International Journal of Sciences & Applied Research

www.ijsar.in

To study the prevalence of Latissimus Dorsi tightness in patients with mechanical low back ache

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Abstract

Introduction: Mechanical low back pain is acute or sub-acute in nature and doesn't radiate below knee. Latissimus dorsi being the largest muscle of the back plays vital role in pathomechanics of mechanical low back pain.

Objectives: To establish prevalence of latissimus dorsi tightness in patients with active mechanical low back pain.

Materials and Methods: 100 subjects having active mechanical low back pain were selected. Prior to selection,subjects were assessed for tightness of pectoralis major, pectoralis minor and teres major. Subjects having positive test for these muscles were not included in sample size. Latissimus dorsi length test was then carried out using pressure biofeedback unit.

Result: The prevalence of latissimus dorsi tightness was studied based on side involvement, Ipsilateral involvement: 61%, Contralateral involvement: 12%, No involvement: 27%.

Discussion: Studies conclude that alteration in trunk muscles occur to reduce noxious stimuli by limiting range of motion [(1).] A decrease in length or increase in stiffness of latissimus dorsi can lead to alterations in movement patterns and postures which cause exacerbation of low back pain.

Conclusion: There is a prevalence rate of 73% for latissimus dorsi tightness in active mechanical low back pain patients.

Keywords: Mechanical low back pain, latissimus dorsi muscle, pressure biofeedback unit, latissimus dorsi length test

Introduction

Mechanical low back pain is any unilateral pain with no referral below knee probably caused by injury to muscles (strain), ligament (sprain), the facet joint, or in some cases sacroiliac joint.The pain commonly refers to buttocks and thighs. Maximum stiffness is experienced while waking up in morning.[(1)]Since a substantial portion of latissimus dorsi lie in the lower back region, tightness of this muscle could be a contributing factor in low back pain. Considering it the largest muscle of back, its

participation in majority of the functional activities is hypothesized. Studies suggest that latissimus dorsi plays an important role in basic back activities such as trunk extension and rotation [2] Muscle tension is usually inversely related to the muscle length, meaning increase in muscle tension can cause decrease in muscle length. A decrease in length or an increase in stiffness of this muscle can lead to alterations in movement patterns and/or postures which can cause an increase in low back pain. [3] Latissimus dorsi length test determines the functional length of the muscle and hence help in assessment of muscle flexibility.

MATERIALS AND METHOD:

A case control prevalence study was carried out at Dr. D.Y.Patil College of Physiotherapy, Pune on subjects having active mechanical low back pain within the age group of 20-40 yrs. Inclusion criteria for subjects was unilateral dominant pain presentation and acute or sub-acute types of pain presentation. Exclusion criteria for subjects was presence of spondylolysis, spondylolisthesis, vertebral fracture, infection of spine, shoulder pathology, tightness of pectoralis major, pectoralis minor and teres major.

Hundred subjects were selected for the study through the screening test, each with primary complaint of low back ache. Motive and procedure of the study was explained to the subjects. To gain more accuracy on the latissimus dorsi length test, tightness of the agonists was assessed [4].Therefore subjects were assessed for teres major (**Fig.1)**, pectoralis major (**Fig. 2**)and pectoralis minor (**Fig. 3**) tightness. [5]The subject was placed in hook lying position, pressure biofeedback unit was placed under the lumbar spine and inflated to a baseline of 40 mmHg. Subject was asked to fully elevate the arm through forward flexion and perform posterior pelvic tilt while the pressure on the device will be observed by the therapist [6]. The pressure level was not permitted drop from 40 mmHg throughout the test in order to eliminate the changes in lumbar lordosis [7, 8].Length of latissimus dorsi was estimated bilaterally using a standard measuring tape in the test positions described by Kendall.Latissimus dorsi tightness was determined by measuring the distance between the lateral epicondyle and plinth [9, 10]. (**Fig**. **4)**

Figure No. 1

Figure No. 2

Figure No. 3

Figure No. 4

RESULTS

A total of 100 subjects were included to study the prevalence of latissimus dorsi tightness in patients having mechanical low back pain. Following are the results obtained:

1. The age of sample population ranged from 20 – 40 yrs. Age group of 20 – 25 showed maximum incidence while age group of 31 – 35 yrs. showed minimum incidence of mechanical low back pain.(Fig. 5)
2. On statistically analyzing the readings obtained, considering the involved side, an arithmetic mean of 12 and an arithmetic median of 13 was obtained. The highest value being 28 and lowest being 0. This data suggests that a mean reading of 12cm of tightness was obtained. (Figure No. 6)

