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Prevalence and epidemiological description of clubfoot at King Saud Medical City, Riyadh, Saudi Arabia

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ABSTRACT

Objectives: Clubfoot is a burden affecting 150,000 newborns worldwide every year. This study looked at the prevalence of clubfoot at King Saud Medical City (KSMC) and examined the risk factors associated with clubfoot in Saudi Arabia.

Methods: Data were collected through the medical system (Medisys) and the database of the orthopedic department intern at KSMC to determine the prevalence of clubfoot using the births recorded from 2015 to 2019 and reviewing their medical files. The epidemiological description of Saudi clubfoot patients was attained by collecting a sample of 100 patients from the clubfoot clinic database.

Results: A total of 18,515 births at KSMC from 2015 to 2019 were evaluated. It was found that 42 patients were affected by clubfoot resulting in a birth prevalence of 2.3/1000 (0.23%) among Saudis at KSMC. Out of 100 clubfoot patients, 93% had no maternal history of chronic disease, while 31% of the cases were a product of consanguineous marriages. About 15% of the patients had an associated developmental dysplasia of the hip.

Conclusion: This study estimates the prevalence of clubfoot in one major medical center in Saudi Arabia to be 2.3/1000. The findings support the data reported in the literature that males are more affected by clubfoot than females, with twice the likelihood that males will be affected by clubfoot. This study will provide an initial look at clubfoot in Saudi Arabia, which can build a base for future studies.

Keywords: Clubfoot, Congenital talipes, CTEV, Epidemiology, Foot deformities, Prevalence, Saudi Arabia

INTRODUCTION

Congenital talipes equinovarus (CTEV), also known as clubfoot, is characterized by inward and downward rotating of foot and it can occur in one or both feet.[1] Clubfoot is considered one of the leading causes of congenital anomalies and disabilities in children.[1,2] It can present alone or as part of a syndrome with other anomalies in which clubfoot becomes more difficult to treat.[3] Some of the reported syndromes that can present with clubfoot are spina bifida, arthrogryposis, and dystrophic dwarfism.[4] Untreated clubfoot can cause functional disability and pain leading to children and families' suffering.[5]

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Many studies have tried to identify the causes leading to congenital clubfoot and it was found that the most common cause is idiopathic.[6] The variations in reported risk factors have been implied to be environmental such as maternal intrauterine variations[7,8] and have also been reported to be genetics in multiple studies.[9-11] Male gender has been reported to be a risk factor for clubfoot in some studies.[12,13] A study looking at idiopathic clubfoot has found a higher prevalence of clubfoot among firstborns.[14] The variations in reported risk factors for clubfoot have been implied in most studies looking at the prevalence of clubfoot and the mechanisms of these factors leading to clubfoot are mostly unknown and a matter of debate.[15]

The reported incidence of clubfoot worldwide is about 1/1000 live birth with an estimated 150,000 children affected annually.[16,17] There are various studies looking at the prevalence of clubfoot in many countries worldwide, but none have been done in Saudi Arabia up to our knowledge. The research aimed to assess the prevalence of clubfoot in one of the major medical centers in the country, King Saud Medical City (KSMC), Riyadh, Saudi Arabia, and describe the population affected by clubfoot, including family history and treatment method. Furthermore, to evaluate sociodemographical and medical factors of the patients with clubfoot. Hence, it will generate data on prevalence in KSMC for the cases of clubfoot that will help in the future management of such cases.

MATERIALS AND METHODS

Data were collected from patients' medical profiles through the medical system (Medisys) and the database of the orthopedic department in KSMC.

Study setting/subject

The study was conducted at KSMC. It is the largest Ministry of Health tertiary hospital with a capacity of 1500 beds. The inclusion criteria for participation in this study were Saudi patients with clubfoot diagnosis in both genders between 2015 and 2019, with full and clear details in medical files including the diagnosis and all information about the patient, with age between 0 and 5 years. We have included all isolated clubfeet and combined clubfeet with other morbidities either idiopathic or syndromic.

Study design

This is a retrospective descriptive cross-sectional study. This type of study was selected due to its analytical data abilities that meet the goal of this study.

Sampling technique

Sampling was through medical files review according to the list provided by the database of the orthopedic department and the Medisys program of KSMC. This resulted in 100 cases with clubfoot, with 42 were born in the hospital.

Data collection

After taking permission from the research committee of the hospital, the required data were collected through medical files by medical interns and supervised by two orthopedic physicians from KSMC.

Data management

Most of the analysis was done to get frequency and percentage using Statistical Package for the Social Sciences version 20 to analyze the data.

RESULTS

A total of 18,515 births at KSMC from 2015 to 2019 were evaluated. It was found that 42 patients were affected by clubfoot resulting in a birth prevalence of 2.3/1000 (0.23%) among Saudis at KSMC.

