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INVESTIGATION OF PSYCHOSOCIAL AND FUNCTIONAL DYNAMICS IN INDIVIDUALS WITH CHRONIC LOW BACK PAIN

ORIGINAL ARTICLE

ABSTRACT

Purpose: The aim of this study was to compare the functional status, psychological status, quality of life and disability levels of individuals with chronic low back pain (LBP) of different origins with healthy individuals.

Methods: A total of 141 individuals, including healthy, nonspecific, non-radiculopathy and radiculopathy groups, participated in the study. Measurements included, the International Physical Activity Questionnaire, physical endurance tests, Visual Analogue Scale, Roland Morris Disability Questionnaire, Trait Anxiety Inventory, Fear Avoidance Beliefs questionnaire and Nottingham Health Profile.

Results: Psychological status, disability level and quality of life scores except anxiety level in individuals with chronic LBP differed significantly in the lowest nonspecific group and the highest in the radiculopathy group ($p<0.001$). Trunk extensor endurance showed a significant difference in favour of the healthy group compared to the other groups, whereas trunk flexion endurance showed a significant difference between all groups. A good correlation was found between the pain level of the patients with the quality of life and fear avoidance behavior, and a very good correlation was found with the disability level ($p<0.001$, $r=0.666$, $r=0.790$, $r=0.865$, respectively).

Conclusion: Due to the differences in the endurance levels and psychosocial situation between patients with low back pain, it is important to plan for the treatment taking into account both the physical and psychological needs of the individual change.

Keywords: Anxiety, fear, low back pain, quality of life

KRONİK BEL AĞRISI OLAN BİREYLERDE PSİKOSOSYAL VE FONKSİYONEL DİNAMİKLERİN İNCELENMESİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışmanın amacı farklı kökenlere sahip kronik bel ağrısı olan bireyler ile sağlıklı bireyler arasında fonksiyonel durum, psikolojik durum, yaşam kalitesi ve dizabilite düzeyini karşılaştırmaktır.

Yöntem: Çalışmaya sağlıklı, nonspesifik, non-radikülopati ve radikülopati gruplarına dahil olan toplam 141 kişi katıldı. Ölçüm parametreleri olarak Uluslararası Fiziksel Aktivite Anketi, fiziksel endurans testleri, Görsel Analog Skala, Roland Morris Dizabilite Anketi, Sürekli Kaygı Envanteri, Korkudan Kaçınma İnançları anketi ve Nottingham Sağlık Profili kullanıldı.

Sonuçlar: Kronik bel ağrısı olan bireylerde anksiyete düzeyi dışındaki psikolojik durum, dizabilite düzeyi ve yaşam kalitesi puanları, en düşük nonspesifik grupta ve en yüksek radikülopati grubunda anlamlı farklılık gösterdi ($p<0,001$). Gövde ekstansör dayanıklılığı diğer gruplara göre sağlıklı grup lehine anlamlı farklılık gösterirken, gövde fleksiyon dayanıklılığı tüm gruplar arasında anlamlı farklılık gösterdi. Hastaların ağrı düzeyi ile yaşam kalitesi ve korkudan kaçınma davranışı arasında iyi bir korelasyon olduğu, dizabilite düzeyi arasında ise çok iyi bir korelasyon olduğu belirlendi ($p<0,001$, $r=0,666$, $r=0,790$, $r=0,865$, sırasıyla).

Tartışma: Gruplar arasındaki endurans düzeyi ve psikososyal durum farklılıklarından dolayı, bireyin hem fiziksel hem de psikolojik ihtiyaçlarının değiştiği göz önünde bulundurularak tedavinin planlanması önemlidir.

Anahtar Kelimeler: Anksiyete, korku, bel ağrısı, yaşam kalitesi

INTRODUCTION

Low back pain (LBP) is a symptom of pain or discomfort resulting from multifactorial etiology with anatomical, physiological, psychological and social consequences (1). LBP is one of the most common complaints in society. It is a syndrome that affects approximately 80% of the world's population at least once in their lives. Although considered to be the most common cause of absenteeism and activity restrictions, it is the second leading symptom in clinic admission (2,3). Various factors are involved in the development of LBP. The most common causes of LBP are structural and mechanical disorders. In a meta-analysis study, decreased trunk muscle endurance and strength were shown to be among the physical factors causing LBP (4). It is known that risk factors such as a decreased abdominal and back muscle strength and flexibility, decreased cardiovascular endurance, smoking and vibration, together with a heavy lifestyle are, associated with LBP (5). The limited effectivenes of treatments for LBP means that it is associated with many health problems such as reduced mobility and quality of life, poorer health status, disability and depression (3,6).

