CHAPTER VI:

FINDINGS, RECOMMENDATIONS AND CONCLUSION

CHAPTER: VI

FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 Findings

6.2 Recommendations

6.3 Conclusion

CHAPTER VI

Despite the advancement of modern medicine, people from the worldwide attribute to various physical illness insulting knee and often treats a knee problem with various practices and techniques. Since many of the problems associated with the knee seek the help of detailed anatomical structure of knee. Therefore, the present study has undertaken to understand the anatomical knowledge of knee, various diseases and disorders involving the knee health and implication of anatomical knowledge in the medical and surgical practices and thereby, equip them with the advanced anatomical knowledge by providing intervention on knee health concepts.

The knowledge scale consisted of four domains, namely, the anatomical concept of knee, clinical correlations of knee, clinical features, management and various surgeries involving knee. The demographic variables found are based on variables such as symmetry, gender, etc. The findings of the analysis are done based on SPSS. The t-test, was applied to find the cadaveric evaluation and morphometric analysis of knee joint, the association between the selected demographic variables and correlations between the symmetrical sexual dimorphism. The findings of the study are described based on the objectives of the study.

6.1 Findings:

- The authors' initial hypothesis was that values for knee anthropometry in the sample population would be different from that other population. When the measurements of the present study were compared with other studies that assessed different ethnicities, the mean values were dissimilar to and similar to those described for the other countries, which leads to the certainty that the incompatibilities are may be a consequence of great anatomical variability of the bones involving in formation of knee and can be the cause of these incompatibilities as well the ethnic differences, culture and customs of the individual and population.

- We observed several studies have been done but no studies shown the entire cadaveric study of knee. None of these studies took into account the possibility of the gender difference in aspect ratio of knee, which was shown in this present study.

- The morphometric data obtained from this study will benefit biomedical engineers, orthotists, and prosthetists in designing knee replacement prostheses of appropriate size for Indian patients undergoing knee replacement operations, allowing patients to maintain mobility and improve their lifestyle after surgery. Furthermore, we have pragmatic that females will definitely benefit from the gender-specific prosthesis.

- In the present study, there was no significant difference in the dimensions of all the measurements of the patella, the patellar ligament and the articular facets when the measurements taken on both the right and left knees were compared, except in the case of patella thickness and patella width. Although we do not have an explanation for the differences in patella thickness and width measured on both knees, we hypothesize that the predominant use of one limb may result in better muscle tone on that side, which may have a direct effect on the shape of the sesamoid bone (patella) within its tendon (quadriceps femoris).Posture and physique could also be contributing factors, but the exact contributions of these factors could not be ascertained in this study.

- The larger stress exerted on the lateral facet may contribute to a higher risk of developing patellofemoral arthritis in our study because the majority of our cadaveric specimens have identical width of MAF and LAF.

- The frequency of patellar alta (ratio>1.5) is observed higher in the present study. The use of the Insall-Salvati ratio to determine the patellar position measured by cadaveric dissection methodology may be less appropriate to the Indian populations in which squatting, sitting cross-legged, and kneeling are customs and culture in daily life. We propose that the normal range of the ratio for squatters among Indian populations may be higher than the existing normal range.

- The anatomical profile of the tibial condyle in Indians, particularly in Indian females, is smaller, highlighting the necessity for population-specific prosthesis sizing.

- The superficial medial collateral ligament is the largest structure of the medial part of the knee. Our findings have the same opinion with those of previous literature, who have described it to be between 10 and 12 cm in overall length.

- All fibular collateral ligaments in all specimens in this research analysis originated from the lateral epicondyle of the femur to the head of the fibula. Furthermore, no any morphological variability in terms of bifurcated, trifurcated ligament or double fibular collateral ligament is observed in any specimen of the present study. In addition, we observe the statistically significant difference between males and females for the length of lateral collateral ligament.

