

## Effect of Knee Pain in Q Angle in College going Students

Jayeeta Roy<sup>1</sup>, Ashish Dobhal<sup>2</sup>, Tripti Pandey<sup>3</sup>, Shakshi Naithani<sup>4</sup>

### How to cite this article:

Jayeeta Roy, Ashish Dobhal, Tripti Pandey, Shakshi Naithani/Effect of Knee Pain in Q Angle in College going Students /Physiotherapy and Occupational Therapy Journal. 2022;15(2): 77-87.

### Abstract

Knee pain is a descriptive time period carried out to sufferers with affected or non- affected q-attitude. The ache of knee is maximum common in anterior thing. One most crucial concept in knee pain is the quadriceps angle i.e Q-perspective. In wellknown, a better Q- perspective will increase the lateral pull of the quadriceps femoris muscle at the patella and potentiates patellofemoral disorders. that is undertaken to assess the connection among the knee ache and Q-attitude. Specifically, Q angle can also increase with immoderate anterior pelvic tilt(converting the orientation of the acetabulum and internally rotating the femur), femoral anteversion and knee valgus(displacing the patella medially relative to the anterior superior iliac spine and tibial tuberosity), and external tibial rotation(displacing the tibial tuberosity laterally. The quadriceps perspective(Q attitude), shaped between the quadriceps muscular tissues and the patella tendon, is considered clinically as a very crucial parameter which shows the biomechanical effect of the quadriceps muscle on the knee, and it is also seemed a essential factor for the right posture and movement of the knee patella. the potential observe of 60 college going students documented that Q-perspective is growth inside the case of knee ache, in which rating of knee ache on the VAS is in addition boom. A big Q-perspective shows the severity of knee pain. Q-perspective being the most vital danger component for knee harm and for more time misplaced from damage. due to knee ache if there's substantial change in Q- angle, it may have an effect on the biomechanics of knee and neighbor joints as nicely. present examine show this reality with the help of relationship between VAS & Q-angle.

**Keywords:** Tibial tuberosity; Quadriceps angle; VAS; Patellofemoral; Anterior advanced iliac backbone; Acetabulum.

### Introduction

The knee joint is a complicated synovial joint of body that receives concerned in approximately 50% musculoskeletal accidents and dysfunctions of which pattelofemoral joint is involved in majorities of injuries and dysfunctions associated with knee joint. An important degree of alignment of patellofemoral joint is quadriceps angle or Q

attitude. boom in Q angle past normal variety increases lateral pull of quadriceps muscle on patella causing extensor mechanism misalignment potentiating patellofemoral ache syndrome(PFPS) which is also referred to as anterior knee pain syndrome. it is a commonplace circumstance encountered in orthopaedic and sports remedy outpatient branch. ache is annoyed with the aid of

**Author Affiliation:** <sup>1-4</sup>Assistant Professor, Uttaranchal (PG) College of Biomedical Sciences & Hospital, Dehradun, Uttarakhand 248001, India.

**Corresponding Author:** Ashish Dobhal, Assistant Professor, Uttaranchal (PG) College of Biomedical

Sciences & Hospital, Dehradun, Uttarakhand 248001, India.

**E-mail:** ashishdobhal1907@gmail.com

**Recieved on:** 11.02.2022

**Accepted on:** 12.03.2022

squatting or climbing stairs or sitting with knees flexed for an extended period of time. The regular Q- perspective varies from 8° to 12° in adult males and 10°-20° in women, in step with extraordinary studies. A Q angle of 20°-22° is supposed to be the predisposing thing to patellar dislocation and anterior knee ache in line with preceding research. A higher Q- perspective increases the lateral pull of the quadriceps. Deviation from the normal range of values acquired from Q-angle measurement has been implicated in numerous knee disorders. In Indian lifestyle, there is extra risk of compressive forces on the patellofemoral joint even as performing immoderate flexion in sitting crossed legs and squatting role for this reason, patellofemoral joint issues and increased Q-angle appear to be more common amongst them.<sup>2</sup>

The Quadriceps perspective, or Q angle, is defined as the angle shaped via the intersection of two strains, one which starts off evolved at the anterior iliac spine and is going to the middle of the patella, and some other that is going from the tibial tuberosity to the middle of the patella. while as compared to individuals with low Q-perspective (LQ-attitude < 15°), asymptomatic individuals with high Q-angle (HQ-angle > 15°). Q attitude represents the course of the quadriceps muscle force vector in the frontal plane, immoderate angulation is thought to predispose people to accidents as a result of bizarre quadriceps forces performing at the knee and patellofemoral joints. but, the extent to which excessive Q perspective increases the danger of knee injury stays unclear<sup>1</sup> in particular, Q perspective might also growth with excessive anterior pelvic tilt (converting the orientation of the acetabulum and internally rotating the femur), femoral anteversion and knee valgus (displacing the patella medially relative to the anterior superior iliac backbone and tibial tuberosity), and outside tibial rotation (displacing the tibial tuberosity laterally).<sup>1</sup>

