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Original Research

Adherence to Home Exercise Program in Patients with Low Back Pain

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Abstract

Objectives: The purpose of this study was to evaluate the exercise adherence of the patients according to the recommended home exercise program and to determine which exercises were performed more accurately.
Materials and Methods: One hundred twenty-one consecutive patients who applied to the Physical Medicine and Rehabilitation Department of Hacettepe University Hospital due to low back pain and who were recommended home exercise program were included in the study. The traditional exercise approaches were applied. On the 10th day following the introduction of the home program, the patients were invited for first control to assess the accuracy of the practice of the exercises. The accuracy of each exercise was analyzed by the physiotherapists (Likert type scoring system from 0 to 4). After 1 month, the patients were called for the second check of the correctness of the application of exercises. The same assessment was repeated.
Results: While the number of patients was 121 at the beginning, the number of patients in the first control decreased to 73, the number of patients in the second control decreased to 21 after 1 month. A statistically significant increase was found for only isometric strengthening exercises in terms of the difference in the accurate application of exercises between second and first assessment ($p < 0.05$).
Conclusion: It is thought that it would be beneficial to carry out further studies to examine the effects of combined interventions to ensure adherence to the home exercise program.
***Keywords*:** *Adherence; exercise; patient*

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Introduction

Low back pain (LBP) is one of the most common musculoskeletal disorders (Holmberg, Thelin, 2006). 70-85% of individuals in the community suffer from low back pain at any time of their life (Hoy, March, Brooks, et.al, 2010). The lifelong prevalence of low back pain was found to be 44%–79%, while the point prevalence was 20.1%–19.7% and the annual prevalence was 35.99% in Turkey (Gilgil, Kaçar, Bütün, et al.,2005; Oksuz, 2006). Most patients recover within four weeks; however, 23% of patients develop chronic LBP, that is not resolved within a year (Airaksinen, Brox, Cedraschi, et al, 2006; Nachemson, 2004; Henschke, Maher, Refshauge, et al.,2008; Stanton, Henschke, Maher, et al.,2008).

Physiotherapy intervention is a common form of conservative treatment of LBP (Goldby, Moore, Doust, et al., 2006; Cairns, Foster, Wright, 2006). Physical therapy and rehabilitation programs often include exercise training as well as the use of the combination of several modalities (Baxter, Gracey, 2004). These programs reduce patients' pain levels and increase their quality of life (Çetin, Ozdemir, Haghari, et al, 2012). Exercise is one of the approaches that is considered indispensable in the treatment of many musculoskeletal disorders. Exercise is quite important as a part of protective rehabilitation and in the pain control and restoration of motor function in a movement restriction as a result of an accident (Baxter, Gracey, 2004; Coşkun, Can, 2012).

When the literature is reviewed, it is seen that there are many studies evaluating the role of exercise training in the treatment of low back pain. A variety of different types of exercise have been found to be effective in treating LBP, including low-to-moderate intensity aerobic exercise (Chan, Mok, Yeung, 2011; Shnayderman, Katz-Leurer, 2013), high-intensity aerobic exercise (Chatzitheodorou, Kabitsis, Malliou, et.al., 2007; Chatzitheodorou, Mavromoustakos, Milioti, 2008), stabilization exercise (Luque-Suárez, Díaz-Mohedo, Ponce-García, 2012). There are several designs for exercise programs. Different programs appear to have similar effects (Hayden, van Tulder, Malmivaara, et al. 2006). Programs can be optimized when the gaps between what is offered and what patients think they prefer or need are identified and the gaps are closed (Slade, Keating, 2009). These studies suggested that therapeutic exercises help reduce pain severity and disability in the long term (Chan, Mok, Yeung, 2011; Shnayderman, Katz-Leurer, 2013; Chatzitheodorou, Kabitsis, Malliou, et.al., 2007; Chatzitheodorou, Mavromoustakos, Milioti, 2008; Luque-Suárez, Díaz-Mohedo, Ponce-García, 2012). However, it was also emphasized that wrong applications of these exercises may be dangerous for the health of the patients. It has been also stated that the effect

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of the therapy depends not only on the patient's performance in the therapy environment but also on her/his exercise performance at home. Several studies have focused on the barriers to adherence to performing home-based exercise programs (Çetin, Ozdemir, Haghari, Taşoğlu, 2012; Deyo, Weinstein, 2001; Frost, Lamb, Shackleton, 2000), but research specifically on adherence to therapeutic self-directed home exercises remains limited. The aim of this study was to analyze the adherence of the patients with low back pain to home exercise programs and the accuracy of application of the exercises which are taught by physiotherapists.

