ORIGINAL ARTICLE

COMPARISON OF ACCELERATED VS STANDARD PONSETI TECHNIQUE AMONG CHILDREN'S HAVING CONGENITAL TALIPES EQUINOVARUS

Baqir Hussain[1], Sohail Rehman[2], Asadullah Jan[3], Qasim[2], Ghayoor Hussain[4], Muhammad Arif Khan[2]

[1]Department of Orthopaedic B Lady Reading Hospital Peshawar, [2]Orthopedic & Spine Unit Hayat Medical Complex, Peshawar, [3]Orthopedic Unit KGN Hospital Bannu, [4]Orthopaedic Unit DHQ Hospital Parachinar-Pakistan

Background: The resurgence and long duration of treatment of the Ponseti method in recent years has been punctuated by less than favourable long-term outcomes for surgically treated feet. Objectives of the study were to compare the two treatment techniques accelerated vs standard Ponseti technique among children's having Congenital Talipes Equinovarus. **Methods:** This was two years randomized control trial study carried out among total 104 idiopathic congenital talipes equinovarus patients in Orthopaedics and Spine Unit, Hayatabad Medical Complex, Peshawar. A convenient sampling technique was used in this study. Informed written consent was taken from each respondent. Patients in group A was subjected to accelerated ponseti technique and patients in group B was subjected to standard ponseti technique. At one month after treatment, all the patients were re assessed on the basis of pirani score. Data was collected and analyzed using SPSS version 21. **Results:** This study included a total 104 clinically diagnosed Congenital Talipes Equinovarus patients with mean age 5.5±2.1 months and 52 in each treatment group. Out of total 104 patients 68 (65.4%) were male and 36 (34.6%) were female**.** They're found significant difference in the mean ponseti scores of these two-group p=0.042 provided comparatively low mean pirani score in accelerated ponseti group. All female child in accelerated ponsati group was responded to the treatment with 100% effectiveness rate**.** The difference of effectiveness of treatment was significant p=0.015 for children age range 4–8 months divided in two treatment group with good effectiveness 80.8% in accelerated ponseti group. **Conclusion:** Accelerated ponseti technique is more effective than standard ponseti technique for Congenital Talipes Equinovarus.

Keywords: Congenital Talipes Equinovarus; Ponseti technique; Treatment; Accelerated ponseti technique; Standard; Clubfoot

Citation: Hussain B, Rehman S, Jan A, Qasim, Hussain G, Khan MA. Comparison of Accelerated vs Standard Ponseti Technique among Children's having Congenital Talipes Equinovarus. J Ayub Med Coll Abbottabad 2022;34(3 Suppl 1):622–6.

DOI: 10.55519/JAMC-03-S1-9496

INTRODUCTION

Congenital talipes equinovarus also called clubfoot is a complex congenital deformity of the foots observed in newborn children, if untreated pose difficulty to walk and mobility with pain and difficulty.[1] It is a deformity of foot characterized by improper alignment of bony and soft tissues of fore, mid and hind foot. This deformity produces and alter structural representation of foot as adductus and cavus of the mid and hind foot region. The clubfoot compare to normal foot is shorter and with shorter calf circumference.[2,3]

Congenital talipes equinovarus is more common in male compared to female and found in one or both feet accounting 50% bilateral cases[4]. It has been reported that upto 80% cases of clubfoot's are reported in low income and developing countries, and children born with these deformities mostly remain untreated in low income countries.[5] The consequences of untreated club foot are over lasting and it affect the quality of life and social acceptance of an individual like marriage issues among girls, mobility and psychological issues[6] etc. In Pakistan approximately 70,000 cases of Congenital talipes equinovarus are reported annually, and only 5–10 cases are treated on time with adequate necessary treatment.[7] This reported rate of treatment is below the standard requirement of treatment of children with this deformity.

Different treatment approaches were used in ancient time to treat this deformity, including a mixed approach of surgery and conservatives' techniques. However the introduction of Ponseti Method get popular and almost successfully replaced the other mode of treatments.[7,8] The Ponseti method use two phases including corrective phase (casting phase) in which the position of the foot is corrected step by step using a series of manipulations and casts and maintenance phase (Braching) where child's feet are put into a brace to maintain it in its correct position for long time.[9] This treatment approach is used with its standard operating time frame and method. Recently the approached has been modified and updated as accelerated Ponseti Method where the frequency of treatment approaches in

a week has been increased, with the aim of providing an aggressive treatment to avoid any recurrent and left deformity.[10] This study has been designed to determine and compare the outcome of the two treatment methods Ponseti and accelerated Ponseti method and to highlight the importance of accelerated Ponseti Method in the treatment of clubfoot in children born with this deformity. The hypothesis of the study was Accelerated ponseti technique is more effective than standard technique in the treatment of congenital talipes equinovarus.

