

Category of Article: Original Research Effect of Kinesiotaping Versus Short Foot Exercises in Children with Functional Flat Feet

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ABSTRACT

Title: To compare the effectiveness of Kinesio-taping versus Short Foot Exercises in children with functional flat feet.

Background: Flat Foot also known as pes planus is the condition wherein the curvature of the medial longitudinal arch is flatter than the normal with entire sole of the foot comes in contact to the ground. These could be because of factors such as muscle weakness, ligament laxity, failure in development of reflexes even after the child starts walking, if left untreated this may lead to complications including the foot pain, frequent falls, impaired gait and can affect the quality of life too.

Objective: The objective of the study was to compare the effects of Kinesiotaping and Short Foot Exercises on children with functional flat feet.

Method: 30 students were selected for the study according to the inclusion and exclusion criteria and were divided into Group A and Group B. The individuals in Group A received Kinesio-taping along with short foot exercises and the individuals in Group B received the short foot exercises.

Results: Both the groups showed improvement in navicular drop test and the foot posture index but individuals in group B treated with kinesio-taping and short foot exercises showed more statistical significance. **Conclusion:** The study concluded that kinesio-taping along with short foot exercises was found to be effective as a treatment plan for children with functional flat feet aged 6-12 years.

Keywords: Pes planus, Kinesio-tape, podiatric exercises

INTRODUCTION

Pes planus also called as the flat foot is the condition where in the curvature of the medial longitudinal arch is flatter than the normal, with the entire sole of the foot coming into complete or near-complete contact with the ground. Flat foot can be classified into 2 main types: flexible flat foot and rigid flat foot. (5). Flexible flat foot: the longitudinal arches are present on heel elevation i.e., tiptoe standing and during non-weight bearing but will disappear when there is complete weight bearing on the foot. FF is also known as developmental FF commonly observed in infants and toddlers as a part of normal development. Rigid flat foot: the longitudinal arches of the foot are absent in during heel elevation i.e.

tiptoe standing as well as during weight bearing and is usually associated with underlying pathology. The feet appear to be flat in infants due to presence of fat and usually begins to resolve after 2 years of age. The arch of the foot starts developing when the child starts walking and the foot starts to bear the body weight. These arches rapidly develop between 2-6 years of age and mature around 12-13 years of age. Complications associated with flat foot include foot pain, hallux valgus, knee problems, impaired range of motion, loss of muscle strength leading to compensatory mechanism which may aggravate the dysfunction. Pain most commonly hampers the activities of daily living, gait, balance, quality of life and increases the risk of fall. (6) The deformity must be managed properly as it may lead to fatigue and cramping in the lower limbs and legs. (6). There are different conservative and surgical interventions for management of flat feet. Conservative methods include exercises, arch supports, orthopedic shoes, braces whereas the surgical interventions include soft tissue surgeries, bone surgeries (6) Kinesio Taping (KT) is a technique that helps relieve pain, relaxes the muscle, and increases the proprioception. KT is a natural, inexpensive treatment which facilitates the body's natural healing process by providing support and stability to the muscles and the joints without restricting the range of normal. It provides sensory feedback. The method was introduced in Japan. (6)

AIMS To compare the effects of Kinesio-taping and Short Foot Exercises in children with Functional Flat Feet.

OBJECTIVES

1. To study the effect of kinesio-taping in children with functional flat feet.
2. To study the effect of short foot exercises in children with functional flat feet.
3. To compare the effect of kinesio-taping and short foot exercises in children with functional flat feet.

MATERIALS: Pen, Paper, Ruler, Kinesio tape, Scissor Materials, Informed consent

PROCEDURE

Study design prepared before beginning the study and the ethical approval was taken from the IEC at Dr. APJ. Abdul. Kalam. College Of Physiotherapy and from the Principal of the LITTLE FLOWER SCHOOL, LONI. All the participants referred in LITTLE FLOWER SCHOOL, LONI were screened according to the inclusion criteria and exclusion criteria. Before the commencement of the study, informed consent was taken from the parents seeking permission for the children participation and informing about the procedure. Demographic Data was taken of the children consisting of the Name, Age, Gender, Weight and the Height. After taking the consent and the demographic data of all the participants, they were randomly allocated into Group A(n=15) and Group B.(n=15). Group B individuals were made to perform Short Foot Exercises and Group A individuals received Kinesio taping along with the Short Foot Exercises. Pre- test was assessed which was determined through the Navicular Drop Test and the Foot Posture Index and the post- test was assessed in the same way after 4 weeks and the statistical analysis was done post- test.

