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## Research Article

# To determine the effectiveness of physical therapy management among the toe walking children's in Karachi Pakistan: An observational study

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## Abstract

**Objective:** To evaluate the effectiveness of Physical Therapy Management among the toe walking children's in Karachi Pakistan.

**Methodology:** A cross sectional survey was conducted from June to October 2018 in Department of physiotherapy, Liaquat National medical college and hospital, Karachi, Pakistan. A self-fabricated questionnaire was used in 36 Toe walking children's. The questionnaire consists of demographics (age and gender), evaluation of pain through visual analogue scale, range of motion through goniometer and cadence was measured. The statistical package for social sciences (SPSS) version 23 was used to interpret the data.

**Result:** The majority (n=24, 66.6%) were belongs to age group of 8 to 12 years and (n=25, 69.4%) were male. Mostly (n=25, 69.4%) were clinically diagnosed cases of cerebral palsy. After checking the involvement it was found that (n=21, 58.3%) were suffering from bilateral toe walking and (n=22, 61.1%) were affected from the day of their birth.

**Conclusion:** The study finalized that the Physical Therapy is effective in decreasing the pain, increasing the range of motion and improving the number of steps among the toe walking children's.

## Introduction

Walking on the toes or balls of the feet is referred as toe walking. Children may toe walk due to musculoskeletal, neural or developmental disorders. The Congenital or positional shortening of the heel cord (Achilles tendon) may also result in walking on the toes. Regarding the positional shortening of the heel cord, babies who learn to walk in a walker or spend a considerable amount of time in an exersaucer kept at a tall height tend to develop a pointed toe position so that their feet cannot touch the ground [1-3]. However this improper positioning causes the ankle and foot to develop in such a

way that may result in toe walking. Sometimes the cause of toe walking is unknown or idiopathic. Idiopathic toe walking, sometimes referred to as habitual or behavioral, occurs when a child walks on the balls of their feet for an unknown reason, However the causes includes congenital short Achilles tendon, muscle spasticity (especially as associated with cerebral palsy) and paralytic muscle disease such as Duchene muscular dystrophy. It may also be one way of accommodating a separate condition, foot drop. The Idiopathic toe walking is widely recognized as a sensory based problem. The vestibular, proprioceptive, tactile and even visual system may be involved, If toe walking continues, especially beyond the age of three, the



child may develop tightness and even contractures of the heel cord and calf muscles (gastrocnemius, gastrosoleus) and those will lead to ankle plantar flexion (toe-down motion of the foot at the ankle) [4,5]. The child may also develop abnormal posture, weakness of the anterior tibialis muscles (responsible for elevation or dorsiflexion of the ankle to clear the foot during gait, running, ascending stairs), and difficulty fitting into shoes as well as balance and safety concerns [6].

Furthermore the Toe walking is somehow manageable but it depends upon the severity and age of the patients. In management of Toe walking we can use the orthosis along with the exercises. The pattern of exercises mainly depends upon the condition of patients but usually the stretching exercises are being used to treat these conditions [7-9]. As the study was just observational, authors have to observe the effectiveness of treatment which is being given by the physiotherapists of concern hospitals. However, the only treatment which can manage the toe walking is physiotherapy and the duration of treatment varies from patient to patient and depends upon the condition of patient.

## Material and methods

### Study design, settings and duration

A cross-sectional descriptive study was conducted from June to October 2018, and data was collected in the Department of physiotherapy, Liaquat National Medical College and Hospital, Karachi, Pakistan.

### Sampling

Convenient Non-Probability Sampling Technique among the 36 selected participants were used. Patients with both genders (male & female), having the age between 3 to 12 years, suffering from Achilles tendon tightness and used to walk on toes, whose parents/ Guardian are willing to their child's participation were included in the study. While, participants having the age more than 13 years and whose parents/ guardian were not willing to sign informed consent were excluded.

### Data collection tool

A self-constructed proforma was used to collect the data, which includes the demographic characteristics age and gender. While, there the disease-related questions were the diagnosis, involvement (unilateral/ bilateral) and the cause (acquired/ congenital).

