

THE EFFECTIVENESS OF ORTHOTICS IN REDUCING EXCESSIVE PRONATION (FLAT FEET) IN CHILDREN BETWEEN 7 TO 10 YEARS OLD

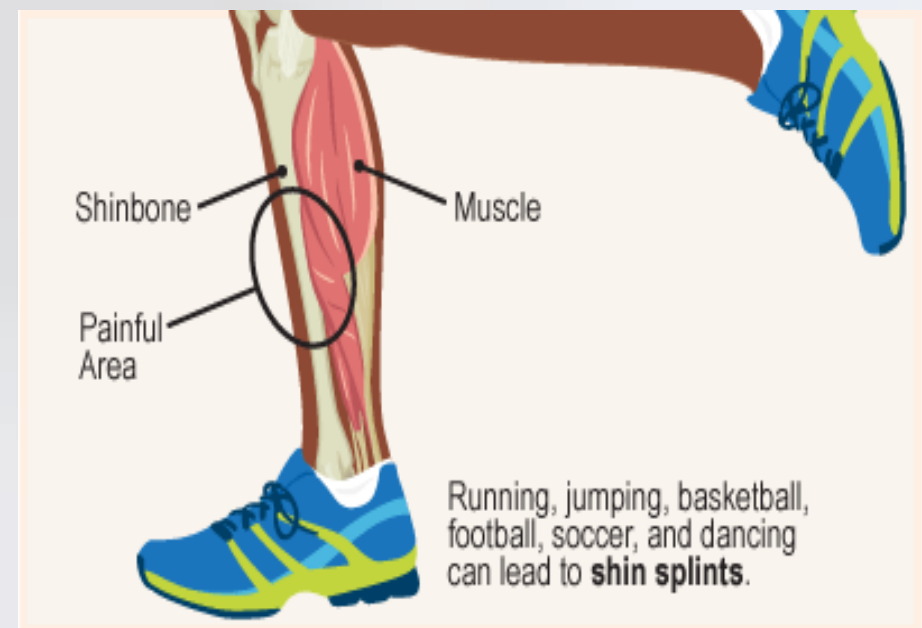
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INTRODUCTION & LITERATURE REVIEW

- Flat feet is a type of foot posture which involves the collapse of the medial longitudinal arch of the foot.
- As a result of it, pronation occurs when the foot lands on the ground. The arch flattens, the heel flares out, and the shin bone rotates inwardly. ⁽¹⁾
- This allows the foot to absorb shock and adapt to the surface.
- Leg muscles have to work extra hard to stabilize the foot during walking or running. ⁽¹⁾
- This can cause shin splints and stress fractures.



- Flat feet in children are mostly physiologic flat feet. They are found in approximately 90% children under age of 2. ⁽²⁾
- Development of normal longitudinal arch begins at the age of 3 to 5 years old. It is completed before the age of 10. The foot grows faster than the rest of the body; it achieves three quarters of its mature length by the time a child is 7 years old. ⁽²⁾
- Children do not usually need custom orthotics until about the age of 6. If a child is still not developing a normal arch at that point, or if in-toeing persists, orthotics may be needed. ⁽²⁾

OBJECTIVE

To investigate the effectiveness of orthotics in reducing excessive pronation (flat feet) in children between 7 to 10 years old.

Justification

- None of the researches have been done regarding of flat feet on the children in Malaysia who are bare-footed most of the time in a day.

Hypothesis

- Null hypothesis: : **there is no significant difference on flat foot before and after wearing orthotics among children**
- Alternative hypothesis: **there is a significant difference on flat foot before and after wearing orthotics among children**