EXERCISE DETAILS

Short foot exercises and Kinesio taping are used in Group A. Plantarflexion and dorsiflexion of the ankles were part of the five-minute warm-up. Short foot exercises that were identical to those provided in the usual group were performed after kinesio taping was placed. A. How to apply Kinesio taping procedure: One day before the tape was applied, the subjects' skin was examined to see if they were sensitive to it. Only those who showed no signs of irritation were included in the follow-up investigation. For the sensitivity test, a portion of the tape was placed on the back of the lower thigh. The region was then examined for blisters, redness, or any inflammation. Individuals were forced to lie on their backs. The foot is positioned in neutral dorsiflexion, minimal inversion, and subtalar neutral posture. Four two-inch-wide "I" tapes were used for the prone taping procedure. the first piece of tape was placed to the plantar aspect, extending from the metatarsal head to the calcaneum. The second piece of tape was secured on the outside of the foot, wrapped medially around the back of the ankle, and then placed diagonally beneath the calcaneus. This piece of tape assisted in limiting the calcaneal eversion and keeping the calcaneus in a more neutral position. The third piece of tape was placed on the medial midfoot, brought under the calcaneus diagonally, and wrapped laterally around the posterior ankle to help "lock" the calcaneus in place or facilitate sensory input. Starting from the lateral midfoot, the fourth piece of tape would cross the navicular and reach the medial distal third of the lower leg, directly above the malleolus that supports the midfoot (5). For four weeks, the participant will be required to complete foot strengthening activities in addition to receiving Kinesio taping. The exercises for strengthening would be the same as those offered to the traditional group. Every five days, the tape would be swapped out. Group B: Short Foot Exercises. A warmup session of 5 minutes was given prior to the exercises which included ankle dorsiflexion and plantarflexion. The Short Foot exercises was then given to the patients which included:

EXERCISES	POSITION	REPETITIONS	SETS
WARM UP Ankle dorsiflexion and plantarflexion	High sitting	5 reps for 1-2 mins	2 sets
Towel crawls	High sitting	5 reps for 1-2 mins	2sets
Picking up small objects	High sitting	5 reps for 1-2 mins	2 sets
Extension of great toe	High sitting	5 reps for 1-2 mins	2 sets
Toe spreads	High sitting	5 reps for 1-2 mins	2 sets
Ball rolling	High sitting	5 reps for 1-2 mins	2 sets
COOL DOWN			2 sets
Heel raises	standing	10 reps with 10 sec hold	2 sets
Calf stretches	Standing	10 reps with 10 sec hold	2 sets

Table-4.1: Distribution of children with functional flat feet according to gender in both groups.

Sno	Gender	Group	
		Group-A Experimental	Group-B Control
1	Male	10(66.7%)	6(40.0%)
2	Female	5(33.3%)	9(60.0%)
Chi-Square value=2.141 df=1, p=0.143, NS			

NS-Not significant. i.e., $p > 0.05$.

