

**Original article:**

## **Assessment of Efficacy of Ponseti and Kite's Method of Treatment for Idiopathic Clubfoot: A Comparative Study**

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### **Abstract**

**Background:** Idiopathic clubfoot is one of the most common pediatric foot deformities, affecting approximately 1–4 per 1000 live births. It was through his attempt to understand the pathophysiology of clubfoot, as well as his ability to learn from the mistakes of his predecessors, that Ponseti developed his current method of treatment for clubfoot. Hence; we planned the present study to assess the efficacy of ponseti and kite's method of treatment for idiopathic clubfoot.

**Materials & Methods:** The present investigation included evaluation of efficacy of ponseti and kite's method of treatment for idiopathic clubfoot. A total of 30 clubfeet patients were included in the present study. Among these 30 patients, 18 were bilateral while the remaining 12 were unilateral (feet). Thus a total of 48 feet were randomly divided with 24 patients in each group; Ponseti or Kite method. Kite's method and Ponseti's method of manipulation and casting were performed as per randomization method. Follow-up details of all the patients were recorded. All the results were analysed by SPSS software.

**Results:** Mean pirani score in the ponseti group and the kite group was found to be 1.3 and 2.1 at one week time respectively. Mean pirani score in the ponseti group and the kite group was found to be 1.2 and 1.9 at tenth week time respectively. Significant results were obtained while comparing the mean pirani score in the ponseti group and the kite group.

**Conclusion:** In terms of total Pirani scores, reduction occurred comparatively faster with Ponseti in comparison to Kite's method of manipulation of clubfoot.

**Key words:** Idiopathic Clubfoot, Kite, Ponseti.

### **INTRODUCTION**

Idiopathic clubfoot is one of the most common pediatric foot deformities, affecting approximately 1–4 per 1000 live births. The deformity is characterized by cavus of the midfoot with forefoot adductus and hindfoot equinovarus. If left untreated, the deformity will persist into adulthood and severely impair gait and adversely affect the lives of those born with this condition.<sup>1-3</sup>

Multiple hypotheses exist regarding the etiology of idiopathic clubfoot. It is generally believed that the condition has a multifactorial etiology that includes genetic and environmental factors. Recently, associations between clubfoot and four single nucleotide polymorphisms (SNPs) have been identified. Variations in the promoter regions of HOXA9, TPM1, and TPM2 alter muscle development and function in the embryo and have been implicated as a genetic risk factor for clubfoot. Environmental factors are also thought to contribute to the

etiology of clubfoot. A study through the Norwegian national cohort analysis demonstrated that smoking during pregnancy increased the risk of a child having clubfoot. The same study counters previous suggestions that season of birth and parental education level are risk factors, as these were not found to increase risk in the study population.<sup>4-6</sup>

It was through his attempt to understand the pathophysiology of clubfoot, as well as his ability to learn from the mistakes of his predecessors, that Ponseti developed his current method of treatment for clubfoot. His understanding of the anatomy of the tarsus of the normal foot and of the clubfoot was greatly enhanced by the work of Farabeuf's *Precis de Manual Operatoire*, first published in 1872.<sup>7,8</sup>

Hence; we planned the present study to assess the efficacy of ponseti and kite's method of treatment for idiopathic clubfoot.

### **MATERIALS & METHODS**

The present investigation was conducted in the department of orthopaedics, SMS Medical College, Jaipur, Rajasthan (India) and it included evaluation of efficacy of ponseti and kite's method of treatment for idiopathic clubfoot. Written consent was obtained from all the subjects before the starting of the study. A total of 30 clubfeet patients were included in the present study. Among these 30 patients, 18 were bilateral while the remaining 12 were unilateral (feet). Exclusion criteria for the present study included:

- Patients above the age of 55 years,
- Patients with history of previous surgical intervention for the same
- Patients with positive history of any other systemic illness

Thus a total of 48 feet were randomly divided with 24 patients in each group; Ponseti or Kite method. Complete demographic details of all the patients were obtained. Patients were examined as per standardized pilot tested proforma and severity of clubfoot was noted according to Pirani clubfoot score. Kite's method and Ponseti's method of manipulation and casting were performed as per randomization method. Follow-up details of all the patients were recorded. All the results were analysed by SPSS software. Univariate regression curve was used for evaluation of level of significance.

### **RESULTS**

A total of 30 clubfeet patients were included in the present study. Among these 30 patients, 18 were bilateral while the remaining 12 were unilateral (feet). 20 patients out of 30 were males while the remaining were females. Mean pirani score in the ponseti group and the kite group was found to be 1.3 and 2.1 at one week time respectively. Mean pirani score in the ponseti group and the kite group was found to be 1.2 and 1.9 at tenth week time respectively. Significant results were obtained while comparing the mean pirani score in the ponseti group and the kite group.

