İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi
ISSN: 2147-7892, Cilt 10, Sayı 1 (2022) 140-150
doi: 10.33715/inonusaglik.1035913

Journal of Inonu University Health Services Vocational School
ISSN: 2147-7892, Volume 10, Issue 1 (2022) 140-150
doi: 10.33715/inonusaglik.1035913

Original Article / Araştırma Makalesi

THE INVESTIGATION OF THE PATIENTS WHO APPLY WITH THE CAUSE OF CHRONIC LOW BACK PAIN TO THE CHIROPRACTIC CLINIC

Kayropraktik Kliniğine Kronik Bel Ağrısı Nedeni ile Başvuran Hastaların İncelenmesi

Mesut ARSLAN[1] *İlknur SARAL*[2] *Ali DONAT*[3]
[1]*Gümüşhane University, Health Services Vocational School, Gümüşhane*
[2,3]*Bahçeşehir University, Faculty of Health Sciences, İstanbul*

Geliş Tarihi / Received: *13.12.2021* ***Kabul Tarihi / Accepted:*** *19.02.2022*

ABSTRACT

In this cross-sectional study, it was planned to examine the relationship between age, gender, daily life activity habits, clinical examination findings and treatment sessions number of the patients with chronic low back pain who applied for chiropractic treatment. After examination of the patient files, who were treated at Private Clinic between January 2010 and December 2017, 408 patients' data were accepted into study. Patients; demographic characteristics, physical examination findings and imaging results were examined. Age, gender, sedentary time (sitting), activity level, stress level, pain duration, spinal dysfunction segments and treatment number were included. Patients' mean age was 43.1 ± 12.6 years, 205 were male (50.2%) and 203 (49.8%) were female. When the total number of received treatment sessions were examined, the average for all patients was 3.5±2.9. The number of treatments were significantly higher in the groups with pain duration of 6-10 years and 11 years and above, compared to the group with 0-5 years of pain (p = 0.009). There was a significant difference between the patients' pain duration and number of treatment sessions. However, there was no significant difference in age, gender, daily life activity habits, clinical examination findings and number of treatment sessions in our study.

Keywords: Chiropractic, Chronic low back pain, Spinal manipulation, Number of treatment sessions, Pain duration.

ÖZ

Bu kesitsel çalışmada, kayropraktik tedavisi için başvuran kronik bel ağrılı hastaların yaş, cinsiyet, günlük yaşam aktivite alışkanlıkları, klinik muayene bulguları ve tedavi seans sayıları arasındaki ilişkinin incelenmesi planlandı. Özel bir klinikte Ocak 2010-Aralık 2017 tarihleri arasında tedavi gören hasta dosyalarının incelenmesi sonucunda 408 hastanın verileri çalışmaya kabul edildi. Hastaların; demografik özellikleri, fizik muayene bulguları ve görüntüleme sonuçları incelendi. Yaş, cinsiyet, sedanter süre (oturma), aktivite düzeyi, stres düzeyi, ağrı süresi, spinal disfonksiyon bölümleri ve tedavi sayısı dahil edildi. Hastaların yaş ortalaması 43.1 ± 12.6 yıl, 205'i erkek (%50.2) ve 203'ü (%49.8) kadındı. Alınan toplam tedavi seans sayıları incelendiğinde tüm hastaların ortalaması 3.5±2.9'du. Ağrı süresi 6-10 yıl ve 11 yıl ve üzeri olan gruplarda tedavi sayısı 0-5 yıl ağrısı olan gruba göre anlamlı olarak daha yüksekti (p = 0.009). Hastaların ağrı süreleri ile tedavi seans sayıları arasında anlamlı fark vardı. Ancak, çalışmamızda; yaş, cinsiyet, günlük yaşam aktivite alışkanlıkları, klinik muayene bulguları ve tedavi seans sayısı açısından anlamlı bir fark yoktu.

Anahtar kelimeler: Ağrı süresi, Kayropraktik, Kronik bel ağrısı, Spinal manipülasyon, Tedavi seans sayısı.

