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Research Paper

The impact of motor control exercises on nonspecific lumbar pain

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Abstract

This study aims to find an answer to this question by investigating the impact of motor control exercises on nonspecific lumbar pain. The study includes 30 healthy female and 30 healthy male individuals between the ages of 30 and 65 with a BMI within the range of 18.6-31.3.60 volunteers with nonspecific lumbar pain participated in this study. The individuals were divided into two randomized groups; traditional lumbar abdominal isometric and stretching exercises as a control group, while another group was assigned motor control exercises as the treatment group. The participants were re-evaluated on the 3^{rd} and 6^{th} weeks with VAS and Oswestry low back pain scales. No relations with demographic structures were found, as a result of the study (p>0.05). There were no statistically significant differences in VAS results before the treatment (p=0.870), on the 3^{rd} week after the treatment (p=0.917) or on the 6^{th} week after the treatment (p=0.358) (p>0.05). According to the groups, the Oswestry results also did not reveal any statistically significant differences before the study (p=0.594), on the 3^{rd} week after the treatment (p=0.894) or on the 6^{th} week after the treatment (p=0.767) (p>0.05). Regardless of the relations between the groups, both of them yielded significant data. According to the VAS score of the control group, the VAS score between 3^{rd} and 6^{th} weeks is fou nd to be significant, compared to the other group (p=0.007; p<0.01).

Keywords: core stabilization exercises, motor control exercises, lumbar pain, flexion exercises, McKenzie exercises

INTRODUCTION

Lumbar pain is one of the most common reasons for disability. It is a health issue that can cause severe clinical, social, health-related and economic losses. Treatments include pharmacological treatment, physical therapy modalities, interventional methods, and exercises. Motor control exercises were developed in the late 1980s at San Francisco Spine Institute, USA. These exercises are based on the stabilization of muscles. Comprising the neutral zone, these muscles are (local) deep muscles; transversus abdominis, multifidus, internal oblique and pelvic floor muscles, while superficial muscles are erector spine, external oblique, rectus abdominis and quadratus lumborum [1].

The aim of motor control exercises is to increase the intraabdominal pressure and the tension in the thoracolumbar fascia of the muscles that are directly adhered to the lumbar spine, in order to provide local spinal segment support. Three systems must work in coordination to ensure stability. The primary one is the passive system; vertebrae, facet joints, intervertebral disc and spinal ligaments (anterior longitudinal ligament, posterior longitudinal ligament and ligamentum flavum); the secondary system is the active muscular system and the third is neural control mechanisms (the strength in ligaments, tendons and muscles, movement receptors and transmitters, vestibular, visual system, feedback) [2]. Transversus abdominis and multifidus muscle play key roles in the active muscular system. It has been observed that persons with lumbar pain complaints have an imbalance in the motor control of local muscles. Motor control exercises were established to relieve this imbalance and are commonly employed today [3].

Motor control exercises are currently used in many different sectors including medical rehabilitation, sports workouts, and health. This type of exercise develops dynamic balance, static balance, flexibility and functional qualities of individuals [4-6]. These core stabilization exercises cause both a physiological amelioration of the muscles and an adaptation in the neural structures [7]. Furthermore, core stabilization exercises, which are used as dynamic and static workouts, improve proprioceptive perception, as well as the body's balance and strength by ensuring muscular amelioration and body control [8,9].

Motor control exercises are founded on the successful co-contraction of Transversus Abdominus (TA) and Multifidus- key local muscles of the lumbar area. The aim of these exercises is to increase the intraabdominal pressure and the tension in the thoracolumbar fascia of the muscles that are directly adhered to the lumbar spine, in order to provide local spinal segment support [10].

Motor control exercises are the isometric contraction of TA, which manifests as the abdominal wall withdraws with the isometric contraction of lumbar multifidus on a segmental level. Biomechanically speaking, co-contraction is suitable for these muscles. A TA contraction that has to be clinically observed is accompanied by lumbar multifidus; conversely, a normal multifidus contraction is accompanied by TA [10,11].

