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EFFECTIVENESS OF PHYSICAL THERAPY ON PATIENTS WITH CHRONIC LOW BACK PAIN

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Abstract

The objective of this study is to examine the impact of physical therapy techniques on both pain levels and functional abilities in individuals suffering from non-specific low back pain. Study participants and research procedures: This randomized-controlled study included a total of 104 patients (38 men, 66 females) between February 2011 and August 2013. The patients had non-specific chronic low back pain for more than 12 weeks without any neurological deficiency. The mean age of the patients was 49.3±12.5 years, with a range of 34 to 62 years. The participants were categorized into two cohorts: the physical treatment cohort (n=52) and the control cohort (n=52). Both groups received exercise and medicinal intervention, with the physical therapy group additionally receiving physiotherapy techniques. Prior to treatment and at two weeks, three months, and one year post-treatment, the patients underwent evaluation using the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Istanbul Low Back Pain Disability Index (ILBP). Outcome: A grand total of 100 patients successfully concluded the one-year monitoring period. Both groups showed significant improvement in VAS, ODI, and ILBP following therapy ($p<0.01$) compared to their initial values. Statistically significant differences in the VAS, ODI, and ILBP scores were seen at three months and one year following treatment between the physical therapy group and control group ($p<0.05$). Conclusion: To achieve lasting improvement in pain and functional status for non-specific chronic low back pain, it is recommended to incorporate multidisciplinary treatments, such as physical therapy.
Keywords: Exercise; non-specific chronic low back pain; physical therapy methods.

خلاصة

الأهداف: تهدف هذه الدراسة إلى دراسة تأثير طرق العلاج الطبيعي على الألم والحالة الوظيفية لدى المرضى الذين يعانون من آلام أسفل الظهر غير المحددة. المرضى والطرق: بين فبراير ٢٠١١ وأغسطس ٢٠١٣، بلغ إجمالي ١٠٤ مريضًا (٣٨ ذكرًا و٦٦ أنثى؛ متوسط العمر ٤٩,٣ ± ١٢,٥ عامًا؛ تتراوح أعمارهم بين ٣٤ إلى ٦٢ عامًا) يعانون من آلام أسفل الظهر المزمنة غير المحددة لأكثر من ١٢ أسبوعًا بدون ألم. تم تضمين أي عجز عصبي في هذه الدراسة. تم تقسيم المرضى إلى مجموعتين: مجموعة العلاج الطبيعي (ن = ٥٢) والمجموعة الضابطة (ن = ٥٢). أعطيت كلا المجموعتين التمارين والعلاج الطبي. كما تم تطبيق طرائق العلاج الطبيعي في مجموعة العلاج الطبيعي. تم تقييم المرضى باستخدام مقياس (VAS)، ومؤشر (ODI)، ومؤشر (ILBP) قبل العلاج وبعد أسبوعين وثلاثة أشهر وسنة واحدة بعد العلاج. النتائج: أكمل ما مجموعه ١٠٠ مريض المتابعة لمدة عام واحد. في كلا المجموعتين، تحسنت خدمات القيمة المضافة، ODI، وILBP بشكل ملحوظ بعد العلاج ($P <0.01$)، مقارنة بقيم ما قبل العلاج. كانت هناك فروق ذات دلالة إحصائية في درجات خدمات القيمة المضافة، ODI، وILBP في ثلاثة أشهر وسنة واحدة بعد العلاج بين مجموعة العلاج الطبيعي والمجموعة الضابطة ($P <0.05$). الاستنتاج: ينبغي تنفيذ نهج متعدد التخصصات بما في ذلك العلاج الطبيعي لتوفير تحسن طويل الأمد في الألم والحالة الوظيفية في علاج آلام أسفل الظهر المزمنة غير المحددة.
الكلمات المفتاحية: تمرين؛ آلام أسفل الظهر المزمنة غير المحددة. طرق العلاج الطبيعي.

