Prevalence and gender trends in knee deformities among children aged 6–12 years in Anand city

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Abstract

Modern lifestyles, characterized by reduced physical activity, increased screen time, and poor dietary habits, contribute to musculoskeletal changes in children, which may affect knee alignment. This study investigates the prevalence and gender-based trends of knee deformities in children aged 6–12 years in Anand City. A cross-sectional design was used with stratified random sampling, including 1378 children. Measurements of intercondylar/intermalleolar distances, Q angle, and genu recurvatum were performed using a universal goniometer. Results indicated statistically significant gender differences in intercondylar distance and Q angle, with males showing a greater intercondylar distance and females a larger Q angle. No significant gender difference was observed for genu recurvatum. The findings suggest gender-specific variation in knee alignment. These results could inform early detection and rehabilitation strategies in pediatric physiotherapy.

Index Terms—knee deformities, genu valgum, genu varum, Q angle, pediatric physiotherapy

I. Introduction

The knee joint undergoes significant developmental changes in childhood, transitioning from varus to valgus alignment. Misunderstandings regarding normal ranges may lead to unnecessary interventions. Gender differences in Q angle have been reported in adults, but studies in children, especially in India, are limited. This study examines the prevalence of knee deformities and gender trends in children aged 6–12 in Anand City, providing insights that are relevant for preventive care and management strategies in physiotherapy.

II. Materials and Methods

This cross-sectional study was conducted in various schools of Anand City, India. Stratified random sampling was used to select participants based on gender. A total of 1378 children aged 6–12 years were included. Ethical approvals and permissions were obtained. Measurements included intercondylar and intermalleolar distances, Q angle, and genu recurvatum, performed using a universal goniometer and standard measuring tape. Chi-square test was used for statistical analysis.

III. Results

The demographic characteristics of the participants are summarized in Table 1. The association of intercondylar distance with gender is shown in Table 2. The comparison of Q angle between genders is shown in Figure 1.

Table 1. Gender Distribution of Participants

Gender	Number of Participants
Male	761
Female	617

Table 2. Association of Intercondylar Distance with Gender

Intercondylar Distance (cm)	Male (n=761)	Female (n=617)
< 2 cm	230 (30.21%)	280 (45.40%)
2-4 cm	400 (52.58%)	300 (48.62%)
> 4 cm	131 (17.21%)	37 (5.98%)

Table 3. Association of Age with different variables

Variables	P-value
Intermalleolar distance	.000
Intercondylar distance	No statistics are computed because IMDC is a constant
Q angle (rt)	.263
Q angle (lt)	.263
Genu recurvatum (rt)	.340
Genu recurvatum (lt)	.340

