Original Article

Gender based differences in core muscle strength, back disability and range of motion in patients with mechanical low back pain

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Objective: To determine the gender differences in Core Muscles Strength, Back Disability, and Range of Motion in patients with mechanical low back pain.

Methodology: This comparative cross-sectional study was conducted at Fauji Foundation Hospital and Pakistan Railway and General Hospital, Rawalpindi from February to June 2019. Purposive non-probability convenient sampling was used for recruitment of 107 patients (57 males and 50 females). Data were collected through a structured questionnaire. Oswestry Disability Index (ODI) and the instruments used were modified sphygmomanometer and inclinometer. Data were analyzed by SPSS 21.

Results: A significant relation of core muscles strength between the two genders was seen in the prone position ($p = 0.000$), with the mean rank 63.77 and 42.86 in males and females, respectively.

Conclusion: Males exhibited greater core strength as compared to females in the prone position but no differences were seen in terms of disability and range of motion.

Keywords: Core muscle strength, disability, gender differences, mechanical low back pain, range of Motion.

INTRODUCTION

Low back pain (LBP) is defined as pain located in the posterior aspect of the body between the margin and the inferior gluteal folds, with or without radiating component.[1] It may be classified as acute (lasting less than 6 weeks) or chronic (lasting more than 12 weeks).[2] Incidence of LBP increase with age.[3,4] The pain is exacerbated by weak core muscles that include tranversus abdominis, external obliques, internal oblique and diaphragm.[5] This is because if the core muscles of the body are not able to sufficiently support the body, the compressive forces put more stress on the structures of the lower back, which can lead to pain and inflammation. The use of core muscle strength and stability training for the treatment of LBP is very well known.[5]

Gender differences in sensitivity to painful stimuli may lie in the biological mechanism between the two genders.[6,7] Older adults with chronic low back pain (cLBP) exhibited limited lumbar mobility compared to those without pain.[8] Knowing the gender differences can help professionals to tailor-made specific interventions to meet the needs of the patients. Women are more prone to poly-pharmacy of analgesic medications and exhibited an increased rate of treatment cessations due to adverse effects.[9] Although pain and disability are often, less severe, underlying changes in trunk behavior may be responsible for recurrence.[10] The aim of this study was to determine these gender differences in LBP.

METHODOLOGY

This comparative cross-sectional study was conducted on 107 in-patients of mechanical LBP at Fauji Foundation Hospital (FFH) and Pakistan Railway General Hospital (PRGH) Rawalpindi, Pakistan from February to June 2019. We used non-probability convenience sampling. The inclusion criteria were age 18 – 65 years with clinically diagnosed mechanical LBP. Patients having back pain due to non-mechanical causes and neurological deficits were excluded. The sample size was calculated using Raosoft. The Foundation University Ethical review committee approved the study and all participants signed an informed consent.

The Oswestry disability index (ODI) was used to assess functional disability. The ODI consists of 10 questions having 6 options each with a range of score 0 – 6. Each question has maximum score of 5 marks. Total score is calculated in the form of percentages that range from 0-100. To calculate total score, the sum of all the responses is taken, divided by a total possible score of 50, and then multiplied by 100. The score obtained then is in the form of a percentage ranging from 0 – 100. This resulting score is further classified into five categorized:

Minimal disability (0 – 20%), Moderate disability (21 – 40%), Severe disability (41 – 60%), Crippled (61 – 80%), and Bedbound (81 – 100%).

A modified aneroid sphygmomanometer was used to assess the dynamic strength of lower back musculature and abdominal core muscles. Stability of core muscles was assessed beforehand by adding known weights to the cuff. Dynamic strength of core muscles was assessed in two positions: supine and prone. For the dynamic strength of the low back musculature the patient was asked to lie comfortably on the couch in the supine position. The cuff of the modified sphygmomanometer was placed under the lumbar region. Mercury level was set at 40 mmHg and the participant was asked to flex the abdominal muscles.

Statistical Analysis: Data were analyzed using SPSS version 21.

Table 1: Gender-based differences in core muscle strength in prone and supine positions.

Variable	Gender	Median (IQ)	Mean Ranks	p-value
Prone DS	Males Females	8.00 (6) 3.00 (6)	63.77 42.86	***0.000**
Supine DS	Males	2.00 (2)	57.37	0.218
	Females	2.00 (4)	50.16	
Range of Motion (ROM)				
Flexion	Males Females	9.00 (14) 7.00 (13)	59.35 47.90	0.056
Extension	Males	8.00(11)	53.92	0.978
	Females	7.50 (22)	54.09	
Lateral Flexion (R)	Males	6.00 (11)	57.93	0.161
	Females	4.50 (12)	49.52	
Lateral Flexion (L)	Males	5.00 (13)	52.58	0.612
	Females	6.00 (13)	55.62	

DS = Dynamic Strength, IQ = Interquartile, R = Right, L = Left

RESULTS

Out of 107 patients, 57 (53.3%) were male and 50 (46.7%) females. There was is a significant difference in the core muscle strength in the prone position between males and females ($p = 0.000$), whereas no significant results were seen in the core muscle strength in supine position ($p = 0.218$) between males and females (Table 1).

ODI showed that 64.9% of males exhibited moderate disability, 17.7% showed severe disability, 8.8% for minimal disability and same 8.8% for crippled. It is important to note that 0% males were bed-bound. For the Range of Motion (ROM), no significant results were seen between the two genders. No significant findings were found in flexion, extension and lateral rotations.

DISCUSSION

Our study showed that core muscle strength in a prone position was greater in males as compared to females. However, the core muscle strength in the supine position showed no significant difference between the genders. In contrast, a study showed that the cross-sectional area of multifidus muscles was greater in males when compared to females and dissimilarity in core muscle strength could be attributed to the difference in core muscle strength seen in individuals suffering from LBP.[6]

A previous study showed that males exhibited greater lumbar ROM as compared to females due to differences in sitting and standing patterns.[9] In patients with LBP, the VAS, ODQ and QUE scores were significantly higher and the pain duration was significantly longer in the specific LBP group.[11]

LBP still ranks as the second leading cause of pain in China.[12] A study showed that males exhibited a higher pain tolerance than females, but in comparison to our study it shows no such difference between the two genders.[13] Estrogen has a complex and multifaceted effect on pain perception which needs to be further researched before any conclusion can be drawn on the pain differences between the two genders.[14]

The study demonstrated that the CORE exercise program was effective in decreasing pain and increasing AROM in patients with cLBP.[15] Lumbar flexion differentiated patients with acute LBP and controls, whereas cervical flexion differentiated patients with acute NP and controls. This study supports a tendency of the affectation of other spinal regions when only one is affected.[16]

CONCLUSION

Males exhibited greater core strength as compared to females in the prone position, but in the supine position, there were no such differences between the two genders. Similarly, there is no difference shown in back disability and range of motion.

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