Ho: The home exercises given by physiotherapists to patients with low back pain are not accurately done in an unsupervised environment.

Ho: Patients with low back pain do not adhere to personal home exercise programs given by physiotherapists.

Materials and Methods

Ethical Statement

The study protocol was approved by Hacettepe University Ethical Committee (No: GO 14/635, 17.12.2014). Informed consent was obtained from all of the patients.

Design of the Study

A cross-sectional design was utilized for this study.

Subjects

121 consecutive patients who were admitted to the Department of Physical Medicine and Rehabilitation Hacettepe University Hospital with a complaint of low back pain were included in the study. Inclusion criteria were determined as being diagnosed with chronic low back pain and being prescribed a home exercise program. Exclusion criteria were determined as severe vision, hearing, speech disorders, learning disabilities, hypertension, cardiovascular problems, history of metastatic cancer, and neurological disorders.

Assessment Tools

Age, gender, and education status of the patients were recorded. Pain severity was evaluated using the visual analog scale (VAS). VAS is a pain severity measurement scale that is simple to use, effective, validated, and reliable. Participants were asked to mark the severity

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of the pain they felt on a 10-cm scale, the numbers from "0" (no pain) to "10" (irresistible pain) (Ogon, Krismer, Söllner, et al, 1996; Mannion, Balague, Pellise, et al. 2007).

For the level of understanding of the patients for exercises, 0: I do not understand, 1: I understand very little, 2: I understand a little, 3: I understand very well and 4: I understand absolutely choices were created, the patients were wanted to select one of them.

Procedure

The patients were first evaluated in terms of strength and shortness of the waist-abdominal and pelvic group muscles by two physiotherapists (OA and NÖÜ) who had clinical experience in this regard. Muscle strength was evaluated via manual muscle test. All evaluations of the same patient were performed by the same physiotherapist. Manual muscle testing is based on the manual application of resistance by the physiotherapist to the muscle or muscle group to be evaluated. For the muscle test, the patient was placed in the most appropriate starting position, asked to do the movement and motivation was provided by verbal stimulation. Muscle tests were started with a value of three. The muscle that can make three values; 3+, 4, and 5 values were checked. It was important to apply the test in a short time without changing the patient's position too often and without tiring the patient. Medical Research Council-MRC scale, which was developed in 1912, was widely used (Otman, Demirel, Sade, 2003). According to the results of the evaluation, some of the exercises including isotonic strengthening exercises of the rectus abdominis (while lying and sitting) and obliquus abdominis muscles (R/L), isometric strengthening of the back extensors (sitting), isometric strengthening of the back extensors (lying), isometric strengthening of the gluteus maximus muscle, posterior pelvic tilt, hamstring stretching, stretching of hip flexors, stretching of lumbar extensors were selected and an appropriate exercise program was created according to the strength and shortness of the patient’s muscles. The individualized exercise programs were taught to each patient individually. This may be seen as an intervention that can be performed very easyly for a patient and can be performed hardly in another patient. The patients were told to do the exercises three times a day, with ten repetitions. The frequency of home exercises was measured using a self-report diary. For the level of understanding of the patients for exercises a scale indicating, 0: I do not understand, 1: I understand very little, 2: I understand a little, 3: I understand very well and 4: I understand absolutely choices were created and, the patients were asked to select one of them. The exercises were introduced again until the patient said 'I understand well or understand absolutely'. The exercises were explained according to the needs of each patient and were also

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given to the patient as on brochure. On the 10th day following the beginning the exercise program, the patients were invited for the first control to assess the correctness of application (Owen, Miller, Mundel, et al. 2019). They were asked to perform the exercises in their program, the correctness of each exercise was assessed by the same physiotherapists with a Likert type scoring system (0: forgotten, 1: unable to do, 2: correct position but wrong motion, 3: correct position and motion, no respiration control, 4: doing absolutely) (Saner, Bergman, Bie, Sieben, 2018). The exercises that were not done correctly were showed to the patient again. The patients were called for the second control after 1 month (Bronfort, Maiers, Evans, et al, 2011). Once again they were asked to do the exercises as they did at home, and the correctness of each exercise was scored in the same way. For statistical analysis, the individuals who had 0,1 and 2 points considered as "not able to do the exercises" while the individuals had 3-4 points considered as "able to do the exercises".

Statistical Analysis

The arithmetic mean and standard deviation (X ± SD) were used for the calculation of age, education status, and pain severity level, number and percentage were used for the calculation of gender and correctness of exercise. The scores obtained before and after the home exercise program were examined using the Wilcoxon Signed Rank Test. The analysis of the change in the ability to perform each type of exercise was made by the McNemar test. The probability of error was taken as $p<0.05$.

