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The Effectiveness of Playing Footprints and Hands on Static Balance in Children Aged 4-6 Years with Flat Foot Conditions in TK Tunas Tridharma Plus Samarinda

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Abstract

The aim of this research was to determine the effect of playing with footprints and hands on the static balance of children aged 4 - 6 years with flat feet at Tunas Tridharma Plus Kindergarten Samarinda. Research methods used is a quantitative approach with a pre-experimental research group design after testing. The population of this research is students Tunas Tridharma Plus Kindergarten Samarinda. The sample taken in this research used purposive sampling with as many respondents as possible 20 children. The data collection techniques used are observation, experimentation and documentation. The data analysis technique used is statistical analysis description, kolmogorov smirnov normality test and test paired sample test. Based on the research results, there are significant changes in abilities the child's static balance as shown by the results of the paired sample test as big as Sig. (2-tailed) 0.001<0.05, so H_0 is rejected and H_1 is accepted, meaning that the effectiveness of the footprints and hands game has a significant influence on the static balance ability of children aged 4-6 years in flat foot conditions.

Keywords: Static Balance, Flat Foot, Footprint and Hands Games

INTRODUCTION

Children's growth cannot be separated from the role of parents in supporting every physical activity that involves movement elements appropriate to the child's age. The role of parents in assisting to monitor children's growth and development and health is expected to have knowledge regarding the child's condition in order to detect early the emergence of health problems. Health problems are not only related to the metabolic system or immune system, but also occur in movement disorders involving children's motor skills, such as walking or gait habits caused by the structure of the child's feet (Sativani & Pahlawi, 2020). One of the abnormalities in the structure of the feet that affects the role of balance and body posture is flat foot.

Flat foot is a condition where part or all of the sole of the foot touches the floor when standing. The condition of the medial arch of the foot, which is closed until it is closed, results in pressure on the subtalar joint which results in internal rotation of the tibia (Safitri et al., 2019). Most *flat foot incidents* occur in physiological form, if not detected early this condition will cause functional symptoms of foot movement which can affect one of the components of physical fitness that plays a role in physical activity, namely balance. Balance in children plays an important role in maintaining body position in static and dynamic conditions, controlling balanced and stable movements, and supporting the maturity of motor skills. Structural abnormalities of the foot can affect the physiological conditions of the plantaris muscles and plantar fascia.

The prevalence of flat feet in children aged 3 years reaches 62.8% and 50% in children aged 6 years (Chen et al., 2014). The medial arch of the foot will improve until the age of 6 years,

then begins to slow down until the age of 10 years. In previous research related to the results of identifying locomotor movements during elementary school, 90 students were the subject, and 66.6% or 60 students were obtained results that did not have a balance according to their growth and development. In general, the arcus pedis in *flat* feet tends to overpronate, so that during walking, especially in the stance phase, *the ground reaction forces* move medially. Meanwhile, in *the cavus foot* , the foot tends to be oversupinated, so that during walking, especially in the stancephase, the *ground reaction forces* move laterally (Hillstrom et al., 2013).

Based on the results of observations through interviews, the knowledge of parents and assistants of kindergarten students regarding the risk of *flat foot conditions* in children is still lacking. So that the form of treatment in the assistance given to children is to overcome the effects of *flat feet* which if not paid attention to early on will cause balance disorders, fatigue when walking and injuries so that it can reduce the productivity and functional movement of children. Efforts to detect the early stages of the risk of disorders from *flat foot conditions* require follow-up.

RESEARCH METHODS

Phase began with collecting respondents as a sample, namely Tunas Tridharma Plus Samarinda Kindergarten students and coordinating with the school to provide a game of footprints and hands for 16 meetings. Before giving the game of footprints and hands, the researcher examined the archus pedis using the *wet footprint test method* by instructing the sample to alternately step their right and left feet on the paint section and then place their feet on the paper which was then identified using the *Clarke's angle test method*. Then proceed with identifying the students' static balance abilities using *the Stork Stand Test* namely the respondent was instructed to maintain body balance by standing upright with his hands on his waist, then lifting one leg attached to the medial side of the knee of the other leg and closing his eyes, and the time was recorded using a stopwatch.

