CHAPTER V

Data analysis is the most important aspect of any study. Data analysis summarizes the information gathered. It entails the use of analytical and logical reasoning to data in order to identify patterns, correlations, and trends. Researchers utilize research data analysis to reduce data to a story and interpret it to obtain insights, according to Le Compete and Schensul. It makes sense that the data analysis process aids in the reduction of a huge large dataset into smaller bits.

Data analysis, on the other hand, is described by Marshall and Rossman as a messy, ambiguous, and time-consuming process that involves bringing a mass of acquired data to order, structure, and meaning. Data analysis, on the other hand, is described by Marshall and Rossman as a messy, ambiguous, and time-consuming process that involves bringing a mass of acquired data to order, structure, and meaning. "Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data," wrote statistician John Tukey in 1961.

Data analysis, on the other hand, is described by Marshall and Rossman as a messy, imprecise, and time-consuming, but creative process. Data interpretation is the process of reviewing data and drawing relevant conclusions using a variety of analytical methods. Data interpretation aids researchers in categorizing, manipulating, and summarizing data in order to answer important questions.

Anatomically it is difficult to give a systematic description of the cadaveric evaluation of knee joint. The knee joint is vulnerable to injury in various sports activities and often insulted by degenerative disorders, metabolic disorders etc. along with many surgical procedures, orthopedic surgical management of fracture, dislocation and arthroscopic surgeries related to the knee joint. The gathered data was analyzed on the basis of the objectives of the study and considered under the headings.

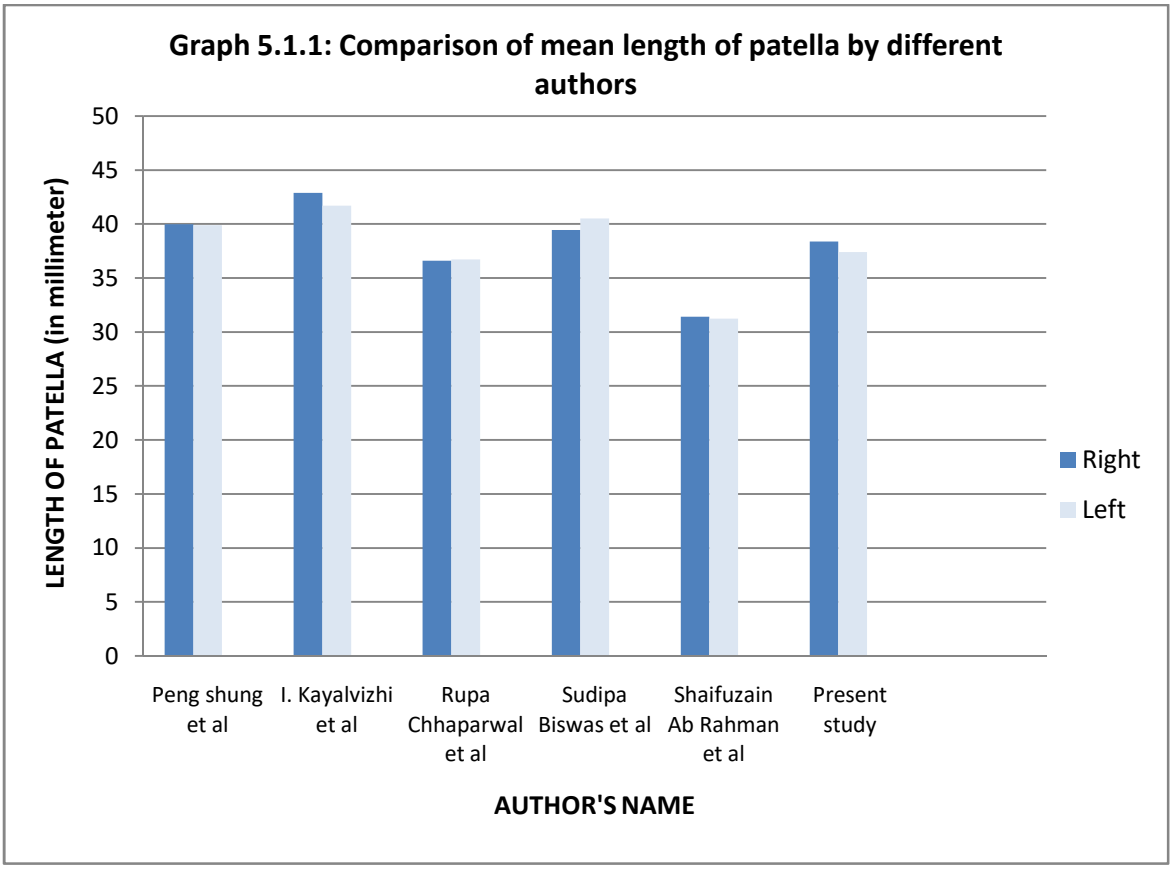
5.1 DISCUSSION AND INTERPRETATION OF MORPHOMETRIC LINEAR MEASUREMENTS OF THE PATELLA:

Morphometric study on the bones involving in the formation of knee is usually done by dry bone study, CT-scan study or intra-operative study as per the literature reviewed in author's record. Typically, measurements were obtained during surgery, and patellar thickness has been found to be a useful indicator for total knee arthroplasty resection depth. In a diseased joint, however, the correct measurement may be impossible to obtain or may be altered. According to the literature reviewed by the author, studies on patellar thickness and various patellar dimensions have been conducted, but no attempts at patellar study in cadavers have been made. As a result, data from the cadaveric study was directly observed for the current investigation. Furthermore, we conclude that the data collected during surgery and analogous data obtained from dry bones do not differ statistically significantly. The present study result is compared with the studies done by other authors and it is elicited in the table below.

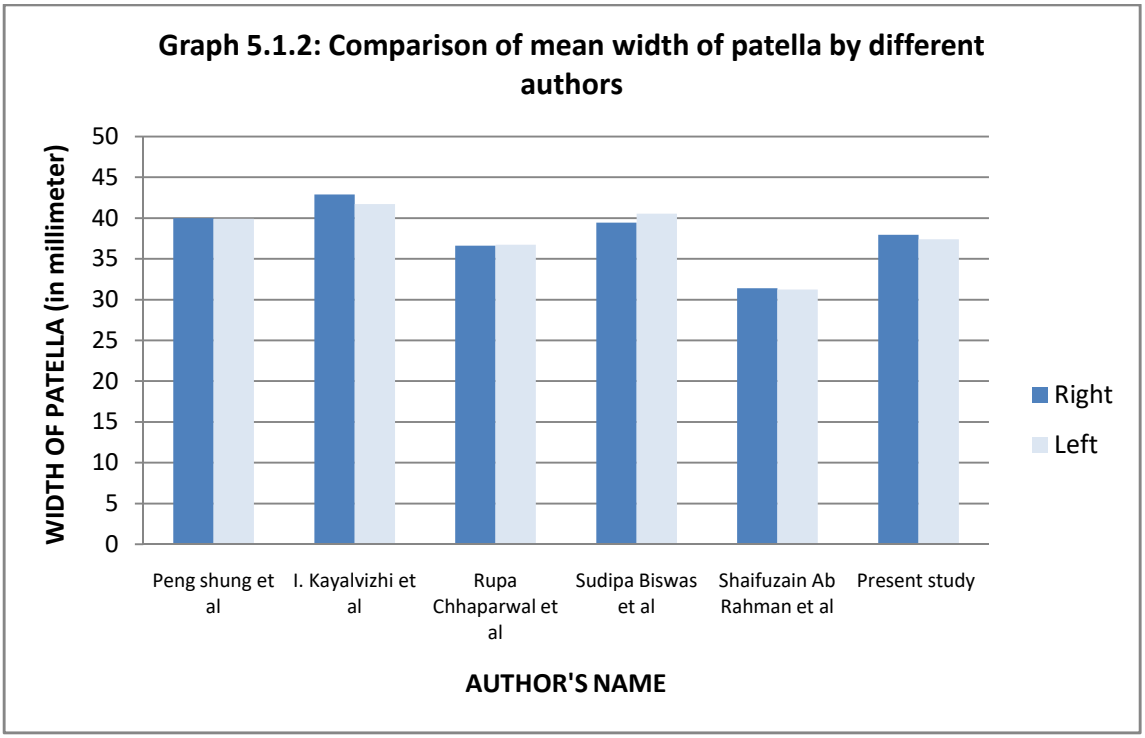
Measurements (in mm)	**Pengshung et al (2014)**	**I. Kayalvizhi et al (2015)**	**Rupa Chhaparwal et al(2018)**	**Sudipa Biswas et al(2019)**	**Shaifuzain Ab R. et al (2020)**	**Present study**
Length of patella	R- 39.98 L- 39.90	R- 42.90 L- 41.70	R- 36.61 L- 36.72	R- 39.45 L- 40.53	R- 31.41 L- 31.24	R-38.37 L-37.40
Width of Patella	R-44.12 L-44.15	R- 42.10 L- 41.30	R- 38.80 L- 38.53	R- 40.54 L- 41.21	R- 40.67 L- 40.85	R-48.95 L-47.40
Thickness of patella	R-22.65 L-22.79	R- 19.70 L- 20.70	R- 19.21 L- 19.31	R- 19.39 L- 19.79	R- 20.82 L- 20.65	R-18.62 L-18.35
Width of lateral articular facet	R-25.21 L-25.06	R- 30.50 L- 26.40	R- 22.73 L- 23.97	R- 19.75 L- 20.16	R- 21.30 L- 21.30	R-27.00 L-27.00
Width of medial articular facet	R-18.92 L-19.15	R- 22.10 L- 22.40	R- 20.94 L- 20.44	R- 14.78 L- 15.60	R- 19.22 L- 19.55	R-22.57 L-26.00

TABLE- 5.1: COMPARISON OF MEAN MORPHOMETRIC MEASUREMENTS OF THE PATELLA BY DIFFERENT AUTHORS

The present study results for morphometry of patella for all the metric measurements are almost similar with study conducted by I. Kayalvizhi et al. except for the mean width of patella.



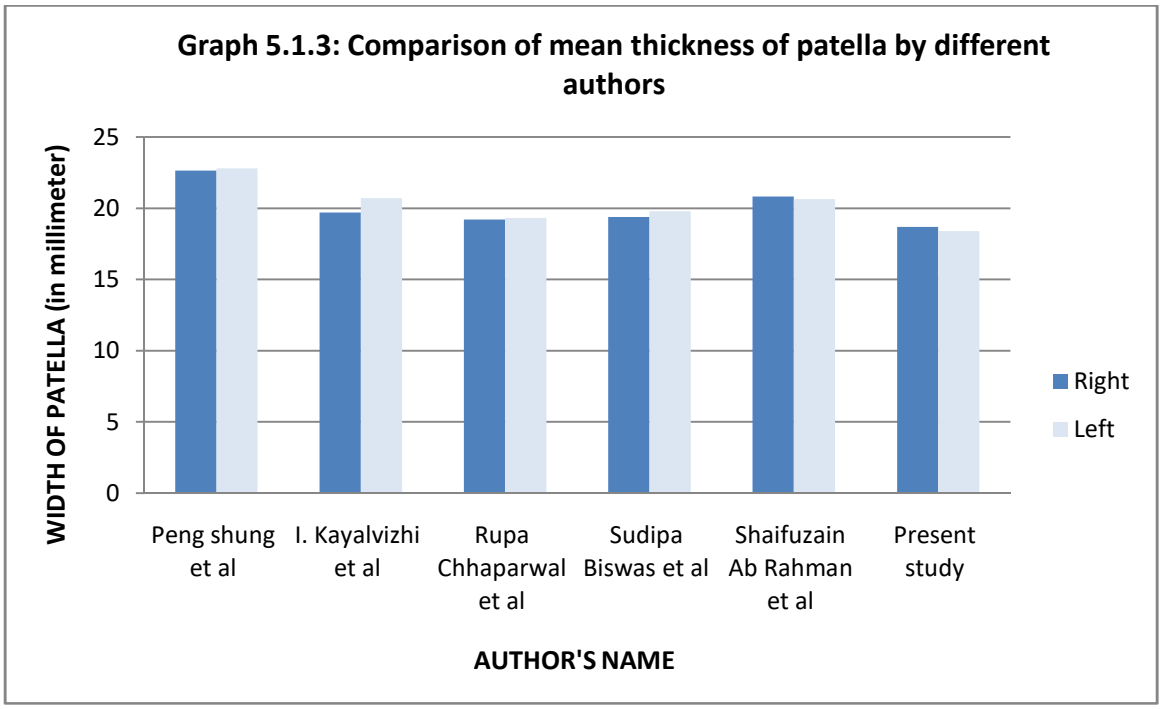
Patellar length is critical for patellofemoral surgeries such as knee arthroplasty, anterior cruciate ligament reconstruction, and proximal tibial osteotomy. The length of the patella in this study was found to be similar to Peng shung et al. (2014) and Sudipa Biswas et al. (2019), but smaller than I. Kayalvizhi et al. (2015) and higher than Shaifuzain Rahman et al. (2020). Furthermore, Type B patella was the most common, confirming previous findings by Wiberg et al. (1941), as well as Koyuncu et al. (2011) and Rupa chhaparwal (2018), who found Type B to be the most common and Type C to be the least common. Despite changes in measuring parameters, the research' findings were similar. Although the reasons for these variations have not been validated, it has been suggested that differences in measuring methods, sexes, and age and body mass index could be contributing factors.



The width of the patella has been proposed as a reliable criterion for determining the typical size of patella thickness and for assisting surgeons in selecting the thickness of the patella prosthesis during knee arthroplasty. While increasing patella thickness reduces range of motion and predisposes to patellar subluxation, a thin patella reduces contact force and can lead to fracture and antero-posterior instability. Poor clinical outcomes could result from either a bigger or thinner patella. Furthermore, numerous patella components are now on the market, allowing the prosthesis to be onset or inset utilizing symmetrical or asymmetrical domes. The replacement of the articular surface, precise location of the dome, and restoration of patella thickness are all priorities in most methods. They do not, however, focus on maximizing the patella's anatomic bony covering.

Moreover, when compared to the current study, the result found by Poonam Vohra et al. was a little lower. The mean width to thickness ratio of patella observed higher in the present study than the observations by Rupa Chhaparwal (2018). In compared to other authors, the present study's result for the mean width of patella was the highest. Furthermore, the mean values of the right and left patella’s are found to be similar.

Although the right patellar breadth was somewhat greater than the left, the difference is statistically insignificant.



Thickness of a patellar implant is significant. The knowledge can helps in avoiding overstuffing or over sizing of the patella during the reconstruction procedures of the patella. A disproportional patellofemoral joint implant would limit movement, cause excessive wear and instability of the patella, and cause knee pain. The data is applicable to implant design of the patella and important from a biomechanical perspective which will enhance the quality of life.

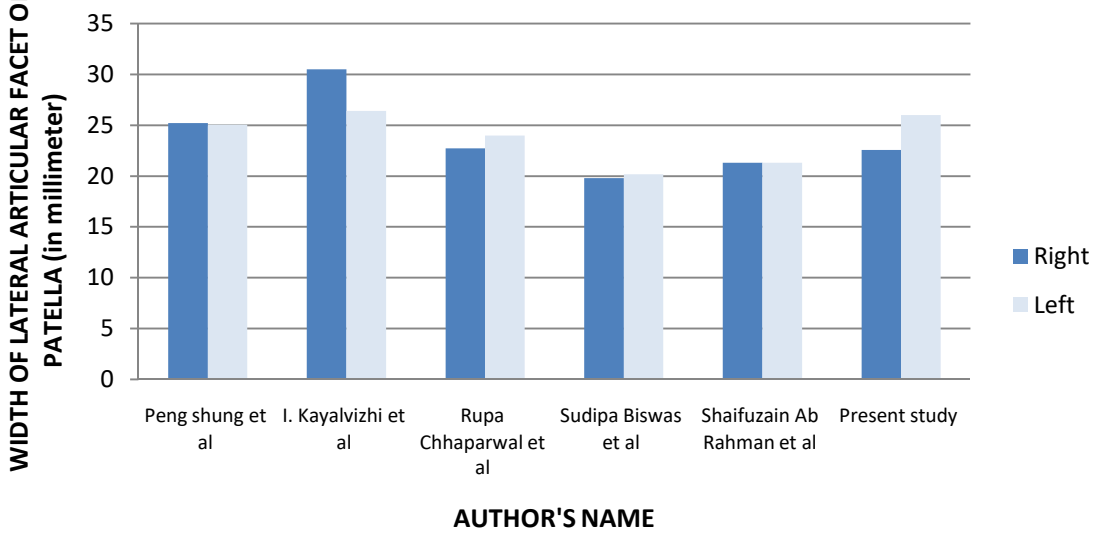
Furthermore, the width and thickness of the patella are found to be highly correlated. In this study, the average width to thickness ratio of the patella was found to be 2.6:1. The width of the patella has been proposed as reliable criteria for determining the typical amount of patella thickness and for assisting surgeons in selecting patella prosthesis during arthroplasty procedures that do not compromise the articular surface's median ridge.

Olateju OI et. al. (2013) found a substantial positive association between patella height and patella width, which validates the findings of Koyuncu et al., who found a linear relationship between patella length and width throughout gestation.

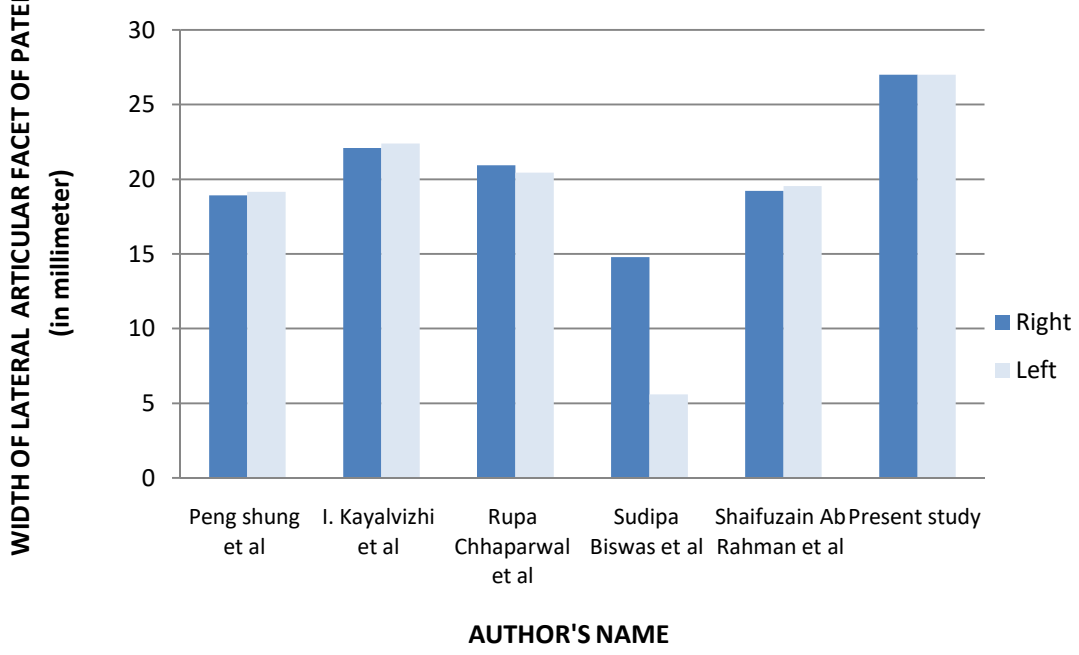
In patellofemoral arthritis, the Chondral wear is the most prominent in the lateral patellar articular facet, which indicates that the lateral patellar articular facet receives higher load than the medial side of the patella. In present study width of LAF and MAF in right and left side is 22.57, 26.00mm and 27.0mm, 27.00mm respectively. Rupa Chhaparwal et al. (2018) observed 20.69 mm, 23.35 mm respectively. Murugan et al. (2017) described the width of the MAF was 18.78 mm and the width of the LAF was 22.75 mm which were slightly lower than present study. They also described similar studies done on other populations like Chinese, Koreans and Westerners in whom the values of width of MAF were 19.03 mm, 18.4 mm and 18.8 mm respectively and values of width of LAF were 25.1 mm in Chinese, 23.3 mm in Koreans and 25.3 mm in Westerners respectively (Peng et al.) (2014), which were correlated with present study.