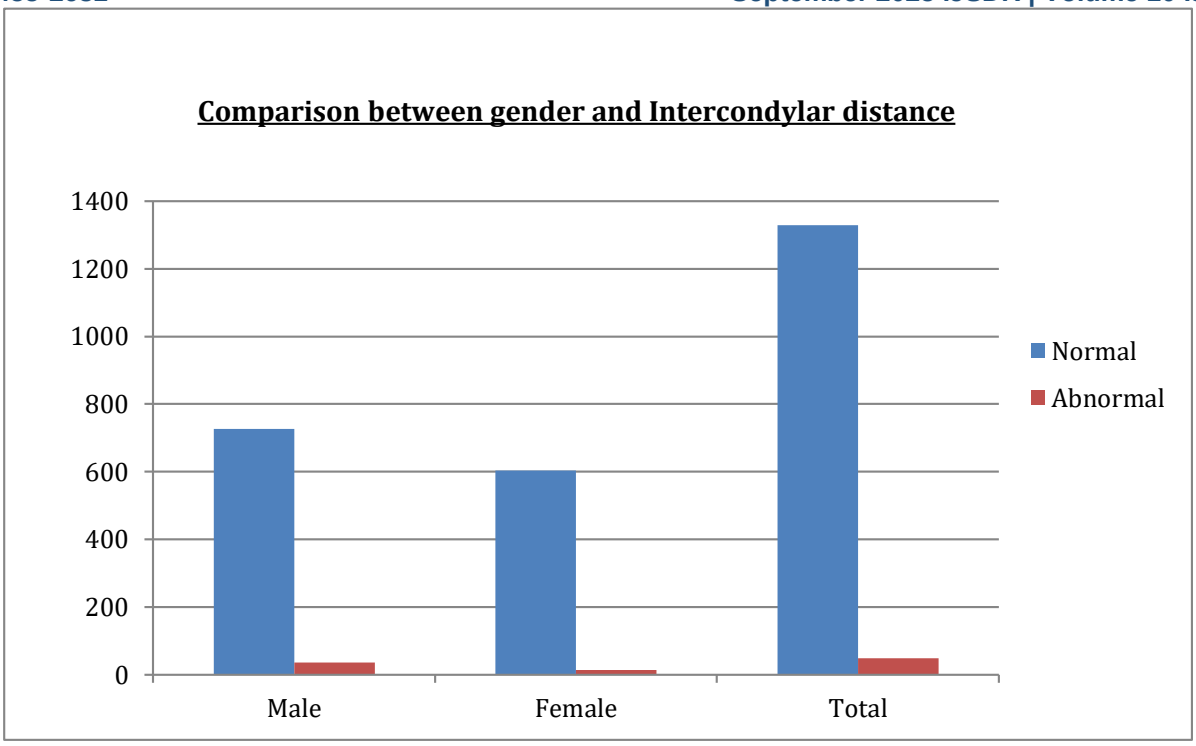


Chart 2 .Gender vs Intercondylar distance

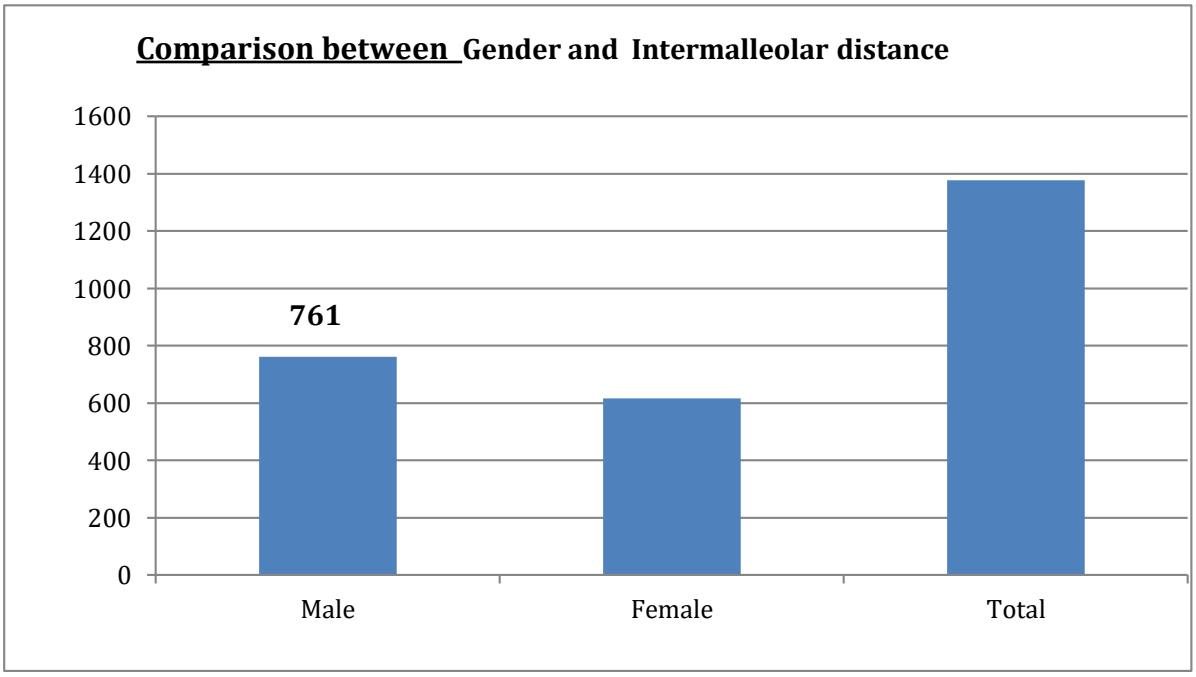


Chart 3.Gender vs Intermalleolar distance

