PS-8

Optimizing Flatfoot Management with Insoles and Exercise: A Systemic Review and Meta-Analysis

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Objective

❖Flatfoot is a common condition characterized by a diminished medial longitudinal arch, potentially causing pain, instability, and functional impairment. Conservative treatments include exercise therapy and foot orthoses, but their effectiveness remains debated due to variability in study designs, orthotic types, and outcome measures.

❖This study aimed to evaluate the comparative effectiveness of various foot orthoses and exercise interventions using a network meta-analysis (NMA).

Methods

❖A systematic review (SR) and NMA were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and registered with PROSPERO.

❖Literature searches were performed in PubMed, Cochrane Library, and Embase up to November 30, 2024. Only randomized controlled trials (RCTs) were included.

❖Eligible studies involved patients with flatfoot, comparing insoles, exercise, insole plus exercise, sensorimotor insoles, talus control foot orthoses (TCFO), and controls.

❖Outcome measures included pain, function, valgus angle, navicular drop, calcaneal pitch, foot posture index-6 (FPI), center of pressure (COP), and radiologic parameters.

❖NMA was performed using the "netmeta" package in R (version 4.3.1) based on a frequentist approach. SUCRA values were calculated to rank treatment effectiveness. Risk of bias was assessed using the Cochrane Risk of Bias 2.0 tool.

Results

❖Nine RCTs were included. The NMA showed that insole plus exercise resulted in the greatest pain reduction (SMD -2.591; 95% CI, -3.469 to -1.714), followed by insoles alone (SMD -1.651; 95% CI, -2.237 to -1.065) (Figure 1a). Functional improvements were observed but not statistically significant (Figure 1b).

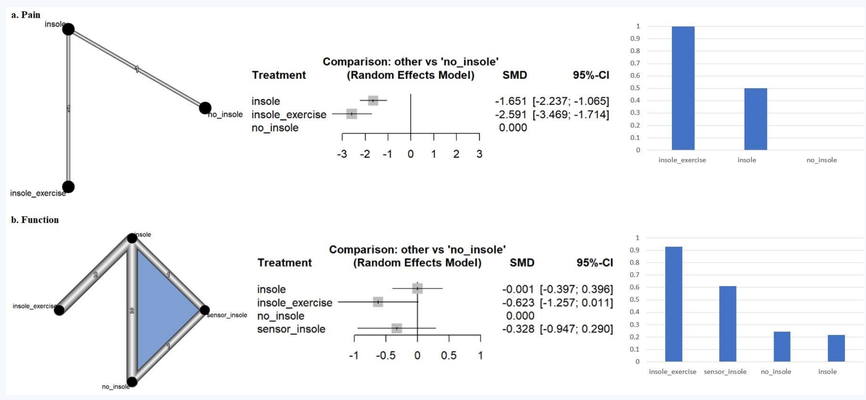

Fig.1. Network plots, forest plots, and SUCRA plots for pain and functional outcomes in patients with flatfoot.

❖Insole plus exercise showed the highest improvement in valgus angle (SMD -1.001; 95% CI, -2.077 to 0.075) and ranked highest in SUCRA (Figure 2a). Navicular drop, calcaneal pitch, and FPI showed improvement trends, but results were not statistically significant (Figure 2b–2d).

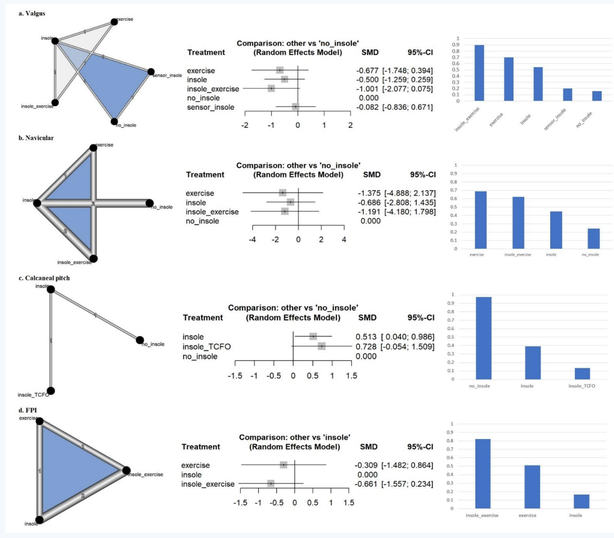

Fig.2. Network, forest, and SUCRA plots for valgus angle, navicular drop, calcaneal pitch, and FPI in patients with flatfoot.

❖COP significantly improved with insoles (SMD -0.751; 95% CI, -1.386 to -0.115) (Figure 3a). Although dynamic and static areas showed no statistical significance, sensorimotor insole and insole plus exercise showed improvement trends and ranked highest in SUCRA (Figures 3b, 3c).

❖The final quality evaluation was discussed among all investigators (Figure 4).

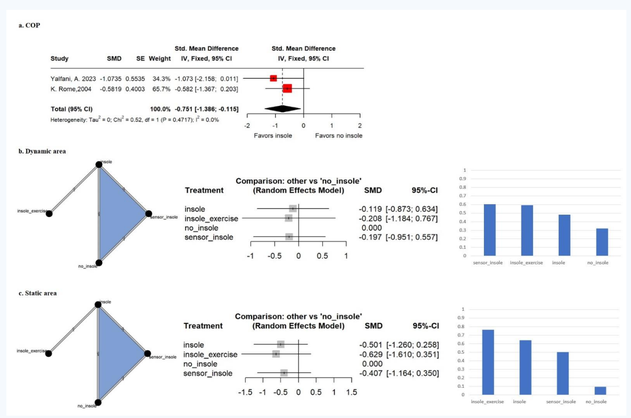

Fig.3. Network, forest, and SUCRA plots for COP, dynamic area, and static area in patients with flatfoot.

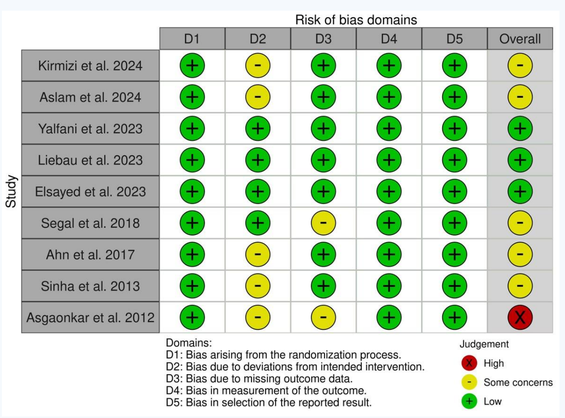

Fig.4. Risk of Bias Assessment for Included Studies Using Risk of Bias (RoB) Tool.

Conclusion

❖This study confirmed that insoles, particularly in combination with exercise, are effective in reducing pain and correcting valgus in patients with flatfoot. These findings support the use of insoles alone or with short foot exercises in clinical practice. Future research should focus on standardizing outcome measures, evaluating long-term effects, and assessing different patient subgroups to optimize treatment recommendations.