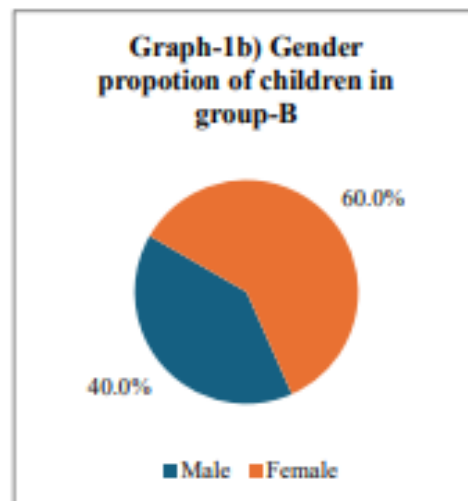
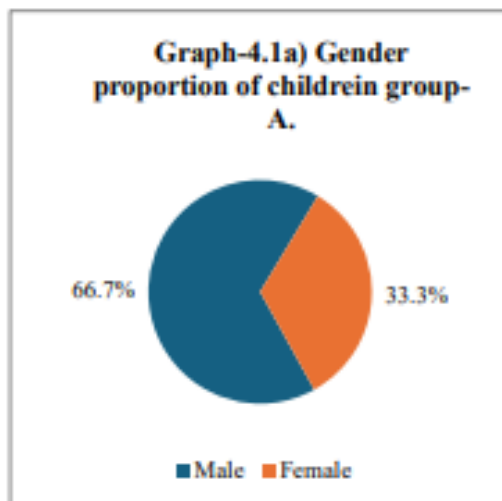
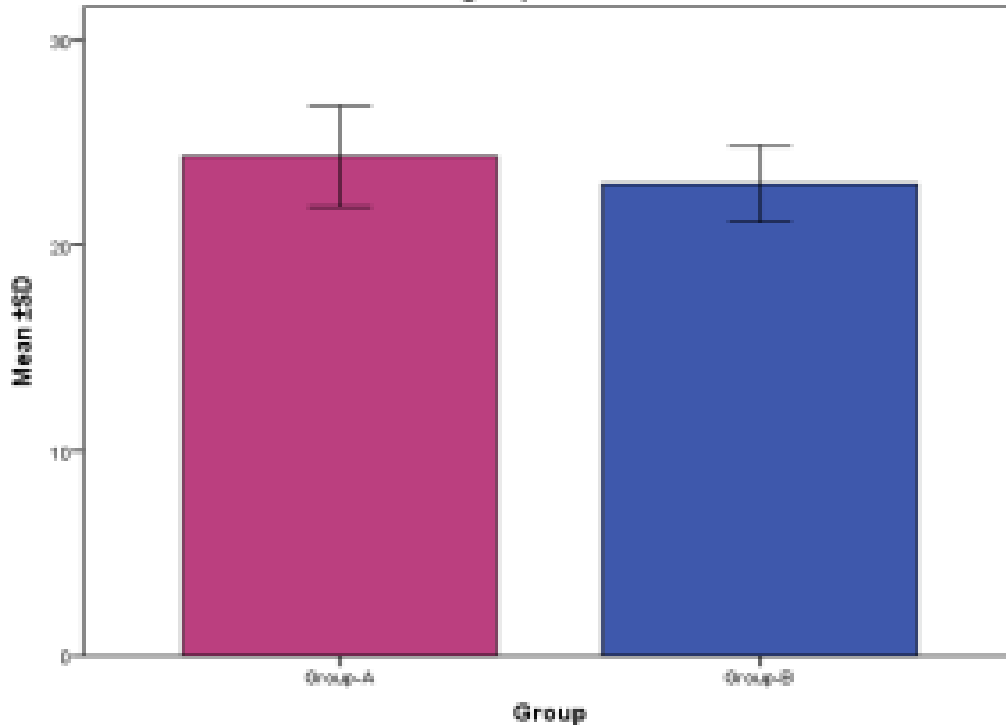


Table-4.2: Range, mean and SD of age of the children with functional flat feet in both the groups.

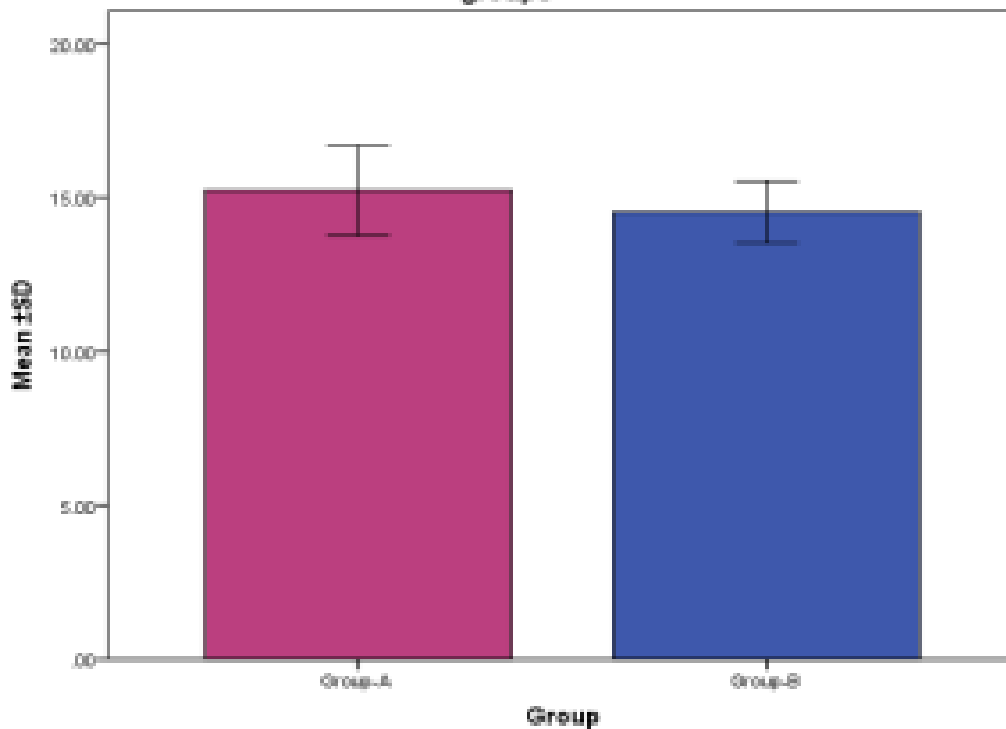
Sr. No.	Variable	Group-A: Experimental		Group-B: Control		Unpaired t-test
		Range	Mean \pm SD	Range	Mean \pm SD	
1	Age in years	6-12	9.33 \pm 1.87	7-10	9.00 \pm 1.19	t=0.580, p=0.566, NS
2	Height (cm)	112-132	126.47 \pm 4.53	114-136	125.93 \pm 5.285	t=0.298, p=0.768, NS
3	Weight (kg)	21-29	24.33 \pm 2.46	20-26	23.00 \pm 1.85	t=1.673, p=0.105, NS
4	BMI	12.62-17.54	15.22 \pm 1.45	12.62	14.51 \pm 1.05	t=1.559, p=0.130, NS

