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# Physical Therapy & Exercise for Persistent Low Back Pain of Randomised Controlled trial Evaluating their effects on pain and Functional Status

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***Abstract***

***Objectives****: The objective of this research is to examine how different physical therapy techniques affect the functional status & pain levels of individuals suffering from non-specific LBP.*

***Methods****: Participants in this randomized-controlled study ranged in age from 34 to 62 years and had non-specific persistent LBP for over 12 weeks without neurological damage. The study lasted from February 2021 to August 2022 & comprised 66 females and 38 males. The mean age was 50.3±12.5 years. There was a physical treatment group with 55 patients & control group with 55 patients. Medical care & exercise were provided to both groups; the physical therapy group additionally received physiotherapy methods.*

***Results****: 110 patients followed up one year. Treatment resulted in a significant improvement (p<0.5) in the VAS, ODI, & ILBP in both groups when compared to values before treatment. Comparing the physical therapy group & control group, there were notable differences in the VAS, ODI, & ILBP scores at 3 months and 1year post-treatment (p<0.05).*

***Conclusion****: Physical therapy is one component of a multidisciplinary strategy that should be used to treat non-specific chronic low back pain in order to improve functional status & pain levels in the long run.*

***Keywords- Low Back Pain, Chronic Low Back Pain, Physical Therapy, Pain, Multidisciplinary***

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## INTRODUCTION

Chronic low back pain (CLBP) is not a monolithic illness, as many studies have proven; rather, it is complicated and influenced by a wide range of biological, social, & psychological factors [1]. When patients present with low back pain (LBP), healthcare providers use diagnostic triage to categorize them as having particular spinal pathologies, radicular syndromes, or non-specific LBP [2]. About 70% of western adults will experience LBP at some point in their life [3-4]. Low back pain is one of the top three most debilitating disorders in terms of years lived with disability [6-7], and it also places a heavy financial strain on society [3-5]. Many people experience severe pain and impairment during the acute phase of low back pain, which can continue up to six weeks. In cases of acute low back pain, the outlook is good. Seventy to eighty percent of afflicted individuals, regardless of treatment or lack thereof, report a resolution of symptoms within six weeks [5-8]. About 5% experience chronic or recurrent pain, which can cause impairment for an extended period of time and slow down the healing process even more [8]. Primary care physicians & physical therapists work together to treat many individuals suffering from acute low back pain [5]. Among the several interventions offered by physiotherapists to this population, exercise therapy is among the most popular [11–13]. Clinical recommendations for the treatment of primary care patients experiencing low back pain are consistent with this approach [14].

In order to help physiotherapists choose the best therapies for patients suffering with acute LBP, there are international clinical practice recommendations that are based on evidence [15–17]. But there is a lack of consistency between the advice in different

national guidelines & outcomes of systematic studies [15, 18–20]. You might think this is strange because any good evidence-based guideline should be founded on systematic reviews of randomized controlled trials (RCTs) since they give the highest quality evidence [21]. On the other hand, while formulating clinical guidelines, just two factors are taken into account: the effectiveness of therapies & their safety. Typically, when converting data into suggestions for clinical practice, additional factors including availability, cost, patient preferences, & practicality are also taken into account. Recommendations may differ for a variety of reasons, including a variety of populations (including those with acute, sub-acute, & chronic LBP) and various definitions of duration [15, 16, 18]. Acute pain is distinct from chronic pain [23], and we know that the effectiveness of interventions varies with the severity of the pain [19, 20, 22]. "Initially line care" for patients with acute LBP should consist of reassuring them, advising them to be active in everyday life, and, if needed, pain medication, according to the most consistent worldwide recommendations [14, 15]. When standard medical treatment fails to alleviate symptoms, additional therapies such as exercise therapy, spinal manipulative therapy, mobilization, & acupuncture may be considered [14, 15, 18]. When it comes to acute LBP, there is some debate over the best time, method, & intervention to apply [14, 15, 17, 24].

In order to effectively manage the discomfort associated with CLBP, exercise is essential. Exercise therapy, patient education, & recommendation to maintain an active lifestyle are all part of the non-invasive and non-pharmacological therapeutic options suggested by CLBP treatment recommendations [25]. One treatment for CLBP that has been supported by evidence is exercise therapy [26-28]. Exercise therapy is suggested by all of the CLBP recommendations [29–32], however there are some variances. Some of the possible advantages include a reduction in the risk of secondary health problems such cancer, cardiovascular disease, metabolic syndrome, bone and neurodegenerative diseases, & improvement in physical function, mood, sleep, stress tolerance, & cognitive function [33]. Importantly for CLBP patients, there is a large & increasing amount of research showing that exercise therapy over the long term can alleviate pain for patients with CLBP and many other chronic pain illnesses [34, 35]. The purpose of this research was to determine which physical treatment methods were most beneficial in alleviating pain & improving functional status in CLBP patients.

