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ANGULAR DEFORMITY OF THE KNEE AMONG CHILDREN AND ADOLESCENTS IN ASABA NIGERIA

Orthopaedics

KEYWORDS: Deformity, Children, Adolescents, Tibiofemoral Angle (TFA).

Celestine MADUKA	Consultant Orthopaedic Surgeon, Department of Surgery, Federal Medical Centre Asaba, Nigeria.
Raymond UDEH	Department of Anatomy, Cross River University of Technology, Calabar, Nigeria.
Augustine ENIVWENAE	Senior Registrar, Department of Surgery, Federal Medical Centre, Asaba, Nigeria,.
Enoch UWAOKHONYE	Registrar, Department of Surgery, Federal Medical Centre, Asaba, Nigeria,
Idris ODERINDE	Registrar, Department of Surgery, Federal Medical Centre, Asaba, Nigeria,

ABSTRACT

Introduction: The study was on the angular deformities among school children and adolescents in Asaba Nigeria. It also studied the relationship between body mass index (BMI) and angular knee deformity. The prevalence of angular deformity was determined from the data analyzed. **Methods:** The research was conducted in kindergarten, primary and post-primary schools in Asaba Nigeria. Clinical measurements of tibiofemoral angles (TFA) or knee angles, weights, heights of children and adolescents 3-17 years were taken. 1775 subjects were assessed. The data was analyzed. **Results:** The normal values of TFA in the studied population were in the range of 5.46˚ of varus to 5.14˚ of valgus. Angular deformity was 4.5%. It did not correlate with BMI. **Conclusion:** The prevalence of angular knee deformity in school children and adolescents in Asaba Nigeria is 4.5%.

INTRODUCTION

Angular deformities of the knee are common in children and adolescents. Some of these represent variation in the normal growth pattern. This implies that they will correct spontaneously without any intervention. However, others can result in cosmetic problems, gait disturbances, pain, and early joint degeneration if left unattended to. These also predispose to early arthritis in the knee and secondary changes in the hip and ankle. Therefore, good clinical diagnosis and appropriate management protocol will ensure that optimal outcome is achieved in these subjects. Hence, there is need for a study of angular of the knee deformities in children and adolescents.

AIMS AND OBJECTIVES

The study was aimed at determining the prevalence of angular deformities of the knee among school children and adolescents in Asaba. It was also to ascertain the type of angular deformities amongst school children and adolescents in Asaba. The relationship between sex and angular deformities was studied. It was also to determine the relationship between Body Mass Index (BMI) and TFA

MATERIALS AND METHODS

It is a cross-sectional study conducted in selected kindergarten, primary, and post-primary schools in Asaba, Nigeria. A stratified random sampling method was used. The age bracket was three to seventeen age groups. Ethical clearances were obtained from relevant the government and private agencies. Informed consent was got from the schools involved in the study.

The following instruments: stadiometer, weighing balance, standard goniometer, and tape meter rule were used. They subjects were in standing position and the foot wears removed. Weights and heights were measured using weighing balance and stadiometer respectively. The knee angles were measured using goniometer. The intercondylar and intermalleolar distances were measured using tape meter rule. The data was entered into a preformat and Body Mass Index (BMI) computed.

Exclusion criteria included pupils and students who did not give oral consent. Children with skeletal or extra skeletal disorders such as developmental dislocations of the hip, various skeletal dysplasia, neuromuscular disorders, and feet deformities were excluded from the study. Students who had previous surgery or those with a history of trauma were also excluded from the study.

STATISTICAL ANALYSIS

Statistical analysis was conducted using IBM SPSS version 20.0 for Windows. A paired t-test was used to assess differences between the right and left TFAs of the subjects. The Average TFA (ATFA) was computed as the representative of both right and left TFA. Student's *t*-test was used to assess variables for differences between different age groups of boys and girls. Correlations between the TFA with age, weight, and standing height measurements were studied by performing Pearson's correlation test. A *P*-value of less than 0.01 was considered to be statistically significant.