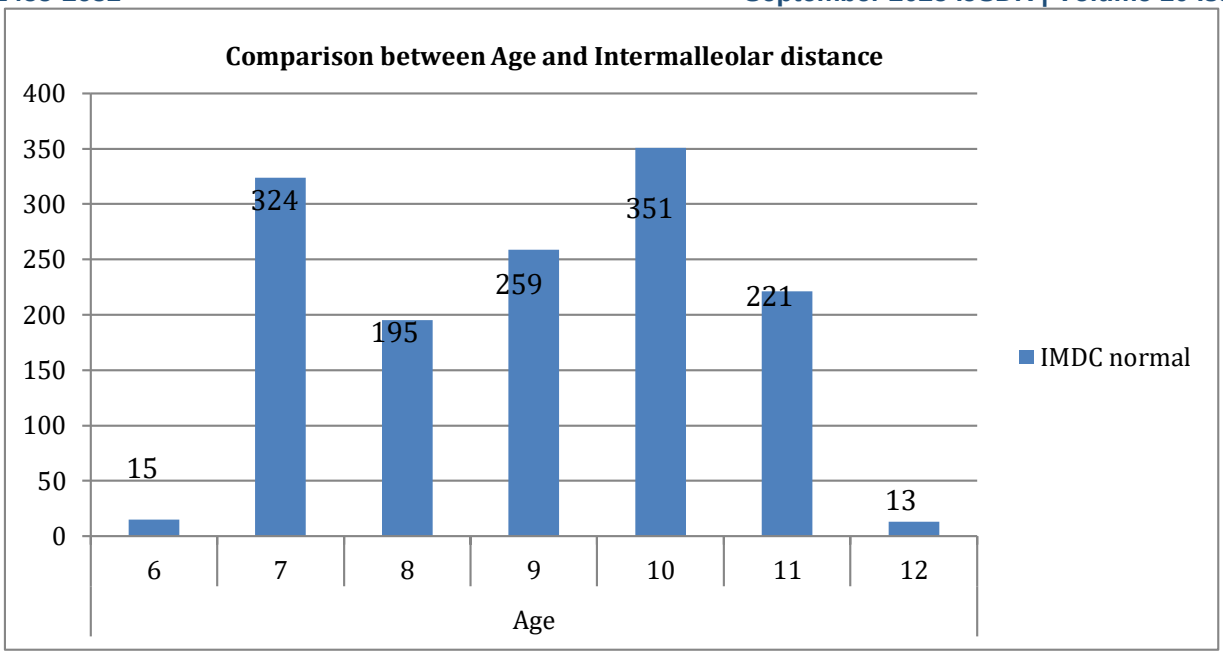


Chart 4. Age vs Intermalleolar distance

Figure 1. Gender Comparison of Q Angle (Right Side– male vs female)