## LITERATURE REVIEW

Pouya Rabiei MSc et al. (2020) In order to alleviate CLBP, various tailored treatments have been implemented. Nevertheless, why they are better than programs that include groups of people is still unclear. For individuals suffering from CLBP, we contrasted a group exercise (GE) program with a personalized one that included pain neuroscience education (PNE) and motor control exercise (MCE). The 73 patients diagnosed with CLBP were divided into two groups: one that received GE treatment (n = 36), & another that received PNE plus MCE (n = 37). For eight weeks, patients received both GE and PNE plus MCE twice weekly. Assessments were taken at baseline and 8 weeks after the intervention to measure pain intensity (VAS), disability (Roland Morris Disability Questionnaire), fear-avoidance beliefs (Fear-Avoidance Beliefs Questionnaire), and self-efficacy (Pain Self-Efficacy Questionnaire). For statistical analysis, a mixed-model approach based on a 2 × 2 variance analysis (treatment group × time) was used. A considerable effect size ($P < 0.001$, partial eta squared [$\eta p2$] = 0.66 to 0.81) was observed following the intervention in both groups, indicating significant improvements in all outcome measures. In comparison to the GE group, the PNE with MCE group had more significant improvements, which had a modest impact on pain intensity ($P = 0.041$, $\eta p2 = 0.06$) & disability ($P = 0.021$, $\eta p2 = 0.07$). When comparing the two groups, we did not find any statistically significant differences in self-efficacy ($P > 0.05$), fear-avoidance beliefs when exercising, or when working. Although there were no significant changes in fear-avoidance attitudes and self-efficacy between the two groups in patients with CLBP, PNE & MCE appeared to be more effective than GE in reducing pain intensity & impairment. Additional research is needed to determine whether individualised treatments are better than group-based ones. [61]

Di Cui et al. (2023) One of the most common causes of disability-adjusted life years is LBP. The administration of musculoskeletal disorders could benefit greatly from digital exercise-based therapies, which would increase accessibility while decreasing financial strain. Nevertheless, unlike in-person physiotherapy, there is no conclusive proof of their efficacy in managing CLBP. Clinical results of patients with CLBP following digital intervention to evidence-based in-person physiotherapy will be compared in this randomized controlled study (RCT). The results show that both groups had high levels of patient satisfaction and adherence, but the digital group had a far lower rate of dropout (11/70, 15.7% vs. 24/70, 34.3% in the conventional group; $P = 0.019$). There are no differences between the groups in terms of change from baseline (median difference: −0.55, 95% CI: −2.42 to 5.81, $P = 0.412$) or program-end scores (−1.05, 95% CI: −4.14 to 6.37, $P = 0.671$), but both groups do see notable improvements in disability, the main endpoint. Additionally, when looking at secondary outcomes (including, impairment in productivity as a whole, anxiety, sadness, and pain), there are no discernible group differences. One possible way to alleviate the symptoms of CLBP is a digital intervention that can be accessed remotely. This randomized controlled trial shows that it may promote recovery at similar levels as evidence-based in-person physiotherapy. [62]

Saddam F. Kanaan et al. (2022) The purpose of this study is to examine the impact on treatment

outcomes of low back pain by incorporating an individualised, comprehensive education package based on evidence. A randomized, controlled clinical trial with a single-blind design. There were 54 volunteers with CLBP (average age 46.75 ± 11.11 years, 80% female) who were randomly assigned to either an intervention group (n = 27) or a control group (n = 27). In addition to the eight 45-minute regular physical therapy sessions that the control group received over the course of four weeks, the intervention group also received four one-hour education sessions pertaining to low back pain. Measured in the beginning, after the intervention, and again after three months. A number of measures were used to assess the results, including the Visual Analogue Scale for pain intensity, the LBP Knowledge Questionnaire for knowledge, the Back Pain Attitudes Questionnaire for attitude, the Oswestry Disability Index for disability, the Depression Anxiety Stress Scale (DASS-21) for mental health symptoms, and the Fear-Avoidance Beliefs Questionnaire for fear behavior. Physical therapy for low back pain might be more effective if it included thorough education for patients. [63]

