



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 15, Issue, 05, pp.24825-24828, May, 2023
DOI: <https://doi.org/10.24941/ijcr.45368.05.2023>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

RESEARCH ARTICLE

A BRIEF STUDY OF TIBIOFEMORAL ANGLE AMONG ADULT MALE POPULATION OF TWO ETHNIC GROUPS OF RAJOURI DISTRICT OF J & K INDIA

¹Seema Sharma, ^{1*}Ritu Slathia, ¹Owais I. Mir, ¹Bhawna Sharma, ²Pallavi Sharma and ²Sarthak Sharma

¹Department of Anatomy, Government Medical College and Associated hospital, Rajouri, J and K. India

²Department of Psychiatry Government Medical College and Associated hospital, Jammu, J and K. India

ARTICLE INFO

Article History:

Received 12th February, 2023

Received in revised form

27th March, 2023

Accepted 14th April, 2023

Published online 30th May, 2023

Key words:

Tibiofemoral, Angle, Measurement, Goniometer and Race.

*Corresponding Author:

Ritu Slathia

Copyright©2023, Seema Sharma et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Seema Sharma, Ritu Slathia, Owais I. Mir, Bhawna Sharma, Pallavi Sharma and Sarthak Sharma. 2023. "A brief study of TFA among adult male population of two ethnic groups of Rajouri district of J & K India". *International Journal of Current Research*, 15, (05), 24825-24828.

ABSTRACT

Objective: The expression of tibiofemoral angle (TFA) in adult males show variations with race. But data related with kashmiri and pahari population is not documented yet. **Methods:** We measured the TFA in 120 (60 kashmiri and 60 pahari) adult males aged between 18 and 25 years. we used supine position for the measurement of TFA. **Results:** The mean tibiofemoral angle in adult Kashmiri male population as 171.8°, with standard deviation of 6.2° and the mean value in Pahari as 170.7°, with standard deviation of 5.4° with p value of 0.48 (non significant). **Conclusion:** Study was conducted on 120 healthy male adult subjects, 60 Pahari subjects and 60 Kashmiri subjects by using calibrated Goniometer with adjustable arms under standard conditions.

INTRODUCTION

The angle between the femur and tibia axes is called the tibiofemoral angle. The term "anatomic axis" refers to the angle created by the lines drawn along the femur and tibia. The stance and functional suitability of the knee joint are determined by the tibiofemoral angle, which can be assessed in a number of methods (5). The anterior superior iliac spine (ASIS) and the centre of the patella, as well as the patella and a point located halfway between the medial and lateral malleoli, are connected by an angle that is known as the knee angle or tibiofemoral angle (27). If both axes have an exterior concavity, the tibiofemoral angle is positive; if both axes have an internal concavity, it is negative. The clinical, radiological, or photographic approaches can all be used to measure the tibiofemoral angle. using a goniometer, the clinical technique is carried out. The most popular and well accepted physical approach for determining the tibiofemoral angle is clinical examination, which uses a goniometer. The lower extremity abnormalities in the coronal plane are known as "knocked knees" or genu valgum. Most people have no symptoms and are functionally unrestricted. Flat feet and sporadic medial foot and knee discomfort may accompany this problem. By the age of two, children begin to acquire physiologic genu valgum, which peaks between the ages of three and four. By age 7, it normally starts to decline and settle into a stable, slightly valgus position.