The Q angle has been counseled as a danger component for anterior cruciate ligament injury, retrospective hazard factor studies have did not verify this dating. Q angle has additionally been associated with patellofemoral pain syndrome, but others have discovered no distinction in Q attitude whilst comparing sufferers with patellofemoral pain with wholesome individuals three. The quadriceps angle (Q angle), formed among the quadriceps muscle tissues and the patella tendon, is considered clinically as a very crucial parameter which shows the biomechanical impact of the quadriceps muscle

at the knee, and it is also seemed a essential issue for the proper posture and movement of the knee patella. The Q attitude is automatically and regularly used as an evaluation parameter at some point of the analysis of many knee-related issues, inclusive of the anterior knee pain, osteoarthritis, and degenerative knee issues preceding research located that girls are at elevated risk of extraordinary anterior pelvic tilt, femoral ante torsion, Q angle, tibiofemoral malalignment, & genu recurvatum. it's been advised that Q attitude is a composite measure of pelvic function, hip rotation, tibial torsion, patella function & foot position regarding the clinical significance of Q angle, it is found that changes on this perspective are associated with chondromalacia patella, lateral dislocation at the patella, erosion of the patellar cartilage & of the lateral condyle, femoral internal rotation, foot pronation & inner tibial torsion perspective that vary from 15-20° are often called excessive<sup>5</sup> size of Q-perspective clinically the use of a goniometer is a easy and maximum extensively used approach adopted in sports activities medicinal drug. size of Q-attitude enables us in screening of unusual Q-perspective in humans who are extra at risk of wear and tear accidents of the knee joint.

Slight to massive quantities of bilateral variability of Q-perspective values were demonstrated in individual that's attributed to bilateral asymmetry in quadriceps muscle electricity five. the main anatomical systems answerable for AKP are subchondral bone, synovium, retinaculum, skin, muscle/tendon, and nerve. those systems may be suffering from many factors, along with systemic disease, but in orthopedic, the maximum common reasons for AKP are patellofemoral malalignment, overuse and trauma. A not unusual device used to assess such patellar malalignment is the Q-angle.

The Q perspective has been used for the analysis of many sicknesses, for the comparison of everyday and injured knees, and for the evaluation of improvements after therapies. This angle highlights knee joint mechanism, settlement of dentures, and identification of relationships amongst structural factors and game accidents. similarly to inflicting knee injuries, Q angle is also mentioned to be suffering from a top notch wide variety bodily factors and postural defects. ladies have constantly been located to have large Q angles than men and are more regularly tormented by patellofemoral troubles.

The role of Q attitude in assessing decrease-extremity accidents in sports activities has been documented. within the young who entered the

sports phase tests, Q attitude values have been wondered. Their bodily hobby ranges are one of a kind nine. Deformities in the legs, brackets leg, X leg, asymmetric leg, and accelerated Q angle may be counted. in addition to correcting this angular disease, other ways may be used. it has been stated that even the colors of garments create perceptual differences due to their outcomes on people. as an instance, white shade manner pure being, peacefulness and suitable person. It represents calm, relaxed and inner peace nine consistent with research, larger than regular Q angle values are the motive that the neuromuscular response and reflex of the quadriceps increase and the explosive energy and vertical soar electricity lower.

It has been shown that an abnormally elevated Q perspective fee, coupled with adjustments in neuromuscular manage or a decrease in carrying activity, reasons the knee joint activity plane to exceed its variety, putting excessive pressure at the joint. Many studies have highlighted a negative correlation among the Q attitude and quadriceps power.

This terrible courting has been reported to rely on the developmental differences in force production ability in terms of elevated muscle tone within the quadriceps and a drop inside the Q perspective. This suggests that, relative to the vastus lateralis, the vastus medialis has observable beginning time delays in muscle hobby & the proportional variations in stability among them is dependent upon the Q-perspective. The Q perspective, which has an crucial effect on comparing both the knee joint and the knee joint's mechanical kingdom in athletes, has been the situation of research studies.

The Q angle, that's a hallmark of everyday alignment within the decrease extremity in addition to biomechanical characteristic, simultaneously presents important statistics at the athletes's lower extremity useful capacity.<sup>10</sup> An information of the everyday anatomical and biomechanical functions of the patellofemoral joint feature. The mechanical evaluation of the proper alignment and the stableness of any joint rely especially on the observe of the effect of structures surrounding that joint. The regular variety of Q perspective values in healthy Jordanians in keeping with gender and bilaterality within-issue symmetry become determined and compared with the other world popular populations. additionally, the affiliation among Q angle and anthropometric measures (frame height, weight, frame mass index (BMI), pelvic width and waist to hip ration (WHR) became also investigated eleven.

if want of the study, there are various studies that display the impact of knee pain in Q attitude, however there's no literature to be had which display impact of knee pain in Q angle particularly college going students. This have a look at tried to assess how consequences of knee pain in Q attitude in university going college students, so that we are able to layout treatment for the equal.

Purpose there's goal to assess the effect of knee ache in Q perspective in university going students, and what's the connection between knee pain, age and Q perspective, so that in future we can design unique remedy and to save you harmful effect.

### Targets

- To evaluate Q angle.
- To assess knee ache on visible analogue Scale. three) to evaluate the impact of knee pain in Q attitude in precise age organization. trade speculation

There may be effects of knee pain in Q attitude in college going college students. NULL hypothesis.