In addition, the Wiberg's classification has been used to further classify the patella bone. The results revealed that the widths of MAF and LAF were comparable in 17.77 percent of Type-I varieties (N=16). The majority of patellae belonged to type II variety (N=49), with 54.44 percent having a MAF width lower than the width of the LAF, and Type III variation (N=25), with 27.77 percent having a MAF width higher than the width of the LAF. The size and shape of the patella are thought to be influenced by the strain exerted by the quadriceps muscle. Koyuncu et al. revealed that 20% of patellae in foetal cadavers have been classified incorrectly in another investigation. In Class B similar to type II variety was reported as the most prevalent (50%) while 30% of patellae were Class C similar to Type III variety. Similarly, in another study by Olateju OI et al. (2013) done in South Africans of European ancestry; type B patellae being the most prevalent.

Graph 5.1.4: Comparison of mean width of lateral articular facet of patella by different authors



Graph 5.1.5: Comparison of mean width of lateral articular facet of patella by different authors



Because it is subcutaneously located, the patella is vulnerable to trauma and can be impacted by any systemic skeletal condition. The size of the patellar implant is critical to the success of total knee arthroplasty or patellofemoral arthroplasty. Early patellar implant failure reported linked to poor implant design attributes and technical faults in a tri-compartment TKA.

Recurrent lateral dislocation and subluxation of the patella, chondromalacia patellae, patellar ligament rupture, patellar and quadriceps tendinitis, and Osgood-Schlatter disease are all linked to a high-riding patella (patella alta). Quadriceps tendon rupture, neuromuscular problems, achondroplasia, and post-operative advancement of the tibial tuberosity have all been linked to a low-riding patella (patella baja).

Fracture of the patella is a common fracture can be occurred by a direct trauma by a blow on the anterior aspect of the flexed knee usually results a comminuted fracture, or an indirect trauma by a sudden forceful contraction of the quadriceps as in sportsperson and athletes. It usually occurs in a 20-50 years age group. More prevalent in males with 2:1 in Male: Female. Fracture can be undisplaced like transverse (50-80%), comminute, stellate fracture and vertical fracture or displaced fracture if displacement is > 3 mm and if articular incongruity > 2 mm like transverse—involving upper or lower poles (50-85%), Oblique fracture, vertical fracture (12-27%), Comminuted fracture (30-35%) or Polar—could be proximal or distal. A direct impact to the anterior portion of the flexed knee can cause a patella fracture, which is a common fracture.

In most cases, both the direct and indirect mechanisms of injury are active at the same time. For example, after a direct fracture, a simultaneous contraction of the quadriceps forces the pieces apart, resulting in a separated fracture of the patella with comminution. The fragments are held in place by the pre-patellar extension of the quadriceps tendon and the patellar retinacula, so the fracture may not be displaced. The required surgical treatment many includes reduction of the fragments, fixing them with *tension-band wiring (TBW)* and repair of extensor retinacula. In cases where it is not possible to achieve accurate reduction of the fragments, it is better to excise the fragments (patellectomy)

Because it is difficult to restore a smooth articular surface in comminuted fractures with displacement, excision of the patella (patellectomy) is the preferable treatment. This eliminates the possibility of osteoarthritis in the patellofemoral joint in the future. More and more comminuted patella fractures are being repaired as fixing outstanding mechanical properties that is patella saving operations.

The patella lies on the outer side of the knee therefore, usually tends to dislocates laterally and. It can be acute dislocation; recurrent dislocation; and habitual dislocation. Acute dislocation of the patella is caused by a sudden contraction of the quadriceps femoris muscle with the knee flexed or semi-flexed. At the time of dislocation, a portion of bone covered in articular cartilage (osteochondral fragment) from the patella or femoral condyle may be shaved off for surgical therapy. Repeated episodes of discomfort, swelling, and the sensation of a loose body may necessitate arthroscopic removal.

Recurrent dislocation of the patella is prevalent in adolescence and can be caused by medial capsule laxity, tiny patella, patella alta, genu valgum, increased Q-angle, torn medial patello-femoral ligament, or some underlying problem in the architecture of the knee. The insertion of the patellar tendon on the tibial tuberosity is relocated medially and downwards in arthroscopic surgical reconstruction, shifting the quadriceps line of pull medially. In addition, the pes anserinus is moved to the lower pole of the patella to provide a 'checkrein' effect for better surgical results.

Habitual dislocation of the patella occurs when the patella dislocates laterally every time the knee is flexed. The patient shows up in early childhood. When the knee is flexed, a shortened quadriceps; vastus lateralis component may cause an unnatural lateral pull on the patella. Release of the tight structures on the lateral side and repair of the lax structures on the medial side are two surgical options. To prevent re-dislocation, an additional 'checkrein' mechanism of some form is a possibility.

We believe the clinical implications are significantly associated with the data from our study. A number of essential clinical aspects of patellar arthroplasty should be highlighted. The patella's shape and size can vary, and some configurations are linked to patellar instability. On radiographs, a bipartite patella is frequently found. The bone seems to be in two pieces, with a smaller supero-lateral fragment: this has traditionally been attributed to the presence of a distinct ossification center, but it could also indicate unsuccessful union following a stress fracture in some cases.

The patella and patellar ligament morphometric data are critical in the diagnosis and surgical repair of knee-related injuries and disorders. The patella's involvement in the natural mechanical design of the knee, as well as its utility in human identification, has been extensively researched. Other research has also revealed useful prognostic variables for patellofemoral joint diseases. As a result, patella and patellar ligament dimensions are frequently used in implant design and specific surgical procedures including patella resurfacing for total knee arthroplasty and the harvesting process for patellar ligament grafts during anterior cruciate ligament reconstruction.

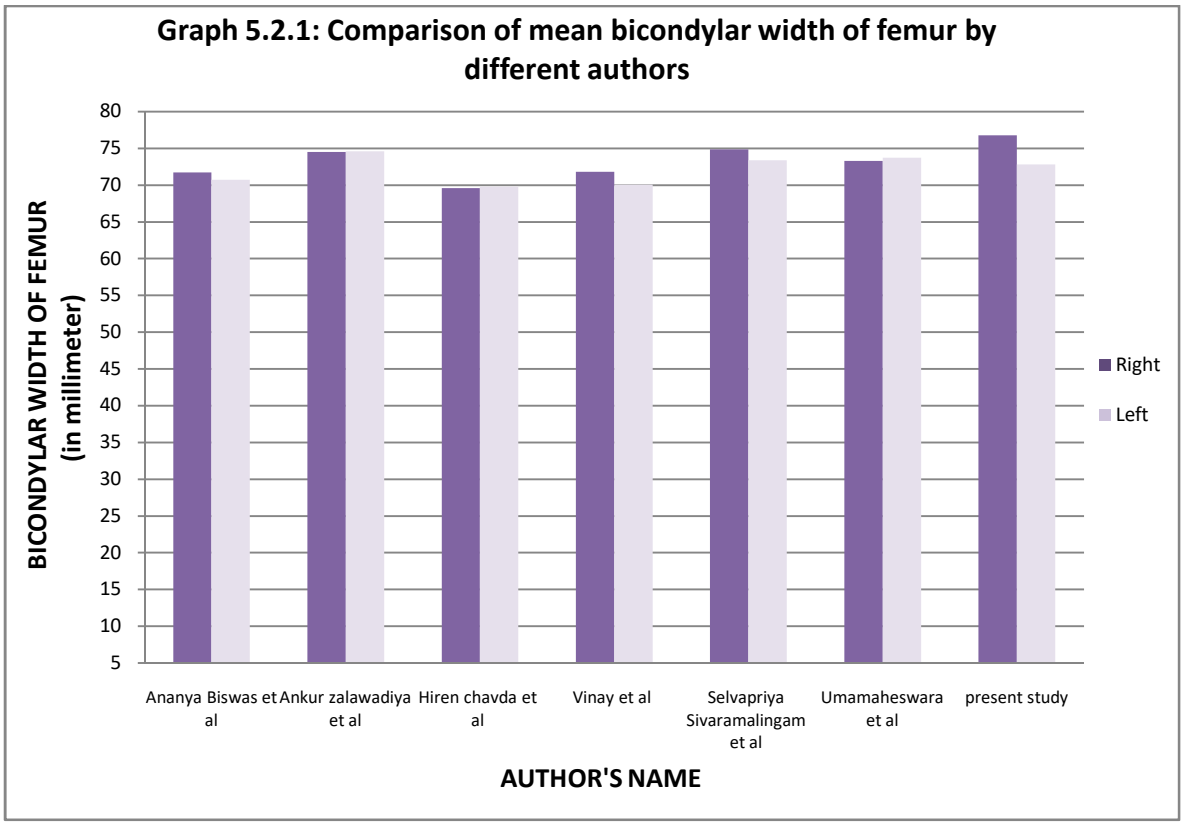
The size and thickness of a patellar implant are critical for successful arthroplasty functionality. A disproportional patellofemoral joint implant would result in poor lever support, motion restriction, excessive wear, and patella instability, as well as knee pain. An incorrect patella position, varied patella morphologies, a constricted medial articular facet, or improper load on the patella are all common causes of patella instability. Furthermore, disproportional patella-patellar ligament lengths may result in a very high (patella alta) or low (patella baja) positioned patella in the patellofemoral joint. The dimensions and classification of patellae, as well as defining the relationship between the patella and the patellar ligament in various demographic groups, are all essential anthropologically besides clinically for the determination of the size of a patellar implant.

5.2 DISCUSSION AND INTERPRETATION OF MORPHOMETRIC MEASUREMENTS OF THE DISTAL END OF THE FEMUR:

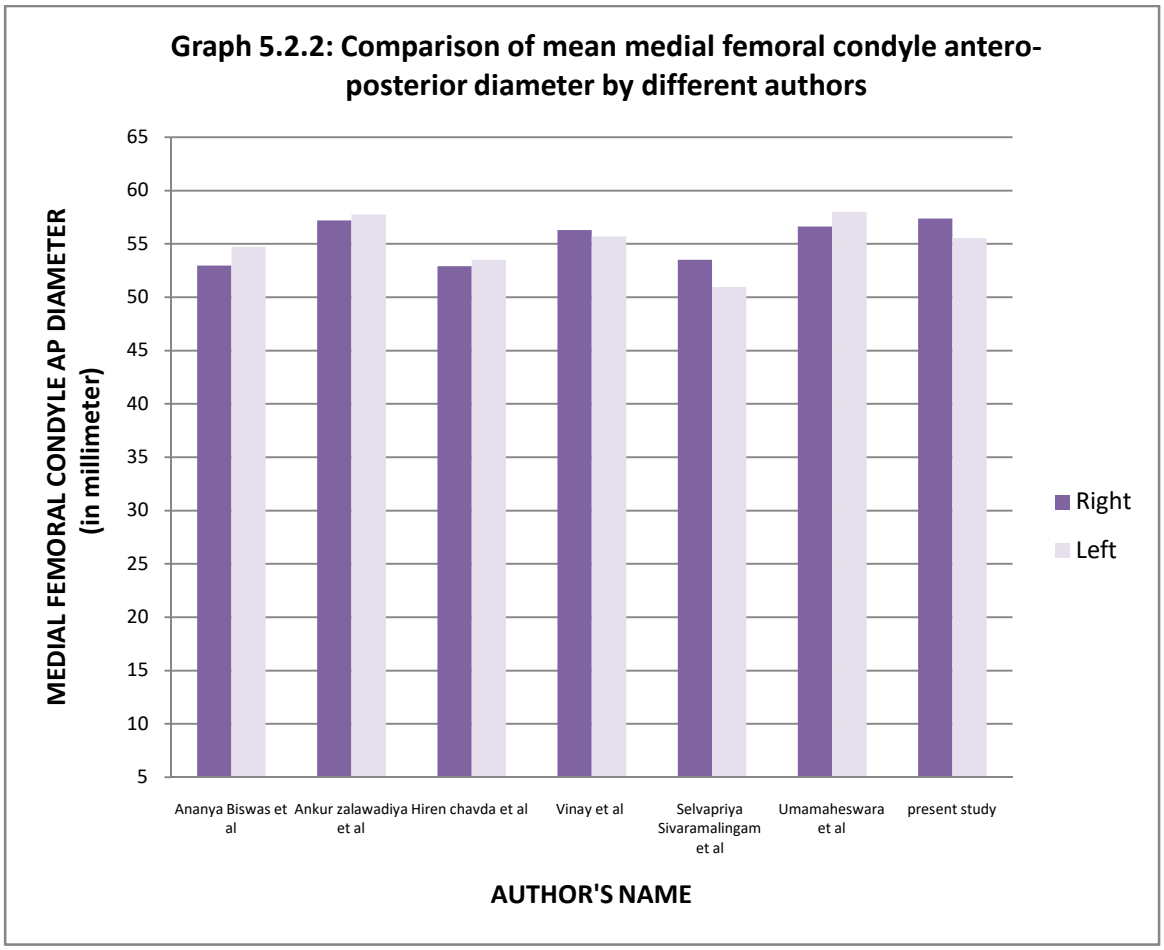
As a degenerative joint disease, primary osteoarthritis of the knee joint develops with age due to persistent wear and strain. The arthroplasty operation delivers exceptional recovery in the quality of life of an affected client with advanced impairment to the knee joint. Ideal prostheses must allow for more than 1000 degrees of stable flexion, rotational laxity in the transverse plane, intrinsic stability in both planes, and a low coefficient of friction between the sliding surfaces. Anatomical knowledge of the lower end of the femur is necessary to achieve this prerequisite. There are several attempts has been made to emphasis on the morphometric study on the distal end of femur usually done by dry bone study as per the literature reviewed in author's record. Therefore, in the present study attempt has been made to record the data from the cadaveric study by direct observation. The results of the present study are compared with the studies done by the various other authors and elicited in the table below.

Author's Name	BCWF	MFCAPD	MFCTD	LFCAPD	LFCDTD	ICNWF	ICNLF
Ananya Biswas et al (2017)	R- 71.71 L- 70.71	R- 52.97 L- 54.74	R- 25.48 L- 27.28	R- 56.20 L- 56.05	R- 27.80 L- 28.03	R- 20.86 L- 19.43	-
Ankur zalawadiya et al (2017)	R- 74.48 L- 74.59	R- 57.21 L- 57.77	R-30.31 L- 31.32	R- 58.36 L- 59.68	R- 31.32 L- 31.99	R- 20.31 L- 20.91	-
Hirenchavda et al (2019)	R-69.60 L- 69.80	R- 52.90 L- 53.50	R- 26.70 L- 26.90	R- 54.70 L- 55.00	R- 30.30 L- 29.60	R- 20.40 L- 18.70	-
Vinay et al (2019)	R- 71.80 L- 70.08	R- 56.60 L- 55.90	R- 28.60 L- 28.10	R- 56.60 L- 56.90	R- 31.10 L- 30.50	R- 21.50 L- 21.70	-
Selvapriya et al (2020)	R- 74.85 L- 73.37	R- 53.50 L- 50.96	R- 32.20 L- 31.29	R- 52.91 L- 52.83	R- 32.30 L- 31.89	R- 21.98 L- 21.01	-
Umamaheswara raoSunnapu et al (2020)	R- 73.26 L- 73.70	R- 56.64 L- 58.02	R- 22.48 L- 28.90	R- 57.40 L- 59.30	R- 30.26 L- 30.72	R- 20.16 L- 22.54	R- 25.32 L- 27.76
Present study	R- 76.76 L- 72.78	R- 57.37 L- 55.55	R- 29.56 L- 28.13	R- 52.64 L- 53.51	R- 32.22 L- 35.44	R- 21.20 L- 21.73	R- 24.64 L- 25.13

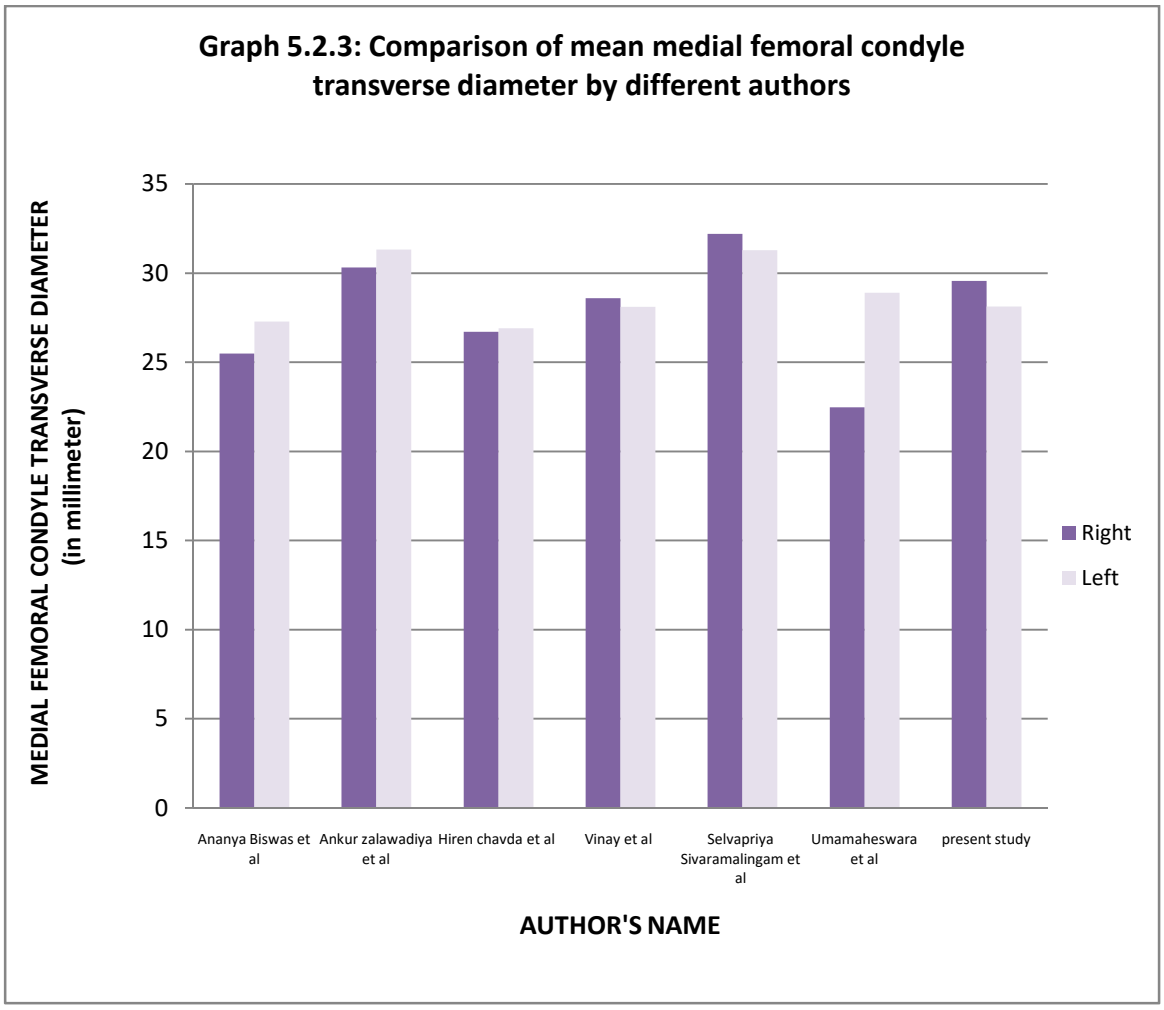
TABLE- 5.2: COMPARISON OF MEAN MORPHOMETRIC MEASUREMENTS OF THE DISTAL END OF FEMUR BY DIFFERENT AUTHORS



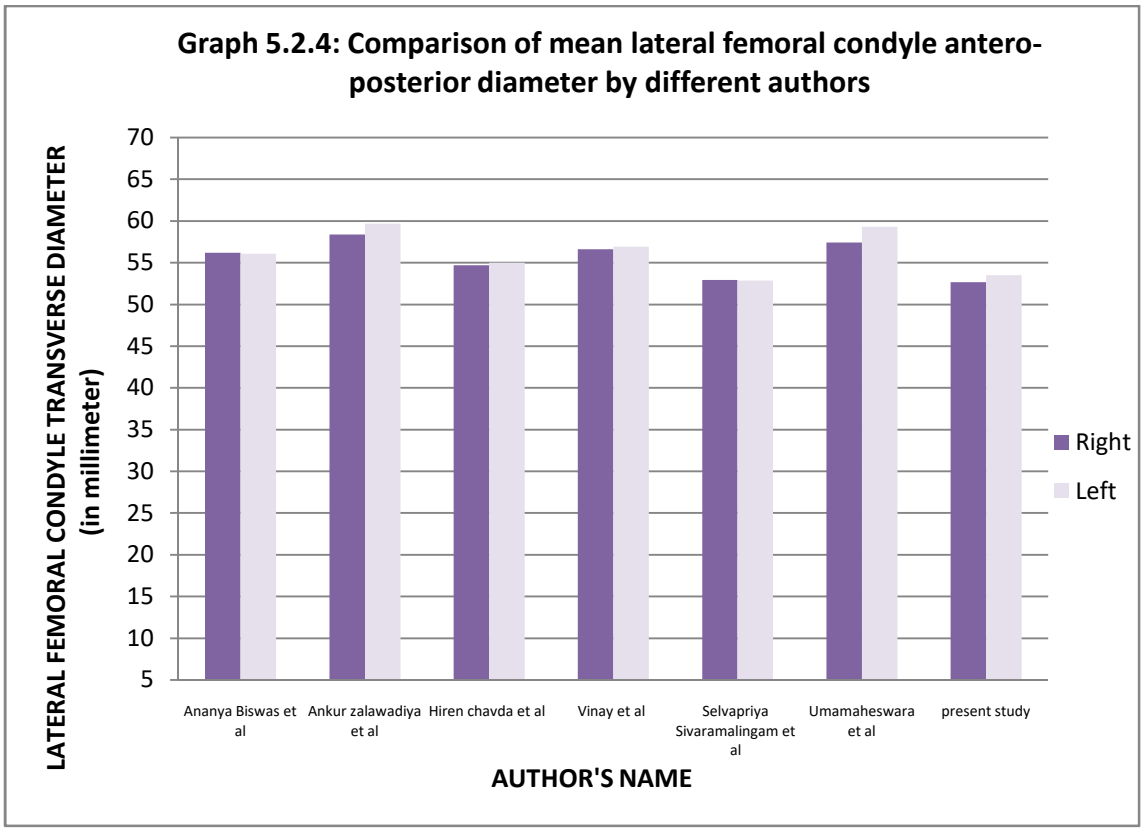
Total knee arthroplasty involves removing less than half an inch (9mm) of the tibial and femoral articular surfaces and replacing them with metal and plastic prosthesis. According to Vinay G. et al. (2019), the average bicondylar width of all specimens was 71.32 5.91 mm, with 71.8 5.91 mm on the right side and 70.8 5.95 mm on the left. Biswas et al. found similar results in a Bengali population, with an average bicondylar width of 71.71 4.5 on the right side and 70.75.25 on the left. Mistri et al., Ravichandran et al., and Shweta et al. discovered slightly higher values in their studies. Similarly, investigations conducted in other countries, such as Terzidis et al and Taner et al, reported greater results than the present study. Unlike previous research, we found a statistically significant variation in bicondylar breadth of the femur between the right and left sides in our investigation. Similarly, the present study found a statistically significant difference in bicondylar femoral breadth between males and females.



