Section: Miscellaneous

Original Research Article

COMPARISON OF ELASTIC BAND EXERCISES AND CONVENTIONAL EXERCISE FOR THE TREATMENT OF MECHANICAL LOW BACK PAIN

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Abstract

Introduction: Mechanical back pain is a common musculoskeletal condition that places a significant burden on healthcare systems and individuals worldwide. Due to its multifactorial nature, the etiology of this disease often involves a complex interaction of anatomical, biomechanical, and lifestyle variables. **Aims and Objectives:** To compare the effects of resistance band exercises and conventional exercises on hip abductors and adductors in people with mechanical low back pain. **Materials and Methods:** This pilot study compared the effectiveness of resistance band exercise with conventional exercise in 120 participants aged 18 to 35 years with subacute and chronic mechanical low back pain. Experimental group. The two outcome measures were the Numerical Pain Rating Scale and the modified Oswestry Back Pain Questionnaire. **Results:** Data shows the distribution of respondents by age and gender. There is a higher proportion of males and a predominance of the 18-22 age group. The modified Oswestry Disability Questionnaire and Numerical Pain Rating Scale (NPRS) for low back pain showed statistically significant improvements after the intervention. The effectiveness of the intervention is further demonstrated by comparing post-test results between Group A and Group B. **Conclusions:** Hip abductor and adductor strengthening combined with traditional exercises appears to be more effective in patients with mechanical low back pain. Reduces pain and disability compared to traditional exercise.

INTRODUCTION

Pain is an unpleasant emotional state that is felt by the mind but can be identified as occurring in any part of the body. Essentially, this is a subjective feeling. Pain is a defense mechanism designed to help the subject protect the injured body part from further damage (1). Low back pain (LBP) is a serious health problem, affecting two-thirds of adults at some point in their lives and between 12 and 44% at some point (2). According to an epidemiological survey (3), 30.1% had never experienced back pain, 46.3% had moderate back pain, and 23.6% had severe back pain. Low back pain (LBP) is a major health problem worldwide, recognized by the World Health Organization (WHO) as a leading cause of disability. Characterized by discomfort, muscle tension, or stiffness between the edges of the ribs and in the gluteal crease, LBP may or may not spread to the lower extremities. LBP places a significant burden on healthcare systems and individuals worldwide (4). Mechanical low back pain (MLBP) is a common cause of disability and workday loss in many countries (5), (6). It is also the leading cause of disability worldwide, as measured by the number of years lived with a disability. MLBP imposes significant economic and social burdens (7). Exercises that target spinal flexors and extensors in static, dynamic, strengthening, and stretching ways have been shown to be effective in reducing pain and improve disability (8). There are various methods for strengthening, such as using free weights or strengthening apparatus. However, because such devices take up a lot of room and are expensive, it is never possible to use them. However, using an elastic resistance band, as suggested by some research, can achieve the same results (9).

An elastic resistance band is a portable, affordable, and incredibly easy-to-use tool for strengthening

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modules. The benefit of an elastic resistance band is that the more the band is stretched, the more resistance is created. Additionally, the band's capacity to shrink back to its initial size makes it useful as a lower resistance when performing an eccentric muscle contraction. Abdominal spinal extensors and hip musculature (abductors and adductors) are well-known biomechanical components that play a significant role in stabilizing the trunk and shifting weights during walking. (10), (11). Aims and Objective: To compare the effectiveness of resistance band exercises with traditional hip abductor and adductor exercises in people with mechanical low back pain.

MATERIALS AND METHODS

Study Design: Experimental Type of Study
Sampling technique: Convenient Type of Sampling
Sample size: 120
Inclusion criteria:
• Both gender subjects
• Age ranges from18 to 35 years.
• Subacute and chronic mechanical back pain.
• Persistent back pain for 6 weeks.
• Pain score reported as 3 to 5 on NPRS.
• The pain is sited below the costal margin and above the gluteal crease.
Exclusion criteria:
• Red flag symptoms, history of any severe trauma, bladder and bowel abnormalities.
• Neurological deficits of the lower extremities.
• Joint dysfunction SI
• Systemic diseases such as RA and ankylosing spondylitis.
• Recent abdominal or back surgery, etc.
• Pregnancy or childbirth within 1 year.
Materials: 2 Thera bands & 1 couch

Figure 1: Thera bands

Procedure: 120 subjects were chosen based on inclusion and exclusion criteria, written informed consent was obtained. A comprehensive lumbar spine musculoskeletal examination was conducted prior to treatment initiation. The pre-treatment pain assessment and disability level were documented utilizing a numeric pain rating scale. (NPRS) and the Modified Oswestry Disability Index for Low Back Pain. The experimental group was supplemented with conventional exercises with the addition of hip abductor and adductor strengthening exercises utilizing elastic bands. The control group was solely administered standard exercises.