MATERIAL AND METHODS

This was two years randomized control trial study carried out among total 104 idiopathic congenital talipes equinovarus patients from the duration of 1st Jan 2015 to 31 April 2016. The study was conducted in Orthopaedics and Spine Unit, Hayatabad Medical Complex, Peshawar. A convenient sampling technique was used in this study. A formal approval of the study from local ethics committee and departmental consent from head of Orthopaedics and Spine Unit, Hayatabad Medical Complex, Peshawar was taken. The patients meeting the inclusion criteria was included in the study through OPD/ER department. Informed written consent was taken from each respondent of the study of participating patients, and the purpose of the study was described to them. The patients were randomly allocated in two groups by lottery method. Patients in group A was subjected to accelerated ponseti technique (cast replacement three times a week) and patients in group B was subjected to standard ponseti technique (cast replacement once a week). All the diagnosis and castings were done by single expert orthopaedic surgeon having minimum of five years of experience. At one month after treatment, all the patients were re assessed on the basis of pirani score (Figure-1) to determine the effectiveness of the procedure. All the relevant information regarding demography and congenital history etc was taken using a predesigned questionnaire. Data was collected and analyzed using SPSS-21.

RESULTS

This study included a total 104 clinically diagnosed Congenital Talipes Equinovarus patients with mean age 5.5±2.1 months and the distributed mean age of patients in accelerated ponseti group was 5.8±2.4 months while in standard ponseti group was 5.2±1.8 years. Out of total 104 patients 68 (65.4%) were male and 36 (34.6%) were female (Table 1).

This study showed that mean follow up pirani score of the accelerated ponseti group was 1.4808±1.01923 (μ±SD) and standard ponseti group was 1.9231±1.16898 of newborn patients with baseline pirani score >5. They're found significant difference in the mean ponseti scores of these two-group p=0.042 provided comparatively low mean pirani score in accelerated ponseti group (Table-2). There found no significant difference in stratified male patients in both treatment group with p=0.2 and treatment effectiveness in both groups were in similar pattern for male patients. However, the effectiveness was significantly differed p=0.007 for female gender where all female child in accelerated ponsati group was responded to the treatment with 100% effectiveness rate (Table-3).

It was also found that there was no significant difference observed in effectiveness of treatment p=1.0 in children with age range upto 4 month between two treatment group, while the difference of effectiveness of treatment was significant p=0.015 for children age range 4-8 months divided in two treatment group with good effectiveness 80.8% in accelerated ponseti group (Table-4).

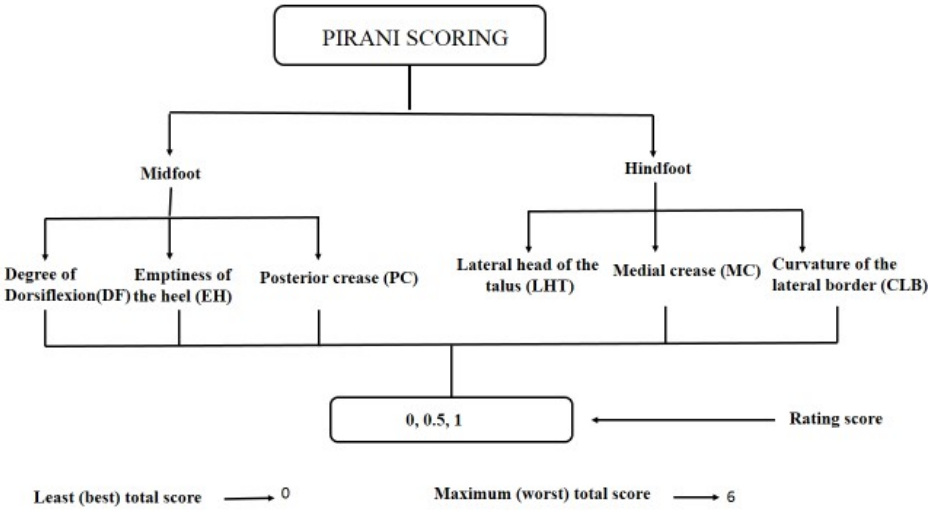

Figure-1: Pirani scoring parameters

Table-1: Demographic characteristics of study participants

Demographic variables		Treatment Groups		Total
		Accelerated Ponseti Group	Standard Ponseti Group	
Gender distribution				
Gender	Male	32	36	68
		61.5%	69.2%	65.4%
	Female	20	16	36
		38.5%	30.8%	34.6%
	Total (n)	52	52	104
		100.0%	100.0%	100.0%
Age statistics				
Age	Mean (months)	5.8558	5.2500	NA
	Standard deviation	2.41388	1.80821	NA
	Standard error mean	0.33475	0.25075	NA
	p-value	0.151		

