ORIGINAL | INDEPENDENT JOURNAL OF ALLIED HEALTH SCIENCES

IJAHS-0203

MEASUREMENT OF QUADRICEPS ANGLE IN FEMALES WITH CHRONIC KNEE PAIN

Sania Khawar Kiani, Riphah College of Rehabilitation Sciences, Wish Campus, Islamabad.
Fouzia Batool, ShifaTameer-e-Millat University, Islamabad.
Amna Yaseen, Riphah College of Rehabilitation Sciences, Wish Campus, Islamabad.
Zainab Gaghar, DPT Student, Riphah College of Rehabilitation Sciences, Wish Campus, Islamabad.
Mir Arif Hussain, Assistant Professor, Riphah College of Rehabilitation Sciences, G-7/4 Campus, Islamabad.

Date of Received: 19/07/2018 **Date of Acceptance:** 12/02/2019

ABSTRACT

Objectives: The purpose of this study was to measure the Q angle in women presenting with chronic knee pain and to find a correlation between age and quadriceps angle. **Methods:** This Cross sectional study was conducted at Railway hospital Rawalpindi and CDA hospital Islamabad. The study duration was 6 months from February 2016 - July 2016. Total 161 females were selected through purposive sampling. Self-structured questionnaire was used to collect the data. A standard universal goniometer was used to measure the quadriceps angle. Data was analyzed using SPSS version 21.0. **Results:** Out of the 161 females, 75(46.5%) Females having knee pain with doing job while 86(53.4%) females having knee pain without doing job. Females with age group 36 and 45 were 61. The highest frequency of Q angle was found to be 19.6 in 27 females. There was a positive intermediate correlation between age and mean Q angle of three assessments with mean and Standard deviation 21.1±1.43, whereas p=0.62 which is not significant. **Conclusion:** This study concludes that females with knee pain had wider quadriceps angle, Ages between 36 and 45 were having high frequency with knee pain. Females who were not doing jobs had wider Q angles. There is a positive intermediate correlation whereas p>0.05, this showed that age and mean Q angle are not related.

Correspondence Address
Sania Khawar Kiani,
Riphah College of Rehabilitation Sciences, Wish Campus, Islamabad.
sania.khawar@riphah.edu.pk

Key words: Musculoskeletal Disorders, Q angle, Knee Pain, Arthritis

Article Citation: Kiani K S, Batool F, Yaseen A, Gaghar Z, Hussain A M. Measurement of quadriceps angle in Females with Chronic knee pain. **IJAHS,** Jan-Mar 2019;01(01-06):18-23.

INTRODUCTION

Worldwide mostly the cases related to females seen in hospitals are that of knee pain this problem has been increasing every passing day and more such cases are to be found. Generally an occurrence rate of 25% has been quoted in the literature. In 2012 august a study was lead to check the incidence rate of anterior knee pain in women. The outcome came out to be 12%-13 %[1] Study conducted in Peshawar showed that the frequency of knee pain was 40.2% in the female population, out of which 21.8% presented with knee pain in left leg whereas24.2% came out to be with pain in the right knee. 53.9% had knee pain in both legs. As the age of women increased the incidence of knee pain also seemed toappear more.[2] Mostly knee osteoarthritis is found more significantly in females as compared to male. Age is a massive factor in knee pain in adult female population.[3] In 27.6% of females knee pain was very common.[4]

One of the most intricate and major weight bearing joints in the human body is the knee joint, any disturbance in that joint can lead to a series of problems affecting the normal functioning of the human machinery. Generally the highly anticipated reason of knee pain is osteoarthritis. Some of the acute injuries due to which knee pain can arise are bone damage, fractures, ligamentous and meniscal injuries, dislocation, rheumatoid arthritis, accumulation of uric acid, infections, chronic injuries are inflammation of patella, schlatter Osgood disease, biomechanical injuries and obesity. In previous literature it is seen that a considerable amount of people with

patellofemoral arthritis had described previous anterior knee pain in their puberty and early adult years; anterior knee pain might be a causative factor in causing patellofemoral osteoarthritis.[7] The frequently known cause of knee pain in grown up individuals is patellofemoral pain syndrome furthermore called as chondromalacia patella. One of the many causes of knee pain in adults is due to some mechanical faults in the patellofemoral joint.[6] Commonly in writings it is cited that due to the wide Q angle pain in knees is one of the most arising issue encountered by the patients. In an article it was mentioned that due to wide Q angle there is increased foot pronation, foot eversion, patellofemoral tracking therefore leads to pain.[5]

