International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 5(L); May 2018; Page No. 13040-13047
DOI: http://dx.doi.org/10.24327/ijcar.2018.13047.2313

Research Article

EFFECTS OF ANTI-PRONATION SPIRAL STIRRUP TAPING VS. CALCANEAL TAPING IN PEDIATRIC FLATFOOT

Monica Chutani[1]., Dheeraj Lamba[2]* and Ritambhara K Upadhyay[3]

[1]Department of Physiotherapy, Lovely Professional University, Phagwara, Punjab, India
[2]Department of Physiotherapy, Jimma University, Jimma, Ethiopia
[3]Jimma Institute of Technology, Jimma University, Jimma, Ethiopia

A R T I C L E I N F O

Article History:

Received 24th February, 2018
Received in revised form 19th March, 2018 Accepted 16th April, 2018
Published online 28th May, 2018

Key words:

Calcaneal taping, Pediatric flatfoot, Kinesiotaping, Static pressure

A B S T R A C T

Objective: Pediatric flatfoot is where the whole plantar area of the foot comes into purely or slightly flat with the ground or fallen of the MLA with hind foot eversion and forefoot abduction. Calcaneal taping is one of the effective treatments to correct the foot arch and caused by loss of elasticity of the intrinsic muscle and also known as low dye taping with calcaneal sling.The objective isto determine the effects of anti-pronation spiral stirrup taping and calcaneal taping on static foot pressure on pediatric flatfoot.

Method: The study is a randomized control trial carried out at Lovely Professional University, Out-Patient Department Punjab. Total 30 patients between age group3-10, both males and females having Foot posture index score more than +5 were randomly allocated to Group A and B. Group A anti-pronation spiral stirrup taping with home based exercises, Group B received calcaneal taping with home based exercises intervention three times for 4 weeks.

Results: There was a statistical significant difference of pre-post reading within area and maximum pressure on both right and left foot in Calcaneal taping. On the flip side, there were no significant changes seen in Anti-pronation taping. The main outcome of the study was area and maximum pressure using Win-Track Medicaptures.

Conclusion: Calcaneal taping was more effective than anti-pronation spiral stirrup taping in improving the navicular height or MLA and decreasing excessive calcaneal eversion.

INTRODUCTION

Flatfoot is a medical condition which is well-known by the term of pesplanus, in this condition or lower extremity deformity where the whole plantar area of the foot comes into purely or slightly flat with the ground or fallen of the medial longitudinal arch with hindfoot eversion and forefoot abduction [1]. The arrangement of the arch can be determined by the age, gender, height, weight, foot calcaneal angle, and any joint mobility of the foot [2,3].. Flat foot are categorized into pathologic flat foot due to many primary causes and physiologic flat foot because of lack of growth in medial longitudinal arch. Flat foot in children is most common/ mostly physiological flat foot [4,5]. Flexibility is the pattern of weight distribution of the foot more willingly than fixed. The division of body weight depends on the shape and location of the arch through the line of gravity [6]. Body weight distribution begins with talus for overlay, because talus receives all the body weight that passes down through the lower leg [7].

Corresponding author:* **Dheeraj Lamba
Department of Physiotherapy, Jimma University, Jimma, Ethiopia

During bilateral stance, 50% of the body weight is acknowledged by talus. On the other side, unilateral stance talus gets the entire hundred percent of the body weight talus passes through the large posterior subtalar articulation to the calcaneus, and another half percent or less passes anteriorly through the talonavicular and calcaneocuboid joints to the forefoot [8,9]. Paediatrics flatfoot (figure1) is found approximately in 90% children less than 2 years of age [10]. Normally, at the age of three, the growth of medial longitudinal arch starts and completed earlier than the age of five, if not can lead to decrease in longitudinal arch resulting body weight transfer over medial side of the foot while walking and running [11]. Flat foot also separated into flexible type, rigid type. Where the flexible flat foot happens when the patient is in weight bearing position then the medial longitudinal arch will disappear. On the other side, the rigid flatfoot differentiates by stiffness; where the arch is flatten in both with foot weight bearing and non-weight bearing position [12]..Kase *et al*. has four mechanics by which kinesiotape attain its beneficial effects: 1) correcting the function of muscles by strengthening weakened muscles; 2) improve the blood circulation and eliminate excessive tissue fluid or bleeding below the skin; 3) decreasing pain through neurological control; 4) re-positioning the misplaced alignment

of ankle joint [13,14]. The Win-Track Platform is standard and conventional method of gait analysis for analyzing the parameter of gait cycle and plantar pressure upon standing and walking. [15]. Anti-pronation spiral stirrup taping is also known as Medial longitudinal arch taping and the aims of this taping technique is to lower down the activity of the muscle and to assist supination of the ankle thereby reducing the work of the involved muscles and reducing load on the plantar ligamentous structures responsible for supporting the arch. This technique may be found beneficial or useful in biomechanical alteration or high impact injuries of the lower limb where velocity and magnitude of navicular drop is contributing to extend force closure to improve stability [16,17] There are several methods to diagnose the patient with flatfoot and for them foot posture index was prepared by Redmond AC during 1998 which provide foot posture measurements and to identify any structural dysfunction of entire foot in frontal, saggital and transverse planes. [18].