NS-Not significant. i.e. $p > 0.05$.

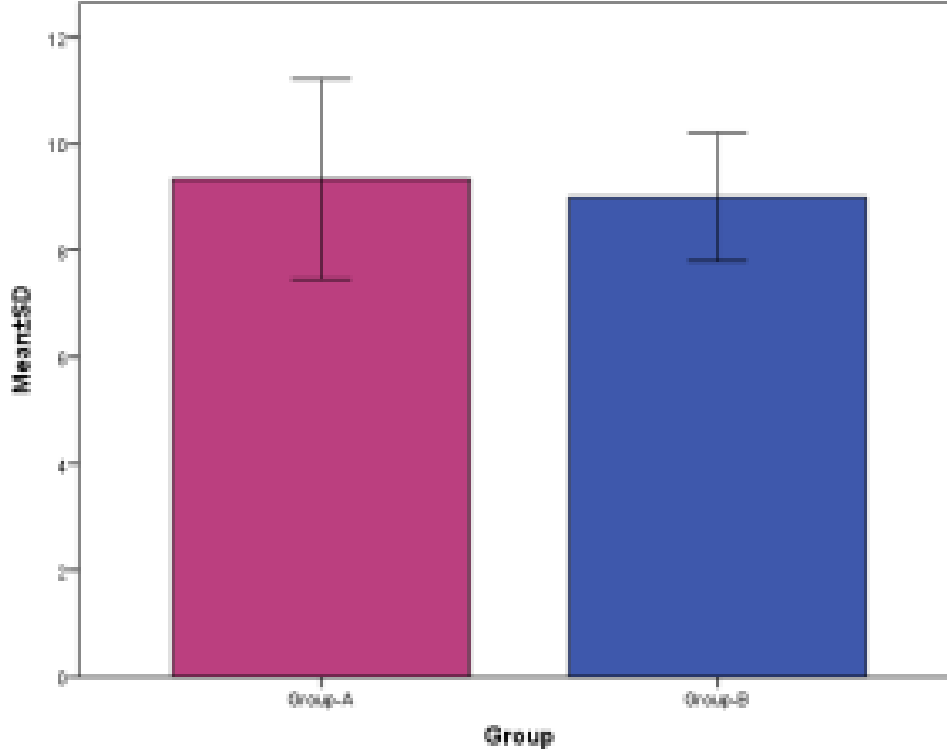
Graph-4: Mean and SD of weight(kg) of children with functional flat feet in both groups



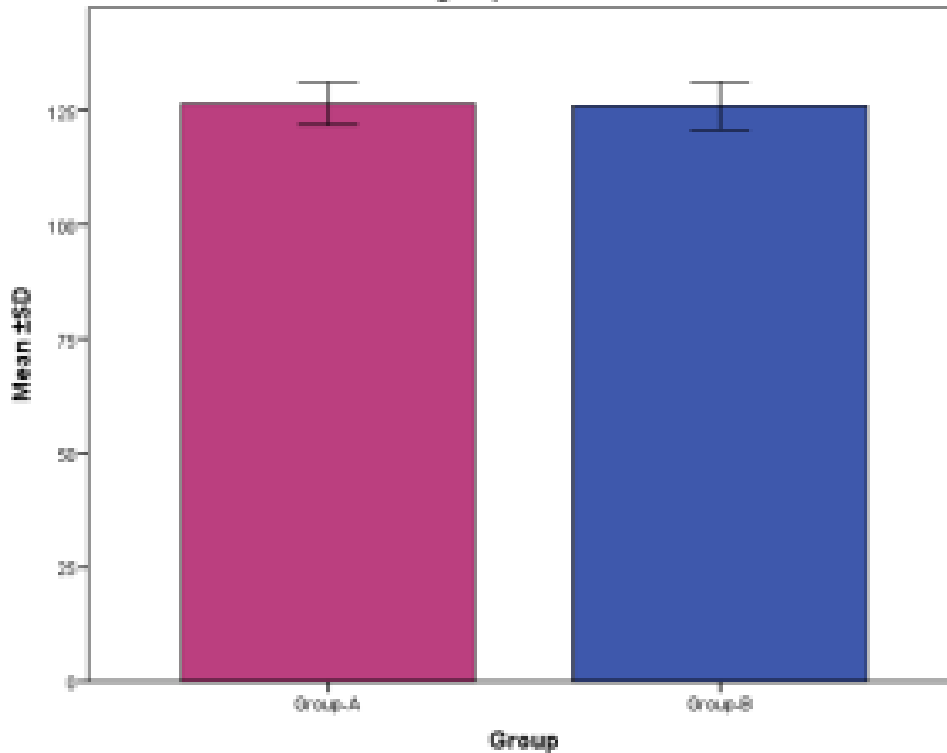
Graph-5: Mean and SD of BMI of children with functional flat feet in both groups



