

Project Title

Specifically Optimized Prefabricated Insoles (SOPI) for managing mechanical foot pains in the subtle cavus foot: The SOPI trial

Project Lead and Members

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Organisation(s) Involved

Tan Tock Seng Hospital

Healthcare Family Group(s) Involved in this Project

Allied Health, Medicine

Applicable Specialty or Discipline

Orthopaedic Surgery, Podiatry, Physiotherapy

Project Period

Start date: Not Applicable

Completed date: Not Applicable

Aims

To compare the effectiveness of SOPI (Specifically Optimized Prefabricated Insoles) versus PPI (Plain Prefabricated Insoles) in managing SCF (Subtle Cavus Foot) patients experiencing MFP (Mechanical Foot Pains).

Project Attachment

See poster attached/below

Background

See poster attached/below

Methods

See poster attached/below

Results

See poster attached/below

Conclusion

See poster attached/below

Additional Information

Accorded the Singapore Health & Biomedical Congress 2023 (Best Poster Award (Allied Health)) Gold Award

Project Category

Care & Process Redesign

Value Based Care, Patient Report Outcome Measurements

Quality Improvement, Clinical Practice Improvement

Keywords

Cavus foot, Prefabricated Insole

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Specifically Optimized Prefabricated Insoles (SOPI) for managing mechanical foot pains in the subtle cavus foot: The SOPI trial

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Background:

The Subtle Cavus Foot (SCF) – clinically characterized by the “peek-a-boo” sign and a positive Coleman block-test – is commonly associated with patients suffering from Mechanical Foot Pains (MFP).^{1,2} See Figure 1. There is no consensus on whether Specifically Optimized Prefabricated Insoles (SOPI) or Plain Prefabricated Insoles (PPI) is more effective clinically.¹ We aimed to compare the effectiveness of SOPI versus PPI in managing SCF patients experiencing MFP.



Figure 1.

- A. Positive “peek-a-boo” sign where bilateral medial heel is visible
B. Bilateral rearfoot in an inverted position is visualized
C. Positive Coleman block-test where right rearfoot varus is corrected

Methods:

A randomized controlled-trial was performed: 29 patients with clinically diagnosed SCF and MFP were prospectively recruited and randomly assigned to receive either SOPI or PPI. SOPI were specifically optimized in-office with forefoot valgus wedging and first-ray fill reduction while PPI were provided as-is. See Figure 2.