The epidemiological description of clubfoot was attained from the orthopedics department at KSMC by collecting data from 100 (n = 100) cases that were following in the clinic for 2015–2019. Out of 100 patients, a total of 42 patients were born in KSMC with clubfoot. The characteristics of these cases are outlined in Tables 1 and 2. Results showed that 68% of patients

Table 1: Characteristics of patients seen in clubfoot clinic at King Saud Medical City.

Characteristic	*n*=100
Gender	
Male	68
Female	32
Mother chronic diseases	
None	93
Asthma	4
Hypertension	2
Diabetes mellitus	1
Family history of clubfoot	
Yes	9
No	91
Consanguinity between parents	
Yes	31
No	69
Developmental dysplasia of the hip	
Yes	15
No	85
Clubfoot	
Bilateral	48
Unilateral	52
Right only	27
Left only	25

Table 2: Associated medical conditions reported among patients with clubfoot.

Associated medical condition	*n*=100
None	86
Asthma	2
Speech difficulty	2
Undescended testis	2
Amblyopia	1
Astigmatism, cardiac, and hand anomalies	1
Cystic fibrosis	1
Diabetes mellitus	1
Hydrocephalus	1
Spinal bifida	1
Spinal deformity	1
Urinary incontinence	1

were male and 32% were female, with 2.1:1 male-to-female ratio. Patients were born to 93% of mothers with no chronic illnesses, while 4% had asthma, 2% had hypertension, and 1% had diabetes mellitus. There was no family history of clubfoot in 91% of the cases, while 9% reported a family history of clubfoot. It was found that 31% of the cases with clubfoot resulted from consanguineous marriage (identified as first- or second-degree cousins). There was 15% of the cases affected by developmental dysplasia of the hip (DDH). Clubfoot affected patients bilaterally in 48% of the cases and unilaterally in 52% of cases, with the right foot affected in 27% and left foot affected in 25%.

As shown in Table 2, 2% of the cases had asthma, 2% had speech difficulty, and 2% had undescended testis, while 86% had no associated medical condition.

DISCUSSION

The prevalence of clubfoot at KSMC is double that of the estimated prevalence of clubfoot worldwide; the prevalence is 2.3/1000 live birth at KSMC among Saudis. Worldwide, the reported prevalence of clubfoot is estimated to be 1/1000 live births.[16,17] This can be attributed to the accessibility and free health-care system for all Saudis. The higher prevalence found in this study can also be due to the consanguineous marriages seen in Saudi Arabia between cousins, as seen in 31% of the cases that had parents that were relatives (first- or second-degree cousins) [Table 1]. Studies from our part of the world where consanguineous marriages are common showed a high prevalence of clubfoot with more than 4 times the risk of idiopathic CTEV in baby born to first-cousin parents.[18,19] The study showed that the male: female ratio was 2.1:1, which has been reported in other studies in the same range.[12,13]

The study showed an increase in the incidence of speech difficulty, undescended testicles, and asthma, with a 2% incidence associated with clubfoot. This signifies an important association clinically as there are reported cases of undescended testis associated with clubfoot in literature, which supports our findings.[20] Speech difficulties were also reported in the literature, with neurodevelopmental difficulties associated with clubfoot.[21] The prevalence of childhood asthma in Saudi varies between 9% and 33.7% depending on the region.[22] The difference between the prevalence of asthma in clubfoot patients and the previous study is due to the differences in sample size and the nature of their study (a questioner-based study), also the limitations of our study to one hospital. Up to our best knowledge, there is no research associating asthma with clubfoot.

The reported prevalence of DDH in patients with clubfoot was found to be 4.1% in a systematic review and meta-analysis done in 2015, which is lower than the percentage seen in this study (15%).[23] Clubfoot has been associated with DDH in the literature and it was found that 15% of cases reported in this study were affected by clubfoot and DDH.[23,24] This result can be due to the higher incidence of DDH found in Saudi Arabia that was reported in a previous study as high as 3.8/1000, which is about 4 times the reported global incidence of DDH.[25] This study found no difference between the right or left foot in the unilaterally affected patients. There were only 9% of patients being affected by clubfoot and have family history of clubfoot.

The study is a hospital based, and it may not reflect the actual prevalence of clubfoot in Riyadh, Saudi Arabia. A multicenter study can provide a more accurate prevalence with more details regarding the sociodemographic analysis and associated medical conditions.

CONCLUSION

This study provides an initial look at the prevalence of clubfoot in Saudi Arabia by examining the reported cases at KSMC and future studies nationwide can give a better look at the prevalence of clubfoot in Saudi Arabia.

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AUTHORS' CONTRIBUTIONS

JHF and AEE provided logistic support, provided research data, and supervised the whole process. MSK, MHS, and ANT conceived and designed the study, conducted research,

analyzed, and interpreted data, and wrote the initial and final draft of the article. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

ETHICAL APPROVAL

This study was reviewed and approved on April 2, 2020, by the Institutional Review Board (IRB) registration number: H1R1-18Mar20-01.

Declaration of patient consent

The authors certify that they have obtained all appropriate patients consent forms from the parents. In the form, the parents have given their consent for the clinical information to be reported in the journal. The parents understand that their children names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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