Peng, Meng-Si, et al. (2022) Many doctors recommend water therapy to patients suffering from persistent LBP, but the evidence for its efficacy in the long run is scant. Objective For the purpose of determining if therapeutic aquatic exercise alleviates persistent LBP in the long run. Concept, Environment, & Subjects The trial's follow-up ended on March 17, 2020, after a three-month run from September 10, 2018, to March 12, 2019, in this randomized, single-blind clinical study. Participating in the study were 113 individuals who had long-term, persistent low back pain. Efforts to One group participated in physical therapy techniques, while the other participated in therapeutic aquatic exercise. Aquatic exercise was administered to the therapeutic aquatic exercise group, whereas transcutaneous electrical nerve stimulation & infrared ray thermal therapy were administered to the physical therapy modalities group. For three months, each intervention required sixty minutes of time twice weekly. Key Results and Evaluation Criteria A Roland-Morris Disability Questionnaire (RMQ) was used to quantify disability level; a score between 0 to 24 was considered significant, with higher values indicating a more severe disability. Pain severity, quality of life, anxiety, sadness, sleep, kinesiophobia, fear avoidance, intervention recommendation, and minimal clinically relevant difference in pain & function were all considered secondary outcomes. Analyses were conducted using the intention-to-treat and per-protocol methods. Final Product While 113 people took part, 59 were female (52.2% of the total; mean age, 31.0 [11.5] years). A total of 98 patients (86.7%) made it through the 12-month follow-up after being randomly assigned to either the physical therapy modalities group (n=57) or the therapeutic aquatic exercise group (n=56). The therapeutic aquatic exercise group demonstrated more disability alleviation compared to the physical therapy modalities group. At the 12-month follow-up point, the therapeutic aquatic exercise group had considerably more improvement than the physical therapy modalities group in terms of the number of participants who met the minimal clinically important difference in pain (at least a 2-point improvement on the numeric rating scale) & disability (at least a 5-point improvement on the Roland-Morris Disability Questionnaire) (26 [46.43%] vs 4 [7.02%]). Two people in the physical therapy modalities group (3.5%) and one person in the therapeutic aquatic exercise group (1.8%) had low back pain or other intervention-related problems. Conclusions Patients suffering from persistent low back pain reported longer-lasting relief from the therapeutic aquatic exercise program compared to physical treatment techniques, and this benefit persisted for up to twelve months. Clinicians may feel more comfortable include therapeutic aquatic exercise in the treatment plans of patients suffering from chronic low back pain in light of this finding, which suggests that patients would benefit more from active exercise than from passive relaxation techniques. [64]

Suh, Jee Hyun MD et al. (2019) A number of exercises have been suggested as potential remedies for persistent LBP. Nevertheless, no definitive workout has emerged as the best option thus far. It was for this reason that the researchers set out to evaluate the relative merits of two different types of exercise: walking & individualized graded lumbar stabilization exercise (IGLSE). Methods: For this study, 48 people suffering from chronic low back pain were randomly assigned to one of four groups. Following the screening process, individuals were assigned to one of four groups: those training for flexibility, those for stabilization exercise (SE), & those training for both stability and WE (SWE). Subjects did each activity for a duration of six weeks. The main result was the VAS for LBP at rest and during exercise. Secondary outcomes included the following: VAS measurements of radiating pain during rest & physical activity, medication usage frequency (number of times/day), Oswestry disability index, Beck depression inventory, particular posture endurance, & lumbar extensor muscle strength. All four groups showed a statistically significant reduction in LBP when exercising. The SE & WE groups both showed a marked increase in exercise frequency, but the SE group showed a marked increase in exercise duration. The groups that had WE or SWE showed considerable improvements in their endurance whether resting flat on their backs, sides, or heads. Results: Patients suffering from CLBP may find relief from their symptoms & reduction in the likelihood of future episodes by incorporating spinal exercise & weight training into their treatment plans. [65]

## PATIENTS AND METHODS

In the period from February 2021 to August 2022, 120 patients with CLBP were located through the

hospital's ……. The study comprised patients who had sustained CLBP for more than 12 weeks and did not have any neurological impairment. Patients were not included if they met the following criteria: they had to be 18 years old or younger, pregnant, have had surgery within the past year, have structural abnormalities, spinal cord compression, severe instability, osteoporosis, BMI greater than 30 kg/m2, severe metabolic or cardiovascular disease, or acute infection. This randomized controlling study comprised 114 patients (38 men and 66 women; mean age 52.3±12.5 years; range 34 to 62 years) who fulfilled the addition norms.

The clinical examination involved taking a thorough medical history in addition to measuring the patient's lumbar mobility, range of motion, & neurological status as well as palpating and inspecting the lumbar region. Just one doctor looked at each patient. The local Ethics Committee gave their approval to the study protocol. Every single patient has their written informed consent document signed. …….. gave a certificate of approval to the study. The number of physical therapists in Saudi Arabia is reported by the ……...

**Involvements**

A total of 55 patients participated in the physical therapy group, while another 55 served as controls. While the CG only received medical & exercise therapy, the PTG also received physical therapy modalities.

**Medicinal cure**

It was recommended to take 1.5 g of paracetamol daily, as needed.

**Exercise plan**

The front abdominal muscles (musculus obliquus externus, internus, rectus), deep abdominal muscles (musculus psoas major, minor, iliacus, quadratum lumbarum), & back muscles (musculi dorsi, erector spinae, transverso-spinales, inter-spinales, intertransversarii) were stimulated. The hamstrings, hip flexors, & lumbar extensors were all given specific stretching exercises to do. In order to help each patient recover, the physiotherapist prescribed an exercise regimen that they could do at home. Furthermore, each patient was provided with a detailed fitness schedule in writing. At least two exercises were performed daily, with each activity being repeated at least ten times, for three months as part of the fitness program.