Table-2: Comparative statistics of two treatment groups for effectiveness of procedure and pirani score

Comparative statistics		Treatment Groups		Total
		Accelerated Ponseti Group	Standard Ponseti Group	
Comparison of effectiveness of procedure				
Effectiveness of Procedure	Yes	42	31	73
		80.8%	59.6%	70.2%
	No	10	21	31
		19.2%	40.4%	29.8%
	Total	52	52	104
		100.0%	100.0%	100.0%
	p-value	**0.018**		
Comparison of Pirani score				
Follow up Pirani Score	Mean	1.4808	1.9231	NA
	Standard deviation	1.01923	1.16898	NA
	P value	**0.042**		

Table-3: Comparison of effectiveness of procedures in treatment groups of gender stratification

Comparative statistics		Treatment Groups		Total
		Accelerated Ponseti Group	Standard Ponseti Group	
Male				
Effectiveness of Procedure	Yes	22	20	42
		68.8%	55.6%	61.8%
	No	10	16	26
		31.2%	44.4%	38.2%
	Total	32	36	68
		100.0%	100.0%	100.0%
	p-value	0.2		
Females				
Effectiveness of Procedure		20	11	31
	Yes	100.0%	68.8%	86.1%
	No	0	5	5
		0.0%	31.2%	13.9%
		20	16	36
		100.0%	100.0%	100.0%
	P value	**0.007**		

Table-4: Comparison of effectiveness of procedures in treatment groups in two different age range

Comparative statistics		Treatment Groups		Total
		Accelerated Ponseti Group	Standard Ponseti Group	
Upto 4 months				
Effectiveness of Procedure	Yes	10	10	20
		66.7%	66.7%	66.7%
	No	5	5	10
		33.3%	33.3%	33.3%
	Total	15	15	30
		100.0%	100.0%	100.0%
	p-value	1.0		
4-8 months				
Effectiveness of Procedure	Yes	21	16	37
		80.8%	50.0%	63.8%
	No	5	16	21
		19.2%	50.0%	36.2%
	Total	26	32	58
		100.0%	100.0%	100.0%
	p-value	**0.015**		

DISCUSSION

This study was designed to compare the new trend of accelerated ponseti treatment approach with standard ponseti technique for the treatment of clubfoot among children with age range 0–8 months. The new born children were selected for this study because the treatment response was comparatively better in newborn than older group[11]. Many other studies carried out to assess the treatment response included children below one year old.[12–14] However few other studies included children of older age upto 3 years depending on the duration and other goal of the study.[6,15]

This study found that accelerated ponseti technique was the best technique to treat clubfoot in children with a significant difference p=0.042 having lesser mean follow up pirani score 1.4808±1.01923 (μ±SD) compared to standard ponseti group (μ±SD) 1.9231±1.16898. The lesser mean ponseti score showed good treatment response in accelerated ponseti treatment group. Other few latest studies also proved the fact of greater treatment response of accelerated ponseti treatment technique compared to standard treatment procedure.[12,16] The accelerated ponseti treatment procedure depends on target treatment group, age and gender.[17] The response of accelerated ponseti treatment was higher in children age less than one year and female patients. This study was also consistent with these finding and it was observed that treatment response in female children was significantly differ p=0.007 with 100% treatment response in accelerated treatment group. The comparatively a smaller number of female children than male in this study may have an effect on the net finding, therefore further studies needed to compare this gender response for treatment taking large equal sample size of male and female patients.

The age distribution of children patients was not according to the statistical importance having less n=30 children in age group <4 month, therefore the statistical inference obtained in this comparison cannot extrapolated and it can be recommended further studies to justify this finding, that children age 4–8 months was having good response to accelerated ponseti group than children age <4 months. It may be that children age >4 months have well developed foot having less chance of recurrence and regrowth.

If the longer-term results of the accelerated method continue to be comparable to those of the standard Ponseti method, it can offer patients a number of benefits. The cost to the parents can be reduced by admitting the patient for three weeks or arranging local accommodation in a hostel. This will involve less time off work and less time away from other dependents. In-patient treatment should improve compliance during the plaster programme. If tenotomy is required it may be possible to have the final plaster removed and the boots and bars fitted in a clinic closer to home.

