

The effect of Laser and taping on pain, functional status and quality of life in patients with fibromyalgia syndrome: A placebo-randomized controlled clinical trial

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Abstract.

BACKGROUND: Conservative treatments have been proved to be effective to control pain and optimize function in fibromyalgia, however there is need for scientific evidence to make better clinical application across various physiotherapy applications.

OBJECTIVE: The aim of this study was to investigate the effects of Laser and taping applications on pain, flexibility, anxiety, depression, functional status and quality of life in patients with fibromyalgia syndrome.

METHODS: Forty-five female patients with fibromyalgia syndrome were included to the study and randomly allocated into three treatment groups; Laser ($n = 15$), placebo Laser ($n = 15$), and taping applications ($n = 15$). Visual analogue scale for pain intensity, trunk flexibility, Fibromyalgia Impact Questionnaire for functional status, Short Form 36 Questionnaire for quality of life and health status, and Beck Depression Inventory for anxiety level were evaluated before and after three weeks interventions.

RESULTS: There were decreased pain severity in activity ($p = 0.028$), anxiety level ($p = 0.01$) and improved general health status, quality of life ($p = 0.01$) found at Laser group, whereas there were increased trunk flexibility, flexion ($p = 0.03$), extension ($p = 0.02$) found at taping group. After interventions, there were decreased pain severity for whole groups at night for Laser group ($p = 0.04$), placebo Laser group ($p = 0.001$), taping group ($p = 0.01$) and improved functional status found for Laser group ($p = 0.001$), placebo Laser group ($p = 0.001$), taping group ($p = 0.01$).

CONCLUSIONS: Kinesiotape application had a similar effect on parameters in FMS patient, so this method could be preferred instead of Laser application for rehabilitation program.

Keywords: Fibromyalgia, Laser therapy, quality of life

1. Introduction

Fibromyalgia Syndrome (FMS) is a painful syndrome characterized by idiopathic, chronic, non-arthritic and stretched points. It is a multi system dis-

ease characterized by sleep disorder, fatigue, headache, morning stiffness, paraesthesia and anxiety [1,2]. Fibromyalgia syndrome is more common between the ages of 30–55 and in women [3].

In a meta-analysis conducted regarding the approaches used in FMS treatment, the medication treatment combined with the proper conservative treatment was reported to be the most suitable approach [4]. Exercise and cognitive behavior treatments hold an important place in FMS together with the medication treatment [5].

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Physiotherapy approaches like stretching and strengthening exercises, massage, manipulation, mobilization, heat, ice, hydrotherapy, ultrasound, electric stimulation, TENS (Transcutaneous Electrical Nerve Stimulation), EMG (Electromyography) biofeedback, Laser (Light Amplification by Stimulated Emission of Radiation), mechanical pressure, radiation energy and electromagnetic energy are used in FMS treatment to reduce the pain and to resolve the muscle spasms [6–9].

The Laser application, which is one of the physiotherapy agents, is used in reduction of pain, muscle spasm and morning stiffness as effective method, however studies regarding the matter are limited. The low level Laser treatment has therapeutic effects in FMS and rheumatoid arthritis, wound healing and during the healing period following nerve injury [10–14].

In FMS to provide postural awareness and to increase extensor tension taping may be applied. While this increase in the tension provides a natural healing, the soft tissues are oriented to a new position. By this means, the stress on the over loaded and stressed tissues may be reduced. The number of evidence based studies for the effects of taping application on the painful points and stressed regions in patients diagnosed with FMS is limited. In a study where the kinesiotape, which is one of the taping methods, is applied on the muscle, results indicating the application increased the bioelectrical activity of the muscle were obtained [15]. Besides, recently taping is included in the treatment programs for its effects like reducing pain, increasing muscle strength, providing a corrective effect and to stop tissue spasm [15,16].

The purpose of this study is to investigate the effects of different physiotherapy approaches, which include Laser and taping methods in FMS on pain severity, trunk flexibility, functional status, anxiety, depression and quality of life.

