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ADHERENCE TO THERAPEUTIC EXERCISE IN PATIENTS WITH NONSPECIFIC LOW BACK PAIN

ORIGINAL ARTICLE

ABSTRACT

Purpose: Adherence to therapeutic exercises for low back pain can significantly impact longevity, quality of life, and health care costs. There is insufficient research describing the nature and relationship between specific patient characteristics and exercise adherence in non-specific low back pain (NSLBP). This research aimed to examine: (i) the relationship between education and adherence, (ii) the relationship between perceived pain level and adherence, and (iii) whether education and pain level are significant predictors of adherence.

Methods: Observational analytic research was conducted in a physiotherapy outpatient setting on a sample of 50 subjects with NSLBP. Data collected were: sociodemographic, pain level according to the visual analogue scale (VAS) and adherence measured by the Exercise Adherence Rating Scale (EARS). For hypotheses testing, statistical methods used were; t-test for small independent samples (i), Pearson correlation coefficient (ii) and linear regression analysis (iii).

Results: The results show that: (i) people with a college education are more adherent, (ii) increasing adherence reduces pain level, and (iii) education and pain level are significant in predicting adherence, where education is a stronger predictor.

Conclusion: College-educated persons are more prone to therapeutic exercise, and adherence determines physiotherapy outcomes. The contribution of research to clinical practice is reflected in the findings of the nature and relationship between education level and exercise adherence in NSLBP and its significant impact on physiotherapy outcomes.

Keywords: Exercise, Low Back Pain, Patient Adherence, Physical Therapy Modalities

SPESİFİK OLMAYAN BEL AĞRILI HASTALARDA TERAPÖTİK EGZERSİZLERE OLAN UYUM

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bel ağrısında terapötik egzersizlere olan uyum, bireylerin uzun ömürlülüğünü, yaşam kalitesini ve sağlık bakım maliyetlerini önemli ölçüde etkileyebilir. Spesifik olmayan bel ağrısında, belirli hasta özellikleri ile egzersize olan uyumun özelliklerini ve ilişkisini açıklayan yeterli sayıda araştırma yoktur. Bu araştırma, (i) eğitim ile uyum arasındaki ilişkiyi, (ii) algılanan ağrı düzeyi ile uyum arasındaki ilişkiyi ve (iii) eğitim ve ağrı düzeyinin, egzersize olan uyumda anlamlı prediktörler olup olmadığını incelemeyi amaçlamıştır.

Yöntem: Bu çalışma, spesifik olmayan bel ağrılı 50 birey ile fizyoterapi polikliniği ortamında nicel araştırma olarak yapılmıştır. Toplanan veriler şunlardır: Sosyodemografik özellikler, Görsel Analog Skala (GAS) ile ölçülen ağrı seviyesi ve Egzersize Uyum Derecelendirme Ölçeği (EUDÖ) ölçülen egzersize olan uyum. Hipotez testleri için kullanılan istatistiksel yöntemler; (i) Küçük Bağımsız Örneklerde t testi, (ii) Pearson Korelasyon Katsayısı ve (iii) Doğrusal Regresyon Analizi.

Sonuçlar: Sonuçlar, (i) üniversite eğitimi almış kişilerde egzersize uyumun daha iyi olduğunu, (ii) artmış uyumun ağrı düzeyini azalttığını ve (iii) eğitimin daha güçlü bir prediktör olduğu durumlarda uyumu öngörmede, eğitimin ve ağrı düzeyinin önemli olduğunu göstermektedir.

Tartışma: Üniversite eğitimli kişiler terapötik egzersize daha yatkındır ve bu uyum fizyoterapi sonuçlarını belirler. Bu araştırmanın klinik uygulamaya katkısı, spesifik olmayan bel ağrısında egzersize uyum ve eğitim düzeyi ilişkisi ve doğası ve bunun fizyoterapi sonuçları üzerindeki önemli etkisine ilişkin bulguları yansıtmaktadır.

