DOI: https://doi.org/10.53350/pjmhs2216425

ORIGINAL ARTICLE

Effects of Chronic Low Back Pain and Disability on Quadriceps Angle A Cross Sectional Survey

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ABSTRACT

Aim: To evaluate the effects of chronic low back pain and disability on quadriceps angle.
Methodology: A descriptive mesuremental study was conducted at Department of Physical therapy Bakhtawar Amin memorial Hospiatl Multan. After taking written informed consent 350 Patients of age 20-40 years with chronic low back pain were taken. Patients with congenital deformity, neuromuscular disorder, spinal cord injury, leg length discrepancy and previous history of knee/hip surgery and meniscal/ligamentous tear were excluded. Oswestry disability index questionnaire and numeric pain rating scale were used to check disability level and pain intensity respectively. Q angle was measured using goniometer in supine lying.
Results: The association of pain with disability for male and female were 0.69(P<0.00) and0.79 (P<0.04) respectively. Pearson's correlation of Q angle with pain and disability of right leg were 0.42(P<0.00) and 0.13(P<0.041), and left leg were 0.43(P<0.000 and 0.27(P0.001) of male. Pearson's correlation in female of Q angle with pain and disability of right leg were 0.54(P< 0.00) and 0.45(P<0.01) and for left leg were 0.57(P<0.00) and 0.49(P<0.00) respectively.
Conclusion: positive association of pain, disability and Quadriceps angle with pain and disability were found. It was found more significant in female than male.
Keywords: Chronic low back pain, Quadriceps angle, Oswestry Disability Index

INTRODUCTION

Chronic Low back pain felt between the inferior gluteal folds and costal margins, with or without leg pain persisting more than 3 months. It affects the people of all ages. It commonly causes lower extremity disability, gait disturbance, abnormal activation of lower extremity muscle[1]. Q angle is an important factor in the assessment of LE alignment. Its prevalence increases with age and is more commonly affects the women. It affects the 80% of general population. Almost 90% of low back pain population having nonspecific chronic low back pain. Pain persistent <6 week is acute low back pain and persistent >3 month is known as chronic low back pain[3,4].

Sedentary lifestyle and long hours of office work are prevalent conditions for causing low back pain. It may be caused by prolonged sitting posture and low back flexion and rotation during sitting posture. Chronic low back pain is a highly disabling condition causes functional disability, worst quality of life decreased work productivity and work absenteeism[5]. It is associated with muscular, postural and mobility control[6].

Radiating pain in lower limb influence the muscle activation, strength imbalance and poor posture and movement control.[7] Strength imbalance between quadriceps muscle and hamstring increases the tibial torsion as hamstring is a major muscle controlling tibial torsion. Increase in tibial torsion causes increase in the angle between patella and tibia and also increases Q angle[8].

There are no exact values of q angle for both genders. Men have 11-14 degree and women have 18-22 degree normal q angle. The values higher than these values are considered abnormal and predispose the person to injuries[9,10]. The increase in Q angle may be indicative of extensor mechanism malalignment, overuse injuries, chondromalacia patellae, and knee joint hypo mobility and predispose the person to anterior knee pain and patellofemoral knee syndrome[11.12].

We hypothesized that pain and functional disability caused by chronic low back pain affects the knee joint and increases the Q angle. The aim of this study is to evaluate the effects of chronic low back pain on quadriceps angle.

Received on 24-10-2021
Accepted on 17-03-2022

METHODOLOGY

A descriptive measurement study was conducted at department of Physical Therapy at Bakhtawar Amin Teaching Hospital, Multan. Sample size was calculated by below sample size formula[13].

$$n = \frac{(Z_{1-\alpha/2})^2(P)(1-P)}{d^2}$$

Where as

$Z_{1-\alpha/2}$= 1.96 is standard normal variant at 5% Type I error and 95% confidence level.