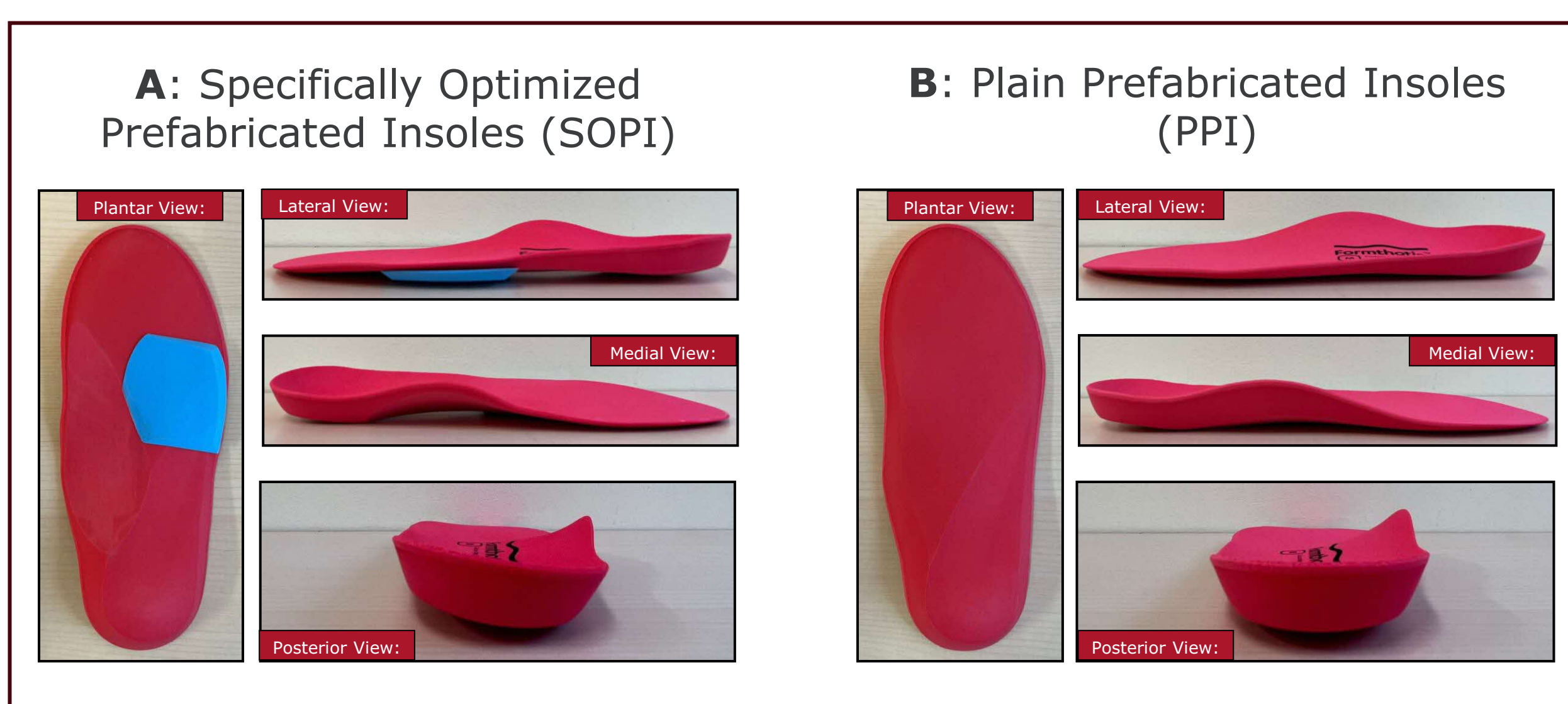


Figure 2.

- A. Plantar, lateral, medial and posterior views of a left sided SOPI – with forefoot valgus wedging added (blue piece) and first ray fill reduction performed. Take note of SOPI being in an everted position in the posterior view compared to PPI.
B. Plantar, lateral, medial and posterior views of a left sided PPI – as it is.

Excluding 3 drop-outs, 13 patients completed the study in each group. The primary outcome measure was the Foot Function Index (FFI) total and subscale scores. Student t-test was used to analyse for differences between groups at 3-months post-intervention. All participating patients provided informed consent prior to their involvement in the study.

Table 1. Baseline Characteristics

	Plain Prefabricated Insoles (n = 13)	Specifically Optimized Prefabricated Insoles (n = 13)	P Value
Age, mean ± SD, y	55.3 ± 12.7	56.6 ± 13.9	.804
Male, n (%)	5 (38.5)	1 (7.7)	.163
Ethnicity			.385
Chinese, n (%)	12 (92.3)	11 (84.6)	
Malay, n (%)	0 (0)	1 (7.7)	
Indian, n (%)	1 (7.7)	0 (0)	
Others, n (%)	0 (0)	1 (7.7)	
BMI, mean ± SD	25.1 ± 2.80	24.7 ± 3.47	.748
Clinical Diagnosis			.382
Achilles Tendinopathy, n (%)	2 (15.4)	1 (7.7)	
Metatarsalgia, n (%)	2 (15.4)	0 (0)	
Peroneal Strain, n (%)	2 (15.4)	4 (30.8)	
Plantar Fasciitis, n (%)	7 (53.8)	8 (61.5)	
Foot Posture Index, median (IQR)	-2 (2)	-2 (2)	.809
Duration of pain, median (IQR), months	6 (11)	10 (20)	.067

Table 2. Foot Function Index (FFI) total and subscale scores at baseline and 3-months end-point

	Plain Prefabricated Insoles, mean ± SD (n=13)	Specifically Optimized Prefabricated Insoles, mean ± SD (n=13)	Between Group Difference, mean difference (95% Confidence Interval)	P Value
FFI-Total				
Baseline	41.6 ± 12.7	44.2 ± 9.0	-2.6 (-11.6 – 6.4)	.553
3-month	17.8 ± 10.9	5.6 ± 5.0	12.3 (5.2 – 19.2)	.002
FFI-Pain				
Baseline	54.0 ± 13.7	57.2 ± 13.9	-3.2 (-14.3 – 8.0)	.564
3-month	24.4 ± 13.5	9.4 ± 8.0	15.0 (5.9 – 24.1)	.003
FFI-Disability				
Baseline	41.4 ± 19.1	48.6 ± 11.9	-7.3 (-20.3 – 5.7)	.258
3-month	17.9 ± 13.0	4.4 ± 5.6	13.5 (5.2 – 21.8)	.003
FFI-Activity				
Baseline	19.8 ± 15.5	13.1 ± 9.7	6.8 (-3.8 – 17.3)	.196
3-month	5.5 ± 7.2	0.6 ± 1.5	4.9 (0.5 – 9.3)	.032

Results:

Pre-intervention, baseline characteristics and FFI scores did not differ significantly between groups. See Table 1 & 2. However, at the 3-months treatment end-point, SOPI demonstrated superior clinical outcomes that were statistically significant compared to PPI, with lower mean FFI-total scores (SOPI: 5.6±5.0, PPI: 17.8±10.9, $P=0.002$, 95%CI: 5.2–19.3), FFI-pain subscale scores (SOPI: 9.4±8.0, PPI: 24.4±13.5, $P=0.003$, 95%CI: 5.9–24.1), FFI-disability subscale scores (SOPI: 4.4±5.6, PPI: 17.9±13.0, $P=0.003$, 95%CI: 5.2–21.8) and FFI-activity subscale scores (SOPI: 0.6±1.5, PPI: 5.5±7.2, $P=0.03$, 95%CI: 0.5–9.3). See Table 2 & Figure 3.

