# The Effectiveness of Parent Manipulation on Newborns with Postural Clubfoot: A Randomized Controlled Trial

Ranoo Chaweerat BNS*, Kamolporn Kaewpornsawan MD**,
Pimol Wongsiridej MD*, Sudaporn Payakkaraung PhD***,
Siwaporn Sinnoi BNS*, Sujidtra Meesamanpong BNS*

** Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*
*** Department of Orthopaedic Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*
**** Department of Pediatrics, Faculty of Nursing, Mahidol University, Bangkok, Thailand*

***Objective:*** *The aim of the present study was to determine the effectiveness of parent manipulation on newborns with postural clubfoot, as compared to newborns that receive no treatment in a randomized controlled trial.*
***Material and Method:*** *Ninety-two healthy newborns, including 40 boys and 52 girls, (169 postural clubfeet, including 77 with bilaterally involvement) were included and categorized into two groups by simple randomization using the sealed opaque envelope technique. In Group A, the parent manipulation group, there were 14 boys and 33 girls in 85 postural clubfeet with 38 bilateral involvements. Manipulations were performed at least 20 times per day and the stimulation of the newborn's foot/feet by parent finger was performed at least 100 times per day. In Group B, the group of newborns receiving no treatment, there were 26 boys and 19 girls in 84 postural clubfeet with 39 bilateral involvements. The follow-up periods for both groups were one, three, and four months after starting the manipulation. The success of the manipulation was measured by the foot appearance, which was normally performed by physical examination.*
***Results:*** *A comparison of the characteristics of newborns and parents in both groups showed no statistical differences, except the sex of the newborn. All newborns in both groups were one to six days old. The success rate after 4 months of manipulation in Group A was 71.8%, but it was 81% in Group B with no manipulation; results indicate no statistically significant difference ($p = 0.16$). The severity of the postural clubfeet indicated no statistical difference in the results of either group ($p = 0.3$). All cases were followed up at one year with 14% of the study participants dropping out in Group A and 11% dropping out of the study in Group B. All postural clubfeet disappeared in every case within one year of birth except one case in Group A that required casting and one case in Group B that required a prescription for orthopaedic shoes.*
***Conclusion:*** *No clinical or statistical differences were found between newborns who received parent manipulation for the treatment of postural clubfoot and newborns who received no treatment. Spontaneous recovery occurred in most of the cases within four months of birth or not more than one year after birth.*

***Keywords:*** *Parent manipulation, Newborn, Postural clubfoot*

***J Med Assoc Thai 2014; 97 (Suppl. 9): S68-S72***
***Full text. e-Journal:*** *http://www.jmatonline.com*

Clubfoot or talipesequinovarus is a common orthopaedic condition. This condition can be divided into two groups: congenital clubfoot and postural clubfoot[1,2]. Congenital or true clubfoot is characterized by an equinovarus foot and a high medial longitudinal arch (cavus). If left untreated, this condition can result in long-term disability, deformity, and pain. Interventions include conservative treatments like splinting or surgical treatments like tendon lengthening[3-5]. Postural clubfoot is a milder form of this condition, which is known to be passively correctable to normal by gentle stretching, which is allowable due to the absence of significant contractures and deep skin creases normally associated with congenital or true clubfoot. The treatment of postural clubfoot can vary between observation, stretching, splinting and casting and the foot can be correctable to normal without surgery[1-5]. A physician or other healthcare provider usually performed the manipulations for this condition. No study comparing the effectiveness of this type of treatment with no treatment was found in the review of literature. The aim of this randomized controlled trial was to determine the effectiveness of parent manipulation in newborns with

***Correspondence to:***
*Kaewpornsawan K, Department of Orthopaedic Surgery, Faculty of Medicine Siriraj Hospital, Mahidol, University, Bangkok 10700, Thailand.*
*Phone: 0-2419-7968*
*E-mail: kamolporn.kae@mahidol.ac.th*

postural clubfoot, as compared to newborns who received no treatment.

