



Bioscientia Medicina: Journal of Biomedicine & Translational Research

Journal Homepage: www.bioscmed.com

The Phenomenon of Toe Walking in Children, Disease or Habit: A Case Report

Chesa Yenni Mahdaniar Sjarfi^{1*}

¹Prodia Health Center, Jakarta, Indonesia

ARTICLE INFO

Keywords:

Bilateral toeing out
Bilateral tip toe
Phenomenon
Toe walking

*Corresponding author:

Chesa Yenni Mahdaniar Sjarfi

E-mail address:

chesayms@gmail.com

The author has reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/bsm.v7i9.864>

ABSTRACT

Background: Some children experience abnormalities in the way they walk, such as toe walking in the form of "bilateral toeing out" or "bilateral tip toe." Bilateral toe walking, also known as "bilateral toeing out," is a condition in which both of a child's feet tend to move outwards when they walk. On the other hand, "bilateral tip toe" is when a child walks by standing on the tips of the toes without touching heels to the floor. This study aimed to present cases of the toe walking phenomenon in children. **Case presentation:** A child checks for complaints on both legs and looks at calcium and vitamin D levels. The patient came with toe walking after the age of 2 years and complained of frequent pain and soreness in both legs for the last 2 weeks. The calcium level in the blood was 5.8 mg/dL, and the vitamin D level was 10 ng/ml. At the request of the patient's parents, X-rays of both extremities were carried out, and the results were within normal limits with no masses or fractures. The patient was diagnosed with bilateral toeing out and bilateral tip toe. The treatment provided by medical rehabilitation specialist doctors to patients is in the form of medical and non-medical therapy. **Conclusion:** The patient was diagnosed with bilateral toeing out and bilateral tip toe.

1. Introduction

The ability to walk is one of the basic skills that is very important in a child's development. However, not all children experience the same process of learning to walk. Some children experience abnormalities in the way they walk, such as toe walking in the form of "bilateral toeing out" or "bilateral tip toe." Bilateral toe walking, also known as "bilateral toeing out," is a condition in which both of a child's feet tend to move outwards when they walk. In this situation, the toes of the child's feet appear to be sideways rather than facing straight forward. Although this disorder may seem mild, it can have a significant impact on a child's motor development. In some cases, bilateral toe walking can be a sign of a structural problem with the bones or muscles that affects the position of the feet. On the other hand, "bilateral tip toe" is when a child walks by standing on the tips of their toes without

touching heels to the floor. This condition can indicate stiffness or tension in the leg muscles, which affects the child's ability to walk normally. Bilateral tip toe can also disrupt a child's balance and coordination of movements.¹⁻⁴

Both of these disorders can be of concern to parents, caregivers, and health professionals because they can affect a child's motor development. When a child experiences this walking disorder, it is important to understand the cause and how to manage it appropriately. Walking abnormalities can be caused by various factors, such as bone problems, muscle problems, or even neurological problems. Therefore, accurate diagnosis and appropriate treatment are essential. Apart from the physical impact, walking disorders in children can also have social and emotional impacts. Children with gait disorders may feel uncomfortable or made fun of by their peers,

which can impact their self-esteem and psychosocial development.⁵⁻⁸ This study aimed to present cases of the toe walking phenomenon in children.

2. Case Presentation

An. FAN aged 4 years, is a child who came to have his health checked at the Prodia Clinic on January 15th, 2023, to check complaints on two legs and see calcium and vitamin D levels. Based on anamnesis from the patient's parents, the patient came with feet that were walking on tiptoe after the age of 2 years and complained of frequent pain and soreness in both legs for the last 2 weeks. Apart from that, the patient also reported experiencing imbalance, often falling when exercising on the catwalk compared to peers at school. In fact, all complaints of soreness in this patient's feet had been felt for 4 months before today, but they had disappeared and then reappeared and gotten worse in the last 2 weeks. History of the patient's birth at 40 weeks with sectio caesaria delivery. Initial history runs at the age of 1 year and 1 month. The patient's treatment history recently took paracetamol for complaints of unbearable aches and leg pain. The patient has regularly consumed multivitamins since the age of 2 years but does not routinely consume vitamin D. Every day, the patient consumes 200-400 ml of UHT milk.

From the physical examination, it was found that consciousness was *compos mentis*, the patient's general condition appeared to be mildly ill, pulse 100x/minute, respiration 20x/minute, temperature 36°C, body weight (BB) 18.3 kg and height (TB) 110 cm. The patient's nutritional status includes a body mass index (BMI) of 15.1 kg/m², which is included in normal BMI. The patient's weight gain is according to the curve. Examination of the general status of the eye revealed that the conjunctiva was not anemic, and the sclera was not icteric. Ear, nose, throat within normal limits, heart, thorax, and lungs within normal limits. Examination of the upper extremities was within normal limits; the lower extremities on both legs had no tenderness and no edema, but the right and left leg muscles felt tense, there were no visible signs of

abnormalities on the soles of the feet, and there was no difference in the length of the legs. Laboratory results for calcium levels in the blood were 5.8 mg/dL and a vitamin D level of 10 ng/ml, and at the request of the patient's parents, X-rays of both extremities were carried out, and the results were within normal limits with no masses or fractures.

