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Pattern of clubfoot deformity and adherence to ponseti treatment among children with clubfoot deformity

Abstract

Background: Clubfoot is painless in a baby, but it can eventually cause discomfort and become a noticeable disability if left untreated. These symptoms become more obvious and more of a problem as the child grows. **Objective:** This study was conducted to assess pattern of clubfoot deformity and adherence to ponseti treatment among children with clubfoot deformity.

Methods: It was a cross sectional descriptive study. A total of 143 club foot children, age between 1 day to 5 years of both male and female were selected purposively to conduct this study. Face-to face interview method was adopted by using semi-structured questionnaire.

Results: Most of the children were boys. More than one third (38.5%) children were in age group 13 to 36 months. Study found about 63 (44%) children had both feet deformity, 49 (34.3%) children had right foot deformity and rest of 31 (21.7%) children had left foot deformity. More than half (53.8%) of the children had typical flexible clubfoot deformity. The second highest (25.9%) children had typical rigid deformity and rest of 12.6% and 7.7% had atypical rigid and atypical flexible clubfoot deformity respectively. About 67.1% (96) children were needed bracing followed by plaster casting 32.2% (46) and 0.7% (1) was given home advice. Majority (88.8%) of the respondents reported that they have been taking treatment regularly where 11.2% (16) reported that they were irregular in taking treatment.

Conclusion: This study presents a patient with Congenital Talipes Equino Varus successfully managed by Physical Therapy approach. Finally, there is need to decentralize clubfoot treatment services away from referral hospitals to the people in the community through outreach programs.

Keywords: Pattern of Clubfoot Deformity, Adherence to Ponseti Treatment

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Abbreviations: HFPW, Health and Family Planning Workers; CTEV, Congenital Talipes Equino Varus; OPD, Outpatient Department

Background

Clubfoot is a complex, congenital deformity of the foot also known as 'congenital talipes equino varus' (CTEV) caused by the abnormal development of a baby's bones, ligaments and muscles whilst in the womb.[1,2] Visually, the foot affected by clubfoot appears to be twisted inwards and downwards. The foot will be shorter than a normal foot and the calf muscles of the affected limb will be smaller.[3] The deformity will feel 'fixed' – not able to be corrected manually and will not resolve on its own.[4] Club foot is a relatively common birth defect, occurring in about one in every 1,000 live births. Approximately half of people with clubfoot have it affect both feet, which are called a bilateral club foot. It occurs in males twice as frequently as in females[1]. Clubfoot may occur as part of a greater syndrome or as an isolated malformation. A combination of genetic and environmental factors appears to be associated with the congenital clubfoot deformity. Its incidence varies with genetic background, gender and race.[5–7] Risk factors included family history, smoking during pregnancy, not enough amniotic fluid during pregnancy or too little of the fluid that surrounds the baby in the womb may increase the risk of clubfoot. Getting an infection or using illicit drugs during pregnancy. These can increase the risk of clubfoot as well.[8]

Every year in Bangladesh an estimated 5000 children are born with a clubfoot deformity which is approximately one of every 1000 children born in our country. Left untreated, the condition leads to lifelong deformity causing individual disability and potential unproductively. This causes the children to grow up as burdens of the family and ultimately leads to significant poverty. This is visible in the fact that many of the beggars in Bangladesh have visible clubfeet. For older children and adults, expensive corrective orthopedic surgery is the only option for treatment which is not often affordable by the generally poor population of our country. However younger children can be treated by the Ponseti Method, which is an effective, inexpensive, and permanent treatment through progressive casting, the soft, pliable tissues of the babies are corrected.[9]

Clinicians are constantly seeking for the most ideal option in the management of Congenital Talipes Equino Varus (CTEV), especially among infants. This case report presents the outcome of a one year Physiotherapy management of an infant with CTEV. Management commenced 48 hours after birth. During the first three months, passive stretching and strapping techniques were employed. Subsequently, plaster of Paris cast was applied using the serial plastering approach. Stretching continued each time the cast was removed for replacement. Follow up after one year showed that the child could walk with apparently normal gait and there was no residual deformity. There is need for more enlightenment on the importance of early referral of CTEV cases for Physiotherapy care.[10]

Methods

Study type

The study was a descriptive type of cross-sectional study conducted from September 2012 to April 2013 in outpatient department (OPD) of selected hospitals in Rajshahi and Comilla division.

Sampling methods

A total of 143 club foot children, age between 1 day to 5 years of both male and female were selected purposively to conduct this study. Face-to face interview method was adopted by using semi-structured questionnaire.