Özcan and Çapan, Casey et al., and Rackwitz did not reach any significant conclusions in their randomized, controlled study, where they investigated the effect of motor control exercises in acute, sub-acute and chronic lumbar pain. Further studies are needed on this topic because the number of relevant studies is insufficient, there are conflicting results from different studies and no significant conclusion can yet be drawn. In addition, lumbar pain has a negative influence on the many aspects of life quality. Therefore further studies are needed in order to improve the life quality for patients. From this perspective, the efficiency of motor control exercises on the lumbar pain needs to be scrutinized [3,9,12].

DATA AND METHODOLOGY

The study volunteers include 30 women and 30 men. Inclusion and exclusion criteria are shown in Table 1.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Within 30-65 age range	Surgical history
Having no physical limitations	Spinal pathology
Having prone instability test (+)	Pregnancy or suspicion of pregnancy
No known systemic illnesses	History of neurological diseases or sequel
Experiencing acute, subacute and chronic pain	History of injury on musculoskeletal system
	Mental or audiovisual issues

Before their inclusion in the study, individuals completed a questionnaire, answering questions about their gender, date of birth, height, weight, marital status, education, duration of pain, surgical history and systematic diseases. Eligibility for the study was determined using the data provided in the questionnaire.

The study was designed using a randomized controlled model (1:1 randomization draw) resulting in the same number of volunteers in the control group and study groups'. Each volunteer was asked to select a numbered paper (1-60) using the closed paper method in order to establish the For the collection of data at the start of the study, Visual Analog Scale (VAS) and Oswestry Low Back Pain Scale v2.0 were used to record individuals' pain levels. Following this, both groups were taken into the physical therapy laboratory, where all exercises were verbally and visually explained to them with the accompaniment of a physiotherapist. Exercises were assigned by taking the physical competence of the participants into account. Participants were later re-evaluated in terms of their pain levels on the 3rd and 6th week of the program using the VAS and Oswestry Low Back Pain scales.

Throughout the study, each exercise method was applied by a fully trained physical therapist. The application of the treatment and the collection of the data took approximately 30 minutes. Volunteers were then asked to complete the Visual Analog Scale (VAS) and Oswestry Low Back Pain Scale v2.0 on the after the first treatment session, third and sixth weeks after the treatment.

Since VAS is a sensitive testing method, some patients found it challenging to understand the details and found it more difficult to use than numbered, graphical pain scales; therefore, the challenging assessment complicated its utilization [13,14].

Designed by Fairbanks and later developed by Hudson-Cook, Oswestry Scale is a suggested scale for the evaluation of mobility and daily life of individuals with lumbar pain due to its valuableness and repeatability. The questionnaire consists of 10 questions; each question has 6 answer options and each option is assigned a value (0-6). The individual is asked to select the answer which most suits their situation. The maximum score is 50 and a score of 1-10 points is considered to be mild functional inability; 11-30 points to be medium functional inability and 31-50 points to be severe functional inability [14,15].

In this study, motor control exercises were assigned to the treatment group, which were separated in a randomized, controlled manner. According to the stabilization capacities of the volunteers, they were assigned as to beginner, medium or advanced level. Each level consisted of a total of six movements, each having two and they were completed three times a week with ten repetitions of each exercise.

For the second group, classic abdominal and lumbar exercises were assigned, again, by taking into consideration the stabilization capacities of the volunteers. This program consisted of a total of six movements with ten repetitions of each movement, applied three times a week.

FINDINGS

The research study began on February 21st, 2018 and was undertaken at the Physiotherapy and Rehabilitation Laboratory of the Faculty of Health Sciences of Bahçeşehir University. Group 1 represented 50.0% of participants (n=30) and Group 2, represented 50.0% (n=30), making a total of 60 participants with 50.0% female participants (n=30) and 50.0% male (n=30) and with ages ranging between 30 and 63 with an average of 43.48 ± 10.59 years (Table 2).