There might be no effects of knee pain in Q perspective in college going students.

### Review of Literature

The knee is the largest and maximum complicated joint of the body. It's far formed by means of fusion of the lateral femorotibial, medial femorotibial and femoropatellar joints. it is condylar synovial joint, incorporating condylar joints between the condyles of the femur and tibia, and one saddle joint between the femur and the patella. It depends at the ligaments and muscle mass that surround it for its energy and balance.

The knee joint relies upon on its ligaments to one of these tremendous extent, it's far imperative that the ligaments be tested in the course of the exam of the knee.

### Quadriceps angle (Q attitude)

The Quadriceps angle, or q angle is described as the attitude shaped via the intersection of lines, one that begins on the anterior iliac spine & goes to the middle of the patella, & any other that is going from the tibial tuberosity to the middle of the patella .

1. By Chandan Kumar, Sunil Thapa, Arjun Prasad Lamichhane, this take a look at had been conducted anterior knee pain is a completely commonplace symptom that poses a tough diagnostic and therapeutic problem. strange patellar malalignment is



- the quadriceps attitude (Q-perspective). AT one hundred instances were selected in this have a look at. Left knees have been worried in forty instances, proper knees in 38 cases and each knees in 22 instances. some of these distinction in case and control organization had been statistically widespread. This observe showed that anterior knee pain have big Q perspective than asymptomatic character.
2. With the aid of Prabhjot Kaur Chhabra, Mayura Setiya Rajan Godwin, the have a look at become performed Quadriceps perspective is an essential indicator of biomechanical characteristic within the lower extremity and describes the lateral pressure implemented to the patellofemoral joint via the contraction of the quadriceps muscle. It's far a quantitative dimension of patellar function with appreciate to the decrease extremity alignment. At 240 adults have been selected as instances and controls of the age group 19-35 had been studied. The measurement of Q perspective changed into finished on both proper and left lower limbs with the help of goniometer in both cases and controls, and facts had been statistically analyzed. effects are showed that Q angle is extensively related to anterior knee pain in both males and females having  $P < 0.000$  with women having more Q-attitude, being extra susceptible to anterior knee pain. This examine additionally confirmed bilateral differences in Q-attitude in both men and women.
  3. In can also, via Seol Park, Yu-Min Ko, Gwon-Uk Jang, Yoon-Tae-Hwang this have a look at attempted to become aware of how genu varum or valgum impacts the electromyographic activities of the vastus medialis, vastus lateralis and rectus femoris at some point of knee isometric contraction. Fifty two teenagers have been decided on in this observe. They were enrolled and categorised into 3 businesses through knee alignment conditions. The individuals gotten smaller their quadriceps in the course of isometric contraction at  $30^\circ$  and  $60^\circ$  of knee flexion. The quadriceps femoris become used for distinctive techniques in keeping with knee alignment for the duration of isometric contraction at  $30^\circ$  and  $60^\circ$ . This study shows that rehabilitation education applications used to bolster the quadriceps ought to recall the knee alignment conditions of the target subjects.
  4. In 2009, Anh-Dung Nguyen et al. to decide the quantity to which choose lower extremity alignment characters of the pelvis ,hip, knee & foot are related to the q attitude .At 218 individuals(102 adult males,116 ladies) are selected for that take a look at. The effects of that observe confirmed as soon as all alignment variables have been accounted for greater tibiofemoral angle and femoral anteversion have been considerable predictors of extra Q perspective in each males & girls.
  5. Through Ramada R Khasawneh Et Al, every other study had been carried out to which important parameter presentations the biomechanical impact of the quadriceps muscle at the knee, & it's also seemed a essential factor for the right posture & motion of the knee patella. That observe includes 500 healthy young Arab college students from the Yarmouk university & Jordan university of technology and technology. The q perspective of these volunteers became measured using a frequent guide Goniometer with the subjects within the upright weight bearing role. It was found that Q angle become more in young ladies than younger men. It was simply determined that there has been a hyperlink with the condylar distance of the femur in each sexes. Weight & dominance elements did now not display to have any impact at the values on that examine.
  6. In 2018, via Nihar Ranjan Mohanty any other take a look at carried out that Q perspective is considered to be the maximum essential variable many of the decrease extremity alignment variables. This observe determine the anatomical elements, those which have effect on the importance of Q attitude & to study sex variations in decrease extremity alignment of kingdom degree athletes.100 state degree athletes of age group 18-27 years have been decided on purposively from various sports academics odisha for look at. The end result of that study confirmed statistically considerable differences had been determined between male & lady state degree athletes to which statistically good sized difference were seen in proper tibiofemoral perspective, proper navicular drop & left navicular drop. considerable fantastic correlation of right Q attitude turned into cited with proper femoral anteversion, proper tibial torsion & right navicular drop.
  7. In 2005, via Omer Faruk Sendur, Gulcan Gurer, Ali Aydeniz at determine to which



patellar malalignment is the most critical cause for anterior knee pain. Patellar alignment is usually decided by the size of the Quadriceps (Q) perspective. on this have a look at intention inspect the connection of Q angle and hypermobility and Q perspective values in exclusive positions. At 253 decided on topics were achieved at the 60 individuals in both supine and uprights positions. The mean Q perspective values in healthy hypermobile people were determined to be substantially higher than that of the nonhypermobile ones. No statistical difference became determined among Q angle values in supine and upright positions. No correlation became determined between existent skeletal deformities and Beighton score values. In conclusion, the Q attitude evaluated among healthful hypermobile people might also have a prognostic cost for likely knee pathologies that could appear in the destiny.