RESULTS

AGE AND SEX DISTRIBUTION

There were a total of 1775 subjects in the study. There were 880 male subjects and 895 female subjects giving male to female ratio of 1: 1.02

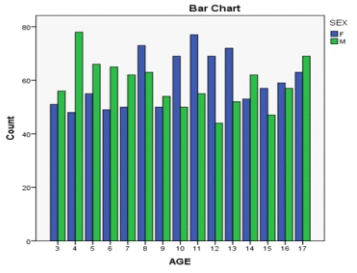
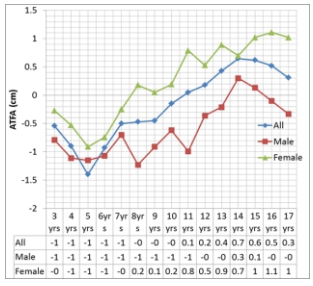


Fig.1: The mean tibiofemoral (knee) angle of subjects by age and sex



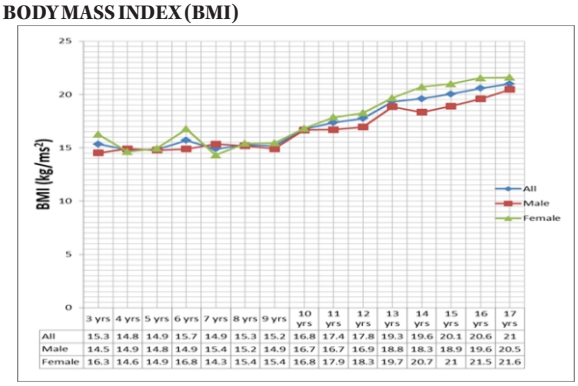
	3 yrs	4 yrs	5 yrs	6yrs	7yrs	8yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs
All	-1	-1	-1	-1	-1	-0	-0	-0	0.1	0.2	0.4	0.7	0.6	0.5	0.3
Male	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0	-0	0.3	0.1	-0	-0
Female	-0	-1	-1	-1	-0	0.2	0.1	0.2	0.8	0.5	0.9	0.7	1	1.1	1

Fig. 2: Average TFA (ATFA) of the subjects for age and sex

The distributions of the average tibiofemoral angle of the subjects for age and sex are shown in figures 1and 2. There is no significant difference between the means of the right TFA (-0.220 + 3.270) and the left TFA (-0.100 + 3.28); p = 0.198. The average of the left and right TFA (ATFA) is computed as the representative TFA for each subject. The mean TFA in this study was -0.160 + 2.650, with a range of -8.50 to 8.00.

There is a good correlation between the right TFA and the left TFA (r = 0.488, p < 0.001). There is also a good correlation between the mean TFA for male and female subjects when compared age for age (r= 0.054). The relationship is not statistically significant (p= 0.109). There is no significant difference between the mean TFA of male subjects (-0.26 0 ± 3.050) and the mean TFA of the female subjects (0.310 ± 2.850) p=0.133.

BODY MASS INDEX (BMI)



	3 yrs	4 yrs	5 yrs	6 yrs	7 yrs	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs	13 yrs	14 yrs	15 yrs	16 yrs	17 yrs
All	15.3	14.8	14.9	15.7	14.9	15.3	15.2	16.8	17.4	17.8	19.3	19.6	20.1	20.6	21
Male	14.5	14.9	14.8	14.9	15.4	15.2	14.9	16.7	16.7	16.9	18.8	18.3	18.9	19.6	20.5
Female	16.3	14.6	14.9	16.8	14.3	15.4	15.4	16.8	17.9	18.3	19.7	20.7	21	21.5	21.6

Age (years)

Figure 3: Average BMI for age and sex

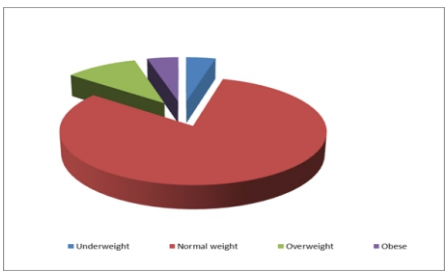


Figure: 4 The Body Mass Index categories of the subjects

The average BMI and related statistics for age and sex are presented in figures and 3 and 4 above. Figure 3 shows the BMI categories of the subjects. 4.7% were under-weight; 79.8% were within the normal range, 10.0% were over-weight, and 5.5% were obese.