Heights ranged between 129 and 191 centimeters with an average of 170.73 ± 10.96 cm; weight measurements ranged between 48 and 96 kilograms with an average of 72.42 ± 14.25 kilograms; BMI measurements ranged between 18.6 and 31.3 kg/m² with an average of 24.66 ± 3.27 kg/m².

73.3% of the participants were married (n=44) and 26.7% were single (n=16). An examination of the educational status, shows that 10.0% (n=6) were junior high school graduates, 43.3% (n=26) were high school graduates and 46.7% (n=28) were university graduates. The duration of pain ranged between 1 and 7 months with an average of 2.58 ± 1.54 months (Table 3).

No statistically significant differences were found between age and gender distributions of the groups (p>0.05). There was also no statistically significant difference between the BMI measurements of Group 1 and Group 2 (p>0.05). In terms of marital status and educational status, no statistically significant differences were encountered between the groups (p>0.05). Finally, there was no statistically significant difference between the duration of pain for Group 1 and Group 2 (p>0.05) (Table 4).

VAS scores before the treatment (p=0.870), on the 3rd week after the treatment (p=0.917) and on the 6th week after the treatment (p=0.358) according to groups did not reveal any statistically significant differences (p>0.05).

Table 2. Distributions of descriptive characteristics

		n (%)
Age (year)	Min-Max (Median)	30-63 (40.5)
	Medt ± Ss	43.48 ± 10.59
Sex	Female	30 (50.0)
	Male	30 (50.0)
Height (cm)	Min-Max (Median)	149-191 (172)
	Medt ± Ss	170.73 ± 10.96
Weight (kg)	Min-Max (Median)	48-96 (75)
	Medt ± Ss	72.42 ± 14.25
BMI (kg/m²)	Min-Max (Median)	18.6-31.3 (24.7)
	Medt ± Ss	24.66 ± 3.27
Marital status	Married	44 (73.3)
	Single	16 (26.7)
Educational status	Junior high school	6 (10.0)
	High school	26 (43.3)
	University	28 (46.7)
Duration of pain (month)	Min-Max (Median)	1-7 (2)
	Medt ± Ss	2.58 ± 1.54

For every participant; as a result of the dual comparisons to determine which follow-up caused the significance; it was found that there was a significant drop in VAS scores on the 3rd week after the treatment (p=0.001) and the 6th week after the treatment (p=0.001), compared to before the treatment (p<0.01). The drop in the VAS scores in the 6th week, compared to those in the 3rd week, is also found to be statistically significant result which occurs (p=0.019; p<0.05) during treatment.

In Group 1; a statistically significant change in VAS scores was found (p=0.001; p<0.01). As a result of the comparisons between groups to determine which follow-up caused the significance; it was found that there was a significant drop in VAS scores in the 3rd week after the treatment (p=0.001) and the 6th week after the treatment (p=0.001) than before the treatment (p<0.01). Compared to the 3rd week VAS scores, the drop in the 6th week scores were also found to be statistically significant (p=0.035; p<0.05) during the treatment.

In Group 2; a statistically significant change in VAS scores was detected (p=0.001; p<0.01). As a result of the comparisons between two groups to determine which follow-up caused the significance; it was found that there was a significant drop in VAS scores in the 3rd week after the treatment (p=0.001) and the 6th week after the treatment (p=0.001) than before the treatment (p<0.01). The change in the 6th week VAS scores, compared to the 3rd week VAS scores, is not statistically significant (p=0.526; p>0.05).

With respect to the changes in the 3rd week after the treatment VAS scores compared to those before the treatment, no statistically significant differences were encountered (p=0.920; p>0.05). Concerning the VAS scores before the treatment and the changes in the 6th week scores, no statistically significant differences regarding the groups were found (p=0.105; p>0.05).

According to the 3rd week VAS scores after the treatment and with respect to the changes in the 6th week scores, a statistically significant difference was found in the groups (p=0.007; p<0.01); while the change (drop) in Group 1 was found to be greater than the change in Group 2 (Figure 1).