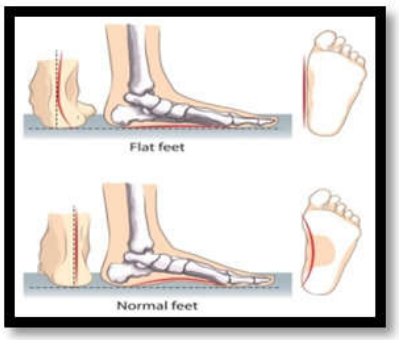


Figure 1 Pediatric Flat Foot

Need of the Study

In the present era, flat foot is the most common upcoming musculoskeletal disorder for pediatric age group. Pediatric flatfoot (Figure1) is always controversial issue for treatment as when to treat and when to observe the physiological and pathological condition in flatfoot. So, this study provides when to treat and which taping technique would be the best and conservative treatment for them.

METHODS

Design*:* Experimental study design carried out at Department of Physiotherapy, Lovely Professional University, Punjab, Santoor International Public School, Phagwara., Adarsh Bal Vidyalaya, Phagwara and Primary School, Alipur.

Population and Sampling: Total 30 sample size: 15 subjects in each group (Group A- Anti-pronation spiral stirrup taping with conventional treatment; Group B- Calcaneal taping with conventional treatment).

Selection criteria

Inclusion criteria

- Infants with flat foot (both male and female)
- School age: 3 to 10 years old
- Bilateral and unilateral flatfoot
- Foot posture index (FPI-36) score equal to or >6

Exclusion Criteria

- Soft tissue release
- Fracture around ankle
- Already using orthotic device
- Any soft tissue injuries
- Neurological/ Musculoskeletal disorder
- Congenital foot anomalies
- Skin allergies

Parameters

- Foot pressure (Area static pressure) in cm^2
- Foot pressure (Maximum pressure static pressure) in g/cm^2

Instruments and Tools

- Win-Track Platform
- Kinesiotaping (5mm X 5mm)
- Weighting machine
- Ruler
- Treatment Table

Procedure

The study was carried out in LPU out-patient department and where foot prints and foot posture index were taken to diagnose flatfoot. Moreover, consent forms were given which is signed by their parents and subjects were randomly allocated into 2 groups (15 children in each group) Group A (Anti-pronation spiral stirrup taping with home based exercises) and Group B (Calcaneal taping with home based exercises). Pre-assessment reading of subjects for Static Foot Pressure (Area and Maximum Pressure) was measured using the force platform system in Win-Track Medicaptures. The distance between the subject and target with eye open was nearby 40 cm. After 4 weeks follow-up was taken for checking the effectiveness of taping and home based exercise intervention and to compare pre and post readings to show the degree of improvement.*(*figure2)

Figure 2 Subjects readings were taken on Win-Track Force Platform with eyes open while subject maintain the upright position and focusing on the target for 5 to 10 seconds (feet place side by side by forming an angle of 30 degrees with both heels separated by almost 4 cm).

Intervention

Group A: Anti-pronation spiral stirrup taping[16]

1. Gather all the materials together (Kinesiotape, scissor).
2. Before applying the tape, the skin of the subject must be clean and dry.
3. Cut the Kinesiotape into single "I" strip and cut all the four ends into round shape.
4. The affected foot of the patient was kept in long sitting position with foot out of the treatment table with ankle maintained in dorsiflexion.
5. Application: 10-20% of the ends of both Kinesiotape should be without any stretch or tension.

6. Start the tape under or above the lateral malleoli, crossing the plantar aspect of the foot.(Figure 3)
7. Direction of pull: Intended to lift the medial longitudinal arch (upto medial malleoli) and end upto the lower leg.(Figure 3)
8. Cut the two lock strips into "I" strip and place it over both the ends of Kinesiotape (rub the tape to activate the adhesive).(Figure 3)
9. Ask the patient to stand and walk to check if the applied tape is uncomfortable or not.
10. Home based exercises as shown from (Figure1-6)

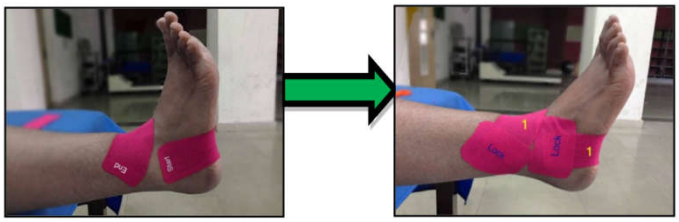


Figure 3 Direction of pull of tape

Group B: Calcaneal taping[17]

1. Gather all the materials together (Kinesiotape, scissor).
2. Before applying the tape, the skin of the subject must be clean and dry.
3. Cut the Kinesiotape into single "I" strip and cut all the four ends into round shape.
4. The affected foot of the patient was kept in long sitting position with foot out of the treatment table with ankle maintained in dorsiflexion.
5. ***Application:*** 10-20% of the ends of both Kinesiotape should be without any stretch or tension.
6. ***Start:*** First strip is distal to the lateral malleoli with medial pull of the calcaneus and attached to the inner aspect of the medial malleoli; Second strip followed the same outline by overlap of approximately width of half or one-third of the tape (moving in distally) and Third and Last strip is around the back of the heel from distal to the lateral malleoli making an anchor upto distal to medial malleoli (last strip serves as a lock for the first two strips). (Figure4)
7. ***Direction of pull:*** Intended to lift the medial longitudinal arch (lateral to medial malleoli Figure4)
8. Home based exercises as Group A

