THE EFFICACY OF ULTRASOUND TREATMENT IN PATIENTS WITH SOFT TISSUE SHOULDER DISORDERS

YUMUŞAK DOKU OMUZ HASTALIKLARINDA ULTRASON TEDAVİSİNİN ETKİNLİĞİ

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ÖZET

Amaç: Bu çalışmanın amacı yumuşak doku omuz hastalığı olan hastalarda ultrason (US) tedavisinin ağrı, eklem hareket açıklığı (EHA) ve tedavinin yaşam kalitesi üzerine etkisini belirlemekti.
Metod: Çalışmaya yaş ortalaması 52.89 ± 8.43 yıl olan, omuz ağrısı ve hareket kısıtlılığı mevcut 46 hasta alındı. Hastaların yaş, cins, omuz ağrısı süresini içeren demografik verileri kaydedildi. Hastalar randomize olarak US içeren (UG) veya içermeyen (CG) olarak fizik tedavi programına alındı. Hastalar haftada beş kez olmak üzere on seans tedaviye alındı. Tedavi öncesi ve sonrası değerlendirmede etkilenen tarafta omuz EHA ölçüldü, ağrı yoğunluğu vizuel analog skala (VAS) ve yaşam kalitesi Nottingham Sağlık Profili (NSP) ile değerlendirildi.
Bulgular: Her iki grupta 23 hasta mevcuttu. Her iki grupta tedavi sonrası omuzda EHA önemli oranda düzeldi ve ağrı yoğunluğu önemli oranda azaldı. NSP ağrı ve uyku alt ölçek skalaları UG'da, istatistiksel olarak anlamlı oranda azaldı. Her iki grubun tedavi öncesi ve tedavi sonrası farklarının karşılaştırılmasında istatistiksel olarak anlamlı farklılık tespit edilmedi.
Sonuç: Sonuçlarımıza göre lokal sıcak ve egzersiz programına US eklenmesi, yumuşak doku omuz hastalığı olan hastalarda omuz hareketine, ağrıya ve yaşam kalitesine ilave etki sağlamamaktadır.
Anahtar Kelimeler: Rehabilitasyon, omuz, ultrason tedavisi

SUMMARY

Objective: The aim of this randomized controlled study was to evaluate the efficacy of ultrasound (US) treatment on pain, range of motion (ROM) and quality of life (QoL) in patients with soft tissue shoulder disease.
Methods: Forty-six patients with a mean age of 52.89 ± 8.43 years, with shoulder pain and limitation of movement were participated in this study. Data about demographic characteristics including age, sex and duration of shoulder pain were recorded. Patients were randomly assigned to physical therapy program, either including US Group (UG) or not (control group CG). Patients were treated five times per week for ten sessions. In pretreatment and post treatment assessments; ROM measurements of the affected shoulder joint were measured, pain intensity was evaluated by visual analog scale (VAS) and of Qol was determined by Nottingham Health Profile (NHP).
Results: There were 23 patients in both of the groups. After treatment ROM measurements of the affected shoulder joint were significantly improved and the intensity of pain was significantly reduced in both of the groups. Pain and sleep subscale scores of NHP were reduced in US. There were no statistically significant differences between baseline and post treatment scores within the groups.
Conclusion: Our results suggest that US combined with local heat and exercise program has no additive effect on shoulder mobility, pain and Qol in patients with soft tissue shoulder disorders.
Keywords: Rehabilitataion, shoulder, ultrasound treatment

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INTRODUCTION

Shoulder complaints are a common problem and the cumulative annual incidence of shoulder disorders varies from 7 to 25 per 1000 general practice consultations (1,2). The high prevalence of shoulder disorders has been attributed to multidirectional range of motion (ROM), complicated biomechanics of the joint and high demands of arm usage in daily living activities (3,4). Only 21 % of the patients reported complete recovery at 6 months, and only 49% of patients reported complete recovery at 18 months (5,6).

Pain is the primary symptom in most patients, and aggravated by active movement in soft tissue. The painful restriction of the range of shoulder movement limits the ability to perform daily activities (5). Also lying on the impaired shoulder, causes problems with sleeping (7). The most common causes of shoulder pain are rotator cuff tendonitis, impingement syndrome, calcific tendinitis, rotator cuff tear and bicipital tendinitis (8).

