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ASSESSMENT OF ANTHROPOMETRIC INDICATORS IN EARLY ADOLESCENT BOYS WITH FLATFOOT

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Abstract: Background: Flatfoot (pes planus) is a common orthopedic condition among adolescents that can negatively affect posture, gait, and overall physical development. Studying anthropometric indicators in adolescents with flatfoot allows for the early detection of developmental problems and the implementation of preventive measures.

Methods: The study was conducted among male high school graduates. Standard anthropometric measurements were taken in participants diagnosed with flatfoot, along with physical examinations of the spine and foot structure. The collected data were analyzed to determine the relationship between the severity of flatfoot and other physical development parameters.

Results: The results of the study showed significant differences in posture and body symmetry in adolescents with flatfoot compared to those without. Spinal deformities such as scoliosis and lumbar hyperlordosis were more prevalent in the affected group. Additionally, their physical performance indicators were found to be lower.

Conclusion: Flatfoot can have a serious impact on the physical development and posture of adolescents. Early diagnosis and the implementation of preventive strategies play a crucial role in avoiding long-term orthopedic complications. The study emphasizes the importance of regular screening and timely intervention in school-aged children to ensure healthy musculoskeletal development.

Keywords: Anthropometric measurements, flatfoot, deformity, scoliosis, lordosis, kyphosis, adolescent development.

Relevance of the Topic

As we know, the future and prospects of every nation depend on its growing youth. According to the Presidential Decree of the Republic of Uzbekistan No. PF-60 dated January 28, 2022, "On the Development Strategy of New Uzbekistan for 2022–2026," tasks have been set to improve the system of providing high-tech medical care for women of reproductive age and pregnant women, as well as children. This includes equipping perinatal centers with the necessary medical equipment and supplies and ensuring they are staffed with qualified personnel.

The social policy implemented over the past five years has systematically ensured the protection of motherhood and childhood, resulting in a decrease in maternal and infant mortality rates.

Currently, the issue of flatfoot in children and the impact of their anthropometric indicators is of particular importance both in Uzbekistan and globally. According to the World Health Organization, flatfoot affects 20–30% of children.

Let us analyze scientific research conducted on flatfoot in children. A study conducted in India also addressed flatfoot. Flatfoot, or pes planus, occurs due to the collapse of the arches of the foot. However, its etiology differs across various age groups. Since anthropometric measurements are age-dependent, their interrelation should also be age-specific with respect to different foot positions. Our research is aimed at identifying the prevalence of the Plantar Arch Index (PAI) and examining any potential correlation between flatfoot and obesity among a population of young students. The results showed that obesity was not associated with flatfoot in the 18–25 age group, possibly due to different indicators of acquired flatfoot etiology in this age group. Our study also suggests that the simple ink footprint method is a basic but effective clinical diagnostic tool for flatfoot deformity using the PAI.

Foot posture is age-dependent. The purpose of this study was to investigate the relationship between the six-element version of the Foot Posture Index (FPI) and other clinical parameters for foot posture in children aged 5–8 years using anthropometric and radiological measurements. A positive correlation was observed between FPI-8 (Foot Posture Index) and the ND (Navicular Drop) test, as well as the CSI (Chippaux-Smirak Index), in children aged 5–6 years. All three well-known foot posture indicators (FPI-6, ND, and CSI) can be used as primary or preferred tools in clinical practice. [2]

The aim of this study was to determine the relationship between flatfoot, socio-demographic factors, and nutritional status in children aged 7–14 years in the Vojvodina province of Serbia. The study was conducted as a cross-sectional research. The main tool used was a questionnaire, and anthropometric measurements were performed using standardized procedures.

To determine the impact of socio-demographic factors and nutritional status on flatfoot as independent variables among schoolchildren, a multivariable logistic regression model was implemented. The multivariable model was adjusted for age, gender, type of residence, and socioeconomic status.

The study showed that nutritional status was significantly associated with the presence of flatfoot among schoolchildren. The high prevalence of flatfoot and obesity in schoolchildren should be considered a warning sign, and comprehensive health policies should be implemented to address these issues. [3]

The purpose of a recent study conducted in Turkey was to define Pes Planus (PP) as a decrease or loss in the length of the medial longitudinal arch (MLA). The aim of the present study was to determine whether PP leads to anthropometric changes in individuals and to explore the relationship between PP and foot type.

