RESEARCH ARTICLE

The Prevalence of Clubfoot in the Neonates who were Referred to the Emergency Department of Mofid Children Hospital

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Hamid Reza SEYYED HOSSEIN ZADEH ARDEBILI MD [1],
Mehrnoush HASSAS YEGANEH MD [2],
Farid IMAN ZADEH MD [3],
Mohammad Reza BIGDELI MD [4],
Mohammad Ali OKHOVVATPOUR MD [4]

1. Assistant Professor, Orthopaedic surgeon, Akhtar Orhtopaedic Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Pediatrician, Mofid's children hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Associate Professor, Pediatric Gastroenterologist, Mofid's children hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4. Orthopaedic resident, Akhtar Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author:
M. Hassas Yeganeh MD
Mofid's Children Hospital, Shariati St, Tehran Iran
E-mail: mehrnoushyeganeh@yahoo.com

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Abstract

Objective

Club-foot is one of the most prevalent congenital anomalies of the lower extremities. Since there is no epidemiologic study on the prevalence of this disease in Iran, we decided to assess it in a sample population in Tehran.

Materials and Methods

We assessed all neonates who were referred to the emergency department of mofid children hospital between October 2007 and November 2008, due to a paediatric emergency problem. None of the patients had chief complaints of lower extremity deformity.

Results

During this time period (13 months), we could examine 682 neonates. None of the parents of these neonates had complaints regarding anomaly of lower extremities of their neonates at the time of the emergency referral. Of them, 371 (54%) were female and 311 (46%) were male. The age of the mother at the time of pregnancy was < 20 yr in 124 (18%) neonates, between 20 and 35 yr in 472 (69%) neonates and > 35 yr in 86 (13%) neonates. There was a previous history of clubfoot in the siblings of one of the neonates who was under orthopaedic treatment.

Among all these neonates, we found two cases of clubfoot (0.3%), with bilateral involvement. In one of these cases, the older sibling also had clubfoot.

Conclusion

The incidence of clubfoot has been reported between 0.39 and 6 cases in 1000 live birth in the literature. In the present study, we found a prevalence of 0.3 for clubfoot in every 1000 neonates.

Keywords: Clubfoot; prevalence; congenital; talipesequinovarus.

Introduction

Club-foot [congenital talipesequinovarus (CTEV)] is one of the most prevalent congenital anomalies of lower extremities. The prevalence of this anomaly is reported to be between 0.39 and 6 cases in each 1000 live births; this wide difference is mainly due to ethnic factors (1, 2). It is more prevalent in males (M/F=2.5/1). Clubfoot is about 30 times more common in the first degree relatives of the patients with clubfoot (2). In 24.4% ofthe patients with clubfoot, there is a positive family history. (1, 2) Clubfoot is one of the most prevalent congenital deformities. It is characterized by forefoot adduction and supination, equinus, heel varus and internal torsion of tibia (1).

In nearly 20% of the patients with clubfoot, other anomalies are usually seen, which may show an underlying disorder causing the clubfoot and these anomalies. Spina bifida is seen in 4.4%, cerebral palsy in 1.9%, arthrogryposis in 0.9% and neuromuscular abnormalities are seen in 7.7% of the patients with clubfoot (2). The etiology of clubfoot is still unknown.Many theories such as vascular, viral, genetic, anatomic, environmental and positional factors have been proposed (2). None of these theories has proved to be the main pathogenesis of clubfoot,but a multifactorial theory best justifies this disease process.

Season of birth does not significantly differ in patients with and without clubfoot (3, 4). the neuromuscular theory has been widely investigated, but the results are controversial, some have shown abnormalities if the striated muscles of these patients (5) while other studies have failed to (6) Some studies have confirmed genetic abnormalities in patients with clubfoot, but not an etiologic relationship (7, 8).

Clubfoot may be either primary (idiopathic) or secondary. Secondary types of this disease are associated with syndromes like arthrogryposis, streeter dysplasia, mobios syndrome or diasthrophic dysplasia. In these conditions, dysplasia is seen diffusely in nearly all neuromuscular tissues, while in the idiopathic type, the dysplastic tissue is limited to the foot or at most to the leg (2). The diagnosis of clubfoot is clinical and is confirmed by radiographic assessment of the foot and ankle (1).

This congenital anomaly may cause major psychological and social problems for the patients and their families (1).

Since no epidemiologic study has been conducted in Iran regarding this disease, we decided to assess a small sample of neonates to determine its prevalence in a subset of Iranian population.

Materials and Methods

In our study, we included all the neonates who were admitted to the emergency department of Mofid Children's Hospital between October 2007 and November 2008. None of the neonates were admitted due to the chief complaint of lower extremity anomaly. Only children in the neonatal age were included in this study. The exclusion criteria were: 1- children older than 2 months 2- admission due to lower limb anomaly 3- disagreement of the parents to participate in the study.

For any neonate who entered the study, we recorded the following data: 1- age in days, 2- sex, 3- maternal age at the time of pregnancy, 4- the number of the previous pregnancies of the mother, 5- history of clubfoot in siblings, 6- history of clubfoot in other relatives, 7- method of delivery, 8- history of smoking in the mother during the first trimester of pregnancy, 9- presence or absence of clubfoot in the neonate (assessed by a senior pediatric resident educated to be able to evaluate clubfoot correctly by four criteria: forefoot adduction, forefoot suppination, hindfoot varus, heel equinus).