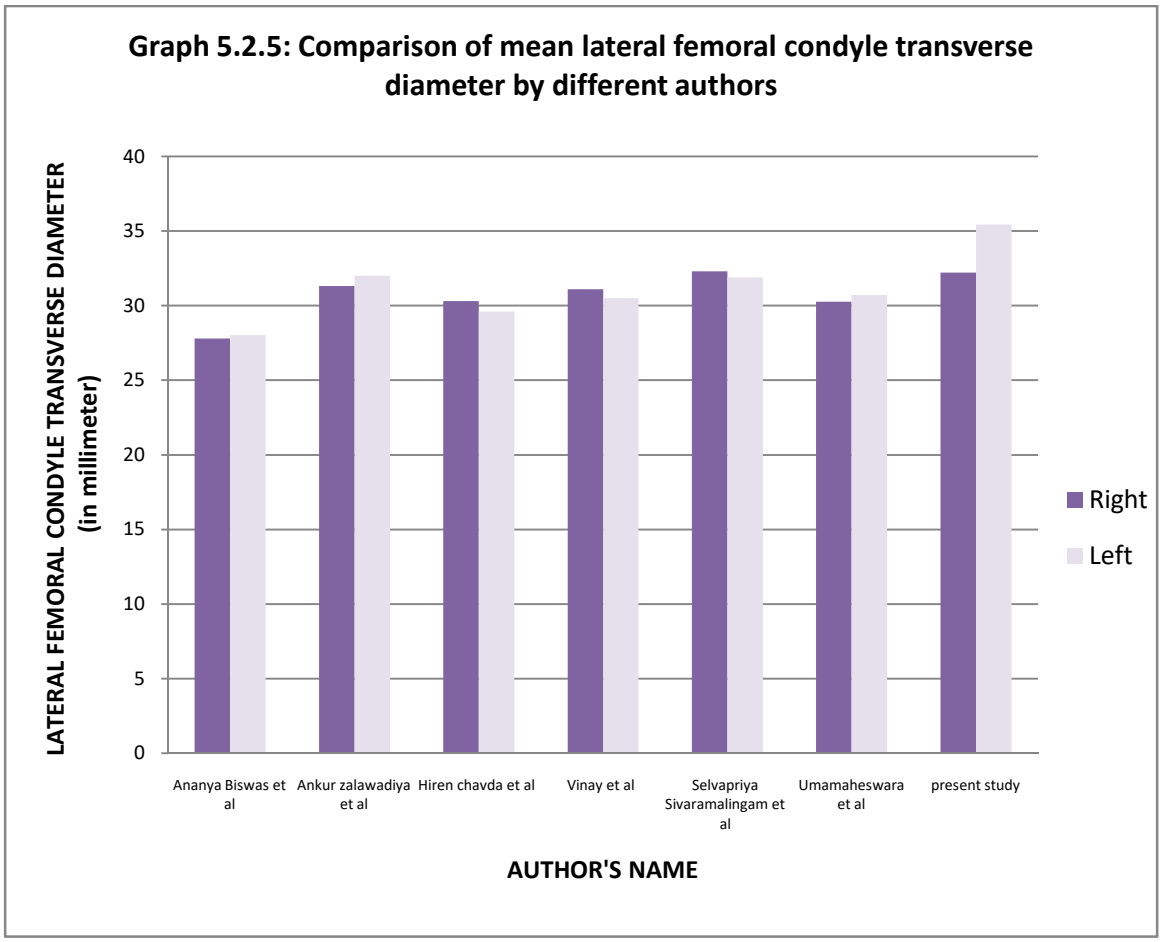
The mean anteroposterior distance of the medial condyle was determined to be 56.3 ±4.73 mm on the right side and 55.7±4.38 mm on the left side in a study by Vinay G. et al (2019), which was somewhat greater than studies by Biswas et al and Hiren et al. Terzidis et al. found greater results in Greek populations than we did in our study. In their CT scan research on Indonesian males and females, Magetsari R et al. found that the average anteroposterior distance of the medial condyle was 44.27±4.91 mm and 40.85±5.73 mm, respectively. We found a higher value in this investigation, which is similar to the work of Ankur Zalawadia et al (2017). Our study also provided data for gender wise and on right and left sides for the medial femoral condyle which will improve the longevity of prosthesis.



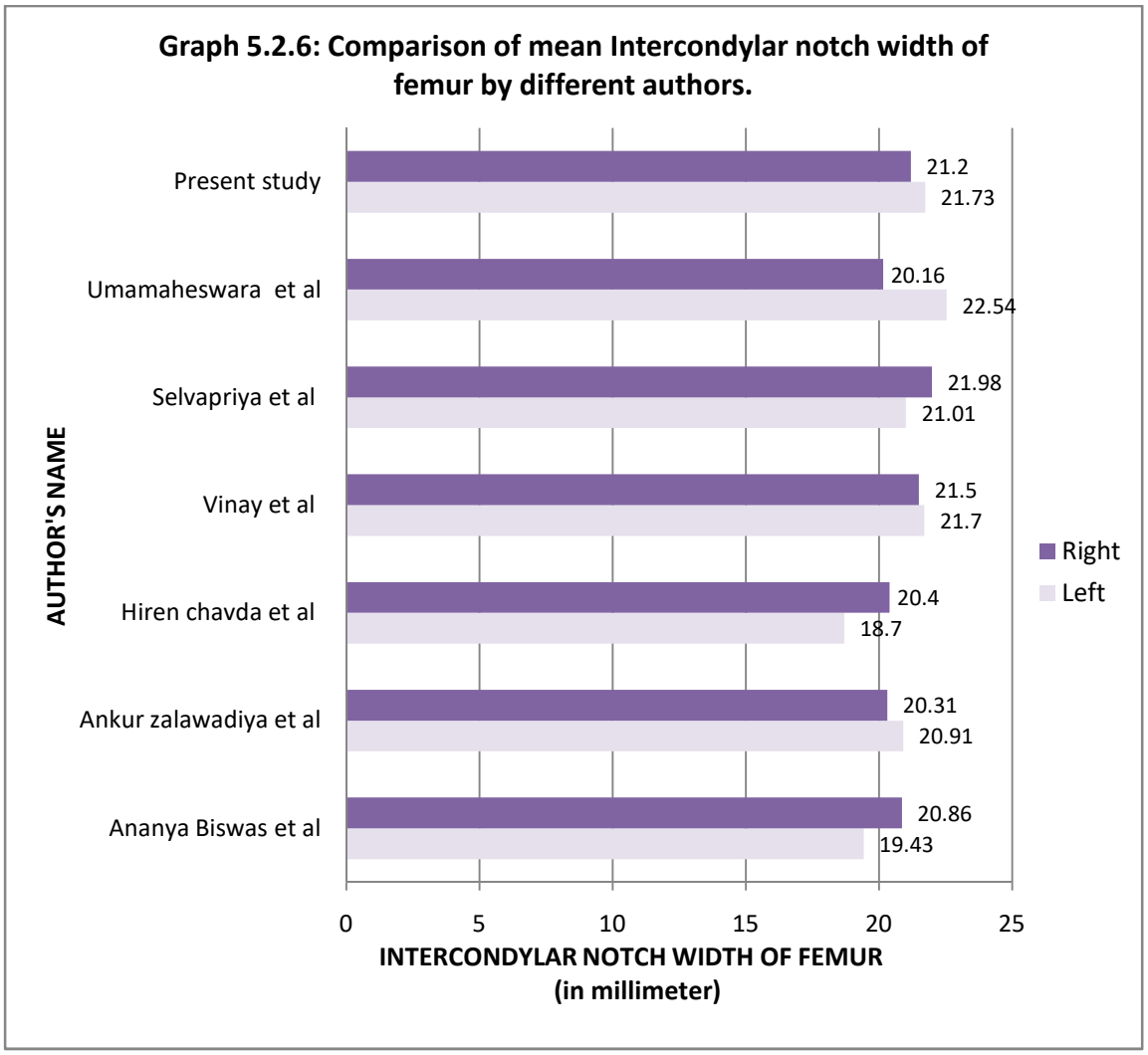
According to the literature, an implant over hang or under hung of 3mm or more was regarded unpleasant in the medio-lateral sense. The mean transverse distance of the medial condyle on the right side was 28.6±3.83 mm and 28.1±3.07 mm in the study by Vinay G. et al (2019), which was similar to Biswas et al, Hiren et al., and the current study. The results obtained were less than those of Ankur Zalawadia et al (2017). Selvapriya et.al. (2017) found the most data.



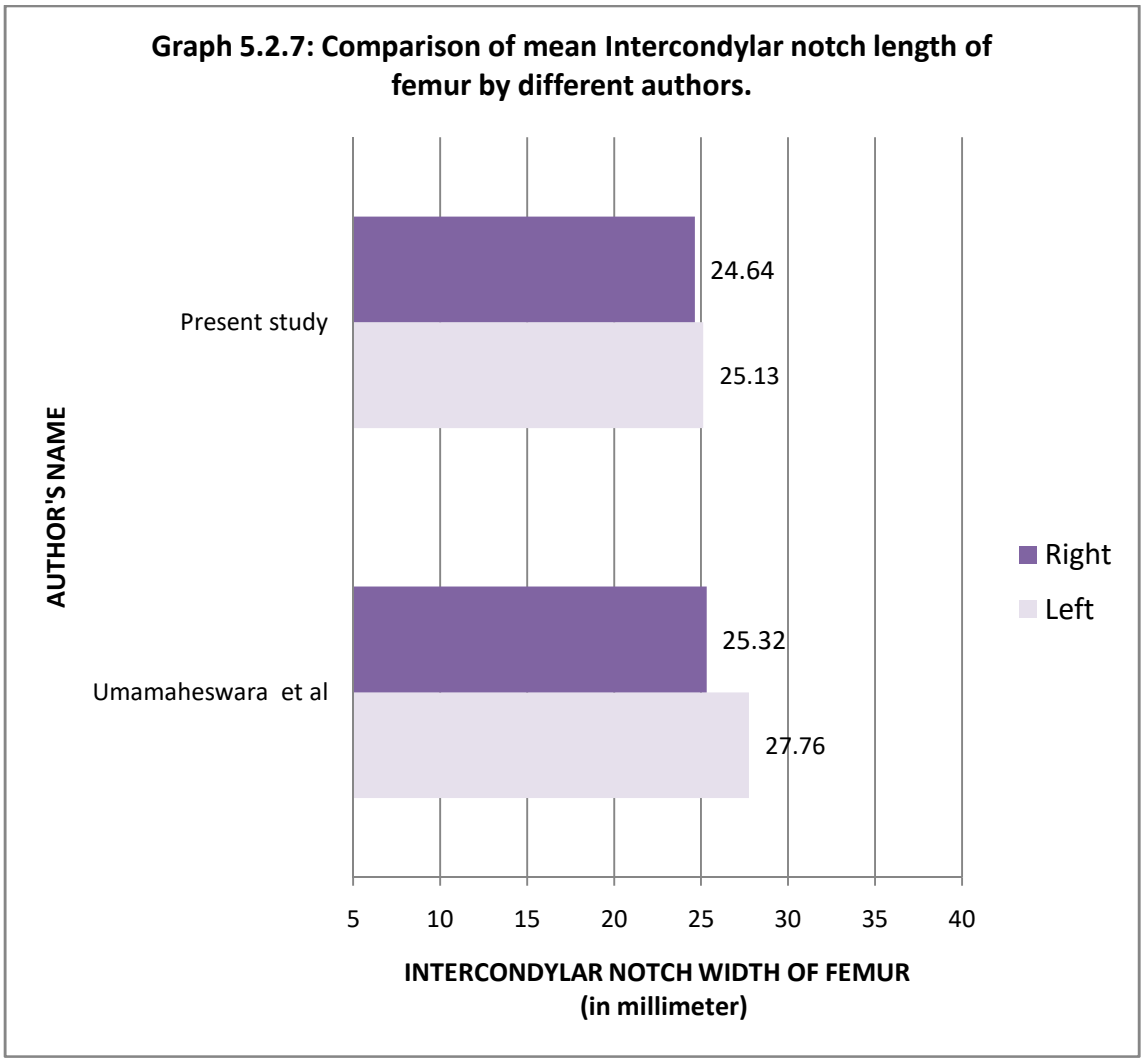
In the study by Vinay G. et al (2019) the average anteroposterior distance of lateral condyle was 56.6±4.4 mm on right side and 56.9±4.26 on left side, almost same results was found by Biswas et al., 13 and Hiren et al. but slightly lesser than studies conducted by Terzidis et al.[5] on Greek population. In our study there was no statistically significant difference was seen between right and left sides and for male and females for anteroposterior distance/diameter of medial and lateral condyle.



The average lateral condyle transverse diameter in the study by Vinay G. et al (2019) was 31.1 3.02 on the right side and 30.5 3.21 on the left side, which was somewhat greater than Biswas et al. Almost all the author showed the values similar. In comparison with the author study, we observed the highest value so far literature is reviewed for the transverse diameter of lateral condyle. Furthermore, the mean values of transverse diameter of medial and lateral condyle didn't show any statistically significant difference.



Literature suggested that there are studies which reported the correlation between the femoral intercondylar notch width and ACL injury. There is little difference in ICNWF measurement data between populations around the world, with the highest concentration in Andhra Pradesh. The results of this study were similar to those of other studies in terms of right and left sides, but they were statistically significant for both males and females, and the results were similar to those of Ankur Zalawadia et al (2017) Men had a height of 21.112.02mm, while females had a height of 19.352.52mm, which was substantially greater in males (p0.001).



Intercondylar notch measurements are clinically essential because smaller intercondylar notches have been linked to smaller anterior cruciate ligaments by various authors. Intercondylar notch stenosis is the narrowing of the intercondylar notch. Many studies have found a link between a narrowing intercondylar notch and an increased risk of anterior cruciate ligament tear rupture. The mean intercondylar notch width measurements revealed a statistically significant difference, however the length of the intercondylar notch was found to be inconsequential. Due to changes in environmental circumstances, lifestyle, inherited factors, and other factors, different ethnicities have distinct measures, which can alter an individual's build and stature.

5.3 DISCUSSION AND INTERPRETATION OF MORPHOMETRIC MEASUREMENTS OF THE PROXIMAL END OF THE TIBIA:

Tibiofemoral articulation is where the proximal end of the tibia meets the distal end of the femur, and it is responsible for transmitting body weight from the femur to the talus. Different types of arthritis regularly affect the knee joint, the most prevalent of which is osteoarthritis, which may necessitate surgical intervention such as total or unilateral knee arthroplasty. TKA is a rigorous procedure that necessitates a precise resection of bone thickness equivalent to the thickness of the prosthetic component placed in order to achieve equal flexion–extension spacing. Knowledge of the lower end of the femur is necessary to achieve these criteria. Therefore, in the present study attempt has been made to record the data from the cadaveric study by direct observation. The results of the present study are compared with the studies done by the various other authors and elicited in the table below.