Figure 2: Couch

During the warm-up and cool-down phases, both exercise groups performed general free movements on the couch while remaining pain-free.
Group A (n=60): Individuals received Elastic Band exercises, which included Pelvic tilt, Bridge, Back Extension, Superman position **Group B (n=60):** control group
The exercises listed above were performed with a two-minute rest period between each set.
Outcome measures –
Numerical pain rating scale (NPRS): Respondents select a whole number (0–10) that most accurately represents the intensity of their pain on the NPRS, which is a segmented numeric version of the visual analog scale (VAS). A horizontal bar or line is the preferred format. The NPRS, like the VAS, is founded upon terms that delineate high and low levels of pain severity.
Modified Oswestry low back pain disability questionnaire: The Modified Oswestry Low Back Pain Disability Questionnaire is a critical instrument utilized to assess the permanent functional impairment of a patient. The examination is regarded as the "gold standard" of functional outcome tools for the low back.
It is possible to convert the Modified Oswestry Low Back Pain Disability Questionnaire's raw score to a percent value by doubling it. Each section is assigned a score between zero and five, with zero indicating "no disability" and five representing "the most severe disability imaginable." The sum of every point constitutes the overall score. The examination may be calculated as a percentage or a raw score, with a maximum value of 50. A greater score signifies a greater degree of disability as reported by the patient.
Interpretation of scores:
0% to 20%: Mild disability: The patient can perform most activities. Other than advice on seat height and exercise, no treatment is usually required.
21-40%: Moderate disability: Patients experience severe pain and difficulty sitting, standing, and standing. Traveling and social life may become more difficult and you may not be able to work. Self-care, sexual activity, and sleep are not significantly

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affected, and patients can usually be treated conservatively.

41%-60%: Severe disability: Pain remains a major problem for this group but affects daily activities. These patients require detailed examination.

61%-80% disability: Back pain disturbs all aspects of a patient's life. Positive intervention is needed.

81%-100% disability: These patients are bedridden or exaggerate their symptoms.

The study's results section offers a thorough analysis of the information gathered from contrasting the post-test results of two groups undergoing various exercise programs for mechanical low back pain. The purpose of the study was to assess the effectiveness of targeted exercises using resistance bands that specifically targeted the hip adductors and abductors. The Modified Oswestry Low Back Pain Disability Questionnaire and Numeric Pain Rating Scale (NPRS) pre- and post-intervention scores for both groups, as well as the respondents' ages and genders, are all included in the data analysis. To further illustrate the efficacy of the intervention, the section includes statistical analyses with t-values, mean, standard deviation, and significance.

RESULTS

Table 1: Age of the respondents (In years)

	Frequency	Percentage
18-22 Years	40	33.33%
23-27 Years	30	25.00%
28-30 Years	27	22.50%
31-35 Years	23	19.16%
Total	120	100%

The above table discusses the frequency and percentage of age of the respondents.

Table 2: Gender of the respondents

	Frequency	Percentage
Male	82	68.33%
Female	38	31.66%
Total	120	100%

The above table discusses the frequency and percentage of gender of the respondents.

Table 3: NPRS (Group A)

Group A		Mean	SD	t value	P value
N P R S	Pre test	5.22	0.73	34.060	<0.0002
	Post test	1.22	0.63		

The above table discusses the Numerical pain rating scale (NPRS) scores of Group A in Pre test & Post test values.

Table 4: Disability (Group A)

Group A		Mean	SD	t value	P value
Disability	Pre test	31.35	5.78	14.05	<0.0003
	Post test	13.99	3.59		

The above table discusses the Disability scores of Group A in Pre test & Post test values.

Table 3 and table 4 Shows, The mean, standard deviation, and p-value of group A, which were calculated to compare the values at baseline and six days after the intervention. Following the intervention, the NPRS and Modified Oswestry Low Back Pain Disability Questionnaire demonstrate a statistically significant improvement, as indicated by the mean values. It was determined that the NPRS and Modified Oswestry Low Back Pain Disability Questionnaire p-values were highly significant.

