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A Cadaveric Study to Define Morphology and Morphometry of Human Knee Menisci in the Region of Central India

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ABSTRACT

Background: The medial and lateral menisci of the knee joint are the functional unit that helps to increase the depth of articular surfaces on the head of a tibia for the reception of femoral condyles. Menisci are important for the distribution of load and thus help to reduce stress on the knee joint. This study aimed at studying the variability in the morphology of menisci of knee joint we studied 70 knee joints and the variation was noted and documented.The anatomical knowledge of morphology and morphometry of menisci is essential while performing surgeries in cases of meniscal injury.

Materials And Methods: Observational study performed in DEPARTMENT OF ANATOMY,INDEX MEDICAL COLLEGE ,INDORE.
5 cadavers were included in the study.so,a total of 70 knee joints were studied.
The peripheral lengths and inner lengths of the menisci were measured with the nonelastic cotton thread.
Variability in the shapes of both; lateral and medial menisci were seen and documented.

Result: The peripheral length of the lateral meniscus was more than that of the medial meniscus but the difference was not significant (p-value≥ 0.05) statistically. The distance between the anterior and posterior horn of the medial meniscus (23.08 ± 3.00 mm) was significantly higher than that of the lateral meniscus (14.08 ± 2.22 mm) having a p-value of 0.0001. From Table 1, it can be observed that the thickness of both menisci was more at the posterior end as compared with the anterior and middle ends and the difference was statistically significant in the parameters of the anterior and posterior ends. The width of the medial meniscus was more at the posterior end as compared with the anterior and middle ends while the width of the lateral meniscus was almost the same at the anterior, middle, and posterior ends.
Discussion: The knowledge of the variational anatomy of menisci is significant as injury to them leads to significant morbidity related to locomotory function.

Conclusion: The conclusion obtained from the study is that the present study will be helpful for surgeons while planning and performing surgical procedures and for anatomists during routine teaching. Tears of menisci are common, most of which occur in the avascular inner zones and seldom heal spontaneously. Peripheral tears have the potential to heal satisfactorily if repaired surgically [11]. So, studies to document the morphological and morphometric features of knee menisci are very much needed.

INTRODUCTION

The term "meniscus" is used to refer to the cartilage of the knee, either to the lateral or medial meniscus. Both are cartilaginous tissues that provide structural integrity to the knee when it undergoes tension and torsion. The menisci are also known as "semi-lunar" cartilages, referring to their half-moon, crescent shape

They are concave on the top and flat on the bottom, articulating with the tibia. They are attached to the small depressions (fossae) between the condyles of the tibia (intercondyloid fossa), and towards the center they are unattached and their shape narrows to a thin shelf

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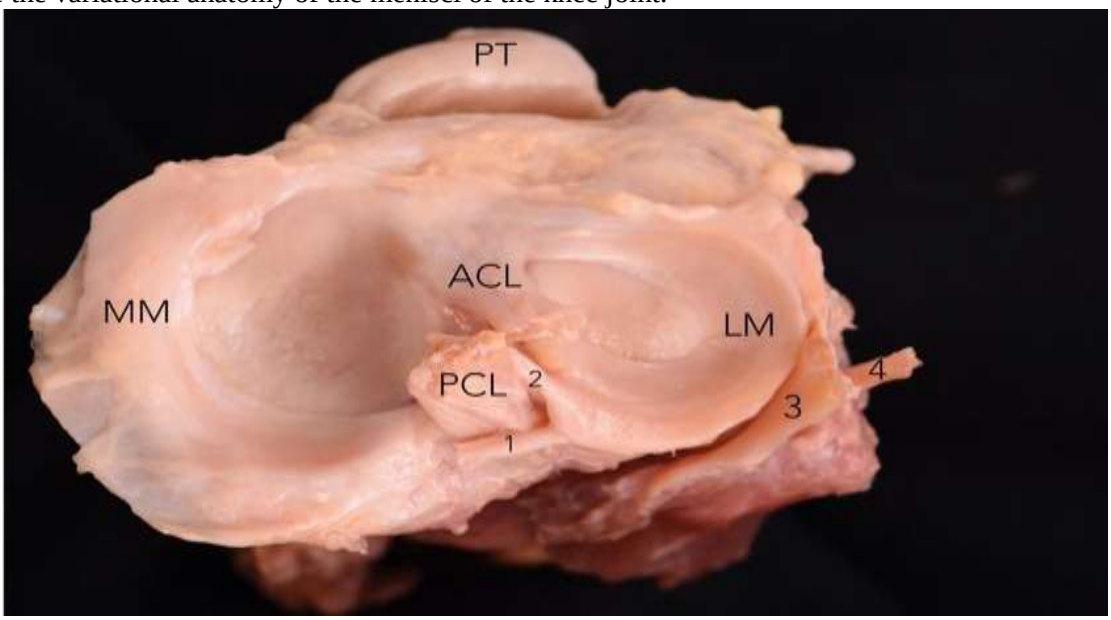
The menisci act to disperse the weight of the body and reduce friction during movement. Since the condyles of the femur and tibia meet at one point (which changes during flexion and extension), the menisci spread the load of the body's weight.[6]