- The present study observed prevalence of fabella bone is more common. Usual bilateral presentation is observed with more prevalence seen on right sided knee. Unilateral to bilateral presentation of fabella was observed as 1:2. Further, we observed the fabella bony only; no remarkable presence of cartilaginous fabella is found. The fabella is observed closely relation to the common fibular nerve in all specimens. The explanation for the increased occurrence in this study could be attributed to various behaviors originating from everyday routines in which Indians kneel more frequently. Furthermore, based on our findings, we may assume that the presence of the fabella is not associated to body side but is gender specific. We agree with the existing literature and believe that the fabella complex and the femoral condyle are stabilized by the fabella whenever it is present. Lack of anatomical knowledge about fabella bone can be missed as loose bodies in diagnosis in both clinically and radiological. Therefore, the study on fabella is of great importance clinically to the orthopedic surgeon for differential diagnosis in knee pain. Furthermore, knowledge of presence of fabella is also beneficial to the radiologist and anthropologist to understand evolutionary changes in knee joint.

- The plantaris muscle has a shorter belly and longer tendon and has been used as an excellent graft. With the presence of other flexors of ankle like gastrosoleus muscles, the excision of the plantaris muscle may have no impact on lower limb function. In the present study, variations pertaining to its attachment in its origin and insertion and double head are found. Meanwhile, we suggest the rare variation in the plantaris muscle observed in the present study is rarest and anatomical knowledge of plantaris muscle is significant which can ignite the interest to the various fields including medicine, surgery and especially to the evolutionary biology and anthropology.

- This study highlights the several variants of the pes anserinus. The pes anserinus is formed by combined occurrence of mono-tendinous Sartorius, Gracilis and Semitendinosus (S/G/ST pattern) and reported to be the most common observed pattern forming PA in the present study. The Sartorius, Gracilis, Semitendinosus, accessory band of sartorius, accessory band of semitendinosus, another accessory band of semitendinosus (S,G,ST,aS,aS,abST pattern) in forming pes anserinus is observed in 1(1.11%) in the present study; these type of variations were not commonly seen and rare to exist. The findings the study would assist in planning of surgical procedures in this area. The detail knowledge of this kind of variants is important in the planning and performing various surgical procedures by orthopedic surgeons and plastic surgeons.

- This study presents the rare case of long accessory band inserting into the tendocalcaneus along with the tendon of plantaris muscle. As a result, the current study emphasizes the importance of operating surgeons understanding unusual anatomical variations of the semitendinosus muscle in order to avoid complications during procedures such as transplant surgeries and graft harvesting during reconstructive surgeries in order to practice efficient surgical procedures.

- We observed the total incidence for the presence of transverse ligament in 85.55% specimen and total absence of ligament is observed 14.44%. The data analysis revealed that there had been few anatomic studies that explicitly addressed the occurrence of this structure. Furthermore, we claim that the anterior intermeniscal ligament, namely the anterior horn of the medial meniscus, is not a substantial stabilizer of the knee.

6.2 Recommendations:

The primary idea of choosing this problem statement for the study was to attempt to understand the comprehensive way of describing the anatomical knowledge of knee joint. The study also explored the cadaveric analysis and morphometric evaluation of knee with clinical implications and variations in the structures related to the knee. The findings of the study revealed that beneficiaries and providers carry similar troubles about the knee illness. The following general conclusion can be derived from the present study:

6.2.1 We suggest that the greatest value of the present work is that it presents possibly the first such systematic cadaveric evaluation and morphometric analysis of knee joint enbloc. In addition, it also attempts to establish and distinguish symmetrical pattern and gender dispersion for all the objectives of the study. Furthermore, an attempt has also been made to cover various variations observed in the structures in relation to the knee joint. Following trends in orthopedic surgery, such a categorization of any structure may be helpful for planning surgical procedures, and would allow further research on the biomechanics and functions of particular research field holistically.