Table 5: NPRS (Group B)

Group B		Mean	SD	t value	P value
N P R S	Pre test	4.89	1.03	18.56	<0.0002
	Post test	2.31	0.63		

The above table discusses the Numerical pain rating scale (NPRS) scores of Group B in Pre test & Post test values.

Table 6: Disability (Group B)

Group B		Mean	SD	t value	P value
Disability	Pre test	31.55	4.88	11.38	<0.0004
	Post test	21.35	2.62		

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The above table discusses the Disability scores of Group B in Pre test & Post test values.

Tables 5 and table 6 shows, the mean, standard deviation, and p-value of group B were calculated to compare the values at baseline and six days after the intervention. Following the intervention, the NPRS and Modified Oswestry Low Back Pain Disability Questionnaire indicate a marginally positive trend, as indicated by the mean values. It was determined that the NPRS and Modified Oswestry Low Back Pain Disability Questionnaire p-values were highly significant.

Table 7: Post Test Values of Group A and Group B

Parameter	Post-Test Values				t' Test	Significance
	Group A		Group B			
	Mean	SD	Mean	SD		
N P R S	1.22	0.63	2.31	0.63	5.73	0.0002
Disability	13.99	3.59	21.35	2.62	9.14	0.0002

The above table shows the t-value, mean, standard deviation, and significance of the data obtained by comparing the post-test values of both groups. Analysis of group A post-test values using an independent t test revealed that they were significantly greater than those of group B.

DISCUSSION

The principal aim of this study was to examine the effects of resistance band-based targeted exercises that specifically targeted the hip abductors and adductors on individuals who were suffering from mechanical low back pain. The evaluation was carried out with the assistance of the Modified Oswestry Low Back Pain Questionnaire and the Numeric Pain Rating Scale (NPRS).

After conducting an analysis of the data, it was observed that there was a moderate discrepancy in the average change in pain levels and a slight variation in disability levels between the two groups that underwent separate exercise regimens. The primary objective of this investigation was to strengthen the hip abductors and adductors in patients experiencing low back pain by utilizing elastic bands; the study ultimately produced positive results.

The study determined that the post-test pain difference between the two groups was 1.09, indicating a significant decrease in pain subsequent to performing the recommended exercises. Significantly, the low levels of pain that were reported at the onset of the research offer a credible rationale for this result. At the outset, the participants in both groups reported mean pain scores of 5, which required a significant reduction of 50% in order to attain results that are clinically meaningful. After the implementation of the intervention, the participants in both groups recorded average pain scores in between 1-2, which suggests that the treatment was effective.

The initial hypothesis proposed that by enhancing the strength of the hip abductors and adductors with elastic bands, individuals suffering from low back pain would experience a decrease in both pain and disability. Prior biomechanical studies that demonstrated substantial reductions in low back pain via targeted hip muscle strengthening provided support for this hypothesis. The findings of the research validate the hypotheses by demonstrating a positive association between the suggested exercises and a decrease in both pain and disability among individuals suffering from low back pain. In general, the results of this study provide significant contributions to the understanding of the potential advantages that may be associated with the implementation of hip-specific exercises for the treatment of mechanical low back pain.

In subjects with non-specific low back pain, Karen D. Kendall et al. (12). Reported a reduction in pain and improvement in function following a lumbopelvic exercise program supplemented with hip strengthening exercises.

Moreover, Riya Rushabh Shah et al. (11). The effects of strengthening the hip poster lateral complex on a cohort of patients with chronic low back pain were examined, and it was reported that disability improved concurrently with a significant reduction in pain.

Rao, M. Sheshagiri, et al. (13). By strengthening the core muscles, floor exercises significantly reduced pain and improved function in cricketers with low back pain, according to the findings of their study.

A study done by Jaynesh Vandra (14) explains that, At one week of intervention, elastic resistance band exercises significantly improved pain reduction, core strength, and functional disability compared to core stabilization exercises, according to a study involving sixty physiotherapy students.

Tai chi, yoga, Pilates, and sling exercises demonstrated greater pain relief than conventional rehabilitation, according to another study done by Ying, et al. (15).

CONCLUSION

The findings of this study highlight the need for a paradigm change in the treatment of mechanical low back pain. Combining adductor and hip abductor strengthening exercises with traditional therapy approaches is a powerful and useful strategy that provides a multifaceted approach to pain and disability management. When considering the incorporation of these evidence-based practices into their clinical frameworks for improved outcomes in the management of mechanical low back pain, healthcare professionals and practitioners can gain significant insights from this study.

