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Original Research Article

The assessment of pain, flexibility and daily activity level in the patients who had facet tropism

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ABSTRACT

Background: The aim of this study to investigate the relationship between asymmetric angular value in lumbar facet joints and pain, flexibility and daily activity level.
Methods: The study included 51 patients with complaint of low back pain (LBP) and underwent lumbar magnetic resonance imaging. Facet joint angle measurements of L4-L5 and L5-S1 were measured. Visual analogue scale (VAS) was used for severity of pain. Joint range of motions (ROM) was measured via goniometry. Body extensibility measurements were performed via body hyperextension test. The Nottingham health profile scale was used to assess daily activity level of individuals.
Results: The VAS values of patients with tropism were significantly higher (p=0.016). There wasn't significance difference in ROM and flexibility (p=0.784). In patient group with facet tropism, there was limit of lateral flexion towards the side where the facet joint angle was larger than the control group (p=0.002). There was no significant difference between daily activity levels of both groups (p=0.755).
Conclusions: Pain severity of facet tropism patients is higher. Patients with facet tropism had lateral flexion restriction. In the light of these findings, when the lateral flexion limitation is detected in individuals with complaints of pain without discopathy, it's necessary to make MR measurements in differential diagnosis by considering facet joint tropism, and to plan physiotherapy and rehabilitation programs. As a result, tropism should be questioned in patients suffering from LBP and limited lateral flexion. There is need for studies in which different evaluation and treatment methods are applied for tropism.

Keywords: Facet joint, Tropism, Daily activity level, Pain, Flexibility, Low back pain

INTRODUCTION

The facet joint carries up to 33% of the axial loading in movement of extension.[1] The facet joints in lumbar spine have a closer orientation to sagittal plane compared to other parts of the spine and are more powerful in lateral flexion movements.[2] The lumbar facet joints form the locking mechanism that prevents torsional forces from slipping or buckling the vertebral bodies by providing stabilization during flexion and extension movement.[2]

Facet joint tropism (FJT) is called asymmetry in facet joint angles of lumbar and lumbosacral regions.[3] and causes some changes in the normal mechanical properties of spine.[4] It has been reported that the incidence in general population is 20-40%.[5] An increase in FJT values was found from L4-L5 to L5-S1.[2]

The diagnosis of FJT is diagnosed by anterior-posterior direct radiographs or advanced imaging methods in individuals (magnetic resonance imaging (MRI),

computed tomography).[6] FJT was determined on the right and left facet joint angle (FJA) in all groups with axial MRI measurements. Considering the average values of facet joint angles groups were formed. According FJT average value, FJT is classified as mild, severe.[7] (none FJT <7°, mild FJT 7°-13°, severe FJT >13°).

Overwieving the literature we noticed that the anthropometric studies were the main bulk.[2] We did'nt find any study examining the relationship between pain intensity, flexibility and daily living activity level in individuals with FJT. This study gave an opportunity to compare pain severity, flexibility and daily living activity levels of patients with and without FJT.

METHODS

Individuals

The study included 51 individuals who admitted to Sultan Abdulhamid Han training and research hospital with low back pain and who had been applied the lumbar MRI. The study was carried out between February 2018 and February 2019. The participants were chosen among volunteer. At the end of the evaluation, there were two groups which were 24 patients (13 females, 11 males) with FJT and 27 (14 females, 13 males) without FJT.

