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ORIGINAL ARTICLE

Epidemiological Characteristic of Clubfoot Patients in Selected Hospitals of Dhaka City

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ABSTRACT

Background and Objectives: Congenital clubfoot or talipes equinovarus is the most common birth defect of the musculoskeletal system affecting 1 in every 1000 live births each year. To date, no epidemiological studies have been conducted in Bangladesh to assess the risk factors associated with this deformity. The purpose of this study was to evaluate the specific demographic and socioeconomic factors that may increase the risk of an infant being born with clubfoot as well as to see the outcome of management of clubfoot.

Materials and methods: The present prospective study was conducted on secondary data derived from the Project "Walk for Life (WFL)" started in Bangladesh in 2009 and gradually expanded to 35 Clinics. The present study data were collected from 5 of those clinics namely NITOR, DMCH, BSMMU, ICMH and CRP. All recruited cases underwent Ponseti casting. Demographic data, Pirani scores, cast and need for tenotomy were reviewed for 338 patients registered in the above 5 clinics during the period 2012. The outcome was evaluated with help of difference between the Pirani scores before and after intervention.

Result: In the present study about half (48.5%) of the children presented at 1 or < 1 month of age with median age of the children being 2 months and a wider age-range from 1 month to 42 months. A male preponderance (72%) was observed in the series. Children with clubfoot were predominantly belonged to poor family (mostly labour or unemployed, lives in tin-shaded house, with monthly income below Taka 10000). About half (48.2%) of the parents/guardians were informed about the place of clubfoot treatment (NITOR, DMCH, BSMMU, ICMH and CRP) from their primary physicians, 23.7% from the parents of the children who previously got treatment from the centers and only 16% from publicity. In terms of treatment provided, more than three-quarters were given 4 - 6 casts and in 80% cases tenotomy was needed. Majority of the children (9.5%) before intervention exhibited a Pirani score from 3.1 - 6.0 which after a mean period 5 weeks of intervention was reduced to 0.5 - 1.0 (the targeted Pirani score) in almost all cases. Only 2 children were referred. The rest 336 were continuing their treatment and as such the final comment was left pending.

Conclusion: Children presented with clubfoot in tertiary level hospitals of Bangladesh are mostly male, belonged to poor family. Half of the children are bilaterally affected and attend in the treatment centers within one month of birth. The primary physicians are the prime source of information about the treatment centers. Mass media are less involved in giving the issue a wide coverage. Majority of the children responded well to 4 - 6 casts and required tenotomy.

Key words: Epidemiological characteristics, clubfoot, tenotomy, Pirani score.

INTRODUCTION

Congenital talipes equinovarus (CTEV), often known as 'clubfoot' is a poorly understood problem, although it is a common developmental disorder of the lower limb. It affects around 1 per 1000 births. Affected individuals are born with one or both

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feet turned in and down.[1] Without treatment walking is impeded and despite advances in modern treatment, disability or stiffness may persist.[2] Compared with other common developmental disorders there has been little research into the cause of CTEV. Both genetic and environmental factors play important role in its development.[3] However, in contrast with other developmental disorders, little is known about its specific genetic and environmental risk factors.[4]

Idiopathic clubfoot, one of the most common problems in pediatrics, is characterized by a complex three-dimensional deformity of the foot. The treatment of clubfoot is controversial and continues to be one of the biggest challenges in pediatric orthopedics. This controversy is due, in part, to the difficulty in measuring and evaluating the effectiveness of different treatment methods. The lack of understanding of the functional anatomy of the deformity, the biological response of young connective tissue to injury and repair, and their combined effect on the long-term treatment outcomes are believed to be the heart of the debate. When clubfoot is analyzed from historical perspective, it is difficult to ascertain if other types of foot deformity, for example equinovarus or metatarsus adductus were included in the definition. However, most experienced authors are able to differentiate it from the other foot deformities when they referred to a clubfoot treatment centre, given the natural history of no improvement without treatment.[5]

MATERIALS AND METHODS:

This cross sectional study was conducted over a period of 4 months between May to August 2013 in collaboration with National Institute of Traumatology & Orthopedic Rehabilitation-Dhaka (NITOR), Dhaka Medical College and Hospital (DMCH), Bangabondhu sheikh Mujib Medical University (BSMMU), CRP-Mirpur and Institute of Child & Maternal Health, Matuial (ICMH). The secondary data were collected from the above-mentioned hospitals kept at archive of the Project "Walk for Life (WFL)" started in 2009 with joint collaboration of Government of Bangladesh and The Glenco Foundation, Australia. All recruited cases underwent Ponseti casting. Demographic data, Pirani scores, number of casts needed and need for tenotomy were reviewed for 338 patients registered in the above 5 clinics during the period 2012. Pirani et al.[6] devised a simple scoring system based on six clinical signs of contracture. Each is scored according to the following principle: 0=no abnormality; 0.5=moderate abnormality; 1=severe abnormality. The six signs are separated into three related to the hindfoot (severity of the posterior crease, emptiness of the heel and rigidity of the equinus), and three related to the midfoot (curvature of the lateral border of the foot, severity of the medial crease and position of the lateral part of the head of the talus). Thus, each foot can receive a hindfoot score between 0 and 3, a midfoot score between 0 and 3 and a total score between 0 and 6.[6]