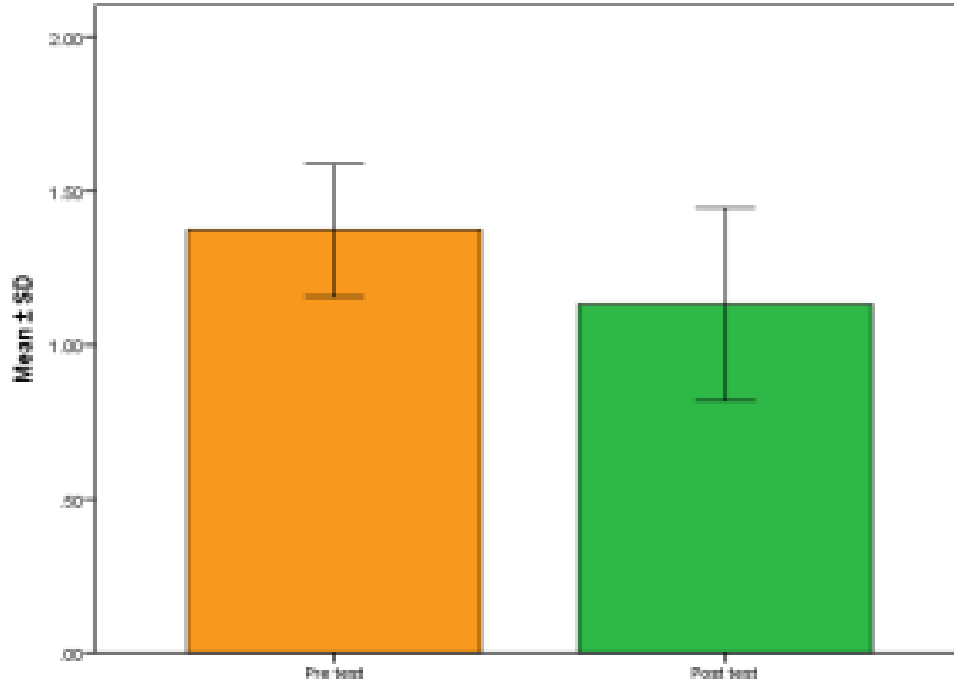
Graph-2: Mean and SD of age of children with functional flat feet in both groups



Graph-3: Mean and SD of height(cm) of children with functional flat feet in both groups



Graph-6: Pre and post test navicular drop(cm) of children with functional flat feet in group-A



Graph-7: Pre and post test Foot posture index of children with functional flat feet in group-A