Little to no change in this alignment is anticipated in the adolescent age range. The degree of genu valgum has been determined using the intermalleolar distance. In a patient who is standing with touching medial femoral condyles, it is the distance between the medial malleoli. A pathologic intermalleolar distance is one more than 8 cm. Rarely, as valgus alignment progresses, it might be accompanied with an out-toed gait, lateral patella dislocation, and rubbing of the knees while walking in children (7). The tibiofemoral angle is a crucial tool for both clinical and social evaluations of people. The ability for the clinician to assess whether the angle is within normal bounds depends on the range of normal values being established. The management and restoration of varus and valgus deformities by orthopaedic surgeons depend on their understanding of the typical range of values for Tibiofemoral Angle in the general population. Additionally, it is essential for diagnosing and managing patients with knee abnormalities brought on by skeletal dysplasias, Blount's disease, and rickets. The orthopaedic surgeon can use it to determine the type of treatment to give these patients (19). Familial variables that contribute to the genetic risk of osteoarthritis also affect how the tibiofemoral joint aligns. Children who are overweight have more TFA misalignment. Children who are overweight are more likely to experience fractures and skeletal misalignment. Knee osteoarthritis is influenced by the tibiofemoral alignment. The tibiofemoral angle (TFA) is an accurate measurement of the pathologic angular malalignment of the knee in children, and it also serves to define the

degree of deformity. The clinical tibiofemoral angle (TFA) has been proven to have good correlation with the anatomical TFA, which is evaluated radiologically, making it one of the most trustworthy assessments of the angular alignment of the knee. The degree of deformity in patients with pathologic genu varum or valgum has been assessed clinically using this technique. Additionally, it has been utilised to distinguish between pathologic and physiological knee angular malalignment (3) At specific flexion ranges, the tibiofemoral compartment with larger contact force displayed decreased anteroposterior translation, which was associated with kinematic pivot patterns. Surgeons who are seeking to facilitate a specific kinematic pattern could find this information useful (9). Cozen's phenomena and physiological genu valgum virtually invariably self-correct. When the underlying condition is treated, the pathologic genu valgum connected to metabolic bone diseases may get better. Unknown is the prevalence and cutoff point of paediatric genu valgum that results in adult degenerative joint disease. The physiological range of tibiofemoral angle (TFA) is not well understood, which may result in therapeutic procedures that are not necessary. Racial and ethnic disparities are thought to exist, according to studies on the TFA developmental pattern, hence it is important to assess unstudied children in north-east India. Data can be utilised as guidance for deformity correction and future studies as well as to identify children who need to be followed up with or evaluated again. This cohort's TFA development differs from that of children of other ethnic backgrounds but is similar to that of other Indian youngsters (2). Keeping above results into the considerations, current study was conducted on the two ethnic groups (Pahari and Kashmiri) of Jammu and Kashmir (India). The various parameter related with study are calculated as well as discussed and presented in this paper.

MATERIALS AND METHODS

The proposed study was conducted in the department of Anatomy, Government Medical College and Associated hospital, Rajouri, J&K, India. The current study determines the normal range of laterally opening tibiofemoral angle among two healthy ethnic populations (Pahari and Kashmiri). Study was conducted over 120 healthy adult subjects, 60 Pahari subjects (male) and 60 Kashmiri subjects (50 male) by using calibrated Metallic Goniometer with adjustable arms under standard conditions. In our study, we used supine position for the measurement of TFA. The data were analyzed by statistical analysis by calculating t and p values by using software origin 8.1.

RESULTS

Fig. 1 (above part) shows the right and left TFA angle for Pahari population under studied age and gender. On average the observed TFA right leg varies between 163° and 183° . Similarly for this group this angle varies between and for left leg. 163° and 183° .