## Material and Method

The present study took place from July 2012 to January 2014. Prior to commencement, this study was approved by the hospital research, ethics committee. Prospective parents were counseled and informed consent was secured from parents willing to participate in this study. Newborns ranging in age from 1-7 days born with postural clubfoot were included in the study. The diagnosis was made by a pediatric orthopedic surgeon who examined the reducible equinovarus, adduction, and supination foot as in Fig. 1. Newborns with arthrogryposis multiplex congenital, myelomeningocele, congenital anomalies, and congenital clubfoot were excluded from the study. Parents who could not pass with at least a performance score of 8 out of 10, after being taught the manipulation techniques, were also excluded from the study. Ninety-two healthy newborns, including 40 boys and 52 girls, (169 postural clubfeet, including 77 with bilaterally involvement) were included and categorized into two groups by simple randomization using the sealed opaque envelope technique. In Group A, the parent manipulation group, there were 14 boys and 33 girls in 85 postural clubfeet with 38 bilateral involvements. Manipulations were performed at least 20 times per day and the stimulation of the newborn's foot/feet by parent finger was performed at least 100 times per day. Group B contained the newborns that received nothing except the explanation of the diagnosis, the prognosis, and the follow-up date. In Group B, there were 26 boys and 19 girls in 84 postural clubfeet from 39 bilateral involvements. The severity of postural clubfoot before the start of manipulation was scored mild, moderate, or severe according to the degree of resistance to manipulation of the newborn's foot. The demographic data were recorded and are shown in Table 1. The follow-up periods for both groups were one, three, and four months after starting the manipulation. The foot was

**Fig. 1** Bilateral postural clubfeet in newborn.

**Table 1.** General characteristics of newborns and parents

| Topics | | Group A | | Group B | | *p*-value |
|---|---|---|---|---|---|---|
| | | Number of feet (newborn) | % | Number of feet (newborn) | % | |
| Severity number postural clubfeet | Mild | 37 | 43.5 | 39 | 46.4 | 0.705 |
| | Moderate | 48 | 56.5 | 45 | 53.6 | |
| | Total | 85 | 100 | 84 | 100 | |
| Sex number newborn | Boys | 14 | 29.8 | 26 | 57.8 | 0.01 |
| | Girls | 33 | 70.2 | 19 | 42.2 | |
| | Total | 47 | 100 | 45 | 100 | |
| Gestational age (weeks) number newborn | 32-36 | 1 | 2.1 | 5 | 11.1 | 0.194 |
| | 37-39 | 36 | 76.6 | 33 | 73.3 | |
| | 40-42 | 10 | 21.3 | 7 | 15.6 | |
| Age of mother (year) number newborn | <25 | 22 | 46.8 | 14 | 31.1 | 0.296 |
| | 25-35 | 20 | 42.6 | 24 | 53.3 | |
| | >35 | 5 | 10.6 | 7 | 15.6 | |
| Education mother number newborn | Primary school | 8 | 17 | 9 | 20 | 0.361 |
| | Secondary school | 18 | 38.3 | 20 | 44.4 | |
| | Bachelor | 12 | 25.5 | 5 | 11.1 | |
| | others | 9 | 19.1 | 11 | 24.4 | |

re-evaluated each visit by a pediatric orthopedic surgeon. The duration and level of success of manipulation were recorded. The success of the manipulation was measured by foot appearance, which was normally performed by physical examination that the foot had no equinovarus, adduction and supination. If the postural clubfoot persisted after four months, the physician discontinued the manipulation, concluding that the manipulation was ineffectiveness in that case. Persistent postural clubfoot in study children aged six months or older were put in a corrective cast until the problem was solved.

***Parent manipulation techniques***

There were two parts to this treatment. The first part was the parent manipulation (Fig. 2). Parent manipulation to correct the postural clubfoot to a normal foot involved the newborn being placed in the supine position. To correct the ride-side postural clubfoot, the thumb and index finger of the parent's right hand held the newborns forefoot and reduced the deformity by abducting the foot with the thumb of the left hand, counteracted against the cuboid. The other fingers of the left hand held the hind foot at the calcaneum. Instructions were given that the manipulation must be performed at least 20 times per day. The second part of the treatment involved the stimulation of the newborn's foot. In Fig. 3, we observe the newborn in the supine position. The stimulation process involves the parent's finger being dragged across the dorsolateral part of the newborn's foot to stimulate the foot to abduct. This procedure must be followed at least 100 times per day.

