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## Socio-demographic characteristics of clubfoot patients: An observational study

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### Abstract

**Introduction:** Congenital idiopathic clubfoot is the most common birth defect of the musculoskeletal system affecting 1 in every 1000 live births each year. Despite numerous studies, the etiology and pathogenesis of clubfoot remains unknown. Till now, no epidemiological studies have been conducted in Jharkhand to assess the risk factors associated with clubfoot. Hence, this study was undertaken.

**Material and Methods:** A descriptive case control study was conducted at Bokaro General Hospital, Bokaro, Jharkhand from April 2018 to April 2019 using structured questionnaires given to mothers of clubfoot patients (n=102) and mothers of children with no first or second degree family history of clubfoot as controls (n=102). Phenotypic characteristics was also noted.

**Results:** Males were twice likely affected and half clubfoot cases had both feet affected. Right side was more affected in unilateral cases. Cause of clubfoot was idiopathic in 87% cases and non idiopathic in 13% cases. Positive family history was found in 12% cases. 51% clubfoot cases were first born children. Seasonal variation was not found to have association with clubfoot. None of the mothers, cases as well as controls were smoker. Maternal religion showed significant association: 20% cases were muslim compared to 5% muslim controls. Maternal age at birth of child and maternal diabetes did not show association with clubfoot.

**Conclusion:** Males sex is twice likely affected by clubfoot and half of clubfoot cases are affected bilaterally. Right foot was more affected in unilateral cases. First born child was at risk of clubfoot. A family history of clubfoot was associated with risk of clubfoot. Maternal religion showed significant association with clubfoot. Maternal smoking, maternal diabetes and maternal age at birth of child were not found to be significantly associated with clubfoot in our study in contradiction to the numerous studies that have shown a strong association.

**Keywords:** Socio-demographic characteristics, clubfoot

### Introduction

Congenital talipes equinovarus or clubfoot, is a major cause of disability worldwide [1]. This birth defect is characterized by equinus of the ankle, varus of the hindfoot, cavus and adductus of the forefoot with an associated calf muscles atrophy [1]. Most commonly clubfoot is idiopathic, but, it may be associated with some other medical syndromes like myelomeningocele or arthrogryposis [2]. The incidence of clubfoot is around 1 in 1000 live births per year, with more than 150,000 infants affected with this deformity each year [3-9]. More than 80% cases are in developing countries, where clubfoot is a major disease burden in such low resource regions [10, 11]. Although many studies have been conducted for past so many years, the etiology and pathogenesis of clubfoot has not been fully understood.

Previous studies have proposed numerous risk factors that are associated with clubfoot, like male gender, maternal smoking habits, maternal conception age, parity, and maternal diabetes [12-18]. Although there have been numerous studies, the etiology and pathogenesis of clubfoot remains unknown. The purpose of this study is to evaluate socio-demographic factors that may increase the risk of this birth defect. Determining these risk factors will assist further understanding of the etiology of this deformity and providing information for the education and counseling of parents.

A descriptive case control study has been conducted using structured questionnaires given to mothers of clubfoot patients and mothers of pediatric patients, preferably on the younger side

with no first or second degree family history of clubfoot as controls.

**Materials and Methods**

Clubfoot clinic is held every Thursday at Orthopaedics Outpatient Department, Bokaro General Hospital where the clubfoot patients are evaluated by Pirani score and treated by Ponseti method free of cost under Cure India Initiative. The purpose of the study was explained to the parents of case and control patients and consent was taken before the interview. This study utilized structured questionnaires to describe specific risk factors that could be associated with clubfoot. The sample for this study included patients from Bokaro General Hospital, Bokaro, Jharkhand. Questionnaires were given to the mothers of pediatric patients, preferably on the younger side. The population of cases included patients with clubfoot who received treatment in orthopedics outpatient department. The population of controls included patients receiving treatment in the Bokaro General Hospital who did not have a diagnosis of clubfoot. Additionally, the controls who did not have a first- or second-degree family history of clubfoot or any other congenital abnormalities were included. The anonymous questionnaires described data about the child and the mother. Information collected about the patient included gender, religion, laterality, birth order, birth month, and type of clubfoot. Information collected about the maternal pregnancy included age at delivery, maternal diabetes, smoking history. The data was recorded in English, and analyzed with EpiInfo version 7 using a student's t-test. A p-value of < 0.05 indicates a statistically significant association.