### **DISCUSSION**

In the present study, mean pirani score in the ponseti group and the kite group was found to be 1.3 and 2.1 at one week time respectively. Mean pirani score in the ponseti group and the kite group was found to be 1.2 and 1.9 at tenth week time respectively. Significant results were obtained while comparing the mean pirani score in the ponseti group and the kite group. Nagaraju KD et al reported the results of 18 recurrent clubfeet in 13 children after Kite's method of casting treated successfully by Ponseti's technique. The average age was 8.3 months. The average preoperative Pirani's midfoot contracture score was 1.8, hindfoot contracture score was 2.4, and total score was 4.2. All patients had full correction of deformities with plantigrade feet and the scores

were reduced to zero at the end of treatment. Three recurrences were found at 6 months follow-up, amounting to 17% failure rate. Two of them necessitated percutaneous tenotomy of the tendoachilles, and one underwent posteromedial soft tissue release with good result at the end of 1 year. Ponseti's method is an effective treatment option in the management of recurrent clubfeet after Kite's method.<sup>9</sup>

Kaseke F et al compared the effectiveness of the Ponseti manipulation versus the Kite's manipulation in the treatment of idiopathic Congenital Talipes Equino Varus (CTEV) as evaluated by the Pirani score. 38 feet in 25 patients, 13 bilateral and 12 unilateral CTEV deformities in children less than one year of age and without prior manipulation or surgical treatment were purposively allocated to either Ponseti (20 feet) or Kite's method (18 feet) at three central hospitals. There were no dropouts. Participants in two hospitals were managed using the Ponseti method and one hospital managed participants using the kite's method. Baseline Pirani scores were measured before the first treatment was done. Thereafter they were followed up weekly and analysis was done for three and six week outcomes using the Pirani score. Correction was measured by the difference between the baseline hindfoot, midfoot and total scores and the Pirani scores at three weeks and six weeks. Both methods were effective in correcting CTEV deformity. Feet managed by the Ponseti method showed faster rates of decrease in Pirani score (improvement) as compared to feet treated by Kite's method. The between group analysis (Kite Ponseti) at three weeks was -1,4056 ( $p = 0.0000$ ) [CI = -1.900 to -0.9103] showing a significantly difference between the methods at three weeks. The between group analysis (Kite Ponseti) at six weeks was -2.2302 ( $p = 0.0000$ ) [CI = -2.9789 to -1.4815] showing a significantly difference between the methods at six weeks. Ponseti management causes faster improvement in CTEV deformity using the Pirani scores than Kite management at three weeks and six weeks.<sup>10</sup>Rijal R et al reported randomized controlled trial where manipulation of club foot was done by Ponseti's and Kite's method and correction evaluated by Pirani score to compare the outcome of treatment. Sixty feet in 38 patients, 22 with bilateral and 16 with unilateral clubfeet in children less than two years of age and without any prior manipulation or surgical treatment were randomly allocated to the Ponseti (30 feet) and Kite (30 feet) methods of manipulation. This process resulted in the right and left feet of the same patient in 12 bilateral cases being compared with one another (Paired analysis). In the remaining 10 bilateral cases, four patients had both feet treated by Ponseti and six had both feet treated by Kite (unpaired analysis). Finally, in 16 unilateral cases, 10 feet were allocated to the Ponseti and six to Kite methods of manipulation (unpaired analysis). Feet were followed up weekly for 10 weeks for change of cast and recording of hindfoot, midfoot and total Pirani scores. Correction was measured as a difference between hindfoot, mid foot and total Pirani scores weekly from weeks 1 to 10 and corresponding baseline scores. Absolute correction and rate of correction in (i) bilateral clubfeet treated by Ponseti's method on one side and Kite's method on the other side in the same patient were compared using paired Student's t test and (ii) patients with unilateral clubfoot (where either of the methods was used) or those with bilateral clubfoot (where both feet treated by either of the two methods on both the sides) were compared using difference between means. In 12 bilateral clubfeet, where one foot received Kite's method and the other Ponseti's manipulation, feet treated by Ponseti's technique showed faster rates of decrease in Pirani score (improvement) as compared to feet treated by Kite's method with the mean of difference between baseline and follow up scores showing significantly greater ( $P < 0.05$ ) difference from zero from fourth week onwards to up to 10 weeks. In unpaired analysis, both for unilateral or bilateral clubfeet, regardless of side, mean Pirani scores in Ponseti feet improved much faster than Kite feet but the difference achieved statistical significance only at the 10th week from the start of treatment.

Hind foot, midfoot and total Pirani scores reduce much faster with Ponseti than the Kite's method of manipulation of clubfoot.<sup>11</sup>

### CONCLUSION

Under the light of above results, the authors concluded that in terms of total Pirani scores, reduction occurred comparatively faster with Ponseti in comparison to Kite's method of manipulation of clubfoot. However; further studies are recommended.

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**Table 1: Demographic details of the patients**

Parameter	Number
Number of patients	30
Number of affected feet	48
Males	20
Females	10

**Table 2: Comparison of total mean pirani score**

Mean pirani score	Ponseti	Kite	P- value
Initial time	5.8	5.3	0.25
At one week	1.3	2.1	0.01
At tenth week	1.2	1.9	0.02

**Graph 1: Comparison of total mean pirani score**