The anatomical knowledge of morphology and morphometry of menisci is significant for surgeons while performing surgeries in cases of meniscal injury. The study aimed to define the variational anatomy of the menisci of the knee joint.

The medial and lateral menisci of the knee joint are the functional unit that helps to increase the depth of articular surfaces on the head of a tibia for the reception of femoral condyles. Menisci are important for the distribution of load and thus help to reduce stress on the knee joint. The anatomical knowledge of morphology and morphometry of menisci is vital while performing surgeries in cases of meniscal injury. The study aimed to define the variational anatomy of the menisci of the knee joint.



AIMS AND OBJECTIVE-

To study the variations in the Morphology of medial and lateral meniscus of knee joint in population of central India.

MATERIAL AND METHODS

The study was conducted in the Department of Anatomy, Index medical College, Hospital and Research centre,Indore,M.P

35 cadavers were included in the study.so,a total of 70 knee joints were studied.

Variability in the shapes of both; lateral and medial menisci were seen and documented .

The peripheral lengths and inner lengths of the menisci were measured with the nonelastic cotton thread.

Menisci were divided into three parts; anterior, middle, and posterior. The maximum width and thickness of each part of the menisci were measured and recorded. The most anterior and posterior parts are identified.

Distance between the medial and lateral meniscus in each knee was also being measured at both the anterior and posterior ends.

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RESULTS

In this study, four shapes of menisci were observed,
crescentic-shaped
U-shaped,
V-shaped, and
C shaped.

	PL(mm)	IL(mm)
RMM	91.4+/-5.56	56.9+/-3.34
LMM	91.03+/-5.66	57.23+/-5.48
RLM	97.0+/-6.66	58.54+/-3.30
LLM	95.56+/-6.98	58.78+/-4.34

TABLE 1

Table 1 shows the peripheral length and inner length of the menisci of medial and lateral menisci of both sides.
RMM-RIGHT MEDIAL MENISCUS
LMM-LEFT MEDIAL MENISCUS
RLM-RIGHT LAATERAL MENISCUS
LLM-LEFT LATERAL MENISCUS
PL-PERIPHERAL LENGTH
IL-INNER LENGTH

TABLE 2

	THICKNESS		
	T1	T2	T3
RMM	6.02+/-0.96	6.65+/-1.12	7.00+/- 1.05
LMM	5.54+/-1.14	5.94+/-1.11	6.24+/-1.16
RLM	5.44+/-0.87	6.54+/-1.23	6.45+/-1.87
LLM	4.99+/-0.67	6.69+/-1.18	6.33+/-1.22

Table 2 Presenting the variability in thickness at anterior ,mid and posterior end of the meniscus on knee joint.
T1-THICKNESS AT ANTERIOR END
T2- THICKNESS AT MIDDLE END
T3- THI-CKNESS AT POSTERIOR END