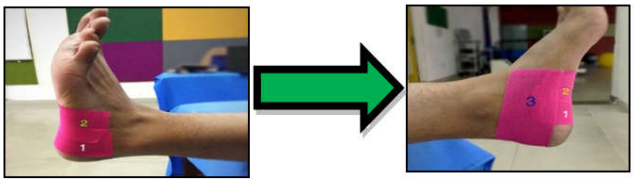


Figure 4 Direction of pull of tape

Home Based Exercises (Figure1-6)

Exercise #1 Toe & Heel Walking

Exercise #4 Tibialis Anterior Strength

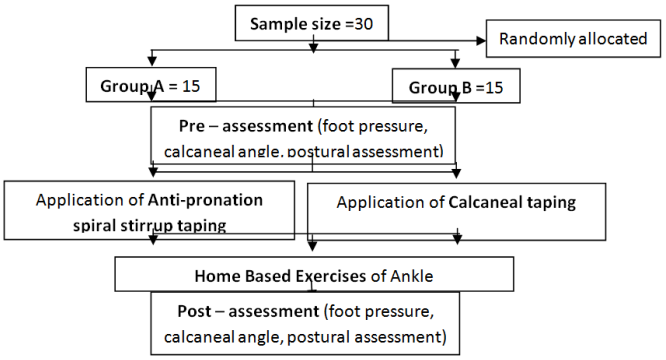
Exercise #2 Calcaneal Abduction

Exercise #5 Ascending/ Descending Slide Walking

Exercise #3 Toe Curls

Exercise #6 Stretch Cuff Muscles

Flow Chart

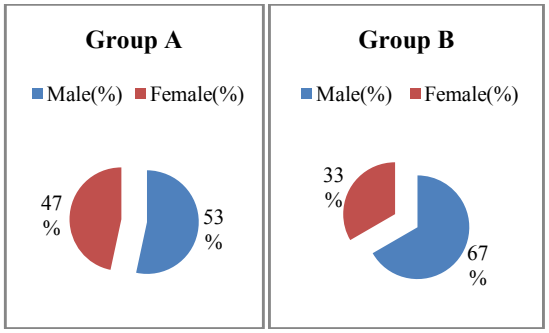


RESULTS

Statistics were performed using SPSS software 20.0. Level of significance selected for the study was $p<0.05$

Table 1 Comparison of mean values for gender between Group A and B

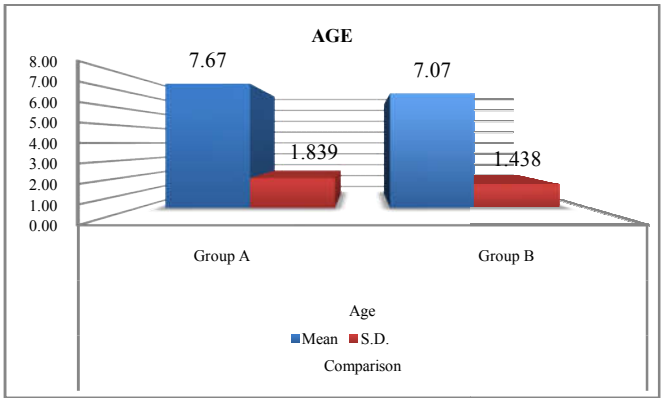
	Gender	
	Group A	Group B
Male(%)	53.3 (08)	66.7 (10)
Female(%)	46.7 (07)	33.3 (5)



Graph 1 Comparison of mean values for gender between Group A and B

Table 2 Comparison of mean values for age between Group A and B

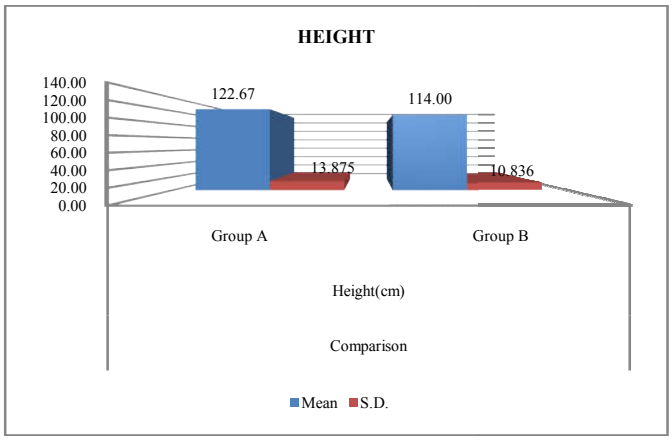
	Group A	Group B	Mean diff	t	P Value
Age Mean ± SD	7.67 ± 1.839	7.07 ± 1.438	0.60	0.996	0.328 (No sig.)



Graph 2 Comparison of mean values for age between Group A and B

Table 3 Comparison of mean values for height between Group A and B

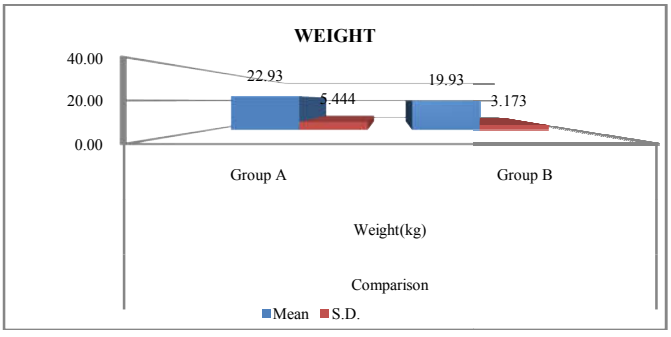
	Group A	Group B	Mean difference	t	P Value
Height Mean ± SD	122.67 ± 13.875	114.00 ± 10.836	8.67	1.907	0.066 (No sig.)