The clubfoot patients, who attended during the year 2012 at the above mentioned hospitals were the study population. Of them the required numbers were included using simple random sampling method. The sample size was determined using the formula $n = (Z^2 \times p \times q)/d^2$. Accordingly the sample size was 350. But because of missing data, 338 patients were feasible to be collected. A structured questionnaire (research instrument) was developed containing all the variables of interest. Data were processed and analysed using software SPSS (Statistical Package for Social Sciences) version 11.5. The test statistics used to analyse the data were descriptive statistics.

RESULTS

Demographic characteristics:

About half (48.5%) of the children presented at 1 or < 1 month of age followed by 29.9% at 2 - 6 months, 10.6% at 7 - 12 months and 0.6% after 36 months of age. The median age of the children was 2 months and youngest and the oldest children were 1 and 42 months old respectively. Nearly three-quarters (72%) of the children were male giving a male to female ratio of roughly 3:1. Nearly half of the children's fathers were unemployed (52.5%), 25.8% service-holder, 16.7% day labor and only 5% businessmen. Majority (96%) of families had only one earning member.

TABLE I. Distribution of study children by demographic characteristics (n = 338)

Demographic characteristics	Frequency	Percentage
Age (months)		
≤ 1	164	48.5
2 - 6	101	29.9
7 - 12	36	10.6
13 - 36	35	10.4
> 36	2	0.6
Sex		
Male	244	72.0
Female	94	28.0
Occupation of parents		
Unemployed	177	52.5
Day labor	56	16.7
Service	87	25.8
Business	17	5.0
Monthly income (Taka) of parents		
< 5000	178	52.5
5000 - 10000	56	16.7
10000 - 20000	87	25.8
≥20000	17	5.0
Housing condition of parents		
Tin-shed	246	72.7
Brick-tin	68	20.2
Building	22	6.5
Thatched	2	0.6

**Median age = (2.0 ± 0.4) months; range = (1 - 42) months.*

Over half (52.5%) of the children's fathers had monthly income of Taka < 5000, 16.7% Taka 5000 - 10000, 25.8% Taka 10000 - 20000 and 5% Taka 20000 or more. Approximately 73% of the children were living in tin-shed house, followed by 20.2% in brick-tin, 6.5% in building and 0.6% in thatched houses (Table I).

Source of information about place of treatment:

Nearly half (48.2%) of the parents/guardians were informed about the place of clubfoot treatment (NITOR, DMCH, BSMMU, ICMH and CRP) from the primary physicians, 16.6% from publicity, 23.7% from patients' relatives, who previously got treatment from these institutes/ hospitals and the rest (11.5%) from other diverse sources (Table II).

TABLE II. Patients' source of information about place of treatment (n = 338)

Source of information	Frequency	Percentage
Physician	163	48.2
Publicity	56	16.6
Patients' relatives	80	23.7
Others	39	11.5

Affected leg and type of Clubfoot:

Approximately half (47%) of the children had their both legs affected, 34% only right and 19% only left leg affected (Fig. 1). Ninety five percent of the clubfoot were typical and the rest (5%) atypical.

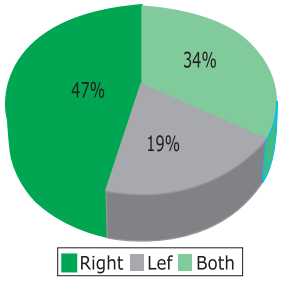

FIGURE 1: *Distribution of children by their affected leg (n = 338)*

Treatment received:

More than three-quarters (75.1%) of the children were given 4 - 6 casts, 15.7% 1 - 3 casts, 7.1% 7 - 9 casts and 2.1% 10 - 12 casts (Table III). Eighty percent of the children required tenotomy.

TABLE III. Distribution of children by number of casts given (n = 338)

Number of casts given	Frequency	Percentage
1 - 3	53	15.7
4 - 6	254	75.1
7 - 9	24	7.1
10 - 12	7	2.1

Pirani score before and after intervention:

Majority of the children (9.5%) before intervention exhibited Pirani score from 3.1 - 6.0 and 4.4% from 1.1 - 3.0. Following intervention almost all of them exhibited a Pirani score ranging from 0.5 - 1.0 (the targeted Pirani score). The difference between the Pirani score before and after intervention is statically significant ($p < 0.001$). Of the total children, 2 were referred. (Fig. 2).