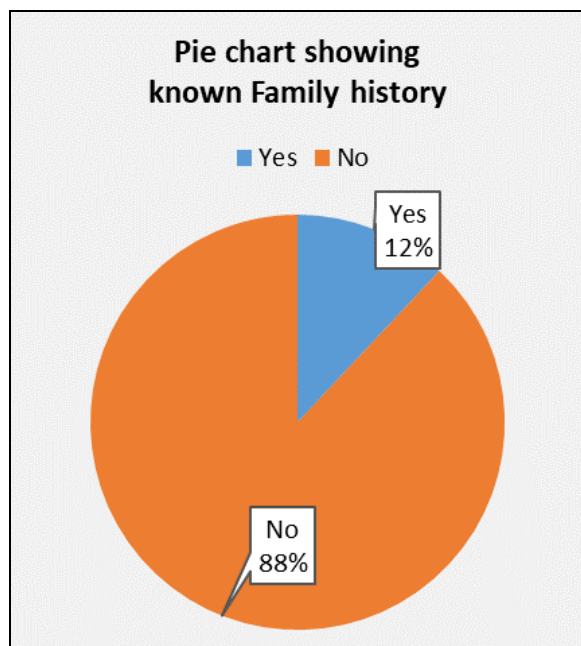
**Fig 1: Ctev Patient 1**



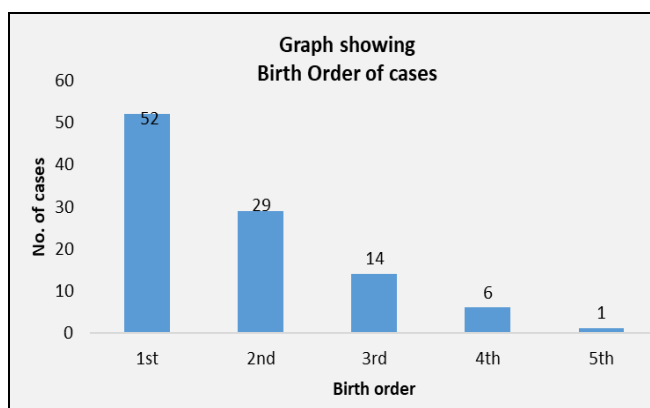
**Fig 2: Ctev Patient 2**

**Results**

Study consists of 102 cases of clubfoot and 102 control patients enrolled in the study to respond to the risk factor questionnaires. Of all clubfoot cases, 70% were male and 30% were female. 51% of the cases presented with bilateral clubfoot, while 49% of the cases presented with unilateral clubfoot. Of the 50 cases with unilateral clubfoot, 42% had an affected left foot and 58% had an affected right foot. Of the 102 families, 12% of the cases reported a known family history of clubfoot. 51% clubfoot cases were first born children. 28% cases presented early to the clubfoot clinic within one month of birth, other 28% cases presented late at and after more than one year of age. 87% clubfoot cases were idiopathic, whereas 13% were non-idiopathic.

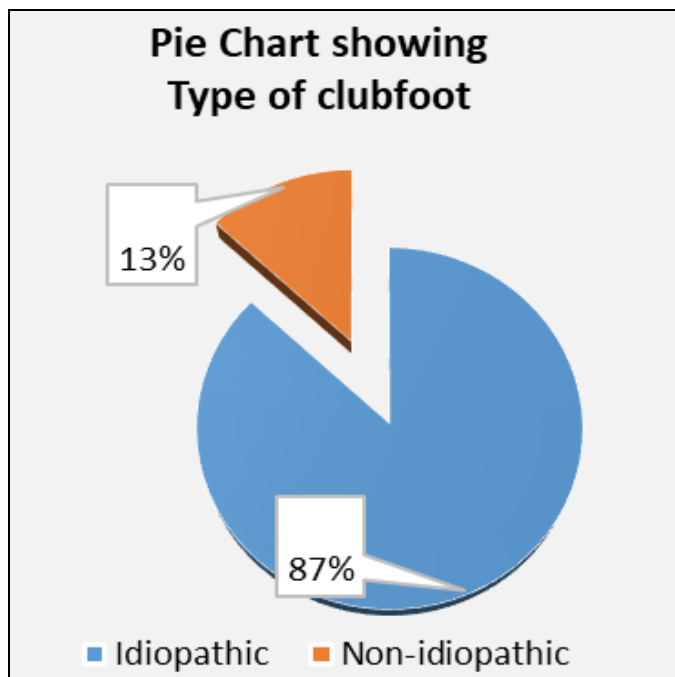


**Graph 1: Family History**



**Graph 2: Birth Order**

The socio-demographic maternal characteristic that showed significant association with clubfoot was maternal religion (p = 0.001362): 20% cases were muslim compared to 5% muslim controls. Maternal age at birth of child was similar in cases and controls. The percentages of maternal smoking and diabetes were similar between cases and controls. We found no seasonal variation associated with increasing risk for clubfoot. 28% of cases and 29% of controls were born in winter months. 26% of cases and 25% of controls were born in summer months. 31% of cases and 30% of controls were born in rainy season



**Graph 3: Type Of Clubfoot**

### Discussion

Congenital clubfoot is the most common musculoskeletal deformity and it affects 1 in every 1000 newborns [3, 6, 7, 19, 22]. Although it is a well-known birth defect, the etiology and pathophysiology of congenital clubfoot remains unknown.