No statistically significant differences were observed in the Oswestry results of the groups before the treatment (p=0.594), on the 3rd week after the treatment (p=0.894) and the 6th week after the treatment (p=0.767) (p>0.05) (Table 5).

In all participants; a statistically significant change has been detected in Oswestry results (p=0.001; p<0.01). As a result of the comparisons between two groups to determine which follow-up caused the significance; 3rd week after the treatment (p=0.001) and 6th week (p=0.001) revealed a significant drop in Oswestry scores than before the treatment (p>0.01). The drop in the 6th week Oswestry scores is found to be statistically significant, compared to the 3rd week Oswestry scores (p=0.001; p<0.01).

Table 3. Evaluation of descriptive criteria between groups

		Group 1 (n=30)	Group 2 (n=30)	p
Age (year)	Min-Max (Median)	30-60 (42.5)	30-63 (40)	[a]0.952
	Medt ± Ss	43.57 ± 9.96	43.40 ± 11.35	
Sex	Female	15 (50.0)	15 (50.0)	[b]1.000
	Male	15 (50.0)	15 (50.0)	
BMI (kg/m²)	Min-Max (Median)	20-30.4 (24.9)	18.6-31.3 (24.6)	[a]0.592
	Medt ± Ss	24.89 ± 3.30	24.43 ± 3.27	
Marital status	Married	22 (73.3)	22 (73.3)	[b]1.000
	Single	8 (26.7)	8 (26.7)	
Educational status	Junior high school	4 (13.3)	2 (6.7)	[c]0.382
	High school	15 (50.0)	11 (36.7)	
	University	11 (36.7)	17 (56.6)	
Duration of pain (month)	Min-Max (Median)	1-6 (2)	1-7 (2)	[d]0.290
	Medt ± Ss	2.33 ± 1.35	2.83 ± 1.70	

[a]Student t Test; [b]Pearson Chi-Square Test; [c]Fisher Freeman Halton Test; [d]Mann Whitney U Test

Table 4. Evaluation of VAS scores according to groups

VAS Scores		Total (n=60)	Group 1 (n=30)	Group 2 (n=30)	^{d}p
Before treatment	Min-Max (Median)	1-10 (5)	1-10 (5.5)	2-10 (5)	0.870
	Medt ± Ss	5.30 ± 2.59	5.27 ± 2.74	5.33 ± 2.47	
Third week after treatment	Min-Max (Median)	1-9 (4)	1-8 (3)	1-9 (4)	0.917
	Medt ± Ss	4.17 ± 2.67	4.17 ± 2.65	4.17 ± 2.73	
Sixth week after treatment	Min-Max (Median)	0-8 (3.5)	0-8 (2.5)	1-8 (4)	0.358
	Medt ± Ss	3.53 ± 2.54	3.23 ± 2.53	3.83 ± 2.56	
	^{e}p	0.001**	0.001**	0.001**	
	^{f}p (1-2)	0.001**	0.001**	0.001**	
	^{f}p (1-3)	0.001**	0.001**	0.001**	
	^{f}p (2-3)	0.019*	0.035*	0.526	
Difference (3rd week AT-BT)	Min-Max (Median)	-4/0 (-1)	-4/0 (-1)	-4/0 (-1)	0.920
	Medt ± Ss	-1.13 ± 0.87	-1.10 ± 0.84	-1.17 ± 0.91	
Difference (6th week AT-BT)	Min-Max (Median)	-5/0 (-2)	-5/0 (-2)	-4/0 (-1)	0.105
	Medt ± Ss	-1.77 ± 1.20	-2.03 ± 1.33	-1.50 ± 1.01	
Difference (6th week AT-3rd week AT)	Min-Max (Median)	-3/0 (0)	-3/0 (-1)	-1/0 (0)	0.007**
	Medt ± Ss	-0.63 ± 0.78	-0.93 ± 0.91	-0.33 ± 0.48	

^{d}Mann Whitney U Test; ^{e}Friedman Test; ^{f}Bonferroni-Dunn Test; *p<0.05; **p<0.01

