RESEARCH ARTICLE

Effect of lumbar traction on discogenic low back pain using variable forces

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Abstract

Objective: To determine the effect of variable traction forces on discogenic low back pain.

Method: The experimental study was conducted at the Department of Physical Medicine and Rehabilitation at the Combined Military Hospital, Okara, Pakistan, from July to December 2018, and comprised patients of low back pain who were randomised into group 1 treated with high-force lumbar traction, hot pack and lumbar stabilisation exercises, and group 2 treated with low-force lumbar traction, hot pack and lumbar stabilisation exercises. There were a 3 sessions per week for 3 weeks for a total of 9 sessions. Modified Oswestry disability index and visual analogue scale were used to measure outcomes. Data was analysed using SPSS 20.

Result: Of the 30 patients, there were 15(50%) in each of the two groups. There were 18(60%) females and 12(40%) males, with an overall mean age of 30±5.5 years. Also 18(60%) subjects were obese on the basis of body mass index.There was significant improvement in pain in both groups ($p<0.05$), while disability scores in group 1 showed more improvement compared to group 2 ($p<0.05$). Young age was significantly associated with better results ($p<0.05$).

Conclusion: Use of variable force lumbar traction improved pain in discogenic low back pain, while high-force lumbar traction also reduced functional disability.

Keywords: Low back pain, Traction, Disability, Exercise, Randomised clinical trial. (JPMA 72: 483; 2022)

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Introduction

Low back pain (LBP) is one of the most widespread disorders in society, with 80% people having back pain at some point in their lifespan.[1] Back pain is a multifactorial disorder, and in roughly 45% of the patients, it is disc-mediated in origin.[2] It affects 40.6% of elderly people in Pakistan.[3] Discogenic LBP (DLBP) is non-radicular and appears without signs of neural strain, instability and spinal malformation.[4] Degenerative changes initiate inflammatory repair mechanisms which sensitise nociceptors in the disc and lead to DLBP. In combination, mechanical and neural elements add to DLBP.[2,5] Risk factors for DLBP are obesity, smoking, frequent weight-lifting, psychological distress and postural stress.[6] LBP negatively affects the performance of tasks in daily life, in employment days and output.[7] LBP influences the quality of life (QOL), causes insomnia and functional disabilities.[8,9]

In clinical practice, in addition to the pharmacological option, multiple non-pharmacological options are available, including paraspinal strengthening and stretching exercises, manipulation, lumbar traction, epidural injection and electrotherapy.[10] DLBP may react positively to traction therapy. Lumbar traction (LT) can cause the distraction of facet joints and vertebral bodies, widening of inter-vertebral foramen and straightening and stretching of spinal curvature and spinal muscles respectively. LT can be applied in intermittent or sustained mode. Intermittent LT includes a mechanical device with traction applied and withdrawn alternatively every few seconds.[11]

Some studies have shown that high-force LT (HFLT) was more effective compared to low-force LT (LFLT) in LBP management.[12] In contrast, some studies showed no significant difference between the two different forces in LBP with or without sciatica.[13]

A lot of studies have been conducted on LBP in Pakistan,[9,14,15] but limited work has been done on LT. The current study was planned to see LT effect on DLBP using variable forces.

Patients and Methods

The experimental study was conducted at the Department of Physical Medicine and Rehabilitation at the Combined Military Hospital, Okara, Pakistan, from July to December 2018. After approval from the institutional ethics review committee, the sample size was calculated using 95% confidence level and 5% confidence interval on basis of a previous study.[16] The sample was raised using non-purposive consecutive sampling technique. Those included were LBP of either gender aged 25-50 years having history of non-traumatic pain at lumbar region for >6 weeks who had never been treated with LT. Patients with history of lumbar surgery, recent epidural injection for LBP <2 weeks, those who had rheumatoid arthritis, tumour, previous

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fracture in thoracic, pelvic, groin and lumbar regions, respiratory disorder, cardiovascular disorder, inguinal hernia, osteoporosis, local acute infection, spondylolysis, spondylolisthesis, pelvic pain, inflammatory disease, spondyloarthropathies and pregnancy were excluded. Data was collected after taking informed consent from all the patients.

Demographic characteristics were noted using a performa. Body mass index (BMI) was also calculated; those having BMI <18.5 kgm^2 were considered underweight, BMI in between 18.5-22.9 kgm^2 as normal weight, 23-24.9 kgm^2 as overweight, >25kgm^2 as obese.[17] The patients were randomised using the lottery method into group 1 treated with HFLT, hot pack and lumbar stabilisation exercises, and group 2 treated with LFLT, hot pack and lumbar stabilisation exercises. Both the groups underwent 3 sessions per week for 3 weeks for a total of 9 sessions which were conducted by trained and qualified physiotherapists. During each session patients in both groups were given 15 minutes of heat therapy with hydro collator pack in the lumbar region, followed by lumbar stabilisation exercises, and intermittent HFLT and LFLT depending upon the group.

A digital traction unit (Auto Trac 460) was used. LT was applied in supine position by two-canvas saddles; one at the region of the lower ribcage and the other at iliac crest. In group 1, traction force was approximately 44% of bodyweight (hold: 20 sec and rest: 5 sec) for 10 minute. In group 2, the traction force was 19% of bodyweight (hold: 20 sec and rest: 5 sec) for 10 minute. The force was increased by 1kg after every three sessions and the traction time was increased by 1 minute for each session so that in session 9 it amounted to 19 minutes.

