



## Prevalence of flatfoot in Turkish male adolescents

Türk erkek ergenlerde düztabanlık yaygınlığı

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**Objectives:** Prevalence of flatfoot in healthy Turkish male adolescents was investigated.

**Patients and methods:** The present study was carried out in a high school in İstanbul in July 2006. Twenty-two subjects with flatfoot were diagnosed among 3169 male adolescent participants. Prevalence of flatfoot was evaluated statistically in this certain age and gender group. Correlation of flatfoot with weight and height were evaluated.

**Results:** Prevalence of flatfoot was found to be 0.69%. Correlation of flatfoot with weight or height was not significant.

**Conclusion:** Rigid and resistant flatfoot can cause severe disability. Therefore, the possibility of flatfoot should be kept in mind in symptomatic male adolescents.

**Key words:** Adolescents; flatfoot; prevalence.

**Amaç:** Bu çalışmada sağlıklı Türk erkek ergenlerde düztabanlık yaygınlığı araştırıldı.

**Hastalar ve yöntemler:** Çalışma 2006 yılının Temmuz ayında İstanbul'da bir lisede 3169 erkek ergen öğrenci ile gerçekleştirildi, katılımcılar arasından toplam 22 düztaban olgusu saptandı. Bu yaş grubundaki erkek ergenlerde saptanan düztabanlık yaygınlığı istatistiksel olarak incelendi. Aynı zamanda düztabanlığın boy ve vücut ağırlıkları ile olan ilişkisi değerlendirildi.

**Bulgular:** Düztabanlık yaygınlığı %0.69 olarak saptandı. Düztabanlık ile boy veya vücut ağırlığı arasında anlamlı bir ilişki bulunmadı.

**Sonuç:** Sert ve dirençli düztabanlık önemli yakınmalara yol açabilmektedir. Bu nedenle semptomatik ergenler değerlendirilirken düztabanlık ihtimali göz önünde bulundurulmalıdır.

**Anahtar sözcükler:** Ergenlik; düztabanlık; yaygınlık.

Flatfoot is described as the loss of the medial longitudinal arch of the foot, valgus deformity of the heel and medial talar prominence.<sup>[1]</sup> The deformity is usually asymptomatic and resolves spontaneously in the first decade of life, or occasionally progresses into a painful rigid form which causes significant disability. Several factors have been identified to contribute to the etiology of flatfoot. These factors include ligamentous laxity, equinus deformity of the foot, tibial torsional deformity, presence of the accessory navicular bone, congenital vertical talus and tarsal coalition. Although it is not obvious, obe-

sity is also accepted as one of the possible factors related to flatfoot.<sup>[1-3]</sup> Previous studies<sup>[4-6]</sup> indicate the prevalence of flatfoot between <1% and 28% at certain age groups. Although there are some previous national studies which focused on torsional profile<sup>[7]</sup> and foot types,<sup>[8]</sup> such a prevalence study of flatfoot has not been carried out in the Turkish population until now. This brief report, with its limitations, was designed to evaluate the prevalence of flatfoot in healthy Turkish male adolescents. Furthermore, correlation between body weight, height and prevalence of flatfoot was investigated.

## PATIENTS AND METHODS

During a general health scanning program in a high school in İstanbul, 3169 subjects were evaluated for the presence of flatfoot in July, 2006. All of the subjects were male within the age range of 14 to 15 years. None of the subjects had a major previous history of any orthopedic or medical pathology. Height and weight of each subject were recorded. The feet of subjects were categorized into normal and flatfoot by clinical examination. The foot was defined as normal if the medial longitudinal arch was normal during standing. Slightly depressed, but still visible arch with no clinical complaints was also accepted as normal. Total loss of the medial longitudinal arch or convexity of the medial aspect of the foot with the presence of talar head on the medial plantar side was categorized as flatfoot.<sup>[9]</sup> No X-rays were obtained for the evaluation of the feet. Flatfoot was considered as flexible if the arch returned to its normal height and appearance on toe raising test of Jack.<sup>[1]</sup>

Mann-Whitney U-test was used in assessing the descriptive methods (mean value, standard deviation, height, and weight). It was accepted statistically significant when the *p* value was <0.05 with the confidence interval as, 95%.