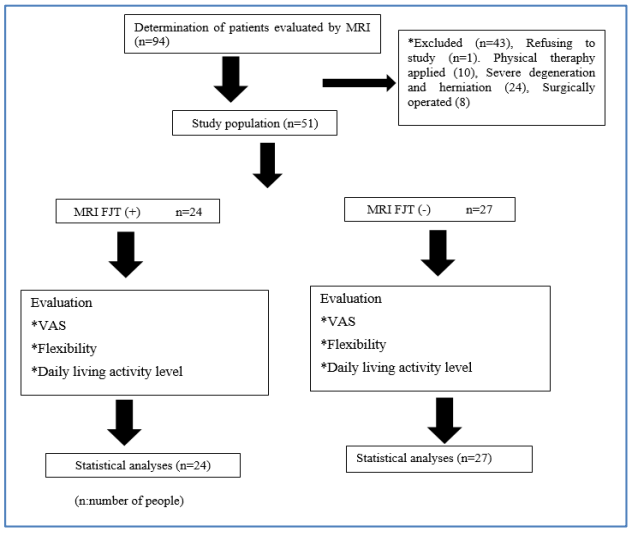

Figure 1: Application flow chart of the research.

Patients between the 20-50 years old with low back pain who were applied lumbar MRI were included in the study. The exclusion criterian was having neuropathic-discopathic problem, physical therapy at least 6 months, trauma history, posterior column anomalies (scoliosis, lordosis), spina bifida, myofascial pain syndrome, fibromyalgia or systemic genetic disorders. All patients had given the informed consent to allow their information to be used in research purposes. The study was approved by the ethics committee. A form with demographic information was filled by volunteers. In this form, information about the age, gender and inclusion criteria were included. The application flow chart created using the consort diagram is shown in (Figure 1).[8]

Study design

The study was a prospective case control study.

Evaluation of pain severity level

Visual analogue scale was used to determine pain intensity of patients. At this criterion; 0 point indicate that there isn't pain and 10 points indicate that there is unbearable pain. The two ends of the parameter to be evaluated at the two ends of 100 mm line were written and we asked the patient to specify a line on the line where patient's condition was appropriate. So we've determined how painful the person has.[9,10]

Evaluation of flexibility

For body extension flexibility assessment, the individuals face the wall and the pelvis and the trunk are positioned in contact with the wall. The distance between sternal notch and wall was measured. Then, the patient pushes the trunk back from the waist. At the last point, the distance between sternal notch and wall was measured again. The difference between the two values was recorded in cm. The measurement was repeated three times and the highest value was used in statistical analysis.

Evaluation of normal joint motion

The pivot point was placed based on the lumbosacral joint. The fixed arm was held perpendicular to lateral side of femur. The moving arm followed the lateral midline of the trunk towards the axilla. Lean forward and backward was asked from patient. During the measurement, care was taken to avoid movement of the hip joint. In the lateral flexion goniometric measurements, the patient was standing with his back facing us. The pivot point was placed at the midpoint of the lumbosacral joint. Fixed arm was placed spina iliaca and parallel to the ground and the patient was asked to lean to the left and right side separately.[11]

Evaluation of daily life activity

Nottingham health profile questionnaire was used to evaluate daily life activity. Daily life activity questions were asked about some problems people face in their daily life. We used this questionnaire because it was a scale with Turkish validity.[12] In the evaluation of the scale, low scores were affected by the disease and high scores were interpreted as being highly affected.

Evaluation of facet tropism angle

MRI device used in the study was examined on 1.5 T MRI device (Siemens, area, Earlengen, Germany) and 4

mm in thickness. MRI measurements were made in L4-L5 to L5-S1 levels in this study due to most of literature involved this level. From the mid-level of the intervertebral disc, the right and left facet joint angle of individuals is similar to the method used by Do et al.[21] FJA was measured bilaterally by drowing lines passing through the vertebral edges against midsagittal line. According to FJA mean value.[9] it was classified as none FJT ≤7°, mild FJT 7°< FJT ≤13°, serious FJT FJT >13°.

Statistical evaluation

Data were analyzed using SPSS 24 for windows (SPSS Inc., Chicago, Illionis) program. The frequency, arithmetic mean and standard deviations of the demographic and physical characteristics of the subjects were determined. Comparative pain, flexibility, range of motion and daily living activities of patients with tropism and non-tropic patients were compared using indepented T-test. Tropism of angular size of the group of patients with tropism, pain, flexibility and daily life were compared with the correlation test. Significance level was accepted as p<0.05.