P = proposed prevalence of variable which is 0.35 taken from previous study[14].

$$n = \frac{(1.96)^2(0.35)(0.65)}{(0.05)^2} = 349.58 = 350$$

After taking written informed consent 350 patients were taken. Male were 110 and female were 240. A non probability convenient sampling technique was used. Patients of age 20-40 years with chronic low back pain were included. Patients with congenital deformity, neuromuscular disorder, spinal cord injury, leg length discrepancy, history of knee and hip surgery, meniscal and ligamentous tear were excluded

Demographic data were collected by self structured questionnaire. Pain intensity was measured using numeric pain rating scale and oswestry disability index was used to measure disability. Q angle was measured using goniometer in supine position. SPSS version 21 was used. For descriptive analysis, mean and standard deviation were used for quantitative variable. Frequency and percentages were calculated for qualitative data. For inferential analysis, Pearson correlation coefficient (r) was used to find out the correlation between functional disability and Q angle in patients with chronic low back pain. The p-value ≤ 0.05 was considered as significant value. All results were calculated at 95% confidence level.

RESULTS

Mean Age of selected sample were 32.5343 ± 5.37986. Male were 31.4% and female were 68.6%. It was more common in housewife's 29.4% and office workers 21.7%.

Table I: Demographic characteristics of participants.

Variables	n
Male	110 (31.4%)
Female	240 (68.6%)
Age in years	
20-25	41 (11.7%)
26-30	80 (22.9%)
31-35	105 (30.0%)
36-40	124 (35.4%)
Occupation	
Labor	42 (12.0%)
Businessman	29 (8.3%)
Farmer	12 (3.4%)
Housewife	103 (29.4%)
Others	49(13.7%)

The mean q angle in males for right limb was 13.3455±1.39748 and for left limb was 13.5818±1.35715 while for females it was 20.3875±2.18301 on right side and 20.6875±2.17783 on left side. Mean q angle was approximately equal for both left and right limb but the mean Q angle was higher in women as compared to men due to wider pelvis.

The association of pain and disability for male were 0.69 and female were 0.79. Pearson's correlation of Q angle with pain and disability of right leg were 0.42 and 0.13 and left leg were 0.43and 0.27 of male. Pearson's correlation in female of Q angle with pain and disability of right leg were 0.54 and 0.45 and for left leg were 0.57and 0.49 respectively

Table II: Descriptive analysis of pain, Disability

Scales	Mean ± SD
Male	
Disability level	42.90 ± 24.33
Numeric pain intensity	5.11 ± 2.30
Q Angle Right	13.35 ±1.41
Q angle left	13.58 ± 1.36
Female	
Disability level	42.21± 22.99
Numeric pain intensity	4.49± 2.24
Q angle Right	20.39 ±2.18
Q angle left	20.69 ±2.178

Q angle=quadriceps angle, SD= Standard Deviation

Table III: Association among variables

Gender	Pain and disability		Q angles	Q Angle and disability		Q Angle and Pain	
	r	P value		R	P value	r	P value
Male	.688	.000	Right	.417	.000	.125	.041
			Left	.429	.000	.273	.001
Female	.789	.000	Right	.538	.000	.446	.000
			Left	.573	.000	.494	.000

r=Pearson's correlation, P= Coefficient of alpha

DISCUSSION

Our study demonstrated that, chronic low back pain CLBP majorly affects the women than men of all ages. Patients presented in this study mostly were age group 30-40 years. Prevalence of CLBP was found higher in house wife and office workers. It is evident that sedentary lifestyle and office workers have more chances of having low back pain. It may be caused by prolonged sitting posture and low back flexion and rotation during sitting posture[5]. It is more common in females due continuous or stressful work or dissatisfaction of work. Sedentary life style and lack of awareness about mechanics of body and loading strategy enhance the risk of mechanical low back pain in housewives[15].

Our study founded positive association between chronic low back pain and disability. CLBP and disability affects the lower extremity function as well as quadriceps angle. In previous study it is proven that, LBP causes deficits in endurance and strength of lumber extensors. Delayed onset of multifidus and transversus abdominis are contributing factors causing disability[16]. It is more common involves the elder people[17]. Hamstring tightness also causes increase in tibial torsion which causes increase in the angle between patella and tibia and Q angle[8]. Our study also supported the results of previous study as moderate pain intensity was found more pronounced in our study[18].

Q angle is larger on left side as compared to right side in both men and women but it is controversial as some researchers say that is greater on right side of the body. It varies according to height but has no correlation with weight, age and physical activity[11].

CONCLUSION

Chronic low back pain affects the quadriceps angle. Women's are more effective than men. There is positive relationship between chronic low back pain and disability with Q angle. Still other issues may have impact on it. Further investigations would be helpful.

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