Introduction

Background

Low back pain, often known as LBP, is the most common kind of disability that may be helped by rehabilitation. It is also the primary cause of disability on a global scale. Between the years 1990 and 2017, there was a roughly fifty percent rise in the number of years lived with disability due to low back pain. LBP may affect people of any age, however it is more prevalent in females1. LBP is quite common, with a lifetime frequency that has been observed to range anywhere from 39% to 84% around the world. The number of instances with low back pain (LBP) in the globe reached over half a billion in the year 2020, which is equivalent to about 10% of the total population of the world. This is a significant increase of 60% compared to the year 1990. Furthermore, it is anticipated that the prevalence would significantly grow during the course of the subsequent 25 years. LBP is not only a source of personal pain, but it also affects society on a worldwide scale. The healthcare system and society as a whole are both significantly impacted by low back pain (LBP). According to Vos et al. (2016), the documented high cost of low back pain (LBP), which includes both losses in employment and usage of resources, as well as its growth in many other nations.

A symptom that is often referred to as low back pain (LBP) is pain or discomfort that is situated below the costal margin and above the inferior gluteal folds, and/or symptoms that are associated to this pain or discomfort in one or both legs. There are instances of low back pain (LBP) in which a particular pathoanatomical etiology cannot be recognized. This kind of LBP is often referred to as non-specific LBP. The presence of spinal degeneration characteristics is very high in persons who do not exhibit any symptoms, and there is a lack of consistency in the connection between aberrant imaging results and low back pain. It is not suggested to do routine diagnostic imaging unless there is a suspicion of a pathology of a significant consequence. A pathology of a serious nature, including malignancy, cauda equina syndrome, and inflammatory spinal disease, is present in less than one percent of all cases of low back pain (LBP). Fractures are present in less than four and a half percent of all LBP cases. In approximately five to fifteen percent of LBP cases, neuropathic pain is present, and it can be linked to diagnoses such as lumbar disc herniation (LDH) or lumbar spinal stenosis (LSS). (Abbasi,2017)

Aims and Objectives

The overarching purpose of this thesis is to study whether or if and how primary care physiotherapy that is based on best practices may enhance clinical outcomes for patients who suffer from low back pain.

Literature review

A person is said to be suffering from low back pain (LBP) if they have pain or discomfort in the lumbosacral area, which is located below the last rib and above the gluteal crease, including or excluding referred leg pain. Despite the fact that low back pain (LBP) may be caused by either known or undiscovered abnormalities or illnesses, it is deemed non-specific in more than 85 percent of instances. Recurrent episodes are prevalent, and low back pain is increasingly being regarded as a disorder that lasts for a long time and may have a variety of different trajectories. This is despite the fact that the majority of episodes are short-lived and may or may not have any lasting implications. To quote Zadro et al. (2019) Low back pain (LBP) is a primary cause of disability and job absence, and it places a significant cost on people, their families, the economy, and health care systems. It is one of the most frequent musculoskeletal illnesses in contemporary civilization, with a worldwide point prevalence of 9.4 percent. 2016 research by Gay et al.

Self-management, physical and psychological therapies, and some kinds of alternative medicine are all components of the biopsychosocial approach, which is suggested for the evaluation and therapy of non-specific low back pain (LBP). Physical therapists play an important part in the care of low back pain (LBP), and the therapies that they provide, such as exercise therapy, are regarded to be the first-line treatment for chronic LBP. 2018 research by James et al.

Based on the data that was available and the clinical experience that was gathered, the second edition of The National Disease Management Guideline "Non-specific LBP" (in German: Nationale VersorgungsLeitlinie (NVL)) was released in March of 2017. The objective of the guideline is to provide a realistic decision-making assistance that can be used by both medical professionals and non-medical professionals, such as physical therapists, in order to enhance the quality of health care received. Unlike in other countries, physical therapy is still regarded an auxiliary health profession in Germany. Therapists are only permitted to give physical therapy services with a prescription from a physician, which is based on the German catalogue of treatments. This is in contrast to other nations. Karadağ et al. is cited in 2019.

During the process of addressing musculoskeletal disorders, Zadro et al. (2019) conducted a systematic evaluation to examine the degree to which physical therapists adhere to existing guidelines. According to the results of questionnaires that were filled out by physical therapists, the median proportion of participants who selected recommended therapies for low back pain was 35%. On the other hand, 44% of participants selected treatments that were not suggested, while 72% of physical therapists said that they would offer treatments with an open recommendation. To quote Zadro et al. (2019)

According to Hanney et al. (2016), early therapy that is supported by evidence may hasten the rehabilitation of people who suffer from low back pain (LBP), as well as lower the amount of health care that is used and prices. On the other hand, it seems that physical therapists seldom adhere to evidence-based standards when it comes to the management of musculoskeletal diseases. Some of the perceived obstacles that prevent the use of recommendations in clinical practice include, but are not limited to, a lack of time, inadequate availability, and restricted access to various guidelines.