**Orthopaedic therapy**

The physiotherapist worked on the waist area for a total of ten sessions, once daily, over the course of five weeks. There was TENS, ultrasound, and heat packs used during the sessions. We used a continuous form of ultrasonic therapy for five minutes at a density of 1.5 W/cm² & frequency of 1 MHz for twenty minutes of hot pack therapy. [36–37] Furthermore, the TENS treatment was administered in the following manner: continuously for 30 minutes at a strength of 100 Hz and 40 μSN.

**Criteria for evaluation**

Every patient was evaluated before therapy began as well as twice, thrice, and once a year following completion of treatment. Using a 10-point scale, from 0 (no pain) to 10 (extreme pain), the VAS assessed the intensity of the pain.[38] The Oswestry Disability Index was used to assess the functional state. ILBP, as well as the ……. Low Back Pain Disability Index [39–43]. [26] Each of the ten questions on the ODI can be scored on a scale from 0 to 5, and they include topics such as pain level, individual care, lifting, walking, sitting, standing, sleeping, social life, travel, & pain alteration. Scores can be expressed as a percentage after multiplying the total by two, with a maximum score of 55. A score of 0% shows no pain or functional handicap, while a score of 100% indicates significant pain & functional limitation, and the evaluation method is points/total score 55 × 100= %. Patients suffering from low back pain in ……. society were the subjects of the validity & reliability investigations.[40] Furthermore, the ILBP is a scale that may be used to measure the useful status of individuals with LBP. It consists of 18 items and can be used to get a total score between 0 and 90. Each question on the scale can be scored from 0 to 5. Research of its validity & reliability was conducted.[41]

**Determine the sample size**

Utilization of VAS data allowed for the determination of the sample size for this investigation. Sahin et al. [42] found that the mean VAS score in PTG was 7.16 with a standard deviation (SD) of 2.54, while the mean score in CG was 5.72.[42] An 80% power (beta: 0.2) was used to determine the sample size. For statistical purposes, a p-value of 0.05 was deemed significant. Thus, 55 patients were needed for each group. With a 10% dropout rate in mind, we set out to divide the patients evenly between the two groups, with 57 in each.

**Randomization**

After two investigators had gathered the patients' medical histories, they would fill out the relevant forms and put them in envelopes. After that, a computer-generated random number table was used to divide the patients' sealed envelopes into two equal groups, one for PTG and one for CG. At 2 weeks, 3 months, & 1year post-treatment, 55 patients from each group finished the trial.

**Statistical analysis**

The statistical analysis was carried out utilizing the widely-used PASW for Windows version 18.0

software developed by SPSS. In order to determine if continuous variables followed a normal distribution, the Shapiro-Wilk test was employed. Using the chi-square test, we looked for differences in the groups according to the categorical factors (i.e., sex, education level, and occupation). To examine statistically significant differences among the variables with atypical distributions, the Mann-Whitney U test was utilized. For normally distributed variables, the Student t-test was used to assess differences in continuous data across the groups. The repeated measures ANOVA was performed to evaluate the results from the parameters that have been evaluated many times in the intra-group analysis. The Bonferroni correction was used to perform an inter-group analysis. If the outcome of the variance analysis test was significant, a post-hoc test was conducted. The Bonferroni Student t-test was employed to identify the differences within the subgroups. Statistical significance was determined by a p-value less than 0.05.

## RESULTS

We followed 110 patients for a year. On average, PTG participants were 55.4±11.4 years old, while CG participants were 48.2±12.3 years old. When comparing the groups according to age, sex, education, occupation, BMI, no statistically significant differences were found (p>0.05). Table 1 displays the demographic details of the two categories. The VAS scores following therapy were considerably lower in both groups than their pre-therapy levels, and there were significant differences between the two sets of scores at three months post-therapy (p<0.05). At 2 weeks & 3 months of addition, ODI & ILBP scores shown a notable improvement when related to their baseline values (p<0.05) (Table 2).

**Table 1. Demographics of Patient**

| | Physiotherapy group (n=55) | | | Control group (n=55) | | | |
|---|---|---|---|---|---|---|---|
| | n | % | Mean±SD | n | % | Mean±SD | p |
| Age (years) | | | 55.4±11.4 | | | 48.2±12.3 | 0.08 |
| Sex | | | | | | | 0.83 |
| Male | 20 | 36.4 | | 22 | 40 | | |
| Female | 35 | 63.6 | | 33 | 60 | | |
| Education | | | | | | | 0.46 |
| Primary | 41 | 77.5 | | 38 | 69.0 | | |
| Secondary | 6 | 10.9 | | 9 | 16.3 | | |
| Higher secondary | 8 | 14.5 | | 8 | 14.5 | | |
| Occupation | | | | | | | |
| Housewife | 39 | 70.9 | | 32 | 58.2 | | 0.09 |
| Office Working | 10 | 18.2 | | 9 | 16.3 | | |
| Work from home | 6 | 10.9 | | 14 | 25.5 | | |
| Body mass index | | | 30.4±5.2 | | | 29.6±5.1 | 0.44 |