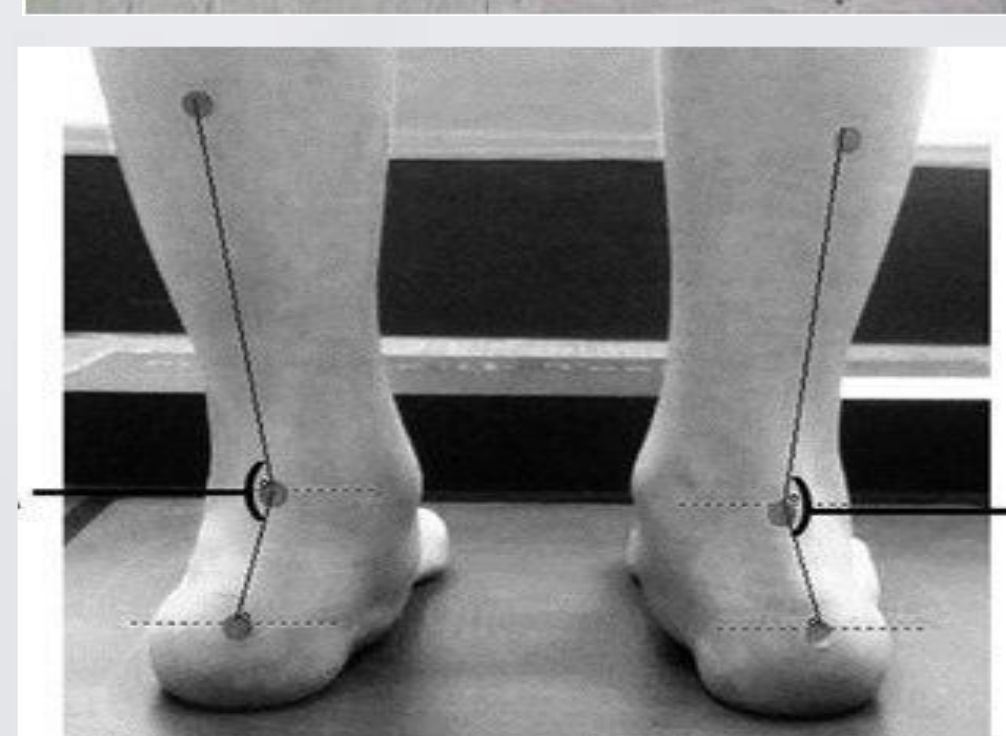
METHODOLOGY

- A cohort study was carried out in 2 Government Chinese primary schools in Klang Valley
- 3 criteria are needed to be fulfilled to be recruited:

- ✓ Students' feet were screened with foot scan and found to have flat feet. ⁽²⁾



- ✓ Students were measured of their calcaneal angle by using plumb line⁽³⁾ and found calcaneal angle ≤ 6 degrees



- ✓ Student asked to tip top and found to have arch reappear (flexible flat feet)

- Students recruited will have Plantar pressure of 5th metatarsophalangeal joint and midfoot measured by foot scan and recorded.

- Then, they were prescribed with a pair of orthotics and were instructed to wear the orthotics in the school shoes for 3 months period. and were used to compare pre- and post-intervention.

RESULTS

- 413 students were screened and 59 students fulfilled the criteria, leading to the inclusion rate/ prevalence was 14.3%.
- After 3 months, only **25** study participants were able to complete the study intervention requirement, which is to wear the orthotics for full 3 months, leading the dropout rate of the study to be 54.54%.

Statistics of Frequencies

	Left				Right			
	Pre 5 th Metatarsal	Post 5 th Metatarsal	Pre-Midfoot	Post Midfoot	Pre 5 th Metatarsal	Post 5 th Metatarsal	Pre-Midfoot	Post Midfoot
Mean	7.52	24.71	6.38	28.90	10.65	37.19	11.25	47.15
Median	7.29	16.02	5.88	21.21	9.65	31.59	8.94	40.40
Mode	0.00	7.40 ^a	0.00	4.72 ^a	4.58 ^a	8.10 ^a	4.58 ^a	4.60 ^a
Skewness	0.117	3.021	0.347	1.358	2.465	2.073	2.465	0.659
Kurtosis	0.043	11.364	-0.382	1.351	0.090	4.998	9.090	-0.630

a. Multiple modes exist. The smallest value is shown
Table 6: statistics of frequencies of the plantar pressure

- The skewness of the data was found to be more than 1.00, in which has shown that the **data was not normally distributed**. Hence, **Wilcoxon signed rank test** was used to compared the data of pre- and post- intervention.