The results of this study indicate that males are twice as likely to be affected by clubfoot compared to females (70% of males and 30% of females, n=102), indicating that there is a genetic predilection for male sex as a strong risk factor for clubfoot [12, 13]. Also, in accordance with the literature, approximately 51% of children had both feet affected. Present study shows right side is affected more than the left in unilateral clubfoot cases (42% left and 58% right, n=50) in a manner similar to the previous studies with an increased prevalence of right sided clubfoot deformity [12, 19].

51% cases and 48% controls were first born children in our study as in the previous studies [17, 18]. 12% of the cases reported known family history of clubfoot in concordance with the previous studies [23, 24]. 28% cases presented early to the clubfoot clinic within one month of birth. Also, 28% cases presented late at and after more than one year of age meaning delay in the commencement of treatment and longer duration of treatment and follow up. 87% clubfoot cases were idiopathic, whereas 13% were non-idiopathic in this study as in the previous studies [26, 27].

Maternal religion showed significant association with clubfoot. 20% clubfoot cases were muslim compared to 5% controls in this study.

Seasonal variation did not affect clubfoot cases in the present study. Clubfoot patients were born more in the winter season as per previous studies [20, 25] However some other studies have not found this seasonal variation [21].

The literature also reports several socio-demographic characteristics that have influence on risk of clubfoot that vary among populations, like maternal smoking [12-18]. None of case and control mothers had smoking habits in this study.

In our study, young maternal age (< 25 years old) was not found to increase risk of clubfoot (55% case mothers, n=102 and 53% control mothers, n=102) in contrast with many other epidemiologic studies [14, 21]. Maternal diabetes was not found to be associated with clubfoot in our study.

### Conclusion

This study states that males are twice as likely to be affected by clubfoot and 51% of clubfoot patients have both feet affected. Right side was more affected in unilaterally affected patients. A significant number of cases presented late to the clubfoot clinic probably due to neglect on the part of parents. First born child was at risk of clubfoot. We also found that a family history of clubfoot was a risk factor. Maternal religion showed significant association with clubfoot. Maternal smoking, maternal diabetes and maternal age were not found to be significantly associated with clubfoot in our study in contradiction to the numerous studies where significant association has been found. Cultural differences may have led to differences in our findings with respect to the previous studies. These preliminary findings will help in the future for similar studies in Jharkhand as well as in the general Indian population.

### Limitations

It is a hospital based case control study which does not reflect the entire population. Gestational age, birth weight were not taken into account in this study. Maternal characteristics like breech presentation, maternal education were not considered in this study. Paternal characteristics like paternal age at conception, paternal smoking were not considered in this study. Any household smoking was not considered in this study. Short duration of study is also a limitation.

### References

1. Barker S, Chesney D, Miedzybrodzka Z, Maffulli N. Genetics and epidemiology of idiopathic congenital talipes equinovarus. *J Pediatr Orthop.* 2003; 23:265-72.
2. Sullivan J. Lovell and Winter's pediatric orthopedics. 4. Philadelphia: Lippincott-Raven; 1996. The child's foot.
3. Wynne-Davies R. Family studies and the cause of congenital club foot. talipes equinovarus, talipes calcaneovalgus and metatarsus varus. *J Bone Joint Surg Br.* 1964; 46:445-463.
4. Danielsson LG. Incidence of congenital clubfoot in Sweden. 128 cases in 138,000 infants 1946-1990 in Malmo. *Acta Orthop Scand.* 1992; 63:424-6.
5. Byron-scott R, Sharpe P, Hasler C, Cundy P, Hirte C, Chan A *et al.* A South Australian population-based study of congenital talipes equinovarus. *Paediatr Perinat Epidemiol.* 2005; 19:227-37.
6. Ching GH, Chung CS, Nemecek RW. Genetic and epidemiological studies of clubfoot in Hawaii: ascertainment and incidence. *Am J Hum Genet.* 1969; 21:566-580.
7. Chung CS, Nemecek RW, Larsen IJ. *al. e.* Genetic and epidemiological studies of clubfoot in Hawaii. General and medical considerations. *Hum Hered.* 1969; 19:321-342.
8. Moorthi RN, Hashmi SS, Langois P, Canfield M, Waller DK, Hecht JT. Idiopathic talipes equinovarus (ITEV) (clubfeet) in Texas. *Am J Med Genet A.* 2005; 132:376-80.
9. Evans AM, van Thanh D. A review of the Ponseti method and development of an infant clubfoot program in Vietnam. *J Am Podiatr Med Assoc.* 2009; 99:306-16.
10. Morcuende AJ. Congenital idiopathic clubfoot: prevention of late deformity and disability by conservative treatment with the Ponseti technique. *Pediatric Annals.* 2006; 35(2):128,132-30,6.
11. Saltzman MH. Foot focus: International initiative to