Table 5. Evaluation of Oswestry scores according to groups

Oswestry Scores		Total (n=60)	Group 1 (n=30)	Group 2 (n=30)	^{d}p
Before treatment	Min-Max (Median)	8-100 (35.8)	8-86.7 (34.8)	8-100 (37)	0.594
	Medt ± Ss	40.51 ± 23.01	38.65 ± 22.09	42.36 ± 24.13	
Third week after treatment	Min-Max (Median)	0-64.4 (22.2)	4-64.4 (23.1)	0-62.2 (20)	0.894
	Medt ± Ss	27.32 ± 16.54	27.51 ± 16.56	27.13 ± 16.8	
Sixth week after treatment	Min-Max (Median)	0-62.2 (16.7)	0-62.2 (14.9)	0-53.3 (16.8)	0.767
	Medt ± Ss	19.54 ± 17.70	18.65 ± 17.36	20.42 ± 18.29	
	^{e}p	0.001**	0.001**	0.001**	
	^{f}p (1-2)	0.001**	0.002**	0.001**	
	^{f}p (1-3)	0.001**	0.001**	0.001**	
	^{f}p (2-3)	0.001**	0.001**	0.002**	
Difference (3rd week AT-BT)	Min-Max (Median)	-40/0 (-12)	-24.4/0 (-10.6)	-40/0 (-13)	0.225
	Medt ± Ss	-13.19 ± 10.24	-11.14 ± 8.13	-15.24 ± 11.78	
Difference (6th week AT-BT)	Min-Max (Median)	-46,7/0 (-21)	-40/-6.7 (-20)	-46.7/0 (-21.1)	0.599
	Medt ± Ss	-20.97 ± 11.29	-20.00 ± 9.71	-21.94 ± 12.77	
Difference (6th week AT-3rd week AT)	Min-Max (Median)	-20/0 (-8)	-18/0 (-8)	-20/0 (-6.3)	0.098
	Medt ± Ss	-7.78 ± 5.13	-8.86 ± 4.87	-6.70 ± 5.23	

^{d}Mann Whitney U Test; ^{e}Friedman Test; ^{f}Bonferroni-Dunn Test; **p<0.01

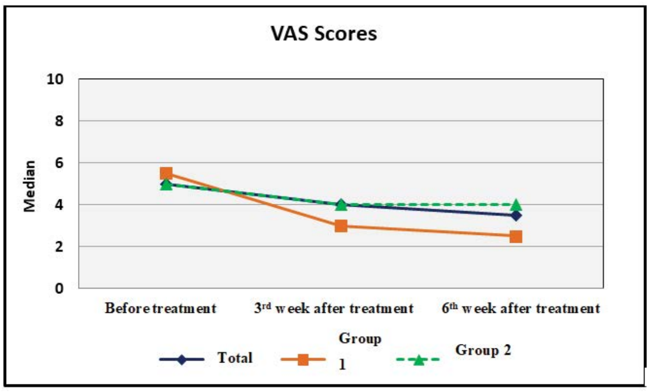

Fig. 1. Distribution of VAS scores

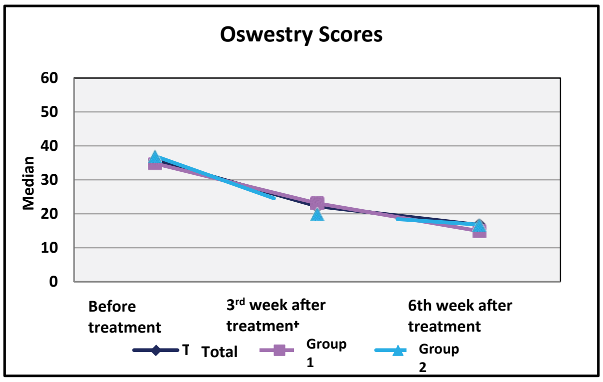

Fig. 2. Distribution of Oswestry scores

In Group 1; a statistically significant change has been detected in Oswestry results (p=0.001; p<0.01). As a result of the dual comparisons to determine which follow-up caused the significance; it was found that a significant drop was detected in the Oswestry scores on the 3rd week after the treatment (p=0.002) and the 6th week after the treatment (p=0.001) than before the treatment (p<0.01). Furthermore, a statistically positive drop was detected in the 6th week Oswestry scores, compared to the scores from the 3rd week during the treatment (p=0,001; p<0.01).