Author's Name	No. of Specimen	BCWT	MTCPD	MTCTD	LTCAPD	LTCTD
Swati Gandhi et al (2014)	100	-	R- 48.45 L- 47.73	R- 30.18 L- 29.38	R- 40.86 L- 40.69	R- 28.62 L- 28.82
Sandeep. Malegaonkar et al (2018)	60	-	R- 41.00 L- 40.60	R- 26.90 L- 26.30	R- 34.30 L- 32.70	R- 28.60 L- 27.50
Chandni Gupta et al (2018)	50	R- 67.70 L- 68.80	R- 45.50 L- 43.60	R- 27.00 L- 27.60	R- 40.80 L- 40.60	R- 26.60 L- 29.20
Ankur zalawadia et al (2018)	120	R- 74.44 L- 74.57	R- 44.27 L- 44.57	R- 28.31 L- 28.32	R- 38.26 L- 38.51	R- 27.13 L- 27.38
Bhadoria Pooja et al (2018)	224	-	R- 36.38 L- 39.19	R- 27.06 L- 26.01	R- 33.19 L- 35.57	R- 24.66 L- 25.65
Nadia Ahmad et al (2019)	80	R- 66.03 L- 66.72	R- 40.18 L- 40.21	R- 28.46 L- 28.27	R- 35.94 L- 37.02	R- 27.89 L- 27.92
Chaitra et al (2020)	75	R- 63.88 L- 63.38	R- 39.51 L- 38.95	R- 26.35 L- 27.24	R- 33.57 L- 32.86	R- 24.71 L- 25.39
Present study	90	R- 72.28 L- 73.13	R- 41.28 L- 42.77	R- 31.28 L- 32.44	R- 40.31 L- 40.24	R- 30.24 L- 29.93

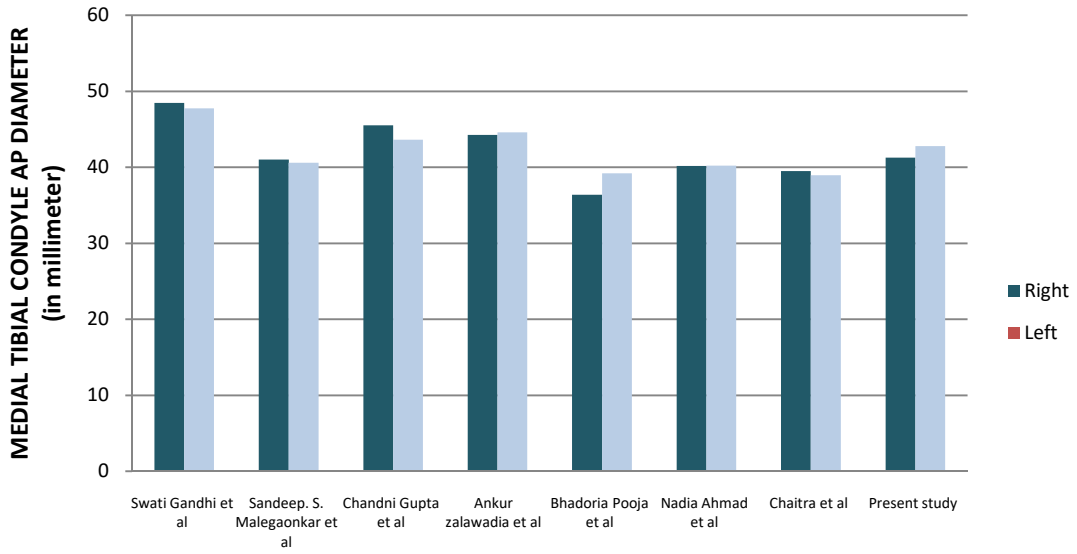
TABLE- 5.3.1: COMPARISON OF MEAN MORPHOMETRIC MEASUREMENTS OF THE PROXIMAL END OF TIBIA BY DIFFERENT AUTHORS

Author's Name	TOTAL AP ICA	AP AICA	AP PICA	TDICA (anterior part)	TDICA (middle part)	TDICA (posterior Part)	Distance from tibial condyle to tibial tuberosity
Swati Gandhi et al (2014)	R- 47.19 L- 49.11	R- 23.84 L- 21.96	R- 17.86 L- 23.22	R- 24.82 L- 25.40	R-7.18 L- 7.41	R- 7.180 L- 7.410	-
Sandeep. S. Malegaonkar et al (2018)	R- 41.90 L- 41.40	-	-	-	-	-	R- 26.80 L- 26.50
Chandni Gupta et al (2018)	R- 46.60 L- 44.90	-	-	-	-	-	R- 50.60 L- 52.40
Nadia Ahmad et al (2019)	R- 42.24 L- 42.89	R- 26.09 L- 27.29	R- 20.83 L- 20.73	R- 23.50 L- 23.23	- -	R- 16.87 L- 17.50	-
Chaitra et al (2020)	R- 40.50 L- 41.05	R- 27.33 L- 27.50	R- 19.41 L- 19.88	R- 20.42 L- 20.78	R- 9.54 L- 9.922	R- 15.48 L- 14.52	-
Present study (2021)	R- 48.77 L- 49.00	R- 26.48 L- 27.04	R- 20.46 L- 20.15	R- 29.48 L- 28.20	R- 11.53 L- 11.46	R- 28.20 L- 17.68	R- 63.06 L- 61.71

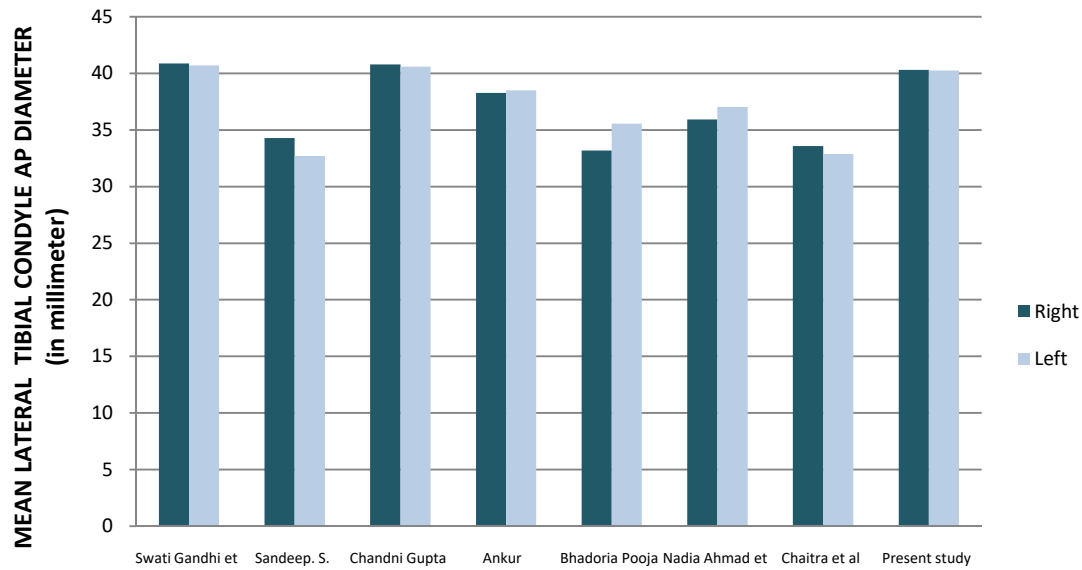
TABLE- 5.3.2: COMPARISON OF MEAN MORPHOMETRIC MEASUREMENTS OF THE INTERCONDYLAR AREA OF TIBIA BY DIFFERENT AUTHORS

The tibial eminence is a non-articular part of the tibia that is between the medial and lateral tibial plateaus and is made up of two spines to which the ACL is attached. PCL does not adhere to the spines of the tibia. A tibial eminence fracture, also called a tibial spine fracture, is an intra-articular fracture of the ACL's bone connection to the tibia that commonly occurs during athletic activity. Poncet was the first to describe it in 1875. The results of the present study's intercondylar area of the tibia were compared to those of other authors and are shown in the figure below.

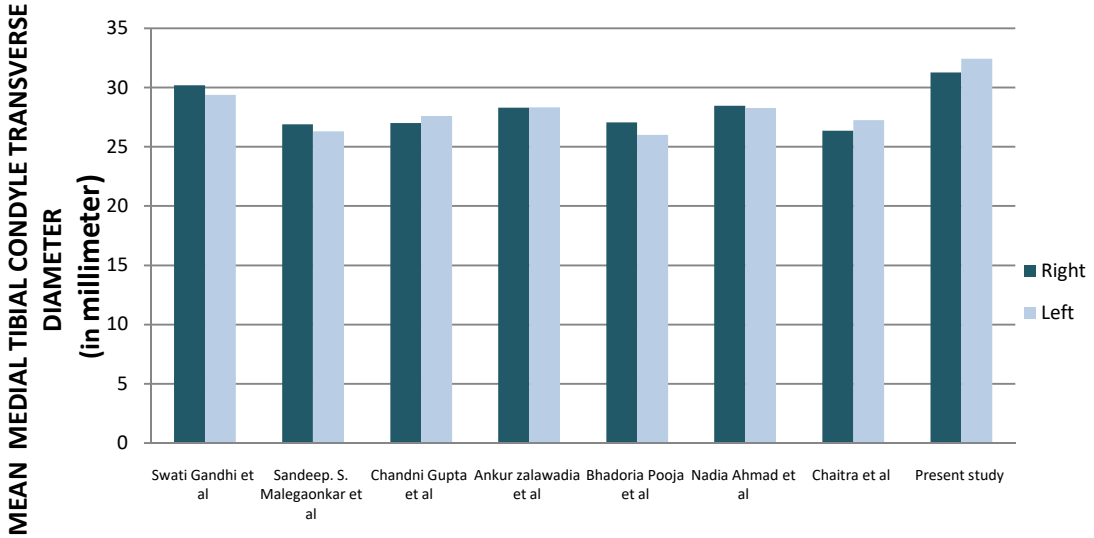
Graph 5.3.1: Comparison of mean medial tibial condyle antero-posterior diameter by different authors



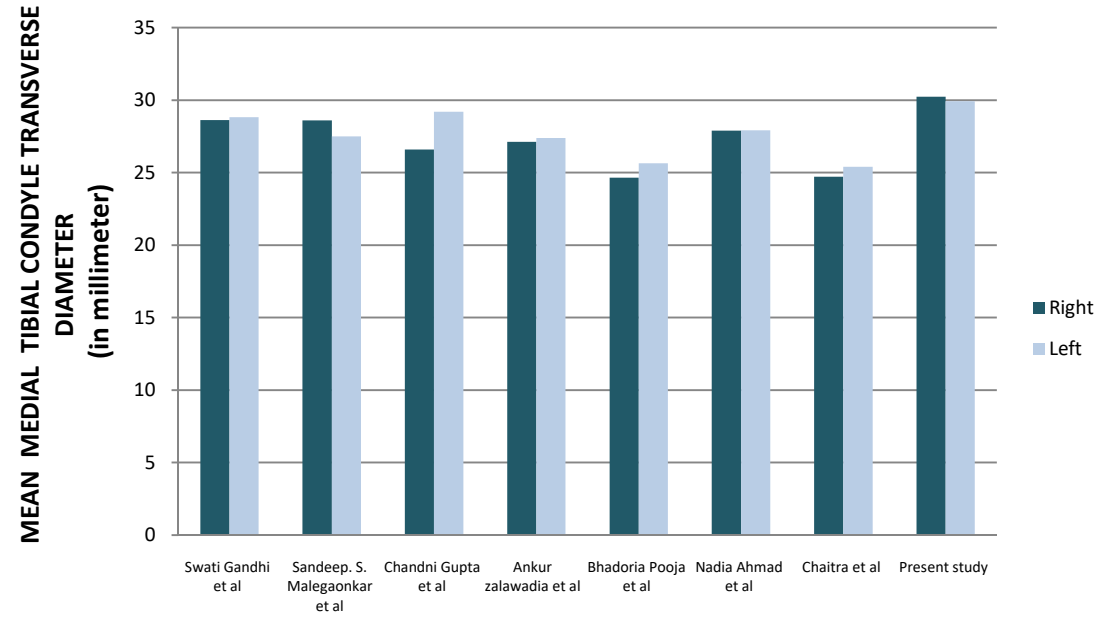
Graph 5.3.2: Comparison of mean lateral tibial condyle antero-posterior diameter by different authors



Graph 5.3.3: Comparison of mean medial tibial condyle transverse diameter by different authors



Graph 5.3.4: Comparison of mean medial tibial condyle transverse diameter by different authors



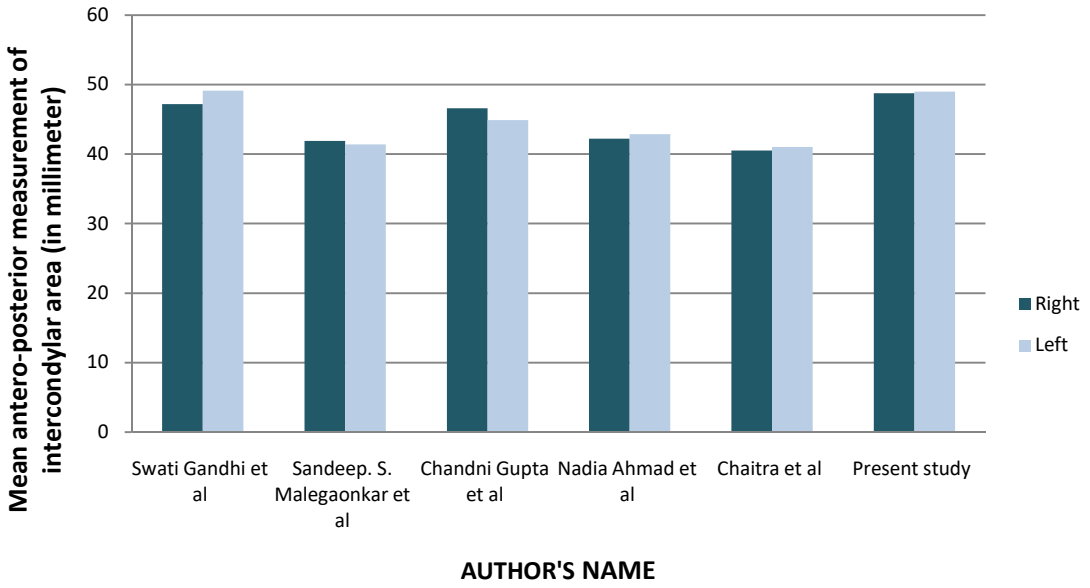
Many researchers attempted to examine the condylar morphometry of the tibia bone. In 2015, Chadani Gupta et al determined the mean transverse length on the right, left, and total tibia to be 6.77 0.31, 6.88 0.65, and 6.83 0.51 cm, respectively, but our data are 6.33±0.435, 6.25±0.465, and 6.29±0.447cm, respectively. The average AP length of the medial condyle on the right, left, and total tibia were 4.55±0.29, 4.36±0.47, and 4.45±0.40 cm, respectively. Our values are almost identical to those in the study: 4.10±0.375, 4.06±0.398, and 4.08±0.383. In her study, the mean anterior-posterior length of the lateral condyle on the right, left, and total tibia was 4.08±0.27, 4.06±0.40, and 4.07±0.34cm, respectively.

Servien et al, had measured anteroposterior measurements of medial and lateral condyle in French population and found it to be 50.8 + 3.3 mm and 47.2 ± 3.3 mm respectively. In the study by chitra et al. the AP measurement of medial condyle of both sides and lateral condyle was found to be 39.51 + 3.23 mm, 38.95 + 4.56 mm and 33.57 + 3.06 mm, 32.86 + 3.00 mm.

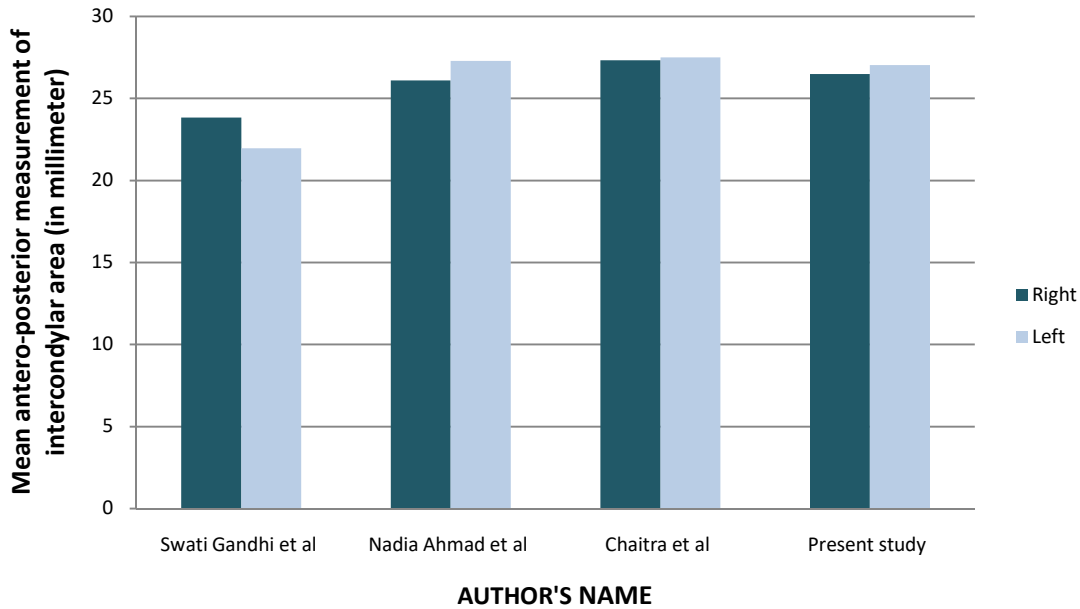
In the present study we observed the AP and TD of LTC is somewhat same in right and left side both. In the present study, the transverse measurement of medial condyle of both the sides is found to be 26.35 + 2.81 mm, 27.24 + 2.75 mm and 24.71 + 2.49 mm, 25.39 + 3.26 mm respectively. We observed the AP diameter of MTC is more than LTC in both side of tibia. The AP diameter is more in the left side of MTC whereas the TD is more in MTC on right side.

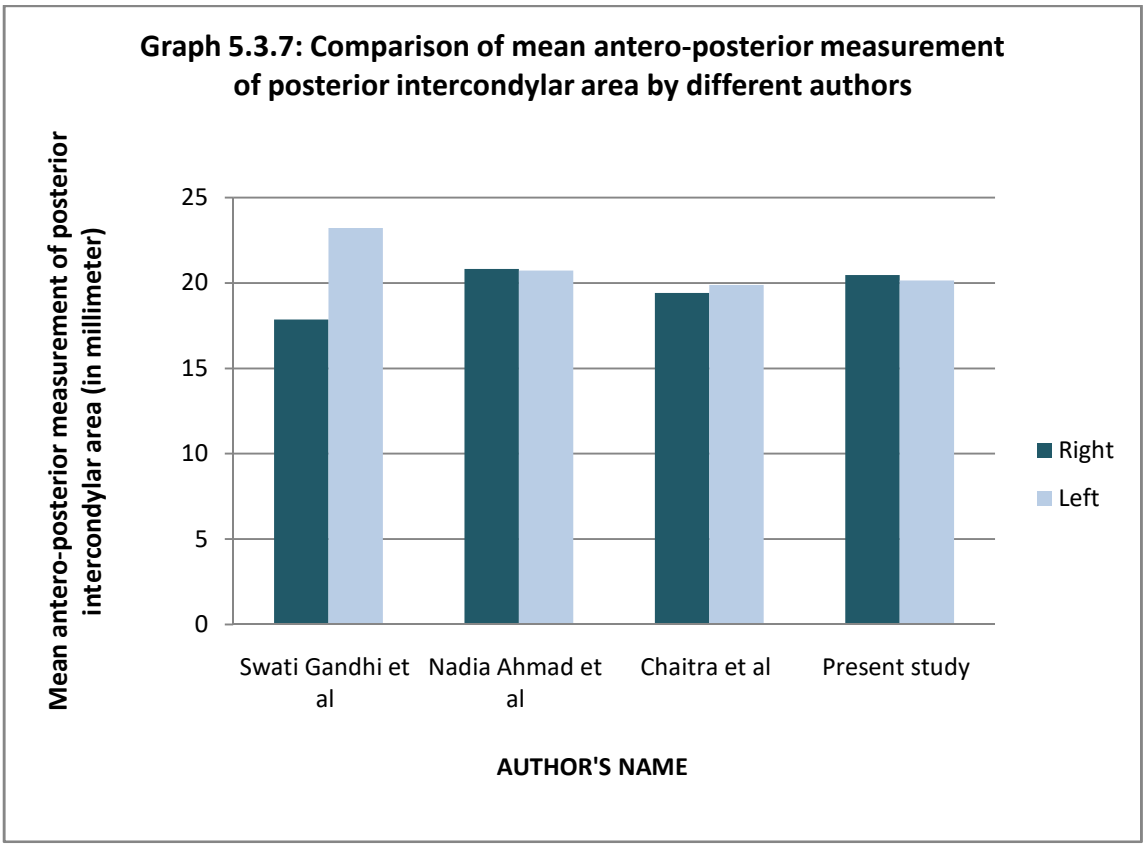
Tibial pleatu fracture is common fractures sustained in two-wheeler accidents when one lands on the knee. Either or both condyles of tibia are fractured. The mechanism of injury can be by an indirect force causing varus or valgus force on the knee or by a direct hit on the knee. These fractures commonly occur in six patterns (Schatzker types). Type I-IV involve only one condyle, lateral or medial. Type V and VI are more complex intercondylar fractures. Recently, there is more drift towards accurate reduction and early mobilization of these fractures. Surgical treatment of these fractures is a technically demanding procedure, and needs substantial anatomical knowledge, variety of equipment and experience. Therefore, present data will help to the surgeons in the various surgical procedures involving upper end of tibia bone.

Graph 5.3.5: Comparison of mean antero-posterior measurement of intercondylar area by different authors



Graph 5.3.6: Comparison of mean antero-posterior measurement of anterior intercondylar area by different authors





The incompatibility of the implant with the tibial bone has clinical ramifications as well. Overhang on the medial or lateral sides might irritate soft tissues and simulate the production of osteophytes, while insufficient coverage can cause the prosthesis to sink prematurely. Although full coverage of the cancellous bone is required, some writers argue that proper rotation of the component is more critical for implant success. While, under sizing of either component could leave exposed cancellous bone, which could be a source of increased bleeding into the knee in the immediate postoperative period and may permit increased osteolysis from wear debris with longer follow-up. As a result, anatomists, anthropologists, and orthopaedic surgeons will benefit from the findings of this study in cases of UKA, full knee arthroplasty surgeries, and meniscal transplantation.