Results

The average age of 121 patients who participated in our study was 44.9±14.7 years (16-70 years). Eighty-five (70.2%) of the patients who participated in the study were female while 36 (29.8%) of them were male. While the number of patients was 121 at the beginning, the number of the patients at the first and second control decreased to 73 and 21, respectively.

At the beginning, the mean pain level of the patients was 4.89±2.36, the pain level was 4.19±2.15 at the first control and 2.90±2.19 at second control. This difference was statistically significant ($p<0.05$). Table 1 contains the socio-demographic information of the participants.

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Table 1. Socio-demographic information of the participants.

	X±SD	**X±SD**	**X±SD**
Age	44.9±14.7		
	At the beginning	**The first control**	**The second control**
Pain severity	4.89±2.36	4.19±2.15	2.90±2.19
Gender	**n**	**%**	
Female	85	70.2	
Male	36	29.8	

Table 2 shows the percentage of correctness of the exercises at the first and second controls. The numbers of the individuals who improved or worsened in terms of the correctness of exercise application from the first control to the second control are also showed in Table 2. In all exercises, the statistically significant increase in the correctness of exercises at the second control compared to the first control was only found for the isometric strengthening exercises of hip extension and m. rectus abdominis while sitting.

It was determined that there was no decrease for the back of leg and thigh flexors stretching.

When the reasons for the decrease in the patient number from 121 to 73 in the first control were examined, it was found that 20.3% of the patients had stopped doing the exercises because of the increased pain, 10.5% of the patients had stopped doing the exercises because they were in the other city, 28.0% of them did not want to come to the control because they thought that they did the exercises correctly, 10.9% of them did not want to come to the control because they did not do the exercises at all. 30.3% of the patients could not be reached by telephone and the reason for not coming to the control was not determined. When the reasons for not coming to the second control were analyzed, 43.8% of them stated that they did not come because of their decreased pain and they thought they healed. 19.2% of the patients stated that they did not come because they could not get permission from their jobs. 22% of them said that they did not come because they stopped doing exercises.

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Table 2. Correctness rates of the exercises at the first and second controls.

Home Exercise Program	A	B	C	D	E	p
Isometric Strengthening of Hip Extension (n=21)	9 (%42.9)	16 (%76.2)	12 (%57.1)	8 (%38.1)	1 (%4.8)	0.039*
Isometric Strengthtening of Rectus Abdominis (n=18)	13 (%72.2)	16 (%88.9)	13 (%72.2)	4 (%22.2)	1 (%5.6)	0.375
Lumbar Extensor Isotonic Strengthening (n=15)	5 (%33.3)	11 (%73.3)	7 (%46.7)	7 (%46.7)	1 (%6.7)	0.070
Isometric Strengthening of Rectus Abdominis while seating (n=11)	2 (%18.2)	10 (%90.9)	3 (%27.3)	8 (%72.7)	-	0.008*
Lumbar Extensor while seating Isometric Strengthening (n=9)	2 (%22.2)	7 (%77.7)	4 (%44.4)	5 (%55,6)	-	0.063
Isotonic Strengthening of M. Obliquus Abdominis (R) (n=7)	6 (%85.7)	6 (%85.7)	5 (%71.4)	1 (%14.3)	1 (%14.3)	1.000
Isotonic Strengthening of M. Obliquus Abdominis muscle (L) (n=7)	6 (%85.7)	6 (%85.7)	5 (%71.4)	1 (%14.3)	1 (%14.3)	1.000
Posterior Pelvic Tilt (n=20)	15 (%75)	17 (%85)	14 (%70)	4 (%20)	2 (%10)	0,688
Stretching of Thigh Flexors (n=17)	16 (%94.1)	17 (%100)	16 (%94.1)	1 (%5.9)	-	NA
Stretching of Lumbar Extensior(n=17)	12 (%70.6)	16 (%94.1)	11 (%64.7)	5 (%29.4)	1 (%5.9)	0.219
Stretches back of leg (n=14)	12 (%85.7)	14 (%100)	12 (%85.7)	2 (%14.3)	-	NA

A: The individuals who accurately done the exercises in the first control period.

B: The individuals who accurately done the exercises in the second control period.

C: The individuals who had no difference between the results of the first and second control periods

D: The individuals who had improved results in the second control period compared to the first control period.

E: The individuals who had worsening results in the second control period compared to the first control period.

