Influence of Index Plus and Index Minus Foot on Static and Dynamic Balance among Collegiate Girls

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Abstract

Background: Index plus foot is defined as the first metatarsus being lengthier than the second whereas the Index minus foot is a condition where the second metatarsus is extended than the first metatarsal**.** The prevalence of index minus foot is higher among females, a study on balance with index minus and index plus foot on normal individual females are lacking. **Objective**: The objective of the study is to determine the influence of index plus and index minus foot among collegiate girls **Methodology:** It is a non- experimental study with sample size of 100 are taken and tested for both static and dynamic balance. **Outcome Measures:** Flamingo balance test and Star Excursion Balance Test. **Results:** The mean and standard deviation of flamingo balance test for index plus group is 9.24+2.77423 and the index minus is 15.04+1.6655. The mean value of star excursion balance test for both groups resulted with less noticeable difference. **Conclusion**: The study concludes that there is a difference in static balance, whereas there is no differences in dynamic balance among collegiate girls.

Keywords: *Index plus and minus foot, static and dynamic balance, flamingo balance test, star excursion balance test.*

Introduction

The metatarsals in the feet are off varying length. Usually the first metatarsal is longer than the second metatarsal which is said to be Index plus foot. In some cases the second metatarsal is longer than the other toes that is Index minus foot. The prevalence of Morton's toe worldwide ranges from 20-30%. It is also noted that the prevalence is more in females compared to men. Clinically there are certain tools to measure the length of the metatarsal.[1]One among them is the Maestro and Barroco techniques.[1] It is done by obtaining a radiograph of the foot drawing lines in the radiograph accordingly. The other method of determining the metatarsal length easily at place is Palpation Based Test.[1] Balance is stated as maintaining equilibrium in which centre of mass adopts according to the individual base of support irrespective to the external and internal factors.[2] One of the required terminology in routine life is balance which can be both static and dynamic.[3] Within the provided optimal base of support balance is the desire of moving body in terms of both physiological and mechanical situation.[4] The static balance is measured using Flamingo Balance Test (FBT). It is one of the cost effective method.[5] The Star Excursion Balance Test is a method used to measure the dynamic postural control of an individual.[5] Since the body's total weight is finally transferred to the foot, even a slight modification in the alignment may alter the line of gravity to fall in the provided base of support.[6] As balance is more consider in daily activities it is necessary to understand the mechanism of balance in index minus and index plus foot.

Material and Methods

The length of the metatarsal is measured by palpation based test. In this method the participant was asked to stand in a piece of graph. One line that is in order to the great toe is drawn and the next line is drawn in horizontal manner in respect to the second toe. A line is drawn horizontally from the above lines at a distance of 2 cm. By using sliding Vernier caliper the length was measured from metatarsophalangeal joint to the new line drawn. If the difference between two lines are greater than zero, it is called index plus and lesser than zero it is called index minus foot.

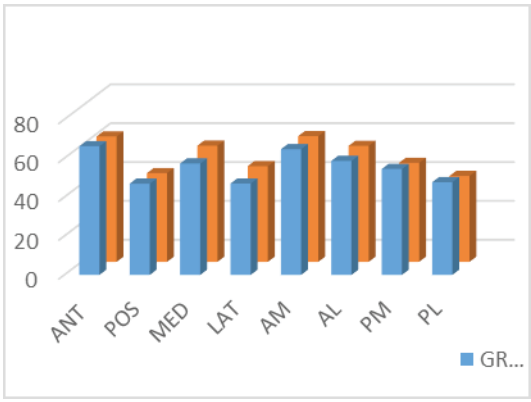
The static balance is measured by Flamingo Balance test and the dynamic balance is measured by SEBT.

Results and Discussion

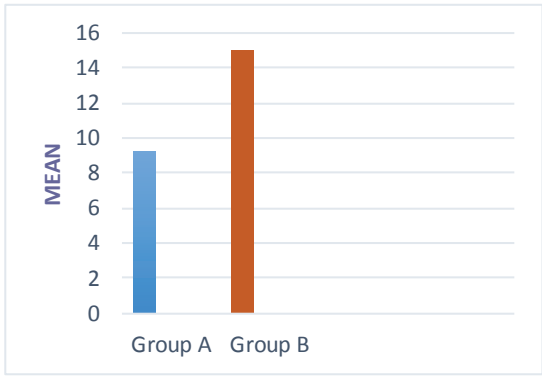
The flamingo balance test performed by the index plus group exhibited a total mean and standard deviation of 9.24+2.77423(Graph 1) whereas the index minus group shown a mean of 15.04+1.6655(Graph 2). The mean value of star excursion balance test for both groups resulted with less noticeable difference. As the weight falls into the calcaneus, it eventually spreads to the forefoot. The majority of the load is been received by the first metatarsal. The great toe is said to play a predominant role in static balance, this is taken into consideration that individual with index plus toe is more supreme in single leg static balance. Where in index minus foot the body load transmitted from the calcaneus should be received slightly more by the second metatarsal compared to the above state. This results is supported by **Agopyan et al suggesting** that there might be a difference in unilateral static balance with index minus toe. Considering the dynamic balance among the groups **In Hyouk Hyong. et.al** showed that there is no significant difference in dynamic balance among different foot shape in his study. It is stated that for an individual to maintain a dynamic balance the muscles play a vital role than the bones. This is in accordance with **Bannister. R** that enough muscle power is required for maintaining dynamic mobility. Thus this study on the basis of human biomechanics shows that static balance varies among the index plus and index minus foot whereas the dynamic balance do not have any significant difference.

Conclusion

On account of all the above, the study concludes that there is a difference on static balance among index minus and index plus foot. Regarding the dynamic balance there is no much difference among the groups.



Graph 1 Flamingo Balance Test.



Graph 2 Star Excursion Balance Test.

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