Mesut ARSLAN ✉, fzt.mesutarslan@gmail.com
Gümüşhane University, Health Services Vocational School, Gümüşhane

Bu makaleye atıf yapmak için(How to cite this article): Arslan, M., Saral, İ., Donat, A. (2022). The Investigation of the Patients Who Apply With the Cause of Chronic Low Back Pain to the Chiropractic Clinic. İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi, 10(1), 140-150. doi: 10.33715/inonusaglik.1035913

INTRODUCTION

Low back pain is one of the main problems of the musculoskeletal system, which has high frequency of occurence and high load in economic terms. 65-80% of the world's population suffer from low back pain complaints in their lifetime. In our country Turkey, the lifetime prevalence of lowback pain is 44-79% (İçağasıoğlu et al., 2015). According to the Turkey Health Research 2019 data of the Turkish Statistical Institute (TUİK) (2020); among the main diseases/health problems experienced by individuals over the age of 15 in the last 12 months, low back region problems (29.7%) take the first place. However, low back pain is the most common cause of lost work days (Çöçelliü et al., 2009).

Studies in the literature have indicated that situations such as gender, age, psychological stress, lack of physical activity, smoking, unemployment, dissatisfaction with work, low socio-economic status, married or divorced, increase the risk of back pain by 2-3 times (Ünde Ayvat, Aydın, & Oğurlu, 2012). In addition, it is known that conditions such as heavy living and working conditions, bad static and dynamic postures, use of wrong body mechanics, decrease in the strength/flexibility of the abdominal/back muscles and cardiovascular endurance and vibration increase the risk of low back pain (Narin, Bozan, Cankurtaran, & Bakırhan, 2008).

Situations that cause lowback pain should be assessed. These are; mechanic (97%), non-mechanical (1%) and low back pain resulting from referred internal visceral disease (2%) (Kul, 2019; Suyabatmaz et al., 2011). Mechanical low back pain: It is pain that decreases with rest and increases with physical activity. Pain is caused by damage to the anatomical structures or impairment of function. Lumbar strain, lumbar disc herniation, spondylolysis, spondylolisthesis, disc degeneration, lumbar spondylosis, facet joint osteoarthritis, lumbar spinal stenosis are the most common causes (Soysal Gündüz, 2011).

There are many treatment methods used in the lumbar region in terms of the literature; exercise, manual therapy, thermotherapy, electrotherapy, pharmacological, surgery are frequently used (Corp et al., 2021). According to the level of evidence in the literature, it is shown that spinal manipulative therapy is effective in acute lowback pain and also in chronic low back pain (Chou et al., 2007). In the literature, Chiropractic spinal manipulation therapy was also found to be the first choice of treatment (Hurwitz et al., 2016; Nelson, Metz, & LaBrot, 2005; Oliphant, 2004; Weeks et al., 2016).

In the literature, there are alot of studies involving high-velocity low-amplitude (HVLA) chiropractic spinal manipulation techniques. However, there are very few study and

there is no cross-sectional study in the Chiropractic field in Turkey. Because, the Chiropractic profession in Turkey is still very new and we need more studies done, on this subject. There are different numbers in the literature about the number of optimal treatment sessions. Therefore, this study was conducted to investigate the number of treatment sessions and related factors.

MATERIAL AND METHOD

Purpose of the Study

This study is a cross-sectional study. Our study was planned to investigate the relationship between age, gender, life activity habits, clinical examination findings and the number of treatment sessions for people with chronic low back pain who were applying for Chiropractic treatment.

Patient Selection

Between January 2010 and December 2017, the data of 1200 patients who were admitted and treated at the Private Clinic, with a complaint of low back pain. These were examined in March 2018 and data from 408 patients who met the inclusion criteria were included in this study (Table 1). High-velocity low-amplitude (HVLA) chiropractic spinal manipulation is applied to these patients who apply to the clinic. In addition, patients are given a home exercise program.

Table 1. Criteria for Inclusion and Exclusion from Study

Inclusion Criteria
• Chronic low back pain (> 3 months),
• Fully completed information and evaluation forms,
Elimination Criteria
• Tumoral, infectious, psychiatric, systemic disease and bleeding diathesis,
• Contraindications to HVLA manipulation like progressive motor deficit, cauda equina syndrome, severe spinal stenosis, severe spondylolisthesis, severe osteoporosis, receiving anticoagulant therapy,
• Patients who have had previous spinal surgery,
• Inadequate/Incomplete information and evaluation forms,

Evaluation

Physical examination (muscle strength, reflex examination, neurological tests, etc.) findings and imaging examinations (X-ray, MRI, etc.) were used in the evaluation of these patients. Their age, gender, sedentary time (sitting), sporting habits, stress level, pain duration, spinal dysfunction segments and the number of treatment sessions performed on the patients were evaluated. Sedentary time (sitting), sporting habits, stress level and pain duration were questioned with a verbal question. Segments with spinal dysfunction; Joint

tenderness with palpation, limited range of motion between segments, asymmetric intervertebral muscle tension, abnormal/blocked joint, joint end sensation and imaging methods (X-ray, MRI, etc.) were determined.