Figure 1. *Clarke's Angle Test*

Figure 2. *Stork Stand Test* (Afafa, 2018)

Identify the results according to the test result criteria using the *Clarke's angle test method* by classifying the examination results into three categories, namely: a) *Flat foot*: <31°, b) *Normal foot*: 31° - < 45°, c) *Cavus foot*: > 45°.

Research methods used is a quantitative approach with a pre-experimental research group design after testing. The population of this research is students Tunas Tridharma Plus Kindergarten Samarinda. The sample taken in this research used purposive sampling with as

many respondents as possible 20 children. The data collection techniques used are observation, experiments and documents. The data analysis technique used is statistical analysis tif description, kolmogorov smirnov normality test and test *paired sample test*. This data analysis technique was used to determine the effectiveness of foot and hand playing on the static balance of children aged 4-6 years at Tunas Tridharma Plus Samarinda Kindergarten.

RESULT AND DISCUSSION

Based on the distribution of respondents in this study, it shows that the number of women is 7 children and men are 13 children. The results of the identification of female respondents were that 5 children had normal arches (71.4%), and 2 children had flat feet (28.6%), while in the male respondents who were surveyed as many as 8 children had normal arches (61.5%) and 5 children with flat feet (38.5%). Furthermore, the results obtained related to static balance in girls with a flat foot condition of 29.7% in the very good category while the boys' static balance is included in the very good category of 32.3%. Based on the percentage data, the static balance of girls with flat feet is worse than that of boys. In this case, according to Sahabuddin (2014) explained that there are factors that affect static balance in girls, one of which is the existence of environmental factors in the playing habits of girls who tend to be passive and are limited to playing outside the home.

The results of the Spearman rank correlation test found that there was a relationship between flat foot and static balance in children aged 4-6 years with a value of p = 0.000 (p <0.005). The difference test in this study used the independent simple t-test and the results showed that there was a difference in the effect of normal feet and flat feet on the static balance of children aged 5-6 years with a significance value of 0.000 (p <0.005).

From this test, the difference in average static balance was obtained, where normal foot was 4.75 ± 1.155 greater than flat foot with a figure of 3.1 5 ± 1.153 . So it can be concluded that static balance on normal foot is better than static balance on flat foot condition.

Table 1. Independent simple t-test

No	N	Static Balance		
		Mean	SD	*P*
Flat feet	7	3,15	1.153	0,000
Normal feet	13	4.75	1,155	

Discussion

People suffering from flat feet experience weakness in the intrinsic or inner muscles of the feet, such as the supporting structure of the foot (longitudinal arch), which can affect the body's levers when the feet collide and push, thereby disrupting balance (Latifah, et al., 2021). Flat foot conditions cause a tendency for the foot to overpronate, which continuously affects the entire structure of the foot, causing the tibia to also experience internal rotation (Safitri et al., 2019). This disorder causes injury caused by the arch structure growing abnormally, affecting the child's balance, continuing deformity and causing pain. Several factors influence the increase in the condition of flat feet, namely male gender, childhood, obesity, weak ligaments, a family or genetic history of flat feet, and the habit of wearing footwear during childhood (Mien, V.A., et al., 2017). As a child gets older, the physiological condition of the tendon tissue in the foot, which functions as a support for the joints, will tighten and form an arch in the foot.

Providing a foot and hand footprint game design aims to train balance which can affect the physiology of the archus pedis to improve the physiological condition of the plantar muscles and plantar fascia. So that the form of the game that is applied is dominated by prioritizing training of body posture to stay in an upright position, and is focused on training children to follow the instructions on the image of footprints and hands by prioritizing flexibility, accuracy, balance and strength to maintain body position which is done repeatedly.

Games in the form of footprints and hands can reduce the impact of overpronation on the ankle so that the ongoing impact that will cause internal rotation of the tibia and femur to induce a shift in the alignment of the hip towards the anterior around can be minimized (Khamis & Yizhar, 2007). So that the distribution of the role of COG (Center of Gravity) on body mass evenly can be well formed and will affect body posture to be more trained in maintaining a balanced state.

CONCLUSION

Based on the results of this research, it can be concluded that the footprint and hand game has a significant influence on the static balance abilities of children aged 4-6 years in flat foot conditions. So this game can be recommended as a stimulant in learning to reduce the impact of flat foot conditions on children's balance abilities which play a role in maintaining body position in static and dynamic conditions, controlling balanced and stable movements, and supporting the maturity of motor movement skills.

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