

INTER AND INTRA RATER RELIABILITY OF THE IMAGE BASED CRITERIA OF THE FOOT POSTURE INDEX IN PEDIATRIC POPULATIONS

Emma Tomes BS¹, Jordan Polk BA¹, Anthony Riccio MD^{1,2}, Jacob Zide MD^{1,3},
Kirsten Tulchin-Francis PhD^{1,2}

¹ Scottish Rite for Children, Dallas, TX, USA

² University of Texas Southwestern Medical Center, Dallas, TX, USA

³ Baylor Scott & White Hospital, Dallas, TX, USA

emma.tomes@tsrh.org

INTRODUCTION

The Foot Posture Index-6 (FPI) is a clinical tool to address the supination, neutrality, or pronation of the foot based on the sum of six individual measurements for each foot [1]. The FPI was originally designed to evaluate and palpate the foot in person. However, assessment using photographs, in feet without pathology, has also been found to be a reliable form of rating the foot, broadening the opportunities for inter and intra rater reliability [2]. This study seeks to evaluate the repeatability and reliability of the FPI through the use of photographs in a variety of pediatric flatfeet that encompass a wide range of foot postures.

CLINICAL SIGNIFICANCE

The FPI is a non-invasive rating scale to quickly assess the posture of the foot. The repeatability and reliability of the scale has been demonstrated on patients evaluated in person, but photographic repeatability and reliability can provide greater flexibility for measurement assessment.

METHODS

Foot photographs were collected for patients enrolled in a prospective IRB approved study. Photos of 10 feet (5 patients; 15.4±2.3 years; 85.4±40.6 kg; 175.1±12.9 cm) over a range of foot postures (including cavovarus, clubfoot, plantar fasciitis, and flatfeet) were used to rate the feet on a scale of -2 to 2 for five image-based measures of the FPI, including curvature of the supra and infra lateral malleoli (Malleoli), calcaneal frontal plane position (Calcaneus), prominence of the talonavicular joint (TNJ), congruence of the medial longitudinal arch (Arch), and abduction/adduction of the forefoot on the rearfoot (Abd/Add). Five raters ranging in experience and familiarity with the FPI rated the feet on two separate days, with at least one day between each rating session. All raters met on two separate occasions to review the FPI measures and review example foot photographs prior to independent rating. Intraclass correlation coefficients (ICC) were calculated to determine intra/inter-rater reliability for individual FPI ratings as well as a summed FPI total score (mFPI, modified as it doesn't include the talar head palpation). ICCs were described as poor (0.0-0.50), moderate (0.51-0.75), good (0.76-0.90), or excellent (0.91-1.00).

RESULTS

Intra-rater reliability was assessed for each rater between the first and second rating sessions. The intra-rater reliability for mFPI score totals was found to be excellent (ICC > 0.91) for 3 of the 5 raters and good for the remaining raters. However, the intra-rater reliability for the individual FPI scores was found to range in agreement (-0.025-0.979). The individual with the lowest ICCs had the least clinical experience with patients with foot deformity. Removal of the 5th rater resulted in an improved range of ICCs (0.372-0.979).

	Inter-Rater Reliability					
	5 Raters			4 Raters		
	ICC	95% CI - L	95% CI - U	ICC	95% CI - L	95% CI - U
Malleoli	0.333	0.075	0.694	0.772	0.534	0.927
Calcaneus	0.853	0.688	0.954	0.868	0.706	0.960
TNJ	0.508	0.236	0.804	0.645	0.355	0.877
Arch	0.787	0.577	0.931	0.829	0.633	0.947
Abd/Add	0.870	0.721	0.960	0.849	0.667	0.954
Total	0.883	0.745	0.964	0.945	0.867	0.984

Table 1. Inter-Rater Reliability between 4 and 5 raters using intraclass correlation coefficients and 95% confidence intervals.

Based on the intra-rater reliability results, inter-rater reliability was recalculated (see Table 1) after removing the 5th rater. All ICC's improved, with the mFPI total found to have excellent agreement (ICC=0.945). Individual FPI measures had moderate to good agreement. The TNJ had moderate agreement (ICC=0.645) and the Malleoli (ICC=0.772), Arch (ICC=0.829), Calcaneus (ICC=0.868) and Abd/Add (ICC=0.849) had good inter-rater agreement.

DISCUSSION

Evaluation of adolescent feet with foot deformity using the mFPI by means of photographic measurements provides a repeatable measure of the feet by multiple raters. The FPI traditionally requires rating to take place in person, due to the measurement of the talar head through palpation. However, rating using photographs provides greater flexibility in assessing the posture of the foot, allowing for easy reliability testing amongst multiple raters. Furthermore, photography allows for long-term documentation, and later assessment as needed.

To our knowledge only one study has previously validated a similar method of rating the FPI using photography, however this was in healthy volunteers and evaluated by certified athletic trainers [2]. Our cohort of patients presented in a complex adolescent foot and ankle clinic with a variety of foot pathologies including cavovarus and planovalgus foot deformities, recurrent clubfoot, and plantar fasciitis.

Intra-rater ICC total scores between sessions had good to excellent agreement, indicating that the mFPI score using photographs is reliable between sessions. However, it was noted that the least clinically experienced rater had the lowest intra-rater reliability which may highlight the importance for proper initial training and continued competency evaluation when utilizing the photo method. Future work will include application of this method to a larger cohort of patients across a range of foot pathologies and the development of a documented training plan.

REFERENCES 1. Redmond, A et al. (2006) Clin Biomech. 2. Terada, M et al. (2014) IJSPT

ACKNOWLEDGEMENTS The authors wish to acknowledge the TSRHC Research Program.

DISCLOSURE STATEMENT Co-author KTF is a GCMAS executive Board member. All other authors have no conflicts to disclose.