Summary of related-sample Wilcoxon Signed Rank Test

Total N	25
Test Statistic	325.000
Standard Error	37.165
Standardized Test Statistic	4.372
Asymptotic Sig (2-sided test)	0.000

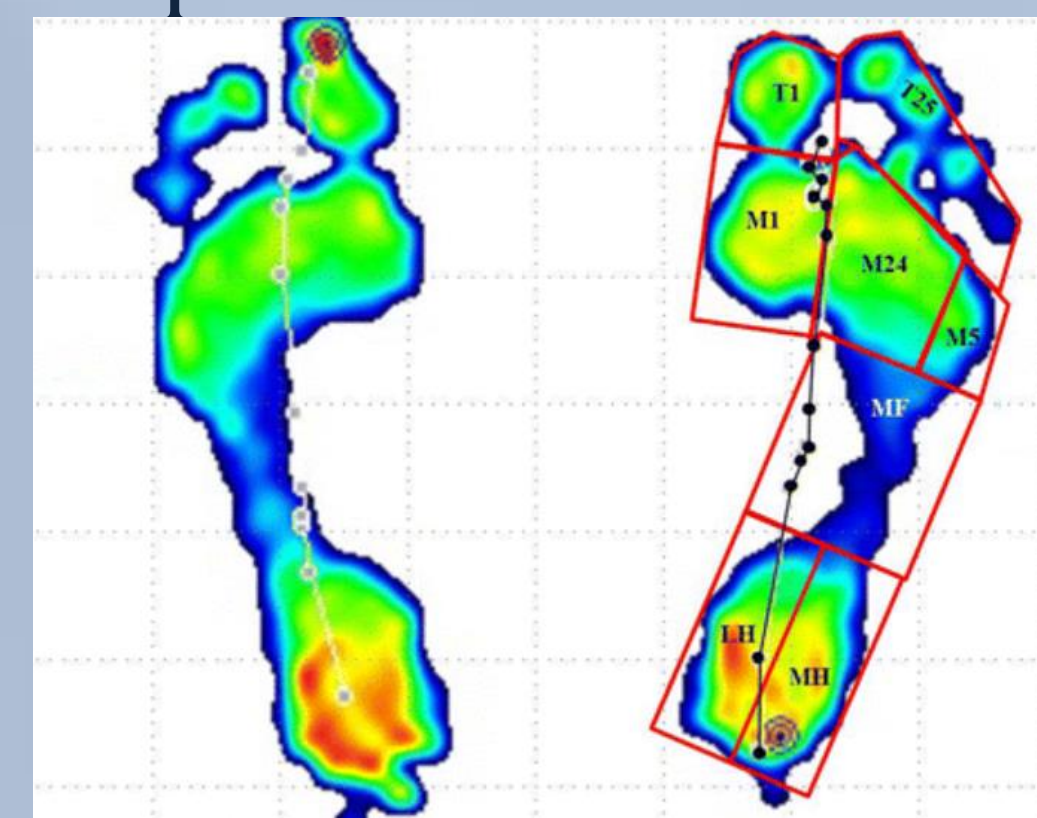
Table 8: related-sample Wilcoxon Signed Rank Test Summary

- All 4 groups of data were found to be significant different pre- and post- intervention.

DISCUSSION & CONCLUSION

Plantar pressure of 5th metatarsophalangeal joint

- In similar studies, plantar pressure of 5th metatarsophalangeal joint significant increased post intervention.
- This is with the help of orthotics, the load would then be spread out throughout the feet instead of only on medial side, leading to increase of plantar pressure at the 5th metatarsophalangeal joint. ⁽⁴⁾



Plantar pressure of midfoot

- Similar studies have shown orthotics shifting load to lateral, leading to significant decrease of plantar pressure of midfoot after wearing orthotics. ⁽⁵⁾
- Results gotten in this study found that midfoot pressure has significant decrease post-intervention, with the reasons of:
 - The foot scan used in the study did not differentiate midfoot pressure into medial and lateral midfoot ⁽⁶⁾
 - Weight of the study participants gained during this period of wearing orthotics (intervention) has interfered the results of midfoot. ⁽⁷⁾

Conclusion

- Orthotics have been found to be significantly improved the condition of flat feet, by wearing orthotics for 3 months.
- However, more studies should be done by having a control group and bigger sample size in order fill the gap of this study.

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