Graph 3 Comparison of mean values for height between Group A and B

Table 4 Comparison of mean values for weight between Group A and B

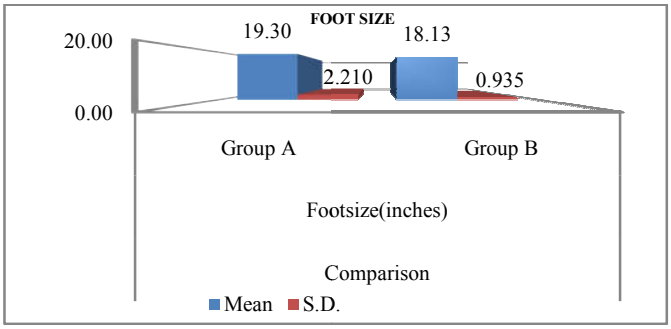
	Group A	Group B	Mean difference	t	P Value
Weight Mean ± SD	22.93 ± 5.444	19.93 ± 3.173	3.00	1.844	0.076 (No sig.)



Graph 4 Comparison of mean values for weight between Group A and B

Table 5 Comparison of mean values for foot size between Group A and B

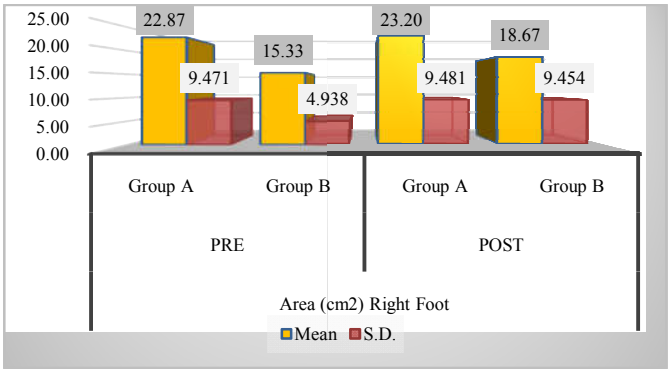
	Group A	Group B	Mean difference	t	P Value
Weight Mean ± SD	22.93 ± 5.444	19.93 ± 3.173	3.00	1.844	0.076 (No sig.)



Graph 5 Comparison of mean values for foot size between Group A and B

Table 6 Comparison of pre and post area (cm^2) of right foot between Group A and B

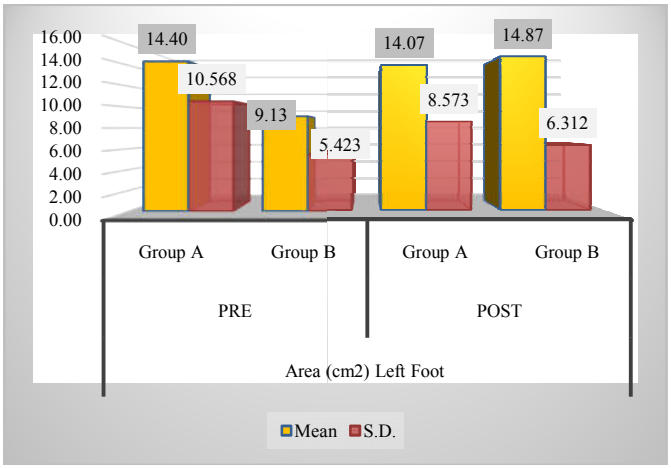
Area (cm^2)		Mean ± SD	Mean Difference	t- value	P value
PRE Value	Group A	22.87 ± 9.471	2.40	0.780	0.442 (No sig.)
	Group B	20.47 ± 7.230			
POST Value	Group A	114.43 ± 7.65	4.53	0.412	0.801 (No sig.)
	Group B	115.23 ± 7.38			



Graph 6 Comparison of pre and post area (cm^2) of right foot between Group A and B

Table 7 Comparison of pre and post area (cm2) of left foot between Group A and B

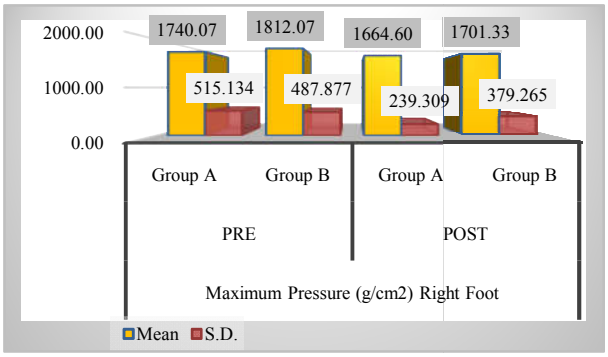
Area (cm^2)		Mean ± SD	Mean Difference	t- value	P value
PRE Value	Group A	14.40 ± 10.568	5.27	1.717	0.097 (No sig.)
	Group B	9.13 ± 5.423			
POST Value	Group A	14.07 ± 8.573	0.80	0.291	0.773 (No sig.)
	Group B	14.87 ± 6.312			