The transition of LBP to chronicity at the psychosocial level is influenced by two key factors: kinesiophobia and fear avoidance beliefs (7,8). The fear avoidance model is a conceptual framework that elucidates the relationship between patients' beliefs about illness, movement, and pain, and the formation of myths and misconceptions surrounding the painful experience. The avoidance of pain and hypervigilance are based on destructive thoughts that activate restrictive attitudes, which in turn increase disability and pain (8,9). Therefore, destructive thoughts are associated with fear of action, which in turn results in worse outcomes in therapeutic interventions (10). Oliveira et al. argue for the importance of identifying psychosocial risk factors in a multidisciplinary approach to the management of patients with LBP (11).There is an emerging consensus that psychosocial factors are of pivotal importance in the transition from acute to chronic LBP and that these may also be causal factors (12). It has been demonstrated in empirical studies that individuals with LBP exhibit elevated levels of anxiety and disability (13,14). Furthermore, it has been demonstrated that patients with chronic LBP exhibit significantly reduced muscle strength in the trunk flexor and extensor muscles (15). In previous studies, healthy individuals and individuals with chronic LBP have typically been compared according to different origins or examined according to pain level (16-18).

A further area for investigation is the manner in which physical and psychosocial symptoms change in accordance with the presence or absence of LBP-related pain and the different origins thereof. A better understanding of how psychosocial and physical variables develop according to different origins in individuals with LBP may inform the development of more effective treatment and prevention strategies for LBP. Furthermore, elucidating this information will assist in determining the psychosocial adaptation of the patient to the treatment, the necessity for multidisciplinary support, and the type and intensity of the exercise to be administered, according to the treatment groups that can be applied to the patients.

The objective of this study was to compare the functional status, psychological status and disability level among healthy individuals, patients with nonspecific low back pain, patients with lumbar disc herniation without root compression (radiculopathy) and lumbar disc herniation with root compression (radiculopathy).

METHODS

This cross-sectional study included individuals who presented to the Buyuk Anadolu Hospital Orthopaedics and Traumatology Clinic between February and June 2021 with complaints of lower back pain. The study population comprised 38 individuals with lumbar disc herniation (non-radiculopathy group), 35 individuals with non-specific low back pain (non-specific group), 36 individuals without low back pain (healthy individuals), and 32 individuals with radiculopathy due to root compression (radiculopathy group). The patients were examined by the same orthopaedic and neurosurgeon physician. Individuals in the healthy group were invited to participate in the study through announcements and were randomly selected from volunteers who had

no history of back problems who underwent both physical and radiological examinations. The MRI was analysed by the same radiologist, who was blinded to the clinical history of the patients and had experience in this field. Imaging was performed using a 1.5 Tesla MRI device. In cases where root compression was suspected, an electromyogram (EMG) was requested. The same physiotherapist evaluated the endurance tests and measurement tools of all participants. In order for the endurance tests to be performed correctly, it was necessary to ascertain that the individual's pain intensity was less than approximately 5 cm, as assessed using a standard 10 cm visual analog scale (VAS). An informed consent form was signed by all participants before inclusion. The study was approved by the local Ethics Committee (YDU/2020/83-1161).

In order to be included in the study, participants were required to meet the following criteria:

- Individuals aged between 20-65 for all groups
- The examination, laboratory and radiology examinations did not reveal any additional lumbar pathology in the nonspecific group
- In the non-radiculopathy group, only lumbar disc herniation was detected in the MRI,
- Individuals with LBP complaints for at least three months or longer were included in the nonspecific, non-radiculopathy and radiculopathy groups. Individuals who met any of the following criteria were excluded from the study: History of back and lower extremity surgery or trauma
- For the non-radiculopathy group, those with root compression findings
- For the nonspecific and healthy group, additional lumbar pathology was identified through examination and radiological examinations.
- Neurological, vestibular disorder, spinal abnormality, LBP of rheumatological origin
- For healthy individuals, those who have experienced LBP in the last year before participation and have had an attack of LBP lasting more than three months in the past
- Individuals who receive low back treatment were excluded from the study.