Based on alloanamnesis, physical examination, simple laboratory examinations, and radiology results carried out by the patient. So the patient has a diagnosis of "tip toe walking" and calcium and vitamin D deficiency. The treatment given to the patient is in the form of medical and non-medical therapy. For medical therapy, patients are given 1x1 1000 IU vitamin D therapy. Non-medical, in the form of education to frequently carry out walking activities on the boardwalk, modifying the diet by consuming foods high in calcium content. Patients are advised to consume foods containing calcium with foods high in vitamin D simultaneously (such as salmon, eggs, cod liver oil, dairy products, etc.) to maximize calcium absorption by the body. However, they are asked to avoid foods that can inhibit calcium absorption, such as foods high in oxalate (spinach, potatoes) and foods high in phytate (broccoli, strawberries). Patients must also limit excessive sodium intake, such as reducing consumption of junk food and packaged foods.

The next step is that the patient is given a referral to the local hospital to receive further treatment and treatment with a medical rehabilitation specialist specializing in children's feet. A few days after a special examination was carried out by a medical rehabilitation specialist, a foot scan and physical examination were carried out. Tibiofemoral angle dextra 22° angle results were found, and sinistra 18°. The patient's intermalleolar distance was measured by measuring the middle malleolar distance on the right and left sides, 8.5cm. The patient was diagnosed with bilateral toeing out and bilateral tip toe. The treatment provided by medical rehabilitation specialist doctors to patients is in the form of medical and non-medical therapy. For medical therapy, the patient received calnic plus syrup 1 x 5ml and continued vitamin D

therapy 1x1 1000 IU. Non-medical in the form of using a correction insole that has been made according to the size of the patient's soles and ankle foot orthosis (AFO) shoes, which are tools to support the body covering the bottom of the knee, ankle, and sole of the foot which is worn when the patient is sleeping which can help stretch the ankle muscles. Patients are advised to have a follow-up 10 months later.

3. Discussion

Some degree of toeing out in children is normal and part of their ongoing development process. This is a phenomenon that often occurs during the growth period of babies and toddlers. By the time babies start learning to walk, they often have unstable postures, and toeing out can be a natural response to this early imbalance. This is a baby's body's way of trying to maintain balance as they move toward more mature walking abilities. Most children will experience changes in their foot posture as they get older. Toeing Out seen in babies will often improve gradually as the child grows. Therefore, it is not uncommon to see toeing out in children under 2-3 years old.⁹⁻¹²

Misalignment or irregularities in the bones of the legs or pelvis can interfere with leg posture when walking. This can happen if the leg or pelvic bones are not in the right position, affecting the way the children places their weight on their legs. Deformities in the bones of the leg or pelvis, such as bending or other abnormalities, can cause misalignment of the legs. This can occur as a result of a congenital abnormality or a condition that develops over time. Structural problems with the bones can also affect joints, such as the knee or ankle joints. If there is misalignment or deformity in these joints, it can affect the movement and position of the foot when walking. Misalignments or deformities in the bones or pelvis can also cause muscle imbalances, where certain muscles work harder or are weaker than others. This can affect how children control their leg movements when walking. Some structural problems may not be visible when a child is a baby or toddler but develop as they grow. This could be the reason why bilateral toeing out

appears at an older age.¹³⁻¹⁵

Bilateral toeing out can affect a child's balance. Abnormal foot posture can make them more susceptible to falling or slipping when walking or standing. When a child experiences bilateral Toeing Out, coordinating movements while walking or running may become more difficult. They may spend more energy and attention on maintaining balance and directing their steps correctly. In some cases, bilateral toeing out can cause limited mobility. Children may find it difficult to participate in physical activities such as running, jumping, or playing sports because their movements are limited by abnormal leg posture. Due to the non-optimal distribution of body weight throughout the legs, children who experience bilateral toeing out may feel tired quickly during physical activity. This is because some muscles may have to work harder to compensate for the abnormal foot posture. Bilateral toeing out can also affect a child's motor development. They may have difficulty achieving motor development milestones such as walking steadily, jumping, or chasing a ball. This may affect their ability to participate in physical and social activities that are important for their growth. In the proper course of treatment, such as physical therapy or surgery if necessary, these effects can be minimized or corrected. It is important for parents, caregivers, and health professionals to work together to identify and manage bilateral toeing out early so that children can grow and develop optimal motor skills and improve their overall quality of life.¹⁶⁻¹⁸

In bilateral tip toe, the movement of the child's heel is lifted from the floor so that only the front of the foot is in contact with the surface when walking or standing. This creates the impression that the child is walking or standing as if standing on the tips of their toes. A child's foot posture in bilateral tip toe can create an unusual angle between the foot and the surface. A raised heel can make this angle sharper than a normal walking posture. This condition can affect a child's balance because the body's center of gravity tends to be higher when standing on the tips of the toes. This can make them more susceptible to

falling or losing balance during activities. Children who experience bilateral tip toe may feel tired more quickly during activities because the leg muscles work hard to maintain this posture. This may limit their ability to participate in physical activity or play. This unusual walking posture can affect a child's self-confidence and the way they interact with their peers. They may feel different or noticed by their peers, which can affect the social aspects of their development. In many cases, treatment of the bilateral tip toe involves physical therapy, orthosis, or other treatment recommended by a medical professional. The main goal is to help the child develop a normal walking posture and overcome the possible effects of this condition. Proper management and early treatment can help children achieve optimal mobility and minimize the negative impact on their daily lives.^{19,20}

4. Conclusion

This study shows the phenomenon of tiptoe disorders in children caused by bilateral toeing out and bilateral tip toe disorders.

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