Anahtar Kelimeler: Bel Ağrısı, Egzersiz, Fizik Tedavi Modaliteleri, Hasta Uyumu

INTRODUCTION

Low back pain (LBP) is the most common musculoskeletal problem and the leading global cause of; years spent with disabilities (1), activity restrictions and absenteeism (2). Because of this, LBP results in a vast medical burden and economic cost (3) globally. LBP belongs to chronic non-communicable diseases, and its non-specific form is dominant among the affected population. The term "nonspecific low back pain" (NSLBP) corresponds to the description and pathophysiology of "back pain that is not attributed to a recognisable, known, specific pathology" (4) which is associated with various factors, primarily related to age, gender, physical condition and work environment.

Well-known clinical guidelines for treating LBP, NICE guidelines (5), emphasise physical, psychological and pharmacological therapies, primarily exercising and self-management. Exercise recommendations for adults with chronic NSLBP vary depending on the patient's physical condition, intensity and progression of the underlying disease, and associated diseases (6), so physiotherapy and self-management programs are tailored to the patient. Self-management involves the collaboration of the patient and the physiotherapist and ultimately allows patients to manage their health and difficulties (7) and maintain the health improvements achieved by physiotherapy. The guidelines emphasise that patients with chronic LBP should exercise and maintain a physically active lifestyle, so patients are usually advised and prescribed home exercise programs (5).

Adherence to physiotherapy programs that include therapeutic exercise and health behaviours in self-management is essential to ensure the sustainability of the benefits achieved (8). Outpatient exercise programs are moderately effective in reducing pain and improving function in chronic NSLBP (9,10). More effective are individually designed programs representing the so-called supervised form of physiotherapy, therapeutic exercises at home with regular check-ups and consultations with a physiotherapist (11). Adherence means the degree to which a person's behaviour corresponds to the agreed recommendations of a health professional (12), so health outcomes will depend on the same. Good adherence is a prerequisite for the effectiveness of exercise programs (12), and patients who adhere achieve a more significant increase in physical function than those who adhere less (13). However, evidence shows that adherence to recommended exercise is very often low, thus limiting the benefits that could be achieved (12,14-16). Exercise adherence declines significantly over time among older people with chronic LBP (17). Similar barriers include fear of worsening pain, time management, and uncertainty about exercise benefits (18,19). Education is also a limiting factor for adherence (20,21) in LBP and other chronic musculoskeletal disorders, but the same needs to be investigated more. As individuals, we differ in the cognitive, emotional, and physical levels of behaviour, so the difference in adherence to therapeutic exercise is expected concerning our characteristics.

This study aimed to examine the existence and the nature of the relationship between adherence, pain and level of education in patients with NSLBP.

The objectives were: (i) to examine the relationship between education and adherence to therapeutic exercise, (ii) to explore the relationship between the level of perceived pain and the adherence to exercise, and (iii) to examine whether education and perceived pain levels are significant predictors of adherence. The following hypotheses were defined and stated; (H1) adherence to therapeutic exercise is higher in persons with a college education, H2 (0) there is no association between the level of exercise adherence and the perceived reduction in pain and (H3) education and perceived pain levels are significant predictors of exercise adherence.

METHODS

This observational analytic research was carried out in the Department of Rehabilitation and Orthopaedics Aids and its physiotherapeutic outpatient unit from May until the mid of June 2022. It was preceded by a comprehensive search of existing evidence and research methodologically similar to ours. It was previously approved by the Ethics Committee of the University Hospital Centre Zagreb (Class: 8.1-22/95-2, number: 02/013 AG) and has followed the tenets of the Declaration of Helsinki.

All the respondents signed the Informed Consent. In accordance with the study design, an effort was made to follow STROBE recommendations.