Data Collection Tools

Functional Status

Endurance Tests

The Biering-Sorensen test was used to evaluate the endurance of the trunk extensor muscles, while the trunk flexor endurance test was used to evaluate the endurance of the trunk flexor muscles. The endurance of the spinal stabiliser trunk muscles was evaluated using the lateral bridge test and the prone bridge test (19-21). The tests were conducted under the supervision of the same physiotherapist, with a three-minutes rest interval between each test. The time spent by the participant maintaining their position was recorded in seconds.

International Physical Activity Questionnaire

The physical activity level of the cases was determined by means of the Turkish version of the short form of the International Physical Activity Questionnaire (IPAQ). The questionnaire was found to be valid and reliable by Saglam et al (22).

Disability Level

Roland–Morris Disability Questionnaire

The Roland-Morris disability questionnaire consists of 24 statements based on the patient's perception of LBP and related disability. These items were reported as physical activity (15), sleep/rest (3), psychosocial (2), home management (2), eating (1) and pain frequency (1) (23). This test is based on measuring how LBP affects the patient's activities of daily living. Yes answers are scored as '1' and no answers scored as '0' points, resulting in a total score of 0-24. A higher score indicates greater disability. Turkish validity was carried out by Kucukdeveci AA et al (24).

Health-Related Quality of Life

Nottingham Health Profile

It consists of 6 parts: physical mobility, pain, sleep, energy level, emotional reactions and social isolation. This one-page questionnaire consists of 38 questions that are answered 'yes' or 'no'. The best score is '0' and the worst score is '100' (25).

Psychological Status

Trait Anxiety Inventory

The Trait Anxiety Form (A-Trait), which was adapted to Turkish and standardised by Öner and Le Compte, was used in the study. The inventory, comprising 20 items, was used to ascertain anxiety levels, with higher scores indicative of elevated anxiety (26).

Fear Avoidance Beliefs Questionnaire

The evaluation of fear avoidance beliefs related to the effects of physical activity and occupational tasks was carried out with the 'Fear Avoidance Beliefs Questionnaire comprising 16 items. A total score approaching zero indicates a reduction in fear avoidance behavior within the section, whereas a maximum score indicates an increase in such behavior (27).

Statistical analysis

Data obtained in the study were analyzed statistically using SPSS vn. 23 software (IBM, Chicago, IL, USA). A minimum of 16 individuals were required to be included in the study in each group, according to the 95% confidence (1-α) and 95% test power (1-β) f= 0.550 effect size parameters. This resulted in a total of 64 individuals being included in the study. According to the Post Hoc Power analysis, the power of the test was determined as 99.9% with 141 people (28). Mann Whitney U test, which is one of the non-parametric methods, was used for comparisons according to men and women. Spearman's rho value was used for correlation. The results of the correlation analysis were classified according to following criteria: very poor (0.00–0.20), poor (0.21–0.40), moderate (0.41–0.60), good (0.61–0.80), or very good (0.81–1.00). The data are presented as mean ± standard deviations and correlation coefficients (r). the level of the statistical significance was set at $p < 0.05$.

RESULTS

A total of 158 subjects were initially screened for eligibility, and 17 were subsequently excluded due to failure to meet the established inclusion criteria. Of these, 10 were from the healthy group and reported a history of LBP within the past year while 7 had herniation on MRI. The study was completed with 141 people (Figure 1).

Table 1 presents IPAQ scores, which indicate the physical activity levels of the groups, as well as demographic and physical characteristics. The demographic and physical characteristics of the groups are compatible with each other. Furthermore, the