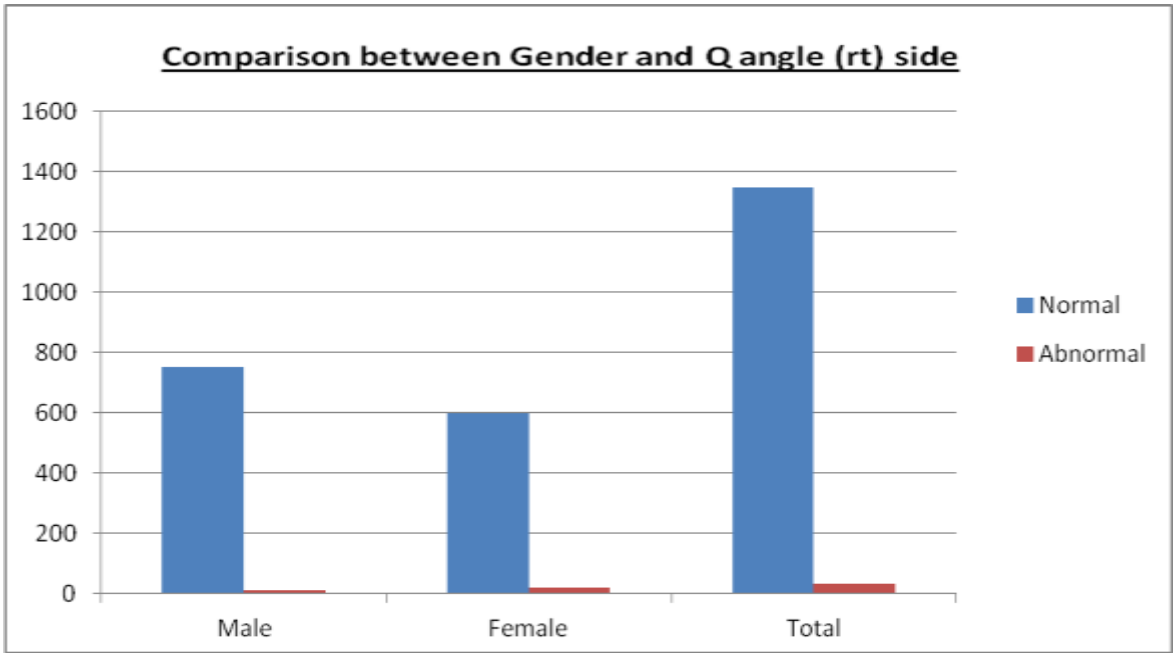
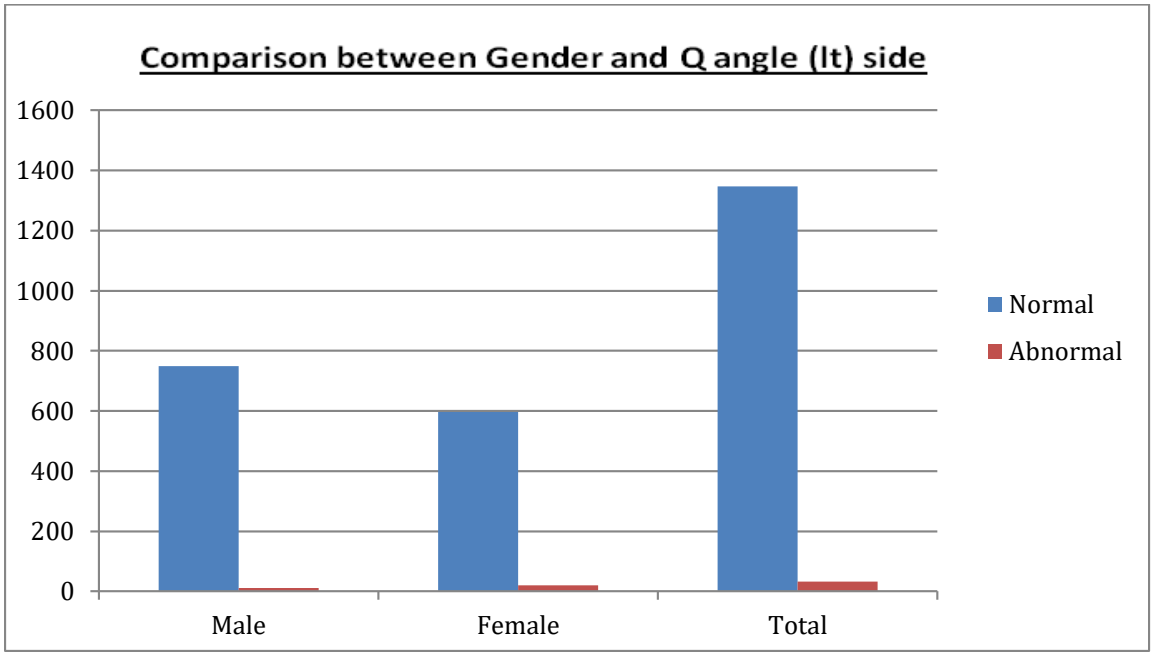


Figure 2. Gender Comparison of Q Angle (left Side– male vs female)



This chart shows that females tend to have a higher Q angle compared to males in the studied age group.

IV. Discussion

This study confirmed gender-based differences in knee anthropometry in the 6–12 age group. Greater intercondylar distance in males and larger Q angle in females align with prior adult studies and suggest early development of sex differences. The lack of significant gender difference in genu recurvatum indicates a possible influence of non-gender factors. The study emphasizes the need for pediatric-focused reference values for Q angle and highlights the potential for early physiotherapy intervention.

V. Conclusion

The study demonstrates significant gender differences in intercondylar distance and Q angle in children aged 6–12. These findings underscore the importance of gender-specific considerations in early identification and management of knee deformities in pediatric populations. Further research is needed to explore clinical implications and develop preventive strategies.

VI. Future Research

- Effect of nutrition on gender-biased deformities.
- Correlation of ankle/hip deformities with knee deformities.
- Development of parental education programs.
- Psychological impact of knee deformities in children.

VII. Acknowledgment

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