In Group 2; a statistically significant change has been detected in Oswestry results (p=0,001; p<0.01). As a result of the dual comparisons to determine which follow-up caused the significance; it was found that the drop in the Oswestry scores of the 3rd week after the treatment (p=0.001) and the 6th week after the treatment (p=0.001) were significant, compared to before the treatment (p<0.01). The drop in the 6th week after treatment Oswestry scores was found to be statistically positive, compared to the 3rd week after treatment Oswestry scores (p=0.002; p<0.01).

No statistically significant changes were found between the groups, with respect to the changes in the 3rd week scores after the treatment, compared to the Oswestry scores before the treatment (p=0.225; p>0.05). According to the Oswestry scores before the treatment and with respect to the changes in the 6th week scores at the end of the treatment, no statistically significant differences were observed between the groups (p=0.599; p>0.05). According to the 3rd week Oswestry scores after the treatment and with respect to the changes in the 6th week scores, no statistically significant changes were found between groups (p=0.098; p>0.05) (Figure 2).

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) was used for statistical analyses. The data from the study was evaluated using descriptive statistical methods (such as average, standard deviation, median, frequency, and percentage, minimum, maximum). Suitability of quantitative data for normal distribution was tested with Shapiro-Wilk test and graphical examinations. In the comparisons between the two groups, where quantitative variables that display normal distribution are examined, Student t-test is applied, whereas the Mann-Whitney U test was employed for comparisons between quantitative variables of two groups without normal distribution. Friedman test was used to evaluate the follow-up of variables that do not display normal distribution and the Bonferroni-Dunn test was used for dual comparisons. Pearson Chi-Square test and Fisher-Freeman-Halton Test was used to compare qualitative data. The significance was measured to be at a level of p<0.05.

DISCUSSION

The effects of motor control exercises on nonspecific lumbar pain are investigated in this study. The study was conducted over two different randomized groups with 60 patients and (1:1) draw was used to support the validity of the study and to achieve stronger results.

Lumbar pain is among the most prevalent musculoskeletal disorders in society. Its diagnosis and treatment is a burden on both the individual and the economy. The causes of lumbar pain are 90% mechanical and if it becomes chronic, it may cause functional impairments [16].

The volunteers in our study were asked to provide details of their age, gender, marital status, education, BMI and duration of pain. The volunteers consisted of 50% men and 50% women. The ages range was between 30 and 63, with an average of 43.48 ± 10.59.

Within the scope of our study, no statistical significance has been found with respect to the factors of age and gender increasing or decreasing lumbar pain (p>0.05).

In various previous studies concerning lumbar pain, it has been stated that men are more prone to be exposed to the risk of lumbar pain, compared to women. The reason for this was thought to be that women express the symptoms of lumbar pain better than men and they are more sensitive to their bodies' reactions to lumbar pain [16].

A similar study, examining the factors that influence lumbar pain, shows that 145 patients aged 64 or below complained of lumbar pain (25.9%), while 55 patients aged 65 or above had lumbar pain complaints (25.9%). No significant correlation was found between advanced age and lumbar pain (p=0.948, χ^2=0.001) [17]. It was also determined that gender differences were not statistically significant in 71 male patients (24.7%) and 129 female patients (26.7%) with lumbar pain complaints (p=0.540, χ^2=0.376) [17]. According to the study of lifelong lumbar pain prevalence based on gender by Esen and Toprak, the percentages are 80.90% for women (n=267) and 70.60% for men (n=120). Another conclusion from the study by Elif E was that lumbar pain is statistically more intensive for men (p=0.009) [18]. Judging by the other studies in the literature; Tekgül detected that women represent the majority, compared to men, with 75% in the first group, 73.3% in the second group, 80.6% in the third group; while Şahin et al. found 65%; Atar found 70% in the first and 80% in the second group [19-21]. An examination of some of the research studies, regarding advanced age, which is one of the important risk factors of lumbar pain, reveals that Şahin's age average for the first group was 52.3 ± 10.4 and the second group was 45.2 ± 12.1; Tekgül's age average for the first group was 51.2 ± 7.4 and the second group was 54.5 ± 8.3 and the third group was 53.7 ± 8.2.

