

Hip Rotation Range of Motion: A Comparison between Healthy Individuals and Patients with Chronic Low Back Pain

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ABSTRACT

Impairment in hip rotation range of motion (ROM) has been postulated as a predisposing mechanical factor in the development of chronic low back pain (CLBP). The purpose of this study was to compare internal and external rotation ROM of the hip in patients with CLBP with those of healthy individuals. The ROM measurements of 40 patients with intervertebral disc prolapse were compared to 100 healthy subjects. ROM was measured using a universal goniometer in prone position. Data of the two groups was compared using the independent samples t-test. The results of the study demonstrated that patients with CLBP had excessive hip rotation ROM as compared to healthy subjects. It was also noted that the average lateral rotation ROM exceeded that of medial rotation in both groups. Additional studies in this area will further strengthen the programmes of physical therapists to help relieve and avoid the incidence of low back pain.

Key words: *hip joint, low back pain, range of motion, rotation*

INTRODUCTION

Chronic low back pain (CLBP) is characterised as pain lasting for more than 12 weeks. It is one of the most widespread ailments afflicting both developed and developing countries. [1] More than 50% of

the general population is influenced by this condition and about 70% of adults are reported to experience at least one episode of low back pain in their lifetime. [2] The precise cause of CLBP has not yet been determined, considering its negative correlation with physical conditioning.

The biopsychosocial nature of CLBP recognises it as a multidimensional problem. [3-5] It is important to identify potential contributing factors in order to resolve the problem of this disabling condition. [5] Among different etiological factors, mechanical factors play a vital role in the progression and persistency of symptoms associated with CLBP. [6] Considering the anatomical similarity of the hip joint and lumbopelvic areas, a number of studies have focused on the association between the mobility of the hip joint and low back pain. [7-9]

Hip joints are the intersegmental components that form a kinematic chain between the lumbopelvic and knee joints. The operation of this complex is synchronised during functional and recreational physical activities. [10-12] Owing to this connection, impairments in hip rotation range of motion (ROM) contribute significantly in CLBP dysfunction. [12,13]

The results from observations of active hip rotation motion and LBP are conflicting. Limited hip rotation is well documented in different categories of LBP patients. [7,14,15] However, Mellin identified no differences between men with and without CLBP for active hip medial or lateral rotation. Cibulka et al. also reported a specific pattern of passive hip rotation movement in individuals with CLBP in which hip external rotation was significantly greater than internal rotation on the affected side. [15] In view of this discrepancy in findings, the purpose of the current study was to examine whether active hip rotation ROM differed between people with and without LBP. The results of this study may help contribute to the growing evidence of CLBP and its rehabilitation strategies.

MATERIALS AND METHODS

Two groups of subjects participated in this study. Group A consisted of a convenience sample of 100 healthy individuals (55 males and 45 females) with no history of low back or hip pain with a mean age of 29±15 years. Group B consisted of in-patients at a tertiary hospital diagnosed with intervertebral disc prolapse, having symptoms such as radiating pain and/or altered sensations lasting for more than 12 weeks. This group comprised of 40 patients (23 males and 17 females) with mean age of 58 ± 23 years and were undergoing treatment for back pain at the time of the study. Patients with acute low back pain, sacroiliac joint dysfunctions, spinal fractures or history of congenital hip disorders were excluded from the study. A written informed consent was obtained from all the study participants in both groups.

Hip rotation ROM was measured using a universal goniometer. The patient was positioned in prone with the knee of the

limb being measured flexed to 90 degrees. The hip was stabilised using a pelvic stabilization belt. The goniometer was aligned along the shaft of the tibia. The patient was then asked to actively rotate the hip medially and laterally within pain limits. An average of three recordings was measured by a single therapist for both medial and lateral rotation. All measurements were noted bilaterally for both groups. The reliability of the goniometer for hip range of motion is reported to be very high with Cronbach α values of 0.90. [17]

Statistical Methods

Statistical package SPSS (IBM SPSS Statistics for Windows, ver. 21.0. Armonk, NY: IBM Corp.) was used to analyse the data. Descriptive statistics were used to calculate the mean and Standard Deviation (SD) for medial and lateral ROM of the hip for both groups. The independent sample t-test was used to compare the means of the two groups. p value less than 0.05 was considered significant.