Participants

The target group consisted of patients with clinical manifestations corresponding to the diagnosis of NSLBP who were referred by a medical doctor to outpatient ten-appointment physiotherapy. Exclusion criteria were: subjects <18, issues with musculoskeletal disorders associated with severe or potentially severe causes or specific pathology, perceived pain levels on VAS <4, pregnant women, subjects with impaired cognitive abilities and inability to follow verbal instructions and non-consent, physical and mental problems that could affect the reduction of reliability in self-completion of the questionnaire (deafness, illiteracy, behavioural disorders, cognitive problems, etc.). The minimum required sample size for the study was estimated a priori. With an effect size of 0.35, 5% type error and 80% statistical power condition, at least 31 respondents in the total sample were required. Considering the coronavirus pandemic and the possibility of dropouts, it was decided that more respondents would be included in the research to ensure a minimum sample size for testing the hypothesis with the desired statistical power. NSLBP patients were initially screened for eligibility on their first visit to physiotherapy. Fifty-one patients who met the study's criteria were offered to participate in this research with a full explanation of the research's need, purpose, and objectives. Based on informed consent, all 51 subjects were initially included, with a dropout of one who did not complete the planned physiotherapy cycle. So, the final statistical analysis was based on 50 subjects.

Measurements

This research was carried out within the framework of everyday practice, where each patient is assigned a physiotherapist or two cooperating physiotherapists who work with them on an individual level rather than through a group approach. As usual, during the initial physiotherapy appointment, sociodemographic data of the respondents were collected: age, gender, and level of education, which were later for study purposes, grouped into groups without college and with a college education. Medical data related to perceived pain was measured as usual with VAS, a validated instrument for pain assessment (22), where zero indicates no pain, and ten is the worst possible pain. After the assessment, joint goals were reached with each patient, including an individual outpatient physiotherapy plan, with additional home exercises advised and initially agreed upon. In general, the treatment for all subjects included spine mobility and strengthening exercises in sitting, pronated and supinated and standing positions; in the form of activation of the lumbar-sacral-pelvic complex and deep muscles, stimulation of proper breathing (approx. 30 minutes, five days a week, ten days in total) and pain relief electrotherapy on the lumbosacral part (lasting 20 minutes). In addition, patients were given recommendations on self-management (protective positions during work, daily activities and sleep). Furthermore, as in regular daily practice, patients were advised to prefer medicines with paracetamol as the only active ingredient during physiotherapy for pain associated with NSLBP rather than taking over-the-counter and prescribed, if necessary, painkillers. For the home program of exercises during outpatient physiotherapy, recommended were repetitions of, mainly, several mobility exercises in the form of self-mobilization aimed at improving mobility in areas of the spine that were restricted and associated with pain and stiffness. To patients, exercise instructions were given verbally and through their experiential performance during outpatient physiotherapy. Daily frequency was at least once, the number of repetitions minimum of ten and retention of the end movement depended on individual tolerance. The choice of exercise position was based on the possibility of their performance at home (such as an adequate exercise mat or chair).

The perceived pain level assessment was repeated with VAS at the final appointment (at the end of the tenth treatment), and adherence to the recommended exercise program at home was simultaneously assessed using the Exercise Adherence Rating Scale (EARS) (23). The EARS consists of 6 statements measuring the adherence to exercises on the Likert scale of 0-4 (23), where zero refers to the statement "strongly disagree" and four "strongly agree". Three questions were formulated posi-

Table 1. Descriptive Data of Exercise Adherence concerning Education

Group	n	X±SD
Without college education	27	11.52 ± 7.743
College education	23	20.09 ± 5.783

n- frequency, X- arithmetic mean, SD- standard deviation

tively and three negatively, which were reversed. The maximum score is 24 and represents the highest adherence. EARS has good psychometric characteristics, adequate internal consistency, and high test-retest reliability (23) in LBP and other chronic musculoskeletal diseases, proven even during cultural adaptations (24, 25, 26). The form of the questionnaire in English can be found in work by Newman-Beinart et al. (2017), in which the authors presented its development and initial psychometric evaluation (23). It was downloaded from the Supplementary data for personal, non-commercial use, and permission was subsequently obtained for thesis verification of this observational research. The questionnaire was translated into Croatian using the forward-backwards translation method by an experienced physiotherapist clinician fluid in English, with no prior validation since there was no aim of testing its psychometric properties in this observational research.