2. Methods

Forty-five female patients diagnosed with FMS according to American Rheumatology Society's criteria [17] by the same physician were enrolled İzmit Romanem Physiotherapy and Rehabilitation Centre in this study (Table 1). In addition to diagnostic criteria, being 18 years or older and having had continuous chronic pain for at least 6 months were the inclusion criteria. Individuals who have accompanying orthopedic, neurologic or systemic diseases, those with surgical history and with skin sensitivity were excluded from the study.

This research was found appropriate in terms of medical ethics by the University's Ethical Committee and the consents of the participants were taken by informing them about the study (01/05/2008) (LUT 08/69-37).

The severity of pain during rest, at night and during activity was evaluated in each treatment session for 3 weeks by using visual analog scale (VAS) [18].

Flexibility was measured by using two different tests [19]. In order to determine the body flexion flexibility, the individuals were requested to lean forward and to stretch their hand finger tips to the ground without bending their knees while standing on a step. The researcher measured the distance between the middle finger and the ground with a measuring tape and recorded. For the body hyperextension measurement, the distance between the sternal notch and the wall was measured while the individuals were in upright position towards the wall. Then, the body extension was requested. The distance between the sternal notch and the wall was measured with a measuring tape and recorded [19]. The tests were repeated for three times and the arithmetic means of the results were calculated.

In order to assess the fibromyalgia impact, the Turkish version of Fibromyalgia Impact Questionnaire (FIQ) was used [20]. In Fibromyalgia Impact Questionnaire, primarily the individual's activities which were blocked were questioned and afterwards the parameters of the individual like the working potential, sleep, psychological state, morning stiffness were assessed by using VAS. Besides, in order to determine the general health status and to assess the quality of life regarding health Short Form 36 (SF-36) was used [21]. This form consists of 8 parameters containing the physical function, physical role, physical pain, general health, vital functions, social functions, emotional role and cognitive health. In addition, Beck Depression Inventory was used for measuring the depression status [22].

3. Procedure

The individuals were classified in 3 study groups randomly. All groups were administered 15 sessions of treatment 5 days a week for 3 weeks. The patients in the first group (Laser group; $n = 15$) were administered Laser and exercise program, the patients in the 2nd group (Placebo Laser group; $n = 15$) were administered placebo Laser and exercise program; and the patients in the 3rd group (Taping group; $n = 15$)

Table 1
Demographic information of the study groups

	Laser group ($n = 15$) X \pm SD (min-max)	Placebo Laser group ($n = 15$) X \pm SD (min-max)	Taping group ($n = 15$) X \pm SD (min-max)
Age (years)	36.4 \pm 8.3 (26–52)	38 \pm 8.4 (25–55)	38 \pm 9.9 (25–54)
Weight (kg)	75.3 \pm 7.7 (62–86.4)	73.5 \pm 4.8 (64–81)	73.8 \pm 9.1 (60.8–88)
Height (cm)	167 \pm 9.1 (147–180)	165.6 \pm 8.3 (149–181)	170.2 \pm 11.03 (153–185)
Body Mass Index (BMI, kg/m ²)	27 \pm 6.4 (18.3–36.6)	26.8 \pm 4.7 (19.2–33.2)	25.5 \pm 4.1 (18.4–35.5)

were administered kinesiotaping and an exercise program. During the study co-interventions such as having painkillers were monitored based on verbal declaration throughout to clinic visits. In such case it was planned to exclude from follow-up the subjects who apply for medication. Eventually, there was no subjects were prescribed for medication throughout the study. All the exercises within the exercise program are chosen from the exercises commonly used in the clinic and which are easy to perform by the patient. The scapular adduction, shoulder elevation, rotating shoulders backwards, chin retraction, levator scapula stretching and pectoral muscle stretching exercises were recommended to be 3 sets daily by repeating each exercise for 10 times. The exercises were performed in the clinic under the supervision of the same physiotherapist for 5 days a week and once a day. For 2 days in the weekend and the other two daily repetitions during the weekdays will be performed by the patient at home.