Pain was measured using the visual analogue scale (VAS)[18] and the Modified Oswestry Disability Index (m-ODI) questionnaire[19] was filled up under supervision by the patients at baseline and at the end of session 9. Data was analysed using SPSS 20. Paired and independent t tests were used as appropriate. P<0.05 was considered significant.

Result

Of the 30 patients, there were 15(50%) in each of the two groups. There were 18(60%) females and 12(40%) males, with an overall mean age of 30±5.5 years. Of the total, 18(60%) patients were obese(Table 1).

Intra-group comparison showed no significant difference at baseline (p>0.05). With respect to m-ODI score, group 1 showed significant improvement compared to group 2 (Table 2). Also, there was significant improvement in both pain and disability in both the groups (Table 3).

Young age was significantly associated with better results (p<0.05) (Table 4).Pain and disability values for those having normal weights showed significantly more improvement as compared to overweight and obese subjects.(Table 4).

Discussion

The current study showed that LBP prevalence was higher among the females and this was consistent with a systematic review.[16] Previous studies had demonstrated association between obesity and LBP.[20,21] The current

Table-1: Descriptive statistics of patients with low back pain.

Variables	Frequency distribution		
	n=30	High force traction n=15	Low force traction n=15
Age			
25-37 years	20(66.7%)	10(66.7%)	10(66.7%)
38-50years	10(33.3%)	5(33.3%)	5(33.3%)
Gender			
Male	12(40%)	5(33.3%)	7(46.7%)
Female	18(60%)	10(66.7%)	8(53.3%)
BMI			
Underweight	0(0%)	0(0%)	0(0%)
Normal weight	4(13.3%)	1(6.6%)	3(20 %)
Over weight	8(26.6%)	5(33.3%)	3(20%)
Obese	18(60%)	9(60%)	9(60%)

BMI: Body mass index.

Table-2: Pain and disability score of patients in the two study groups.

	Pain assessment on VAS				Disability assessment on Modified ODI			
	Initial mean score	Final mean score	Mean difference	p-value	Initial mean score	Final mean score	Mean difference	p-value
High-force lumbar traction	3.00±00	2.67±0.49	0.33±0.49	0.01	3.53±0.63	3.20±0.56	0.33±0.49	0.01
Low-force lumbar traction	3.00±00	2.73±0.46	0.27±0.46	0.04	3.13±0.83	2.93±0.70	0.20±0.41	0.08

Table-3: VAS and Modified ODI scores of patients in the two study groups.

High force lumbar traction v/s Low force lumbar traction							
VASbefore		VASafter		ModifiedODIbefore		ModifiedODIafter	
Mean difference	p-value	Mean difference	p-value	Mean difference	p-value	Mean difference	p-value
0.20	0.23	0.00	0.04	0.40	0.15	0.27	0.01

VAS: Visual analogue scale, ODI: Oswestry disability index.

References are not in sequence

Table-4: Inter-group comparison of outcomes based on different age groups and body mass index (BMI) groups.

Variables	High force lumbar tractionLow force lumbar traction							
	VAS		Modified ODI		VAS		Modified ODI	
	*Mean difference	*p*-value	**Mean difference	*p*-value	*Mean difference	*p*-value	**Mean difference	*p*-value
Age								
25-37year	0.40±0.52	0.03	0.50±0.70	0.05	0.27±0.47	0.08	0.18±0.40	0.16
38-50year	0.45±0.20	0.37	0.40±0.55	0.17	0.25±0.50	0.39	0.25±0.50	0.39
BMI								
Normal	0.33±0.49	0.01	0.33±0.41	0.02	1.1±0.40	0.01	0.67±0.51	0.01
weight								
Overweight	0.27±0.46	0.04	0.40±0.52	0.03	0.5±0.51	0.05	0.5±0.54	0.07
Obese	0.33±0.50	0.08	0.11±0.33	0.32	0.44±0.24	0.40	0.11±0.33	0.32

VAS: Visual analogue scale, ODI: Oswestry disability index, BMI: Body mass index.; *Mean VAS difference =Mean difference of VAS between initial VAS score and Score at the end of study.;
**Mean Modified ODI difference =Mean difference of Modified ODI between initial Modified ODI score and score at the end of study.

results were consistent with such findings.

The age group with the highest prevalence in the current study was 25-37 years, while a previous study reported it to be 21-40 years.[22] Another study, however, showed the most affected to be aged 56-64 years.[23]

The finding that LT had positive effect on pain and disability for LBW patients and that the addition of hot pack further relieved pain and improved functional status was supported by a randomised control trial.[24] The intra-group results showed that HFLT was more effective in reducing disability compared to LFLT, because high force is required to separate the vertebras.[25]

Pain improvement occurred in both the groups, which is line with a study.[26] Another study conducted showed that most of the physiotherapists used traction at high force of 30-50% of the bodyweight to get beneficial effects which was consistent with the present study.[12] Another study's outcome measures showed that therapeutic traction and sham traction showed the same improvement for non-specific LBP as the cause of the pain was unknown.[27]

In the current study, lumbar stabilisation exercises were used along with traction in line with a study which showed that pain and disability improved with lumbar stabilisation exercises.[28]

In terms of limitations, the results of the current study cannot be generalised because of a small sample size and the lack of long-term follow-up. Further studies taking into consideration these limitations are recommended.

Conclusion

Use of variable force lumbar traction improved pain in DLBP, while HFLT also reduced the functional disability score.

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Conflict of interest: None.

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