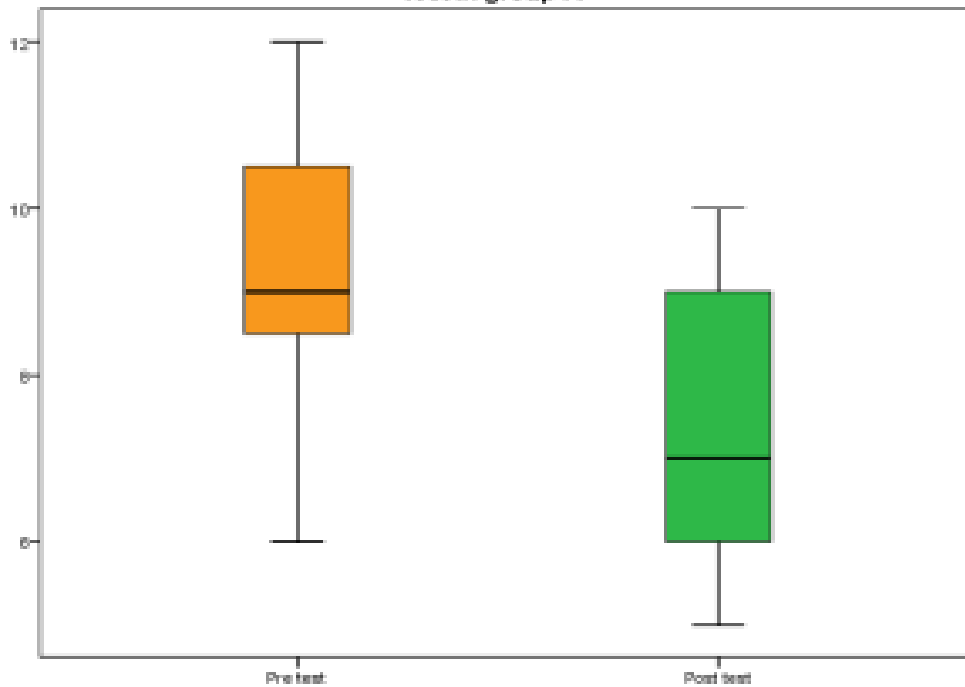


Table-4.3: Range, mean and SD of outcome measures of children with functional flat feet in group-A

Sno	Outcome measures	Group-A: Experimental				Paired t-test/ Wilcoxon test	p-value
		Pre -test		Post test			
		Range	Mean ±SD	Range	Mean ±SD		
1	Navicular drop test (cm)	1.00- 1.90	1.37±0.21	0.40- 1.60	1.13 ±0.31	t=6.393*	p=0.000
2	Foot function index	6-12	9.33±1.76	6-10	7.67±1.72	z=3.493*	p=0.000

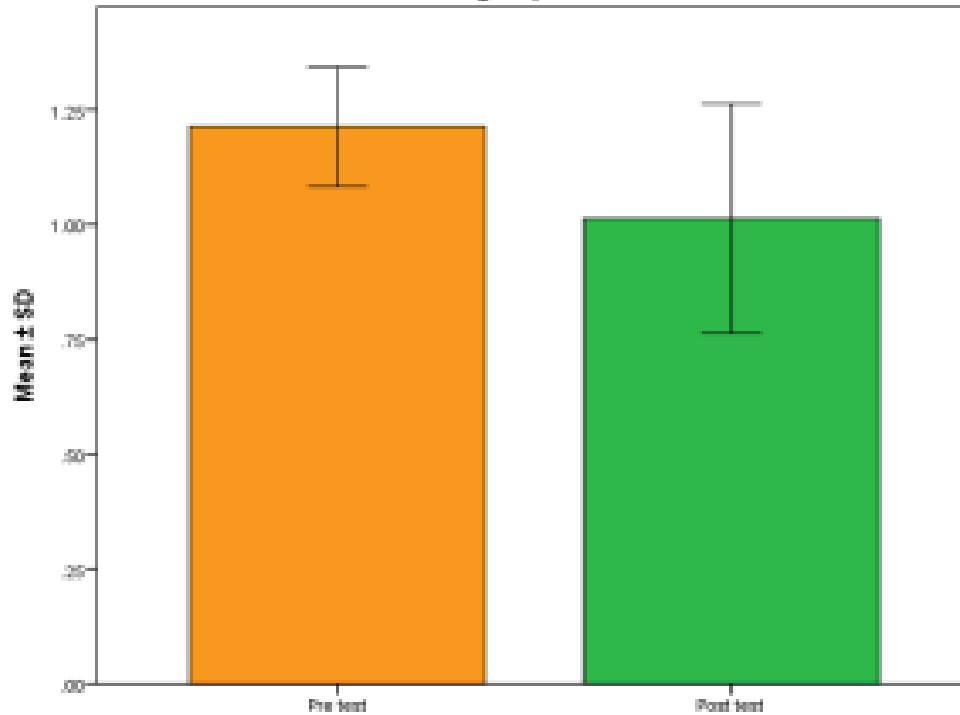
Note: * denotes –Significant (p<0.05), t- paired t-test, z- Wilcoxon test,

Table-4.4 Range, mean and SD of outcome measures of children with functional flat feet in group-B.

S no	Outcome measures	Group-B: Control				Paired t-test/ Wilcoxon test	p-value
		Pre -test		Pos-t test			
		Range	Mean ± SD	Range	Mean ± SD		
1	Navicular drop test (cm)	1.00- 1.40	1.21± 0.13	0.40- 1.30	1.01 ±0.25	t= 3.742*	p= 0.002
2	Foot function index	6-9	8.47± 1.18	6-8	6.13±1.76	z= 3.418*	p= 0.001

Note: * denotes –Significant (p<0.05), t- paired t-test, z- Wilcoxon test,

Graph-8: Pre and post test navicular drop(cm) of children with functional flat feet in group-B



Graph-9: Pre and post test Foot posture index of children with functional flat feet in group-B