## RESULTS

We detected 22 participants with flatfoot according to the diagnostic criteria described as above. Three thousand one hundred and forty seven participants were accepted to have normal feet. All of the flatfeet were flexible and there was no rigid flatfoot. Prevalence of flatfoot was 0.69% in our study group in adolescent boys.

The average of body weight was 55.4±9.7 kg in the normal group and 58.6±8.7 kg in the flatfoot group. The difference between the two study groups was not significant (*p*=0.075 and *r*=0.032 Mann Whitney U-test). Weight of the subjects alone did not have an effect on the presence of flatfoot.

The average height was 165.5±7.3 cm in the normal group and 166.4±7.9 cm in the flatfoot group. The difference between the two study groups was also not significant (*p*=0.494 and *r*=0.012 Mann-Whitney U-test). Height of the subjects alone was also inconsistent with the presence of flatfoot.

## DISCUSSION

Children with flexible flatfoot are usually asymptomatic and may achieve correction spontaneously in the first decade of life. A few children, especially older, obese or adolescent ones, may have foot strain with prolonged standing, abnormal shoe wear, pain in the longitudinal arch, abnormal fatigue, discomfort extending upward on legs and sometimes pain in the calf. Diagnosis is generally made on the basis of history and clinical examination. Radiological parameters and footprint analysis can be used for qualification, classification and monitoring of these patients.<sup>[2,10]</sup> Parents are generally concerned about the appearance of the feet. Treatment modalities offered for flexible flatfoot affect parents' anxiety positively rather than the child's treatment. Treatment of the flexible flatfoot begins with conservative care, parental reassurance, observation and possible use of arch supports.<sup>[11]</sup> If the deformity is rigid, it may cause severe disability. The management of rigid flatfoot or resistant cases is usually surgical correction if conservative modalities do not provide any relief.<sup>[2]</sup> Several risk factors have been claimed to result in flexible flatfoot. Although there is still debate, obesity is one of these correlating factors.<sup>[1,3]</sup>

Prevalence of flatfoot reported in the literature<sup>[4,6,9]</sup> is usually for children younger than 8-10 years old and differs among age groups. As the age of the group increases, prevalence of the flatfoot decreases due to its benign nature of spontaneous correction. It was reported that<sup>[9]</sup> 43% of children had moderate and 14% had severe flatfoot in the age group of 2-3 years. The prevalence dropped to 31% for moderate and 9% for severe flatfoot in the age group of 3-4 years, 24% for moderate and 4% severe at age group of 4-5 years, and 19% for moderate and 2% for severe in the age group of 5-6 years. In a different study,<sup>[12]</sup> it was also reported that the prevalence of flatfoot was 16.4% in the age group of 8-10 years. Our study group includes adolescent boys of 14 and 15 years old. Prevalence of the flatfoot in our group was 0.69%. Considering our result and spontaneous resolution after the first decade, it can be said that real prevalence of symptomatic flatfoot is not very high in adolescents.

Our study has some limitations. One of them is that it includes only adolescent males. Because of differences between genders in terms of ligamen-

tous laxity and torsional profile at lower extremity which are counted in the etiology of flatfoot, similar studies should also be done for females. The second limitation is the age group of the participants. It is obvious that during childhood and adolescent period, prevalence of the flatfoot changes in certain age groups. Additionally, one may claim that obesity is a predisposing factor for flatfoot considering the results of this and other studies. However, we could not show a correlation between flatfoot and weight and height; this issue also requires confirmation with another study about whether body-mass index has a correlation with flatfoot.

In conclusion, the prevalence of clinically symptomatic flatfoot in healthy Turkish male adolescents is not very high as expected, with a percentage of 0.69%; but it should be kept in mind while examining the symptomatic adolescents.

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