The management of shoulder disorders includes activity modification, non-steroidal anti-inflammatory drugs, steroid injections, therapeutic exercises and physiotherapy. Evidence from randomized clinical trials on shoulder disorders shows small effects favoring the effectiveness of non-steroidal drugs and steroid injections. A wide array of physiotherapy methods is used to treat shoulder disorders (9-12).

Ultrasound (US) is one of the most frequently used electrophysical agents in physical therapy practice (2). Ultrasound is assumed to have thermal and mechanical effects on the target tissue resulting in an increased local metabolism, circulation, extensibility of connective tissue and tissue regeneration (13). Despite its frequent use, the effectiveness of US remains controversial. The recent reviewers published on the efficacy of treatment of painful shoulder problems suggest that there is not enough evidence to support or refute the efficacy of common physiotherapy interventions for shoulder pain (6, 14,15).

The effect of US in the management of shoulder disorders have shown to be ineffective or no clinical benefit in some studies (13,15-19). Although in some studies US have been shown to be effective in improving the symptoms in patients with shoulder disorders (20,21).

The aim of this randomized controlled study was to evaluate the efficacy of US treatment on pain, range of motion and to determine the impact of treatment on quality of life (QoL) in patients with soft tissue shoulder disorders.

METHODS

Patients with the diagnosis of soft tissue shoulder disorder were selected from outpatients' appointment file for physical therapy program in Ankara Numune Training and Research Hospital Physical Medicine and Rehabilitation Clinic.

Inclusion criteria were as follows: (1) Shoulder pain longer than 3 months and limited range of motion; (2) No corticosteroid injection or physical therapy before the study; (3) No evidence of metabolic disorders, infectious, inflammatory disease in routine laboratory tests; (4) No history of trauma of the shoulder joint; (5) No evidence of the conditions that could affect management response such as cervical disc herniation, fibromiyalgia; (6) Fifty-one patients were eligible for inclusion criteria. Patients' cards were randomly assigned into two groups either including US Group (UG) or not Control Group (CG). Five patients were unable to attend the standardized physical therapy program regularly, leaving 46 (41 women, 5 men) patients to be included in the analysis. Data about demographic characteristics including age, sex and duration of shoulder pain were obtained. Nineteen patients had ultrasound and 27 had magnetic resonance imaging of the effected shoulder joint. The diagnoses of the patients are shown in Table 1.

Measurements

Each patient was assessed pretreatment and then after treatment by a resident who was blinded to the groups of the patients. Range of motion (ROM) measurements of the affected shoulder joint was measured by Myrin goniometry while the patients were sitting on a chair. Internal and external rotations were measured after the arm was positioned at 90° abduction and wrist at 90° flexion (22).

Pain intensity of pain was recorded by using 100-mm visual analog scale (VAS) with score of 0 indicating no pain and a score of 100 indicating the worst conveyable pain (23).

The Turkish version of Nottingham Health Profile (NHP) was used to assess QoL in patients (24). NHP is one of the best known and most widely used health-related Qol instrument that has been used in a wide range of diseases to assess subjective perception of physical, emotional, and social aspect of the illnesses (25-27). In our study we evaluated two dimensions of this self-administered questionnaire; as pain and sleep. Scores for each section can range from 0-100 with a higher score indicating more severely compromised QoL.

Therapeutic Interventions

The physical therapy program was applied in Ankara Numune Training and Research Hospital Physical Medicine and Rehabilitation Clinic. The standard physical therapy program included hot pack, active and passive exercise program given consecutively five times a week for a total of ten sessions in 2 weeks. All therapies were applied on the same day, with a few minutes resting time between the therapies. Hot packs (60°C) were applied for 10 minutes to the shoulder for superficial heat. Exercise for the shoulder girdle included the active and passive ROM, Codmann, stretching exercises for flexion and abduction and isometric exercises. The active, individual exercise program was directed by the same physical therapist. Passive ROM exercises were performed for the patients with severe pain and later active ROM, gradually isometric and dynamic resistance exercises were added to the exercise schedule (17, 28- 30). All the exercises repeated for 10- 20 times. The duration of exercise was a minimum of 15 and a maximum of 30 minutes.