Graph 7 Comparison of pre and post area (cm2) of left foot between Group A and B

Table 8 Comparison of pre and post maximum pressure (g/cm2) of right foot between Group A and B

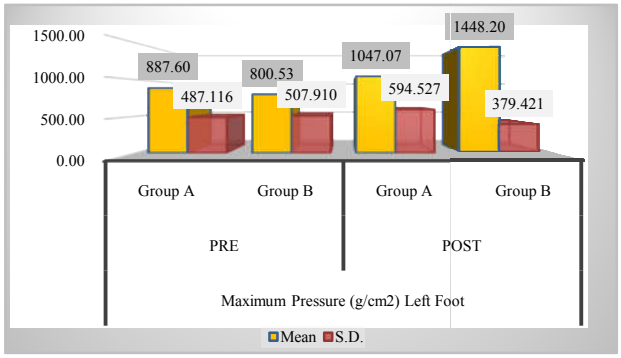
Maximum Pressure (g/cm^2)		Mean ± SD	Mean Difference	t- value	P value
PRE Value	Group A	1740.07 ± 515.134	72.00	0.393	0.697 (No sig.)
	Group B	1812.07 ± 487.877			
POST Value	Group A	1664.60 ± 239.309	36.73	0.317	0.753 (No sig.)
	Group B	1701.33 ± 379.265			



Graph 8 Comparison of pre and post maximum pressure (g/cm2) of right foot between Group A and B

Table 9 Comparison of pre and post maximum pressure (g/cm2) of left foot between Group A and B

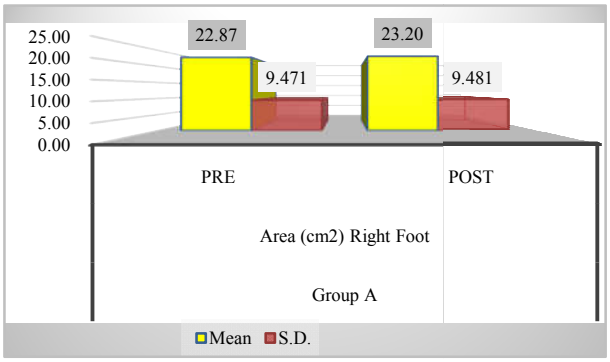
Maximum Pressure (g/cm^2)		Mean ± SD	Mean Difference	t- value	P value
PRE Value	Group A	887.60 ± 487.116	72.00	0.393	0.697 (No sig.)
	Group B	800.53 ± 507.910			
POST Value	Group A	1047.07 ± 594.527	401.13	2.203	0.036 (Sig.)
	Group B	1448.20 ± 379.421			

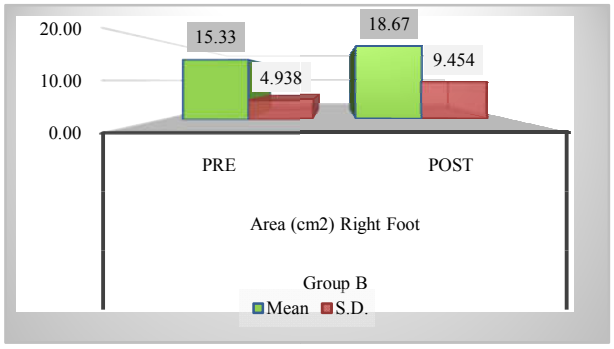


Graph 9 Comparison of pre and post maximum pressure (g/cm2) of left foot between Group A and B

Table 10 Comparison of pre and post area (cm2) of right foot within Group A & B

	Pre Mean ± SD	Post Mean ± SD	Mean Difference	t	P value
Group A	22.87 ± 9.471	23.20 ± 9.481	0.33	0.136	0.894 (No sig.)
Group B	15.33 ± 4.938	18.67 ± 9.454	3.33	0.889	0.036 (Sig.)

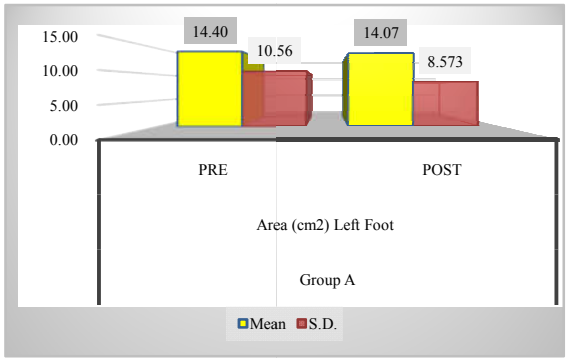


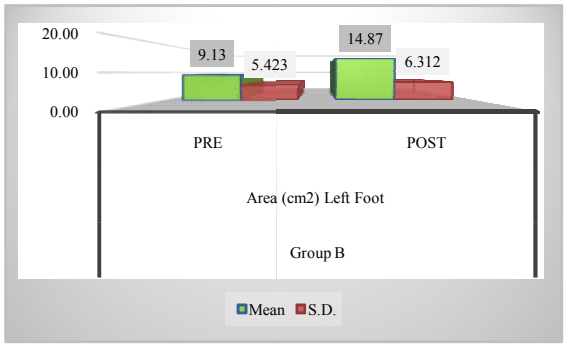


Graph 10 Comparison of pre and post area (cm2) of right foot within Group A & B

Table 11 Comparison of pre and post area (cm2) of left foot within Group A & B

	Pre Mean ± SD	Post Mean ± SD	Mean Difference	t	P value
Group A	14.40 ± 10.568	14.07 ± 8.573	0.33	0.088	0.932 (No sig.)
Group B	9.13 ± 5.423	14.87 ± 6.312	5.733	2.832	0.013 (Sig.)

