



## Original Article

## Effects of Adding Segmental Traction Therapy to Routine Physiotherapy on Pain and Functional Ability of Patients with Acute Low Back Pain

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### ABSTRACT

**Background:** Low back pain (LBP) is one of the most common musculoskeletal complications of today's societies which, poses a big portion of health expenses and work absentees. Lumbar disc herniation is claimed to be one of the several causes of LBP. Conservative therapies like physiotherapy are found to be beneficial for treatment in such a kind of LBP. However, there is low evidence proving traction therapy can be effective. Therefore, the aim of this study was to evaluate effects of a 7-day physiotherapy protocol along with segmental traction therapy on pain and range of motion in patients with acute LBP

**Methods:** A total of 9 patients with acute LBP voluntarily participated in this study. They undertook a 7-day conventional physiotherapy along with segmental traction therapy. Pain, functional ability and lumbar flexion range of motion (ROM) were measured before and after the therapeutic intervention.

**Results:** A significant reduction in pain was observed after the intervention ( $P=0.006$ ). In addition, patients' functional ability increased significantly ( $P=0.03$ ). However, there were no significant changes in lumbar flexion ROM.

**Conclusion:** According to results of the present study segmental traction therapy along with a physiotherapy protocol consisting of TENS, Ultrasound and Hot pack reduces pain and improves functional ability in patient with acute LBP. Although no effect on lumbar ROM is expected.

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### Introduction

Low Back Pain (LBP) is a common musculoskeletal disorder in developed societies [1]. It is creating a big proportion of disabilities, work losses and economic burden on society [1, 2]. It is caused by several factors. Among them, Lumbar Disc Herniation (LDH) is the most common reason of acute, chronic and recurrent LBP [2]. Various conservative treatments are recommended for managing LDH in which physiotherapy plays a major role in reducing the induced pain and disability.

Lumbar traction is one of the recognized physiotherapy modalities for managing LDH [3]. Traction is applied in a variety of forms, including general and inverse traction, and decompression units [2-4]. A commonly accepted mechanism for its therapeutic effect is that traction opens the inter-vertebral foramen (IVF). Consequently, it leads to the reduction of protruded disc into its original location in addition to decreasing nerve root compression [5]. Nevertheless, there is still lack of consensus concerning its effectiveness. For example, Parasad et al. have demonstrated that 6 weeks of inverted traction therapy decreased the pain and disability of patients with LBP [6]. Similarly, Kemanli et al. reported that 15 sessions of general traction therapy reduced the pain while increases lumbar Range of Motion (ROM)

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in patients suffering from LDH [2]. On the contrary, Beurskens et al. did not find any significant effect of a 12-session general traction therapy in patients with LBP [7]. Cai et al. year have examined effects of adding general traction therapy to routine physiotherapy on pain and disability of patients with LBP. They did not report a clear answer to their research question as their participants revealed various and noncontagious results [1]. Nevertheless, lots of physiotherapist around the world use mechanical traction as their treatment protocol for patients with LBP [3, 8].

The possible explanation for such discrepancies among the results of previous studies may be explained by imperfection results of general traction as it increases the stress on annulus fibrosus, if its load passes a certain threshold and thus, patients' pain and disability increase secondarily. In contrast, segmental traction can concentrate the force on the target segment [5, 9] and therefore, we hypothesized that it leads to reveal positive results in fewer therapeutic sessions compared to previous studies in which general traction was used commonly for 12 to 15 sessions [2, 10]. Therefore the aim of this study was to evaluate effects of adding segmental traction therapy to the routine physiotherapy on pain intensity, functional ability and lumbar flexion ROM in patients suffering from acute low back pain. We hypothesized that patients' pain would decrease and their functional ability and lumbar flexion ROM would increase after application of a 7-session segmental traction and routine physiotherapy protocol.

## Methods

A group of 9 patients suffering from acute LBP with radiculopathy and the pain intensity of minimum 3 on Visual Analog Scale (VAS), participated in this study voluntarily. Patients were excluded if they had any history of spinal deformity, fracture, laminectomy within the past year or any spinal inflammatory diseases [2]. Acute LBP was defined as suffering from back pain within last 4 weeks [11]. All participants were given a complete description of aims and procedures prior to the study. Then, volunteers signed their informed consents and participated in the study. This research was approved by The Board of Ethics, University of Social Welfare and Rehabilitation Sciences.

Participants' were asked to mark their pain intensity on VAS ruler and name 3 to 5 functional activities negatively

affected by their LBP. Then, they gave a number from zero to ten to each affected activity (zero for absolute disability, and 10 for pure functionality). The sum of given numbers was recognized as patients' functional scale (PFS) [12]. Schober test was performed to assess lumbar flexion ROM [13, 14].

The intervention procedure was divided into two parts including routine physiotherapy and segmental traction therapy. Each patient undertook 7 routine physiotherapy sessions consisting 10 minutes of hot pack, 15 minutes of TENS (75  $\mu$ sec, 85 Hz) and 8 minutes of continuous ultrasound (1 MHz, 1.5 W/cm<sup>2</sup>) over the lumbar paravertebral areas. As for segmental traction therapy, SpineMed Decompression System, S200BC was used. Participants were fastened to the traction table using two belts; one was placed just below the rib cage and the other one on the iliac crest. In order to transform the traction force directly to the involved segment, the adjustable part of the traction table was tilted automatically based on patients' weight and segmental level of the lumbar spine which was involved. The traction force was measured as follows:

$$T_F = \frac{B_W}{4} - 4.53 \quad (1)$$

Where  $T_F$  denotes Traction force in Kgf,  $B_W$  presents Body weight in Kgf. Patients' feedbacks guide the therapist to add or remove up to 2.5 Kg of extra load at each session. The traction therapy lasted for 30 minutes at each therapy period. Lumbar ROM, VAS and PFS were measured before and after the 7-sessions of therapeutic procedures.