Statistical analysis

The G* Power (the University of Dusseldorf, Germany version 3.1.9.5/14 January 2020) was used to define the required sample size. Statistical data processing was performed in the PSPP program (GNU Project, version 1.4.1/5 September 2020). Category variables are presented by numbers and percentages and continuous by measures of mean and scatter, arithmetic means, and standard deviation. To test the hypotheses, based on the normality of the distribution verified by the Kolmogorov Smirnov test, the following statistics were used: t-test for small independent samples (H1), Pearson's correlation coefficient (H2 (H0)) and linear regression analysis (H3), with a defined significance level set at $p<0.05$.

RESULTS

Sample structure

The study involved 50 respondents with an average of 49.96 ± 13.89 years. Respondents were primarily females (58 %) and non-college-educated persons (46 %).

Adherence to therapeutic exercise concerning education

According to Leven's test, variances of the sample do not differ significantly, so the result of the t-test for independent samples, $t (48) = - 4.367$, $p <0.01$,

Table 2. Correlation between Adherence and Perceived Level of Pain Reduction

	Level of pain before therapy	Level of pain after therapy	Adherence
Level of pain before therapy	1	0.475**	0.159
Level of pain after therapy		1	-0.579**
Adherence			1

Pearson's correlation test; **p<0.01

Table 3. Descriptive Data for EARS, Pain Level Before Therapy and Education in All Respondents

	n	X±SD
EARS	50	15.46 ± 8.089
Pain level before therapy	50	7.02 ± 1.545
Education	50	0.46 ± 0.503

n- frequency, X- arithmetic mean, SD- standard deviation

Table 4. Regression Coefficients

	β	t	p	Correlations		
				Zero- order	Partial	Part
1 (Constant)		-0.272	> 0.05			
Level of pain before therapy	0.330	2.779	< 0.01	0.159	0.376	0.318
Education	0.624	5.247	< 0.01	0.533	0.608	0.600

β- strength of predictive factor, t- result of t-test, p- significance

confirms the H1. To a greater extent, college-educated persons adhere to therapeutic exercise, clearly seen in the almost twice as large arithmetic mean (20.9 ± 5.78) shown in Table 1.

Correlation between adherence and perceived level of pain reduction

A significant reduction in perceived pain was found in all subjects, regardless of adherence (Figure 1). However, as seen in Table 2, a statistically significant, negative correlation was found between adherence to therapeutic exercise and the perceived reduction in pain; r = -0.579, p<0.05. This indicates that increasing adherence to therapeutic exercise reduces the perceived pain level and vice versa, rejecting the H2 (H0).

Education and perceived baseline pain levels as predictors of exercise adherence

Descriptive data can be seen in Table 3, where education per se was used as a "dummy" independent variable along with the level of pain before, while the dependent was adherence.

The linear regression analysis revealed the existence of a significant effect of education and perceived baseline pain levels on exercise adherence; F (2.47) =14.735, p <0.01, R2 =0.38. The resulting model explains 38% of the variance in therapeutic exercise adherence, and by checking individual predictors, as seen in Table 4, both are significant in the prediction of adherence, where education (t = 5.247, p<0.01), β =0.624 is a stronger predictor from baseline pain level (t =2.779, p<0.01), β =0.330, which confirms H3.