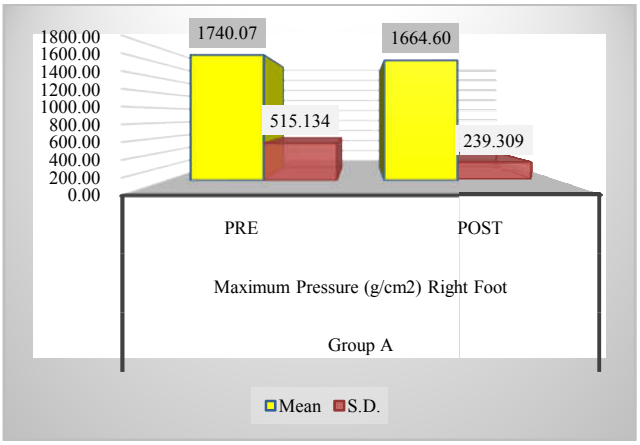


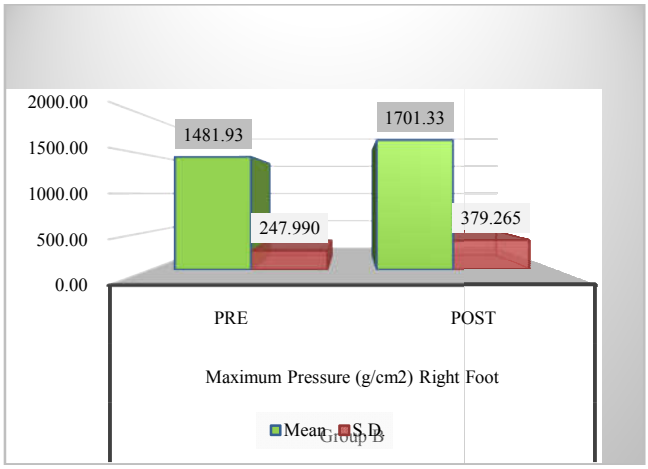


Graph 11 Comparison of pre and post area (cm2) of left foot within Group A & B

Table 12 Comparison of pre and post maximum pressure (g/cm2) of right foot within Group A & B

	Pre Mean ± SD	Post Mean ± SD	Mean Difference	t	P value
Group A	1740.07 ± 515.134	1664.60 ± 239.309	75.47	0.522	0.610 (No sig.)
Group B	1481.93 ± 247.990	1701.33 ± 379.265	291.40	0.846	0.050 (Sig.)

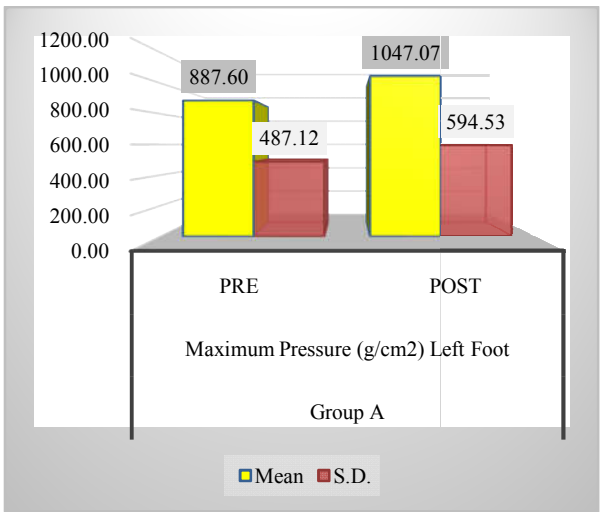


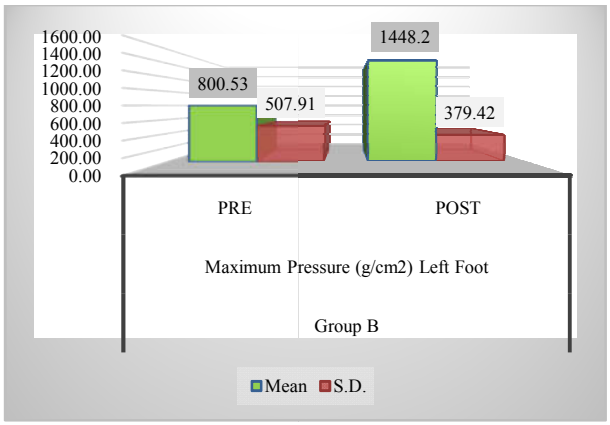


Graph 12 Comparison of pre and post maximum pressure (g/cm2) of right foot within Group A & B

Table 13 Comparison of pre and post maximum pressure (g/cm2) of left foot within Group A & B

	Pre Mean ± SD	Post Mean ± SD	Mean Difference	t	P value
Group A	887.60 ± 487.116	1047.07 ± 594.527	159.47	0.785	0.445 (No sig.)
Group B	800.53 ± 507.910	1448.20 ± 379.421	647.67	4.133	0.001 (Sig.)