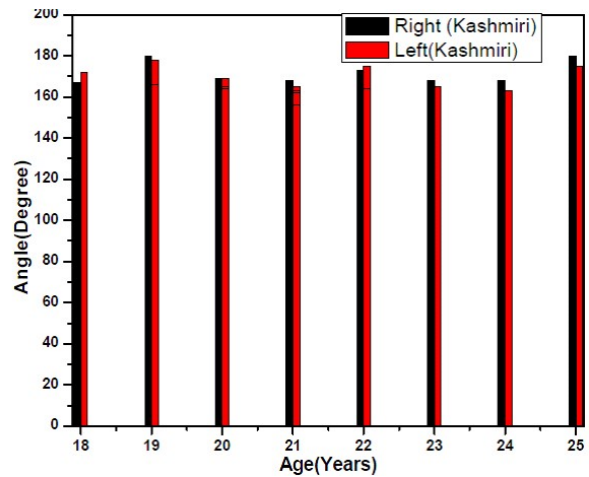
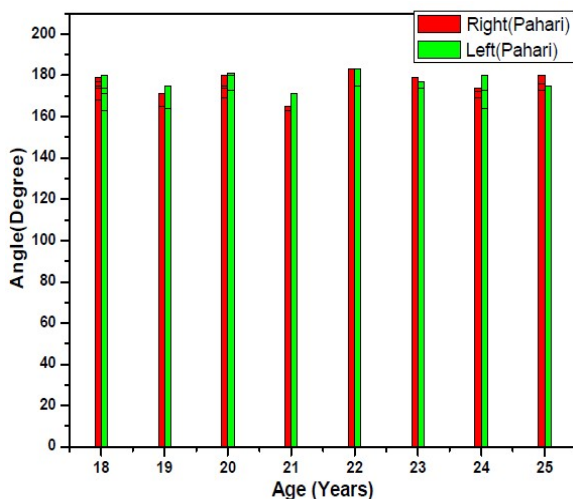


Fig. 1 (above to below) shows the right and left TFA angle for Pahari and Kashmiri groups.

Also in case of kashmiri males (see Fig.1 below part), for right leg this angle varies between 160° and 180° . Similarly for this group this angle varies between and for left leg. 158° and 177° . Further Fig. 2 (above to below) shows the right-right and left-left of TFA angle for Pahari and kashmiri population respectively. It was observed that the kashmiri population have slightly lower (on average insignificant) value of this angle in both legs. The ethnicity/ race could be the best reason.

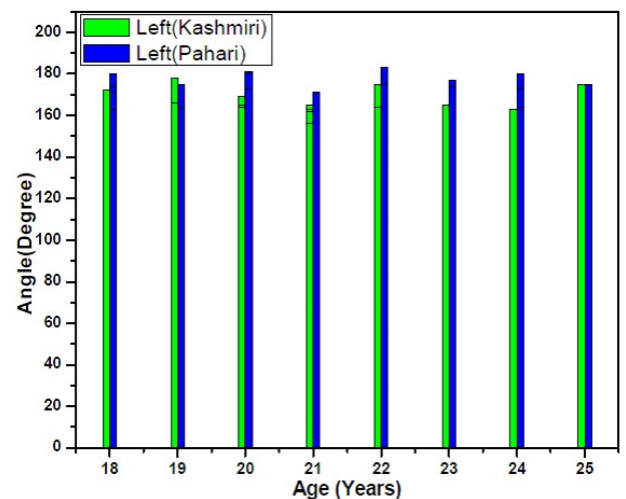
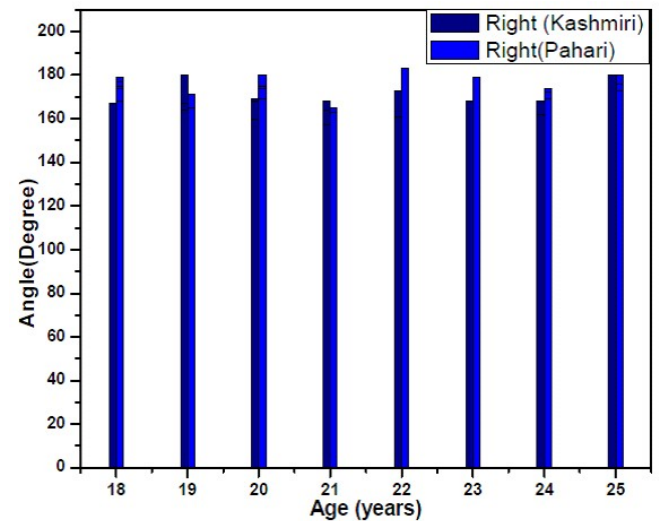


Fig 2. Showing the comparison between right and left TFA in Pahari males of age group 18-25 years

