THE CORRELATION BETWEEN STATIC MEASUREMENT OF MEDIAL LONGITUDINAL ARCH AND DYNAMIC MEASUREMENT OF ARCH INDEX

Bita. Shakibi (1), Raghad. Mimar (1), Vida. Shakibi (1)

Kharazmi University

1.Physical Education and Sport Sciences School, Kharazmi University, Tehran, Iran

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Introduction

One of the structures, which plays an important role in both shock absorption and energy transfer during activity, is the medial longitudinal arch (MLA) of the foot (Ogon, 1999). There are few studies in this context, which have assessed MLA in static and dynamic situations and found an association between them (Chen, 2006; Teyhen, 2009). Although, there are several methods for evaluation of MLA, dynamic measurement for determination of foot type is less considered. Thus, as the function of the foot during dynamic activities depends on its type (Razeghi, 2001), the purpose of this study was assessing the correlation between static measurement of MLA and dynamic measurement of arch index (AI).

Methods

60 healthy females (mean mass 53.77±8.31 kg, mean height 159.24±4.50 cm, mean age 23.10±3.18 yr), with no history of injuries were included in this study. Static height of MLA was measured using navicular drop test (Figure 1). Dynamic arch index was measured by geometry software using emed-at2 platform (Figure 2). Analysis was carried using Pearson correlation coefficient (95% CI).

Figure 1. An example of the measurement of navicular drop.

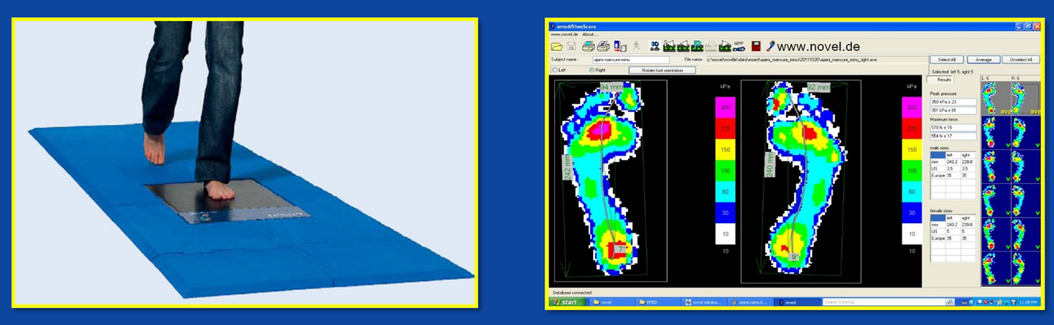

Figure 2. An example of the measurement of dynamic arch index by using emed-at2 platform.

Results

The correlation between navidular drop and dynamic AI was significant (r=0.62, P=0.000) (Figure 3).

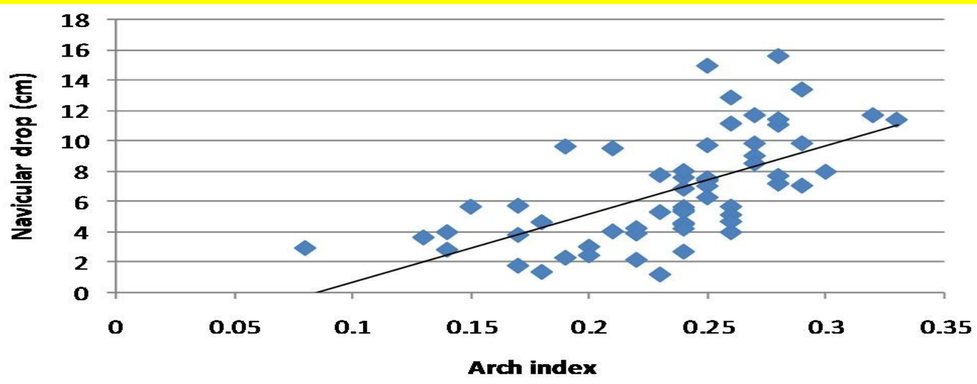

Figure 3. Scatter plot displaying the relationship between navicular drop and dynamic arch index (r=0.62).

	Arch index							
	Pes rectus		Pes planus		Pes cavus		Total	
	n	%	n	%	n	%	n	%
Navicular drop								
Pes rectus	22	**81.5**	2	7.4	3	11.1	27	45
Pes planus	10	66.7	4	**26.7**	1	6.7	15	25
Pes cavus	8	44.4	-	-	10	**55.6**	18	30
Total	40	66.7	6	10	14	23.3	60	100

Table 1: Dividing the foot into three types: rectus, planus and cavus, by navicular drop test and dynamic AI.

As shown in table 1, 45% of subjects were pes rectus, 25% were pes planus and 30% were pes cavus in static situation. While, 66.7% of subjects were pes rectus, 10% were pes planus and 23.3% were pes cavus in dynamic situation.

Discussion and Conclusion

The findings demonstrated a significant association between static height of MLA and dynamic AI. But, as shown in table 1, the number of feet which in static situation had the same type as in dynamic situation for pes rectus, pes planus and pes cavus were 22 (81.5%), 4 (26.7%) and 10 (55.6%), respectively. While, the number of feet which in static situation had different types from in dynamic situation for pes rectus, pes planus and pes cavus were 5 (18.5%), 11 (73.3%) and 8 (44.4%), respectively.

In a study, a significant correlation was found between subarch angle and arch height, which were obtained from a radiograph. However, no correlation was found between midfoot arch index and arch height. So, it was concluded that due to variability in soft tissue and bone structure, midfoot arch index is less valid and reliable parameter for assessing MLA structure (Chen, 2006). In another study, a significant correlation was found between static and dynamic arch height indices. Thus, it was concluded that 60% of variability in static arch height can be predicted by a multivariate model generated by plantar parameters during gait (Teyhen, 2009). The findings of the presented study were consistent with Teyhen et al. (2009) study and confirmed its findings. Maybe, the reason of contradiction with Chen et al. (2006) study is the difference in either measurement methods or the number and age range of the participants.

Although, a significant correlation was found between static and dynamic measurement methods in the present study, the numerous numbers of differences between static and dynamic measurements were related to abnormal feet. So, as the foot sustains pressures generated by dynamic activities, determination of dynamic foot type is more important.

References

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