5.4 DISCUSSION AND INTERPRETATION OF MORPHOLOGICAL VARIATIONS IN THE MENISCI OF KNEE:

Menisci are semicircular fibrocartilaginous structures wedged between the femoral condyles and the tibial plateau on the medial and lateral sides of the knee, having bony attachments at the anterior and posterior parts of the tibial plateau. The knee joint is a double condyloid joint with a range of motion of 20º. Because the femur condyles rest unevenly on the tibia's low concave surface, the knee joint relies on other structures for both static and dynamic stability, which are provided by a variety of soft tissue structures including the medial and lateral collateral ligaments, anterior and posterior cruciate ligaments, medial and lateral menisci, the joint capsule, and muscles crossing the joint. In the current scenario, a ruptured meniscus is healed and conserved rather than removed; however, this is only possible if the meniscus tissue is of good quality. As a result, knowledge of menisci morphology is required for this study in order to assess the prevalence of various medial and lateral meniscus forms and compare the findings of various authors listed below.

Different shapes of medial menisci	Murlimanju et al(2010) (n=108)	Veeresh Itagi et al (2015) (n=60)	J.Pranu et al (2018) (n=58)	Shashidhar et al(2019) (n=50)	**Present study (2021) (n=45)**
Crescent shaped	27 (50%)	58 (96.66%)	32 (54.6%)	24 (48%)	33 (73.33%)
Sickle shaped	--	1 (1.66%)	--	--	5 (11.11%)
C-shaped	--	--	--	NIL	4 (8.88%)
Sided U-shaped	6 (11.1%)	--	6 (10.8%)	19 (14%)	3 (6.66%)
Sided V-shaped	21 (38.9%)	1 (1.66%)	20 (34.6%)	7 (38%)	0.00%
Discoid	Nil	--	Nil	Nil	Nil

TABLE- 5.4: SHOWING COMPARISON OF MORPHOLOGICAL VARIATIONS IN DIFFERENT SHAPES OF MEDIAL MENISCI GIVEN BY DIFFERENT AUTHORS

The changes in the morphology of the meniscus may be attributable to mesenchymal differentiation or the development of the vasculature early in embryonic life, according to the literature. The meniscus develops from the differentiation of mesenchymal tissue within the limb bud, and by the eighth week of foetal development, it is a well-defined structure. During O'Rahilly stage 22, the meniscus emerges from the eccentric section of the articular interzone, although the menisci are difficult to detect until week 9 of growth. The blood supply of the meniscus, on the other hand, enters from the periphery and extends across the full breadth during embryologic development. According to the research, changes in the morphology of the meniscus can be attributed to mesenchymal differentiation or the development of the vasculature early in embryonic life. The meniscus arises from the differentiation of mesenchymal tissue within the limb bud, and it is a well-defined structure by the eighth week of foetal development. The meniscus originates from the eccentric region of the articular interzone during O'Rahilly stage 22, yet the menisci are difficult to discern until week 9 of growth. During embryologic development, the blood supply of the meniscus enters from the periphery and expands across the entire width.

Muralimanju et al. (2010) studied the morphology of 108 meniscuses from 54 adult cadaveric knee joints in their study. They discovered % crescent-shaped medial meniscuses, 38.9% V-shaped medial meniscuses, and 11.1 % sided U-shaped medial meniscuses. 61.1 % of the lateral meniscus was C-shaped, 38.9% were crescent-shaped, and no discoid medial or lateral meniscus was seen. In the study done by Veer Itagi et.al. medial meniscus was crescentic in shape (96.66%). The 'C' shape of the lateral meniscus was the most common (88.33%). In 5% of lateral meniscus, incomplete lateral discoid menisci were found. In the specimens, there were no full discoid medial or lateral menisci. The findings were nearly identical to those found in the current investigation, albeit with lower prevalence.

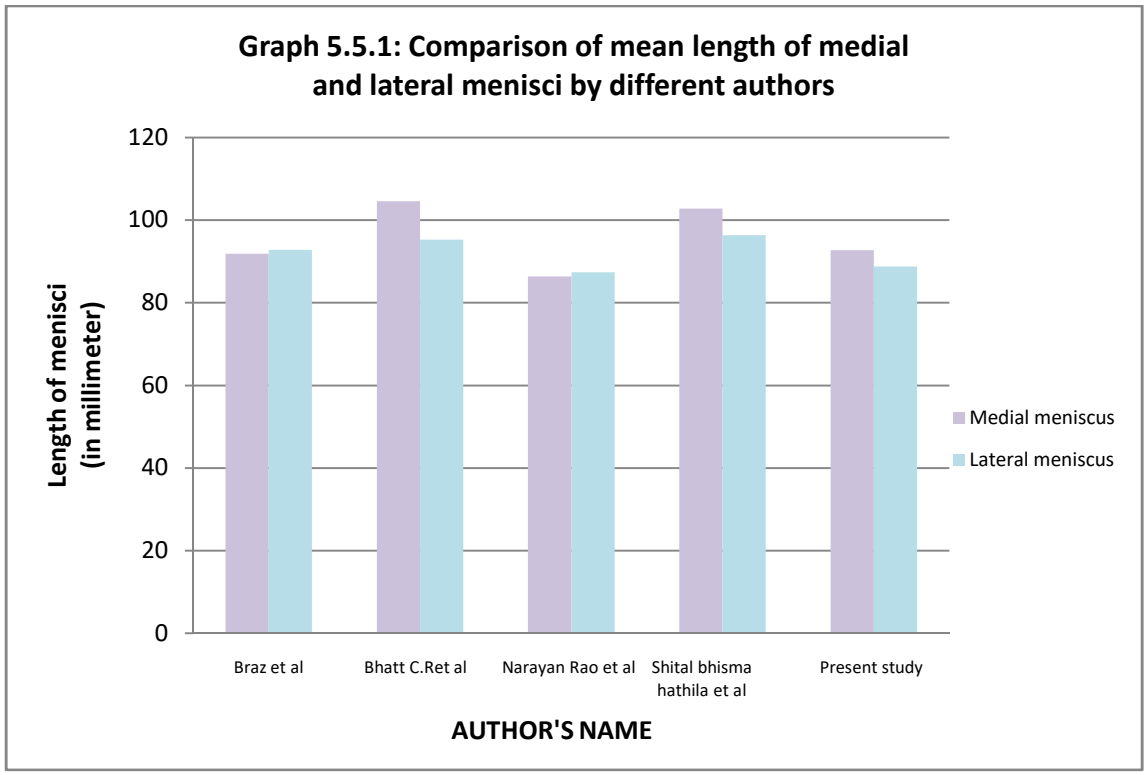
Normal menisci are uncommon and often asymptomatic, while discoid menisci have a higher susceptibility for tearing. However, it is critical to recognize these polymorphisms since they can be mistaken for more serious abnormalities on MRI. It can predict the likelihood of an injury and play a crucial role in clinical practice, particularly in menisci transplant procedures.

5.5 DISCUSSION AND INTERPRETATION OF MORPHOMETRIC MEASUREMENTS OF THE MENISCI OF KNEE:

Morphometry of menisci and in particular, thickness and width of the menisci can determine the kind of injury, mode of treatment and its prognosis. The present study also made an attempt to understand the morphometry of menisci and the data has been compared with the various other authors enlisted in the table below.

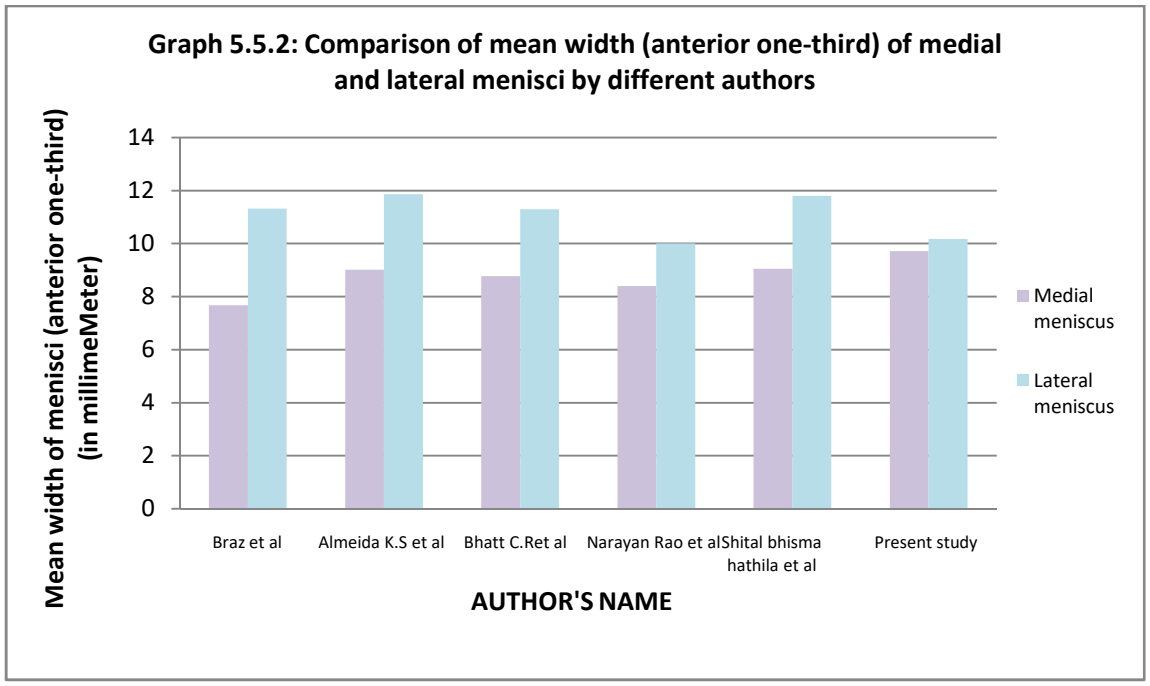
AUTHOR'S NAME	LENGTH OF MENISCI (in cm)		WIDTH OF MENISCI (in mm)						THICKNESS OF MENISCI (in mm)					
			Anterior one-third		Middle one-third		Posterior one-third		Anterior one-third		Middle one-third		Posterior one-third	
	MM	LM	MM	LM	MM	LM	MM	LM	MM	LM	MM	LM	MM	LM
Braz et al (2010)	91.85	92.80	7.680	11.32	9.320	11.16	14.96	11.67	6.170	4.400	6.310	6.520	5.180	5.460
Almeida K.S et al (2004)	-	-	9.020	11.86	12.16	11.97	17.37	11.44	5.920	3.710	5.310	6.100	5.910	5.290
Bhatt C.R et al (2014)	104.6	95.30	8.780	11.30	12.08	11.66	16.46	11.50	5.820	3.700	5.640	5.780	5.800	5.200
Narayan Rao et al (2014)	86.40	87.4 0	8.400	10.0 0	8.400	10.00	15.00	9.800	5.400	5.000	5.600	5.900	5.400	5.700
Shital bhisma hathila et al (2018)	102.8	96.40	9.050	11.80	11.10	12.53	15.39	12.03	6.210	4.140	6.180	5.900	6.300	5.600
PRESENT STUDY	92.75	88.81	9.71	10.18	11.59	10.05	18.80	9.900	4.885	4.266	5.888	4.944	6.000	3.500

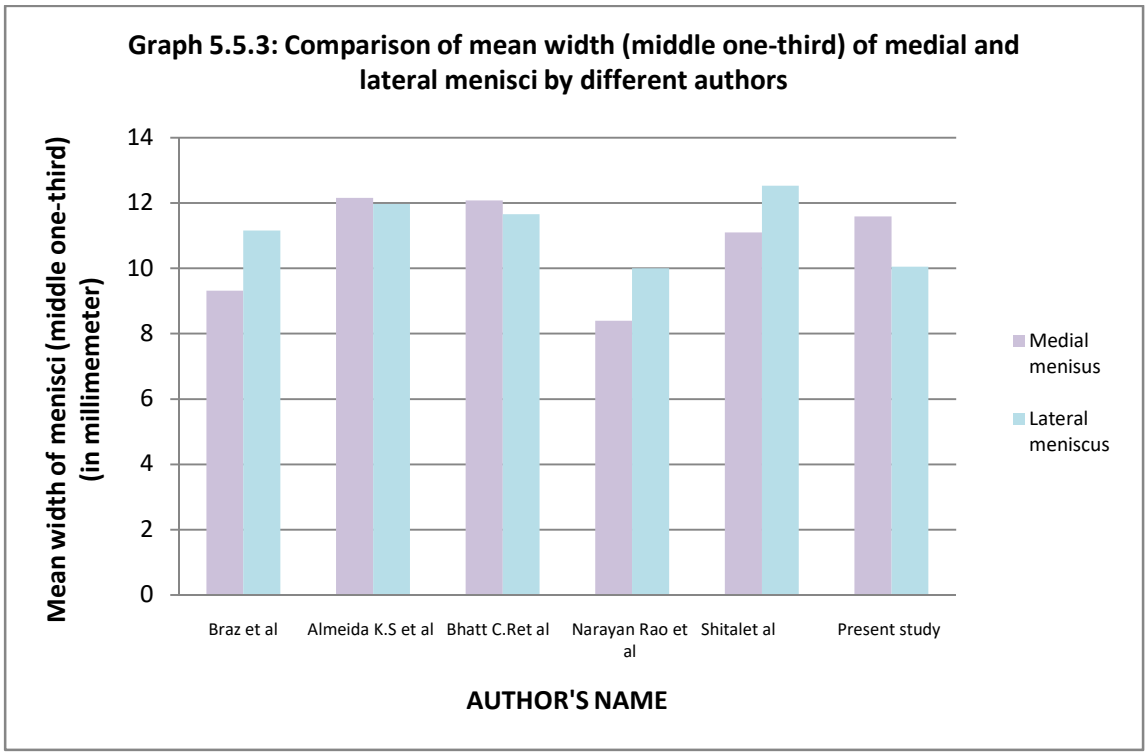
TABLE 5.5: SHOWING MEAN COMPARISON OF MORPHOMETRIC VARIATION IN MENISCI GIVEN BY DIFFERENT AUTHORS



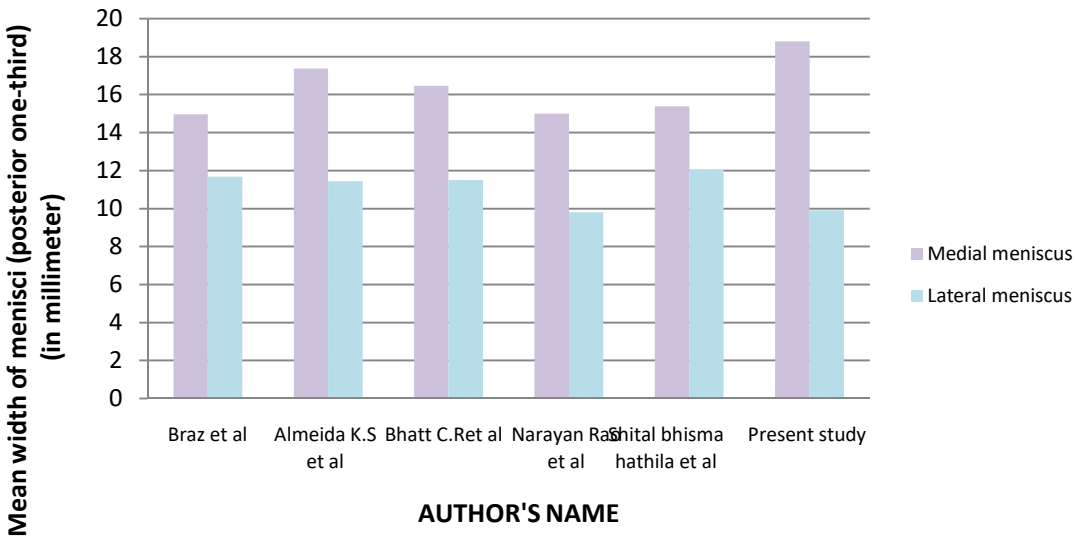
Various authors have studied the morphological and morphometric parameters of the medial and lateral menisci of the knee joint, with Almeida K.S et al in 2004, Rao N et al in 2014, Braz et al. in 2010, Bhatt CR et al. in 2014, and Shital et al. in 2018 conducting more comprehensive studies on the menisci. In a more generalized description of the morphometry research of menisci, Testut and Latarjet (1975) stated that the average thickness of the outer circumference for the lateral meniscus is 8mm and for the medial meniscus is 6mm, and that the typical width of menisci is 10-12mm.

Hayashi et al., (1988) stated about the necessity to reduce substantially the thickness and the width of discoid meniscus during the surgical procedure, and revealed that the normal menisci showed thickness and width of 6-8mm and 12- 13mm, respectively.

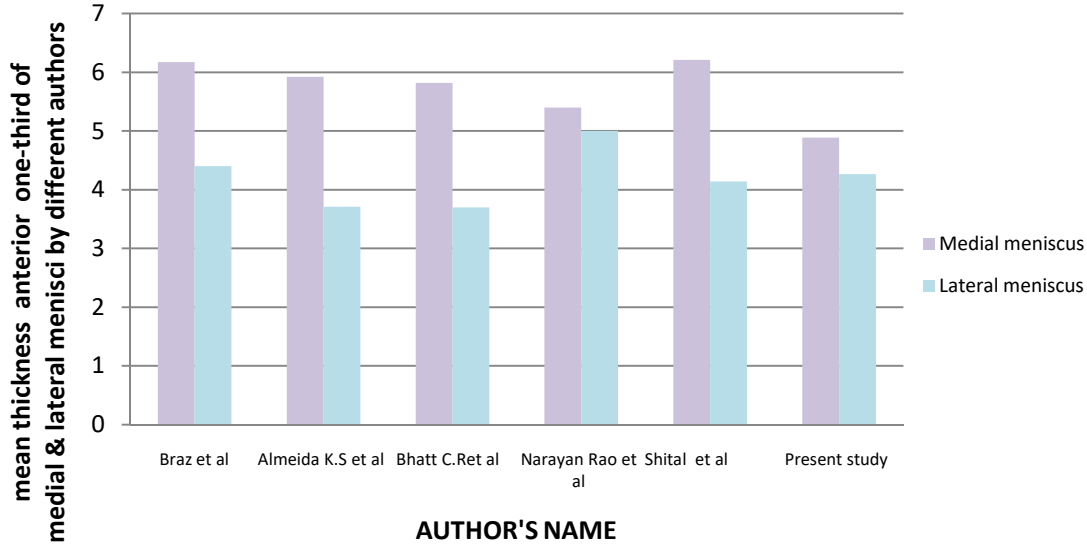

Graph 5.5.2: Comparison of mean width (anterior one-third) of medial and lateral menisci by different authors
Mean width of menisci (anterior one-third) (in millimeMeter)
14
12
10
8
6
4
2
0
Braz et al
Almeida K.S et al
Bhatt C.Ret al
Narayan Rao et al
Shital bhisma hathila et al
Present study
AUTHOR'S NAME
Medial meniscus
Lateral meniscus

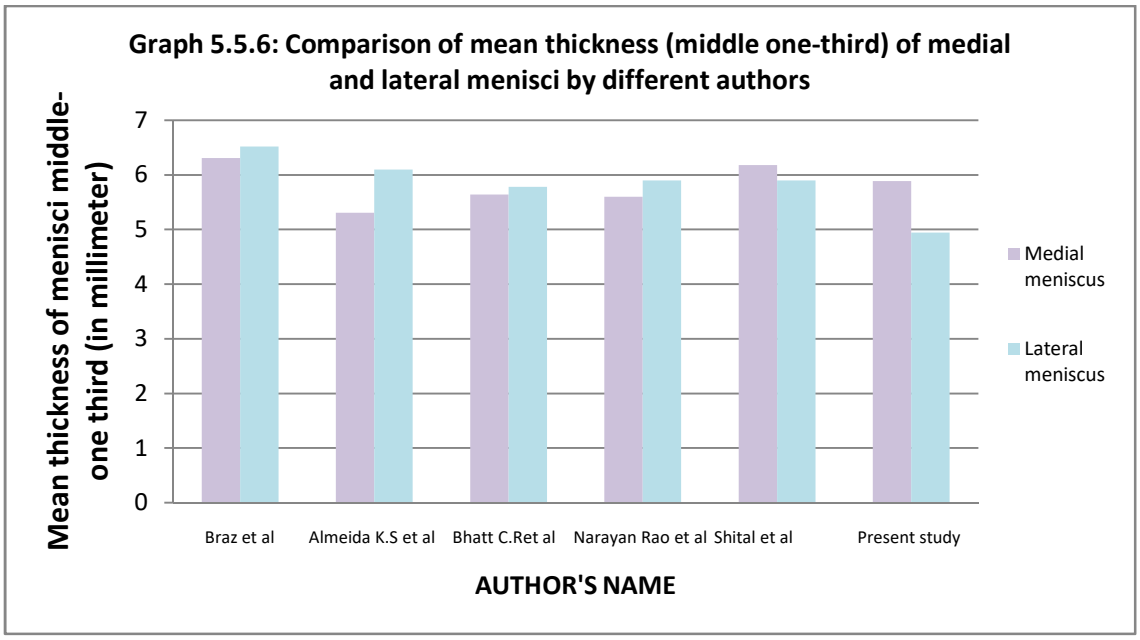

Graph 5.5.3: Comparison of mean width (middle one-third) of medial and lateral menisci by different authors
Mean width of menisci (middle one-third) (in millimemeter)
14
12
10
8
6
4
2
0
Braz et al
Almeida K.S et al
Bhatt C.Ret al
Narayan Rao et al
Shitalet al
Present study
AUTHOR'S NAME
Medial menisus
Lateral meniscus