Ethical Aspect of the Study

Ethics committee approval was obtained by the Scientific Research and Publication Ethics Committee of Gümüşhane University, dated 14.02.2018 and with the number E.6219. This research was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Mean, standard deviation, median lowest, highest, frequency and ratio values were used in the descriptive statistics of the data. The distribution of the variables was assessed by the Kolmogorov-Smirnov test. Kruskal-Wallis, Mann-Whitney U test were used in the analysis of quantitative independent data. SPSS 22.0 program was used in the analyses. The statistical significance level was accepted as $p < 0,05$ in all evaluations.

RESULTS

In a cross-sectional study of patients admitted for chiropractic care with low back pain, 408 patients with low back pain were examined. The mean age of the 408 patients studied was 43.1 ± 12.6 years. Of the patients, 212 (52%) were between the ages of 26-45, 170 (41.7 %) were over 46 years of age, and 26 (6.4%) were younger than 25 years. Of the patients, 205 (50.2%) were male and 203 (49.8%) were female. The mean daily sitting time of the patients was 8.2±3.1 hours. It was determined that 128 (31.4%) of the patients did sports, and 280 (68.6%) did not. In addition, it was determined that 95 (23.3%) of the patients had low stress, 120 (29.4%) moderate and 193 (47.3%) high-level stress (Table 2).

The average pain duration of these patients was 9.2 ± 7.9 years. It was found that 184 (45.1%) were experiencing pain for 0-5 years, 101 (24.8%) for 6-10 years and 123 (30.1%) for over 11 years. In addition, 328 (80.4%) of the patients were found to have only low back pain, 61 (15%) low back and neck pain, and 19 (4.7%) low back and back pain. When the spinal dysfunction level of the studied patients were examined, it was determined that in 347 (85%) of the patients had multiple segments involved and 61 (15%) involved a single segment. When the direction of spinal dysfunction (spinous process rotation) of the patients were examined, it was determined that the patients had a spinous process rotation to the right in 198 (48.5%), and left in 97 (23.3%) bilateral in 113 (27.7%). The mean number of treatment sessions of the patients was 3.5±2.9 (Table 2).

Table 2. Distribution of Patients According to Descriptive Data

Descriptive Data	Number	Percentage
Age		
≤ 25	26	6.4
26-45	212	52
≥ 46	170	41.7
Gender		
Male	205	50.2
Female	203	49.8
Sitting Time (Hours / Day)		
0-5	98	24
6-10	210	51.5
≥ 10	100	24.5
Sporting habits		
Yes	128	31.4
None	280	68.6
Stress Level		
Low	95	23.3
Middle	120	29.4
High	193	47.3
Pain duration (years)		
0-5	184	45.1
6-10	101	24.8
≥ 11	123	30.1
Areas of Pain		
Lowback	328	80.4
Lowback and neck	61	15
Lowback and midback	19	4.7
Spinal Dysfunction Level		
Multi segment	347	85
L1	4	1
L2	6	1.5
L3	2	0.5
L4	15	3.7
L5	34	8.3
Direction of spinal dysfunction		
Right	198	48.5
Left	97	23.3
Bilateral	113	27.7
Number of treatments		
I	71	17.4
II	80	19.6
III	74	18.1
IV	103	25.2
≥V	80	19.6

The number of treatment sessions in the group with pain duration of 6-10 years, 11 years and above was significantly higher ($p = 0.009$) than the group with a disease duration of 0-5 years. However, there was no significant ($p > 0.05$) difference between the other groups (6-10 years/11 years and above). In addition, no significant relationship was found between the number of treatment sessions and the area of pain ($p = 0.053$), sitting time ($p = 0.914$), sports habits ($p = 0.710$) and stress level ($p = 0.080$) (Table 3).