The systematic review that was conducted by Zadro et al. (2019) does not include a single study that was conducted in Germany, and in general, there is a lack of research on the current physical therapy care for musculoskeletal problems in Germany. Unlike in Germany, physical therapists in other countries, such as the Netherlands, Great Britain, or the United States, are more independent in their decision-making regarding physical therapy treatments because they are not bound to a physician's prescription. As a result, the findings of this review cannot simply be applied to the health care system in Germany. It is required to conduct an inquiry into the management of physical therapy in Germany in order to determine whether or not physical therapy is being overused, underused, or misused, and to investigate the obstacles that prevent the use of recommendations that are particular to the health care system in Germany. (Zadro et al. ,2019)

Patients and methods

From February 2011 through August 2013, 110 individuals with CLBP were identified using the hospital's physical medicine and rehabilitation clinic's data. The research comprised individuals who had sustained CLBP for more than 12 weeks and did not have any neurological impairment. People who did not meet the inclusion criteria were those who were 18 years old or younger, pregnant, had undergone surgery in the past, had structural abnormalities, spinal cord compression, severe instability, osteoporosis, had a body mass index (BMI) greater than 30 kg/m2, had severe metabolic or cardiovascular disease, or had an acute infection. The

randomized controlled trial comprised 104 patients who matched the inclusion criteria, with an average age of 49.3±12.5 years (ranging from 34 to 62 years old) and 38 men and 66 females. The clinical examination included taking a thorough medical history in addition to measuring the patient's lumbar mobility, range of motion, and neurological status as well as palpating and inspecting the lumbar area. Just one doctor looked at each patient. The local Ethics Committee gave its approval to the research protocol. Every patient was asked to sign an informed consent form. All procedures followed the guidelines laid down in the Declaration of Independence.

Interventions

There were two groups of patients total: one that received physical treatment (n=52) and another that served as a control. While the control group (CG) only got medical and exercise treatment, the physical therapy group (PTG) also received physical therapy modalities.

Physical therapy

The frontal abdominal muscles (musculus obliquus externus abdominis, musculus obliquus internus abdominis, musculus rectus abdominis), deep abdominal muscles (musculus psoas major, musculus psoas minor, musculus iliacus, musculus quadratum lumbarum), and back muscles (musculi dorsi, musculus erector spinae, musculi transverso-spinales, musculi inter-spinales, musculi intertransversarii) were all prescribed active isometric and isometric strengthening exercises. The hamstrings, hip flexors, and lumbar extensors were all given specific stretching routines. Each patient was given specific instructions by the physiotherapist on an exercise regimen that could be done at home. The patients were also provided with a written workout schedule. During the three months of the program, participants were required to exercise at least twice a day, ten times each.

The physiotherapist worked on the waist area for a total of ten sessions, once daily, over the course of five weeks. A combination of ultrasound, TENS, and a heated pack were used during the sessions. The patient had 20 minutes of hot pack treatment and 5 minutes of continuous ultrasonic therapy at a frequency of 1 MHz and a density of 1.5 W/cm². The following method of transcutaneous electrical nerve stimulation (TENS) was also used: continuous, 100 Hz, 40 µSN for 30 minutes.

Evaluation criteria

Before therapy began and again two weeks, three months, and a year later, every single patient underwent evaluation. Using a 10-point scale, from 0 (no pain) to 10 (extreme pain), the VAS assessed the intensity of the pain. To assess functional state, the Oswestry Disability Index (ODI) was used. ILBP, which stands for the Istanbul Low Back Pain Disability Index. Each of the ten items on the ODI—which range from 0 to 5—evaluates a different aspect of everyday living, including pain, lifting, walking, sitting, standing, sleeping, social life, travel, and pain change. The maximum score is 50, and the result is expressed as a percentage, which is the product of the total score and two. In this assessment, 0% denotes no pain or functional handicap and 100% denotes significant pain and functional limitation, calculated as follows: points/total score (50) ¡ 100= %. Research on its validity and reliability was carried out on Turkish society members suffering from low back pain. Furthermore, the ILBP is a scale that may be used to measure the functional status of individuals with low back pain. It consists of 18 questions 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 on its dependability and validity was conducted.