8. In 2006, through Belchior A.G.C, Arakakij.C, have been carried out to analyze the difference among the attitude of the quadriceps in symptomatic and asymptomatic people in two special exam situations, having the quadriceps cozy and in a maximal voluntary isometric contraction through radiographic size, aiming to make contributions to the assessment and remedy of sufferers with patellofemoral disorder. At forty knees had been decided on in this observe. there is a difference between the price of the Q angle amongst symptomatic and asymptomatic people, being observed a better price in the FDP bearers, while in a maximal isometric contraction of the quadriceps muscle no statistical difference turned into observed in the gift have a look at, with a reduction inside the perspective in both groups.
9. In march , with the aid of Orhan Ahmed Sener, college of sports activities Sciences, Selcuk university, Konya, Turkey were research of the impact of recreation training and training on Q angle in younger men and women. The quadriceps angles of 240 female and six hundred male subject were measured in each supine and standing function by means of goniometer. finally, the imply dominant knee Q attitude of young women and men appeared to be in regular range. The effect of bodily interest on Q angle need to be investigated more notably. it's far although that recreation training has a reducing effect on Q- perspective.
10. In November, Ajlan Sac, Mehmet Yalcin Tasmektepligil have a look at performed that a total of 50 healthy and proper leg dominant guys with a Q angle between fiveâ– | and 20â– | and active in sports activities were blanketed. floor electromyography turned into used to decide those muscle tissues hobby ranges .at the consequences that terrible correlations were between the Q angle and the average top torque in extension and flexion, the common power at all angles. No giant relationship among the Q attitude and the level of the muscles. This take a look at concluded that, A higher Q attitude is associated with decreased isokinetic knee energy, strength output, and torque angles. it's far concept that feasible high Q perspective associated knee joint problems and sports accidents may be averted by together with proper quadriceps energy physical activities in in workout prescriptions to be organized.
11. In June, Islam Tarawneh Bsc, Omar Al-Ajoulin Md, Abdullah Alkahawaldah Md, Heba Kalbouneh Dds, Amjad Shatarat Md, Maher Hadidi MD conducted to establish the normal values of quadriceps perspective (Q attitude) in Jordanians in keeping with gender and bilaterality within challenge symmetry in both extremities, and to study its affiliation with anthropometric measures. Q attitude become measured the usage of goniometer from 419 people (219 men and 2 hundred ladies). Pearson correlation coefficient was used to evaluate the affect of with anthropometric measures at the values of the Q perspective in each genders. As a result, no tremendous distinction become observed among aspects in unique agencies. This look at reinforces the want to set up reference values of Q angle in a given populace.
12. By way of Veeramani Raveendranath, Shankar Nachiket, Narayanan Sujatha, Ranganath Priya, Devi Rema: on this observe performed the quadriceps angle (Q attitude) is a scientific alignment of the quadriceps femoris musculature relative to the underlying skeletal systems of the pelvis, femur and tibia. The aim of this take a look at had been to calculate the Q attitude in a young, healthy adult Indian population so that you can document any large differences in the Q attitude between men and women and to investigate those differences. two hundred limbs from healthful grownup Indian volunteers have been studied. The end result