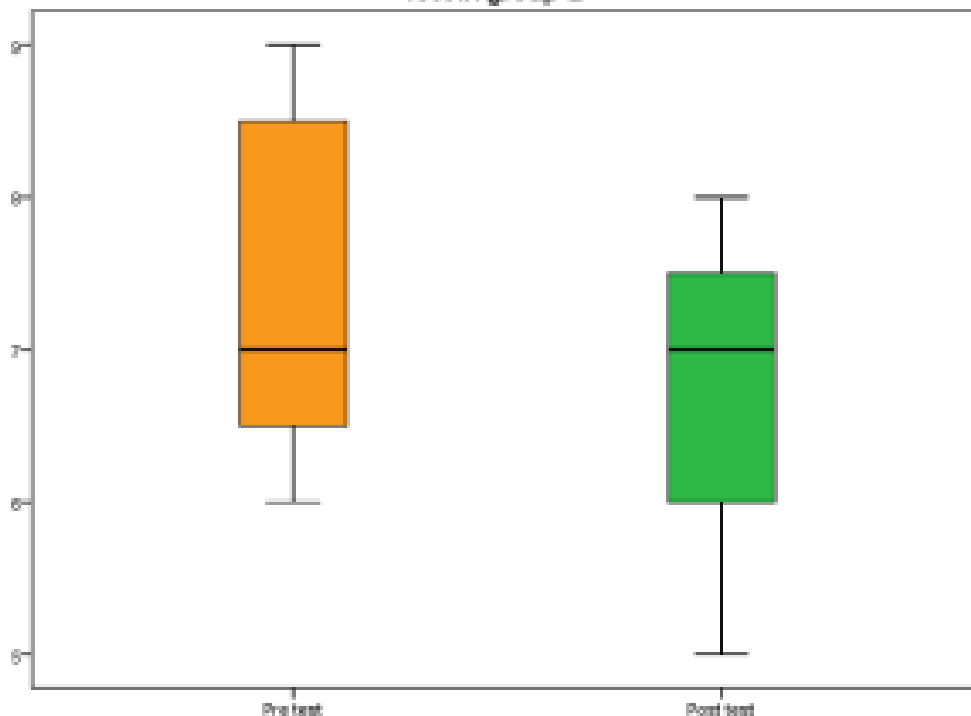
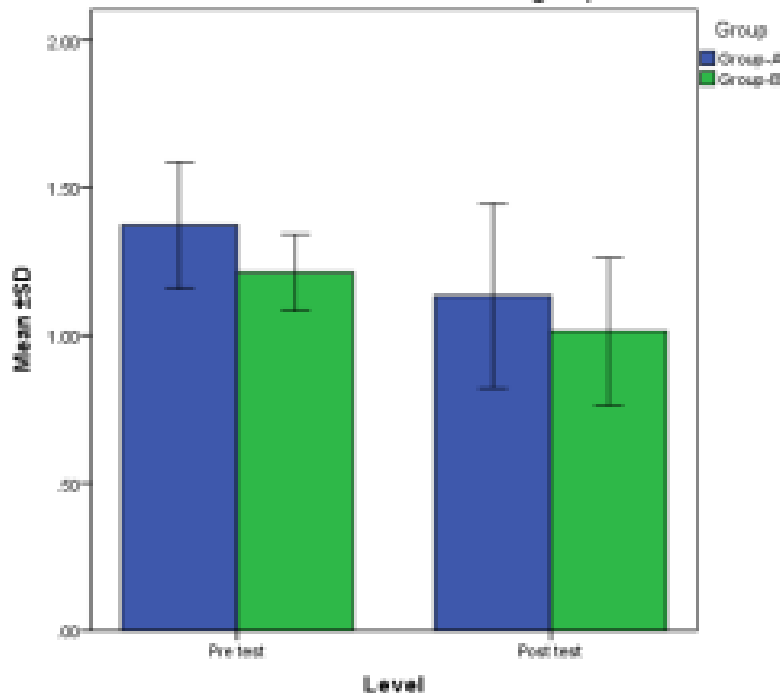


Table-4.5: Comparison of pre and post-test outcome measures of children with functional flat feet in between the groups.

