Int J Biol Med Res. 2011; 2(3): 712-715

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

# Incidence of congenital talipes equinovarus among children in southeast Nigeria

**Ukoha U[a], Egwu OA[a*], Okafor IJ[b], Ogugua PC[b], Udemezue OO[a], Olisah R[b], Anyabolu AE**

[a]*Department of Anatomy, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.*
[b]*Department of Anatomy, Anambra State University, Uli, Anambra State, Nigeria.*

ARTICLE INFO

*Keywords:*
Congenital defects
Talipes equinovarus
Nigeria

ABSTRACT

Congenital talipes equinovarus (CTEV) / club foot occurs in at least 2 per 1000 live births. It has two forms: syndromic and idiopathic. The objective of the study was to determine the incidence of talipes equinovarus (club foot) among children in Nnamdi Azikiwe University Teaching Hospital, (NAUTH), Nnewi Anambra State, Nigeria. The records of 12,464 patients aged between one day – 2years were reviewed over a six year period (2004-2010). A total of 43 patients had congenital talipes equinovarus with an incidence of 3.4 per 1,000. Twenty four males (0.19%) and 19 females (0.15%) had congenital talipes equinovarus. There was statistically significant difference ($P<0.05$) between the incidence in males and females with the males recording a higher value.



## 1. Introduction

The foot is the part of the lower limb distal to the leg. It supports the weight of the body and has an important role in locomotion. The skeleton of the foot consists of 7 tarsal bones, 5 metatarsals and 14 phalanges. The foot and its bones are divided into 3 parts: the hind foot (talus and calcaneus) the mid foot (navicular, cuboid and cuneiforms) and the fore foot (metatarsals and phalanges)[1]. Because the muscles of the leg rather than those of the foot move the foot, under- development, contracture, fibrosis or imbalance of these muscles of the leg can markedly distort the foot. There are numerous grades and directions of these distortions and the general name talipes is given to any of these distortions [1]. It is a latin word and a combination of two words; talipes = talus + pes i.e. ankle + foot respectively. It is a congenital (birth) deformity and is so named because the deformity is mostly in the talus. Usually, the normal infant foot at birth is proportionately longer and thinner than that of the older child and the joints of the ankle and foot are very supple [3]. The foot can be dorsiflexed so that the top touches the tibia anteriorly, plantar flexed so that the dorsum of the fore foot is parallel with the tibia and inverted or everted in the hind part at 45 degrees. The fore foot is flexible enough to be moved into 45degrees of adduction or abduction. The feet of a new born infant may appear to be in abnormal positions, but if the feet can be moved through the range of motion described above, there is no need for concern because such abnormal positional foot configuration resolve spontaneously but if the reverse is the case, then it is known as congenital talipes. [3] Several types or forms of congenital talipes exist but the most common (about 95%) is known as the congenital talipes equinovarus. The deformity has three elements: the ankle is in equines, the subtalar joint is in varus and the mid and fore parts of the foot are in varus much of which is due to contracture or underdevelopment of the triceps surae muscle group. Because the foot is plantar flexed and the heel is turned inward and cannot bear the weight of the body, the weight is shifted to the lateral side of the fore foot [4].

Club foot can be more or less severe. The more severe type is termed syndromic because it occurs in association with other abnormalities as part of a genetic syndrome. It arises in many neurological and neuromuscular disorders for example spina bifida or spinal muscular atrophy, spinal dysraphism, tethered cord etc. the less severe types occurs in isolation in which case it is often called idiopathic as the cause is unknown. The club foot appearance at birth resembles the position of the foot during early

* Corresponding Author : Dr. Egwu OA
Department of Anatomy,
Nnamdi Azikiwe University,
Nnewi Campus, Anambra State, Nigeria.
Mobile: +234834518414
E.mail: egwuoc@yahoo.com.

fetal development, so it is assumed that some unknown cause halts the normal change of the position during fetal growth. The idiopathic form is the most common [5]. CTEV occurs in about 1 in every 1,000 live births and both males and females are equally affected but it occurs in males more often than in females by a ratio of 2:1. Approximately 50% of cases of club foot are bilateral and is mostly an isolated dysmelia. There is paucity of literature on the incidence of talipes equinovarus (club foot) among children in this environment. Therefore, the study was conducted to determine the incidence of the talipes equinovarus among children in Nnamdi Azikiwe University Teaching Hospital, (NAUTH), Nnewi, Anambra State, Southeast Nigeria.