- of this observe, each the Q attitude and the lateral placement of the tibial tuberosity had been substantially more in girls. females had a drastically more Q perspective as compared to males because of a greater laterally placed tibial tuberosity.
13. Via Garbriel Peixoto Lean Almeida, Ana Paula De Moura Campos Carvalho E Silva, (Â€|), And Amelia Pasqual Marques: in this take a look at to analyze the relationship between the Q attitude and anterior knee ache severity, useful potential, dynamic knee valgus and hip abductor torque in ladies with patellofemoral ache syndrome (PFPS).This take a look at blanketed 22 women with PFPS. on this study the result is the Q angle did no longer gift any courting with ache intensity, practical potential, FPPA, or hip abductor top torque inside the sufferers with PFPS.
  14. With the aid of Hugo Machado Sanchez, Eliane Gouveia De Morais Sanchez, Mario Antonio Barauna, Roberto Sergio De Tavares Canto: in this have a look at to compare the fee of Q perspective in exceptional positions, within the outside and internal rotations of decrease limbs. This have a look at evaluated sixty two volunteers, 32 girls and 30 guys inside the following positions: supine positions with parallel feet, supine with abduction(external rotation of lower limbs) and standing position with parallel feet and with external rotation. on this observe result are showed considerable differences within the status function with kidnapped feet and parallel to the left leg, and symmetry between the decrease limbs independent of rotation of limbs within the supine posture.
  15. By using Benjamin R Freedman, B.s. Timothy J. Brindle, P.t. And Frances T. Sheehan: The Q attitude is extensively used clinically to assess people with anterior knee pain. latest research have puzzled the software of this measure and have counseled that a big Q perspective might not be associated with lateral patellofemoral translation, as regularly assumed. end result reveals that the Q angle did not represent the line-of-movement of the quadriceps. An increased Q attitude correlated to medial patellar displacement and tilt within the cohort with anterior knee ache.
  16. By using Bade B. Omololu, Mbbs, Frcs, Fwacs, Olusegun S. Ogunlade, Md, Frcs, And Vinod Okay. Gopaldasani: The Q angle has been studied among the grownup Caucasian population with the status quo of reference values. Scientist are beginning to just accept the concept of different human races. The Q angles of the left and right knees had been measured the usage of a goniometer in 477 Nigerian adults inside the supine and standing positions. result confirmed that Q perspective in adult Nigerian men is similar to that of person Caucasian men, but the Q-perspective of Nigerian women is more than that in their Caucasian counterparts.
  17. Via Toby O Smith Et Al: The quadriceps or Q attitude is an index of the vector for the blended pull of the extensor mechanisms and the patellar tendon. it is used as a trademark for patellofemoral joint dysfunction. The purpose of this newsletter is to systematically overview and appraise the literature to determine the reliability and validity of this take a look at. The findings suggest that there is enormous war of words at the reliability and validity of the scientific Q perspective measurement. this will be due to a loss of standardization inside the dimension method.
  18. With the aid of Rajeev Choudhary, Mudasir Malik, Ammar Aslam, Deepak Khurana, Sangita Chauhan: This take a look at performed to compare the values of quadriceps perspective (Q angle) in relation to age, weight, height, gender, bilateral and postural variations, and strenuous sports at the weight bearing limbs so as to look at its variability. 450 person healthy volunteers are decided on on this take a look at. This examine confirmed Q perspective is an vital parameter to assess quadriceps muscle â€™s feature and its impact on knee. An boom inside the attitude is honestly related to patellofemoral troubles. higher Q perspective among ladies may also predispose them to sports associated injuries. it's miles vital to take into consideration of such factors like intercourse, peak, posture, aspect, foot rotation, and muscleâ€™s rest whilst measuring and evaluating the attitude.
  19. By Maitreyee Nandi(Kar), Chinmaya Kar : Quadriceps angle (Q angle) is one of the maximum vital indicators of balance of patella-femoral joint. The scientific method of measurement of Q attitude isn't always standardized, and its fee depends on various methods used. but the radiological approach of dimension of Q angle is greater correct. This study concluded that as a consequence, from a known clinical Q perspective value, we are able to derive the respective radiological

Q attitude, circuitously keeping off the complete troublesome maneuver in ordinary exercise. So this study recommends this approach in scientific fields because this is a greater rational and ideal method to estimate the radiological Q attitude.

20. By Nikolaos Pefanis, Xenofon Papaharalampous, Georgios Tsiganos: on this study carried out to examine the possible courting among the Q angle and different factors on the incidence of ankle sprains, because its value, whilst assessed efficiently, gives useful data for the anatomical alignment of the lower extremity. The observe pattern consisted of forty five excessive-level athletes. Q angle measurements have been made on radiographs. This study confirmed that would have an effect on the probability of maintaining an ankle sprain are the athlete's age, anthropometric traits, and prior accidents.

### **Visual Analogue Scale**

A visual Analogue scale is a measurement instrument that attempts to degree a function or mindset this is believed to variety across a continuum of values and can't without problems be immediately measured. it is frequently utilized in epidemiologic and medical studies to measure the depth or frequency of numerous symptoms. for instance, the quantity of pain that a patient feels degrees throughout a continuum from none to an intense quantity of pain. From the sufferers perspective, this spectrum appears continuous + their ache does not take discrete jumps, as a categorization of none, moderate, slight and extreme might recommend. It changed into to seize this idea of an underlying continuum that the vas changed into devised.

The most simple VAS is a directly horizontal line of fixed duration, typically one hundred mm. The ends are defined as the extreme limits of the parameter to be measured(symptom, ache, health) oriented from the left(worst) to the proper(first-rate). In a few research, horizontal scales are oriented from right to left, and many investigators use vertical VAS.

### **Reliability**

Test-retest reliability has been shown to be precise, but better amongst literate ( $r=0.94$ ,  $p=0.001$ ) than illiterate sufferers ( $r=0.71$ ,  $p=0.001$ ) before and after attending a rheumatology outpatient clinic.

### **Validity**

In the absence of a gold standard for pain, criterion validity cannot be evaluated. For construct validity, in patients with a variety of rheumatic diseases, the pain VAS has been shown to be highly correlated with a 5 point verbal descriptive scale ("nil", "mild", "moderate", "severe" and "very severe") and a numeric rating scale (with response options from "no pain" to "unbear-able pain"), with correlations ranging from 0.71-0.78 and 0.62-0.91, respectively). The correlation between vertical and horizontal orientations of the VAS is 0.99.

### **Methodology**

#### **Study Design**

*Observational*

#### **Study Setting**

1. The study was conducted at Uttarakhand (PG) College of Biomedical Science & Hospital, Dehradun.
2. And Shri Guru Nanak Dev Hospital, Dehradun.