Data analysis

The surveyed data had converted into frequencies and percentage forms. After collecting information from primary source, data were processed and analyzed by following steps:

a. Reviewed of collected data and information

b. Sorted of revised data and information

c. Analyzed for easy explanation

Ethical issue

Verbal informed consent from the respondents after proper explanation of the purpose and method of the study was undertaken. Ensuring the respondent's parents about maintain confidentiality.

Socio-economic characteristics of the respondents

Among 143 clubfeet children study found about 92 (64.3%) children were boys and 51 (35.7%) were girls. In case of age distribution, more than one third (38.5%) children were in age group 13 to 36 months where second most (31.5%) were in age group 4 to 12 months and rest of 21.7% and 8.4% children were in age group < 4 months and > 36 months respectively. In father's level of education study found more than one third (35.7%) children's father have secondary level of education where rest of 28.7%, 21%, 9.1%, 5.6% children's father have primary, college, illiterate and university level of education respectively. In mother level of education study found the highest proportion (45.5%) of mothers have secondary level of education the second highest (35.7%) have primary level of education and rest of 13.3%, 4.2% and 1.4% mothers have college, illiterate and university level of education respectively. In case of club foot children mother's marital age, almost two third (62.2%) mothers got married when they were in below 18 years of age. Family income showed that more than half (53.8%) of the respondents family income were 5000 tk to 10,000 tk where rest of 26.6%, 15.4% and 4.2% family income were 11,000 to 20,000 tk, < 5000 tk and 21,000 tk to 30,000 tk respectively. Study found half of the (51.7%) respondent's family members were < 5 person and about one third (33.6%) respondent's family members were 5 to 6 person and rest of 14.7% respondent's family members were 7 to 10 person (Table 1).

Clinical conditions of the respondents

Study found about 63 (44%) children had both feet deformity, 49 (34.3%) children had right foot deformity and rest of 31 (21.7%) children had left foot deformity (Figure 1A). However, among the children with clubfoot deformity study found, more than half (53.8%) of the children had typical flexible clubfoot deformity. The second highest (25.9%) children had typical rigid deformity and rest of 12.6% and 7.7% had atypical rigid and atypical flexible clubfoot deformity respectively (Figure 1B).

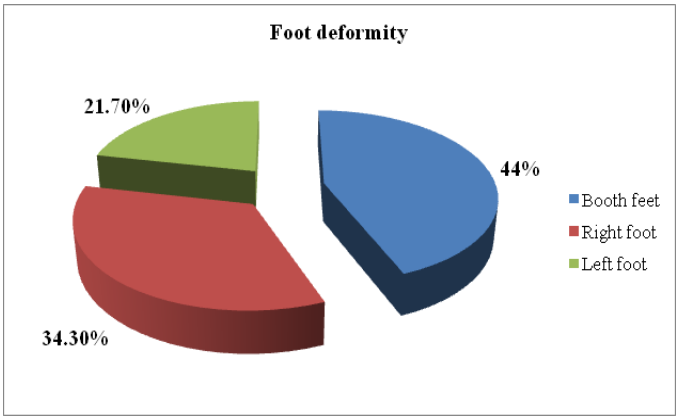

Figure 1A Clinical condition of the respondents.

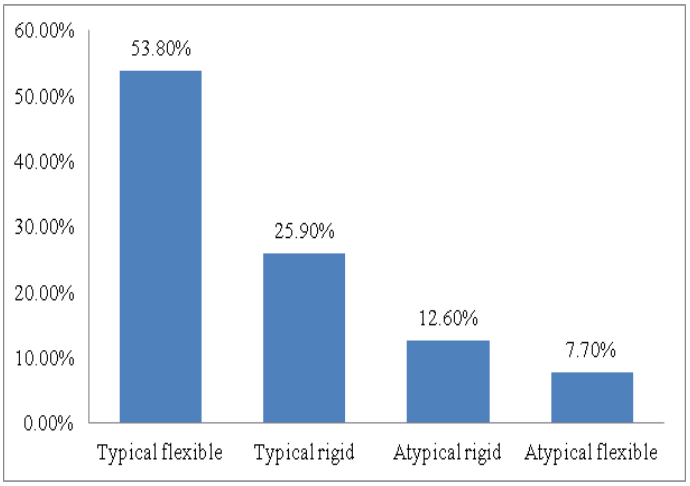

Figure 1B Clinical conditions of the respondents.