## 2. Materials and Method

This is a six (6)-year retrospective study of all clinical cases of congenital talipes equinovarus (club foot) at the Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi between 2004 and 2010. NAUTH is a tertiary health institution that covers most of Anambra, parts of Imo, Enugu, Abia and Ebonyi States of Southeast Nigeria.

The study was carried out using the manual retrieval method of data collection. Patients folders were sorted out and reviewed in the period under study. Those with the condition were categorized into syndromic and idiopathic and also unilateral and bilateral congenital talipes equinovarus. The results were tabulated according to age and sex. The data obtained were represented in percentages (%), mean and standard deviation (SD).

## 3.Results

A total of 43 cases of congenital talipes equinovarus (CETV) were recorded within the period under study. There was incidence of 3.4 per 1000 of the 43 cases (0.34%), 24 (0.19%) and 19 (0.15%) were males and females respectively. The age of the patients ranged from a day old to two years.

Twenty-six (0.21%) had bilateral congenital talipes equinovarus while 17 (0.13%) had unilateral congenital talipes equinovarus. Thirty-seven (0.29%) were idiopathic while the remaining 6 (0.05%) were syndromic. Two (0.02%) of the congenital talipes equinovarus were of the rigid type.

**Table 1. Showing frequency of congenital talipes equinovarus**

| | No. of patients | No. of Males | No. of Females |
|---|---|---|---|
| CTEV | 43 (0.34%) | 24 (0.19%) | 19 (0.15%) |
| BILATERAL | 26 (0.21%) | 13 (0.10%) | 13 (0.10%) |
| UNILATERAL | 17 (0.13%) | 11 (0.09%) | 6 (0.05%) |
| IDIOPATHIC | 37 (0.29%) | 20 (0.16%) | 17 (0.13%) |
| SYNDROMIC | 6 (0.05%) | 2 (0.016%) | 2 (0.02%) |
| NON-OPERATIVE MANAGEMENT | 38 (0.30%) | 20 (0.03%) | 18 (0.14%) |
| OPERATIVE MANAGEMENT | 5 (0.04%) | 4 (0.03%) | 1 (0.01%) |

**Table 2. Frequency of CETV according to age range**

| AGE RANGE (MONTHS) | CTEV | BILATERAL | UNILATERAL | IDIOPATHIC | SYNDROMIC |
|---|---|---|---|---|---|
| 0-1 | 12 (0.9%) | 9 (0.02%) | 3 (0.02%) | 9 (0.07%) | 3 (0.03%) |
| 2-3 | 10 (0.08%) | 6 (0.05%) | 4 (0.03%) | 10 (0.08%) | 0 (0.00%) |
| 4-5 | 6 (0.05%) | 2 (0.02%) | 4 (0.03%) | 5 (0.04%) | 1 (0.01%) |
| 6-7 | 4 (0.03%) | 2 (0.02%) | 2 (0.02%) | 3 (0.02%) | 1 (0.01%) |
| 8-9 | 4 (0.03%) | 2 (0.02%) | 2 (0.02%) | 3 (0.02%) | 1 (0.01%) |
| 10-11 | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) | 1 (0.01%) | 0 (0.00%) |
| >11 | 6 (.05%) | 4 (0.03%) | 2 (0.02%) | 6 (0.05%) | 0 (0.00%) |
| TOTAL | 43 (0.034%) | 26 (0.21%) | 17 (0.13%) | 37 (0.29%) | 6 (0.05%) |

**Table 3. Frequency of unilateral CTEV according to sex**

| CTEV | No. of patients | No. of Males | No. of Females |
|---|---|---|---|
| UNILATERAL | 17 (0.13%) | 11 (0.09%) | 6 (0.05%) |
| UNILATERAL (RIGHT FOOT) | 10 (0.08%) | 6 (0.05%) | 4 (0.03%) |
| UNILATERAL (LEFT FOOT) | 7 (0.06%) | 5 (0.04%) | 2 (0.02%) |