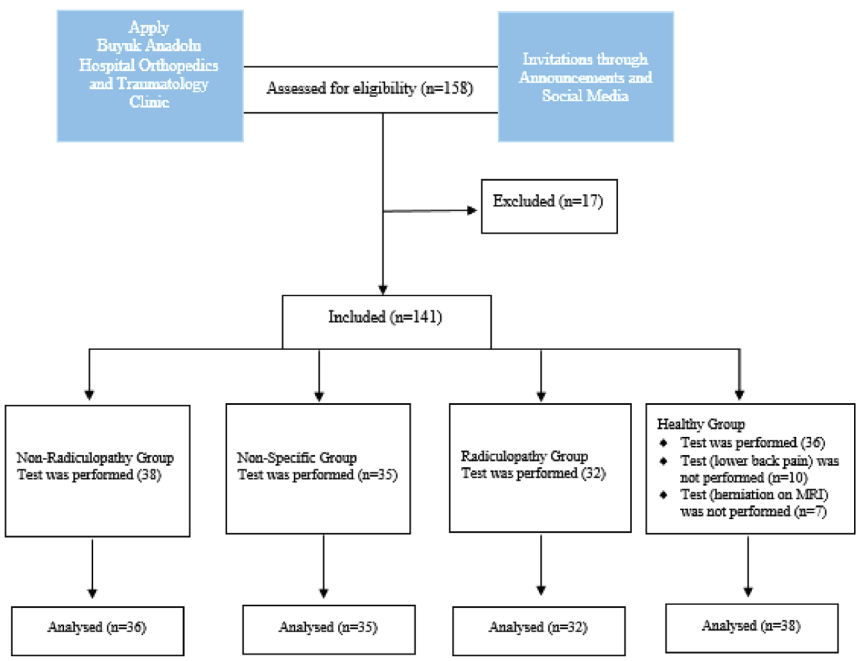


Figure 1. Selection of the Individuals Recruited for the Study and Group Formation

Table 1. Physical and Demographic Characteristics of the Groups

	Healthy Group	Nonspecific Group	Non-radiculopathy group	Radiculopathy group	Total	p
Age	38.28 ± 12.8	39.66 ± 12.88	39.79 ± 13.62	40.59 ± 11.49	39.55 ± 12.66	0.899
BMI	25.73 ± 3.65	26.22 ± 5.02	26.32 ± 4.81	27.75 ± 4.13	26.47 ± 4.46	0.289
Sex						
Male	16 (44.4)	16 (45.7)	18 (47.4)	15 (46.9)	65 (46.1)	0.995
Female	20 (55.6)	19 (54.3)	20 (52.6)	17 (53.1)	76 (53.9)	
IPAQ	4393.97 ± 5394	4131.29 ± 1975.77	5077.54 ± 7916.94	4537.23 ± 3469.93	4545.5 ± 5251.52	0.890

IPAQ: International Physical Activity Questionnaire, BMI: Body Mass Index

physical activity level of the groups was similar.

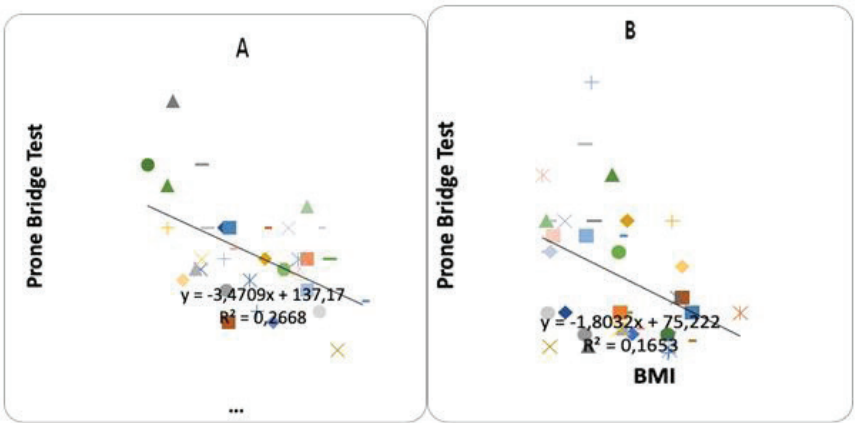
With regard to the pain intensity experienced by the groups, the radiculopathy group reported the levels of pain intensity at rest and during activity, while the nonspecific group exhibited the lowest levels (Table 2). A moderate negative correlation was found between the prone bridge test score and BMI in the healthy group and non-radiculopathy group (r= -0.518, r=-0.407, respectively) (Figure 2).

A positive good correlation was observed between VAS rest and VAS activity scores with quality of life and fear avoidance. Furthermore, a positive very good correlation was found with the disability level. However, no relationship was no relationship observed between VAS rest and VAS activity scores and anxiety levels (Table 2).

The mean values of the lateral bridge test (p=0.00), prone bridge test (p=0.00) and trunk flexion test (p=0.00), differed significantly (p<0.05) between the sexes in relation to quality of life (p=0.03) and anxiety level (p=0.026).. The mean values of quality of life (mean k: 88.7, m: 70.3) and anxiety level (mean k: 43, m: 42) were higher in women, whereas the mean values of the lateral bridge test (mean k: 10, m: 20), prone bridge test (mean k: 15, e: 40) and trunk flexion test (mean k: 12.5, e: 20) were higher in males.