Table 3. Comparison of the Difference Between Duration of Pain, Area of Pain, Sitting, Sporting Habit, Stress Level and The Number of Treatment Sessions

	Treatment session Mean / Standard Deviation	**p (p<0.05)**
Duration of Pain (Years)		
0-5	3.2±2.4	**0.009**
6-10	3.7±4.0	**(Kruskal-Wallis test)**
11-15	3.8±2.3	
Area of Pain		
Lowback	3.2±2.0	0.053
Lowback and Neck	4.8±5.1	(Kruskal-Wallis test)
Lowback and Midback	4.4±3.8	
Sitting Time (Hours / Day)		
0-5	3.4±2.0	0.914
6-10	3.5±2.6	(Kruskal-Wallis test)
≥10	3.6±3.9	
Sporting Habit		
Yes	3.8±3.9	0.710
None	3.4±2.2	(Mann-Whitney u test)
Stress Level		
Low	3.5±4.1	0.080
Middle	3.4±2.6	(Kruskal-Wallis test)
High	3.6±2.2	

DISCUSSION

This study was planned to cross-sectional investigate the relationship between age, gender, activities of daily living, clinical examination findings and the number of treatment sessions for patients with low back pain, who presented for Chiropractic treatment. It is important because it made the first cross-sectional study in Turkey. At the end of our study, there was no significant difference between area of pain, sitting time, sports habits, stress level and treatment sessions. However, in our study, a significant difference was found between the duration of the pain and the number of treatment sessions.

One of the causes of low back pain is degenerative disc disease. Two important mechanisms are influential in the development of low back degenerative problems: rotational constraints and compressive forces. Because the L5-S1 segment is supported by bone structure and ligaments, rotational constraints affect the L4-L5 segment in particular. Rotational stresses cause changes in both facet joints and intervertebral discs. Compressive stresses mainly affect the L5-S1 segment (Nerlich, Schleicher, & Boos, 1997). In similar studies degenerative findings were mostly found in L4-5 and L5-S1 segments (Güven, Çırak, Işık, & Kıymaz, 1999; Temiztürk, Temiztürk, Özkan, & Özgüzel, 2015). In this study, vertebral subluxations were most frequently detected in L5 and L4 segments in accordance with the literature.

Takatalo et al. (2009) one study found that disk degeneration was at 54% in one level and disk degeneration at multiple levels in 21%. In this study, it was determined that 85% of the patients had multiple segments of spinal dysfunction and 15% involved a single spinal segment.

Altınel et al. (2008) this study found that the incidence of low back pain was higher among people aged 41-64. In a similar study, it was found that the frequency of low back pain was higher in the 21-40 age group (Boyraz et al., 2015). In another retrospective study, most of the patients referred to the chiropractic clinic were found to be between 18 and 30 years of age (Stevens, Campeanu, Sorrento, Ryu, & Burke, 2016). In this study, more patients were admitted with complaints of low back pain between the ages of 26-45. With the modern lifestyle, it is observed that the age range in which the frequency of low back pain occurs is gradually falling.

Bejia et al. (2005) in a study conducted by 350 hospital workers, it was found that women had more low back pain; it has also been shown that the frequency of low back pain falls with sports activities. A similar study of chronic low back pain found more low back pain in women (Cecchi et al., 2012). Another study found that 51.7 percent had more low back pain in men (Boyraz et al., 2015). 61.80 percent of the patients were males in the study conducted on patients who were admitted to family medicine with mechanical low back pain complaints (Balcıoğlu, Ünlüoğlu, & Bilgin, 2017). In this study, it was found that 50.2 percent of men had more low back pain; it was also found that 68.8 percent of the patients with low back pain did not engage in sporting activities in accordance with the literature. Studies in the past have found more low back pain in women, but recent studies have shown that it has changed and more low back pain has been seen in men.

Balcıoğlu et al. (2017) this study found that the causes of low back pain were increased when (30.30%) staying in the same position for a long period of time. In this study, it was also found that 76 percent of the patients sat for 6 hours or more per day. It is thought that long-term static postures cause more mechanical load on the spine and this increases the risk of low back pain.

In a study conducted by Bogduk (2006), psychological factors such as anxiety, depression and stress were reported to cause low back pain. In a study of war veterans with low back pain, 32.8 percent were diagnosed with depression (Dunn, Green, Formolo, & Chicoine, 2011). In this study, it was determined that 47.3 percent of the patients who had complained of low back pain experienced high level of stress. Therefore, patients who are

referred to the clinic with low back pain should definitely be evaluated psychologically and this should be taken into consideration in treatment approaches.