CONCLUSION

Accelerated ponseti technique is more effective than standard ponseti technique for Congenital Talipes Equinovarus. We recommend more studies having more study variables which can determine the effectiveness of either procedure before recommending accelerated ponseti technique for Congenital Talipes Equinovarus.

ACKNOWLEDGMENT

The authors are thankful to administration of Orthopedics and Spine Unit, Hayatabad Medical Complex, Peshawar for facilitating and providing an opportunity to work on this trial-based research study.
Conflict of interest: None

AUTHORS' CONTRIBUTION

BH: Conceptualization, write-up, data collection. SR: Write-up, correspondence. AJ, QK: Data analysis, proof reading. GH, MAK: Data collection.

REFERENCES

1. Najdi H, Jawish R. Management of metatarsus adductus, bean-shaped foot, residual clubfoot adduction and Z-shaped foot in children, with conservative treatment and double column osteotomy of the first cuneiform and the cuboid. Int J Orthop 2015;2(6):438–44.
2. Pirani S, Hodges D, Sekeramayi F. A reliable & valid method of assessing the amount of deformity in the congenital clubfoot deformity. Orthop Proc 2008;90(Suppl 1):53.
3. Chu A, Lehman WB. Persistent clubfoot deformity following treatment by the Ponseti method. J Pediatr Orthop B 2012;21(1):40–6.
4. Culverwell A, Tapping C. Congenital talipes equinovarus in Papua New Guinea: a difficult yet potentially manageable situation. Int Orthop 2009;33(2):521–6.
5. Smythe T, Kuper H, Macleod D, Foster A, Lavy C. Birth prevalence of congenital talipes equinovarus in low-and middle-income countries: a systematic review and meta-analysis. Trop Med Int Health 2017;22(3):269–85.
6. Spiegel DA, Shrestha OP, Sitoula P, Rajbhandary T, Bijukachhe B, Banskota AK. Ponseti method for untreated idiopathic clubfeet in Nepalese patients from 1 to 6 years of age. Clin Orthop Relat Res 2009;467(5):1164–70.
7. Murtaza K, Saleem Z, Malik S. Talipes equinovarus or Clubfoot: A review of study approaches, management and trends in Pakistan. Pak J Med Sci 2020;36(6):1414–20.
8. Ošťádal M, Lišková J, Hadraba D, Eckhardt A. Possible pathogenetic mechanisms and new therapeutic approaches of pes equinovarus. Physiol Res 2017;66(3):403–10.
9. Pulak S, Swamy M. Treatment of idiopathic clubfoot by ponseti technique of manipulation and serial plaster casting and its critical evaluation. Ethiop J Health Sci 2012;22(2):77–84.
10. Ahmad AA, Aker L. Accelerated Ponseti method: First experiences in a more convenient technique for patients with

severe idiopathic club feet. Foot Ankle Surg 2020;26(3):254–7.
11. Krestyashin V, Vibornov D, Domarev A, Krestyashin I, Isakov A. About analgesia for infants during transcutaneous achillotomy at treatment of congenital clubfoot by ponseti method. Arch Euromedica 2016;6(1):13–5.
12. Harnett P, Freeman R, Harrison W, Brown L, Beckles V. An accelerated Ponseti versus the standard Ponseti method: a prospective randomised controlled trial. J Bone Joint Surg Br 2011;93(3):404–8.
13. Morcuende JA, Abbasi D, Dolan LA, Ponseti IV. Results of an accelerated Ponseti protocol for clubfoot. J Pediatr Orthop 2005;25(5):623–6.
14. Elgohary HS, Abulsaad M. Traditional and accelerated Ponseti technique: a comparative study. Eur J Orthop Surg Traumatol 2015;25(5):949–53.
15. Ganesan B, Luximon A, Al-Jumaily A, Balasankar SK, Naik GR. Ponseti method in the management of clubfoot under 2 years of age: A systematic review. PLoS One 2017;12(6):e0178299.
16. Sutcliffe A, Vaea K, Poulivaati J, Evans AM. Fast casts': Evidence based and clinical considerations for rapid Ponseti method. Foot Ankle Online J 2013;6(9):2.
17. Ahmad MN, Ghani A, Singh R, Bhatt MF, Shabir SA, Nisar K, *et al*. Comparative Study of Accelerated Ponseti Cast with Standard Ponseti Cast. J Med Sci Clin Res 2020;8(2):388–92.

Submitted: April 22, 2021	*Revised: May 30, 2021*	*Accepted: October 24, 2021*

Address for Correspondence:
Dr. Sohail Rehman, Orthopaedic & Spine Unit Hayat Medical Complex, Peshawar-Pakistan
Email: drsohailrehman26@gmail.com