Psychological state

An examination of the anxiety levels of the groups revealed no significant difference between the nonspecific group and the radiculopathy group in individuals with chronic low back pain. However, a significantly higher difference was observed in the non-radiculopathy group compared to the other groups (p=0.04) (Table 3). The lowest level of quality of life was observed in the radiculopathy group, while the highest was observed in the nonspecific group among patients with chronic low back pain. No significant difference was observed between the nonspecific and non-radiculopathy groups in quality of life scores. However, a significant difference was observed between the radiculopathy group and the other groups (p<0.001) (Table 3). The mean values of fear avoidance scores



A: Healthy group, B: Non-radiculopathy group, BMI: Body Mass Index

Figure 2. The Relationship Between the Prone Bridge Test and BMI

Table 2. Correlation Analysis Results of the Evaluated Parameters

		Quality of Life	Anxiety Level	VAS Rest	VAS Activity	Disability Level
Quality of Life	r					
	p					
Anxiety Level	r	0.347				
	p	**<0.001**				
VAS Rest	r	0.602	0.085			
	p	**<0.001**	0.313			
VAS Activity	r	0.666	0.132	0.957		
	p	**<0.001**	0.118	**<0.001**		
Disability Level	r	0.508	0.055	0.831	0.865	
	p	**<0.001**	0.516	**<0.001**	**<0.001**	
Fear Avoidance	r	0.484	0.005	0.734	0.790	0.797
	p	**<0.001**	0.951	**<0.001**	**<0.001**	**<0.001**

VAS: Visual Analog Scale

are presented in Table III. A significant difference was observed between all groups in terms of fear avoidance score. The lowest fear avoidance scores were observed in the nonspecific group, while the highest scores were observed in the radiculopathy group (p<0.001) (Table 3).

Disability level

A comparison of the disability levels of patients with LBP revealed that, the lowest score was observed in the nonspecific group, while the highest score was noted in the radiculopathy group. A significant difference was observed between all groups (p<0.001) (Table3).

Functional status

A comparison of the lateral bridge test scores revealed no statistically significant difference between the groups (p>0.05). While the prone bridge test and Biering-Sorenson test scores were found to be significantly different between the healthy group and the other groups, no such difference was observed between the nonspecific and non-radiculopathy groups. A significant difference was ob-

Table 3. Comparison of Parameters According to Groups

	Healthy Group (n=36)	Nonspecific Group (n=35)	Non-radiculopathy Group (n=38)	Radiculopathy Group (n=32)	P
Pain intensity					
VAS rest	---	2 (0 - 4)[a]	3 (0 - 5)[a]	7 (1 - 10)[b]	**<0.001**
VAS activity	----	3 (0 - 5)[a]	5 (0 - 5)[b]	9 (3 - 10)[c]	**<0.001**
Psychological state					
Anxiety Level	42.72 ± 1.56[a]	44.2 ± 4.22[b]	45.39 ± 5.01[c]	44.22 ± 4.1[b]	**0.041**
Fear Avoidance	---	9.34 ± 12.15[a]	20.63 ± 15.92[b]	36.25 ± 21.43[c]	**<0.001**
Level of disability	---	1.66 ± 2.46[a]	5 ± 5.06[b]	17.09 ± 5.68[c]	**<0.001**
Quality of Life	---	61.12 ± 88.79[b]	98.79 ± 85.62[b]	166.88 ± 74.53[a]	**<0.001**
Functional status					
LBT	19.94 ± 9.13[a]	17.77 ± 8.48[a]	16.95 ± 12.89[a]	-	**>0.05**
PBT	47.56 ± 23.48[c]	28.34 ± 16.75[b]	27.76 ± 21.31[b]	-	**<0.001**
BST	21.81 ± 9.94[c]	17.17 ± 9.05[b]	13.84 ± 11.82[b]	-	**<0.001**
TFT	27.92 ± 13.96[a]	21.91 ± 11.91[b]	13.89 ± 9.69[c]	-	**<0.001**

[a-c] There is no difference between groups with the same letter for each line. LBT: Lateral Bridge Test, PBT: Prone Bridge Test, BST: Biering-Sorenson Test, TFT: Trunk Flexion Test

served between all groups in the trunk flexion test ($p<0.001$) (Table 3).

DISCUSSION

The main finding of our study is that the functional and psychological dynamics differed between groups. While other psychosocial parameters with the exception of anxiety level, exhibited parallel changes in relation to pain severity, trunk flexion endurance demonstrated divergence across all groups.