Boyraz et al. (2015) in one study, 99.3 percent of patients with low back pain complained of only back pain, and 0.7 percent of low back and mid back pain complaints. In this study, only 80.4 percent had low back pain, 15 percent had low back and neck pain, 4.7 percent had low back and mid back pain. The lumbar region is the most active and most loaded area in the spine. For this reason, it is thought that low back pain is seen more frequently.

Globe et al. (2016) recommend guidelines for low back pain in chronic low back pain for 1-3 sessions/week and for a duration of 2-4 weeks. Haas, Vavrek, Peterson, Polissari, & Neradilek (2014) an optimal spinal manipulation session in chronic low back pain was identified as 12. In another study, it was determined that only those who received chiropractic spinal manipulation therapy had 12 visits or more (Weeks et al., 2016). In a similar study, 50 percent of patients who visited the Chiropractic clinic visited 1-3 sessions (Stevens et al., 2016). In a study with Chiropractors and Family Physicians, patients with chronic low back pain with Chiropractic treatment showed better healing; and the number of Chiropractic spinal manipulation sessions was 4 (Nyiendo, Haas, & Goodwin, 2000). In a retrospective study of female war veterans with low back pain, the mean number of treatment sessions was 7.9 (Corcoran, Dunn, Formolo, & Beehler, 2017). A similar study was done on male patients with low back pain and the mean number of treatment sessions was 8.7 (Dunn et al., 2011). Stig, Nilsson, & Leboeuf-Yde (2001) in one study, 50 percent of patients reported pain relief after the 4th session. The mean number of sessions was 3.5 ± 2.9 in this study. There are many different opinions in the literature, in this regard, and therefore more work on this subject is needed. Kıymaz, Mumcu, & Arslan (2003) in the study, it was found that 54 percent of patients had low back pain for more than 12 months. In similar studies, it has been found that the majority of patients have chronic low back pain (Rubinstein, Pfeifle, van Tulder, & Assendelft, 2000; Stevens et al., 2016). In a study on male war veterans with low back pain, 86.6 percent of them had long-lasting low back pain (Dunn et al., 2011). In this study, 54.9 percent of the patients suffer from low back pain which lasted for 6 years or more.

According to the level of evidence in the literature, Chiropractic spinal manipulation is shown to be effective in acute low back pain and also in chronic low back pain (Chou et al., 2007). In our study, the number of sessions was significantly higher in the group with pain duration of 6-10 years, 11 years and above than the group with 0-5 years of disease duration.

Therefore, it is of utmost importance to provide Chiropractic treatment accessibility to patients with low back pain as soon as possible.

CONCLUSION AND RECOMMENDATIONS

Limitations of patient inclusion; some patients have missing data in their files and are excluded from the study.

There is a lack of Chiropractic offices in Turkey; availability is limited to a few private offices. There is no insurance reimbursement for Chiropractic manipulative therapies. Therefore, the lack of availability and finances cause patients to choose this type of service, as a last option.

We believe that increasing the availability of Chiropractic spinal manipulation treatment in the acute phase of low back pain and even in terms of preventive health is of great importance. Therefore, we would like to emphasize the necessity of providing this service to the health institutions, especially the first level health institutions.

More studies are recommended to investigate the effectiveness of Chiropractic spinal manipulation therapy with randomized controlled trials and with different patient groups. Also, more studies are needed comparing chiropractic spinal manipulation therapy with other treatment modalities.

REFERENCES

Altınel, L., Köse, K. Ç., Ergan, V., Işık, C., Aksoy, Y., Özdemir, A., Doğan, N. (2008). Afyonkarahisar ilinde erişkinlerde bel ağrısı sıklığı ve etkileyen faktörler. Acta Orthop Traumatol Turc, 42(5), 328-333.

Balcıoğlu, H., Ünlüoğlu, İ., Bilgin, M. (2017). Aile hekimliği polikliniğine mekanik bel ağrısı nedeni ile başvuran hastaların tercih ettikleri tedavi yöntemlerinin değerlendirilmesi-Evaluation of the treatment methods of patients with mechanical low back pain complaints admitted to family physician's clinic. Ankara Medical Journal, 17(2), 119-126.