Graph 13 Comparison of pre and post maximum pressure (g/cm2) of left foot within Group A & B

DISCUSSION

In today's generation, pediatric flatfoot is becoming one of the common foot postural deformity among children. There is variety of tapes and taping techniques that are made to improve the foot arches and reduce the symptoms like pain and tenderness in the foot. Most of the studies concluded that the occurrence of the flatfoot is influenced by several factors like age, gender, BMI, height and weight. In one of the study conducted by Martin Pheffer *et. al*[6] gender, BMI and weight are showing significant prevalence of flatfoot as the age increases the incidence of pesplanus decreases, boys have more tendency to have flatfoot than girls which is similar with the current study when comparing the mean values of gender between Group A and Group B where in Group A out of 15, 08 were male and 07 were female and for Group B 10 were male and 05 were female.(Table & Graph 1-4)

Arch tapings are commonly used to increase the medial longitudinal arch and works as a short-term treatment for decreasing exaggerated calcaneal eversion of the foot. There are many taping techniques which improve the navicular height and correct the arch position in its place but till now there is no evidence which reveals that calcaneal taping is effective for flatfoot individuals or correcting medial longitudinal arch as in some of the studies it was proved to be effective for the patient with plantar fasciitis. However, Bushra *et.al*[19] and Amruta *et.al*[20] concluded that plantar fasciitis taping and low-dye taping is more effective for the patient with plantar fasciitis rather than calcaneal taping. So, the Calcaneal taping is still in controversies that for which patients this taping technique would be effective. In 2010, Sushma *et.al* [21] conducted a study on effect of Low dye calcaneal taping on angle of pelvic tilt in individuals with excessive calcaneal eversion in which they concluded that there is immediate changes seen in angle of pelvic tilt by correcting the excessive calcaneal eversion using low-dye calcaneal taping.

The purpose of present study is to find out the most effective taping technique between anti-pronation spiral stirrup taping and calcaneal taping for pediatric flatfoot in elevating the medial longitudinal arch during weight bearing and balance in static pressure by assessing area and maximum pressure of both foot. The result of this study showed that calcaneal taping improves the overall foot structure and this was measured by the force platform system i.e win- track medicapteurs (equal distribution of area and maximum pressure) for static foot analysis.

Static postural differences are present between the subjects with flatfoot. Asymptomatic flatfoot have more calcaneal eversion compare with neutral feet and symptomatic flatfoot illustrate more forefoot abduction and this can lead to stress over the structures of the medial aspect of the ankle which cause pain over the ankle due to decrease in the distribution of the weight in foot which is similar with this study that all the pre assessment reading shows decrease in weight distribution where the sensor of the win-track force platform is not able to detect the pressure over forefoot and midfoot. Static postural differences are present between the subjects with flatfoot. Asymptomatic flatfoot have more calcaneal eversion compare with neutral feet and symptomatic flatfoot illustrate more forefoot abduction and this can lead to stress over the structures of the medial aspect of the ankle which cause pain over the ankle due to decrease in the distribution of the weight in foot[22] which is similar with this study that all the pre assessment reading shows decrease in weight distribution where the sensor of the win-track force platform is not able to detect the pressure over forefoot and midfoot. (Table & Graph 5-7)

On comparing the significance between Group A (Anti-pronation spiral stirrup taping with home based exercises) and Group B (Calcaneal taping with home based exercises) there is significance difference in post intervention for Group B in maximum pressure (g/cm^2) of left foot and insignificant in all other parameters. After using paired t-test there is significant difference between Group B in Area of right foot with mean difference (18.67 from 15.33), left foot (14.87 from 9.13), maximum pressure of right foot with mean difference (1701.33 from 1481.93) and left foot (1448.20 from 800.53) on the other hand Group A showed insignificance improvement in both area and maximum pressure for both right and left foot parallel with Hsun-Wen Jung where he concluded that there is significant change in mean pressure and force in forefoot and midfoot. [3] (Table & Graphs 8-13)

CONCLUSION

Till now there is no evidence that calcaneal taping is effective for flatfoot but this study concluded that calcaneal taping is effective than anti-pronation spiral stirrup taping in correcting the medial longitudinal arch and in reducing calcaneal eversion of the foot.

Ethical Approval

Ethical approval was taken from the Department of Physiotherapy, Lovely Professional University.

Funding

No funding was taken for the study from any agency/organisation.

Conflict of Interest

There is no conflict of interest of any sort.

Acknowledgements

We are thankful to Jimma University, Ethiopia and Lovely Professional University, Uni Hospital, Department of Physiotherapy OPD. Phagwara, Punjab and its staff and Out Patient Department of Physiotherapy, Uni Hospital, Lovely Professional University, Phagwara for helping in carrying out this research to a fruitful outcome.