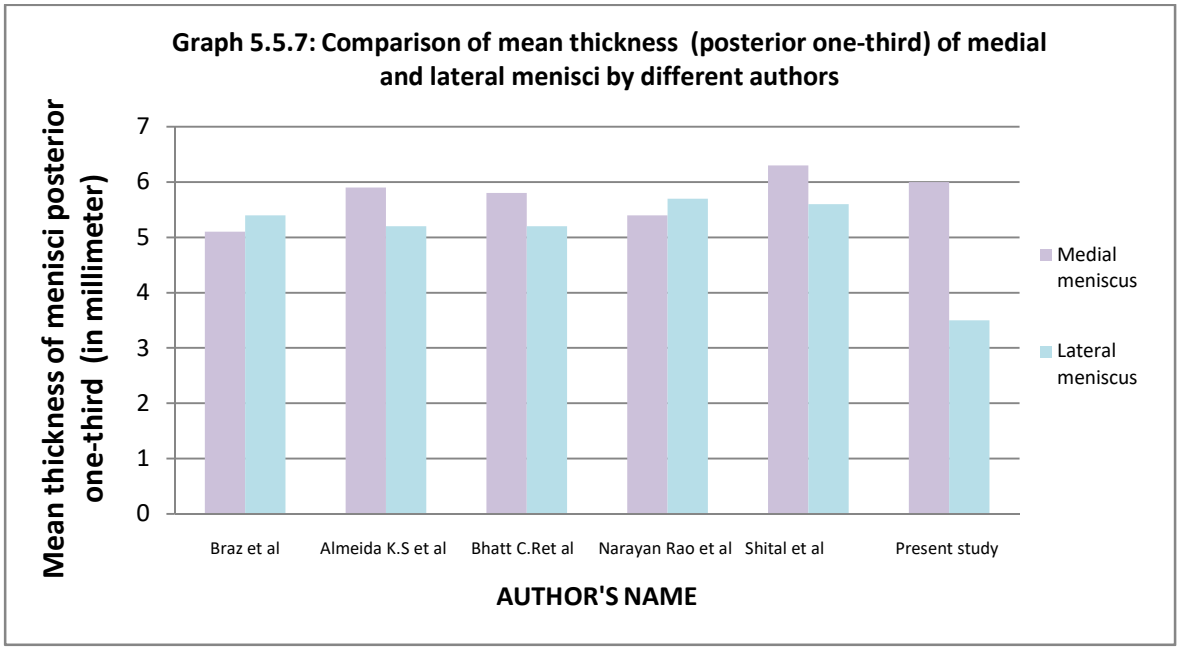
Graph 5.5.4: Comparison of mean width (posterior one-third) of medial and lateral menisci in present study



Graph 5.5.5: Comparison of mean thickness (anterior one-third) of medial and lateral menisci by different authors







A morphometric examination of 44 menisci from 22 knees was undertaken by Almeida et al., (2004). They discovered that the medial meniscus thickness in the anterior third, middle third, and posterior third was 5.92mm, 5.31mm, and 5.91mm, respectively, whereas the lateral meniscus thickness was 3.71mm, 6.10mm, and 5.29mm. The anterior third, medial third, and posterior third of the medial meniscus measured 9.02mm,

12.16mm, and 17.37mm, respectively, while the lateral meniscus measured 11.86mm, 11.97mm, and 11.44mm. The distance between the anterior and posterior horns of the medial meniscus was 29.70 mm, while the distance between the anterior and posterior horns of the lateral meniscus was 12.71 mm.

A morphometric examination of 40 menisci from 20 knees was undertaken by Braz and Silva (2010). The medial menisci thickness in the anterior third, middle third, and posterior third was 6.17mm, 6.31mm, and 5.18mm, respectively, whereas the lateral menisci thickness was 4.40mm, 6.52mm, and 5.46mm. For the anterior third, middle third, and posterior third, the medial menisci were 7.68mm, 9.32mm, and 14.96mm wide, while the lateral menisci were 11.32mm, 11.16mm, and 11.67mm wide. The medial meniscus had an average outer circumference of 91.85mm while the lateral meniscus had an average circumference of 92.80mm.

Muralimanju et al. (2010) studied 212 menisci from 106 knees (53 right and 53 left side) from 27 female and 26 male fetuses in a morphometric analysis. They discovered that the medial meniscus had a peripheral length of 26.66mm and the lateral meniscus had a peripheral length of 25.14mm. The inner body lengths of the medial and lateral meniscus were found to be 14.72mm and 12.59mm, respectively. The anterior third, middle third, and posterior third medial meniscus thicknesses were 1.61mm, 1.47mm, and 1.48mm, respectively, whereas the lateral meniscus thicknesses were 1.57mm, 1.52mm, and 1.49mm. The anterior third, middle third, and posterior third of the medial meniscus measured 2.94mm, 2.88mm, and 3.28mm, respectively, while the lateral meniscus measured 3.26mm, 3.53mm, and 3.44mm.

According to the Shitalet. al., the length of the medial menisci at the outside circumference is 10.28$\pm$0.77cm, whereas the lateral menisci are 9.64$\pm$0.33 cm. These findings closely resemble to the studies of Braz et al. and Bhatt CR et.al. The length of the medial meniscus is 7.52$\pm$0.7cm, while the lateral meniscus is 6.81$\pm$0.2cm, according to Murlimanju BV et al. These findings are comparable to those seen in the current investigation.

Knee meniscal injuries are a prevalent set of injuries unique to the knee that are frequently reported as sports activity increases. The twisting movement, which is a crucial part of the damage mechanism, is only achievable with a flexed knee. As the

rotation occurs between the femur and tibia condyles, the meniscus is 'sucked in' and nipped. The meniscus tears longitudinally as a result of this. A little twisting, such as that which occurs when walking on an uneven surface, might tear the meniscus. In the elderly, a deteriorated meniscus might be torn by a minor or no injury. Meniscal tears come in a variety of shapes and sizes. The most common type of tear is the bucket-handle tear, which is followed by radial, anterior horn, posterior horn, and complex tears.

The discoid meniscus, degenerated meniscus in osteoarthritis and a presence of meniscal cyst makes it more prone to the injury. The peripheral meniscal tears, being in a vascular area, often heal. The meniscus can be ripped longitudinally (bucket-handle tear) or transversely, separating it from the capsule. Because of its solid attachment to the tibial collateral ligament and greater excursion during rotatory movements, the medial meniscus is more vulnerable to injury than the lateral. The popliteus muscle protects the lateral meniscus by pulling the posterior horn of the meniscus backward, preventing it from being crushed between the articular surfaces.

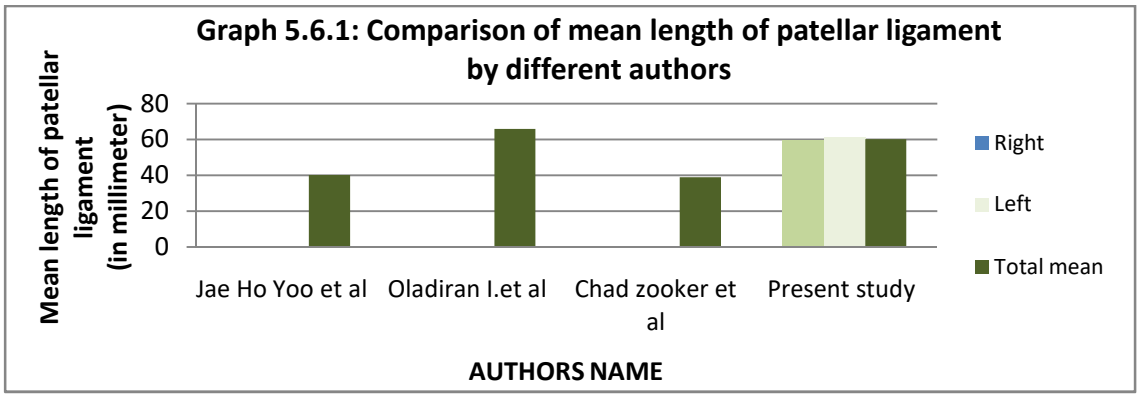
The meniscus is torn most commonly at its posterior horn. With every subsequent injury, the tear extends anteriorly. The meniscus, being an avascular structure, once torn does not heal. If left untreated, it undergoes many more sub-tears, and damages the articular cartilage, and thus initiating the process of osteoarthritis. Often it is difficult to diagnose the cause of knee symptoms on history and clinical examination. Such non-specific symptom-complex is termed as internal derangement of the knee. Surgical removal of the menisci known as meniscectomy; nearly doubles the articular cartilage stress on the femur and multiplies the forces by six or seven times on the tibial plateau. Degenerative changes in the tibiofemoral joint may be intensified by increased joint stress. In the current situation, arthroscopic menisci repair, closed partial meniscectomy, meniscal transplant, total meniscectomies, and cadaver menisci transplant are all opportunities. Though, conservative surgery is favored to aggressive excision since complete removal of the menisci renders the knee immovable. Following a meniscal tear, surgeons rarely conduct complete meniscectomies; instead, they try to keep as much of the meniscus as possible, either through debridement or repair. We believe there is a link between increased weight, sedentary lifestyle, higher sports activity and meniscal morphometry, meniscus injury, menisci surgical intervention, and subsequent osteoarthritis.

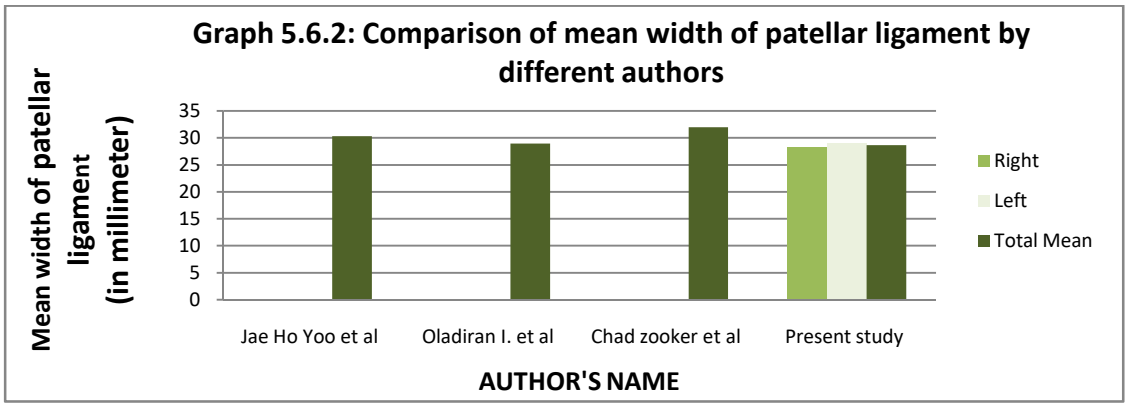
5.6 DISCUSSION AND INTERPRETATION OF MORPHOMETRIC MEASUREMENTS OF PATELLAR LIGAMENT OF KNEE:

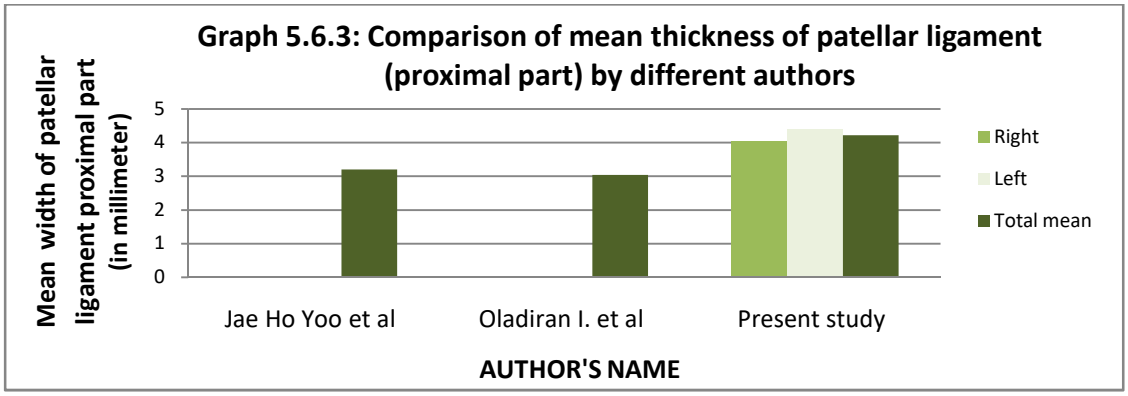
The Patellar ligament of the knee joint is a strong, flat central band of quadriceps femoris tendon that stretches from the apex of the patella to the superior smooth portion of the tibial tuberosity, improving quadriceps pulls on the tibia. A tendon connects a muscle to a bone, and the patellar 'tendon' connects a bone to another bone (patella to tibial tuberosity), therefore the patellar ligament. An infrapatellar fat pad and a synovial membrane separate the posterior aspect of the patellar ligament from the knee joint, as does the patellar ligament from the tibia. Excessive pulling of the patellar tendon on the tibial tuberosity can occurs in sporty adolescents whose tibia has not fully ossified can may lead to inflammation of a growth plate (apophysitis) known as Osgood-Schlatter Disease.

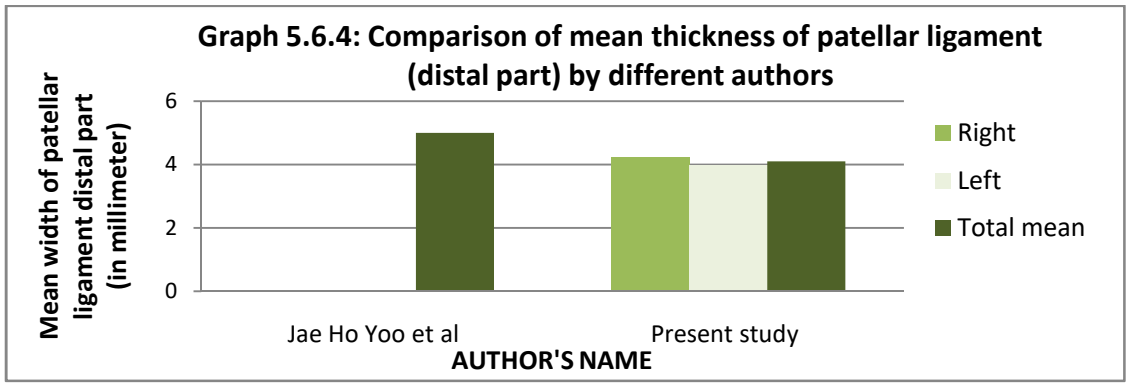
The anterior cruciate ligament, posterior cruciate ligament, medial patellofemoral ligament (MPFL), and contralateral patellar tendon are commonly measured in the clinical setting to determine their suitability for grafting for reconstruction of the anterior cruciate ligament, posterior cruciate ligament, medial patellofemoral ligament (MPFL), and contralateral patellar tendon. This preoperative procedure demands ensuring that the graft has the correct breadth and length, and that it is neither too short nor too lengthy.

There is a scarcity of data on the morphometric characteristics of these structures. It is essential to have a preoperative examination of patella tendon width. Because patellar tendon graft is the graft of choice in anterior cruciate ligament reconstruction surgeries using "Bone-patellar tendon-bone" autograft harvest, morphometric information on the patellar ligament can be quite useful to surgeons. For present study data is recorded from cadaveric study by direct observation. Morphometric study on patella and patellar ligament is usually done by dry bone study, CT-scan study or intra-operative study as per the author’s record.


Graph 5.6.1: Comparison of mean length of patellar ligament by different authors
Mean length of patellar ligament (in millimeter)
80
60
40
20
0
Jae Ho Yoo et al
Oladiran I.et al
Chad zooker et al
Present study
AUTHORS NAME
Right
Left
Total mean


Graph 5.6.2: Comparison of mean width of patellar ligament by different authors
Mean width of patellar ligament (in millimeter)
35
30
25
20
15
10
5
0
Jae Ho Yoo et al
Oladiran I. et al
Chad zooker et al
Present study
AUTHOR'S NAME
Right
Left
Total Mean


Graph 5.6.3: Comparison of mean thickness of patellar ligament (proximal part) by different authors
Mean width of patellar ligament proximal part (in millimeter)
5
4
3
2
1
0
Jae Ho Yoo et al
Oladiran I. et al
Present study
AUTHOR'S NAME
Right
Left
Total mean


Graph 5.6.4: Comparison of mean thickness of patellar ligament (distal part) by different authors
Mean width of patellar ligament distal part (in millimeter)
6
4
2
0
Jae Ho Yoo et al
Present study
AUTHOR'S NAME
Right
Left
Total mean

In present study, the mean value of patellar length measured on right side 60.24±0.625 and on left side 59.96±0.614 respectively. The result was much higher than found in Jae Ho Yoo et al., Oladiran Olateju OI et al and lesser than the result found in Zooker Chad et al. Mean value of width of patellar ligament was measured 28.33±0.535 on right side and 28.95±0.436 on left side. The data was similar in other study by the author Jae HO Yoo et al., Oladiran Olateju OI et al. and Zooker, Chad et al. shown in figures above. Mean value for thickness of patella is measured in proximal and distal part and found similar as by Jae HO Yoo et al. Furthermore, mean values in male and female cadaveric specimen for sex dimorphism was also found to be similar. The length of patellar ligament is observed insignificantly higher in males than females. The disparity in results could be related to differences in female build and stature. In comparison to the current study, the results found by Poonam Vohra et al. were a little lower.

The interrelationship between patellar ligament and patella is significantly important for the determination of size of patellar implant. The native patellar tendon gives excellent functional outcomes with low recurrence rates and so it is a reliable and preferred graft.

When undergoing ACL reconstruction with a bone-patellar tendon-bone (BPTB) autograft, a preoperative measurement of patella tendon length and width is required for numerous reasons. Patellar tendon ruptures after BPTB autograft ACL restoration are a rare complication that has only been recorded in a few cases in the literature. Following removal of the middle one-third of the patellar tendon, the remaining portion of the tendon may be at greater risk of rupture when the patient resumes intensive physical activity. Furthermore, preoperative radiological evidence of patella alta or baja can indicate a patella tendon that is shorter or longer than usual. A graft-tunnel length mismatch can be caused by a patellar tendon that is too long or too short. In this case, an alternate graft for ACL restoration may be recommended.

The Insall–Salvati index or ratio is the length of the patellar ligament divided by the longest length of the patella. The index's normal ratio has a mean (range) of 1.0 (0.8–1.2). Patellar alta is indicated by a ratio less than 0.8, while patellar alta is indicated by a ratio more than 1.2. It is perhaps the most widely used method for determining patellar height and detecting anomalies such as patella alta and patella baja. Tibial tuberosity anomalies, such as Osgood-Schlatter disease and osteotomies, have an impact on it. In such an unusual situation, a different method of calculating the ratio may be required. The ratio was first calculated using a radiographic technique on a 30° flexed lateral knee x-ray and then applied to sagittal MRI. Although attempts have been made to eliminate measuring errors on radiographs, the accuracy of this radiographic approach is harmed by the approximations and assumptions used. However, literature suggests that measurements taken in situ, for as with a cadaver, are more precise since they avoid approximation and assumptions.