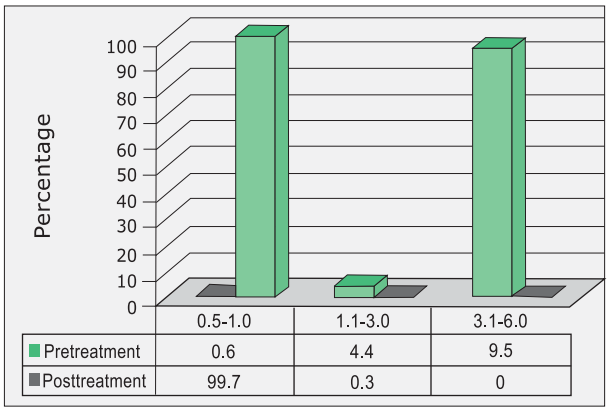

FIGURE 2 : *Comparison of Pirani score between children before and after intervention (n = 338)*

DISCUSSION

In the present study about half (48.5%) of the children presented at ≤ 1 month of age with median age of the children being 2 months (range: 1 - 42 months). The presentation age is wider indicating that half of the people are not aware of its early treatment. Male predominance (72%) was another finding of our study which correlates well with other studies.[7,8] Nearly half (47%) of the children were bilaterally affected which also favours the findings of the other studies.[7,8] Nguyen et al[9] in a descriptive clinic-based epidemiologic study using structured questionnaires given to biological mothers of clinically confirmed clubfoot subjects as cases (n = 99) and biological mothers of children between ages 0-18 months with no first or second degree family history of clubfoot as controls (n = 97) demonstrated that males were twice as likely to have clubfoot and half of clubfoot subjects were affected bilaterally. The results of the present study support previously reported data in the literature indicating that there is a genetic influence for male sex and bilateral affection of the clubfoot.

Over half (52.5%) of the childrens' fathers had income below Taka 5000 which suggests that the condition is primarily found in the poor community. However, it may not be the true reflection of the community. The well-off parents may take their children to private hospitals for treatment and hence may not be registered to the five study hospitals. Nearly half (48.2%) of the parents/guardians were informed about the place of clubfoot treatment (NITOR, DMCH, BSMMU, ICMH and CRP) from their primary physicians, 23.3% from the parents of the children who previously got treatment from the centers and only 16% from publicity. It means that very few people are informed about the problem from the mass media like television and newspapers. Had the mass media been involved in behavior change communication to make the community aware about the problem, a large number of parents would have brought their children in the centres early, which is essential for a better outcome of the treatment.

In terms of treatment provided, more than three-quarters were given 4 - 6 casts and in 80% cases tenotomy was needed. Majority of the children

(95%) before intervention exhibited a Pirani score from 3.1 - 6.0 which after a mean period 5 weeks of intervention was reduced to 0.5 - 1.0 (the targeted Pirani score) in almost all cases. Only 2 children were referred. As treatment was not completed then, final comment was left pending. The Bangladesh sustainable clubfoot program, Walk for Life (WFL), in an attempt to respond to the unmet need of clubfoot initially recruited 1040 patients from 3 divisions of Bangladesh and after 12 months of treatment published a report. The male to female ratio was 2.7:1 with a mean age of 22 months at presentation (range, 0 to 36 months). Typical idiopathic congenital talipes equinovarus responded with a median of 5 casts (range: 1 to 25) with 76% required tenotomy which favours the findings of the present study. The percentage of patients missing at the 12-month was 12%. Two percent of patients encountered complications. The study concluded that the training and use of local physiotherapists and paramedics will yield a good clinical outcome in an environment with full access to clinical follow up. A higher than expected number of atypical cases are found requiring modified Ponseti treatment. Complications are few provided the treatment is started early.[10]

Summing up of the findings of the present study and those of others reveal that males are twice as likely to be affected by clubfoot and approximately half of clubfoot patients are affected bilaterally. These findings suggest a strong genetic association with clubfoot. Other studies reported young maternal age, maternal education, young paternal age, paternal smoking habits, and household smoking habits to be associated with clubfoot development. But unfortunately we did not find such data from the database of "Walk for Life." However, these preliminary findings lay the foundation for future epidemiologic studies about clubfoot in the context of Bangladesh.

CONCLUSION

From the findings of the study it can be concluded that children presented with clubfoot in tertiary level hospitals of Bangladesh are mostly male, belonged to poor family and at least half are bilaterally affected. Only half of the clubfoot children attend in the treatment centers within one month of birth, the age at which majority will have a favourable outcome. Primary physicians are the prime source of information about the treatment centres. Mass media are less involved in giving forth the needed information about clubfoot to the community. Majority of the children responded well to 4 - 6 casts and required tenotomy.

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