References

1. YutoTashhiro, Takahiko Fukumoto, Daosuke Uritani, Daisuke Matusumoto, ShuNishiguchi, Naoto Fukutani. Children with Flat Feet have weaker toe Grip Strength than having Normal Arch, *J. Phys. Ther. Sci*. 2015; 27: 3533-3536
2. K. Vadivelan, GKiyanduru. Comparison of foot taping versus custom made medial arch support on pronated flatfoot in school going children. *Int J Physiother* 2015; 2(3):491-501
3. Hsun-Chang, Hsiao-Chieh, Chien-Ju Lin, Fong-Chin Su, Ming-June Tsai. The Relationship between Foot Arch Volumes and Dynamic Plantar Pressure during Midstance of Walking in Preschool Children. PLOS one 2014; 9(4):1-7
4. Hong-Jae Lee, Kil-Byung, JeeYoo, Sung-Won Yoon. Effect of Custom- Molded Foot Orthoses on Foot Pain and Balance in children with Symptomatic Flexible Flat Foot. *Ann Rehabil Med* 2015; 39(6):905-913
5. FarzinHalabchi, Reza Mazaheri, Maryam Mirshahi. Pediatric Flexible Flatfoot; Clinical Aspects and Algorithmic Approach. *Iran J Pediatr* 2013; vol 23(number 3)
6. Martin Pfeoffer, Rainer Kotz, Thomas Ledl, Gertrude Hauser. Prevalence of flat foot in preschool-aged children. *Pediatrics* 2016; vol 118: (number 2)
7. Seung-Min, Ji-Hong, Jae-Ho Yu, and Jin-Seop. The effect of elastic and non-elastic tape on flat-foot. *Indian Journal of Science and Technology* 2015, Vol8 (26) 1-5
8. Daniel Lopez, Ana Constenla, Adolfo Casasnovas and Francisco Tajes. The Impact of Foot arch height on quality of life on 6-12 year olds. Colombia Medica 2014; Vol.45 N4
9. Dorsey Williams, Irene McClay. Measurements used to characterize the Foot and The Medial Longitudinal Arch: Reliability and Validity. *Physical Therapy* 2000; Vol 8. No. 9
10. Yan Gui-Sen, Yang Zheng, Lu Ming, Zhang Jian and Guo Yuan. Relationship between symptoms and weight bearing radiographic parameters of idiopathic flexible flatfoot in children. *Chinese Medical Journal* 2013: 126 (11)
11. ShivamSinha, Hae Song, Hak Jun Kim, Yeong Yoon, and Sang Song. Medial arch orthosis for pediatric flatfoot. *Journal of Orthopedic Surgery* 2013; 21(1): 37-43
12. E. Sadeghi-Demneh, F. Azadinia, F. Jafarian, F. Shamsi, M. Jafarpishe and Z. Rezaeian. Flatfoot and Obesity in school-age children: a cross sectional study. World Obesity. *Clinical Obesity* 2015; 42-50
13. David Hettle, Linda Linton, Julien Baker, Orna Donoghue. The Effect of Kinesiotaping on Functional Performance in Chronic Ankle Instability- Preliminary Study. *Clinical Res Foot Ankle* 2013; 1:1
14. Alejandro Luque-Suarez, Francisco Javier Baron-Lopez, Maria Teresa Labajos-Manzanaras and Mark Jonathan Hancock. Effects of Kinesiotaping on foot posture in participants with pronated foot a quasi-randomized, double blind study. *Physiotherapy* 2013; PHYST-709
15. SumandeepKaur, VijJaspreet Singh. Qualitative gait analysis of healthy adults using foot print method and Win Track. *IOSR-JNHS* 2014;Vol 3: 16-21

16. Krista M. Prusak, Lain Hunter, Matthew K. Seeley and Hopkins. Comparison of two taping techniques on navicular drop and center of pressure measurements during stance. Athletic Training and Sports Health Care. 2014 Vol 6 no. 6
17. Matthew Hyland, Alisa Webber-Gaffney, Lior Cohen. Randomized control trial of calcaneal taping, sham taping and plantar fascia stretching for the Short-term management of plantar heel pain. *J Ortho Sports PhysTher* 2006; 36:364-371
18. Baisakhi Das, Vijaya Kumar and Amitesh Narayan. Normative data for Foot Posture Indiex (FPI-6) and association of foot posture with anthropometric parameters in school children from Mangalore: A cross sectional study.
19. Khan B, Bashir MS, Noor R. Effectiveness of Plantar Fasciitis Taping and Calcaneal Taping in Plantar Heel Pain. *Journal of Riphah College of Rehabilitaion Sciences*. 2015; 3(2):99-103.
20. Sankhe AJ, Shukla G, Rathod VJ, Alagesan J, Manickavasagam I, Kamalakannan M. The effect of Calcaneal taping versus Low dye taping in treating patients with plantar fasciitis-Randomized Clinical Trial. *International Journal of Therapies and Rehabilitation Research*. 2016 Jan 1;5(3):41.
21. David B, Murley G, Franettovich M, Bird A. Effect of augmented low-dye taping and ankle bracing on lower limb muscle activity during walking in young adults with flat-arched foot posture. *Journal of Science and Medicine in Sport*. 2010 Jan 31; 12:e213-4.
22. Kerr CM, Stebbins J, Theologis T. Static postural differences between neutral and flat feet in children with and without symptoms. *Clinical Biomechanics*. 2015 Mar 31; 30(3):314-7.

How to cite this article:

Monica Chutani *et al* (2018) 'Effects of anti-pronation spiral stirrup taping vs. Calcaneal taping in pediatric flatfoot', *International Journal of Current Advanced Research,* 07(5), pp. 13040-13047.
DOI: http://dx.doi.org/10.24327/ijcar.2018.13047.2313

****