TABLE 3

WIDTH (mm)			DISTANCE BETWEEN HORNS
W1	W2	W1	W2
7.70+/- 1.8	7.90+/- 2.87	7.70+/- 1.8	7.90+/- 2.87
6.87+/-1.03	6.76+/-1.55	6.87+/-1.03	6.76+/-1.55
9.49+/-2.00	12.01+/-1.12	9.49+/-2.00	12.01+/-1.12
10.30+/-1.78	12.04+/-2.56	10.30+/-1.78	12.04+/-2.56

Table 3 Presenting the variability in the width at anterior ,mid and posterior end of the meniscus on knee joint.
W1- WIDTH AT ANTERIOR END
W2- WIDTH AT MIDDLE END

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W3- WIDTH AT POSTERIOR END

The peripheral length of the lateral meniscus was more than that of the medial meniscus but the difference was not significant (p-value≥ 0.05) statistically. The distance between the anterior and posterior horn of the medial meniscus (23.08 ± 3.00 mm) was significantly higher than that of the lateral meniscus (14.08 ± 2.22 mm) having a p-value of 0.0001. From Table 1, it can be observed that the thickness of both menisci was more at the posterior end as compared with the anterior and middle ends and the difference was statistically significant in the parameters of the anterior and posterior ends. The width of the medial meniscus was more at the posterior end as compared with the anterior and middle ends while the width of the lateral meniscus was almost the same at the anterior, middle, and posterior ends.

Discussion

The knowledge of the variational anatomy of menisci is significant as injury to them leads to significant morbidity related to locomotory function. Tears of menisci are common, most of which occur in the avascular inner zones and seldom heal spontaneously. Peripheral tears have the potential to heal satisfactorily if repaired surgically [11]. So, studies to document the morphological and morphometric features of knee menisci are very much needed.

DISCUSSION

In the present study, we have studied the variations in the morphological features of lateral and medial menisci. According to present study, Medial menisci were crescentic-shaped, U-shaped, and V-shaped, while lateral menisci were C shaped, and crescentic shaped.

The findings of our studies are in accordance with the findings of B.V. Murlimanju *et al*. [12] who reported shapes of lateral menisci as C shaped and crescentic, while shapes of medial menisci as crescentic shaped,V-shaped and U shaped (11.1%). Parsons *et al*. [13] reported in their study that the medial menisci are always crescent shaped whereas the lateral menisci may be either crescent or disc-shaped. The medial menisci were described by Flick *et al*. [14] as half, two-thirds, or three-fourth ellipse, while the lateral menisci were compared to an almost complete circle.

In the present study, the average peripheral length of the medial menisci was 91.21 mm and the lateral menisci was 96.28 mm while the average inner length of the medial and lateral meniscus was 57.06mm and 58.66 mm respectively.

The findings in this study are in accordance with the study of Braz *et al*. [7] who reported peripheral length of the medial menisci was 91.85 mm and lateral menisci 92.80 mm and the inner length of the medial menisci 55.16 mm and the lateral menisci 57.84. As mentioned in studies conducted by researchers the medial meniscus was larger than the lateral, but these authors haven't mentioned the values of their measurements [7]. It was found in the present study that the distance of the anterior horn of the medial meniscus from its posterior horn was 21.99 ± 3.56 mm while the distance of the anterior horn of the lateral meniscus from its posterior horn was 13.76 ± 2.74 mm. Our findings are in accordance with the study of Braz *et al*. [7] who reported distance between the anterior horn of the medial meniscus from its posterior horn was 25.88 mm while the distance between the anterior horn of the lateral meniscus from its posterior horn was 12.55 mm and also with findings of Kohn *et al*. [9] who described that the distance between horns of the lateral meniscus is smaller compared to that of the medial meniscus.

CONCLUSION

Medial and lateral menisci are of different shapes and show variant anatomy at the anterior and posterior ends. Medial and lateral menisci have different inner lengths and peripheral lengths. It is very important to keep in mind the variant anatomy of menisci while planning various procedures on knee joints including arthroscopy. The findings of the present study will be helpful for surgeons while planning and performing surgical procedures and for anatomists during routine teaching.

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