DISCUSSION

As emphasised by clinical guidelines, patients with NSLBP are advised to maintain an active lifestyle and follow their healthcare provider's advice, which includes adherence to home exercise, which we believe should be obligatorily preceded by active out-

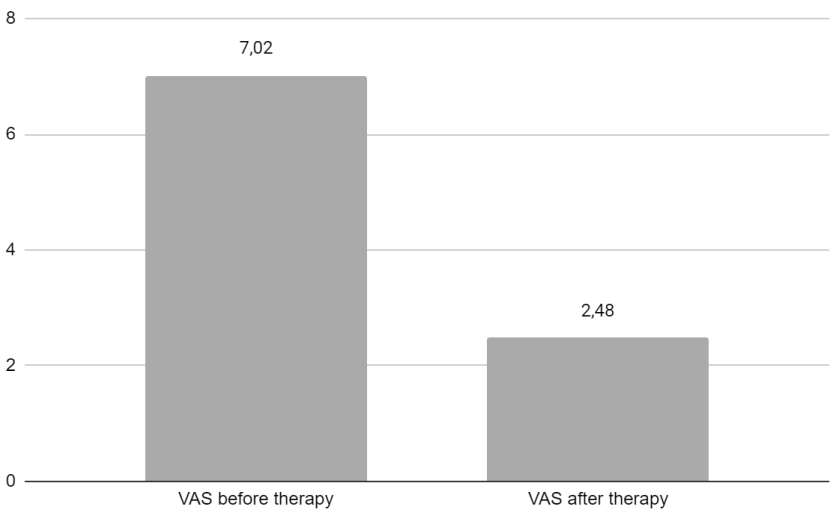

Figure 1. Pain Level According to Visual Analogue Scale (VAS) in Both Groups Before and After Therapy

patient physiotherapy so that patients have a living experience of exercise, and so the possibility of improper exercise out of the clinical setting would be minimised. This non-experimental research revealed significant findings about the nature and relationship between specific patient characteristics and exercise adherence in nonspecific low back pain.

Research shows that exercise adherence determines the effectiveness of physiotherapy programs (12) but also that levels of adherence are very often low, thus limiting the benefits that could be achieved (12,14-16). Recently described limiting factors for exercise adherence in people with chronic LBP are older age (17), fear of worsening pain, time management, uncertainty about exercise benefits (18,19), self-efficacy (21), and level of education (20,21). Research on exercise adherence and related factors is insufficient; even adherence can significantly impact longevity, quality of life, and health care costs (20). Therefore, this study aimed to examine the existence and nature of the relationship between education, perceived pain levels, and adherence to therapeutic exercise in patients with NSLBP.

The sample in our study consisted of 50 respondents with an average age of 49.96 ± 13.89 years, which is generally considered to be middle age and associated with an increased incidence of health problems and lifestyle-related diseases. The majority of the respondents were women and college-educated persons. Additionally, research indicates gender differences in terms of prevalence and degree of disability, which are more significant in persons who identify as women (27) and is most often associated with biological attributes of physical and physiological characteristics of women.

Recent research shows that the level of education may affect exercise adherence among people with chronic LBP (21,28). We confirmed that the level of education is a limiting factor for adherence; college-educated people adhere more to therapeutic exercise than those without a college education. Additionally, Taulaniemi et al. showed that lower levels of education are associated with lower exercise adherence (29). The reason for this maybe can be found in the fact that college education, according to the European Qualification Framework, represents the highest levels of knowledge, skills, responsibilities and independence in an area and the overlap of different areas (30), and certainly equally advanced levels of thinking, analysing and reasoning in the context of autonomous health behaviour.

It is a well-known fact that pain is closely correlated with the level of bodily functions, that is, functional abilities. The research of di Fabio et al. has shown that patients who adhere to prescribed exercises achieve a more significant increase in physical function than those who adhere less (13). Although the level of perceived pain in all our subjects was significantly lower after therapy than before, with increased adherence to exercise, the perceived pain level was reduced considerably. Additionally, Mannion et al. showed that pain reduction in LBP is associated with adherence to exercise (31). Nava-Brigas et al. pointed out that adherent patients have a faster and more significant reduction in pain and improved function (32). Our finding corroborates the statement; that good adherence is needed to improve the effectiveness of exercise programs (12).