In our study, no significant differences between marital status and educational level were found (p>0.05). In this sense, 73.3% of the participants were married (n=44) and 26.7% were single (n=16). An examination of the educational status, shows that 10.0% (n=6) were junior high school graduates, 43.3% (n=26) were high school graduates and 46.7% (n=28) were university graduates.

In a study, conducted by Matsui et al., 170 (27.4%) out of 200 patients with diagnosed lumbar pain were married, whereas 30 patients (19.9%) were either widow/ers or single. No significant link was found between marital status and lumbar pain complaints (p=0.059, χ^2=3.567). The relationship between pain and educational status, however, revealed that as the educational level increased, pain levels dropped (p=0.001, χ^2=11.879). Moreover, family discords, issues arising from children, living with parents, living alone or being deprived of family support may increase risks of lumbar pain [22]. Another similar study found that workers with physical jobs and additional service employees have higher rates of lumbar pain than administrators. A multifaceted research study revealed that chronic lumbar pain is 4.97 times more common in people, who are married or separated from their spouses [23]. Individuals with lower educational levels often work in more ergonomically challenging circumstances. They are often in occupational roles that involve heavy and non-ergonomic physical activities.

In the context of our study, no statistically significant conclusions were drawn between BMI measurements (p>0.05). Heights ranged between 129 and 191 centimeters with an average of 170.73 ± 10.96 cm; weight measurements ranged between 48 and 96 kilograms with an average of 72.42 ± 14.25 kilograms; BMI measurements varied between 18.6 and 31.3 kg/m² with an average of 24.66 ± 3.27 kg/m². Individuals with lower BMI values often start complaining of lumbar pain at early ages (under 40 years old), whereas as BMI increases, lumbar pain became more frequently observed in ages over 40 (p=0.000) [18]. In a review, by Leboeuf-Yde the data associated with 65 epidemiological research studies that investigated the link between lumbar problems and BMT was collated [24]. However, in a study by Eryavuz and Akkan no significant relation was found between mass increase and neck and lumbar pain [23].

It has been shown that there is a positive relationship between increased BMI and lumbar pain prevalence, and the risk is higher in women than men [25]. Also in tall individuals, scitalgia due to lumbar discopathy is at an increased risk than normal height [26]. Liddle SD et al. suggested that 80%-90% of individuals with lumbar pain complaints recover in 6 weeks without any treatment programs. However, 5%-15% of individuals with lumbar pain may turn into chronic lumbar pain problems, which is significantly more difficult to treat [27]. Psycho-social life and working conditions play the most important role, as lumbar problems become chronic. Pain that takes a long time to be relieved, unemployment issues and historical experiences of lumbar pain are undeniably influential in this situation [28].

As a biopsychosocial part of the treatment model for chronic lumbar disorders exercise is a good option. Still, no final conclusion has been drawn as to which exercise programs are most effective [27].

In our study, VAS and Oswestry scores from motor control exercises (group 1) and traditional exercise programs (group 2) in patients with nonspecific lumbar pain were investigated.

Accordingly, no statistically significant differences were observed in groups before the treatment (p=0.870), on the 3rd week after the treatment (p=0.917) and 6 weeks after the treatment (p=0.358) in VAS scores (p>0.05).

A statistically significant change in VAS scores in Group 1 was found (p=0.001; p<0.01). As a result of the dual comparisons, conducted to find out which follow-ups caused the significance; the drop in VAS scores in the 3rd week after the treatment (p=0.001) and 6th week after the treatment (p=0.001) are more significant than before the treatment (p<0.01). Compared to the 3rd week VAS scores in the treatment, the drop in the 6th week scores are found to be statistically significant (p=0.035; p<0.05).