In this study the two main subjects under study are knee pain and Q angle. Knee pain is discussed earlier lets now focus on Q angle. This specific angle is formed by two lines that intersect one of which passes from the anterior superior iliac spine ASIS to the midpoint of patella and the second goes from the tibial tuberosity to the mid of patella.[22] It is defined as an angle in which the quadriceps muscles are aligned in such a way that it produces a certain angle which is called as Q angle or the quadriceps femoris angle. The normal value of Q angle is 14-17 degrees. Q angle for females is 17 degrees and 14 degree for males. An article also mentioned that the value of Q angle more than more than 15 for men and greater than 20 for females was considered not normal.[9]

If the value of Q angle comes out to be more than its standard range then it points to several concerning issues such as overused activities which chiefly involve the knee causing a major strain on the biomechanical aspect and a prospect of emerging knee joint symptoms escalates quickly. An increased quadriceps femoris angle also tends to increase the lateral pull on the patella. It's very damaging as it increases the compression of the lateral patella on the lateral lip of the femoral sulcus. If this force is more than required then during the phase of knee extension patellar dislocation takes place. Q angle also has an impact on the QRRT (quadriceps reflex response time) and in the neuromuscular response.

There were two main objectives of this study the first was to measure the frequency of Q angle in those females who were suffering with knee pain and second reason was to determine the correlation between age and Q angle. An individual who presents with a sedentary lifestyle his whole body tends to go in a downfall pit and eventually leads to progression of degenerative changes in the body and ultimately ends the capacity of body to fully play its part. This study provides awareness for the females. It shows the importance of a healthy lifestyle which is the key to living a happy and nourished life

MATERIALS AND METHODS

This descriptive cross sectional study was conducted at Railway Hospital and CDA Hospital Islamabad, Pakistan, from February 2016 - July 2016. Ethical approval was obtained from the review committee.

Females aged about 20-55 with Knee pain were included. Whereas the excluded subjects were males, children and individuals presenting with genetic pathologies, fractures, systemic diseases and absence of knee pain. Data was collected with the help of two tools a self-structured Performa and a universal goniometer. The Performa included of proper consent taken from each patient and their privacy was completely assured along with that demographics such as name, age, sex, occupation, diagnosis, other than that three goniometric readings were observed and a mean of Q angle. The goniometer has two arms one is stationary whereas the other is moving arm, readings are noted down in degrees. Quadriceps femoris angle is easily measured with the person in either lying or horizontal position. The readings were taken with knee in normal extension phase. Muscles should be in their neutral position as the extra tension or pull from

the muscles directly affects the readings. Place the pivotal point of goniometer on the central point of patella, one arm to be positioned from center of patella to the tibial tuberosity, whereas the other arm directing to anterior superior iliac spine ASIS. The angle formed was then noted three readings were taken from each patient to minimize the chances of error and their mean Q angle was calculated. SPSS 21 was used to calculate and evaluate the numerical data. Keeping the privacy of patient intact was of utmost importance. Special attention was paid to keep the patients comfortable and that they felt safe. No harm was caused to any person during the research.

RESULTS

The results Showed, Out of 161 females with knee pain 75(46.5%) women with knee pain were doing job and 86(53.4%) women with pain in knee were those who were not doing any job. The Figure 01 and table 01 showed the highest frequency of Q angle was found to be 19.67 which included 27 females. 4 women had 18.67, 2 had 19.33, 10 females had Q angle of 20.00, 12 of them had 20.33, 15 women had 20.67 degrees, 19 of them had an angle of 21.00, 16 females had 21.33, 19 of them 21.67 degrees, 12 had 22.00; fewer number of women had the readings ranging from 23 to 25.