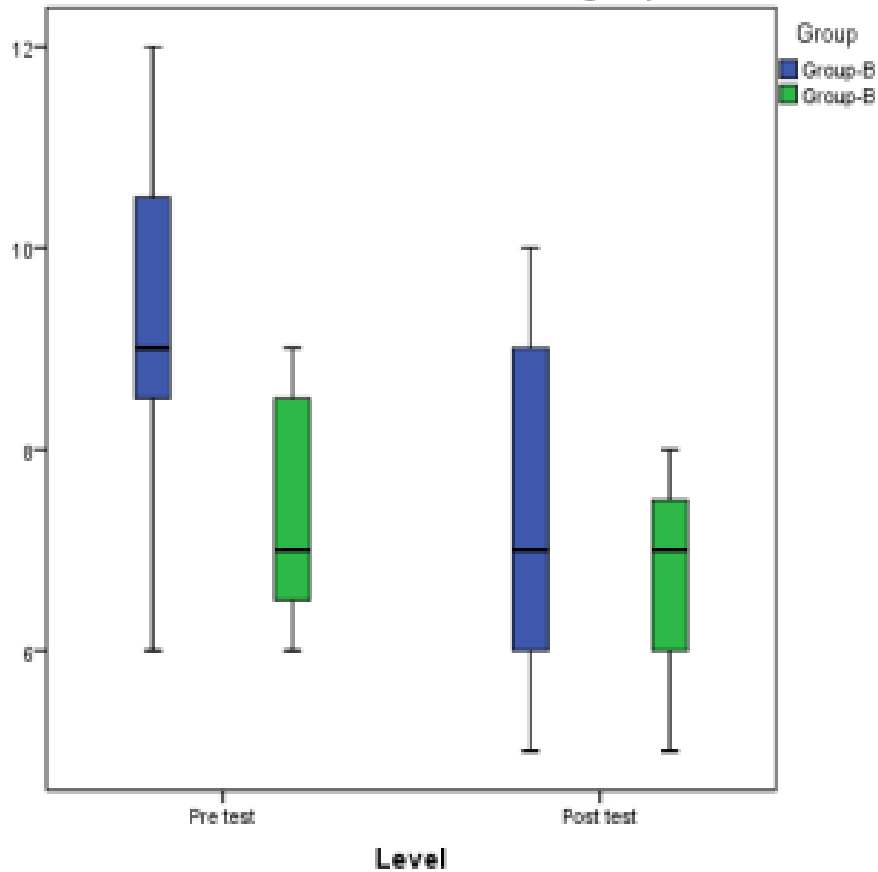
Sno	Outcome measures	Pre test		Post test	
		Group-A	Group-B	Group-A	Group-B
		Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD
1	Navicular drop test (cm)	1.37±0.21	1.21±0.13	1.13 ±0.31	1.01 ±0.25
2	Foot function index	9.33±1.76	8.47±1.18	7.67±1.72	6.13±1.76
Between group comparisons: Mann-Whitney U test		<ul style="list-style-type: none"> Navicular drop t=1.462, p=0.273, NS Foot posture: z=1.670 p=0.086, NS 		<ul style="list-style-type: none"> Navicular drop t=1.159, p=0.256, NS Foot posture: z=2.006 p=0.045, S 	

S-denotes significant (p<0.05); NS – not significant (p>0.05).

Graph-10: Pre and post test navicular drop(cm) of children with functional flat feet in between the groups



Graph-11 : Pre and post test Foot posture index of children with functional flat feet in between the groups



DISCUSSION

Experimental group participants were treated with kinesio-taping along with short foot exercises targeting the strengthening of the intrinsic muscles of the foot. Comparison of pre and post-test values of navicular drop, and foot posture index was done which showed that, there was significant difference in the Foot posture index with p value being <0.05 and mean difference being highly significant. This effect of Kinesio-taping is based on the mechanism explained by, Kenzo Kase that kinesio - Kinesio- tape is designed to mimic the qualities of human skin. The tape has comfortable thickness to skin epidermis and can be stretched from its resting length studies suggested that taping reduces pronation, as indicated by shifts in midfoot pressure from medial to lateral along with the changes in forefoot and hindfoot forces due to biomechanical changes like eversion of calcaneus in relation to talus & medial rotation of navicular commonly seen in flat feet. (5)

Conventional group participants were treated with short foot exercises. Comparison of pre and post-test values of the navicular drop test and the foot posture index was done which showed that there was significant difference seen with p value being <0.05

Short foot exercises help in strengthening of the intrinsic muscles of the foot namely the abductor hallucis, flexor digitorum brevis and the quadratus plantar. They serve as an important role in stabilising

the medial longitudinal arch. Intrinsic foot muscles also play an important role in static balance, such as standing on one leg, and in adjusting posture.

The result from the statistical analysis of the study supported the alternative hypothesis which stated that there is a beneficial effect seen on the subjects with both short foot exercises along with kinesio-taping and the short foot exercises.

CONCLUSION

The result of the study shows that:

- Both the interventions in experimental and control group were found to be individually effective in treating children with functional flat feet
- But, while compared the post-test outcomes in between the groups, the experimental group was significantly better than control group of children with functional flat feet.

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