***Sample size calculation***

Using the formula for two independent proportions, where P1 is the success rate of Group A = 80% and P2 is the success rate of Group B = 60% as determined by pilot study, the N/group was calculated

**Fig. 2** Parentmanipulation on the right postural clubfoot-Part 1.

**Fig. 3** Parentmanipulation stimulation of the evertors muscle by dragging at the dorsolateral border of the foot-Part 2.

to be 82 feet/.

***Statistical analysis***

Mean and standard deviation (SD), range, and frequencies (%) were used to describe parents and newborn demographic data. Chi-square test was used to compare categorical variables between groups. Student's t-test was used to assess differences between two means. For comparison between two groups, the percentage of normal feet in both groups was compared by Chi-square as the primary outcome at four month after starting the manipulation. SPSS version 18 was used to analyze the data. A p-value of less than 0.5 indicated a statistically significant difference.

## Results

There were no complications or problems from the manipulation during the study. In Table 1, the comparison of the characteristics of newborns and parents in both groups, there was no statistical difference, except the sex of the newborn. All newborns in both groups were one to six days old, with a mean age of 3 days in group A and 2.87 days in group B; there was no statistically significant difference ($p$ = 0.549). The success rate after 4 months of manipulation in Group A was 71.8%, but it was 81% in Group B with no manipulation; the results indicate no statistically significant difference ($p$ = 0.16) (Table 2). The severity of the postural clubfeet indicated no statistical difference in the results of either group ($p$ = 0.3) (Table 2). The sex of the newborns indicated no statistical differences in the outcomes of either group ($p$ = 0.928). All cases were followed-up at one year, with 14% of the participants dropping out of the study in Group A and 11% dropping out in Group B. All postural clubfeet disappeared in every case within one year of birth, except one case in Group A that required casting and one case in Group B that required a prescription for orthopedic shoes (Table 3).

## Discussion

By the present study, we know that the potential of spontaneous recovery of postural clubfoot in newborns without manipulation is high enough to do nothing to newborns presenting with postural clubfoot at birth. Parent manipulation had no effect on the recovery of the postural clubfoot children in this

**Table 2.** Results of parent manipulation in Group A and control Group B

| Severity | Results | Group A | | Group B | | *p*-value |
|---|---|---|---|---|---|---|
| | | Number of feet | % | Number of feet | % | |
| Mild | Success | 27 | 73 | 32 | 82.1 | |
| | Failure | 10 | 27 | 7 | 17.9 | |
| | Total | 37 | 100 | 39 | 100 | |
| Moderate | Success | 34 | 70.8 | 36 | 80 | 0.16 |
| | Failure | 14 | 29.2 | 9 | 20 | |
| | Total | 48 | 100 | 45 | 100 | |
| Total cases | Success | 61 | 71.8 | 68 | 81 | |
| | Failure | 24 | 28.2 | 16 | 19 | |
| | Total | 85 | 100 | 84 | 100 | |

**Table 3.** Number of remaining postural clubfeetof both groups during follow-up

| Time follow-up | Group A | | Group B | |
|---|---|---|---|---|
| | Number remaining postural clubfeet | % | Number postural clubfeet | % |
| Starting time | 85 | 100 | 84 | 100 |
| 1 month | 77 | 90.5 | 71 | 84.5 |
| 3 months | 57 | 67 | 42 | 50 |
| 4 months | 24 | 28.2 | 16 | 19 |
| 12 months | 1 | 1.1 | 1 | 1.1 |

study. There is no evidence that the severity of postural clubfoot affects the outcome. Most of the postural clubfeet transform to normal feet within four months of birth and not more than one year after birth, spontaneously by the nature of the children. The increasing power of the evertor and peronei muscles of the child's foot help to reduce and ultimately self-correct the condition to normal over time.

**Conclusion**

There was no statistically significant difference between parent manipulation and doing nothing in newborns with postural clubfoot. Most of the cases resulted in spontaneous recovery within four months of birth and not more than one year after birth.

**Acknowledgement**

The present study was supported by the Siriraj Research Development Fund, Faculty of Medicine Siriraj Hospital, Mahidol University.

**Potential conflicts of interest**

None.