RESULTS

The mean and SD of ROM measurements of the two groups are presented in Table 1. Hip external ROM was greater than the hip internal ROM irrespective of the group to which the subjects belonged. Symmetry between internal and external rotation of the hip was greater in healthy individuals than that of patients with IVDP. The mean ROM measurements of hip medial and lateral rotation in individuals with CLBP were significantly greater than those of healthy individuals ($p < 0.05$). The comparison of the means of the two groups is displayed in Table 2.

Table 1: Mean and SD of hip rotation ROM measurements

Group	N	Internal Rotation Mean \pm SD		External Rotation Mean \pm SD	
		Left LL	Right LL	Left LL	Right LL
Group A	100	25.31 \pm 5.76	26.32 \pm 5.32	22.65 \pm 5.81	22.91 \pm 5.92
Group B	40	40.85 \pm 12.13	44.75 \pm 10.56	52.60 \pm 10.04	55.00 \pm 12.26

Group A: Healthy individuals; Group B: patients with IVDP;
N: Sample size; SD: Standard Deviation; LL: Lower Limb.

Table 2: Comparison between hip rotation ROM measurements of the two groups

	Group	Mean Difference	Standard error difference	t value	p value
Left IR	Group A	15.540	1.512	10.274	.000
	Group B				
Right IR	Group A	15.430	1.346	11.459	.000
	Group B				
Left ER	Group A	29.950	1.358	22.056	.000
	Group B				
Right ER	Group A	31.090	1.538	20.211	.000
	Group B				

Group A: Healthy individuals; Group B: patients with IVDP;
IR: Internal Rotation; ER: External Rotation

DISCUSSION

An important step in the management of individuals that suffer from CLBP is the precise identification of mechanical factors that contribute to the problem. [5,6] The purpose of this study was to compare differences in hip rotation ROM between healthy individuals and patients with CLBP. The results demonstrated that patients with CLBP had an increased ROM of hip rotation as compared to healthy individuals.

Existing literature identifies different patterns of end-range hip rotation ROM in individuals with and without back pain. Van Dillen et al. proposed that limited hip rotation ROM may be compensated for by increased lumbopelvic rotation, eventually leading to back pain in individuals who take part in sports activities. [14] Similarly, several researchers report limited hip rotation ROM in individuals with back pain. [7,14,15] However, these studies included individuals who were diagnosed with the condition recently or not more than a year or two. The results of the present study may be at odds with these findings mainly because we took into consideration the patients who were suffering from back pain over a longer period of time, precisely over 10 years, including individuals who were active manual labourers.

The findings of this study bring into light the possibility that reduced lumbar rotations, over a period of time, may be compensated by increased rotations at the hip in chronic LBP patients. Future studies are warranted in this view. Also, the patient group in this study was notably older than the healthy subject group. Likewise, no differences in passive range of hip rotation

motion between people with and people without LBP were reported by Ellison et al. [18] Watanbe et al. suggest that subjects over 50 years of age demonstrate more lateral rotation at the hip. [19]

Our study also noted an asymmetry between medial and lateral rotation. Wong et al. also reported similar findings in patients with back pain. The high prevalence of this trend in patients may mean that this imbalance, in which medial rotation is less than lateral rotation, may predispose a person to back pain or may be a result of back pain, or both. [9] The American Academy of Orthopaedic Surgeons suggests medial and lateral hip rotation ROM to be equal. [20] The Committee on Medical Rating of Physical Impairment on the other hand, describe more lateral than medial hip rotation ROM in their report of normal ranges. [21]

Further studies are required to warrant the importance of excessive or restricted hip rotation ROM in creating a predisposition to low back dysfunction. While the findings of this descriptive research offer some evidence of a relationship between flexibility of the hip joint and low back pain, a longitudinal study is required to further substantiate this connection and establish the existence of cause and effect.

CONCLUSION

Patients with CLBP demonstrated excessive hip rotation ROM than healthy individuals. These results are important because they suggest that hip mobility may be one of the factors contributing to CLBP development or persistence. Thus, hip rotation mobility should be integrated in the

evaluation, as well as design of preventive and intervention strategies for management of CLBP.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the study participants.

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- How to cite this article: Krishna HS, Pramod PV, D'souza CJ et.al. Hip rotation range of motion: a comparison between healthy individuals and patients with chronic low back pain. *International Journal of Science & Healthcare Research*. 2020; 5(4): 160-164.