Sample size calculation

Utilization of VAS data allowed for the determination of the sample size for this investigation. The findings from Sahin et al. show that the VAS in PTG had an average score of 7.16 and an SD of 2.54, whereas in CG it was 5.72. With a beta of 0.2 and a power of 80%, the sample size was determined. For statistical purposes, a p-value of 0.05 was deemed significant. Therefore,

48 patients were needed for each group. To account for the 10% dropout rate that we anticipated, we attempted to divide the patients into two groups of 52. Two investigators completed the necessary paperwork for each patient and put it in an envelope after collecting their medical histories. Next, a computer-generated random number table was used to divide the patients' sealed envelopes into two equal groups, one for each condition (PTG, CG). Each group consisted of 50 patients who finished the trial at the two-week, three-month, and one-year follow-up points.

Statistical analysis

Software developed by SPSS Inc. of Chicago, Illinois, USA, known as PASW for Windows version 18.0, was used to conduct the statistical analysis. Using the Shapiro-Wilk test, we checked whether the continuous variables followed a normal distribution. The chi-square test was used to assess the differences between the groups with respect to the categorical variables, which include sex, education status, and occupation. To examine statistically significant differences among the variables with atypical distributions, the Mann-Whitney U test was used. The Student t-test, which is appropriate for variables with normally distributed parameters, was used to compare the groups' continuous data. Parameters that were tested many times in the intra-group analysis were subjected to repeated measures analysis of variance (ANOVA) for the purpose of data comparison. In order to conduct an inter-group analysis, the Bonferroni correction was used. If the outcome of the variance analysis test was significant, a post-hoc test was conducted. The subgroup differences were detected using the Bonferroni Student t-test. Statistical significance was determined by a p-value less than 0.05.

Results

After one year, 100 patients were still alive and well. By comparison, the average age of CG was 46.2±12.3 years, while that of PTG was 50.4±11.4 years. When comparing the groups according to age, sex, education, profession, and body mass index (BMI), no statistically significant differences were found ($p>0.05$). There were 63% females and 13% college grads across the groupings. Table 1 shows the demographics of the two groups.

Table 1. Patient demographics

	Physiotherapy group (n=50)			Control group (n=50)			
	n	%	Mean±SD	n	%	Mean±SD	*p*
Age (year)			50.4±11.4			46.2±12.3	0.08
Sex							0.83
Male	18	36		19	38		
Female	32	64		31	62		
Level of education							0.46
Primary school	39	78		36	72		
Secondary school	4	8		8	16		
Higher education	7	14		6	12		
Profession							0.09
Housewife	37	74		31	62		
Office worker	9	18		7	14		
Working class	4	8		12	24		
Body mass index			29.4±5.0			28.6±5.2	0.44

SD: Standard deviation.

There was a substantial change between the pre- and three-month post-therapy VAS ratings in both groups, with the difference being statistically significant ($p<0.05$). Table 2 shows that compared to baseline values, ODI and ILBP scores significantly improved after two weeks and three months of follow-up.

At two weeks, three months, and one year of follow-up, the VAS, ODI, and ILBP scores were significantly different from the baseline values across the groups, favoring PTG. (Table 2).

Table 2. Intra- and inter-group comparisons of results before, at two weeks, three months, and one year after treatment

	Physiotherapy group (n=50)	Control group (n=50)	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

Pain and functional status were both improved by the combination of physical therapy, exercise, and medical treatment for non-specific CLBP in this randomized controlled study, as compared to exercise and medical treatment alone. For three months after therapy, this improvement persisted. At three months post-treatment, our findings demonstrate that physiotherapy in conjunction with medical therapy and exercise produces superior pain and functional status benefits.

Reducing pain, improving soft tissue flexibility (due to spasm and tension), strengthening and extending the trunk stabilizers, and enhancing mobility and posture are the primary goals of chronic low back pain (CLBP) treatment. These outcomes should lead to enhanced functional capacity, enhanced ability to carry out daily activities, and prevention of work loss. Physical therapy modalities, manipulation, exercise programs, spinal manipulation, medication, and rest are some of the many approaches used to manage chronic low back pain (CLBP). Compared to relying on only one treatment method, a multidisciplinary approach yields better results. Hence, our research included a multidisciplinary strategy that encompassed physical therapy, exercise, and medicinal treatment.