1. Pain was checked by using Visual Analogue Scale (VAS)
2. Range of motion was measured by using Goniometer,

### Data collection procedure

The data was collected (before and after the treatment) from the patients on the very first day before the start of physiotherapy, and after the successful completion of 30 sessions again the data was collected by examining the pain, range of motion and cadence of patients.

## Data analysis procedure

Descriptive statistics; categorical variables were measured as frequency and percentage where continuous variables were expressed as mean standard deviation. Inferential statistics. Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 23.

### Ethical concern

As the Ethical approval was taken from the Review Committee of Liaquat National School of Physiotherapy, Karachi. Informed consent was taken from the parents/ guardian of patients prior to the data collection that their participation is voluntary, information will be kept confidential and they can leave the study anytime.

## Results

### Demographic characteristics

Demographic Characteristics are described in Table 1, which shows that majority (n=24, 66.6%) belongs to age group of 8 to 12 years, and were male (n=25, 69.4%). Among all, mostly (n=17, 47.2%) were already diagnosed cases of cerebral palsy.

### Involvement & etiology

Involvement & etiology are described in Table 2 which states that, majority (n=21, 58.3%) had bilateral; involvement of feet's and (n=22, 61.1%) were suffering from disease from the day of their birth.

**Table 1:** Demographic Characteristics.

Demographics	Frequency (n=36)	Percentage %= 100.0
<b>Age</b>		
3 to 7 years	12	33.3
8 to 12 years	24	66.6
<b>Gender</b>		
Male	25	69.4
Female	11	30.5
<b>Diagnosis</b>		
Cerebral Palsy	17	47.2
Delayed Milestone	08	22.2
Muscular Dystrophy	06	16.6
Post Traumatic	05	13.8

**Table 2:** Involvement & etiology.

Variable	Frequency (n=36)	Percentage %= 100.0
<b>Involvement of foot</b>		
Unilateral	15	41.6
Bilateral	21	58.3
<b>Etiology</b>		
Acquired	14	38.8
Congenital	22	61.1



## Pain, range of motion and cadence

Mean and standard deviations are described for Pain, Range of motion and cadence in Table 3 which states that, there is significant difference between the pre and post treatment sessions. Before the start of treatment the pain ( $\sigma$  4.49 $\pm$ 0.202), range of motion ( $\sigma$  6.71 $\pm$ 1.449) and the number of steps ( $\sigma$ 11.94 $\pm$ 1.449). However, after the treatment the pain ( $\sigma$  3.97 $\pm$ 0.186), range of motion ( $\sigma$  9.86 $\pm$ 1.32.) and the number of steps ( $\sigma$ 19.09 $\pm$ 2.957).

**Table 3:** Pain, Range of motion and cadence.

Variable	Pre Treatment (mean+ S.D)	Post Treatment (mean+ S.D)
Pain	4.49 $\pm$ 0.202	3.97 $\pm$ 0.186
Range of motion	6.71 $\pm$ 1.449	9.86 $\pm$ 1.320
Number of steps/ cadence	11.94 $\pm$ 1.449	19.09 $\pm$ 2.957

## Discussion

This study concluded that the Exercise are beneficial and had good outcome on improving walking pattern in toe walking children. Throughout the world different studies were conducted and concluded that patients who use to walk on toe's due to tightness of muscles that can be released or managed by applying different Exercise [2,8,10]. The exercises plays an important role in the management of pain, improving range of motion and the cadence of patient. The application of exercises is relatively inexpensive intervention that might be effective in decreasing tightness of calf muscle group, subsequently enhancing range at ankle joint and improve the quality of walking as well. Moreover the study provides a small but statistically significant increase in ankle dorsiflexion Range of motion, a mild improvement also seen in no of steps taken by individual after reassessment a well [4,7,9,11].

## Conclusion

Among the Toe walking children's the physiotherapy is beneficial in increasing the range of motion and improves the number of steps taken per minute (cadence).

## Recommendations

In future the study should be conducted in order to check the length of heel cord and gait pattern after the completion of treatment.

## Limitations

Delimitations in this study is the child ill health status during therapy, poor patient compliance related to therapy. Duration of study was very less for the achievement of desired successful results. Due to ill health status of most children, the frequency and intensity of exercises were to be limited. Patients/ children non-cooperative behavior was also a problem facing situation which can affect the therapy.

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