Table 1. X-Function Paired Sample t Test (Pahari)

| Parameter | N | Mean (Degree) | S.D | T.value | P.value |
|--------------------------|----|---------------|------|---------|----------------------------------|
| Tibio femoral angle (Rt) | 60 | 172.86 | 5.83 | -0.56 | 0.78 Prob> t Non significant |
| Tibio femoral angle (Lt) | | 173.33 | 5.31 | | |

Table 2. X-Function Paired Sample t Test (Kashmiri)

| Parameter | N | Mean (Degree) | S.D | T.value | P.value |
|--------------------------|----|---------------|------|---------|------------------------------|
| Tibio femoral angle (Rt) | 60 | 168.31 | 5.77 | 0.32 | 0.74 Prob> t Nonsignificant |
| Tibio femoral angle (Lt) | | 168.13 | 6.10 | | |

Table 3. Showing comparison b/w Mean and S.D in Pahari and Kashmiri

| Parameter | N | Mean(Degree) | S.D | T- value | P- Value |
|-----------------------------------|----|--------------|------|----------|----------|
| Tibio-femoral Angle (Rt) Pahari | 60 | 170.7 | 4.37 | 2.12 | 0.042 |
| Tibio- femoral angle(Rt) Kashmiri | | 167.9 | 5.99 | | |
| Tibio-femoral Angle (Lt) Pahari | 60 | 170.4 | 6.18 | 1.78 | 0.078 |
| Tibio-femoral Angle (Lt) Kashmiri | | 168.1 | 6.10 | | |

Table 4. showing the comparison of mean values tibiofemoral angle between Indian and Paharis and Kashmiri populations

| Population | Gender | MeanT.F.A | StandardDeviation | P. Value |
|------------|--------|-----------|-------------------|-------------------------------|
| Indian | Males | 174.4° | 1.7° | 0.55 Prob> t Non significant |
| Pahari | Males | 167.4° | 1.7° | |
| Kashmiri | Males | 171.8° | 6.2° | |

DISCUSSION

The knee angles and other skeletal angles show significant variation with ethnicity and countries. The measurement of this TFA in the population helps clinicians in diagnosis and as well as management of valgus and varus deformities. Thereby studying this angle in a particular ethnic groups may would help in effective treatment. The rigorous research in studying TFA has been carried out worldwide. The measurement of this angle in Pahari and Kashmiri populations is generally missing in the existing literature. But this particular angle were measured and studied in Caucasians,^{8, 16} Chinese,^{6, 11} Japanese,³⁰ American,¹⁵ Saudi¹, Malaysian, European⁴, and many other populations. The Genu valgum was found to occur in Caucasians (both genders) when this angle is less than 165° and when this is angle was found greater than 175° then genu varum occurred.¹⁴ However, in adolescence there is a balancing effect between varus and valgus with individuals straight legs.²⁸ The knee angles of the adult Saudi population and compare with other populations by [Ahmed El Fouhil (2011)]. In their study, an Antero-posterior bilateral radiograph of 333 normal knees of 120 males and 213 females with age range of 18-65 years was analyzed. In their study, the average TFA in Saudi population was found to be around 171.41°. Further the mean tibiofemoral angle in adult Saudi¹ male population was 174.4°, with standard deviation of 1.7°. The mean tibiofemoral angle in adult Malawian¹⁴ male population was 174.1°, with standard deviation of 3.5°. The mean tibiofemoral angle in adult European⁴ male population was 173.1°, with standard deviation of 1.4°. The mean tibiofemoral angle in adult Chinese^{6, 11} male population was 177.8°, with standard deviation of 2.7°. The mean tibiofemoral angle in adult American¹⁵ male population was 177.7°, with standard deviation of 2.3°. However, all these above studies were studied by radiographic methods. Also in African subjects, the mean TFA in Kenyan males was 173.77° with standard deviation (SD) of 3.15° by using radiographic technique. Similarly in Tanzanians mean TFA in males was 176.45 with standard deviation (SD) of 3.27°. In case of Caucasians, the range of TFA was between 170-175 degree Olive, Singh and Maheshwari (2013) studied TFA by using standard goniometry, among healthy Maharashtrian²⁴ (India) males aged between 20 to 50 years. In male adults, they found mean TFA around 173.40° with standard deviation (SD) of 1.78°.