**Table 2. Evaluations of outcomes within and between groups**

| | Physiotherapy group (n=55) | Control group (n=55) | Inter-group | |
|---|---|---|---|---|
| | Mean±SD | Mean±SD | *p* | F |
| VAS baseline | 6.1±0.2 | 5.2±0.2 | | 7.071 |
| VAS 2nd week | 4.3±0.2* | 4.0±0.2* | 0.032 | |
| VAS 3rd month | 4.4±0.2* | 4.2±0.2* | 0.012 | |
| VAS 1st year | 4.7±0.3 | 5.0±0.2 | 0.007 | |
| ODI baseline | 50.6±1.0 | 45.2±1.3 | | 6.690 |
| ODI 2nd week | 43.6±1.6* | 33.3±2.3* | 0.021 | |
| ODI 3rd month | 43.7±1.7* | 33.8±2.1* | 0.011 | |
| ODI 1st year | 46.6±2.1 | 45.3±1.5 | 0.011 | |
| ILBP baseline | 30.7±1.8 | 24.0±2.0 | | 9.615 |
| ILBP 2nd week | 21.7±1.5* | 14.9±1.8* | 0.037 | |
| ILBP 3rd month | 22.6±1.7* | 16.8±1.6* | 0.019 | |
| ILBP 1st year | 25.3±2.0 | 22.0±1.9 | 0.002 | |

SD: Standard deviation; VAS: Visual Analog Scale; ODI: Oswestry Disability Index; ILBP: Istanbul Low Back Pain Disability Index; F: Test statistics (analysis of variance with repeated measurements); * p<0.05 according to baseline values in intra-group comparison

## DISCUSSION

Results showed that compared to exercise and medication alone, a combination of physical therapy, exercise, & medication for non-specific CLBP improved functional status and pain levels in this randomized controlled trial. Three months following treatment, this improvement persisted. After three months of treatment, these data demonstrate that pain & functional status are better improved with a combination of physiotherapy, medicinal therapy, and exercise. The primary objectives of CLBP treatment include alleviation of pain, enhancement of soft tissue flexibility (reduced spasm & tension), enhancement of trunk stabilizer strength & endurance, and improvement of mobility & posture. These goals are pursued to enhance functional capacity, enhance the ability to carry out daily activities, and prevent work loss. [43–44] Treatment for CLBP includes a wide range of approaches, including medication, spinal manipulation, exercise, physical therapy, and schooling. Research consistently shows that combining many types of expertise yields better results than relying on just one method. [45–46] Thus, our study included a multidisciplinary strategy that encompassed physical therapy, exercise, & medical treatment.

One major contributor to the onset of back pain is a lack of strength & endurance in the paraspinal muscles. Furthermore, compared to healthy individuals, those suffering from low back pain have weaker body muscles.[47] Lumbar discomfort is three times more likely in persons who have weaker muscles. For this reason, exercise is often recommended as a treatment for non-specific CLBP.[48] Its stated goal is the alleviation of pain & enhancement of functional status via better posture, stronger trunk muscles, and increased aerobic capacity.[49] Research conducted by Van Tulder et al. [50] indicated that exercise may hasten the improvement of daily life activities and the return

to work for those suffering from low back pain. Exercising helped people with CLBP significantly reduce pain & increase their functional level, according to a meta-analysis. This was in contrast to patients who received no treatment or other conservative treatments.[51] Research has also demonstrated that kinesophobia, anxiety, & pain coping difficulties are associated with inactivity, and that exercise therapy alleviates these symptoms.[52–53] But there is a lack of data on how different kinds of exercise (such as flexion, stretching, or strengthening) affect patients' results.[49–52] The pain reduction from exercise therapy for CLBP is only effective for up to six months, according to multiple studies.[54] The Back exercises that were included in our study included lumbar isometrics, lumbar flexion, & stretching exercises for the back and hamstrings. Medications, exercise therapy, and physiotherapy all contributed to a marked improvement in functional status & pain levels.

Additionally, we noted that this enhancement persisted for a duration of one year. Because we found that pain & functional status were adversely affected in the CLBP patients' research, we can say that the treatment successfully reduced pain & improved functional status.[55] The current study employed the VAS to measure the intensity of pain, & ODI & ILBP to assess the level of functional ability. At 3month & 1 year of follows, we discovered that physiotherapy significantly improved VAS, ODI, & ILBP scores more than medical and exercise therapy alone.