Nature of the treatment

In case of duration of treatment receiving for clubfoot deformity study found, 39.2% (56) children were receiving treatment less than 3 months where 11.2% (16), 20.3 (29%) and 28.7% (41) were receiving treatment for 3 to 6 months, 7 to 12 months and > 12 months respectively. About 67.1% (96) children were needed Bracing, 32.2% (46) children were needed Plaster casting and 0.7% (1) was given home advice. In case of number of plaster casting required (n=97) before bracing study reviled that more than half (51.5%) children were required 4 to 6 plaster cast. 27.8% (27) required 7 to 10 plaster cast, 13.4% (13) children required 1 to 3 plaster cast and rest of 7.2% (7) children required 11 to 15 plaster cast. In case of duration of using brace (n=97) for clubfoot deformity study found about one third (34%) respondents were using brace more than 12 months where rest of 23.7% (23), 22.7% (22), 16.5% (16), 3.1% (3) were using brace for 3 to 6 months, less than 3 months, 7 to 12 months and one day (today) respectively (Table 2).

Adherence to Ponseti treatment

In case of got information about clubfoot treatment study found more than one third (35.7%) respondents heard about clubfoot

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treatment from previous patients. About 32.2% (46) respondents got information from publicity and rest of 20.3% (29), 7% (10), 4.2% (6) and 0.7% (1) got information from Physicians, Health and family planning workers (HFPW), Midwifes and Others respectively. Majority (88.8%) of the respondents reported that they have been taking treatment regularly where 11.2% (16) reported that they were irregular in taking treatment. About 86% (123) respondents faced problem during receiving treatment where 14% (20) reported that they did not face any problem in receiving clubfoot treatment. In case of problems faced during plaster casting study revealed that the highest respondents (79.7%) faced continuous crying for 1st two days of plaster' of their children. Rest of 8.9% (11), 6.5% (8) and 4.8% (6) were faced 'swelling of feet', 'plaster broken' and 'plaster put off automatically' respectively. About 53.1% respondents did not need any surgery. More than two third (69.6%) respondent's parents followed the advice and exercise strictly where rest of 27.2% (40), 2.2% (3) and 1.1% (1) respondent's parents or caregivers 'Not too strictly', 'Poorly followed' and 'Not followed' the advice and exercise respectively. In case of follow up, study found 45.2% respondents came for follow up every after 2 months where rest of 29%, 21.5% and 4.3% respondents came for follow up every after 1 month, every after 3 months and every after 3 weeks respectively. In case of satisfaction of receiving treatment study reviled that more than half (54.5%) respondent's parents were highly satisfied, one third (34.3%) respondents were satisfied and rest of 11.2% were dissatisfied (Table 3).

Table 1 Socio-economic characteristics of the respondents

Characteristics	Frequency	Percentage
Gender		
Boys	92	64.3
Girls	51	35.7
Age		
< 4 months	31	21.7
4 to 12 months	45	31.5
13 to 36 months	55	38.5
>36 month	12	8.4
Father's level of education		
Illiterate	13	9.1
Primary	41	28.7
Secondary	51	35.7
College	30	21
University	8	5.6
Mother's level of education		
Illiterate	6	4.2
Primary	51	35.7
Secondary	65	45.5
College	19	13.3
University	2	1.4
Mother's marital age		
< 18 ears	89	62.2
18 to 10 years	54	37.8
Family income		
< 5000 tk	22	15.4
5,000 to 10,000 tk	77	53.8
11,000 to 20,000 tk	38	26.6
21,000 to 30,000 tk	6	4.2
Family members		
< 5	74	51.7
5 to 6	48	33.6
7 to 10	21	14.7

Table 2 Nature of the treatment

Characteristics	Frequency	Percentage
Length of treatment receiving		
< 3 months	56	39.2
3-6 months	16	11.2
7-12 months	29	20.3
> 12 months	41	28.7
Mode of treatment		
Bracing	96	67.1
Plaster cast	46	32.2
Home advice	1	0.7
No. of Plaster Casting (Before Bracing		
1-3 plasters	13	13.4
4-6 plasters	50	51.5
7-10 plasters	27	27.8
11-15 plasters	7	7.2
Duration of using Brace		
From today	3	3.1
< 3 months	22	22.7
3-6 months	23	23.7
7-12 months	16	16.5
> 12 months	33	34.0

Table 3 Adherence to Ponseti treatment

Characteristics	Frequency	Percentage
Got information about Clubfoot treatment		
Physicians	29	20.3
Previous patients	51	35.7
Publicity	46	32.2
Midwife	6	4.2
HFP workers	10	7
Others	1	0.7
Regular attending clinic		
Regular	127	88.8
Irregular	16	11.2
Problem faced in receiving treatment		
Yes	123	86
No	20	14
Problem faced during plaster casting		
Continuous crying for 1st two days of plaster	98	79.7
Swelling of feet	11	8.9
Plaster broken	8	6.5
Plaster put-off automatically	6	4.8
Done small surgery (tenotomy)		
Yes	67	46.9
No	76	53.1
Following advice and exercise		
Strictly	99	69.6
Not too strictly	40	27.2
Poorly	3	2.2
Not followed	1	1.1