#### **Sample Size**

Total 60 subjects with knee pain were included in the study.

#### **Inclusion criteria**

- Age 18-25 years
- each gender
- Knee ache extra than 21 days.

Not acquired any remedy or physical activities from 2 weeks.

- Normal radiographic findings.
- Co-operative subjects.

#### **Exclusion standards**

Osteoarthritis

Degenerative knee disorders which have suffered fracture.

Dislocation or previous surgical procedure of knee. With neurologic pathologies.

No any knee deformity related offering pain.

No current damage or fracture at affected aspect

#### **Instrumentation**

Standard Goniometer Sofa

Caricature Pen Sanitizer Towel



**Variable of Observe**

1. Q perspective
2. Pain rating on visible Analog Scale
3. Age group 18-25 years

**Procedure**

The subjects who fulfilled the inclusion criteria was included in this study. Method and purpose of the study was explained to the subjects. Q angle was measured both male and female students. VAS score was taken more than 21 days. Written consent form was signed by the patient and with the permission of patients and their attender. All the forms were taken and scores were calculated and mentioned in data.

**Data Analysis**

Data analysis was done using Microsoft excel.

- Karl Pearson’s correlation coefficient test is used to find the significant correlation.
- Descriptive analysis was done to calculate the mean for age, vas scale and q angle of subjects.
- Descriptive analysis was done to calculate the standard deviation for age, vas scale and q angle of subjects.
- r is the correlation coefficient value.

**Result and Interpretations**

The data was analyzed for 60 subjects, the descriptive statics was used to analyzed demographic data. Mean age, vas, q angle for subjects was (22.222), (5.222), (19.833°).

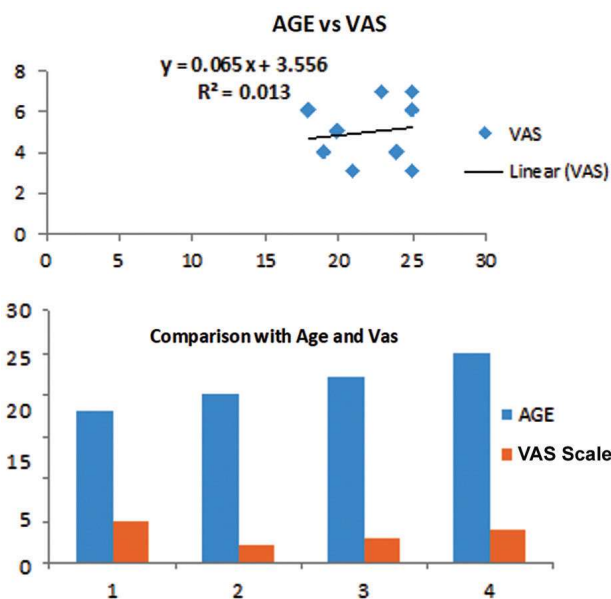
**Table 1:** Demographic Data

	Mean	SD
Q Angle	19.833°	1.47196°
Age	22.222	2.878492
Vas Scale	5.222	1.563472

Age and Vas scale shows a positive correlation.

**Table 2:** Correlation between Age and vas Scale.

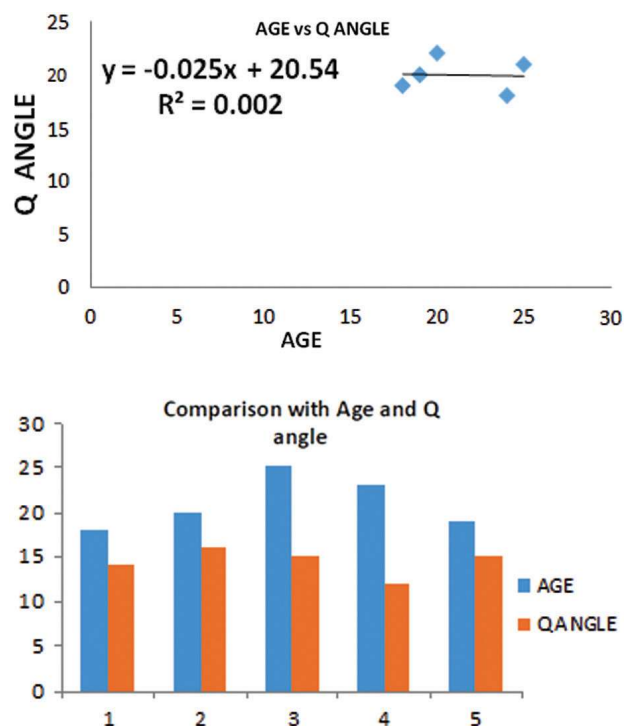
	Mean	SD	r
Age	22.222	2.878492	0.114002
VAS	5.222	1.563472	



**Fig. 1:** Age and Q angle shows a negative correlation.

**Table 3:** Correlation Between Age and Q Angle.

	Mean	SD	r
Age	22.222	2.878492	-0.16592
Q Angle	19.833°	1.47196°	



**Fig. 2:** Vas and Q angle shows a positive correlation

**Table 4:** Correlation Between Vas and Q Angle.

	Mean	SD	r
Vas Scale	5.222	1.563472	0.97
Q Angle	19.833°	1.47196°	

## Interpretation of Result

The above result define that there are significant change in Q angel due to knee pain.