As a result, significant differences were found in the circumferential measurements of the waist, thigh, both thighs, and the right leg of females — specifically in the bimalleolar area ($P < .05$). Significant differences were also observed in the bimalleolar circumferences of both the right and left feet. Similar significant differences were recorded in the indices of males ($P < .05$). Differences were noted in both genders. In both males and females, significant differences were

found between the right and left foot MLA and tarsal heights ($P < .05$). It was concluded that PP affects not only the anthropometric dimensions of the foot but also the thigh, hip, and leg measurements.

Early treatment of PP is crucial, as failure to do so may result in irreversible lower extremity problems that can significantly reduce quality of life. [4]

In the scientific case report, a 20-year-old woman was presented to the physiotherapy department with a musculoskeletal disorder characterized by impaired gait related to underdevelopment and flatness of the heel in one foot since birth. Aside from these foot deformities, no other significant abnormalities were found.

In this practical study, a survey was conducted to evaluate the effectiveness of foot rehabilitation exercises in managing painful flatfoot in a 20-year-old woman. The patient's foot pain and discomfort caused by flatfoot significantly affected her daily activities and quality of life.

Through a structured rehabilitation program consisting of targeted exercises, stretching, and orthotic intervention, significant improvements in functional mobility and foot posture were observed, along with a reduction in pain. The implementation of personalized exercises aimed at strengthening the intrinsic foot muscles, enhancing arch support, and improving proprioception played a crucial role in managing the painful flatfoot. Additionally, improvements in foot condition contributed to solving major biomechanical issues, increasing flexibility, and boosting the overall effectiveness of the rehabilitation program. Including stretching exercises helped relieve muscle tension and improve muscle strength.

This practical study highlights the importance of rehabilitation protocols tailored to the individual needs of patients with painful flatfoot. By identifying biomechanical abnormalities, strengthening intrinsic foot muscles, and optimizing foot posture, it enables physicians to effectively alleviate symptoms, improve functional outcomes, and enhance the overall quality of life for individuals affected by this condition. Ultimately, continuous research in foot rehabilitation not only enhances clinical procedures but also plays a crucial role in promoting overall health and restoring functional autonomy in individuals. [5]

Children's foot health plays a significant role in their play, locomotive activity, healthy lifestyle, somatic development, and weight management. The burden of flatfoot among children in Ethiopia is not well known. The objective of this study was to assess the structure of the medial foot arch and its associated factors using the Staheli plantar arch index among a large sample of school children aged 11–15 in Ethiopia.

A school-based cross-sectional study was conducted among 11–15-year-old children from a randomly selected sample of eleven primary schools. The sample size was proportionally allocated between public and private schools within the sample to ensure diversity. Data collection included physical measurements, full-weight-bearing footprint-based assessments, and a structured questionnaire regarding foot pain, footwear, and physical activity. The data were analyzed using descriptive statistics, as well as univariate and multivariate logistic regression models.

The results of this study showed that the overall prevalence of flatfoot was nearly the same among children with normal body weight. Children with evident foot issues require the development of a screening algorithm to improve diagnosis and treatment indicators. [6]

Another scientific study from India focused on the medial longitudinal arch, a structure formed by components that allow for the efficient functioning of the foot. The medial longitudinal arch consists of two pillars—anterior and posterior. In this study, the research method and materials included conceptual observations and an observational approach integrated into the current investigation.

In a study conducted in India, 350 participants between the ages of 17 and 40 were randomly selected from the North Gujarat region. Among them, there were 240 males and 110 females. Based on the results and the methodology used, the study found that within the randomly selected population of 350 individuals aged 17–35 years, the prevalence of unilateral flatfoot was 12.5% (10% in males and 12.5% in females) [7].

As part of a project, a study conducted in Poland aimed to determine the relationship between children's longitudinal and transverse foot arches and their weight, gender, and age. The method used was developed under the "Let's Get the Kids Moving" initiative by researchers at the Health Medical University and for the Run Health Foundation. A total of 655 children (51.5% boys) aged 7 to 10 years from primary schools in southwestern Poland participated in the study. The average age of the participants was 8.7 years, with a standard deviation of 0.8 years.

For all children, anthropometric measurements (weight and height) were taken, and their longitudinal and transverse foot arches were assessed under their body weight. A two-dimensional foot scanner (Sensor Medica, Italy) was used to examine the plantar aspect of the children's feet. The data collected from the 655 participants showed that being overweight made them more likely to develop lower longitudinal and transverse arches. Foot shape did not differ significantly by gender or age.

The conclusion from this study is that screening school-aged children's footprints can allow for the early detection of foot shape abnormalities, enabling early diagnosis of functional or structural flatfoot in children. [8]

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