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Table Continued

Characteristics	Frequency	Percentage
Follow up		
Every after 2 week	4	4.3
Every after 1 month	27	29
Every after 2 month	42	45.2
Every after 3 month	20	21.5
Satisfactory about treatment		
Highly satisfied	77	54.5
Satisfied	50	34.3
Dissatisfied	16	11.2

Discussion

The choice of techniques for management of CTEV in infants has historically provoked much debate. Recently, there is a swing towards conservative management possibly because the results of surgical procedures are unpredictable.[11] This case report showed the outcome of Physical therapy approach for the management of an infant who presented with CTEV. Management in this case report involved a combination of passive stretching and manipulation, Plaster of Paris casting, tenotomy and brace fitting with follow-up up to 3 years but here we counted above 1 year and below 1 year because of our study design and limitation. Although it is usually recommended that serial plaster casting be the first direction of conservative treatment after manipulation and it was recommended that the age limit must be below 3 when they have started their treatment. In my thesis the study sample was n= 143, at the period of interview 91.6 % children was below three years and only 8.4% was above 3 years but they were taking treatment for several duration under the method of ponseti. Among them almost half (44.8%) have taken 4-6 plasters based on their age of adherence, early adherence less number of plaster. Out of 97 children 61.9% has taken <6 plasters of below one year and 65.2% out of 46 children of >1 year has taken 7 or more plasters.

The outcome showed relation with various factors related the initial presenting pathology. Treatment consisted of serial manipulations followed by casting later on tenotomy where it's needed which depends on various relevant condition like age of the children, clinical condition of foot, care at home and regularity of treatment etc. Among studied sample n=143, 114 were typical and 29 were atypical and 43.8% tenotomy has done on typical case whereas 58.6% tenotomy done on atypical case. For the outcome here and 97 children are using brace after performed manipulation, casting and tenotomy of 69.0% and 31% were using brace after manipulation and serial cast only. In this study percentage of tenotomy and number of cast is higher among those patient who has started their treatment quite latter and atypical foot group. 49 Children were using brace over the six months and 91.8% (45) were able to walk, stand and other activities like healthy baby and only 8.2% (4) were not able to do this due to their insufficient age of walking. The case report presented a remarkable success of using POP (Plaster of Paris) cast after manipulation and properly followed the instruction of physiotherapist about bracing and exercise who were giving in those four clubfoot clinic where data has collected.

Though CTEV is universal and occurring without counting any race, ethnicity and continent and socio demographic factor. In my study, my study area was Comilla, B-baria, Chandpur and Sirajganj where I interviewed 143 participants in various socio-demographic backgrounds. Among thus 69.2% was from poor family and rest of all from middle class & lower middle class family ironically I failed to get a single participant or patient from any rich family. It can be notify their mother marital age and their educational level, almost 2/3, to be exactly 62.2% of clubfoot children's mother was early married and 39.9 was illiterate which was noteworthy. One of a impressive findings in my study that I am realizing, 76 (52.4%) was below one year and 67 (47.6%) was above one year which indicates of majority clubfoot patients/children's early adherence of physiotherapy treatment of clubfoot clinic in my study area. It can be noted that out of 89 children of early married mothers among 143 mothers 31 children were 1st child of their mother.

Although there is no universally accepted method of assessing outcome in CTEV the central aim of physical therapy is to restore the patient to the maximum functional ability in the use of the foot. Early commencement of physical therapy, proper manipulation was followed by cast and intensive follow-up during bracing & exercise. There was a very relevant study conducted by "Texas Scottish Rite Hospital for Children, 2222 Wellborn Street, Dallas, TX 75219, USA", "A comparison of two non operative methods of idiopathic clubfoot correction: the Ponseti method and the French functional (physiotherapy) method.[12] In the treatment of idiopathic clubfeet, the Ponseti method and the French functional method have been successful in reducing the need for surgery. The purpose of this prospective study was to compare the results of these two methods at one institution. Patients under three months of age with previously untreated idiopathic clubfeet were enrolled. All feet were rated for severity prior to treatment. After both techniques had been described to them, the parents selected the treatment method. Outcomes at a minimum of two years were classified as good (a plantigrade foot with, or without, a heel-cord tenotomy), fair (a plantigrade foot that had or needed to have limited posterior release or tibialis anterior transfer), or poor (a need for a complete posteromedial surgical release).