- eradicate clubfeet using the Ponseti method. *Foot & Ankle International*. 2009; 30(5):468-71.
12. Kancherla V, Romitti PA, Caspers KM, Puzhan- kara S, Morcuende JA. Epidemiology of congenital idiopathic talipes equinovarus in Iowa, *Am J Med Genet A*. 1997-2005; 152A:1695-700.
  13. Alderman BW, Takahashi ER, LeMier MK. Risk indicators for talipes equinovarus in Washington State, 1987-1989. *Epidemiology*. 1991; 2:289-92.
  14. Parker SE, Mai CT, Strickland MJ, Olney RS, Rickard R, Marengo L *et al*. Multistate study of the epidemiology of clubfoot. *Birth Defects Res A ClinMolTeratol*. 2009; 85:897-904.
  15. Cardy AH, Barker S, Chesney D, Sharp L, Maf-fulli N, Miedzybrodzka Z. Pedigree analysis and epidemiological features of idiopathic congenital talipes equinovarus in the United Kingdom: a case- control study. *BMC Musculoskelet Disord*. 2007; 8:62.
  16. Skelly AC, Holt VL, Mosca VS, Alderman BW. Talipes equinovarus and maternal smoking: a population-based case-control study in Washington state. *Teratology*. 2002; 66:91-100.
  17. Dickinson KC, Meyer RE, Kotch J. Maternal smoking and the risk for clubfoot in infants. *Birth Defects Res A ClinMolTeratol*. 2008; 82:86-91.
  18. Honein MA, Paulozzi U, Moore CA. Family history, maternal smoking, and clubfoot: an indication of a gene-environment interaction. *Am J Epidemiol*. 2000; 152:658-65.
  19. Lochmiller C, Johnston D, Scott A, Risman M, Hecht JT. Genetic epidemiology study of idiopathic talipes equinovarus. *Am. J. Med. Genet*. 1998; 79:90-96.
  20. Carney BT, Coburn TR. Demographics of Idiopathic Clubfoot: Is there a seasonal variation?. *J Pediatr Orthop*. 2005; 25:351-52
  21. Loder RT, Drvaric DM, Carney B, Hamby Z, Barker S, Chesney D *et al*. Lack of seasonal variation in idiopathic talipes equinovarus. *J Bone Joint Surg Am* 2006; 88:496-502.
  22. Wynne Davies R. Family studies and the aetiology of clubfoot. *J Med Genet*. 1965; 2:227-32.
  23. Melissa Palma, Thomas Cook, Julio Segura, Augustin Pecho, Jose A Morcuende. Descriptive Epidemiology of Clubfoot in Peru: A Clinic-Based Study *Iowa Orthop J*. 2013; 33:167-171.
  24. McConnell L, Cosma D, Vasilescu D, Morcuende J. Descriptive epidemiology of clubfoot in Romania: a clinic-based study. *European Review for Medical and Pharmacological Sciences*. 2016; 20:220-224.
  25. Pryor GA, Villar RN, Ronen A, Scott PM. Seasonal variation in the incidence of congenital talipes equinovarus. *J Bone Joint Surg Br*. 1991; 73:632-4.
  26. Choubey R, Kiradiya N, Shukla J. Demographic Characteristics of Congenital Talipes equinovarus in Bundelkhand Area of Madhya Pradesh. *Orthopaedic Journal of M P Chapter*. 2016; 22(2).
  27. Wijayasinghe SR, Abeysekera WYM, Dharmaratne TSS. Descriptive Epidemiology of Congenital Clubfoot Deformity in Sri Lanka. *Journal of the College of Physicians and Surgeons Pakistan*. 2018; 28(2):166-168