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Effect of Taping on Flexible Flat Foot - An Observational Study

[1]Paramjeet Kaur, [2]Ninderpreet Kaur

[1,2]College of Physiotherapy, Adesh University, Bathinda, Punjab, India

Abstract: **Flatfoot is a condition in which the foot does not have a normal medial longitudinal arch when standing. Interventions used to attempt to correct excessive pronation include taping, prescription of orthotics and corrective exercises programme. Therefore the purpose of the study is to describe the outcome for a series of patient with Flexible Flat Foot who will be treated with Physical therapy treatment program, given by the researcher. Method: The Study sample included 50 subjects of age group18-28years. Subjects were then asked to sign the Consent form and gave their will regarding being enrolled in the study. During the assessment, subjects were assessed by the Staheli's Arch Index. Assessments were done as per the Assessment form. All the patients were received total intervention for 24 hrs. The patients were assessed at baseline and after 24 hrs. Results: After statistical analysis, a significant improvement was found in the Staheli's arch index. The level of improvement ($p< 0.05$) was significantly high with Taping in flexible flat foot. Conclusion: The present study has concluded that taping is effective for 24 hrs in the management of flexible flat foot. However, it was statistically found in this study.**

Keywords**: Taping, Flexible flat foot, Staheli's arch index.**

1. INTRODUCTION

Flatfeet – Also called Pes Planus or Fallen Arches [1], is a condition in which the foot does not have a normal medial longitudinal arch when standing. It is classified as pediatric flatfoot (congenital) and adult flatfoot (acquired). [2] The Human arch is a complex structure offering elasticity for shock absorption as stability for transmitting muscle force while walking. Insufficiency in foot arch function in adults may increase the risk of overuse injury.[3] Adult flatfoot may present as an incidental finding or as a symptomatic condition with clinical consequences ranging from mild limitations to severe disability and pain causing major life impediments[3,4]. Flexible flat feet is the most common type in which the foot is flat on standing and return to normal arch in weight bearing positions.[5]

Aberrations in foot function in people with flat-arched feet, such as excessive pronation, present as eversion of the calcaneus, abduction of the forefoot, and lowered medial longitudinal arch. Flexible Flat Foot can occasionally be painful, with more specific complaints after intense exercises or long walks. The pain is diffuse in the feet and lower legs. It may include ligament, laxity, muscular or neurological anomalies, and genetic conditions or collagen disorders. [4]

Dysfunction of the foot can often arise from the foot losing its normal structural support, thus altering is shape. An imbalance in the forces that tend to flatten arch and those that support the arch can lead to loss of the medial longitudinal arch. An increase in the arch-flattening effects of the triceps surae or an increase in the weight of the body will tend to flatten the arch. Weakness of the muscular, ligamentous, or bony arch supporting structures will lead to collapse of the Arch [6, 7]. It creates the abnormal bony relationships between anatomically normal bones. As the result of this abnormal relationship between normal bones, the active muscular force balance between opposing muscle groups is distorted. This allows one muscle to have a mechanical advantage over its antagonist. This actively maintains and progressively worsens the abnormal bony relationship. Third, this abnormal bony relationship and disturbed muscular mechanical advantage exert their influence immediately at the point of heel contact in the gait cycle. At this point, the foot and posterior talocalcaneal joint are dorsiflexed relative to the supporting surface so that the majority of motion occurs in the transverse body plane. [8]

Flat foot can be evaluated clinically by using either of the following methods: Arch index, Percent of area of arch of foot print, Arch angle, Navicular drop test. Kinematic analysis of running indicates excessive increase in range of Pronation, leading to stress on soft tissues surrounding foot complex. Kinetic analysis shows moderately high load imposed on toes & imposition of load on medial rather than the lateral side of foot. [2]