In my study, result shows a positive correlation between age and vas scale. When age increases, vas scale also increases.

In age and Q angle result shows a negative correlation. When age increases, Q angle decreased.

Vas scale and Q angle also shows a positive correlation. In the same, when vas scale increases, Q angle increases i .e. while patient's vas score increased Q angle also increases.

## Discussion

The Q-angle is defined as the extreme angle fashioned by using the vector for the mixed pull of the quadriceps femoris muscle and the patellar tendon. The measurement of that attitude may be accomplished the usage of unique methods, which include the radiographic method or clinically through the goniometer, and in exclusive approaches, having the patient in supine with knee in general extension and comfortable quadriceps, or shriveled, knee 30° of flexion with quadriceps comfy, sitting with the knee in a ninety° flexion and in status.<sup>1</sup>

In my take a look at the records found out high-quality correlation between the age and vas scale of more than 21 days of affected person.

Vas scale and q perspective are showing high-quality correlation, this means that if vas scale is elevated then q angle multiplied.

Age and q perspective are showing also bad correlation, which imply if patient age expanded then q perspective price is reduced.

On this examine age was 18-25 yrs and imply changed into 22.222. The q attitude mean turned into 19.833° and the vas scale mean become 5.222.

Quadriceps femoris attitude (Q angle) may be taken into consideration as an index of knee characteristic and patellofemoral kinetics. females have extra Q attitude than adult males, so they're more susceptible to broaden anterior knee pain. The suggest Q attitude at the left facet is extra than on right facet in asymptomatic ladies and men. The reason for this could be the bilateral asymmetry in Q attitude. there may be little evidence in literature regarding this statement. it can be postulated that opportunity is excessive that right limb of symptomatic topics may additionally have suffered more trauma in addition to other intrinsic factors

as compared to the left limb. As greater variety of cases to anterior knee ache is of the right facet, the mean Q perspective fee in the symptomatic organization is greater at the right aspect than on left aspect. Bilateral variability in Q attitude does exist in each males and females. It has a proof in literature in this look at. there are many studies which have correlated the demographic variables with Q angles weight, authors determined a vast correlation among top and weight with Q perspective, that is in step with the studies executed through Jha A et al, found a correlation among peak and Q angle similar to the locating of prakash v et al,. but, authors did not discover vast correlation among Q angle and BMI. present locating is in contrary to the end result of research carried out by way of and prakash V et al, probably that they had greater obese affected person than our examine.<sup>1</sup> lower extremity is the most critical part of the frame used excessively during a wearing event.

The anatomical, anthropometric and biomechanical courting of the lower extremity alignments are most vital area to be studied often for diagnosing the faulty alignments and stopping destiny injuries which may also occur at some stage in various athletic occasions. The anthropometric profile of an athlete performs an essential position in figuring out his or her capacity for achievement inside the game. For the general assessment of absolutely the length and shape of the individual, top and frame mass are inter-associated traits.<sup>1</sup> then again, some other look at Daneshmandi et al. recorded appreciably better values in Q-perspective, femoral anteversion and tibiofemoral perspective in woman athles.<sup>6</sup>

Mckeeon and Hertel mentioned that girls demonstrate more Q-angle, genu recurvatum, anterior pelvic tilt and femoral anteversion compared to guys and, no sex distinction in tibial varum and navicular drop. woodland and Francis said that the Q-angle value can suffer changes because of muscle imbalance, tibial torsion, woman anteversion and a excessive or low patella.

Nguyen and Shultz pronounced that for each the right and left decrease extremities, females had extra mean values than adult males for pelvic perspective, femoral anteversion, quadriceps angle, tibiofemoral perspective, and genu recurvatum. men and women have been not distinct on navicular drop or tibial torsion. Mathew and Madhuri (2013) stated giant correlation among the standing height, thigh length, duration of the decrease limbs and the tibio femoral angle of south Indian kids. In gift observe, imply Q attitude high quality correlated

with vas scale even whilst taken the concern was more than 21 days. If was was increased, Q attitude accelerated. alternatively, if age became elevated q attitude become decreased.

every other study of Grelsamer et al. observed that men and women of equal heights demonstrated comparable Q angles, concluding that the mild distinction in Q angles between males and females may be explained with the aid of the truth that men have a tendency to be taller. similarly, the mean Q attitude values reported from our populace changed into more at the proper facet in comparison to the left, however this difference turned into now not statistically sizable, this is much like the bilateral variations documented in other research. alternatively, a examine on Nigerian adults found out a significant contra-lateral difference of Q angles in both males and lady, recommending the documentation of each right and left angles in the clinics and the research reports.

In contrast with females, the relation among the pelvic width (measured as distance between the ASIS's) and Q angle measurements become no longer determined in males, different elements seem to influence this perspective, for instance, it changed into shown that the quadriceps contraction had a extensive impact at the Q perspective by way of changing the location of the patella, as adult males in our populace are physically greater active than girls, we count on decrease Q perspective values primarily based on their more potent quadriceps muscle.