RESULTS

24 patients had FJT present at the L4-L5 level; 9 of them did not have FJT 15 mild FJT. At the level of L5-S1 there was no 9 FJT presence of 15 mild FJT. 6 patients had mild FJT at the both levels. Table 1 shows the characteristics of the group with and without FJT. The mean age of patients with FET is 34.63±12.28, mean age of patients without FET It was 30.48±10.26.

The severity of the pain (VAS)

Pain scores of patients with and without FJT were measured by independent T-test. Pain values are shown in (Table 2). The pain values of the individuals with FJT were found to be significantly higher than those without (p=0.016).

Table 1: Features of the group with and without facet tropism.

Variables	Tropism positive (n=24)	Tropism negative (n=27)
Male	11	13
Female	13	14
Age in years (mean±SD)	34.63±12.229	30.48±10.263

SD: Standard deviation, n: Number of people, m: Mean.

Table 2: Evaluation of pain severity.

	Grops	N	Mean±SD	P value
VAS	Without tropism	27	5.48±2.064	0.016
	With tropism	24	6.88±1.895	

VAS: Visual analogue scale, SD: Standard deviation, N: Number of people, p: Significance level.

Evaluation of flexibility measurement

Statistical analysis of the elasticity measurement of patients with and without FJT was measured by independent T-test. When the goniometric measurements and flexibility of the groups were compared, there was no significant difference in flexion, extension and lateral flexion joint range and flexibility (p>0.05). According to the patients with FJT, there was a significantly limited range of motion in the right or left lateral flexion to the side where the angular value was large (p=0.002). Normal joint movement values are shown in (Table 3). The numerical values of patients with and without unilateral lateral flexion limitation are shown in (Table 4).

Table 3: Evaluation of flexibility measurement.

	Groups	N	Mean±SD	P value
Flexion (degree)	Without tropism	27	71.30±22.557	0.786
	With tropism	24	69.63±20.911	
Extension (degree)	Without tropism	27	28.04±8.972	0.153
	With tropism	24	24.79±6.672	
Right lateral flexion (degree)	Without tropism	27	29.26±7,9 30	0.735
	With tropism	24	28.46±8.876	
Left lateral flexion (degree)	Without tropism	27	27.93±6.765	0.840
	With tropism	24	27.46±9.623	
Flexibility difference (cm)	Without tropism	27	6.689±2.6249	0.784
	With tropism	24	6.428±4.0730	

SD: standard deviation; N: number of people; cm: santimetre; MRI: mgnetic resonance imaging; p: significance level.

Table 4: Lateral flexion symetrical measurement measurement.

	Groups	N	Mean±SD	P value
Unilateral flexion limitation (degree)	Without tropism	27	1.30±107.465	0.002
	With tropism	24	1.71±0.464	

SD: standard deviation; N: number of people; p: significance level.

Evaluation of daily living activity level

The daily living activity level of patients with and without FJT was measured by independent t test. There was no significant difference between the two groups (p=0.755). The daily living activity values of Nottingham are shown in (Table 5).

Evaluation of facet tropism angle

Angular values of patients with tropism were measured by correlation test. No significant difference was found between angular values of FJT and pain severity, flexibility and daily living activity level. The values of the evaluation of facet tropism angle are shown in (Table 6).

Table 5: Daily living activity.

Groups	N	Mean±SS	P value
Without tropism	27	166.63±107.32	**0.755**
With tropism	24	176.26±111.99	

SD: standard deviation; N: number of people; DLA: daily living activity; p: significance level.

Table 6: Evaluation of facet tropism angle.