Pes Planus may occur in up to 20 percent of adults, many of whom are flexible and have no resulting difficulties. Some recent studies estimated a 5% incidence of flatfoot in all children and adults and found that 15% had a simple hyper mobile flatfoot, 6% had simple hyper mobile flatfoot with a tight heel cord, and 2% had a tarsal coalition. [16]

Most flexible flat feet are asymptomatic, initial options including activity modification, footwear and orthoses, exercises and medication. Exercises for flat feet, Heel cord stretching and lengthen the Achilles tendon and posterior calf muscles, Orthotics, Reduce contributing factors like wear shoes with low heels and wide toes, lose weight, do exercises to strengthen the foot muscles. [4,9]Interventions like foot taping and foot orthoses are commonly used clinically under the assumption that they can modify foot biomechanics, particularly reducing foot pronation. [3]

Interventions used to attempt to correct excessive pronation include prescription of orthotics [10] and taping. Low-dye taping and high-taping techniques have been investigated in the correction of foot pronation. [11] Kinesiotaping has recently become increasingly popular for the management of musculoskeletal impairments, including foot pronation. Unlike rigid tape, this is used in most traditional taping techniques. Current evidence suggests that traditional taping interventions may be effective via a sensor motor or psychophysical feedback loop, rather than simply by 'motion control. [6]

The aim of this was to evaluate the effect of Taping on Flexible Flat Foot on the students of Adesh University.

2. METHOD

Design:

The research design of present study is observational in nature. The study was performed at the students of College of Physiotherapy, Adesh University, Bathinda, Faridkot. The study was approved by the Institutional Research Committee and Ethical Committee of Adesh University, Bathinda. Total 60 subjects, both male and female, age between 18-28 years were included in the study. Subjects were selected on the basis of convenient sampling. All the subjects had with unilateral or Bilateral Flexible Flat Foot. Subjects which were included in study assessed by Toe standing test, Staheli arch index. Subjects were excluded if they were traumatic injury of foot and leg (eg. fractures), soft tissue injury of lower limb (eg. Strains & Sprains), subjects received any medical or conservative treatment for arch management, history of any lower limb surgery, lower limb pathology, any Neurological Condition of Lower Limb. Fifty subjects completed the study.

Intervention:

Taping was applied according to procedure recommended by Pijnappel [12]. Standard 5cm rigid (traditional) tape was used. A single strip, 20 cm in length, was applied from the fibula (lateral malleolus), around the Calcaneus, with 100% stretch, to the middle third of the medial tibia. The strip was applied directly to the skin, with the subject in a supine position and the rear foot positioned in a supinated position. Once applied, the tape strip was warmed by rubbing Therapist's hand three times from the fibula (malleolus) to the middle third of the tibia in order to maximize tape adhesion. Taping was applied to the subjects for 24 hours only. [11]

Parameters:

Foot Print Study: For obtaining foot prints, we used floor as a platform. A sheet of paper was stabled by the therapist's hands on the floor. After applying ink we requested the subject to stand and perform a small flexion of the ipsilateral knee (about 30̊), with the aid of the investigator and then to go to the initial position, removing the foot from sheet. [13]

Staheli's Arch Index: It is used to calculate the ratio of the area of the middle third to the whole toeless footprint area. Staheli's has characterized the width of the foot in the area of the arch and the heel, and the ration between these widths is called the Staheli's arch index. [14]

PI = A/B

- Here A = Measurement of the support width of the central region to the foot.
- B = measurement of the support width of the heel region to the foot.