The patients in the UG received continuous US in addition to hot pack and exercise program. Sonopuls 434 (Enraf, Holland) was used with a frequency of 1.5 MHz, and an intensity of 1.5 W cm2. The transducer head had an area of 4 cm2. The US was applied with a slow, gliding rotator movement; the treating physical therapist applied the transducer head over the superior and anterior periarticular regions of the subjects' glenohumeral joint.

The patients were reevaluated immediately after treatment. The main outcome measures of the treatment were: pain by VAS, ROM and NHP scores.

SPSS 11.5 was used for statistical analysis. The demographic and clinical characteristics of the patients were analyzed using descriptive statistics. Student's t test and Fischer Exact test were used to compare the baseline values between the groups. We computed the difference of outcome measure between post-treatment and baseline scores for each subject and compared the two groups using Paired sample t- test. The comparison of the differences between the groups is analyzed with Mann-Whitney U test. A value of $p<0.05$ was considered as statistically significant.

RESULTS

There were 41 female, and 5 male patients with a mean age of 52.89 ± 8.43 years (range 36-73). There were 23 patients in the UG and 23 patients in CG. Comparison of demographic and clinical characteristics of patients in both of the groups is presented in Table 2. There were no differences between groups in terms of age, gender and duration of the pain. Eleven patients (5 with Diabetes mellitus, 4 with Hypertension, 1 with osteoporosis, 1 with peptic ulcus) in Group 1, 6 patients (2 with Diabetes mellitus, 2 with Hypertension, 2 with osteoporosis) in Group 2 had comorbid diseases.

Baseline and post treatment ROM measurements of the shoulder joint are are shown in Table 3. The range of flexion, abduction, adduction, internal and external rotation measurements, VAS, pain and sleep sub scores of NHP were significantly improved in UG ($p=0.001$, $p=0.001$, $p=0.015$, $p=0.003$, $p=0.002$, $p=0.001$, $p=0.001$, $p=0.010$ respectively). In CG the range of flexion, abduction, adduction, internal and

Tablo-I
The etiology of shoulder pain

	Ultrasound Group (n=23)	Control Group (n=23)
Diagnosis		
Impingement	11	8
Periarthritis	7	7
Rotator cuff rupture	3	5
Supraspinatus partial rupture	2	3

Tablo-II
Demographic properties and clinical features of the patients

	Ultrasound Group (n=23)	Control Group (n=23)	P
Age (years, mean±sd)	54.43 ± 8.86	52.52 ± 9.38	0.481
Comorbid disease n(%)	11 (47.8)	6 (26.1)	0.111
Dominant extremity involvement n(%)	23 (100)	21 (93.1)	0.244
Time since onset of pain (month, mean±sd)	15.82 ± 4.19	12.91 ± 5.79	0.058

Tablo-III
Baseline and post treatment ROM measurements, VAS and NHP in both of the groups

		Baseline mean±sd	Post treatment mean±sd	P
Flexion (°)	Ultrasound Group	139.34 ± 17.14	162.82 ± 34.00	**0.001**
	Control group	128.47 ± 19.50	156.30 ± 23.94	**0.001**
Extension (°)	Ultrasound Group	43.40 ± 4.68	51.13 ± 28.78	0.238
	Control group	44.34 ± 26.83	50.43± 28.28	0.367
Abduction (°)	Ultrasound Group	122.60x37.47	153.69x38.14	**0.001**
	Control group	104.43 ± 42.40	149.56 ± 37.10	**0.001**
Adduction (°)	Ultrasound Group	40.45 ± 8.00	45.00 ± 0.00	**0.015**
	Control group	39.78± 9.35	44.13 ± 3.25	**0.025**
Internal rotation (°)	Ultrasound Group	67.95± 28.35	77.95 ± 22.60	**0.003**
	Control group	60.21± 22.98	73.69 ± 15.96	**0.001**
External rotation (°)	Ultrasound Group	63.18 ± 32.23	80.22 ± 19.66	**0.002**
	Control group	60.65 ± 24.18	76.08± 14.92	**0.001**
VAS	Ultrasound Group	7.65 ±10.93	4.26 ± 2.19	**0.001**
	Control group	7.91 ± 1.44	5.34 ± 2.28	**0.001**
NHP pain	Ultrasound Group	60.12 ± 23.93	35.33 ± 30.41	**0.001**
	Control group	53.35 ± 26.60	44.07 ± 24.41	0.125
NHP sleep	Ultrasound Group	55.65 ± 33.14	38.69 ± 27.68	**0.010**
	Control group	67.82 ± 19.90	58.69 ± 17.40	0.065

*P values based on paired sample t test

external rotation measurements and VAS were significantly improved (p=0.001, p=0.001, p=0.025, p=0.001, p=0.002, p=0.001 respectively).