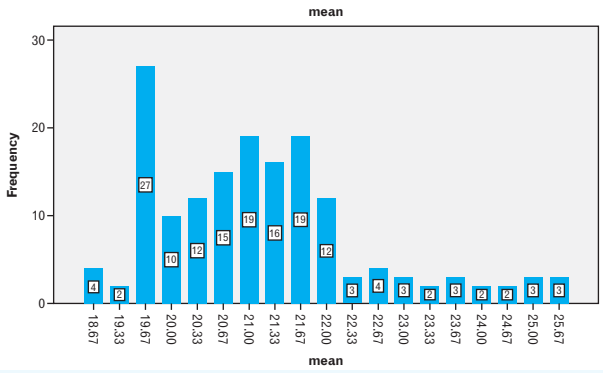

Figure 1. Frequency of Mean of Q-Angle

Ages of female were divided into 4 groups consisted of age group 0 to 20 years, 21 to 35 years, 36 to 45 age and the last group of 46 to 55 years of age. The figure 03 shows that 51 females with knee pain belong to age group 21 to 35. 61 females with knee pain fall in to the age group of 36 to 45. 43 females fall into age group of 46 to 55. This shows that the most frequency of females with knee pain belong to age group of 36 to 45.

Table 1. Shows Frequency of Mean of Q-Angle

Mean Score of Q-angle	Frequency
18.67	4
19.33	2
19.67	27
20.00	10
20.33	12
20.67	15
21.00	19
21.33	16
21.67	19
22.00	12
22.33	3
23.00	4
23.33	2
23.67	3
24.00	2
24.67	2
25.00	3
25.67	3

The Given table 2 indicates that age Spearmen's correlation which is denoted by 'r' is 0.39. This means that there is a positive direct correlation between age and mean of Q angle and p = 0.62 which is non-significant.

Table 2. Correlation of age and mean Q Angl

Correlation	'r'	p-value
Age * mean Q angle	0.39	0.62

DISCUSSION

This study "Measurement of Q angle in females with Knee pain" was conducted to measure frequency of Q angle in females with knee pain and to determine the correlation between age and Q angle. There are several studies which support the theme and concept of our study and many other studies who contradict this study.

According to the results of current study it showed that more frequency of knee pain is found in women who are not doing jobs. Highest frequency of Q angle was 19.67. 36 to 45 age group females suffered more from knee pain. There is a positive intermediate correlation between age and mean of Q angle. Mean Q angle is 21.1, correlations r= 0.39 and p= 0.62

A study presented no important association was found between quadriceps angle and varying ages. They did find a significant relation between Q-angle in men and women and $p<0.05$. 18% females and 10% of males had wider Q angles. This study presented a positive intermediate correlation between age and quadriceps angle, $p=0.62$[15]

Previous study consisted of 85 women with PFPS (Patello femoral pain syndrome) present in one limb, there appeared to be little difference in Q-angle between individuals with PFPS (19.61±4.35) and the one with no Patello femoral pain (17.63±4.29) due to which they stated that no major association could be found between the Q angle and misalignment of lower limb. In present study readings of 610 females were taken. $p=0.62$, $r=0.39$[17]

A study was conducted on an Indian population consisted of 100 healthy individuals; the standard goniometric method was used as is done in this study. The mean was 12.73 °C; values of Q angle in right appeared to be more than those of left limb. There was a positive correlation of Q-angle with the laterally placed tibial tuberosity. The present study also used goniometric method. The mean was 21.1[18]

In previous study 140 males and 110 females were included as subjects. The study showed that Q angle had a positive association with females. Average of both male and females came out to be 13.070, 12.364 in the case of men and 13.968 in women. In this study the mean was 21.1 whereas 610 females were included as subjects. There was a positive intermediate correlation. $p=0.62$[24]

CONCLUSION

The p value showed that age and mean Q angle are not related. More number of women with sedentary lifestyle had wider quadriceps femoris angle, mostly of ages 36 to 45. Public, private, education, health sector and media should join forces to create awareness about women's health. Women are an integral part of our society educating them will provide as a means of a better and improved upbringing of the future generation. Eventually educating the population will lead to an educated and civilized world.

REFERENCES

1. Roush JR, Bay RC. Prevalence of anterior knee pain in 18–35 year-old females. International journal of sports physical therapy. 2012;7(4):396.

2. Fayyaz A, Farooqi S, Khan DA. Prevalence of knee pain in young adult females in selected educational institutes of Hayatabad, Peshawar. Annals of Allied Health Sciences. 2016 Jun 1; 1(2):52-7.

3. Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I. Caspian journal of internal medicine. 2011; 2(2):205.