6.2.2 Knee replacement surgery is one of the most popular and cost-effective musculoskeletal surgical procedures. The numbers of cases done continue to grow worldwide, with substantial variation in utilization rates across regions and countries. The main indication for surgery remains painful knee osteoarthritis with reduced function and quality of life. The threshold for intervention is not well defined, and is influenced by many factors including patient and surgeon

preference. Most patients have a very good clinical outcome after knee replacement, but many patients do not. So despite excellent long-term survivorship, more work is required to enhance this procedure and development is rightly focused on increasing the proportion of patients who have successful pain relief after surgery. Implant size and changing implant design has historically been a target for improving post-surgical outcome based on race, region and gender. Implant components used for TKA in Asian patients are mostly produced based on anthropometry of the Western population. There would be differences in terms of conformity of implants to the patient's anatomy and clinical results after TKA due to anatomic features and life styles dissimilarities between Western and Asian populations. For that reason, surgeons in Asia are particularly concerned in related surgical techniques and implant designs that are being used in TKA for better quality clinical results as well as patient satisfaction.

6.2.3 The majority of total knee arthroplasty implants on the market are made to fit the anatomy of the Western population's knees. Female Indians had smaller dimensions than male Indians, and both had lesser aspect ratios than the Western population. Therefore, Western implants may have drawbacks when implanted in Indian patients. This suggests that there is a need for an implant design based on the Indian population. Moreover, this study provides definite rationale for designing total knee prosthesis, especially a gender-specific design suitable for the Indian population. Using the results of present study the surgeons can guide for better implant design suitably matched for the Indian populations gender specific, implantation methods, avoiding complications, and improving perioperative care for patients accordingly where they can also use the data recommended by the study. In doing so, the surgeons and medical professionals can enhance recovery programmed, which could help them to understand the manifestations of greater recognition and to establish more improved new technologies to advance future knee replacement care further to ensure patient safety and provide better and suitable healthcare to the society. As a conclusion, the implant manufacturers will have to consider ideal size of patella component for Asian patients, especially for the female.

6.2.4 The results of the present study recommend that the outcome of the arthroplasty procedure in a Indian population can be in a different manner from the Western population. To avoid misinterpretation, it's important to figure out from which perspective we're looking at the results: functionally therapeutically anatomically or in multifold.

6.2.5 The present study represents a moderate to significant connection between matched patella measures. Furthermore, when the thickness and width of the patellae were evaluated, the association in the right knee was stronger than in the left knee. The breadth of the patella has been proposed as reliable criteria for predicting normal patella thickness and assisting surgeons in determining the thickness of the patella prosthesis during arthroplasty. Although certain characteristics such as height, weight, and gender can be used to estimate the normal thickness of the patella.

6.2.6 Shifting the patellar tendon insertion both medially and distally is important when performing a patellar tendon transfer for patella subluxation which is most commonly observed laterally. In malalignment or malposition of the patella, realignment of the patella gives a favorable post-surgical outcome. When the patellar tendon is redirected too far distally, the articular surface of the patella is pressed against the femoral condyles, causing patellofemoral arthritis. As a result of our findings, we recommend that a patellar tendon transfer treatment to reestablish the normal patellofemoral connection be undertaken only when the patella height is clearly aberrant. As a result, the normal location of the patella in the knee becomes a requirement.

6.2.7 Unicompartmental knee arthroplasty is now widely recognized and developing as a potential treatment option for older individuals with unicompartmental arthritis of the knee. The morphometric measurements of the upper end of the tibia are extremely important and serve a significant role in the creation of correctly fitted

prostheses. The current orthopedic prostheses are best adapted for the western population, resulting in implant size incompatibility with the resected bony surfaces.

6.2.8 For surgeons doing ACL repairs with patellar tendon autografts, a quick and cost-effective method of assessing patellar tendon length is critical. Clinical palpation, MRI, and even conventional radiography have all been employed in previous research with positive outcomes. According to our findings, measuring over a cadaveric study would be incredibly beneficial. The tibial tubercle bone may overhang proximally, which could explain the difference in patellar tendon length when palpated versus after harvesting. The data gathered will aid the surgeon in planning operations such as using a patellar tendon autograft. The length of patellar ligament is observed insignificantly higher in males than females in the present study. Therefore, we strongly postulate the demographic variables like height, BMI and specially gender, should be considered individually prior to surgery and should not be underestimated.