**References**

1. Wynne-Davies R. Genetic and environmental factors in the etiology of talipes equinovarus. Clin Orthop Relat Res 1972; 84: 9-13.
2. Honein MA, Paulozzi LJ, Moore CA. Family history, maternal smoking, and clubfoot: an indication of a gene-environment interaction. Am J Epidemiol 2000; 152: 658-65.
3. Bensahel H, Guillaume A, Czukonyi Z, Desgrippes Y. Results of physical therapy for idiopathic clubfoot: a long-term follow-up study. J Pediatr Orthop 1990; 10: 189-92.
4. Goldner JL. Congenital talipes equinovarus-fifteen years of surgical treatment. Curr Pract Orthop Surg 1969; 4: 61-123.
5. Ponseti IV. Treatment of congenital club foot. J Bone Joint Surg Am 1992; 74: 448-54.

## *ประสิทธิผลของการดัดเท้าโดยพ่อแม่ในทารกแรกเกิดที่มีเท้าปุกเทียมการวิจัยแบบสุ่มทดลอง*

***เรณู ฉวีรัตน์, กมลพร แก้วพรสวรรค์, พิมล วงศ์ศิริเดช, สุดาภรณ์ พยัคฆเรือง, ศิวพร สินน้อย, สุจิตรา มีสมานพงษ์***

***วัตถุประสงค์:*** *การศึกษาครั้งนี้ต้องการทราบประสิทธิภาพของการดัดเท้าโดยพ่อแม่ในทารกแรกเกิดที่มีเท้าปุกเทียม โดยใช้การวิจัยแบบสุ่มทดลอง*

***วัสดุและวิธีการ:*** *ทารกแรกเกิดที่มีสุขภาพแข็งแรงจำนวน 92 ราย เป็นเด็กชาย 40 ราย เด็กหญิง 52 ราย ที่เป็นเท้าปุกเทียมได้รับเข้าศึกษาเป็น 2 ข้าง จำนวน 77 ราย รวมเป็นเท้าปุกเทียม 169 ข้า และแบ่งออกเป็นสองกลุ่ม โดยการสุ่มทดลองกลุ่ม A ได้รับการดัดเท้าและการกระตุ้นเท้าโดยพ่อแม่เด็ก เป็นเด็กชาย 14 ราย และเด็กหญิง 33 ราย เป็น 2 ข้าง 38 ราย รวมเป็นเท้าปุกเทียม 85 ข้า กลุ่ม B, ทารกแรกเกิดไม่ได้รับการรักษาใด ๆ เป็นกลุ่มควบคุม เด็กชาย 26 ราย เด็กหญิง 19 ราย เป็น 2 เท้า 39 ราย รวมเป็นเท้าปุกเทียม 84 ข้า ติดตามผลการรักษาใน 1, 3 และ 4 เดือน ความสำเร็จของการดัดเท้าวัดโดยการตรวจร่างกายดูลักษณะเท้าซึ่งเป็นปกติ*

***ผลการศึกษา:*** *ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติในการเปรียบเทียบลักษณะของทารกแรกเกิดและผู้ปกครองของทั้งสองกลุ่ม ยกเว้นเพศของทารกแรกเกิด อายุของทารกแรกเกิดอยู่ระหว่าง 1-6 วัน ทั้งสองกลุ่ม อัตราความสำเร็จหลังจาก 4 เดือนของการดัดเท้าโดยเท้ากลับมาปกติในกลุ่ม A คือ 71.8% แต่กลับเป็น 81% ในกลุ่ม B โดยไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติ ($p = 0.16$) ความรุนแรงของเท้าปุกเทียมไม่ทำให้เกิดผลลัพธ์ต่างกันอย่างมีนัยสำคัญทางสถิติ ($p = 0.3$) การติดตามใน 1 ปี พบการออกจากกลุ่ม 14% ในกลุ่ม A และ 11% ในกลุ่ม B พบว่าเท้าปุกเทียมหายไปเอง ยกเว้น 1 ราย ในกลุ่ม A ที่ต้องรับการเข้าเฝือกรักษาและ 1 ราย ในกลุ่ม B ที่ได้รับการดัดรองเท้า*

***สรุป:*** *ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติระหว่างการดัดเท้าโดยพ่อแม่ในทารกแรกเกิดที่มีเท้าปุกเทียม โดยใช้การวิจัยแบบสุ่มทดลอง และเท้าปุกเทียมสามารถหายได้เองภายใน 4 เดือนหรือไม่เกิน 1 ปีเป็นส่วนใหญ่*