N/A: Not Applicable *p<0.05

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Discussion and Conclusion

This study was conducted to analyze the patients' adherence to the home exercise programs which were recommended to the patients who were admitted to an outpatient clinic of a university hospital with a complaint of low back pain. It was determined that the patients did not adapt to home exercise programs and did not do all of the exercises correctly according to the first control results. It is thought that this condition is due to the reasons stated by the patients, such as not wanting to come to the controls, not minding the controls and exercises.

According to the analysis results, the number of patients who were called for two controls decreased from 121 to 21, this condition showed that the adherence to the exercise program was low. In a study by Lundell (2015), the adherence level of the patients with low back pain to the home exercise program was analyzed, 41 of 87 patients were included and 23 patients were followed in similar with our study. In a study conducted by Van Koppenand et. al. (2016), it was stated that only 4 of the 51 patients diagnosed with low back problems were compatible with their home exercise programs. The researchers stated that most of their patients who participated in the study did not comply, although they seemed as open to new behavior strategies.

In a study by Kolt et al. (2007), it was stated that the factors affecting compliance are multidimensional. The patient-related factors such as pre-existing low levels of physical activity, poor compliance with the exercise therapy, poor self-efficacy, depression, anxiety, despair, poor social support/ activity, higher number of perceived obstacles for doing exercises and increased pain levels during exercise are strong predictors for poor treatment compliance in the patients with musculoskeletal disorders.

We found many "factors that affect the compliance" which are different from the literature. For example, giving up the exercises due to increased pain, perception of the patient about correctness of the exercise application and related ignorance of the controls, guilt due to no exercises, reduction in pain and the perception about healing, lack of permission from the job and lack of exercise. It is thought the cultural differences and being a society that does not like to be physically active are seen to be effective in the development of these conditions.

The relevant literature has demonstrated that exercise is one of the treatment modality that can lead to improved outcomes (Hayden, van Tulder, Tomlinson, 2005; Steffens, Maher, Pereira, et al., 2016; Shiri, Coggon, Falah-Hassani, 2018). However, it has been seen that the

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effect of low back exercises on pain and quality of life was generally analyzed. In our study, each exercise was evaluated in detail, no similar study was found in the literature. For this reason, it is thought that our study is important because it emphasized that each exercise that will be included in a home exercise program should be evaluated in detail in new studies on this subject.

In our study, 3 of 11 exercises were stretching exercises and 8 of them were strengthening exercises. At the seccond evaluation (after 1 month), it was determined that isometric strengthening of the lumbar extensor, isometric strengthening of the lumbar extensor while sitting, isometric strengthening of the thigh and isometric strengthening of m. rectus abdominis while sitting were the exercises in which the most of the errors were made. According to the results of our study, two of these exercises (isometric strengthening of lumbar extensor while sitting and isometric strengthening of m. rectus abdominis while sitting) were learned correctly at the first control. This difference was statistically significant, thus monitoring of the exercises which has an important role in the protection of low back health is thought to be important.

Stretching exercises were found to have the lowest error rate and be the least regressive movements. Because these exercises provide a relaxation feeling to the patients and it is thought as the easiest exercise.

Although the right and left lateral abdominal isotonic strengthening exercises have little or no change in their correctness percentage between the first and second controls, it is thought that the reason indicated by the patients such as it is easy to keep them in mind because I can easily lift off may be effective in this condition.

It was found that in the patients doing the exercises and participating to the follow-up visits, the severity of pain decreased. Our results obtained in this study are in agreement with the results of the studies in the literature (Buchner, Zahlten-Hinguranage, Schiltenwolf, et al., 2006; Hayden et al., 2005; Richards, van Kessel, Virgara, et al., 2012).

The present study had some limitations. The patients were not recorded if they had acute or chronical pain, this is the first limitation of the study. Particularly, giving up exercises after healing and/or not coming to the control visits with acute problems reveals the reasons that affect adherence and can not be predicted. The second limitation was that the education level in patient selection was not standardized. The third limitation was that psychological factors

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that would trigger low back pain in patients were not examined. Another limitation of the study was the lack of information about patients' disability levels.

In conclusion, there are many personal and environmental factors that affect adherence to low back exercises. Nowadays, when we consider the increase of low back problems and their effect on health spendings, it is thought that the correct application of home exercise programs by the patients provides important contributions for both the health of the person and the decrease of health expenditures of the country. However, it was determined that the explanation with practicing, giving brochures and calling for control visits are not sufficient to provide exercise adherence. It is thought that it is important to conduct new studies that will use motivational approaches to increase adherence to exercises for low back pain. In addition, programs that aim to help patients gain self-management skills to protect their low back health are also thought to be useful.

Declaration of Conflicting Interests

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