The Laser was applied for 3 minutes for each pre-determined painful points (17) on the back of the individuals in prone position by using a Low-Level Laser device (Ga-AS Laser, 100–240 v, 50–60 hz 75 VA, Chattanooga Group) and head (40 mw, wave length: 850 nm). The energy density for radiant exposure at each point was set approximately 2J/cm² (23). In order to monitor the placebo impact, for the individuals in the placebo Laser study group, the application was performed using the Laser head without giving energy and according to the procedure containing the positioning and period mentioned above. For taping, kinesiotape technique was applied to thoracic and cervical paravertebral muscles, levator scapula and the upper part of the trapezius muscle with 0% tension using the muscle technique (Illustration 1–2) The band was applied for 3 weeks by replacing with a new for every 3–5 days depending on the status of the individual (sweating, skin structure, friction status) (Fig. 1).

For statistical analysis, 3 \times 2 (Group \times Time) analysis of variance (ANOVA) test was used to compare differences in 3 treatment groups during 2 test session (pre and post treatment). Greenhouse-Geisser correction was used to adjust degrees of freedom when



Fig. 1. Taping application.

sphericity assumption was violated. When interaction term was significant main effect were evaluated. The pre-treatment and post-treatment evaluations of the patients who were enrolled in the treatment program in both three groups were analysed using Student-t test. The statistical significance level was accepted to be $p < 0.05$.

4. Results

All subjects ($n = 45$) enrolled to separate treatment groups were successfully completed the study without any dropout during the follow-up. There was no statistically significant group by time interaction for all parameters tested ($p > 0.05$).

The pre-treatment and post-treatment pains of all groups during rest, activity and night were analyzed

Table 2
Differences in pre-treatment and post-treatment Pain severity for each group

	Laser group		Placebo Laser group		Taping group		P
	MD ± SD	p	MD ± SD	p	MD ± SD	p	
Rest	2.1 ± 3.24	0.65	1.7 ± 2.05	0.76	2.06 ± 2.53	0.56	0.64
Activity	3.63 ± 3.03	0.02*	3.26 ± 3.18	0.89	4.23 ± 2.32	0.98	0.89
Night	3.5 ± 4.06	0.04*	3.86 ± 2.37	< 0.001*	4.33 ± 3.03	< 0.001*	0.79

p indicates statistical significance in groupxtime interaction term. P indicates statistical significance in pre-post tests. *According to intergroup and intragroup statistical analysis results $p < 0.05$.

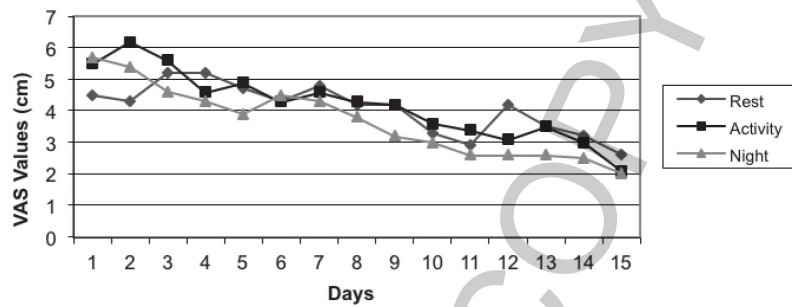


Fig. 2. 15-days change in the pain level of Laser group.