Because adherence to an exercise program affects the outcome of physiotherapy treatment in patients with NSLBP (33), there is a need to identify patient characteristics before treatment that could predict adherence and outcome after (34) physiotherapy. Our findings revealed that education and baseline pain levels significantly predict exercise adherence; however, education was a stronger predictor than pain. Dhondt et al. showed that lower levels of education and back pain not associated with poor posture increased the chances of non-adherence. At the same time, a favourable outcome was predicted if the cause of low back pain, shorter duration of symptoms and pain-free status, and recovery of functional abilities were known (34). Saner et al. showed that a positive association between exercise and pain reduction helps overcome adherence barriers (33). Deliberating our findings, the level of education and, consequently, the way in which patients understand or do not understand the importance of exercise adherence and the issue of NSLBP in general obviously in the first line determines their adherence.

Contrary to these findings, Ris et al. have demonstrated that individual patient characteristics, such as sociodemographic characteristics, level of disability, comorbidities, and clinical assessment results, are not significant predictors of exercise adherence in LBP (35). This confrontation of results implies the need for further qualitative and quantitative research to identify the possible predictors of exercise adherence as clearly as possible. Although not observed in our study, it is vital to highlight the patient-physiotherapist relationship and its impact on adherence and treatment outcomes (36), primarily the potential of the physiotherapist to influence the level of knowledge and acceptance of therapeutic exercises by the patient.

Deliberating the limitations and risks of bias, we highlight several possible ones. We point out that in all subjects, in addition to therapeutic exercises, electrotherapy procedures were applied on an outpatient basis, which, in addition to adherence, may have contributed to the reduction of pain, including both groups. Additionally, although it was generally about spine mobility and strengthening exercises in the outpatient setting and self-mobilization exercises at home, the fact is that not all patients made the same movement patterns, for example, due to intolerance to a certain position. At the same time, it was about a different number of recommended home exercises between patients. Although no self-initiated reports of events that resulted in taking paracetamol, prescription drugs or over-the-counter painkillers during physiotherapy were noted, the fact is that subjects who use analgesics and anti-inflammatory drugs as regular therapy to treat other bodily complaints or comorbidities such as pericarditis (and others not excluded by the criteria) may have passed under our radar, which could in that case, individually or together, contribute to the risk of bias in terms of pain. Despite the appropriate sample size in our study, we suggest further research on a larger sample and examining other characteristics of patients as possible predictors of adherence. Also, it would be desirable to test the Croatian version of the questionnaire for reliability and validity, including the entire EARS instrument, in order to obtain information on the reasons for non-adherence.

As a final upgrade of this research, it is necessary, while avoiding the previously mentioned risks of bias, to change the design of the study to an experimental one, with preferably a very similar baseline to the experimental and control group attending outpatient physiotherapy, which would differ only in terms of additional exercises at home, additionally monitoring not only short-term but also long-term outcomes in terms of pain and disability. Still, it is necessary to take into account the ethics of this kind of study design, considering that it is about persons in pain who are looking for a remedy for their ailments.

College-educated persons are more prone to therapeutic exercise, and adherence determines physiotherapy outcomes. The contribution of this research to clinical practice is reflected in the findings of the relationship between exercise adherence, education, and pain in patients with NSLBP and the importance of assessing adherence, given the significant impact on longevity and quality of life and health care costs. Despite the efforts of a thorough and detailed description of the participants and the research environment, it is up to the readers to make the final assessment of the generalizability and application of the findings in their own environment.

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Author Contribution: Concept - ILK; Design- ILK, SS, Resources – ILK, Materials – ILK; Data Collection and Processing – ILK; Analysis and Interpretation – ILK, SS; Literature Search – ILK, SS; Writing Manuscript – ILK, SS; Critical Review – ILK, SS.

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