The activation of the pituitary gland is responsible for the initiation stress process, which is triggered by the presence of pain. Accordingly, the onset of the process in low back pain is associated with stress factors, as evidenced by the correlation between the frequency or intensity of the pain and these factors (29). While some of the hormones secreted during stress have a protective effect on the body, others render the body more susceptible to trauma and psychological distress (30). The last decade has seen a growing emphasis in research on the multidimensional nature of LBP, with a particular focus on the psychosocial dimension. A substantial body of research has demonstrated that individuals with chronic LBP experience emotional difficulties, including depression, anxiety, and hopelessness (31). The current evidence base identifies psychosocial factors as significant determinants of LBP and emphasizes their role in the transition from recent onset pain to persistent pain (32). The results of various studies indicate that psychosocial factors including fear of pain, pain, disability, depression and catastrophizing, influence the clinical profile and prognosis in individuals with LBP (33). In our study, an examination of the psychosocial factors according to the different origins of individuals with LBP revealed that the highest levels of anxiety were observed in the non-radiculopathy group, while the highest levels of fear avoidance behavior were observed in individuals with radiculopathy.

Santos et al. found that the cause of functional decline in patients with LBP was anxiety and stress, and that levels of stress, depression, anxiety and dysfunction were higher in older patients with LBP (13). Similar to the results of this study, higher levels of anxiety and disability were also observed in other groups compared to healthy individuals in the current study. In addition, several studies have shown a strong relationship between pain-related fear and disability in individuals at different stages of the transition from acute to chronic pain (34). In parallel with the results of these studies, our study found a strong correlation was found between pain severity and disability and fear avoidance behavior.

In their study, Garbi et al. established a correlation between pain intensity with disability, as well as depression level (14). The findings of the present study indicate that individuals with radiculopathy and high levels of pain exhibited a higher disability level than those without radiculopathy. Conversely, the non-radiculopathy group demonstrated elevated anxiety levels. This result can be attributed to the fact that in the radiculopathy group, the patient focused on the pain and distanced themselves from other sources of distress due to the severe pain experienced. In contrast, in the non-radiculopathy group the patient focused on the physical and psychosocial difficulties caused by the persistence of this condition.

In a previous study, Cho et al. demonstrated that patients with chronic LBP exhibited significantly reduced muscle strength in both the trunk flexors and extensors when compared to a healthy group (15). Furthermore, an increased BMI and a reduction in trunk muscle strength were found to be directly correlated with chronic LBP (35). In the current study, the trunk endurance values of the nonspecific LBP and non-radiculopathy groups were significantly lower than the healthy group, similar to the results of previous studies. Moreover, Bohannon et al. suggested that enhanced prone bridge performance would be associated with reduced abdominal adipose tissue. A similar correlation was observed between prone bridge performance and BMI in the healthy and non-radiculopathy group as was the case in the present study (36). Abdominal region body mass ratio and waist circumference may play a role in the absence of this relationship in the nonspecific group. A review of the literature revealed no studies that had compared the trunk endurance values of individuals with nonspecific LBP and individuals with lumbar disc herniation. The results of the study did not differ between the two groups in the prone bridge and Biering-Soren-

son tests, but did differ in the trunk flexion test. The higher frequency and duration of pain in the non-radiculopathy group may have been a contributing factor to this result. Given that trunk flexion endurance is more susceptible to decline in individuals with lumbar disc herniation, it is crucial to prioritise exercises that enhance the endurance of trunk flexor muscles in treatment programmes.

The limitation of the study was the inability to compare measurement data according to age decades due to the insufficient number of participants. Additionally, waist circumference measurement, which could have augmented the reliability of BMI measurement data, was not conducted on individuals.

CONCLUSION

The results of this study indicate that there were significant differences in functional and psychological parameters differed between the various groups. While psychosocial parameters other than anxiety levels demonstrated variation in relation to the severity of pain, it was observed that anxiety level was higher in the non-radiculopathy group. Of particular clinical relevance is the observed difference in trunk flexion endurance among all groups. It is therefore recommended that greater emphasisbe placed on increasing trunk flexor muscle endurance in patients with chronic low back pain. In terms of trunk flexor muscle endurance, physical evaluation of patients with nonradiculopathy and nonspecific low back pain, whose treatment programs are generally continued without separation, is of critical importance to shed light on the treatment. Given the discrepancies in endurance levels and psychosocial profiles across the groups, it is crucial to devise a treatment plan that considers the evolving physical and psychological needs of the individual.

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Conflict of Interest: The authors declare that there is no conflict of interest.

Author Contributions: TY, AY and AÖ designed the study, interpreted the data, and made major contributions to the writing of the article. AY evaluated the suitability of the patients and referred potential participants to the polyclinics. All authors read and approved the final version of the manuscript.

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