In this research, the average Insall–Salvati index is observed 1.61. The acquired result is more than 1.3, indicating that the cadaveric patellae in this study are positioned high in the patellofemoral joint (patella alta). In a study conducted by Olateju OI et al. (2013), the Insall– Salvati ratio obtained for female specimens was 1.53 and 1.49 for male specimens. We agree with the findings that there is a considerable diversity in patella positions among different demographic groups, including Europeans, Arabs, Africans, Chinese, and non-Europeans, and we observed that patella alta is more common among these populations in the current research.

Consequently, an anatomical knowledge of patellar ligament is of great importance in the field of knee surgery, ligament reconstruction surgery and sports medicine to the General surgeons, orthopedic surgeons, and to the physical therapist.

5.7 DISCUSSION AND INTERPRETATION OF THE CRUCIATE LIGAMENT OF KNEE JOINT:

The anterior cruciate ligament is the most frequently ruptured ligament, with tear of the medial or lateral collateral ligaments occurring frequently. It is most commonly caused by a twisting force on a semi-flexed knee. The O'Donoghue trio refers to when the medial collateral ligament, medial meniscus, and anterior cruciate ligament are all injured at the same time.

The PCL is the primary restraint that prevents the tibia from excessively posterior translation under the femoral condyles. The anteromedial band (AMB) and the posterolateral band (PLB) are the two bands that make up the anteromedial band (Levangie &Norkin 2005). The PCL is most likely to play a small role in regulating both varus and valgus strains. It acts as a knee stabilizer by keeping the weight-bearing tibia taut and preventing hyperextension of the knee. If the front aspect of the tibia is impacted with the knee semi-flexed, the ligament is ruptured, forcing the tibia backwards onto the femur.

After an arthroscopic evaluation of the femorotibial joint, a definitive diagnosis of cruciate ligament injury is made. Prior to surgery, the surgeon must evaluate the possibility that a partial cruciate tear will proceed to a complete tear during recovery from anesthesia, necessitating aided recovery. A lateral, medial, or cranial approach to the femorotibial joints may be used to evaluate the cruciate ligaments, and the results of reconstructive surgery have been inconsistent.

5.8 DISCUSSION AND INTERPRETATION OF THE COLLATERAL LIGAMENT OF KNEE JOINT:

Knee ligament injuries are becoming more common as people participate in more sports activity nowadays. The tibial collateral ligament, located on the medial side of the knee, is the most commonly injured ligament. The type of injury is determined by the force's direction and severity. Indirect, twisting, or bending pressures on the knee are the most common causes of knee ligament injury. If the damaging force is valgus and causes the leg to abduct on the femur, the MCL ligament is injured. The most common site of rupture is the femoral attachment. As a result, gross anatomical understanding of the ligament is required for surgical care of the damaged ligament as well as MCL release during knee arthroplasty.

In study done by Fang liu.et.al.(2010) observed the mean overall length of the SMCL measured from mean length of SMCL was 100.7 ± 9.5 mm (range,90.0 to 117.1). The SMCL was broad, flat and triangular in shape therefore, thickness was observed in the proximal, mid and distal SMCL. Those were measured as 10.9 ± 1.2 mm, 17.7 ±2.1 mm and 10.7 ± 1.8 mm, respectively. The average width of the SMCL in the proximal and distal part was similar. The average mid width observed widest and firmly attached to the medial meniscus in its posterior portion was 1.6 times wider than the proximal or the distal part. He reported meniscotibial ligament was approximately 1.7 times wider than the meniscofemoral ligament. whereas the MFL was approximately 3 times longer than the MTL.In the present study we observed the MFL was approximately 2.5 times in males and 3 times longer in females than the MTL. These findings might fulfill significant knowledge gap in the knee parameters values of knee joint.

As people participate in more activities, knee ligament injuries are becoming more common. The most usually injured ligament is the tibial collateral ligament, which is positioned on the medial side of the knee. The degree and direction of the force determine the type of injury. Knee ligament injury is most commonly caused by indirect, twisting, or bending stresses on the knee. The MCL ligament is injured when the damaging force is valgus and causes the leg to abduct on the femur. The femoral attachment is the most

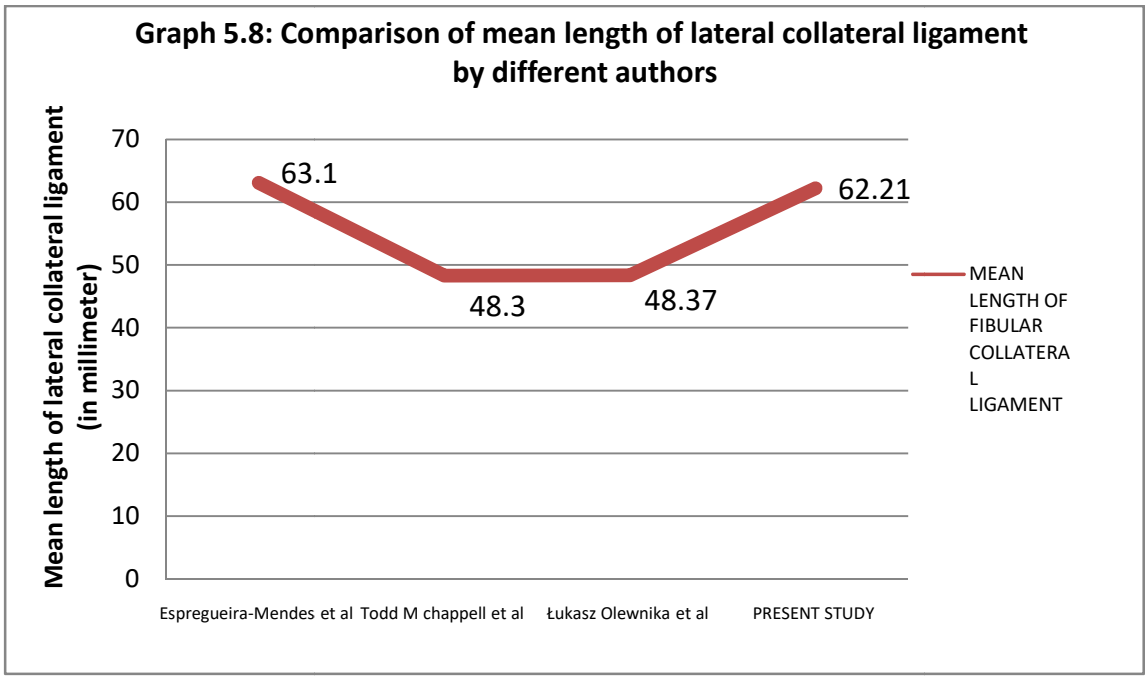
common location of rupture. As a result, a thorough understanding of the ligament's anatomy is essential for both surgical repair of the injured ligament and MCL release during knee arthroplasty.

There are three main layers to the lateral structures of the knee. Just posterior to the overlaying iliotibial tract, the thickest layer, the lateral part of the capsule, separates into two laminae. The LCL, fabellofibular, and arcuate ligaments are all contained inside these laminae. Although lateral knee injuries are less prevalent than medial knee injuries, they can be more disabling since they are subjected to higher force during locomotion. During the stance phase of the gait cycle, when the lateral structures are stretched, the physiological varus angulations of the limb axis increases and reaches a maximum with complete extension of the knee. Injury to the cruciate ligaments is frequently accompanied with lateral compartment injuries; independent damage to this component is uncommon.

The relevance of the structures crossing the lateral and posterolateral corners of the knee has lately been highlighted by advanced arthroscopic diagnostic and surgical procedures. As a result, prior understanding of the specific anatomy of the fibular collateral ligament is required for discussion of the many authors listed below.

Author's Name	Year of Study	No. of Specimen	Length of LCL (in mm)	Width of LCL (in mm)
Espregueira-Mendes et.al.	2006	20	63.10	
Todd M chappell et.al.	2014	70	48.30	-
ŁukaszOlewnika et.al.	2019	111	48.37	4.000 (Proximal part)
PRESENT STUDY	2021	90	62.21 R- 61.88 L- 62.55	3.875 R- 3.950 L- 3.800 (Middle one third)

TABLE- 5.8: COMPARISON OF MEAN MORPHOMETRIC MEASUREMENTS OF THE LATERAL COLLATERAL LIGAMENTS BY VARIOUS AUTHORS



LCL had a mean length of 63 mm in a research by Espregueira-Mendes et al. As the knee flexed, the length decreased dramatically and slackened. At 900 degrees of knee flexion, the length was substantially shorter than at 00 degrees. Todd et al. and Olewnika et al. found outcomes that were smaller than those found in this study.

The FCL appears to be dynamically governed by the movements of the short and long heads of the biceps femoris and their attachment to the LCL. The lateral compartment of the knee has a complicated and varied architecture. The FCL is only repaired if the ligament is completely torn, and grafts are usually taken from the semitendinosus tendon (Moulton et al., 2015). Highly specific diagnosis is the surgeon's tool for repairing and reconstructing the LCL, popliteofibular ligament, or both. Since a result, the current findings, along with previous research, confirm the significance of the study, as the LCL is a key constraint against varus angulations and the popliteofibular ligament is a primary restraint against tibial external rotation.

This morphometric anatomy knowledge is required to the surgeons for the treatment of acute injuries to the lateral aspect of the knee joint, particularly reconstructions necessitated by lesions that produce persistent rotatory instability.

5.9 DISCUSSION AND INTERPRETATION OF THE TRANSVERSE LIGAMENT OF KNEE JOINT:

The literature on the transverse ligament of the knee is limited. An identifiably separate anterior intermeniscal ligament was observed in 47 specimens in a study by Eric W. Nelson et al (94%). The average mid-substance width was 3.3 mm and the average length was 33 mm. The average perpendicular distance between the anterior intermeniscal ligament and the anterior edge of the anterior cruciate ligament's tibial insertion was 7.8 mm (range, 2.0 to 13.5). In 12 knees (24%), the anterior intermeniscal ligament served as the major attachment for the anterior horn of the medial meniscus; 7 knees (14%), had no tibial insertion, and 5 knees (10%) only had a fine fascial tibial connection. On plain lateral knee radiographs, the anterior intermeniscal ligament was visible in four cases, according to Sintzoff et al. In each case, MRI scans revealed that the ligament was encased in fat. In a cadaveric anatomic research conducted by Kohn and Moreno, the anterior intermeniscal ligament was seen in 69% of 46 paired knee specimens.

In our study, we did not focus on the bony relationship of the transverse ligament and its different type. We focused on the prevalence of presence and absence of the transverse ligament and attempt has been made to establish the symmetrical pattern and sexual dimorphism. Further, we observed the mean length of ligament was observed 34.25mm on right sided c and 33.64mm on left sided. The mean mid-width was observed 4.200 in right sided and 3.722 in left sided. The data for both the metric measurements was observed statistically insignificant. We observed the total prevalence for the presence of ligament 85.55% and total absence of ligament was observed 14.44%. We concluded from the data analysis that so far less anatomic study had specifically reflected the prevalence of this structure. A thorough understanding of the anterior intermeniscal ligament anatomy can help with arthroscopic evaluation, surgical repair, and meniscal allograft reconstruction. Understanding these patterns is helpful in avoiding patient damage during surgical operations, particularly arthroscopic ACL reconstructions conducted near the anterior intermeniscal ligament of the knee.

5.10 DISCUSSION AND INTERPRETATION OF THE OBLIQUE POPLITEAL LIGAMENT OF KNEE:

The posterior anatomy of the knee consists of a network of structures and has uniquely complex biomechanics. Controlling knee hyperextension due to soft-tissue i.e. genu recurvatum is one of the functions of the posterior structures, especially the OPL. One of the biggest troubles in discussing a study on the OPL is that there is no standard regarding how morphometric anatomical measurements should be made on this structure, or in describing relation to the nomenclature of its expansions. Thus, there is a lack of uniformity among the data in the literature, and the capacity for comparison between studies is lost.

At its medial origin, the OPL had a mean thickness of7.4 mm. On the other hand, LaPrade et al. found slightly higher numbers (9.5 mm). Moreover, in evaluating the length of the ligament and the thickness of its lateral insertion, there was greater discordance. In the present study, it was observed that the length of the OPL was approximately 33.6 mm, while in the study by LaPrade this number reached 48 mm. One possible explanation outcome from our study is drawn as detailed anatomical study on oblique popliteal ligament is highly recommended. The anatomical scope for the ligament is tremendous. We observed various morphological differences while dissecting the ligament. Due to time constraint, we could not emphasize on studying and documenting morphological variations and various extensions of attachment of oblique popliteal ligament.

5.11 DISCUSSION AND INTERPRETATION OF THE OS FABELLA:

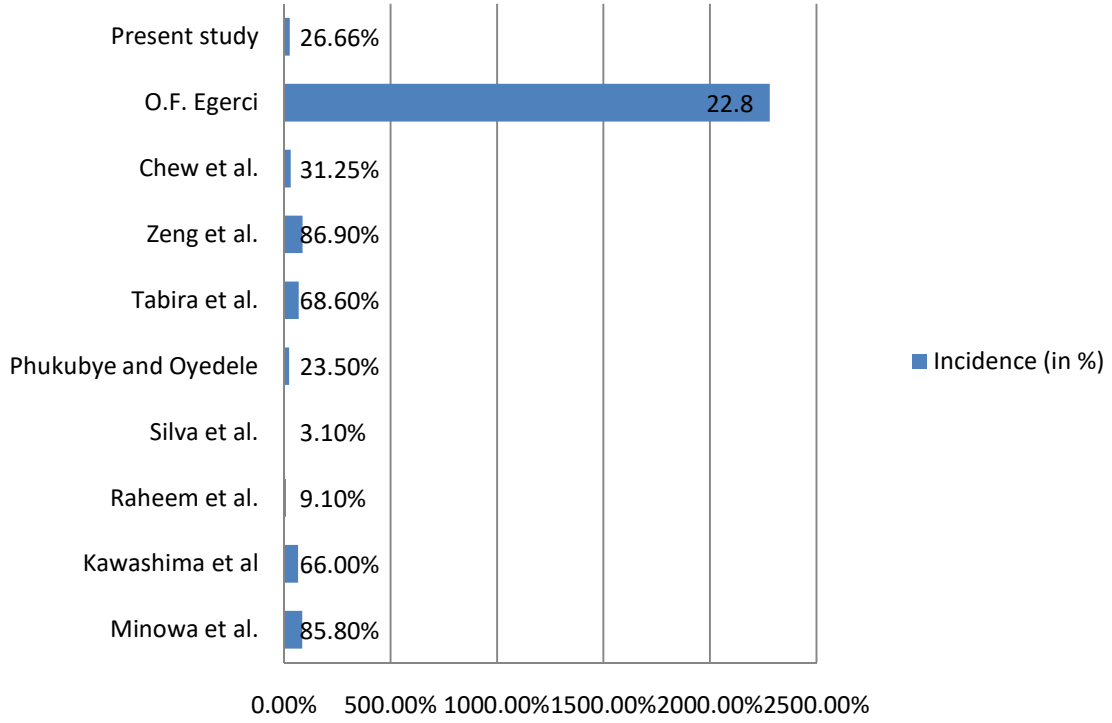
Fabella refers to a little bean or bead. The posterolateral aspect of the knee joint is where the clinical ramifications of the fabella can be found. The fabella is seen at a prevalence of 10–30% in society, and once diagnosed; it is usually located on both knees. However, there are research in the literature that focus on determining the prevalence of the fabella in different ethnic groups. Its presence was frequently coupled with fabella syndrome, a disorder of considerable importance in orthopedic surgery and clinical routine, which causes persistent discomfort in the posterolateral region of the knee. The fabella's significance in the stabilization of the posterolateral structures of the knee is demonstrated by its interaction with the fabellofibular ligament, which is thickening of the distal section of the short head of the biceps femoris tendon. As a result, in this investigation, an attempt was made to record data from the cadaveric study through direct observation. The results of the present study are compared with the studies done by the various other authors and elicited in the table below.

Author's Name	Year	Methodology Of Study	Prevalence Of Fabella (In Percentage)
Minowa et al.	2004	Cadaveric study	85.8%
Kawashima et al	2007	Cadaveric study	66.0%
Raheem et al.	2007	Cadaveric study	9.1 %
Silva et al.	2010	Cadaveric study	3.1 %
Phukubye and Oyedele	2011	Cadaveric study	23.5%
Tabira et al.	2012	Cadaveric study	68.6 %
Zeng et al.	2012	Cadaveric study	86.9 %
Chew et al.	2014	Radiography and MRI	31.25 %
O.F. Egerci	2016	Radiographic study	22.8
Present study	2021	Cadaveric study	26.66%

TABLE 5.11: COMPARISON OF PREVALENCE OF OS FABELLA BY DIFFERENT AUTHORS

Limited literature is available worldwide about the fabella. The fabella has a little amount of literature available nationally and internationally. Its prevalence has been found to range between 20% and 87%, with values ranging from 9% to 31% in western populations to 66% and 86% in Asian ethnics. Tutor et al. found an overall prevalence of 16.93% in their study, with no significant differences across genders. Kawashima et al discovered a prevalence of 66% in the Japanese population in an anatomical examination on cadavers.

Graph 5.11: Prevalence of Os fabella (in %) by difeerent authors



A similar observation was made by Chew et al in a Chinese population, reporting a prevalence of 31.25%. In the study done by kato et al, observed prevalence of fabella was 81% with bony fabella (28%), 26 knees with cartilage fabella (21%), and potential ossified fabella 51%. In the study done in Takebe reported in 1981 about seven patients suffering from common fibular nerve palsy due to compression from the fabella. Zeng et al. observed that they could only identify 8 out of 19 cartilaginous fabellae through

radiographic images. Minowa et al. grouped fabellae into rigid and elastic groups rather than osseous and cartilaginous and stated that 77 (36.3%) out of 182 fabellae an elastic structure. On the other hand, Tabira et al. observed 46 out of 75 fabellae to be osseous and 24 cartilaginous. In another study conducted in Far East, Chew et al. observed the prevalence of the fabella to be 31.25% and reported that all of these cases had an osseous structure. There are few studies in current literature that investigates the frequency of the fabella among fabella to be lower than those specified in South- Eastern Asian studies. The argument supported by the authors with this conclusion is that most of the other studies originate from China and Japan where daily habits of these populations require a high number of knee movements such as kneeling and thus, lead to a higher prevalence of fabella cases. The present study findings matches the data obtained by the O. F. Egerci et al., Chew et.al, Oyedele et.al, and helped to evaluate whether fabella exists bilaterally or not, and its symmetry patterns and allowed us to analyses hat prevalence of fabella exhibits wide dispersion shown in fig. above.

Sesamoid bones have four functions: to modify pressure, to reduce friction and so protect the tendons, to change the direction of a muscle pull, and to help muscular motions. The existence of a fabella can cause posterolateral knee pain, which is known as fabella syndrome. In osteoarthritic knees, the presence of fabella bone might be mistaken for intra-articular loose bodies or osteophytes, or for intra-meniscal calcifications on plain radiographs. Fabella fractures are also uncommon; however they can induce posterolateral knee discomfort and functional impairment.

It is possible that this contributes to the high prevalence of missed diagnoses in clinical and radiological. Dislocation of the fabella and fabellofemoral osteoarthritis are frequently misdiagnosed, and because to the tight anatomical relationship of the fabella at the posterolateral corner of the knee, compression of the common peroneal nerve can occur. Both non-operative and surgical excision can be used to remove a fabella. Fabellectomy is the therapy of choice when conservative care fails or when the common peroneal nerve is entrapped. As a result, understanding the anatomical foundation of the fabella bone is critical in the pathology and surgery of the knee.

5.12 DISCUSSION AND INTERPRETATION OF THE PLANTARIS MUSCLE:

The Plantaris is a superficial muscle of posterior compartment of leg. It is a vestigial muscle, has a small belly and long slender tendon. It arises from lower part of lateral supracondylar line and oblique popliteal ligament, tendon runs obliquely inferomedially between gastrocnemius and soleus and inserts in a calcaneum medial to the tendocalcaneus. The muscle may be absent in 10 % cases or may be double, but not much literature is available in this regard. The plantaris become vestigial as the foot is evolved for long-distance walking and running. The muscle was useful to other primates for grasping with their feet. It has been considered that the plantaris muscle is earlier attached to the plantar aponeurosis of the foot but with evolutionary process of erect posture, the insertion of the muscle got shifted to a higher position. Consequently, the existence and importance of the plantaris muscle cannot be underestimated. Therefore, in the present study we aimed to analyze with the secondary objective; the anatomy regarding the plantaris muscle as variation is observed during the cadaveric dissection of knee joint. We observed the Plantaris muscle is present in all cadavers. The mean length of belly and tendon of muscle is found 8.3cm and 38.46cm respectively. Mean width of belly and tendon of muscle is found 5.5cm and 0.9cm respectively. The mean length of plantaris from proximal to distal attachment is measured 41.6cm.A rare anatomical variation of unilateral double headed plantaris muscle is found in one of knee joint.