Physical therapy modalities are another approach that is utilized in the treatment of individuals with non-specific CLBP. They were also involved in this analysis. Cold therapy, heat packs, ultrasound, diathermy, & transcutaneous electrical nerve stimulation are all examples of treatments that permit temporary relief.[36] With the exception of minor skin irritation, these therapies are safe, simple, non-invasive, and rarely cause serious side effects. [56-57] A number of studies have demonstrated that PT is more beneficial than a placebo. [57- 58] TENS is a popular physical therapy tool. When compared to a placebo, transcutaneous electrical nerve stimulation (TENS) improved pain relief and joint mobility in one research.[49] As a control, placebo, & TENS group, Marchand et al. [59] split 48 individuals suffering from low back pain. The TENS group reported a 43% decrease in pain intensity.[59] Another study that compared the effects of hot and cold applications found that the former was more effective than a placebo in alleviating acute or subacute lumbar pain, while the latter helped with pain control during the acute phase as decreased muscle tension.[36]

There was no control group in our research. Physical therapy, in conjunction with medication & exercise, improved pain and functional status more than either modality alone. While our study did not assess the effectiveness of these treatment modalities in isolation, we did find that physical therapy had a beneficial impact when added to the other treatments. Efficacy of CLBP treatments is sometimes only assessed for a brief period of time, and there is often no control group included in these trials. Additionally, CLBP treatment groups might be rather diverse.[60] Our research comprised a control group in addition to two identical treatment groups. A year of follow-up was maintained. Maintaining pain control & functional improvements is crucial for the long-term success of CLBP treatment. The most reliable way to show that workouts work is via isokinetic measurements, however they can be somewhat subjective. One possible drawback of our study is that we didn't test isokinetic muscular strength. The extent to which medical and exercise treatments contribute to patients' progress is another restriction. The ideal control group for this study would consist of a group of patients who are monitored but not treated. Nonetheless, we treated the patients in our control group with medication & exercise since doing otherwise would be immoral.

## CONCLUSION

One of the most prevalent chronic pain syndromes globally is CLBP, which poses significant social, economic, & public health concerns. Many patients nowadays want a more comprehensive approach to their healthcare, one that incorporates exercise therapy as one component. Finally, methods for treating long-term health problems should ideally have an impact that lasts and lead to lasting improvement. Our research shown that the effects of the medication were able to last for at least a year following administration. Thus, it was determined that physiotherapy, medical therapy, & exercise were all more effective than exercise and medication alone in treating non-specific CLBP. Based on these findings, a multidisciplinary strategy incorporating physiotherapy is the best course of treatment for CLBP in order to achieve lasting improvement.

## DECLARATION OF CONFLICTING INTERESTS

Regarding this article's publishing and/or authorship, the writers have stated that they have no conflicts of interest.

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## REFERENCES

1. Abenhaim L, Rossignol M, Gobeille D, Bonvalot Y, Fines P, Scott S. The prognostic consequences in the making of the initial medical diagnosis of work-related back injuries. Spine. 1995;20:791–5

2. Aina A, May S, Clare H. The centralization phenomenon of spinal symptoms–a systematic review. Man Ther. 2004;9(3):134–43. https://doi.org/10.1016/j.math.2004.03.004. (PMID: 15245707).

3. 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. 2014;73(6):968.

4. McIntosh G, Hall H. Low back pain (acute). BMJ Clin Evid. 2011;2011:1102.

5. Olafsson G, Jonsson E, Fritzell P, Hägg O, Borgström F. A health economic lifetime treatment pathway model for low back pain in Sweden. J Med Econ. 2017:1–9.

6. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990- 2017: a systematic analysis for the Global Burden of Disease study 2017. Lancet. 2018;392(10159):1789–858 London.

7. Pengel LH, Herbert RD, Maher CG, Refshauge KM. Acute low back pain: systematic review of its prognosis. BMJ (Clinical research ed). 2003; 327(7410):323

8. Downie AS, Hancock MJ, Rzewuska M, Williams CM, Lin CW, Maher CG. Trajectories of acute low back pain: a latent class growth analysis. Pain. 2016;157(1):225–34.

9. SBU. Preventiva insatser vid akut smärta från rygg och nacke Stockholm: Statens beredning för medicinsk och social utvärdering (SBU) [The Swedish Agency for Health Technology Assessment and Assessment of Social Services]; 2016

10. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, Fu R, et al. Noninvasive treatments for low back pain. In: Comparative effectiveness review no. 169. (prepared by the Pacific northwest evidence-based practice center under contract no. 290-2012-00014-I.) AHRQ publication no. 16- EHC004- EF. Rockville: Agency for Healthcare Research and Quality; 2016.

11. Bernhardsson S, Oberg B, Johansson K, Nilsen P, Larsson ME. Clinical practice in line with evidence? A survey among primary care physiotherapists in western Sweden. J Eval Clin Pract. 2015;21(6):1169–77.

12. Nordeman L, Nilsson B, Moller M, Gunnarsson R. Early access to physical therapy treatment for subacute low back pain in primary health care: a prospective randomized clinical trial. Clin J Pain. 2006;22(6):505–11.

13. Keating JL, McKenzie JE, O'Connor DA, French S, Walker BF, Charity M, et al. Providing services for acute low-back pain: a survey of Australian physiotherapists. Man Ther. 2016;22(Supplement C):145–52.

