Correlation of flexibility and radiologic parameter in children with pes planus

Min Hwan Kim, Ja Young Choi, Shin-seung Yang

1. Department of Rehabilitation Medicine, College of Medicine, Chungnam National University, Daejeon, Republic of Korea

2. Deajeon Chungcheong Regional Medical Rehabilitation Center, Chungnam National University Hospital, Daejeon, Republic of Korea

Purpose: The pes planus is a reduction of the medial longitudinal arch which cause the foot to be flattened and the various causes have been suggested to contribute the dynamic functional abnormality of foot arch. Pediatric patients generally exhibit increased joint range of motion and hypermobility. Although there are many pediatric patients with pes planus, few studies have been conducted on the relationship between the clinical or radiologic parameters and flexibility in children with flexible flat foot. The objective of this study was to investigate the correlation between clinical feature of flatfoot, and flexibility of trunk and extremity in pediatric flexible flat foot.

Methods:

This retrospective and single group study included a total of 34 feet from 17 children with flexible flat feet (10 boys, 7 girls). Resting calcaneal stance position angle (RCSPA) and Foot posture index (FPI) scores were measured in relaxed standing position. Bilateral weight-bearing foot radiographic assessment was conducted. Radiographic parameters were measured by blinded and independent

reader: calcaneal pitch angle (CPA), talometatarsal angle (TMA) and talocalcaneal angle (TCA) on lateral views. The Beighton scoring system determines the flexibility by evaluating the hyperextension of the joint according to the criteria for each category when performing stretching motion such as passive hyperextension of the fifth MCP joint, elbow, knee and passive apposition of thumb and active forward flexion of trunk. Pearson correlation coefficients were calculated to estimate the correlations between clinical (FPI, RCSPA) or radiographic parameters and Beighton score. *P*-values of less than 0.05 were considered significant.

Results: This study enrolled in a total 17 children with flexible flat feet. Their average age is 6.2years, height is 102.38cm and weight 17.63kg. Children with flat foot showed the high Beighton score (Table 1). Beighton score showed a positive correlation with radiologic parameters such as CPA (r= 0.36; p < 0.05), but not with TMA or TCA. Also, Beighton score did not show any correlation with RSCPA or FPI. The RCSP showed a negative correlation with FPI (r=-0.39; p < 0.05)(Table 2).

Conclusion:

Flexibility measured by Beighton score was significantly related with calcaneal pitch angle in children with flat feet and so, it is inferred that the children flat foot have the increased flexibility of limb and trunk.

Table 1. Average data of clinical measure and radiologic parameters of flat foot

RCSPA	FPI	CPA(°)	TMA(°)	TCA(°)	Beighton score
-9.7 ± 2.8	8.78 ± 2.28	10.83 ± 3.10	24.12 ± 6.0	49.13 ± 5.1	7.87 ± 1.8

Table 2. Correlation between clinical measure and radiologic parameters of flat foot

	FPI		Beighton score	
	Correlation	*p*-value	Correlation	*p*-value
RCSPA	-0.393*	0.021	0.105	0.581
TMA	0.115	0.517	0.081	0.669
TCA	0.109	0.541	0.314	0.091
CPA	0.061	0.731	0.363*	0.049

FPI, foot posture index; RCSPA, resting calcaneal stance position angle; TMA, talometatarsal angle; TCA, talocalcaneal angle; CPA, calcaneal pitch angle
* Correlation is significant at the 0.05 level by Pearson's correlation coefficient