Part of plantaris muscle	Kum kum rana et al. (2006)		**Present study**	
	Length	Width	Length	Width
Outer belly	10.6cm	-	8.1cm	1.3cm
Inner belly	5.08cm	-	6.6cm	1.6cm

TABLE 5.12: COMPARISION OF MEAN MORPHOMETRIC OF PLANTARIS MUSCLE BY DIFFERENT AUTHORS

The Plantaris muscle was discovered to originate from the following locations in 1871, 1897, and 1943: the lower part of the linea aspera; the posterior ligament of the knee at the intercondylar space; the fascial covering of the popliteus; the fibula, between the flexor hallucis longus and the peroneus longus; the oblique line of the tibia, undercover of the soleus; or the lateral condyle of the femur above the origin of the lateral head of the gastrocnemius. The Plantaris insertion has been found in the soft tissues between the gastrocnemius and soleus muscle bellies; the inner border of the calcaneal tendon, the dorsomedial surface of the calcaneal tendon at its insertion, the bursa between the calcaneal tendon and the calcaneum; the fibrous and fatty tissues in front of the calcaneal tendon and the plantar aponeurosis.

The result observed by our study is similar to the study done by K.K.rana et al.(2006) reported the double head of plantaris; that the inner belly of the muscle crossed the tibial nerve as it descended between the gastrocnemius and the soleus muscles. The popliteal artery is found to lie medial to both the bellies. The nerve to inner belly of the plantaris muscle is a branch of nerve innervating the lateral head of the gastrocnemius muscle. The nerve supply to the outer belly is in common with the nerve to the lateral head of gastrocnemius muscle. We compare the data with the other authors studies and shown above. In some animals like the American bear, the plantaris muscle can be found to be attached to the plantar aponeurosis (Daseler & Anson). The similar very rare observation is seen in our study.

Although the presence of the double head plantaris muscle, as well as the fabella and fabellofibular ligament muscles, may be of significant significance, it is rarely discussed due to a paucity of research. The rupture of the plantaris muscle tendon might be difficult to detect. Plantaris muscle is used as a graft in anterior talofibular and calcaneofibular ligament reconstruction, flexor tendon transfer in the hand, and atrioventricular repair. As a result, a surgeon's, orthopedic surgeons, plastic surgeons, radiologist's, and physical therapist's anatomical knowledge of muscle is critical. Furthermore, an anthropologist's understanding of anatomical differences of the plantaris muscle is important for understanding evolutionary changes in lower limbs and knee joint.

5.13 DISCUSSION AND INTERPRETATION OF THE PES ANSERINUS OF KNEE:

Pes anserinus (PA) in Latin means 'goose foot´. The radiating arrangement of tendons of PA resembles to the goosefoot, hence the name pes anserinus. It is also known as guy ropes. The pes anserinus is formed by the tendinous insertion of Sartorius (S), Gracilis (G), and Semitendinosus (ST) muscles in the anterior to posterior aspect on the anteromedial surface of the upper part of the tibia, lying superficial to the tibial collateral ligament[1,2].The anatomical knowledge and relationship of the structures in the medial aspect of the knee and the tendons forming PA is essential for the accurate diagnosis, and for the development of improved surgical and operative procedures in the various pathologies related to the knee. Lack of morphological and anatomical knowledge of the PA tendon can lead damage to the infrapatellar branch of the saphenous nerve, tibial collateral ligament, and difficulty in identifying their insertion pattern.

The infrapatellar branch of the saphenous nerve can be injured by a surgical incision at this location. On the medial side, it is always separated in medial surgical approaches to the knee, which explains the numbness that inevitably follows such surgeries. If the nerve is partially sectioned, such as by an arthroscopy portal incision or a tiny medial arthrotomy for examining the medial portion of the knee, a painful neuroma can develop. Unfortunately, the position of the nerve relative to the line of the joint is variable. In most cases, it crosses just below the joint line, passing over the patellar ligament at its insertion on to the tibia. In the medial approach to the knee, the nerve is severed, resulting in a scar on the medial knee incision. As a result, extreme caution must be exercised when surgically accessing this location to avoid harm to the nerve.

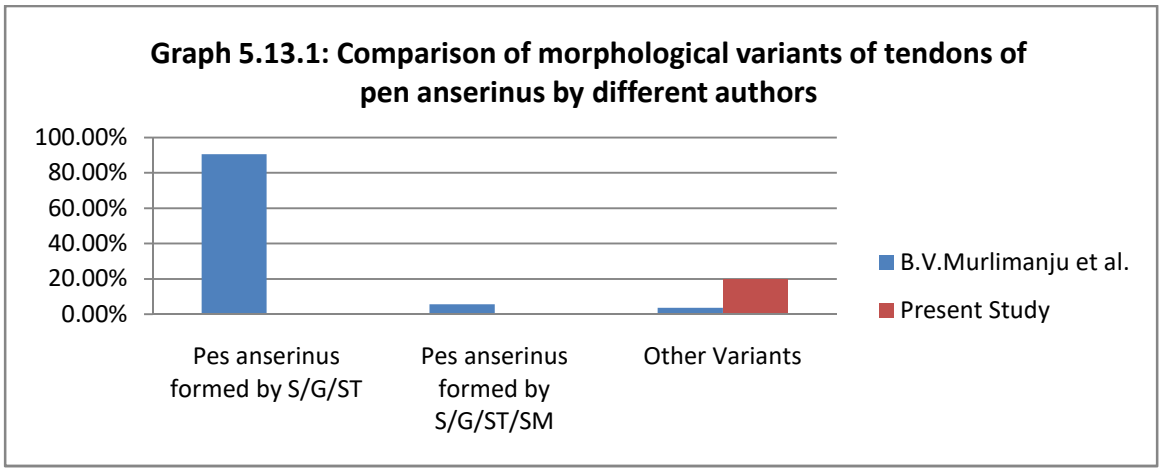
The PA is commonly affected by the overuse, acute trauma, iatrogenic disorders, and tumors. Understanding the tendon constituent of pes anserinus and the arrangement of the accessory bands is a prerequisite for a favorable clinical outcome. An incorrect incision might result in issues such as severing the main tendon, insufficient graft length, tibial nerve damage, decreased glide, and muscle stiffness. The purpose of the present study is to macroscopically review and focus on the anatomical and morphological variant of the pes anserinus muscle.

I. Anatomical and morphological analysis for the structures constituting in the insertion of the Pes anserinus.

Substantial landmarks are necessary during a surgical procedure to approach the incision site and identify the correct tendons for grafting. To avoid difficulties, orthopedic surgeons must be aware of the surface landmark, anatomical, and morphological variants of pes anserine before harvesting the anserine graft. So, the present study was aimed to give most important input regarding proper recognition of various variations in tendons and structures which forms the pes anserinus in their insertion type. This similar type of study was carried by various other authors and their results are compared with the result of the present study elicited in table below.

Author's Name	Year of study	Number of samples	Pes anserinus formed by S/G/ST	Pes anserinus formed by S/G/ST/SM	Other Variants
Ashaolu et al.	2015	20	1 (5%)	25%	70%
Cidambi et al.	2016	123	117 (97.60%)	---	6 (2.40%)
Olewnik et al.	2018	102	54 (52.9%)	----	47.10%
B.V. Murlimanju et al.	2019	53	48 (90.60%)	3 (5.70%)	2 (3.70%)
Present Study	2024	90	67 (74.44%)	5 (5.55%)	18 (19.99%)

TABLE- 5.13.1: AUTHOR WISE COMPARISON OF MORPHOLOGICAL VARIANTS OF TENDONS OF PES ANSERINUS



The pes anserinus is formed by combined occurrence of mono-tendinous Sartorius, Gracilis and Semitendinosus (S/G/ST pattern) in 1(5%) specimen by Ashaolu et al.97.60% by cidambi et al., 54 specimen (52.9%) by olewnik et al., 48 (90.60%) specimen by B.V. Murlimanju et al. and in 67(74.44%) specimen in the present study and reported to be the most common observed pattern forming PA in the present study.

We observed tibial collateral ligament and accessory tendon also showed taking participation in formation of pes anserinus. We also observed the PA was also formed with combined occurrence of mono-tendinous Sartorius, Gracilis, Semitendinosus and Semimembranosus tendon (S/G/ST/SM pattern) in 5 (5.55%) specimens, the data measured is almost similar with B.V. Murlimanju et al. but the value was very less compared to the study done by Ashaolu et al.

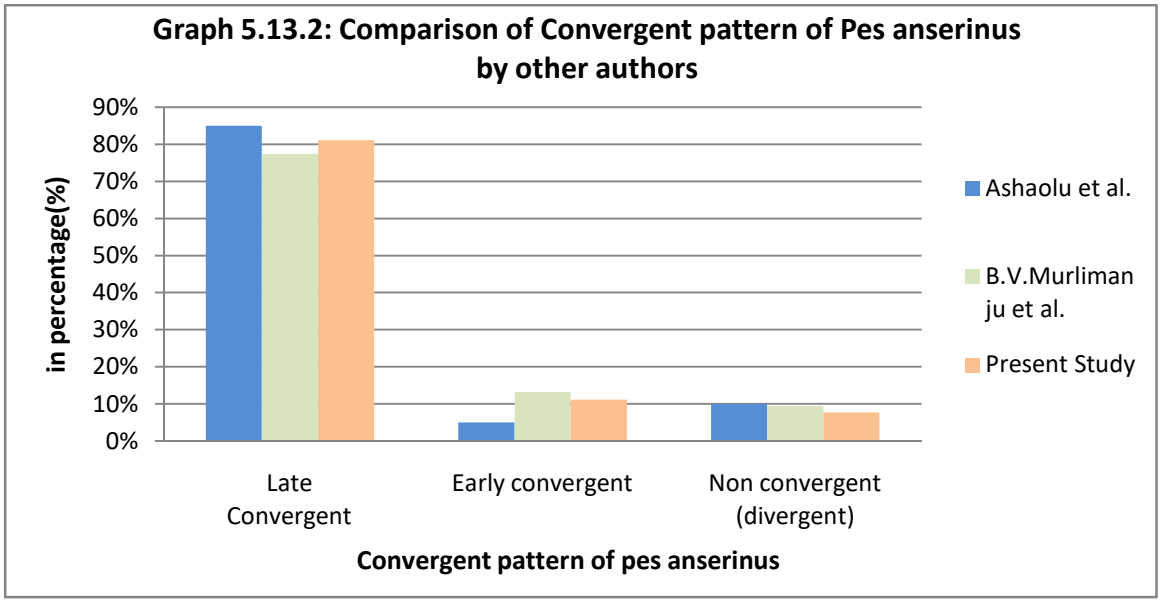
In other variant observed the TCL, accessory band of sartorius and accessory bands of semitendinosus, accessory band of gracilis are taking participation in the formation of the pes anserinus in 2(2.22%) specimens. The participation of accessory band of semitendinosus (S/G/ST/aST pattern) is observed as a most frequent variation in 12 (13.33%) specimens. The Sartorius, Gracilis, Semitendinosus, accessory band of sartorius, accessory band of semitendinosus (S,G,ST,aS,aST pattern) is observed in 1(1.11%) specimen. The Sartorius, Gracilis, Semitendinosus, accessory band of sartorius, accessory band of semitendinosus, another accessory band of semitendinosus (S,G,ST,aS,aST,abST pattern) was observed in 1(1.11%) these types of variations were not commonly seen. In addition, no accessory band of gracilis was observed in present study and no classification of the pes anserinus has been drawn up.

II. Anatomical and morphological analysis for the Convergent pattern of Pes anserinus

Author's Name	Year of study	Number of samples	Late Convergent	Early convergent	Non convergent (divergent)
Ashaolu et al.	2015	20	85%	5%	10%
B.V.Murlimanju et al.	2019	53	41 (77.40%)	7 (13.2%)	5 (9.4%)
Present Study	2024	90	73 (81.11%)	10 (11.11%)	**7** (7.64%)

TABLE- 5.13.2: AUTHOR WISE COMPARISON FOR CONVERGENT PATTERN OF PES ANSERINUS

The frequency of tendon convergence pattern was observed in 41 lower limbs in a study conducted by the author B.V. Murlimanju et al (77.4%). Semitendinosus gave an additional slip that attached to the medial condyle of the tibia in 7 specimens (13.2%), resulting in early convergence. The type and the remaining 5 specimens (9.4%) had a deviant pattern.



III. The frequency of site of insertion of the pes anserinus:

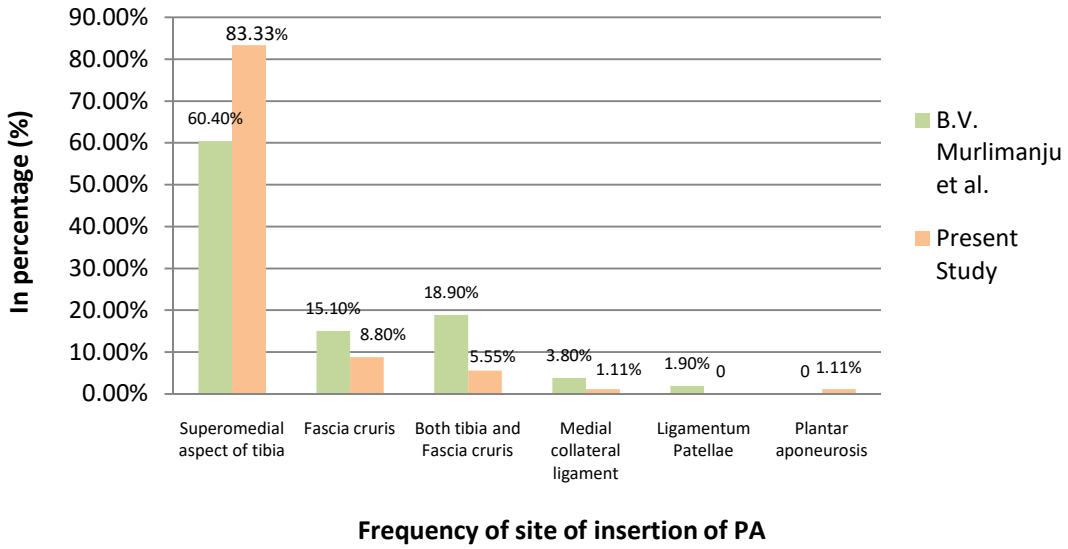
While, dissecting the Pes anserinus, we observed various different site of attachment of pes anserinus of knee. As per the literature review by author's record there is various sites for the insertion of pes anserinus; which includes at the common site of superomedial aspect of upper medial aspect of the tibia, fascia cruris of the leg, both tibia and fascia cruris, medial collateral ligament and ligamentum patellae.

Author's Name	Supero medial aspect of tibia	Fascia cruris	Both tibia and Fascia cruris	Medial collateral ligament	Ligamentum Patellae	Plantar aponeurosis
B.V. Murlimanju et al.	32 (60.40%)	8 (15.1%)	10 (18.90%)	2 (3.80%)	1 (1.90%)	-
Present Study	**75 (83.33%)**	**8 (8.88%)**	**5 (5.55%)**	**1 (1.11%)**	**0 (0.00%)**	**1 (1.11%)**

TABLE- 5.13.3: AUTHOR WISE COMPARISON OF MORPHOLOGICAL VARIANTS OF SITE OF INSERTION OF TENDONS OF PES ANSERINUS

In the study done by the author B.V. Murlimanju et al. observed the pes anserinus was giving insertion at the superomedial aspect of proximal tibia in 32 lower limbs (60.4%). It was inserting into the fascia cruris and not tibia in8 specimens (15.1%). However, in 10 cases (18.9%), the insertion was both at the tibia and fascia cruris. The pes anserinus was also giving slip to medial collateral ligament in 2 cases (3.8%) and ligamentum patellae in 1 case (1.9%).The aforementioned data is summarized below. In the present study we observed no evidence of site of insertion into ligamentum patellae and with the prevalence of 1.11% in one of the specimens exceptionally in the plantar aponeurosis via another accessory band of semitendinosus. While the short accessory band of semitendinosus inserts into the tibia bone and fascia cruris of the leg.

Graph 5.13.3: Comparison of frequency of site of insertion of the pes anserinus by different authors



Injuries to the pes anserinus structures on the medial side of the knee are common. Also because gracilis and semitendinosus tendons are frequently harvested for the reconstruction operation, any presence of accessory structures or bands therein can impede the graft harvesting technique. Furthermore, surgeons can use current anatomical understanding of the structures that make up PA, the convergent patter of PA, and the way of insertion of pes anserinus to do a preoperative radiological evaluation of the pes anserinus and minimize difficulties during knee transplant graft procedures. Furthermore, the preoperative radiological investigations of pes anserinus may be helpful to the operating surgeons to prevent the injury and subsequent difficulties during the graft harvesting procedure and reconstructive surgeries of knee joint. Main reason to choose pes anserinus as a preferred choice as because both semitendinosus and gracilis tendons could be harvested.

5.14 DISCUSSION AND INTERPRETATION OF THE SEMITENDINOSUS MUSCLE OF KNEE:

Semitendinosus is a one of hamstring group of muscle lies in posteromedial aspect of thigh. During the cadaveric dissection of human knee joint author observed in one of the specimens an unusual accessory band of semitendinosus muscle with variation in its insertion pattern.

A tendinous intersection is frequently found in the muscle's midpoint, and the long head of the biceps femoris may also get a muscular slip. When harvesting the tendon surgically for a transplant, these connections with the medial head of the gastrocnemius and the biceps femoris can present problems. The semitendinosus muscle insertion in the plantar aponeurosis, on the other hand, is uncommon. One of the specimens possessed two extra bands of semitendinosus muscle. The first accessory band, measuring 46.6cm from the common muscle insertion, is discovered in the rear of the leg. The width has been found to be 0.4mm. Along with the plantaris muscle, the band was placed into the tendocalcaneus. The second accessory band is made up of common muscular belly and is 19.2cm in length and 8.0mm in width. The band was seen being put into the leg's crura. Furthermore, no substantial anatomical difference in the same limb or cadaver been identified.

The present knowledge can be very useful to the surgeon as a strong autograft can be created with hamstring tendons. The STT and the GT are commonly used as autograft material for the reconstruction of the anterior cruciate ligament (ACL).

Chapter Summary:

The overall results and data interpretation of the morphometric analysis and cadaveric evaluation of knee highlights that various range of anatomical structure related to the knee joint is highly significant and an exhaustive anatomical discussion is attempted to drawn though beyond the scope. The second part of the analysis explains The knee joint is one of the most complicated joints in the body. The tissues surrounding it are also complicated. A painful knee can mean doom for a person's health. Due to the poor intrinsic repair capacity and preserving normal anatomical architecture, various lesions, particularly those affecting the knee joint, such as acute trauma or osteoarthritis, remain a major unmet clinical concern. Meniscal injuries, other ligament injuries, dislocations of the knee, and fractures of the patella can all worsen the situation. Many illnesses and stress can injure the knee in multiple ways, so it's critical to understand how it's built before attempting to understand the problems that can occur. The final section of the investigation delves into people's opinions on how to address knee ailments. While the clinician has a variety of options for repairing a damaged joint surface, ligament repair, reconstruction procedures, and many others, none of them can reliably restore the natural articular cartilage integrity or the integrity of other structures of the knee, resulting in the tissue's limited ability to withstand mechanical stresses during daily activities throughout life. Further, in the potential advancements in surgery requires a clearer understanding of the morphometric anatomical knowledge is needed to establish the efficacy of these new technologies.

The overall results denote multifold highly specific correlation role of surgical, allopathic, physiotherapeutic, rehabilitation, Ayurveda, homeopathy, nutrition, ergonomic research field for the knee approaches, which denotes affected individual moderately can have favorable multidirectional attitude towards the knee illness.

In the last part of the analysis denotes that both patient and health care professional is beneficiary in utilizing the present knowledge on the data of knee and have information about the detailed anatomy of knee and its clinical implication in modern treatment.