ANGULAR DEFORMITY

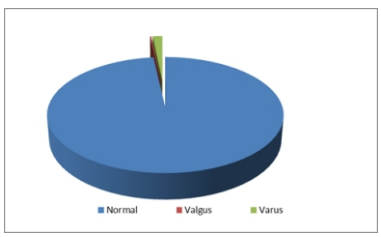


Figure 5: Tibiofemoral Angle categories of the female subjects

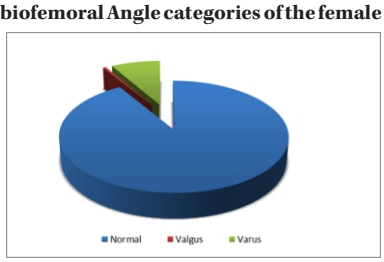


Figure 6: Tibiofemoral Angle categories of the male subjects

The distributions of the tibiofemoral angle categories of the male and female subjects are shown in figures 5 and 6 respectively. The average TFA in this study was -0.160 + 2.650.

Table 1: Body Mass Index (BMI) and angular deformity of the subjects

Body Mass Index (BMI)	Angular Deformity (°)			
	Present	Absent	Total	p-value
Under Weight	2	82	84	0.805
Normal Weight	68	1348	1416	0.570
Over Weight	8	169	177	0.676
Obese	2	96	98	0.273

The distribution body mass index and angular deformity of the subjects is shown in table 1 above. A significant positive correlation existed between the BMIs and the TFAs; with the TFA increasing in positivity as the BMI increases (r = 0.108, p = 0.001).

DISCUSSION

The average TFA in this study was -0.160 + 2.650. The normal range of TFA is defined as mean +2SD.

This implies that all measured TFAs within the range of -5.460 to +5.140, were considered as normal, while values outside this range constituted those with angular deformity. Valgus deformity implies a TFA greater than 5.140, while a varus deformity implies a negative TFA more than 5.460. Using the above criteria the prevalence of angular deformity is 4.5%. 78.7% of the deformities were varus, while valgus deformity was present in 21.3%.

A greater proportion of the male subjects (6.3%) had angular deformities, compared to the females who had only 2.8%. 87.3% of the deformities in males were varus while the remaining 12.7% were valgus. 60.0% of the deformity was varus in the females while 40.0% were valgus. This study there shows that the prevalence of angular deformity is higher in males compared to females (p < 0.001). Varus deformity is commoner in both male and female subjects.

The subjects who have normal weight had the highest incidence of angular deformity (of 4.8% compared to 4.5% for the study population). 2.4% of the subjects with underweight had angular deformity while the prevalence of angular deformity in overweight subjects was 4.5%. Only 2.5% of the obese subjects had angular deformity. The differences in the prevalence of angular deformity among the various BMI groups did not reach statistical significance.

CONCLUSION

The prevalence of angular deformity amongst children and adolescent population in Asaba Nigeria is 4.5%. 78.7% of the deformities are varus while the remaining 21.3% are valgus. The deformities are commoner in males occurring in 6.3% of them as compared to 2.8% of the females. Varus deformity is commoner among male and female subjects. A significant positive correlation exists between the BMI and TFA. Angular deformity does not correlate with Body Mass Index (BMI).

CONFLICT OF INTEREST DECLARATION

The authors declare that they have no conflict of interest

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