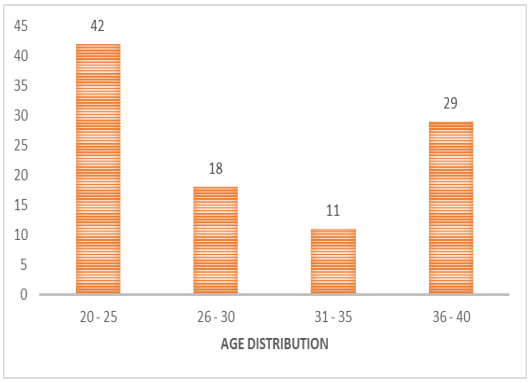

Figure No. 5

3. The two tailed probability was tested for the obtained data using the Wilcoxon test, A p value of less than 0.0001 was obtained.
4. The prevalence of latissimus dorsi tightness was then studied based on the side involvement, following are the findings: (Figure No.7). Ipsilateral involvement: 61%. Contralateral involvement: 12%. No involvement: 27%

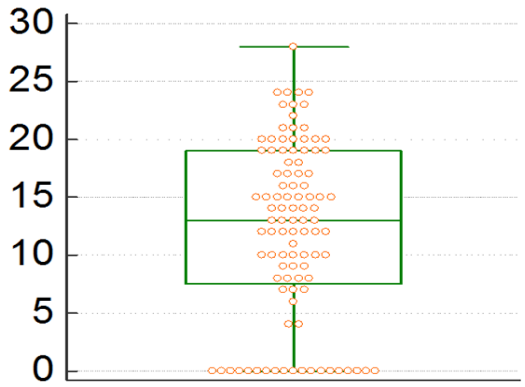

Figure No. 6

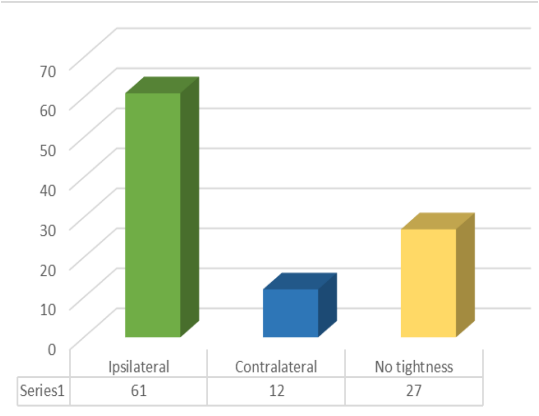

Figure No. 7

DISCUSSION

Mechanical low back pain have varied etiological factors and an exact cause of this condition cannot be determined most of the times. Previous studies put forward primary causes of mechanical low back pain which include poor posture, poorly-designed

seating, incorrect bending and lifting motion, prolonged standing, prolonged sitting, and strenuous activities. Abnormal recruitment of musculature and muscle strains majorly contribute to the pain. A study was done previously which elaborated on muscle recruitment in low back patients. It was concluded that the alterations in trunk muscle recruitment in patients are functional in that they reduce the probability of noxious tissue stresses by limiting range of motion and providing stabilization to the spine [11]

Latissimus dorsi in association with thoracolumbar fascia helps in force distribution. Studies have suggested that the posterior layer of thoracolumbar fascia which is formed through latissimus dorsi can effectively contribute to low back pain [12].

Latissimus dorsi connects upper limb to the pelvis and contributes in many strenuous activities. Although studies being limited, a study on role of latissimus dorsi in twisting of trunk provides evidence that it does significantly contribute to the action. Another study carried out concluded that latissimus dorsi muscles are more recruited in loading and truck flexion than on standing. [13]

In this study prevalence of latissimus dorsi tightness in mechanical low back pain was found. However, since Latissimus dorsi length test has low to moderate reliability, therefore few assessments were added during the study. Latissimus being a very widespread muscle has many synergistic muscles such as pectoralis major, pectoralis minor and teres major at the shoulder. To gain more accuracy for the results, samples having tightness of the previously mentioned muscles were excluded from the study. A previous study on latissimus dorsi state that if the muscle is tight there will be increase in lumbar lordosis while performing full overhead shoulder flexion. Therefore while testing, a pressure biofeedback unit was placed to observe the changes in lumbar lordosis. Tightness was seen on both ipsilateral and contralateral sides in samples. Tightness on the ipsilateral side supported the findings in the previous study that latissimus dorsi takes part in kinematical chain and can contribute to low back pain. [14]

Latissimus dorsi tightness can either be a cause or an impairment resulting from mechanical low back pain; in either of the cases it is important to notice the changes in this muscle and work on it while managing mechanical low back pain. Thus emphasizing the importance of latissimus dorsi involvement in mechanical low back pain mechanism.

ACKNOWLEDGMENT

I would like to thank the principal Dr.Tushar Palekar, Ph.D. and my guide Dr. Parita Kothari, PT. for their guidance and encouragement throughout the study. I would also like to thank Internship incharge, all my teachers, the physiotherapy department staff, the registration staff and my colleagues for their cooperation and help during the course of my study.

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