#### **Limitation of the Study**

- Pattern length become small, it is able to be greater than a hundred.
- Examine become conducted over a quick time period.
- On this study Q angle dimension may be in different posture.
- Availability of patients or topics.

#### **Future Study**

- Same study may be finished with large sample.
- The take a look at could be performed with gender specifications.
- Topics is probably taken from one of a kind colleges/ towns/states.
- We will follow therapeutic intervention.
- Further research can be executed on biomechanical adjustments on knee whilst Q attitude is decreases.

#### **Conclusion**

The prospective examine of 60 college going students documented that Q-attitude is increase inside the case of knee pain, wherein rating of knee pain on the VAS is further increase. A massive Q-attitude suggests the severity of knee pain. Q-attitude being the most essential chance issue for knee injury and for greater time misplaced from damage. due to knee pain if there is sizeable exchange in Q-attitude, it may affect the biomechanics of knee and neighbor joints as nicely. Present study show this reality with the assist of courting between VAS & Q- angle.

#### **References**

1. Chandan Kumar, Sunil Singh Thapa: The relationship of quadriceps angle and anterior knee pain.
2. Prabhjot Kaur Chhabra, Mayura Setiya, Rajan Godwin: "Quadriceps Angle": An Important Indicator of Biomechanical Function of lower Extremity and its relation with anterior knee pain, Resident, Department of Anatomy, M.G.M medical college.
3. Seol Park, Yuminko Pt. Gwon -Uk Jang , Yoon Tae Hwang And Ji-Won Park: A Study on the Differences of Quadriceps Femoris Activities by knee Alignment during Isometric Contraction.
4. Anh-Dung Nguyen Et Al: Relationships Between lower extremity alignment and the Quadriceps angle, clin J Sport Med (pub med)
5. Ramada R. Khasawneh, Mohammed Z. Allouh, Ejlal ABU-El-RUB: Measurement of the quadriceps(Q) angle with respect to various body parameters in young Arab population.
6. Nihar Ranjan Mohanty, Shyamal Koley: A study on lower Extremity Malalignment and Its correlation to Q Angle in state Level Athletes of Odisha.
7. Omer Faruk Sendur Et Al. ; Relationship of Q angle and joint hypermobility and Q angle values in different positions, clin Rheumatol (pub med)
8. Belchior A.c.g, Arakaki J.c, Bevilaqua-Grossi D, Reis F.a And Carvalho P.T.C - Effects in the Q angle measurement with maximal voluntary isometric contraction of the quadriceps muscle (Researchgate.net)
9. Orhan Ahmet Sener, Mehmet Durmaz: Effect of Sport Training and Education on Q Angle in Young Males and Females, Faculty of sport sciences, Selcuk university, Konya, Turkey.



10. Ajlan Sac, Mehmet Yalcin Tasmektepligil: Correlation between the Q angle and the isokinetic knee strength and muscle activity.
  11. Islam Tarawneh Bsc, Omar Al-Ajoulin Md, Abdullah Alkhawaldah Md, Heba Kalbouneh Dds ,Amjad Shatarat Md, Darwish Badran Md,Maher Hadidi Md : Normal values of Quadriceps angle and its correlation with anthropometric measure in a group of Jordanians.
  12. Veeramani Raveendranath, Shankar Nachiket, Narayanan Sujatha, Ranganath Priya, Devi Rema : the quadriceps angle (Q angle) in Indian men and women.
  13. Gabriel Peixoto Leao Almeida, Ana Paula De Moura Campos Carvalho E Silva,(...), And Amella Pasqual Marques: Q angle in patellofemoral pain: relationship with dynamic knee valgus, hip abductor torque, pain and function.
  14. Hugo Machdo Sanchez, Eliane Gouveia De Morais Sanchez, Mario Antonio Barauna, Roberto Sergio De Tavares Canto: Evaluation of Q angle in different static postures.
  15. Benjamin R. Freedman, B.s., Timothy J.brindle, P.t. And Frances T. Sheehan: Re-evaluating the functional implications of the Q-angle and its relationship to in- vivo patellofemoral kinematics.
  16. Bade B. Omololu, Mbbs, Frcs, Fwacs, Olusegun S. Ogunlade, Md, Frcs, And Vinod K. Gopaldasani,Md: Normal Q- angle in an Adult Nigerian Population. (Pub Med)
  17. Toby O Smith Et Al: The reliability and validity of the Q-angle : a systematic review, knee surg sports Traumatol Arthrosc.2008 Dec. (Pub Med).
  18. Rajeev Choudhary, Mudasir Malik, Ammar Aslam, Deepak Khurana, Sangita Chauhan: Effect of various parameters on Quadriceps angle in adult Indian population, journal of clinical Orthopedics and Trauma.
  19. By Maitreyee Nandi (Kar), Chinmaya Kar: The "quadriceps angle": correlation between clinical and radiographic measurements from a study in North Bengal.
  20. Nikolaos Pefanis, Xenofon Papaharalampous, And Georgios Tsiganos: The effect of Q angle on Ankle sprain occurrence.
-