## Statistical Analysis

SPSS V20 on MS Windows was used for data analysis. Effects of the intervention protocol were examined using paired t-test. The level of significance was set at  $P < 0.05$ .

## Results

Participants' demographic data are demonstrated in Table 1.

Paired t-test showed a significant reduction in pain while a significant increase in patients' PFS after the intervention protocol was seen. However, no significant change was observed for lumbar ROM. Mean and standard deviations of measured variables were demonstrated in Table 2.

**Table 1:** mean and standard deviations of participants' demographic data

Age (yrs.)	Height (cm)	Weight (kg)	BMI (kg/m <sup>2</sup> )
38.11±9.98	166.55±5.87	71.00±13.26	25.77.19±3.99

BMI: Body mass Index

**Table 2:** Mean and standard deviation of evaluated variables before and after the therapeutic protocol

Variable	Before	After	P value
Pain	7.78±0.97	5.00±2.00	0.006
PFS	4.37±2.57	6.58±2.27	0.03
Lumbar Flexion	18.44±1.33	19.89±2.16	0.14

## Discussion

Our results demonstrated that 7 sessions of adding segmental traction therapy to routine physiotherapy caused significant pain reduction in patients suffering from acute LBP. A significant increase in functional scale of patients was also shown. However, no difference was observed in lumbar ROM.

We found out that patients suffering from acute LBP had significantly lesser pain after 7 sessions of segmental traction therapy added to routine physiotherapy. It has been demonstrated that routine physiotherapy including TENS, hot pack and ultrasound plays an effective role in reducing pain [15]. TENS may reduce pain by suppressing the C fibers through the spinal cord [15, 16]. It has been claimed that ultrasound is an effective modality to decrease pain and inflammation [15]. Superficial heating would be also a considerable way of relieving pain [17]. Therefore, we credit some parts of the abovementioned results to 7 sessions of routine physiotherapy. But, we attribute the post treatment changes mainly to the segmental traction therapy for two reasons. Firstly, our participants suffered from leg pain in addition to LBP. We placed the TENS electrodes over their paravertebral areas, therefore it was expected to observe pain relief on patients' low back areas. However, our participants reported a decrement of leg pain in addition to pain reduction in their back areas. We attribute these findings to the application of the segmental traction as it opens the IVF and consequently reduces nerve compression [18]. Secondly, it was claimed that, segmental traction versus general traction decreases stresses on annulus fibrosus and ligaments [19]. Therefore, internal disc pressure is reduced and the protruded disc is returned to its original location, results in decrease pain and increase functional ability [5, 9, 20].

Kemanli et al and Chai et al. year have reported that 15 sessions of general traction therapy reduces pain in patients with low back pain. Our results showed that patients' pain reduced after 7 sessions of the traction therapy. This pain relief is accomplished in half of the therapeutic sessions of previous studies when using segmental traction therapy. On the contrary, Beurskens et al. [7] and schimmel et al. [21] did not observe any difference between the baseline and 12 sessions, and between the baseline and 20 sessions of traction therapy respectively. The discrepancy among results is because our participants suffered from acute low back pain while participants of the aforementioned studies were patients with chronic LBP.

Although, there are several reasons reported as causes of chronic LBP, LDH is recognized as the main cause of acute LBP. Therefore, traction therapy is more beneficial in patients with acute LBP compared to those ones suffering from chronic LBP. Based on our findings, we recommend using segmental traction in patients with LDH as it seems that therapists achieve their therapeutic goals in fewer sessions compared to general traction.

We observed an increase in PFS of the participants after the therapeutic sessions. Unlu et al. reported a significant

decrease in patients' disability following 15 sessions of general traction therapy [10]. Kemanli et al. also observed significant improvements in disability scores after 15 sessions of general traction therapy in addition to routine physiotherapy [2]. We achieved same results in half of the aforementioned period using segmental traction therapy. Therefore, this result is another confirmation for our hypothesis that segmental traction therapy results in reducing therapeutic sessions in comparison with general traction, which leded in pain reduction in 15 sessions in previous studies [2, 10].

We did not observe any significant difference between the lumbar ROM at the baseline and after 7 sessions of therapeutic protocol using segmental traction therapy. Previous research studies showed improvements in lumbar ROM after 15 sessions of general traction therapy or general traction therapy in addition to routine physiotherapy. Our result was not in agreement with previous findings. It sounds like 7 sessions of segmental traction is not enough to improve ROM in patients with acute LBP. Another explanation for such a discrepancy is fear avoidance behavior which manifests reduced ROM even after the treatment. Thomas et al. have shown that fear avoidance behavior is negatively correlated with lumbar ROM in patients with LBP [22]. Therefore, the abovementioned theory, our result is expected.

## Conclusion

We conclude that adding segmental traction therapy to 7 sessions of routine physiotherapy is an effective treatment for pain reduction and functional ability increment in patients with acute LBP. This approach results much faster pain relief than traditional general traction therapy. However, no effect on lumbar ROM is observed in 7 sessions of therapy.

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**Conflict of Interest:** None declared.

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