Bejia, I., Younes, M., Jamila, H. B., Khalfallah, T., Salem, K. B., Touzi, M., Bergaoui, N. (2005). Prevalence and factors associated to low back pain among hospital staff. Joint Bone Spine, 72(3), 254-259.

Bogduk, N. (2006). Psychology and low back pain. International Journal of Osteopathic Medicine, 9(2), 49-53.

Boyraz, I., Duran, A., Koc, B., Erkuran, M. K., Sarman, H., Yazici, S. (2015). The demographic characteristics of patients admitted to the emergency due to low back pain. Acta Medica Anatolia, 3(1), 17-23.

Cecchi, F., Negrini, S., Pasquini, G., Paperini, A., Conti, A., Chiti, M., Molino-Lova, R. (2012). Predictors of functional outcome in patients with chronic low back pain undergoing back school, individual physiotherapy or spinal manipulation. Eur J Phys Rehabil Med, 48(3), 371-378.

Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J. T., Shekelle, P., Owens, D. K. (2007). Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Annals of Internal Medicine, 147(7), 478-491.

Corcoran, K. L., Dunn, A. S., Formolo, L. R., Beehler, G. P. (2017). Chiropractic management for us female veterans with low back pain: A retrospective study of clinical outcomes. Journal of Manipulative and Physiological Therapeutics, 40(8), 573-579.

Corp, N., Mansell, G., Stynes, S., Wynne-Jones, G., Morsø, L., Hill, J. C., van der Windt, D. A. (2021). Evidence-based treatment recommendations for neck and low back pain across Europe: A systematic review of guidelines. European Journal of Pain, 25(2), 275-295.

Çöçelliü, L. P., Neslihan, A., Ganidağlı, S., Görgü, A., Oyucu, S., Ünsal, Ö. (2009). Ağrı kliniğimize başvuran hastalarımızın 2001-2007 tarihleri arasındaki retrospektif değerlendirmesi. Gaziantep Medical Journal, 15(2), 66-72.

Dunn, A. S., Green, B. N., Formolo, L. R., Chicoine, D. (2011). Retrospective case series of clinical outcomes associated with chiropractic management for veterans with low back pain. Journal of Rehabilitation Research & Development, 48(8), 927-934.

Globe, G., Farabaugh, R. J., Hawk, C., Morris, C. E., Baker, G., Whalen, W. M., Augat, T. (2016). Clinical practice guideline: chiropractic care for low back pain. Journal of Manipulative and Physiological Therapeutics, 39(1), 1-22.

Güven, M. B., Çırak, B., Işık, H. S., Kıymaz, N. (1999). Lomber disk hernilerinde retrospektif bir çalışma. Van Tıp Dergisi, 6(1), 20-23.

Haas, M., Vavrek, D., Peterson, D., Polissar, N., Neradilek, M. B. (2014). Dose-response and efficacy of spinal manipulation for care of chronic low back pain: a randomized controlled trial. The Spine Journal, 14(7), 1106-1116.

Hurwitz, E. L., Li, D., Guillen, J., Schneider, M. J., Stevans, J. M., Phillips, R. B., Vassilaki, M. (2016). Variations in patterns of utilization and charges for the care of low back pain in North Carolina, 2000 to 2009: A statewide claims' data analysis. Journal of Manipulative and Physiological Therapeutics, 39(4), 252-262.

İçağasıoğlu, A., Yumuşakhuylu, Y., Ketenci, A., Toraman, N. F., Karataş, G. K., Kuru, Ö., Haliloğlu, S. (2015). Kronik bel ağrısının türk toplumuna maliyeti. Turkish Journal of Physical Medicine & Rehabilitation/Turkiye Fiziksel Tip ve Rehabilitasyon Dergisi, 61(1), 58-64.

Kıymaz, N., Mumcu, Ç., Arslan, M. (2003). Nöroşirürji polikliniğine başvuran bel ev/veya bacak ağrılı hastaların değerlendirilmesi. Tıp Araştırmaları Dergisi, 1(1), 9-12.

Kul M. (2019). Bel ağrısının nadir bir nedeni: Böbrek tümörü. Uluslararası Katılımlı 27. Fiziksel Tıp ve Rehabilitasyon Kongresi, Sözel Bildiri, 17-21 Nisan, Titanik Belek Kongre Merkezi, Antalya.

