

FOOT LENGTH RATIOS FOR SELECTED DIMENSIONS IN A MIXED GENDER, NON PATHOLOGICAL SAMPLE

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INTRODUCTION

Although there are various studies involving foot measures in children (Gould, 1990; Wenger et al. 1983), there is a paucity of information on the mathematical relationship within various foot measures. A previous study (Chockalingam & Ashford; 2002) has suggested that selected foot length ratios in a non-clinical male sample, are remarkably consistent. This work reported ratios of 1.45 (SD 0.01) between the foot length and the distance between the heel and the head of the first metatarsal and 4.5 (SD 0.11) between the length and heel width. These types of simple measurements, which are relatively easy to record by the clinician or indeed other personnel, may be useful in a variety of ways, for example: more quantifiable available data for the clinician and coincidentally 'hard' data for the patients clinical records; could be useful in future research, particularly when classification of foot types are being considered; and the design and construction stage of last production and foot orthosis prescription may benefit from this data.

The present study reports on the previous work, however unlike the simple methodology utilised previously, a pressure platform was used to record the data in a mixed gender sample. Furthermore, we also report on an additional foot ratio not previously published.

METHOD

A convenience sample of 78 university students comprising of 47 males and 31 females with an average age of 21.03 years, height of 173 cms and weight of 71.39 kgs was recruited for the study, which was approved by the institutional ethics committee. All subjects took part in the study reported no known foot pathologies and were not wearing any foot support devices or orthoses. Furthermore the subjects were recruited from a well active sporting population drawn from a variety of sports ranging from athletics to football. A Footscan® (RS Scan Intl, Belgium) pressure platform system was used to measure the pressure distribution and in turn foot prints. Various measurements as shown in the figure were carried out.

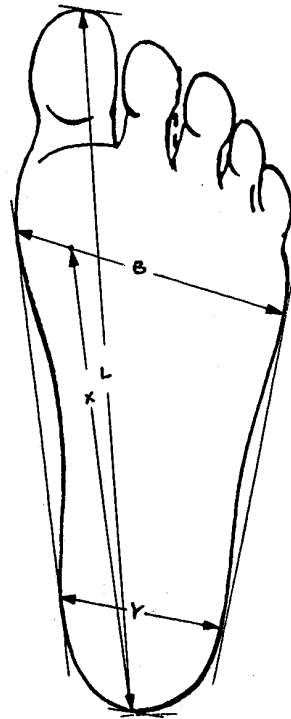


Figure 1: Various foot measurements

RESULTS

Average ratios between the foot length (L) and various other measurements are given in Table 1.

L X Ratio				L Y Ratio				L B Ratio			
Left		Right		Left		Right		Left		Right	
Mean	1.301	Mean	1.307	Mean	5.560	Mean	5.494	Mean	3.304	Mean	3.297
St. Dev	0.039	St. Dev	0.040	St. Dev	0.474	St. Dev	0.513	St. Dev	0.304	St. Dev	0.309
Range	0.186	Range	0.220	Range	2.282	Range	2.494	Range	1.432	Range	1.279
Minimum	1.196	Minimum	1.206	Minimum	4.497	Minimum	4.218	Minimum	2.635	Minimum	2.641
Maximum	1.382	Maximum	1.426	Maximum	6.779	Maximum	6.712	Maximum	4.068	Maximum	3.920

Table 1: Descriptive statistics for various foot length ratios.

DISCUSSION AND CONCLUSION

The consistency of the data in this mixed gender sample demonstrates a similar pattern to previous work. However, given the method of data collection and analysis in this study, the data is a more accurate reflection of the selected foot ratios than the previous published data. This assertion is primarily based on the premise that whilst using simple footprint data, this methodology does not allow for the margins of the lateral and medial borders of the foot (soft tissue expansion) to be recorded accurately. Furthermore, a third foot ratio not previously published, also shows remarkable consistency across the sample.

Further studies are required to chart and map all the foot ratios in different ethnic, gender and pathological foot types, which could be helpful in the clinical, the research dimension and the shoe manufacturing industry.

REFERENCES

- Chockalingam N & Ashford RL (2002) Foot length ratios for selected dimensions in a non clinical male sample. *Aust J Podiatric Med* 36 (2): 45-47.
- Gould N (1989) Foot growth in children age one to five years. *Foot & Ankle* 10 (5): 221-213.
- Wenger DR, Mauldin D, Morgan D, Sobol MG, Pennebaker M, Thaler R (1983) Foot growth rate in children age one to six years. *Foot & Ankle* 3 (4): 207-210.