Variables	N	Mean average±SD	L4-L5 asymetrıc degree	L5-S1 asymetrıc degree
Flexion (degree)	24	69.63±20.911	0.311	0.182
Extansion (degree)	24	24.79±6.672	0.635	0.907
Right lateral flexion (degree)	24	28.46±8.876	0.138	0.621
Left lateral flexion (degree)	24	27.46±9.623	0.551	0.374
Flexibility difference (cm)	24	6.42±4.0730	0.081	0.448
Nottingham DLA score	24	176.257±111.9923	0.444	0.140
VAS	24	6.88±1.895	0.867	0.657

SD: Standard deviation; N: number of people; p: significance level; cm: santimetre; VAS: visual analog scale.

DISCUSSION

This study was performed to compare pain, flexibility and daily living activity levels of patients with and without FJT. Our study was inspired by the current literature and the patient group was studied at L4-L5, L5-S1 levels in which FJT and disc degeneration were studied most.[13-16] Pain, flexibility and normal range of motion levels were also evaluated in individuals with mild FJT, and the relationship between pain and daily activity level was evaluated. Since we excluded patients with discopathy from the study, we had the opportunity to evaluate the isolated relationship between FJT angle and flexibility. The most important primary finding of the study is the limited lateral flexion on the side with FJT. The second finding is that patients with tropism have higher pain intensity.

In literature, Rong et al, demonstrated that biomechanical forces such as flexion-extension via increasing intradiscal pressure may cause disc degeneration in the facet tropism model, especially at C5-C6 level.[17] Lumbar facet joints have an important place in the control of the movement of the spine.[18] Our study is the first study evaluating FJT and rotational movements at lumbar level. In our study, lateral flexion joint motion range was asymmetrically restricted in individuals with FJT. The lateral flexion was limited in the joint movement. In the literature, we could not find a study examining the relationship of FJT with flexibility and normal joint movements. In our study, there was no significant difference in the range of motion and flexibility between tropism positive and negative groups. This may be due to the fact that our participants were having mostly mild degree of tropism. There is a need to study patients with more severe facet joint tropism to assess flexibility.

One of the causes of low back pain is facet joint pain. Axial loads applied to asymmetric joints in facet tropism; it may cause facet-centered pain during flexion, extension or rotational movements.[19] In the literature, the study of Schlengier et al, emphasizing that posterior elements of the spine are important in the development of pain will be able to distinguish between FJT-pain relationship and pain associated with disc.[20]

herniation, except for studies by Do et al, on the relation of FJT, discopathy and related lumbar back pain.[21] We did not find any study. In our study, we determined that the pain of FJT patients in the individuals who were excluded from discopathy was higher than those without FJT. In this study, it should be considered that facet joint tropism may be present in the evaluation of patients with low back pain.

Today, low back pain is a common condition for people. It is known in the literature that individuals with low back pain affect daily living activity levels.[22] Low back pain affects people's daily life activities negatively. In the low back pain; walking, bending, weight lifting, travel, social life, clothing and sexual relations of the person affects many activities.[23] However, we found that patients with FJT had no effect on their daily activities despite the pain. We found no similar study to compare these results. The reason for this is that the patients in the study group may have mild FJT or have mechanical back pain in both groups. In addition, we could not find any studies explaining the relation of angular values of FJT with the pain. In our study, no significant difference was found

between the angular values of tropism and pain severity, flexibility and daily living activity level. Further studies are needed to evaluate the angular value.

CONCLUSION

Pain severity of FJT patients is higher than that of non-tropism patients. When the goniometric measurements of the groups were compared, patients with FJT had lateral flexion restriction towards the angular value. When the hyperextension elasticity of the groups was examined, there was no significant difference between the two groups.

Considering the effect of FJT presence on daily living activity level, in our study, the average of the total score of daily living activity in the presence of FJT is higher. These findings were not significant although they were found to be more affected by the disease.

In the light of these findings, when the lateral flexion limitation is detected in individuals with complaints of pain in the clinic without discopathy, it is necessary to make MRI measurements in the differential diagnosis by considering FJT, and to plan physiotherapy and rehabilitation programs suitable for those with tropism.

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