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REFERENCES

1. Wilde VE, Ford JJ, McMeeken JM. Indicators of Lumbar Zygapophyseal Joint Pain: Survey of an Expert Panel With the Delphi Technique. Phys Ther [Internet]. 2007 Oct 1;87(10):1348–61. Available from: https://academic.oup.com/ptj/article/87/10/1348/2742263
2. Janwantanakul P, Pensri P, Moolkay P, Jiamjarasrangsi W. Development of a risk score for low back pain in office workers - a cross-sectional study. BMC Musculoskelet Disord [Internet]. 2011 Dec 25;12(1):23. Available from: https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/1471-2474-12-23
3. Frymoyer JW, Pope MH, Clements JH, Wilder DG, MacPherson B, Ashikaga T. Risk factors in low-back pain. An epidemiological survey. J Bone Jt Surg [Internet]. 1983 Feb;65(2):213–8. Available from: http://journals.lww.com/00004623-198365020-00010
4. World health organisation. Low back pain. 2023; Available from: https://www.who.int/
5. Maniadakis N, Gray A. The economic burden of back pain in the UK. Pain [Internet]. 2000 Jan 1;84(1):95–103. Available from: https://journals.lww.com/00006396-200001010-00012
6. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis [Internet]. 2014 Jun;73(6):968–74. Available from: https://ard.bmj.com/lookup/doi/10.1136/annrheumdis-2013-204428
7. van Tulder MW, Koes BW, Bouter LM. A cost-of-illness study of back pain in The Netherlands. Pain [Internet]. 1995 Aug;62(2):233–40. Available from: https://journals.lww.com/00006396-199508000-00013
8. Facci LM, Nowotny JP, Tormem F, Trevisani VFM. Effects of transcutaneous electrical nerve stimulation (TENS) and interferential currents (IFC) in patients with nonspecific chronic low back pain: randomized clinical trial. Sao Paulo Med J [Internet]. 2011;129(4):206–16. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-31802011000400003&lng=en&tlng=en
9. Iversen VM, Vasseljen O, Mork PJ, Gismervik S, Bertheussen GF, Salvesen Ø, et al. Resistance band training or general exercise in multidisciplinary rehabilitation of low back pain? A randomized trial. Scand J Med Sci Sports [Internet]. 2018 Sep 24;28(9):2074–83. Available from: https://onlinelibrary.wiley.com/doi/10.1111/sms.13091
10. Uchida MC, Nishida MM, Sampaio RAC, Moritani T, Arai H. Thera-band® elastic band tension: reference values for physical activity. J Phys Ther Sci [Internet]. 2016;28(4):1266–71. Available from: https://www.jstage.jst.go.jp/article/jpts/28/4/28_jpts-2015-1041/_article
11. Shah RR, Dhrubaprasad BD, Alagappan TR. Efficacy of hip posterolateral complex strengthening on patients with chronic low back pain. MOJ Yoga Phys Ther. 2019;
12. Kendall KD, Emery CA, Wiley JP, Ferber R. The effect of the addition of hip strengthening exercises to a lumbopelvic exercise programme for the treatment of non-specific low back pain: A randomized controlled trial. J Sci Med Sport [Internet]. 2015 Nov;18(6):626–31. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1440244014000214X
13. Seshagirirao M, Susmitha KLVR, Sundari KS. A RANDOMISED CONTROLLED STUDY ON CORE STABILITY EXERCISE PROGRAMME USING SWISS BALL, THERABAND AND FLOOR EXERCISES IN CRICKETERS WITH LOW BACK PAIN. Int J Physiother [Internet]. 2015 Dec 14;2(6). Available from: https://ijphy.com/index.php/journal/article/view/154
14. Vandra J. COMPARISON OF CORE STABILIZATION EXERCISE AND ELASTIC RESISTANCE BAND EXERCISE FOR IMPROVING CORE MUSCLES STRENGTH TO REDUCE NON -SPECIFIC LOW BACK PAIN. Int Multidiscip [Internet]. 2020; Available from: https://www.researchgate.net/
15. Li Y, Yan L, Hou L, Zhang X, Zhao H, Yan C, et al. Exercise intervention for patients with chronic low back pain: a systematic review and network meta-analysis. Front Public Heal [Internet]. 2023 Nov 17;11. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1155225/full.

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