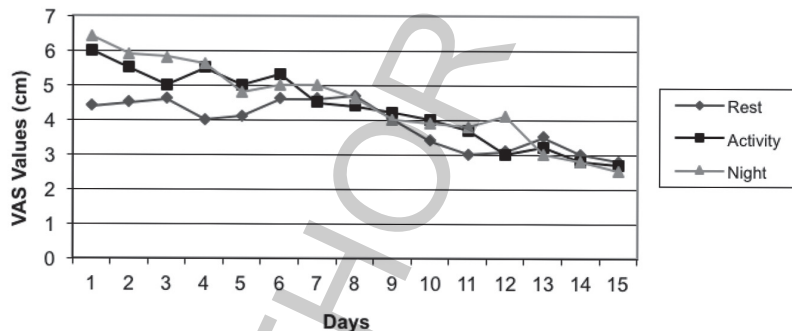


Fig. 3. 15-days change in the pain level of placebo Laser group.

according to VAS, there was statistically significant decrease in the night pain to post-treatment (Post-T) when compared pre-treatment on whole groups for Laser group ($p = 0.04$), for placebo Laser Group ($p = 0.001$), for taping group ($p = 0.001$) and (Pre-T) pain level during activity in Laser group ($p = 0.02$), (Table 2, Fig. 2). In analysis in other groups and in intergroup analysis no statistically significant differences were found ($p > 0.05$, Table 2, Fig. 3, Fig. 4).

After body flexion flexibility treatment, there had been a statistically significant increase in placebo Laser ($p < 0.001$) and taping ($p = 0.03$) groups. In body hyperextension flexibility, there had been a statistically significant increase only in taping group ($p = 0.02$), (Table 3).

When the pre-treatment and post-treatment values were compared in terms of Fibromyalgia Impact Ques-

tionnaire results, a statistically significant difference in all groups in favor of the post-treatment values in all groups ($p < 0.001$ Laser group), ($p < 0.001$ placebo Laser group), ($p = 0.01$; taping group), (Table 4).

When the pre-treatment and post-treatment SF-36 questionnaire results were evaluated, a statistically significant difference was found in favor of post-treatment in Laser group ($p = 0.01$), (Table 4).

When the pre-treatment and post-treatment test results of Beck Depression Scale were compared, a statistically significant difference was found in favor of post-treatment in the Laser group ($p = 0.01$) and in taping group ($p = 0.01$) (Table 4).

When the intra group change amounts were compared between the groups, no statistically significant difference were found between the groups in

Table 3
Differences in pre-treatment and post-treatment in flexibility testing for each group

	Laser group		Placebo Laser group		Taping group		P
	MD ± SD	p	MD ± SD	p	MD ± SD	p	
Flexion (cm)	6.8 ± 14.6	0.09	3.26 ± 2.52	< 0.001*	1.86 ± 3.13	0.03*	0.29
Extension (cm)	0.73 ± 3.19	0.03	1.4 ± 2.58	0.05	2.2 ± 3.42	0.02*	0.22

p indicates statistical significance in groupxtime interaction term. P indicates statistical significance in pre-post tests. *According to intergroup and intragroup statistical analysis results $p < 0.05$.

Table 4

Differences in pre-treatment and post-treatment of Fibromyalgia Impact Questionnaire, Short Form 36 Questionnaire and Beck Depression Inventory scores of all study groups

	Laser group		Placebo Laser group		Taping group		P
	MD ± SD	p	MD ± SD	p	MD ± SD	p	
FIQ	23.75 ± 14.42	< 0.001*	16.17 ± 13.42	< 0.001*	19.73 ± 18.74	0.01*	0.16
SF36	11.53 ± 15.89	0.01*	5.73 ± 13.4	0.12	6.73 ± 13.47	0.07	0.27
Beck	6.06 ± 5.61	0.01*	2.4 ± 5.2	0.11	3.93 ± 4.87	0.01*	0.64

p indicates statistical significance in group x time interaction term. P indicates statistical significance in pre-post tests. *According to intergroup and intragroup statistical analysis results $p < 0.05$.