Narin, S., Bozan, Ö., Cankurtaran, F., Bakırhan, S. (2008). Kronik bel ağrılı hastalarda fizyoterapi programının fonksiyonel kapasite ve yaşam kalitesi üzerine etkisi. Dokuz Eylül Üniversitesi Tıp Fakültesi Dergisi, 22(3), 137-143.

Nelson, C. F., Metz, R. D., LaBrot, T. (2005). Effects of a managed chiropractic benefit on the use of specific diagnostic and therapeutic procedures in the treatment of low back and neck pain. Journal of manipulative and physiological therapeutics, 28(8), 564-569.

Nerlich, A. G., Schleicher, E. D., Boos, N. (1997). 1997 Volvo Award Winner in Basic Science Studies: Immunohistologic markers for age-related changes of human lumbar intervertebral discs. Spine, 22(24), 2781-2795.

Nyiendo, J., Haas, M., Goodwin, P. (2000). Patient characteristics, practice activities, and one-month outcomes for chronic, recurrent low-back pain treated by chiropractors and family medicine physicians: a practice-based feasibility study. Journal of Manipulative and Physiological Therapeutics, 23(4), 239-245.

Oliphant, D. (2004). Safety of spinal manipulation in the treatment of lumbar disk herniations: a systematic review and risk assessment. Journal of Manipulative and Physiological Therapeutics, 27(3), 197-210.

Rubinstein, S., Pfeifle, C. E., van Tulder, M. W., Assendelft, W. J. (2000). Chiropractic patients in the Netherlands: A descriptive study. Journal of Manipulative and Physiological Therapeutics, 23(8), 557-563.

Soysal Gündüz, Ö. (2011). Lumbar disk hernisi tanısı ile opere olan hastalarda inflamatuvar bel ağrısı, sakroiliit ve spondiloartropati grubu hastalıkların sıklığı. (Tıpta yandal uzmanlık tezi). Dokuz Eylül Üniversitesi, İzmir.

Stevens, G., Campeanu, M., Sorrento, A. T., Ryu, J., Burke, J. (2016). Retrospective demographic analysis of patients seeking care at a free university chiropractic clinic. Journal of Chiropractic Medicine, 15(1), 19-26.

Stig, L.-C., Nilsson, Ø., Leboeuf-Yde, C. (2001). Recovery pattern of patients treated with chiropractic spinal manipulative therapy for long-lasting or recurrent low back pain. Journal of Manipulative and Physiological Therapeutics, 24(4), 288-291.

Suyabatmaz, Ö., Çağlar, N. S., Tütün, Ş., Özgönenel, L., Burnaz, Ö., Aytekin, E. (2011). Kronik bel ağrılı hastalarda bel okulunun etkinliğinin araştırılması. İstanbul Med J, 12, 5-10.

Takatalo, J., Karppinen, J., Niinimäki, J., Taimela, S., Näyhä, S., Järvelin, M.-R., . . . Tervonen, O. (2009). Prevalence of degenerative imaging findings in lumbar magnetic resonance imaging among young adults. Spine, 34(16), 1716-1721.

Temiztürk, F., Temiztürk, Ş., Özkan, Y., Özgüzel, H. (2015). Bel ağrılı hastalarda klinik muayene bulguları ve manyetik rezonans görüntüleme bulguları arasındaki ilişkinin araştırılması. Kocatepe Tıp Dergisi, 16, 110-115.

Türkiye İstatistik Kurumu (TUİK). (2020). Türkiye Sağlık Araştırması 2019. https://data.tuik.gov.tr/Bulten/Index?p=Turkey-Health-Survey-2019-33661 adresinden 18.01.2022 tarihinde erişildi.

Ünde Ayvat, P., Aydın, O. N., Oğurlu, M. (2012). Algoloji polikliniğine başvuran bel ağrılı hastaların risk faktörleri. Ağrı, 24(4), 165,170.

Weeks, W. B., Leininger, B., Whedon, J. M., Lurie, J. D., Tosteson, T. D., Swenson, R., Goertz, C. M. (2016). The association between use of chiropractic care and costs of care among older Medicare patients with chronic low back pain and multiple comorbidities. Journal of Manipulative and Physiological Therapeutics, 39(2), 63-75. e62.