14. Wong JJ, Cote P, Sutton DA, Randhawa K, Yu H, Varatharajan S, et al. Clinical practice guidelines for the noninvasive management of low back pain: a systematic review by the Ontario protocol for traffic Injury management (OPTIMa) collaboration. Eur J Pain (London, England). 2017;21(2):201–16.

15. Koes BW, van Tulder M, Lin CW, Macedo LG, McAuley J, Maher C. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. Eur Spine J. 2010;19(12):2075–94.

16. Ladeira CE. Evidence based practice guidelines for management of low back pain: physical therapy implications. Rev Bras Fis. 2011;15(3):190–9.

17. Chou R, Hoffman LH. Guideline for the evaluation and management of low back pain - evidence review. Glenview: American Pain Society; 2017.

18. Delitto A, George SZ, Van Dillen LR, Whitman JM, Sowa G, Shekelle P, et al. Low back pain. J Orthop Sports Phys Ther. 2012;42(4):A1–57.

19. Macedo LG, Saragiotto BT, Yamato TP, Costa LO, Menezes Costa LC, Ostelo RW, et al. Motor control exercise for acute non-specific low back pain. Cochrane Database Syst Rev. 2016;2:Cd012085.

20. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Nonpharmacologic therapies for low back pain: a systematic review for an American College of Physicians Clinical Practice Guideline. Ann Intern Med. 2017;166(7):493–505.

21. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ (Clinical Research Ed). 1996;312(7023):71–2.

22. Hidalgo B, Detrembleur C, Hall T, Mahaudens P, Nielens H. The efficacy of manual therapy and exercise for different stages of non-specific low back pain: an update of systematic reviews. J Man Manip Ther. 2014;22(2):59–74.

23. Nijs J, Van Houdenhove B. From acute musculoskeletal pain to chronic widespread pain and fibromyalgia: application of pain neurophysiology in manual therapy practice. Man Ther. 2009;14(1):3–12.

24. Wenger HC, Cifu AS. Treatment of low back pain. Jama. 2017;318(8):743–4.

25. O'Connell NE, Cook CE, Wand BM, Ward SP. Clinical guidelines for low back pain: A critical review of consensus and inconsistencies across three major guidelines. Best practice & research Clinical rheumatology 2016; 30(6): 968-80.

26. Hayden JA, van Tulder MW, Malmivaara AV, Koes BW. Meta-analysis: exercise therapy for nonspecific low back pain. Annals of internal medicine 2005; 142(9): 765-75

27. Hayden JA, van Tulder MW, Tomlinson G. Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain. Annals of internal medicine 2005; 142(9): 776-85.

28. van Middelkoop M, Rubinstein SM, Verhagen AP, Ostelo RW, Koes BW, van Tulder MW. Exercise therapy for chronic nonspecific low-back pain. Best Pract Res Clin Rheumatol 2010; 24(2): 193-204.

29. Bekkering GE, Hendriks E, Koes B, et al. Dutch Physiotherapy Guidelines for Low Back Pain; 2003.

30. Wong JJ, Cote P, Sutton DA, et al. Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration. European journal of pain (London, England) 2016.

31. Qaseem A, Wilt TJ, McLean RM, Forciea MA. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Annals of internal medicine 2017; 166(7): 514-30

32. National Institute for Health and Care Excellence. NICE guidelines: Low back pain and sciatica in over 16s: assessment and management. 2016; 2016.

33. Pedersen BK, Saltin B. Exercise as medicine: evidence for prescribing exercise as therapy in 26 different chronic diseases. Scandinavian Journal of Medicine and Science in Sports 2015; 25(Suppl 3): 1-72.

34. Hayden J, Van Tulder MW, Malmivaara A, Koes BW. Exercise therapy for treatment of non-specific low back pain. Cochrane Database of Systematic Reviews 2005; (3).

35. van Middelkoop M, Rubinstein SM, Verhagen AP, Ostelo RW, Koes BW, van Tulder MW. Exercise therapy for chronic nonspecific low-back pain. Best Practice & Research Clinical Rheumatology 2010; 24(2): 193-204

36. Shahbandar L, Press J. Diagnosis and Nonoperative Management of Lumbar Disk Herniation Oper Tech Sports Med 2005;13:114-21.

37. Jordan J, Konstantinou K, Morgan TS, Weinstein J. Herniated lumbar disc. Clin Evid 2005;14:1-4.

38. Strong J, Ashton R, Chant D. Pain intensity measurement in chronic low back pain. Clin J Pain 1991;7:209-18.

39. Fairbank JC, Couper J, Davies JB, O'Brien JP. The Oswestry low back pain disability questionnaire. Physiotherapy 1980;66:271-3.

40. Fritz JM, Irrgang JJ. A comparison of a modified Oswestry Low Back Pain Disability Questionnaire and the Quebec Back Pain Disability Scale. Phys Ther 2001;81:776-88

41. Duruöz MT, Özcan E, Ketenci A, Karan A, Kiralp MZ. Cross cultural validation of the revised Oswestry pain questionnaire in a Turkish population. Arthritis δ Rheumatism 1999;42 (Suppl):1200.