6.2.9 The current study underlines the need of understanding the peculiar anatomical variation of the accessory band of the semitendinosus muscle entering into the plantar aponeurosis during knee reconstruction surgeries. Furthermore, we believe that such a long accessory band can be mistaken for a plantaris tendon, and that understanding this knowledge can aid orthopedic, radiologist, and plastic surgeons in various knee surgery procedures. To optimize future hamstring transplant procedures, our findings recommend that the present classification of accessory band presence in pes anserinus be expanded to encompass such "rare cases."

6.2.10 A systematic dissection module is developed for exploring the cadaveric knee in the present study. The module covered utilization of knowledge which can be used in lecture methods, case presentations, discussion, role-play, demonstrations, video presentations and in published literature related to the knee. The result of the present study provides detailed structural anatomy of knee and structures in

surroundings to the knee with various variations associated and hence it is recommended that if any health care professionals, surgeons, anatomist or researchers intends to explore further in the area of knee, can adopt this module in imparting medical health education.

6.2.11 Present study will provide an ample of data to the research aspirants in the field of knee. Knowledge will contribute more for research work in elaborating normal anatomy related to knee and the detailed aspects of knee.

6.2.12 A healthy collaboration of an anatomist with clinical health practitioners such as, Orthopedic Surgeons, General Surgeons, Plastic Surgeons, Rheumatologist, Physicians, Pediatrician, Physical therapist, Orthotist, Prosthetist, Rehabilitation therapist, Vocational therapist, Nutritionist, Nurses, Social workers and community health workers can provide holistic care to the person with knee problems. It is recommended that utilization of present study information in regular interaction and knowledge can be shared among the practitioners that can expand the quality of knee health care services in the community.

6.2.13 The paramedics of health center and social worker can take the initiative in providing knowledge to the community in identifying knee problems at early onset and refer the case to practitioners to deliver suitable intervention at preventive phase. This could strengthen the healthcare and contribute to greater extent in enhancing community health. Because, the number of primary total knee replacements is expected to rise exponentially in expectations with the increasing numbers of baby boomers and the aging population.

6.3 Conclusion:

After the study work of dissection of ninety cadaveric knee of lower limb; different anatomical variations were came across in the morphometric linear measurements of articular surface of the patella bone, morphometric linear measurements of the distal end of femur, morphometric linear measurements of the proximal end of the tibia, morphological and morphometric variations in the medial and lateral menisci of knee, morphological and morphometry of collateral, cruciate and various other ligaments of the knee, detailed anatomical knowledge of anterior aspect, medial aspect, postero-medial aspect, postero-lateral and posterior aspect of knee. The present study concludes that an anatomical knowledge of knee performs substantial corner, valuable services and social benefits to the mankind.

Nevertheless, fewer attempts have been observed in literature to understand the native cadaveric structural evaluation and morphometric evaluations en bloc. Although morphometric analysis of knee and structures associated with it can be available with various different methods and shows consequences concerning a patient's health. Furthermore, due to lack of sensitization in the awareness for body donation and decrease in availability of cadavers in the medical institutes has been a gross problem in the current scenario. Therefore, in modern era cadaveric study on Knee joint generate measurable and testable data based on estimates. The number of problems associated with the knee is increasing with obesity, sedentary and modern lifestyle and rate of people with physical knee disorders and young patients for joint replacement surgery is still alarming. This explains why in recent years researchers have attracted widespread concern throughout the developing world and among the developed county community in general in the field of knee.

Despite the various methods that facilitate the study of knee joint including cadaveric study, bone study, CT scan study, MRI study, Intra operative study, several features enable us to consider the methodology together. All of these are focused on analysis of knee and mere shows an important role in the various anatomical and clinical aspects involving knee and providing the important data for the modern medical science and finally enclose an important role in beneficiary to the health services and society.