Ann Rheum Dis 2002;61:40-50 https://doi.org/10.1136/ard.61.suppl_3.iii40
5. Braun J and Baraliakos X. Treatment of ankylosing spondylitis and other spondyloarthritides. Current Opinion in Rheumatology 2009;21:324-334 https://doi.org/10.1097/BOR.0b013e32832c6674
6. Regel A, Sepriano A, Baraliakos X, et al. Efficacy and safety of non-pharmacological and non-biological pharmacological treatment: a systematic literature review informing the 2016 update of the ASAS/EULAR recommendations for the management of axial spondyloarthritis. RMD Open 2017;3:e000397. https://doi.org/10.1136/rmdopen-2016-000397
7. Fragoulis GE, Siebert S. Treatment strategies in axial spondyloarthritis: what, when and how?. Rheumatology (Oxford). 2020;59 (Suppl4):iv79-iv89. https://doi.org/10.1093/rheumatology/keaa435
8. Chen FC, Jin ZL, Wang DF. A retrospective study of transcutaneous electrical nerve stimulation for chronic pain following ankylosing spondylitis. Medicine (Baltimore). 2018 Jul;97(27):e11265 https://doi.org/10.1097/MD.0000000000011265
9. Karamanlıoğlu, Duygu Şilte, et al. Effectiveness of ultrasound treatment applied with exercise therapy on patients with ankylosing spondylitis: a double-blind, randomized, placebo-controlled trial. Rheumatology international, 2016, 36.5: 653-661 https://doi.org/10.1007/s00296-016-3441-3
10. Sari H, Cakmak B, Can G. Impact of physical therapy agents on quality of life and emotional status in ankylosing spondylitis. Turk J Phys Med Rehab 2003;49:8-12.
11. Dagfinrud H, Kvien tK, Hagen KB. Physiotherapy interventions for ankylosing spondylitis. cochrane Database Syst Rev 2008;23(1):cD002822 https://doi.org/10.1002/14651858.CD002822.pub3
12. Kraag G., Stokes B,Groh J et al.The effects of comprehensive home physiotherapy and supervision on patients with ankylosing spondylitis.A randomized controlled trial. The Journal of Rheum 1990;17(2):228-33.
13. Hidding A, Van der Linden S, Boers M.Is group physical therapy superior to individualized therapy in ankylosing spondylitis? A randomized controlled trial. Arthritis Care Res 1993;6:117-25. https://doi.org/10.1002/art.1790060303
14. Hidding A, van der Linden S, Gielen X, et al. Continuation of group physical therapy is necessary in ankylosing spondylitis: results of a randomized controlled trial. Arthritis Care Res 1994;7(2):90-6 https://doi.org/10.1002/art.1790070208
15. Analay Y, Özcan E, Karan A.The effectiveness of intensive group exercise on patients with ankylosing spondylitis. Clin Rehabil 2003 Sep;17(6):631-6. https://doi.org/10.1191/0269215503cr658oa
16. Helliwell PS, Abbott CA, Chamberlain MA. A randomized trial of three different physiotherapy regimens in ankylosing spondylitis. Physiotherapy 1996;82:85-90 https://doi.org/10.1016/S0031-9406(05)66956-8
17. Van Tubergen A, Landewe R, van der Heijde D et al. Combined spa-exercise therapy is effective in patients with ankylosing spondylitis: a randomized controlled trial. Arthritis Rheum 2001;45:430-8 https://doi.org/10.1002/1529-0131(200110)45:5<430::AID-ART362>3.0.CO;2-F
18. Altan L, Bingöl U, Aslan M, Yurtkuran M. The effect of balneotherapy on patients with ankylosing spondylitis. Scand J Rheumatol. 2006 Jul-Aug;35(4):283-9 https://doi.org/10.1080/03009740500428806
19. Dundar U, Solak O, Toktas H, Demirdal US, Subasi V, Kavuncu V, Evcik D. Effect of aquatic exercise on ankylosing spondylitis: a randomized controlled trial. Rheumatol Int. 2014 Nov;34(11):1505-11. https://doi.org/10.1007/s00296-014-2980-8
20. Liang Z, Fu C, Zhang Q, et al. Effects of water therapy on disease activity, functional capacity, spinal mobility and severity of pain in patients with ankylosing spondylitis: a systematic review and meta-analysis. Disabil Rehabil. 2019;29:1-8 https://doi.org/10.1080/09638288.2019.1645218