**Table 4. Frequency of CTEV according to age in males**

| AGE RANGE (MONTHS) | CTEV | BILATERAL | UNILATERAL | UNILATERAL (RIGHT FOOT) | UNILATERAL (LEFT FOOT) |
|---|---|---|---|---|---|
| 0-1 | 8 (0.06%) | 6 (0.05%) | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) |
| 2-3 | 5 (0.04%) | 2 (0.02%) | 3 (0.02%) | 3 (0.02%) | 0 (0.00%) |
| 4-5 | 3 (0.02%) | 1 (0.01%) | 2 (0.02%) | 0 (0.00%) | 2 (0.02%) |
| 6-7 | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) |
| 8-9 | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) | 1 (0.01%) |
| 10-11 | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) |
| >11 | 3 (0.02%) | 1 (0.01%) | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) |
| TOTAL | 24 (0.19%) | 13 (0.10%) | 11 (0.09%) | 6 (0.05%) | 5 (0.04%) |

**Table 5. Frequency of CTEV according to age in females**

| AGE RANGE (MONTHS) | CTEV | BILATERAL | UNILATERAL | UNILATERAL (RIGHT FOOT) | UNILATERAL (LEFT FOOT) |
|---|---|---|---|---|---|
| 0-1 | 4 (0.03%) | 3 (0.02%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) |
| 2-3 | 5 (0.04%) | 4 (0.03%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) |
| 4-5 | 3 (0.02%) | 1 (0.01%) | 2 (0.02%) | 1 (0.00%) | 1 (0.01%) |
| 6-7 | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) |
| 8-9 | 2 (0.02%) | 1 (0.01%) | 1 (0.01%) | 0 (0.00%) | 1 (0.01%) |
| 10-11 | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) |
| >11 | 3 (0.02%) | 3 (0.02%) | 0 (0.02%) | 0 (0.00%) | 0 (0.00%) |
| TOTAL | 19 (0.15%) | 13 (0.10%) | 6 (0.05%) | 4 (0.03%) | 2 (0.02%) |

## 4. Discussion

Congenital talipes equinovarus (CTEV), often known as club foot is a common but little studied developmental disoreder of the lower limb [5]. It is a birth defect that occurs in about 2 in every 1,000 live births [1]. From the present study, 24 males and 19 females were affected. This is similar to report from Lochmiller et al [6] that CETV occurs more often in males than in females. This study also shows that 26 (60%) of CTEV occurred bilaterally while 17 (40%) were unilateral, which is in agreement with the findings of Wynne [7] that approximately 50-70% of CETV are bilateral. Of the 17 (0.13%) unilateral CETV, 10 (0.08%) had the right foot affected while 7 (0.05%) had the left foot affected. These findings are very similar in most populations and agree with that obtained in UK and US as the right foot was affected slightly more often than the left foot [5]. The findings from this study shows that 37 (0.29%) of the cases of CETV were idiopathic while 6 (0.05%) were syndromic. This also is similar to the findings by Zosia [5] that idiopathic CTEV is by far the most common. Females recorded 17 (0.13%) cases of idiopathic while males had 20 (0.16%). This also confirms that idiopathic CTEV is more common in males than in females regardless of the population studied [5].

The 6 (0.05%) cases of syndromic congenital talipes equinovarus occurred in association with other features as part of a genetic syndrome as confirmed by Zosia [5]. It arises in many neurological and neuromuscular disorders such as spina bifida cystica, spinal dysraphism, arthrogyroposis and spinal muscular atrophy etc. The cause(s) of this connection or link of CETV with neurological and neuromuscular disorders is still unknown and it is often more severe [8].

Only 6 (0.05%) of 26 cases of the bilateral CTEV were syndromic while none of the unilateral is syndromic. The upper limb was affected in 2 (0.02%) of the syndromic CTEV but was normal in all the idiopathic CTEV as was also confirmed by Zosia [5] that the upper limb is normal in idiopathic CTEV.