An essential component of low back pain risk factors is diminished strength and endurance of the paraspinal muscles. Patients suffering from low back pain also tend to have weaker muscles overall compared to healthy individuals. The likelihood of experiencing lumbar discomfort is three times greater in those who have diminished muscular strength. Hence, exercise is a mainstay in the therapeutic arsenal for non-specific CLBP. The goal is to enhance functional status and decrease discomfort by strengthening the trunk muscles, improving posture, and increasing aerobic capacity.

As a therapy for low back pain, exercise helped patients go back to their normal routines and jobs more quickly. Patients with chronic low back pain (CLBP) who had exercise therapy shown considerable improvements in pain and functional status when compared to those who underwent no treatment or other conservative therapies, according to a meta-analysis. As stated by Zadro et al. (2019)

Research has also shown that kinesophobia, anxiety, and pain coping difficulties are associated with inactivity, and that exercise treatment alleviates these symptoms. The exact impact of different forms of exercise (such as flexibility, stretching, or strengthening) on patient outcomes is unknown, however. Several studies have shown that exercise treatment for chronic low back pain (CLBP) only provides pain reduction for a maximum of six months. The activities used in our research included lumbar flexion, isometric lumbar flexion, and lumbar and hamstring

stretching. The results showed that the combination of medication, exercise therapy, and physiotherapy improved both functional status and pain. This improvement persisted for a full year, as we noted before as well.

After analyzing the data from the CLBP trial, we found that both pain and functional status were adversely impacted. Consequently, the therapy was shown to effectively alleviate both pain and functional status. In this research, the functional status was evaluated using the ODI and ILBP, while the pain intensity was measured using the VAS. Compared to medical and exercise treatment alone, we discovered that the inclusion of physiotherapy resulted in considerably larger improvements in the VAS, ODI, and ILBP scores at three months and one year of follow-up.

We also included physical therapy methods as a treatment option for individuals with non-specific CLBP in this research. Ultrasound, diathermy, cold application, hot packs, and transcutaneous electrical nerve stimulation (TENS) are some of the techniques that provide temporary therapy. In addition to being painless and simple to administer, these treatments are also non-invasive and usually only produce minor skin irritation as side effects. A number of studies have shown that PT is more beneficial than a placebo. Transcutaneous electrical nerve stimulation (TENS) is a famous physical therapy tool. One trial indicated that transcutaneous electrical nerve stimulation (TENS) was superior to a placebo in alleviating joint discomfort and enhancing mobility. was split 48 patients presenting with low back pain into three groups: control, placebo, and transcutaneous electrical nerve stimulation (TENS). Patients in the TENS group reported 43% less severe pain. Hot application was found to be more effective than a placebo in alleviating acute and subacute lumbar pain in another study that compared the two methods (Hanney et al., 016). On the other hand, cold application helped with pain control during the acute phase and reduced muscle tension.

We did not include a placebo group in our analysis. Physical therapy, when combined with medication and exercise, improved pain and functional status much more than the combination of the two alone. Physical therapy had a beneficial impact when added to the other treatment modalities, even though we did not assess their effectiveness individually in our research. There is a lack of a control group, the duration of therapy is often too short, and the CLBP treatment groups are too diverse in many studies. Our research includes a control group in addition to two identical treatment groups. The next year, the monitoring was maintained. Maintaining pain management and functional gains is crucial for the long-term success of CLBP therapy. Although they are very subjective, isokinetic measures are considered the gold standard for proving that workouts work. One possible caveat is that we didn't test participants' isokinetic muscular strength in this research. Uncertainty over the efficacy of medicinal and exercise treatments is another drawback. Ideally, this study's control group would consist of patients who are observed but not treated. Nonetheless, we treated the patients in our control group with medication and exercise since doing otherwise would be immoral.

Conclusion

Finally, methods for treating long-term health problems should ideally have an impact that lasts and lead to lasting improvement. Improvements were able to be maintained for one year after therapy, according to our research. Hence, for non-specific CLBP, a combination of exercise, medicinal therapy, and physiotherapy proved to be more successful than one of these treatments alone. In order to achieve long-term success in treating CLBP, these data indicate that a multidisciplinary strategy including physiotherapy is the way to go.

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