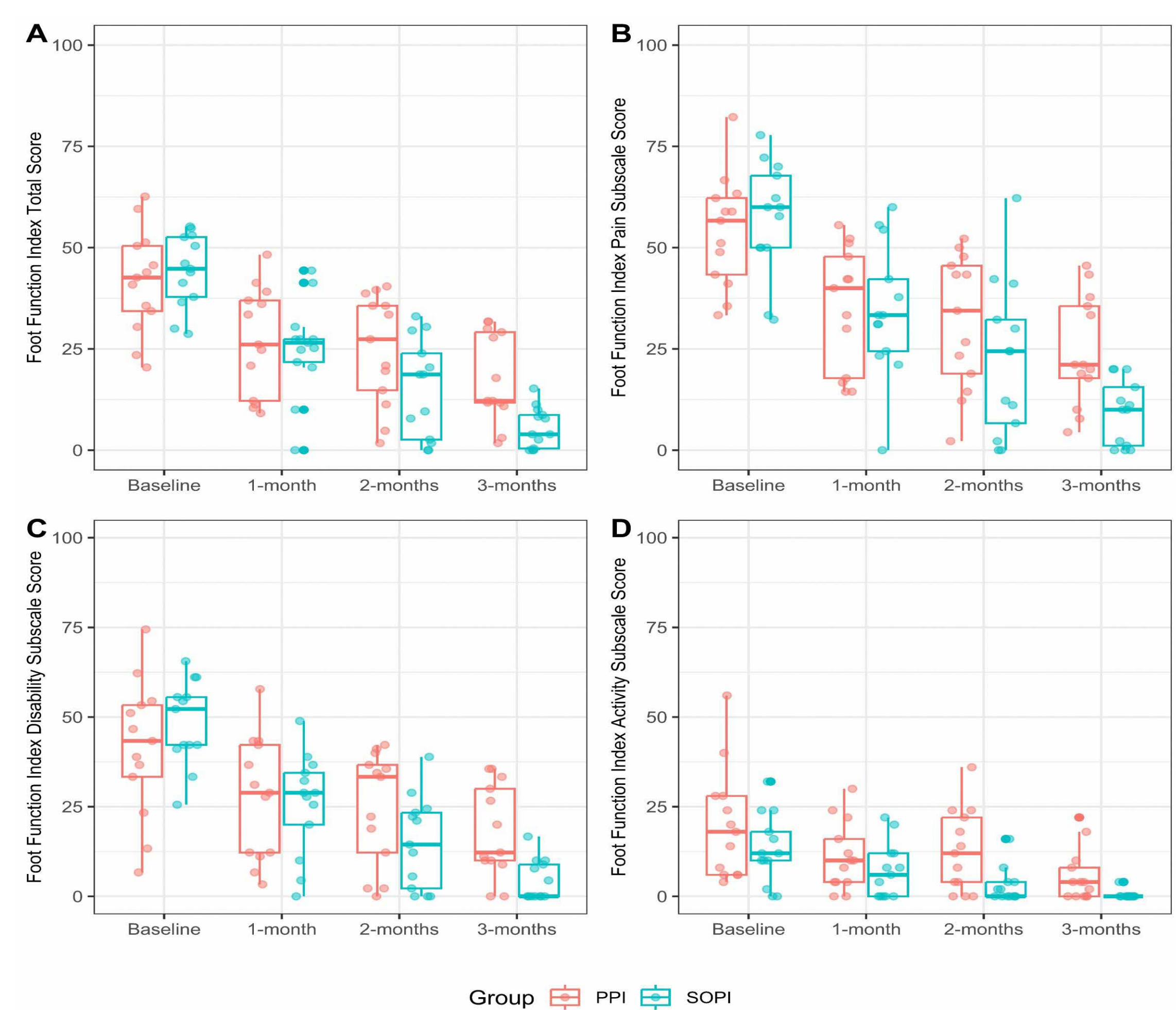


Figure 3.

Boxplots showing primary outcome measures of Specifically Optimized Prefabricated Insoles (SOPI) versus Plain Prefabricated Insoles (PPI). A. Foot Function Index (FFI) Total Scores. B. FFI Pain Subscale Scores. C. FFI Disability Subscale Scores. D. FFI Activity Subscale Scores.

Discussion & Conclusion:

SOPI are more effective than PPI in managing MFP in patients with clinically identified Subtle Cavus Foot after 3 months of use. Considering SOPI’s affordability, accessibility, and ease of replication in-office, we recommend the use of SOPI for SCF patients presenting with MFP. Future studies can explore SOPI’s value in preventative care.

References:

- Manoli A and Graham B. The subtle cavus foot, “the underpronator,” a review. *Foot Ankle Int* 2005; 26: 256-263.
- De Oliveira Junior AS, dos Santos ALG, de Souza Nery CA, et al. Subtle cavus foot: prevalence of associated injuries. *Scientific Journal of the Foot & Ankle* 2018; 12: 112-116.

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