Tachdjian, [9] reported that club foot affects both siblings in 32.5% of monozygotic twin but in only 29% of dizygotic twins. From the present study, only 3 (0.02%) of the patients were monozygotic twins but both siblings were not affected. A history of a relative having idiopathic CTEV is common although the heritability varies between populations. In Caucasian populations 20-24% of cases report family history [6,8] in comparison with up to 54% of Polynesians [10]. None admitted a family history of idiopathic CTEV in this study.

According to etiological hypothesis, idiopathic CTEV is more likely to occur if amniotic fluid leakage (oligohydramnios) was noted [11] but none of the cases of club foot in this study had oligohydramnions. Only 1 (0.01%) had polyhydramnios at seven months of gestation. Since there are no records of oligohydramnios, the next possible cause(s) of club foot in this study may be attributed to uterine restriction as postulated by Hoffa [12] in his `mechanical forces or positional hypothesis' which was a widely held hypothesis; and also an arrest of the normal medial rotation of the foot in late fetal development as described by Kawashima and Uhthoff [13] in the "developmental hypothesis".

In this study, the incidence of club foot was found to be 3.4 per 1000. The incidence varies among different races. 0.39 per 1000 among the Chinese, 1.2 per 1000 among Caucasians, and 6.8 per 1000 among Polynesians, 6-7 per 1000 among Tongas, Hawaii [10]; Maoris [14] and in the UK [15] suggesting that the etiology is at least partly influenced by genetic and environmental factors [5, 16].

## 5. Conclusion

Several forms of congenital talipes equinovarus exist, but the most common in Southeast Nigeria is the Idiopathic congenital talipes equinovarus, which is in conformity with previous studies and therefore should serve as a guide in future studies concerning the impact of the study environment on the occurrence of CTEV.

## 6. References

[1] Moore KL, Dalley AF. Clinically oriented Anatomy. 5th ed. Lippincott Williams and Wilkins USA, 2006; Pp 658-714.

[2] Leikin JB, Lipsky MS. Complete Medical Encyclopedia. American Medical Association 1st ed random house reference New York, 2003; pp1189-1190.

[3] Behrman l, Mitchell R, Katz D. Ultrasound assessment of femoral anteversion; A comparism with computer tomography. Brit J Bone & Joint Surg 1987; 69:268-270.

[4] Saladin KS. Human Anatomy. McGraw Hill USA, 2005; Pp 223

[5] Zosia M. Congenital Talipes equinovarus (clubfoot): a disorder of the foot but not the hand. Journ of Anat. 2003; 202(1): 37-42.

[6] Lochmiller C, Johnston D, Scott A, Risman M, Hecth JT. Genetic Epidemiologic Study of Idiopathic Talipes equinovarus. Am J Med Genet 1998; 79:90-96.

[7] Wynne DR. Genetic and environmental factors in the etiology of talipes equinovarus. Clin Orthop. 1972; 84: 9-13.

[8] Barker S and MacNicol. Seasonal distribution of Idiopathic Congenital Talipes Equinovarus in Scotland. J Pediatric Orthop 2001; 10:1-5.

[9] Tachdijan M. Pediatric Orthopedics. Philladelphia: Saunders 1972. Pp 1275.

[10] Chapman C, Scott NS, Port RV, Nicol RO. Genetics of clubfoot in Maori and Pacific peoples. J Med Genet .2000; 37:680-683.

[11] Farrell SA, Summers AM, Dallaire L, Singa J, Johnson JA, Wilson RD. Clubfoot, an adverse outcome of early amniocentesis; disruption or deformation. J Med Genet. 1999; 36: 843-846.

[12] Hoffa A. Lehrbuch der orthopdischen chirurge Stuttgart: Ferdinand Enke. 1902.

[13] Kawashima T, Uhthoff HK. Development of the foot in Prenatal life in relation to Idiopathic clubfoot. 1990; 10:232-237.

[14] Brougham DI, Nicol RO. Use of the Cinccinati Incision in Congenital Talipes eqinovarus. J Pediatr Orthop. 1988; 8: 696-698.

[15] Wyne-Davies R. Family Studies and cause of congenital clubfoot. Br J Bone Joint Surg. 1964; 46:445-463.

[16] Cummings RJ, Dawdson RS, Armstrong PF, Lehman WB. Topic. J Bone & Joint Surg. 2002; 84(2): 290.