In the current study this angle in the Pahari and Kashmiri was found to be 171.8° and 167.4° with standard deviation of 1.7° and 4.7° respectively. The obtained values were compared between both populations (Pahari and Kashmiri) and also with previous studies done on this angle worldwide. There was no significant difference in the tibiofemoral angle with respect ethnicity. The purpose of the present study was to provide normative data on the tibiofemoral angle in male Pahari and Kashmiri population, and to compare their trends with those reported by previous studies. Values of tibiofemoral angle in present study showed that there was no significant difference in the angle with respect race.

CONCLUSION

Present study is an attempt to analyze and Correlate the tibiofemoral angle between two different adult populations (Pahari and Kashmiri) and to compare the values with the published data of different populations of world, in order to find out the significant difference in tibiofemoral angle with rest of the populations. Study was conducted on 120 healthy male adult subjects, 60 Pahari subjects and 60 Kashmiri subjects by using calibrated Goniometer with adjustable arms under standard conditions. The mean tibiofemoral angle in adult Kashmiri male population as 171.8°, with standard deviation of 6.2° and the mean value in Pahari as 170.7°, with standard deviation of 5.4° with p value of 0.48 (non significant). In this study, we found there is no significant difference in the angle, according to different age groups and gender. Although there are limitations of this study, that sample size is limited only to 120 male individuals, but it has a lot of further scope in research field.

REFERENCES

- Ahmed EIF, Khalid IK, Nizar AAN, Muhammad A. 2011. Normal knee angles in the adult Saudi population. *Saudi Med J*, 32 (11): 1143-1148.
- Baruah RK, Kumar S, Harikrishnan SV. Developmental pattern of tibiofemoral angle in healthy north-east Indian children. *J Child Orthop*. 2017 Oct 1;11(5):339-347. doi: 10.1302/1863-2548.11.170047. PMID: 29081848; PMCID: PMC564392.