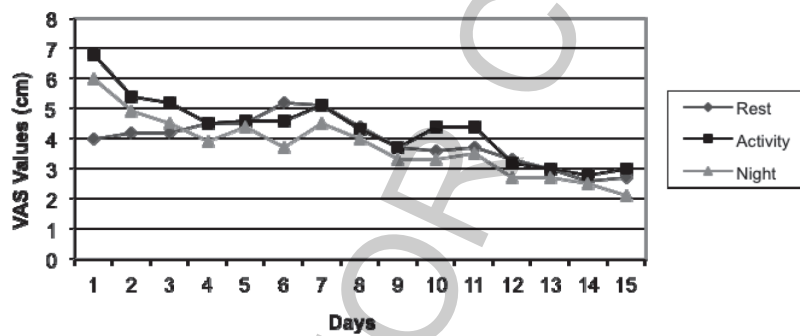


Fig. 4. 15-days change in the pain level of taping group.

Fibromyalgia Impact Questionnaire, SF-36 Questionnaire and Beck Depression Scale ($p > 0.05$) (Table 4).

5. Discussion

In this study where the impact of the Laser application and taping on pain, function and quality of life of the cases diagnosed with fibromyalgia all treatment groups were found to be effective on different parameters. While it is observed that the three-week Laser and taping in FMS improved the general health level, depression and anxiety and increase functionality similarly, the Laser application additionally led to decrease in pain level and increase in body flexion flexibility and the taping led to increase in body hyperextension flexibility. The decrease in the general health level in the fibromyalgia syndrome causes loss in working potential and work capacity. Therefore, in physiotherapy the target is to decrease the symptoms and increase the quality of life with the follow-up [24].

In this study, as a result of the all interventions on the painful points decrease in night pain and Laser application decrease depression level and increase in the quality of life and functionality levels were observed and in the group administered on the placebo a significant increase only in functionality level was observed. These results are of the quality to support the therapeutic impact of the Laser application and taping applied with exercise. There are many studies in the literature which show the efficiency of the Laser application in cases with fibromyalgia [25–27], and Matsunati et al. [28] indicated that the stretching exercises administered with the Laser treatment do not have any additional contribution compared to the exercise treatment. Nonetheless, in the follow-up of the treatment methods compared, the change amount in the cases with FMS in terms of functionality status, depression and quality of life was found similar and especially after the Laser application the pain level was statistically decreased and the quality of life was increased.

In upper extremity myofascial syndromes there is spasm in levator scapula and trapezoid muscles and loss of flexibility especially with postural disorder [29]. In our study, taping to levator scapula and upper trapezoid muscle contributed to the body flexibility in the follow up unlike the other applications. Taping is a non-invasive physiotherapy method of which the efficiency in musculoskeletal system is researched in the literature recently and which is commonly applied [16]. Gonzales-Iglesias et al. [30] found the taping applied to cervical region more efficient in reducing the pain and increasing the joint range of motion compared to the placebo application. They concluded that the taping is applied regularly with the stretching exercises was effective on stressed regions [30].

There are limitations has found in the current study. Firstly, all treatment groups have received exercise treatment that interfere the results. But, we standardized exercise regimen for all subjects to be able to report additional effects of Laser and taping applications. Also, the measurements applied at this study were selected from basic and common clinical tests such as flexibility testing to be able to improve reproducibility. Eventually, some of these tests have low reliability across session. Therefore, the flexibility results should be interpreting with caution. we believe that this study that investigates the efficiency of the Laser and taping from the physiotherapy modalities would provide a contribution to the literature in terms of showing the changes that may be obtained in the follow-up.

Findings of this study contribute to clinical reasoning in cases diagnosed with fibromyalgia. Laser and taping techniques are efficient methods, which may be preferred in FMS treatment to increase the functional level. When pain control is aimed as the target, the Laser application may be preferred which taping application may be applied to increase the body function. Future studies in which the long-term impact of different treatment programs administered in FMS treatment are necessary.

As a result, the Laser and taping may be used in the treatment of cases diagnosed for FMS in a reliable and effective manner, and that may take their place in the literature as treatment methods, which are well tolerated by the patients.

6. Conclusions

Taping had a similar effect on parameters in FMS patients so these methods could be preferred instead of Laser application for rehabilitation program.

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