Two hundred and sixty-seven feet in 176 patients treated with the Ponseti method and 119 feet in eighty patients treated with the French functional method met the inclusion criteria. The patients were followed for an average of 4.3 years. Both groups had similar severity scores before treatment. The initial correction rates were 94.4% for the Ponseti method and 95% for the French functional method. Relapses occurred in 37% of the feet that had initially been successfully treated with the Ponseti method. One-third of the relapsed feet were salvaged with further nonoperative treatment, but the remainder required operative intervention. Relapses occurred in 29% of the feet that had been successfully treated with the French functional method, and all required operative intervention. At the time of the latest follow-up, the outcomes for the feet treated with the Ponseti method were good for 72%, fair for 12%, and poor for 16%. The outcomes for the feet treated with the French functional method were good for 67%, fair for 17%, and poor for 16%.[13]

This is vital because at this stage there is an enormous potential for remodeling of the tissues through peripheral manipulative therapy techniques if appropriately applied. This is also important as most guardians in Nigeria will not want their wards to undergo surgical procedures at a very early stage of development even when it is medically advisable.

Conclusion

This study presents a patient with Congenital Talipes Equino Varus successfully managed by Physical Therapy approach. This case report indicates that management of Congenital Talipes Equino

Varus. If commenced early after birth could help in achieving good recovery and reduce cost of treatment while ameliorating the psychological burden on both the caregiver and patient's parents. Although all individual outcome indicators showed adherence of combined approach (physiotherapy & surgery) in case of my study field where ponseti was applying in clubfoot clinic by physiotherapist and orthopedic surgeon was almost 70% (to be exact 69.0%) and most of them in here were atypical clubfoot and older among my study sample. But 30% of children got same result only by approaching and applying of physiotherapy treatment which was outstanding and still they are continuing their follow up bracing and exercise under keen supervision of physiotherapist. Till the date of interview there were no difference of the children having brace between who have performed tenotomy and who don't have performed tenotomy.

Non-operative correction of an idiopathic clubfoot deformity can be maintained over time in most patients showing improved results with use of the Ponseti method. Another proven fact of early adherence, the children got early recovery or better result that came earlier, so undoubtly should give emphasis of early adherence and establish the thought that it get 100% cure in conservative treatment also. There is need for clinicians involved in the treatment of clubfoot to increase the knowledge of clubfoot and its treatment among the parents and caregivers. There also is need to improve the communication skills of clinicians offering treatment to children with clubfoot at the Clubfoot Clinics. Finally, there is need to decentralize clubfoot treatment services away from referral hospitals to the people in the community through outreach programs.

References

1. AAOS American Academy of Orthopedic and Surgeons (2014).
2. GCI. Global Clubfoot Initiatives.
3. Cooke S, Balain B, Kerin C, et al. Clubfoot. *Orthopaedics and Trauma.* 2008;22(1):139–149.
4. Dietz, Fred MD. The genetics of idiopathic clubfoot. *Clinical Orthopaedics and Related Research.* 2002;401(1):39–48.
5. Lochmiller C, Johnston D, Scott A, et al. Genetic epidemiology study of idiopathic talipes equinovarus. *Am J Med Genet.* 1998;79(2):90–96.
6. Cartlidge I. Observations on the epidemiology of club foot in Polynesian and Caucasian populations. *J Med Genet.* 1984;21(4):290–292.
7. Boo NY, Ong LC. Congenital talipes in Malaysian neonates: Incidence, pattern and associated factors. *Singapore Med J.* 1990;31(6):539–542.
8. Clubfoot. Health Encyclopedia, University of Rochester Medical center, New York, USA.
9. Walk for life. The national club foot program of Bangladesh, Bangladesh, 2009.
10. AO Ezeukwu, SM Maduagwu. Physiotherapy management of an infant with Bilateral Congenital Talipes Equino varus. *African Health Sciences.* 2011(3):444–448.
11. Andrei GZ, Vermesan S. Considerations in treating congenital clubfoot in children: A two year retrospective study. *Revistade Ortopedie si traumatologic– Asoris.* 2009;3(15):19–23.
12. Richards BS, Faulks S, Rathjen KE, et al. A comparison of two nonoperative methods of idiopathic clubfoot correction: the Ponseti method and the French functional (physiotherapy) method. *J Bone Joint Surg Am*. 2008;90(11):2313–2321.
13. Shimizu N, Hamada S, Mitta M, et al. In: Simons GW (Ed.), Etiological Considerations of Congenital Clubfoot Deformity. (2nd edn), Springer, New York, USA, 1994.

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