3. Bafor A, Omota B, Ogbemudia AO. Correlation between clinical tibiofemoral angle and body mass index in normal Nigerian children. *Int Orthop.* 2012 Jun;36(6):1247-53. doi: 10.1007/s00264-011-1451-z. Epub 2011 Dec 20. PMID: 22183152; PMCID: PMC3353071.
4. Bach CM, Steingruber IE, Peer S, Nogler M, Wimmer C, Ogon M. Radiographic assessment in total knee orthoplasty. *Clin Orthop* 2001; 385: 144-150.
5. Chao EYS, Neluheni EVD, Hsu RWW, and Paley D. Biomechanics of mal-alignment. *The Orthopedic Clinics of North America.* 1994; 25(3):379-386.
6. Cheng JYC, Chan PS, Chiang SC, Hui PW. Angular and rotational profile of lower limb in 2,630 Chinese children. *J Pediatr Orthop* 1991; 11:154-161.
7. Deckard ER, Ziemba-Davis M, Meneghini RM. Tibiofemoral Contact Forces Influence Intraoperative Kinematic Pivot Pattern Dependent on Posterior Cruciate Ligament Resection in Primary Total Knee Arthroplasty. *J Am Acad Orthop Surg Glob Res Rev.* 2022 Apr 5;6(4):e22.00033. doi: 10.5435/JAAOS Global-D-22-00033. PMID: 35389911; PMCID: PMC8989784.
8. Didia BC, Igbigbi PS, Dimkpa CD. The tibiofemoral angle in Nigerians. *West African Journal of Anatomy* 1999; 6:29- 3.
9. Espandar R, Mortazavi SM, Baghdadi T. Angular deformities of the lower limb in children. *Asian J Sports Med.* 2010 Mar;1(1):46-53. doi: 10.5812/asjms.34871. PMID: 22375192; PMCID: PMC3289162.
10. Fakoor M, Safikhani Z, Razi S, and Javaherizadeh H. Study of knee angle development in healthy children aged 3-16 years in Ahwaz, Iran. *The Internet Journal of Orthopaedic Surgery* 2010; 16(1):26-33.
11. Felson DT, Nevitt MC, Zhang Y, Aliabadi P, Baumer B, Gale D, et al. High prevalence of lateral knee osteoarthritis in Beijing Chinese compared with Framingham Caucasian subjects. *Arthritis Rheum* 2002; 46: 1217-1 222.
12. healthy Indian children; A Clinical study of 215 children. *J Child Orthop.*2010;4(6):575-586.
13. Hunter DJ, Sharma L, and Skaifer T. Alignment and osteoarthritis of the knee. *J. Bone Surg Am.* 2009; 91(1): 85-93.
14. Igbigbi PS. and Msamati BC. Tibiofemoral angle in Malawians; *Clinical Anatomy* 2002; 15: 293-296
15. Ilahi OA, Kadakia NR, Huo MH. Inter- and intraobserver variability of radiographic measurements of knee alignment. *Am J Knee Surg* 2001; 14: 238-242.
16. Igbigbi PS, Kwatampora. Lower limb angles of East African subjects. *West African Journal of Anatomy* 1997; 5: 9-15.
17. Mohd-Karim MI, Sulaiman AR, Munajat I, Syurahbil AH. Clinical measurement of the tibio-femoral angle in Malay children. *Malaysian Orthopaedic Journal.*2015; 9(2)47-67.
18. Mathew S E and Madhuri V. Clinical tibiofemoral angle in south Indian children. *Bone and joint research.* 2013; 2(8):155-161.
19. Oswald MH, Jakob RP, Schneider E, and Hoogewoud HM. Radiological analysis of normal axial alignment of femur and tibia in view of total knee arthroplasty. *Journal of Arthroplasty.*1993;8(4):419-42.
20. Qureshi, MA, Soomro, MB, Jokhio IA. Knee angle development in Karachi children. *Prof Med J.* 2000; 7:482-491.
21. Qureshi MA, Soomro MB, Jokhio IA. Normal limits of knee angle in Pakistani children; a photographic study of genu varum and genu valgum. *Professional.* 2000; 7:221-226.
22. Ramagopal G. Bow legs and knock knees: is it physiological or pathological? *International Journal of Contemporary Pediatrics.* 2016; 3(2):687-691.
23. Rahman S A, Badahdah W A. Normal development of tibiofemoral angle in Saudi Children from 2 to 12 years of age. *World Appl Sci J* 2011; 12:1353-1361.
24. Singh O, Maheshwari T P, Hasan S, Ghatak S, Rampal S K. A study of tibiofemoral angle among healthy maharashtrian male population. *International journal of biomedical research* 2013; 4(7):323-329. 53.
25. .Saini UC,Bali K, Sheth B, Gahlot N, and Gohlot A.Normal development of knee angle in
26. Sutherland DH, Olshen R, Cooper L, Woo SL. The development of mature gait. *J Bone Joint Surg Am.* 1980 Apr;62(3):336-53. PMID: 7364807.
27. Salenis P, Vankka E. The development of tibiofemoral angle in children. *The Journal of Bone and Joint Surgery.*1975;57(2):359-361.
28. Shopfner, C.E., Coin, G. Genu varus and valgus in children. *Radiology.* 1969; 92:723-732.
29. Tufan A, Meulenbelt I, Bijsterbosch J, Kroon H M, Bierma-Zienstra S M.A, Nelissen and R G H H et al. Familial influence on tibiofemoral alignment. *Annals of the Rheumatic Diseases.* 2010; 69(3):542-545.
30. Tamari K, Tinley P, Aayagi K. Gender and age related differences in axial alignment of the lower limb among healthy Japanese volunteers: comparative and correlation study. *Journal of Japanese Physiotherapy Association* 2003; 6: 25-34.