The differences within the groups are shown in Table 4. There was no statistically significant difference within the groups.

DISCUSSION

Ultrasound has been used as a therapeutic agent for decades to reduce pain and related disability, but there are limited data available to support the usage of US in the treatment of musculoskeletal disorders (12). Although physicians and therapists remain convinced that US is useful for the treatment of some musculoskeletal pain, the results of researches are surprisingly inconclusive (31). In everyday clinical practice the application of US is often combined with other physiotherapeutic interventions, usually with exercise therapy.

In our study we included patients with soft tissue shoulder disorders who have persisting pain and limited ROM. Post treatment measurements of pain and ROM were improved in both of the groups wit-

Tablo-IV
Comparisons of the differences between pre and post treatment data within the groups

	Ultrasound Group mean±sd	Control group mean±sd	P
Flexion (°)	23.47 ± 25.01	27.82 ± 15.94	0.981
Extension (°)	-7.72 ± 29.86	-6.08 ± 31.69	0.986
Abduction (°)	31.08 ± 31.36	45.13 ± 47.50	0.955
Adduction (°)	4.54 ± 8.00	4.34 ± 8.70	0.798
Internal rotation (°)	10.00 ± 14.22	13.47 ± 13.68	0.156
External rotation (°)	15.43 ± 16.98	17.04 ± 22.86	0.777
VAS	-3.39 ± 2.48	-2.56 ± 1.77	0.134
NHP pain	-24.78 ± 23.30	-9.27± 27.91	0.072
NHP sleep	15.11 ± 26.26	9.13 ± 22.54	0.274

*P values based on Mann Whitney *U* test

hout significant difference within two treatment methods. Only the improvement in extension was not statistically significant in both of the groups. This may be related to unremarkable decrease in extension before treatment. Similarly, Downing and Weinstein studied with 20 patients, compared the effectiveness of continue US and sham US (32). They reported that US is of little effect when combined with ROM exercises. Van der Heijden et al also conducted a randomized placebo controlled study (2). They concluded that neither electrotherapy nor US were proven to be effective for soft tissue shoulder disorders. Gürsel et al compared the efficacy of continue US and sham US, both of the groups had improvement in pain, ROM, HAQ and shoulder disability scores without statistical significance (18). They concluded that US brings no benefit when applied with other physical therapy interventions in the management of soft tissue disorders of the shoulder. Recently, Ainshwoth et al reported the results of a multicentre, double blinded, placebo controlled randomized trial, and found out that adding US to a package of physiotherapy had no additional benefit in the management of unilateral shoulder complaints (13). Nykanen also reported similar results (33). Sauers et al reported that there were only 2 studies which evaluated the effect of US interventions in patients with subacromial impingement syndrome. Pulsed US was used in one of the study (34) but the other report that was conducted by Berry et al failed to identify the type of US (35). So it is impossible to draw a meaningful conclusion regarding the effectiveness of US treatment.

Ultrasound has been found to be effective only in one study. Ebenbichler et al reported that US is effective in treating patients with calcific tendinitis of the shoulder. The patients treated with pulsed US had significantly larger improvements in their pain and decrease in calcium deposits relative to their sham controls at the end of 6-week treatment program (21).

In recent years, there has been a growing interest in the assessment QoL particularly in chronic disabling conditions. The measurement of QoL provides information about the influence of the condition on the patient's life. In our study, pain and sleep sub scores of NHP was improved in patients receiving US. The better results in UG may be related to longer duration of physiotherapy sessions, and placebo effect but the differences within the groups were not statistically significant. Our results suggest that US combined with local heat and exercise program has no additive effect on shoulder mobility, pain and Qol in patients with soft tissue shoulder disorders.

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