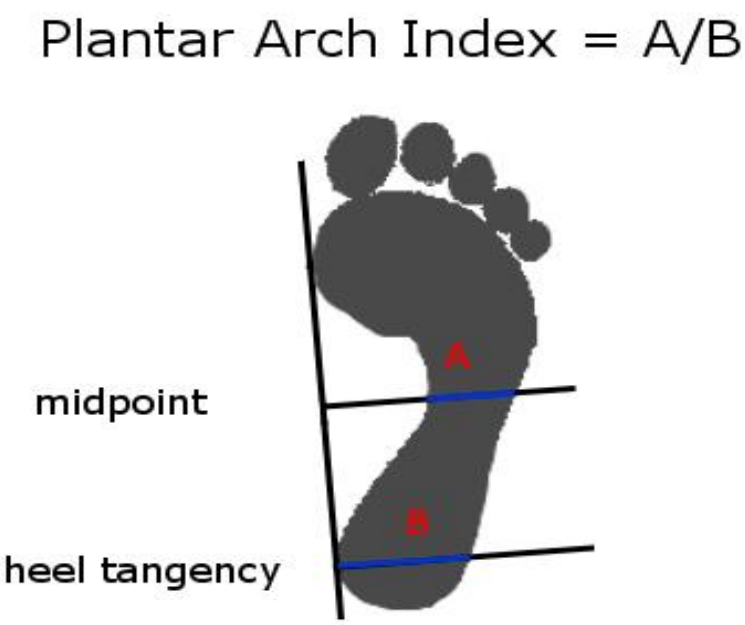

Fig. 2.1

Reliability of the Arch Index: The Arch Index demonstrated excellent reliability, with an interclass correlation coefficient of (ICC) 0.99 (95% CI, 0.97-0.99). [15]

Statistical analysis:

The statistical analysis of the data was performed by Statistical Package for Social Sciences (SPSS) 20.0 for Windows. Student's t test was used for the intergroup comparison of independent variables, whereas paired t test was used for the time-dependent changes of intragroup variables. The results were presented as mean, and a P value< 0.05 was considered statistically significant.

3. RESULTS

There was statistically significant difference found in terms of age, gender P > 0.05.

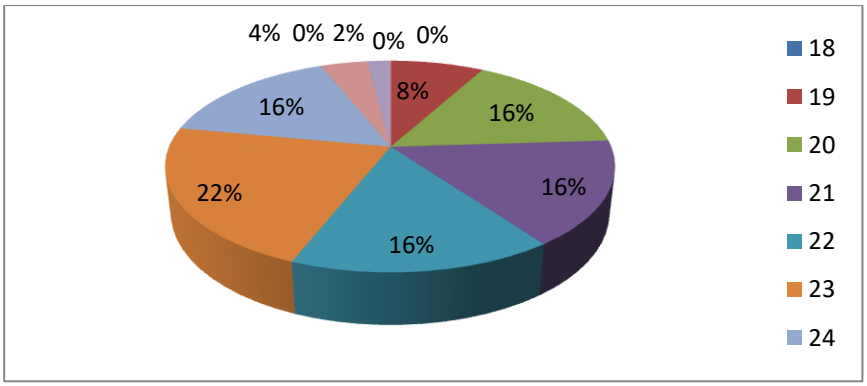

Figure 1: Pie chart showing Mean percentage of age

Table 1: Showing pre and post values for mean of Staheli's arch index, t-value and p- value (value of significance).

Staheli's arch index	Pre- value (At baseline)	Post- value (After 24 hrs)	t - value	p – value*
Mean	0.79	0.71	4.74	0.05