Equinus must be assessed with the knee both in extension and in flexion. The true contracture of the gastrocnemius-soleus muscle complex, which crosses the knee, is indicated by the equinus measured with the knee extended. The difference between the equinus measured with the knee flexed and that measured with it extended indicated the amount of stiffness in theankle joint. The posterior aspect of the calcaneus must be palpated carefully when the equinus is measured because the bone may be pulled proximally away from the heel pad.The varus or valgus position of the heel at rest and in the position of best correction should be measured. The lateral border of the foot should be held in the position of maximum correction and measured. Persistent varus could indicate varus deformity at the calcaneocuboid joint or varus deformity of the metatarsals.

Forefoot supination should be noted. All deformities were assessed in relation to the next most proximal segmen, i.e., the forefoot on the mid foot, the midfoot on the hindfoot, and the hindfoot on the ankle. If the hindfoot is in 30° of varus and thefore foot (the line of the toes) is angulated 30° in relation to the tibia,then the deformity is hindfoot varus and there is no forefoot supination.

After collecting these data, we analyzed them statistically.

Results

In this time period (13 months), 682 neonates were in cluded in our study. Of them, 371 (54%) were female

and 311 (46%) were male, 116 (17%) were preterm (born before the 37th week of gestation), 11 (1.6%) were postterm (born after 40th week of gestation) and the rest [555 (81.4%)] were term. Two hundred and sixty five (39%) neonates were the first child of the family and the remaining 417 (61%) were the second to the fourth child of the family.

Three hundred and ninety neonates (57%) were born by caesarean section and the rest were delivered vaginally. We could not assess the presentation of the baby during vaginal delivery because the parents neither knew nor had any records with them in this regard in the emergency conditions.

The maternal age at the time of pregnancy was < 20 yr in 124 (18%),> 20 and < 35 yr in 472 (69%) and > 35 yr in 86 (13%) neonates. Twelve (1.7%) mothers had a history of smoking during the first trimester of the pregnancy. In 7 families (1%), another child had clubfoot and was under orthopaedic treatment. We could not reliably assess the presence of clubfoot in other family members, due to inaccuracy of the data presented by parents, especially in the emergency set-up.

Among all these neonates, according to the criteria presented above, we found two cases with clubfoot (0.3%). Both neonates had bilateral involvement,both were male and born at term through vaginal delivery. One of them was the first child and the other was the second child of the family. The age of the first neonate's mother at the time of pregnancy was 19 years and theother mother was 26 years at the time of pregnancy. The mother of the first neonate had the history of smoking during the first trimester of the pregnancy. The second neonate had an older sister who also had blateral clubfoot. She had undergone surgical correction of both feet. None of these neonates had other gross anomalies.

Table1: the demographic data of cases:

	Number (%)
Sex	
Male	311-(45%)
Female	371-(55%)
Gestational age	
Preterm	116-(17%)
Term	555-(81%)
Post-term	11-(2%)
First child	265-(39%)
Second- forth child	417-(61%)
Method of delivery	
Caesarean section	292-(43%)
Vaginal delivery	390-(57%)
Maternal age at the time of pregnancy	
< 20	124-(18%)
>20 - < 35	472-(69%)
> 35	86-(13%)
History of smoking in the 1st trimester	
Yes	12-(2%)
No	670-(98%)
History of CTEV in the family	
Yes	7-(1%)
No	675-(99%)

Discussion

Club-foot is one of the most prevalent congenital anomalies of the lower extremities. The prevalence of this anomaly is reported between 0.39 and 6 cases in each 1000 live births.This wide difference is mainly due to ethnic factors (1, 2). Its prevalence in the Chinese, Caucasian and Polynesians is 0.39, 1.2 to 2 and 6 per 1000 live births, respectively (2). It is more prevalent in males (M/F=2.5/1). Clubfoot is about 30 times more common in the first degree relatives of the patients with

clubfoot(2). Clubfootaffects both siblings in 32.5% of monozygotictwins but in only 2.9% of dizygotictwins (1). In 24.4% of the patients with clubfoot, the family history is positive.

Most investigations of populations, families and twins suggesta genetic component, but the mode of inheritance does not followa distinctive pattern. Studies on children with clubfoot supporta single major genetic factor, and observations on twins areuseful in determining if the cause is principally genetic. Increased rates are found in monozygotic compared to dizygotic twins (1).

To date, the prevalence of clubfoot has not been studied in our country. With regard to the number of the admissions of neonates to Mofid Children's Hospital, as a major referral center, and its coverage of different racial and social classes of people from different parts of capital city (or even country), we selected the patients referred to this hospital's emergency department as a miniature sample of the population living in the capital city of Tehran. During a 14 months period, among 682 neonates who were admitted to the emergency department due to any reason other than lower extremity anomaly, we found 2 cases of clubfoot. This means that clubfoot may have a prevalence of 3 cases per 1000 live births. This prevalence is in accordance with the literature which shows a prevalence of almost 2 cases in 1000 live births in Caucasians.

This is a preliminary and limited study on the epidemiology of clubfoot in a subset of the population of Iran. Our study had many short-comings: first, the number of cases was small. Second, the sampling of cases was not proper. Third, we cannot generalize the results of this study for the whole country. However, it presented a preliminary report of the prevalence of clubfoot. The authors believe that larger multi-centeric studies throughout the country are necessary to further evaluate the prevalence of this condition.

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