4. McAlindon TE et al. Knee pain and disability in the community. Rheumatology. 1992 Mar 1; 31(3):189-92.

5. I-IEIDERSCHBIT BC, Hamill J, VAN EMMERIK EA. Q-angle influences on the variability of lower extremity coordination during running.

6. Fairbank JC et al. Mechanical factors in the incidence of knee pain in adolescents and young adults. Bone & Joint Journal. 1984 Nov 1;66(5):685-93.

7. Utting MR, Davies G, Newman JH. Is anterior knee pain a predisposing factor to patellofemoral osteoarthritis?. The knee. 2005 Oct 31;12(5):362-5.

8. Neogi T. Joint Pain Epidemiology.

9. Hahn T, Foldspang A. The Q angle and sport. Scandinavian journal of medicine & science in sports. 1997 Feb 1;7(1):43-8.

10. Horton MG, Hall TL. Quadriceps femoris muscle angle: normal values and relationships with gender and selected skeletal measures. Physical therapy. 1989 Nov 1;69(11):897-901.

11. Grelsamer RP, Dubey A, Weinstein CH. Men and women have similar Q angles A clinical and trigonometric evaluation 2005. Journal of Bone & Joint Surgery British.;87.

12. Veeramani R et al. Gender differences in the mediolateral placement of the patella and tibial tuberosity: a geometric analysis. Anatomy. 2010;4(1).

13. Guerra JP, Arnold MJ, Gajdosik RL. Q angle: effects of isometric quadriceps contraction and body position. Journal of Orthopaedic& Sports Physical Therapy. 1994 Apr;19(4):200-4.

14. Herrington L. Does the change in Q angle magnitude in unilateral stance differ when comparing asymptomatic individuals to those with patellofemoral pain?. Physical Therapy in Sport. 2013 May 31; 14(2):94-7.

15. Arti H, Fakoor M. Evaluation of correlation between Q-angle and anterior knee pain. Journal of Shahrekord University of Medical Sciences. 2012 Apr 15;14(1):11-9.

16. Tsakoniti AE et al. Effect of Q-angle on patellar positioning and thickness of knee articular cartilages. Surgical and radiologic anatomy. 2011 Mar 1;33(2):97-104.

17. Kaya D, Doral MN. Is there any relationship between Q-angle and lower extremity malalignment.ActaOrthopTraumatolTurc. 2012 Nov 1;46(6):416-9.

18. Raveendranath V et al. Bilateral variability of the quadriceps angle (Q angle) in an adult indian population. Iranian Journal of Basic Medical Sciences. 2011 Sep 1;14(5):465-71.

19. VeeramaniRaveendranath SN et al. The Quadriceps angle (Q angle) in Indian men and women. Eur J Anat. 2009;13(3):105-9.

20. Emami MJ et al. Q-angle: an invaluable parameter for evaluation of anterior knee pain. Arch Iran Med. 2007 Jan 1;10(1):24-6.

21. Sanfridsson J, Arnbjörnsson A, Friden T, Ryd L, Svahn G, Jonsson K. Femorotibial rotation and the Q angle related to the dislocating patella. ActaRadiologica. 2001 Mar 1;42(2):218-24.

22. Mizuno Y, et al. Q angle influences tibiofemoral and patellofemoral kinematics. Journal of Orthopaedic Research. 2001 Sep 1;19(5):834-40.

23. Biedert RM, Warnke K. Correlation between the Q angle and the patella position: a clinical and axial computed tomography evaluation. Archives of orthopaedic and trauma surgery. 2001 Jun 1;121(6):346-9.

24. Jha A, Raza HT. Variation In Q-Angle According To Sex, Height, Weight &Interspinous Distance-A Survey. Indian Journal of Orthopaedics. 2000 Apr 1;34(2):99.

25. Livingston LA, Mandigo JL. Bilateral Q

angle asymmetry and anterior knee pain syndrome. Clinical biomechanics. 1999 Jan 31; 14(1):7-13.

26. Caylor D, Fites R, Worrell TW. The Relationship between Quadriceps Angle and Anterior Knee Pain Syndrome 1. Journal of Orthopaedic& Sports Physical Therapy. 1993 Jan;17(1):11-6

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Fouzia Batool	Script writing	
2	Sania Khawar Kiani	Data analysis	
3	Aman Yaseen	Compiled Result	
4	Zainab Gaghar	Data collection	
5	Mir Arif Hussain	Final review & script submission	