*p > 0.05 is not significant

*p < 0.05 is significant

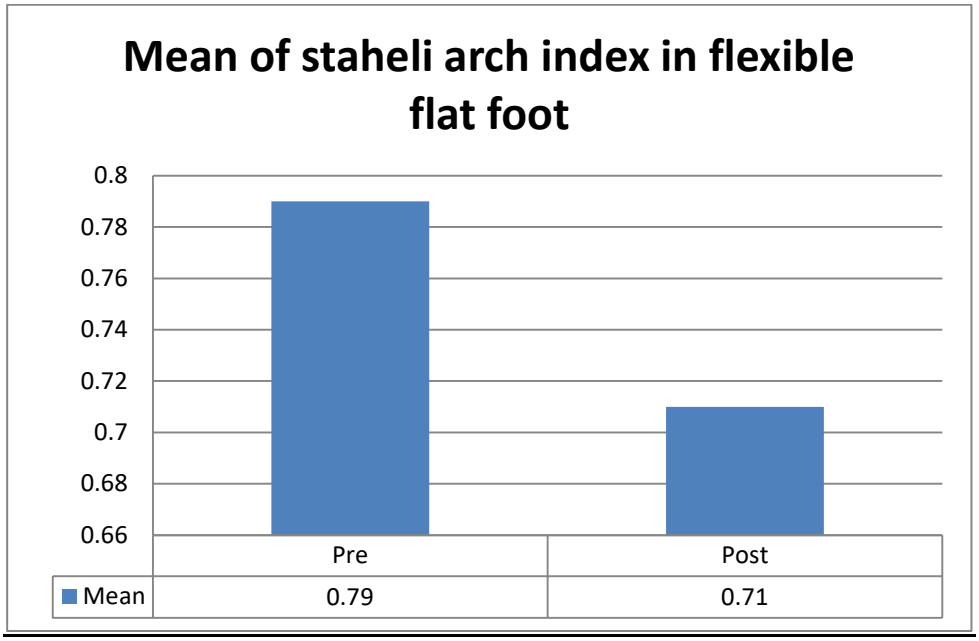

Figure 2: Showing pre and post mean of Staheli's arch index in flexible flat foot

4. DISCUSSION

The aim of this study was to find the effect of taping on flexible flat foot. The effect has been studied by the means of clinical evaluation. As there were limited studies in the literature which showed the effect of taping alone on flexible flat foot. Therefore, present study was focused on it.

Many studies stressed on the effect of taping and corrective exercises on flexible flat foot on foot alignment factors. In flat foot – the head of the talus bone is displaced medially and distal from the Navicular. As a result, the spring ligament and the tendon of the tibialis posterior muscles are stretched, so much so that the individual with flat foot loses the function of the medial longitudinal arch.

Sivachandrian et al , 2016 conducted the study on "Effect of corrective exercises programme among athletes with flat feet on foot alignment" concluded that the experimental group (corrective physical exercises programme for 12 weeks) compare with control group, better significant improvement on angle of arch foot, navicular height and medial longitudinal arch.

Alejandro Luque-Suarez et al, in 2013 conducted the study on "The effects of Kinesiotaping on foot posture in participants with pronated foot: A quasi-randomised, double-blind study" they concluded that Kinesiotaping did not correct foot pronation compared with sham Kinesiotaping in people with pronated feet 24 hours after tape application.

Halabchi F et al , 2013 A clinical approach including "Pediatrics flexible flatfoot" has been produced to go through the various causes, prevalence, division, diagnosis and its management, its purpose is to present a clinical algorithmic approach.

Within the context of study, there were several limitations that may have affected the results: the sample size of the study was small, sample was chosen from only one area, the treatment was only for 24 hours i.e., a short term effect, more measuring tools can be used to evaluate Arch index to make the data statistically more significant.

Furthermore studies can be done on different population. The intervention can be used in combination to treat flexible flat foot. The study can be done on large number of subjects.

The results of the present study indicated that the taping was effective in improving the medial longitudinal arch in flexible flat foot. There was a higher statistically significant difference found in between the pre and post treatment Staheli's arch index measurements applied to the subjects with flexible flat foot. The effect of the taping is statistically significant as it decreases the foot pronation in flexible flat foot and it helps to maintain the medial longitudinal arch.

The present study has concluded that taping is effective for 24 hrs in the management of flexible flat foot. However, it was statistically found in this study.

Abbreviations: Taping, Flexible Flat Foot, Staheli's arch index.

Consent: All authors declare that written informed consent was obtained from the subjects before starting the study for publication of this study report.

Ethical approval: This study was approved by Research and Ethical committee of College of Physiotherapy, Adesh University, Bathinda, and Punjab, India.

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Competing interests: Authors declare that no competing interests exist.

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