42. Sahin N, Albayrak I, Durmus B, Ugurlu H. Effectiveness of back school for treatment of pain and functional disability in patients with chronic low back pain: a randomized controlled trial. J Rehabil Med 2011;43:224-9.

43. McGill SM. Low back exercises: evidence for improving exercise regimens. Phys Ther 1998;78:754-6

44. Simmonds M, Olson SL, Jones S, Hussein T, Lee CE, Novy D, et al. Psychometric characteristics and clinical usefulness of physical performance tests in patients with low back pain. Spine (Phila Pa 1976) 1998;23:2412-21.

45. Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann Intern Med 2007;147:478-91.

46. Negrini S, Giovannoni S, Minozzi S, Barneschi G, Bonaiuti D, Bussotti A, et al. Diagnostic therapeutic flow-charts for low back pain patients: the Italian clinical guidelines. Eura Medicophys 2006;42:151-70.

47. Poitras S, Rossignol M, Dionne C, Tousignant M, Truchon M, Arsenault B, et al. An interdisciplinary clinical practice model for the management of low-back pain in primary care: the CLIP project. BMC Musculoskelet Disord 2008;9:54

48. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, KlaberMoffett J, Kovacs F, et al. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. Eur Spine J 2006;15:192-300.

49. Quittan M. Management of back pain. Disabil Rehabil 2002;24:423-34.

50. van Tulder M, Malmivaara A, Esmail R, Koes B. Exercise therapy for low back pain: a systematic review within the framework of the cochrane collaboration back review group. Spine (Phila Pa 1976) 2000;25:2784-96.

51. Hayden JA, van Tulder MW, Malmivaara AV, Koes BW. Meta-analysis: exercise therapy for nonspecific low back pain. Ann Intern Med 2005;142:765-75

52. Klaber Moffett JA, Carr J, Howarth E. High fear-avoiders of physical activity benefit from an exercise program for patients with back pain. Spine (Phila Pa 1976) 2004;29:1167-72.

53. Norris C, Matthews M. The role of an integrated back stability program in patients with chronic low back pain. Complement Ther Clin Pract 2008;14:255-63.

54. Smith C, Grimmer-Somers K. The treatment effect of exercise programmes for chronic low back pain. J Eval Clin Pract 2010;16:484-91.

55. Maughan EF, Lewis JS. Outcome measures in chronic low back pain. Eur Spine J 2010;19:1484-94.

56. Moyá F, Grau M, Riesco N, Núñez M, Brancós MA, Valdés M, et al. Chronic low back pain: multispecialty assessment of 100 patients. Aten Primaria 2000;26:239[Abstract]

57. Li LC, Bombardier C. Physical therapy management of low back pain: an exploratory survey of therapist approaches. Phys Ther 2001;81:1018-28

58. Şimşek Ş, Yağcı N, Gedik E. The effect of back school program on fear avoidance behavior, disability and pain in chronic mechanic low back pain. J Clin Anal Med 2015;6(Suppl 3):389-93.

59. Marchand S, Charest J, Li J, Chenard JR, Lavignolle B, Laurencelle L. Is TENS purely a placebo effect? A controlled study on chronic low back pain. Pain 1993;54:99-106.

60. Karahan AY, Sahin N, Baskent A. Comparison of effectiveness of different exercise programs in treatment of failed back surgery syndrome: A randomized controlled trial. J Back Musculoskelet Rehabil. 2016 Jun 17. [Epub ahead of print]

61. Rabiei, P., Sheikhi, B., & Letafatkar, A. (2021). Comparing pain neuroscience education followed by motor control exercises with group-based exercises for chronic low back pain: a randomized controlled trial. *Pain Practice*, *21*(3), 333-342.

62. Cui, D., Janela, D., Costa, F., Molinos, M., Areias, A. C., Moulder, R. G., ... & Correia, F. D. (2023). Randomized-controlled trial assessing a digital care program versus conventional physiotherapy for chronic low back pain. *NPJ Digital Medicine*, *6*(1), 121.

63. Kanaan, S. F., Alhendi, Z. M., Almhdawi, K. A., Aldahamsheh, Z., Ismail, N., & Khalil, H. (2023). Evaluating the effectiveness of a comprehensive education on low back pain treatment outcomes: a controlled clinical study. *Clinical Rehabilitation*, *37*(1), 98-108.

64. Peng, M. S., Wang, R., Wang, Y. Z., Chen, C. C., Wang, J., Liu, X. C., ... & Wang, X. Q. (2022). Efficacy of therapeutic aquatic exercise vs physical therapy modalities for patients with chronic low back pain: a randomized clinical trial. *JAMA Network Open*, *5*(1), e2142069-e2142069.

65. Suh, J. H., Kim, H., Jung, G. P., Ko, J. Y., & Ryu, J. S. (2019). The effect of lumbar stabilization and walking exercises on chronic low back pain: A randomized controlled trial. *Medicine*, *98*(26), e16173.

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