For Group 2, no statistically significant changes in VAS results were found (p=0.001; p<0.01). As a result of the dual comparisons, conducted to find out which follow-ups caused the significance; the drop in VAS scores in the 3rd week after the treatment (p=0.001) and 6th week after the treatment (p=0.001) are more significant than before the treatment (p<0.01). The change in the 6th week scores are not significant, as per the statistical data of 3rd week VAS scores (p=0.526; p>0.05).

A statistically significant difference was found between groups in this study with respect to the 3rd week VAS scores after the treatment and the 6th week scores (p=0.007; p<0.01); while the change in Group 1 (drop) is found to be higher than the change in Group 2.

No statistically significant difference has been observed in the groups' Oswestry data from before the treatment (p=0.594), on the 3rd week after the treatment (p=0.894) and the 6th week after the treatment (p=0.767) (p>0.05).

In Group 1, a statistically significant change was observed in Oswestry data (p=0.001; p<0.01). As a result of the dual comparisons, conducted to find out which follow-ups caused the significance; 3rd week after the treatment (p=0.002) and 6th week (p=0.001), compared to before the treatment, revealed a significant drop in Oswestry scores (p<0.01). A statistically significant drop in the scores of 6th week, compared to the 3rd week after the treatment, was also detected in Oswestry scores (p=0.001; p<0.01).

In Group 2; a statistically significant change according to Oswestry data was found (p=0.001; p<0.01). As a result of the dual comparisons, conducted to find out which follow-ups caused the significance; 3rd week after the treatment (p=0.001) and 6th week (p=0,001), compared to before the treatment, revealed a significant drop in Oswestry scores (p<0.01). Furthermore, the drop in the 6th week Oswestry scores, compared to the 3rd week scores, was found to be statistically significant (p=0.002; p<0.01).

In the study, significant changes between groups in terms of Oswestry scores were not found (p>0.05). However, once each group was separately evaluated, it was observed that the drop in their scores were significant (p=0.001; p<0.01), (p=0.002; p<0.01).

According to the acquired results, significant changes in the VAS and Oswestry scores for both exercise groups were found. In Group 1, VAS scores of the 3rd week after the treatment and 6th week after the treatment were found to be significant, which suggests that motor control exercises can prove to be more effective than classic lumbar exercises as of the 3rd week of the beginning of the treatment?

Studies encountered during the literature review also supported our claims. Sung [29] reports that a core stabilization exercise training that is undertaken for 3 days a week and core stabilization exercise programs improved individual muscular endurance in a study, where muscular endurance and electromyographic changes were examined.

Similar to our study, Goldby et al. [30] also stated that core stabilization, manual therapy, and training programs are the most effective methods in decreasing pain in individuals with chronic lumbar pain complaints.

Tulder et al., who studied exercise programs, however, did not come to any conclusions in terms of the efficiency of both exercise models. A comparison of both exercise protocols revealed contrasting conclusions. Similarly, contrasting findings were set forth concerning strengthening and isometric exercises, which were said to be more effective than inactive physical therapy protocols [31]. Another compilation of similar works, scrutinizing 54 randomized controlled studies carried out with control groups, concluded that body strengthening exercises designed to improve mobility or motor control exercises, improve the functional lumbar state better than rest or home exercise programs [27].

CONCLUSION

In our study, no demographically significant conclusions in the two groups, where motor control exercises and traditional exercises were assigned against nonspecific lumbar pain, were found. However, with respect to VAS and Oswestry scores, both groups revealed significant results. However, VAS score changes on 3rd and 6th weeks in the control group were found to be more significant.

Consequently, it can be inferred that both exercise groups have positive outcomes on pain. Significant findings, acquired as a result of the study, indicate that motor control exercises have a positive impact on nonspecific lumbar pain. In line with the acquired findings, no significant differences were observed between demographic structures, which contribute to the suggestions that those further studies need to be conducted using larger populations.

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