Original Article

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Comparison of Two Different Kinesiotaping Techniques on Moderate to Severe Hallux Valgus: A Pilot Study

Physiotherapy Section

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ABSTRACT

Introduction: Moderate to severe hallux valgus causes pain in the foot, balance deficits, gait impairments and eventually falls. With a chronic progressive onset the severity of hallux valgus increases. Regular kinesiotaping delivered will not be able to correct all biomechanical changes of foot. To check if modified kinesiotaping is able to address this problem, highlights the need of the present study.

Aim: The study aimed to compare the effect of two different kinesiotaping techniques on angle of hallux valgus, medial arch, great toe pronation, and balance (static and dynamic).

Materials and Methods: The present pilot study with 20 young adults having moderate to severe hallux valgus were selected from Outpatient department of Dr. D.Y. Patil College of Physiotherapy, Pune, Maharashtra, India, based on inclusion and exclusion criteria. The study duration was six months from September 2019 to February 2020. Demographic data includes age, gender, body mass index and side affected with hallux valgus. Both genders, with ages between 18 to 65 years, not undergoing any other intervention and having hallux valgus angle 20-40, i.e., moderate and >40, i.e., severe, were included in the study. For a total sample size of 20, subjects were divided into two groups based on convenience sampling. Group A was given Toe Spread Out (TSO) exercise and modified kinesiotaping technique while Group B was given TSO exercise and kenzo kase kinesiotaping technique. The treatment was given for two weeks, and taping was performed five times during the given period. Subjects were reassessed post two weeks of session. Hallux valgus angle, pes planus, great toe pronation and balance were assessed by joint protractor app, navicular drop test and Neurocom balance master, respectively, at baseline and after two weeks of treatment. For normally distributed data paired t-test and independent student t-test was used for intragroup and intergroup comparison. If the data is not normally distributed then Wilcoxon test for intragroup and Mann Whitney for Intergroup was used.

Results: According to present study findings there was statistically significant difference for hallux valgus angle (p=0.046), navicular drop (p=0.003), and great toe rotation (p=0.038) was noted.

Conclusion: The findings of this study strongly support the use of the modified taping technique in moderate to severe hallux valgus over the Kenso-kase taping technique. Furthermore, the correction of navicular drop and great toe pronation has an additional positive impact on the improvement in hallux valgus.

Keywords: Athletic taping, Flat foot, Navicular drop, Pronation

INTRODUCTION

Hallux valgus is a most common chronic complaint causing an increase in angulation between the first metatarsal (shaft) and proximal phalanx of the hallux. The condition is pathological if found to be greater than 15° [1]. The severity of the degree of hallux valgus is classified as mild if 15-20°, moderate 20-40° and severe more than 40° [2]. With increased severity of deformity, many associated foot changes such as sinking of navicular bone and pronation of first metatarsophalangeal and first phalanx occur.

It leads to pain in the foot, balance deficits, gait impairments and falls in the older population. Causative factors may be intrinsic, such as weakened abductor hallucis muscle, genetics, pes planus, ligamentous laxity, age, first ray hypermobility and tight Achilles tendon or extrinsic, such as high-heeled narrow shoes and excessive weight bearing [3]. This leads to the development of soft tissue and bony prominence on the medial side called as a bunion. In a systematic review (2010), Nix S et al., reported a 23% prevalence rate among 18-65 years of population [4].

The condition is managed both surgically and conservatively. With ageing, the condition's prevalence increases. There are many operative techniques to correct hallux valgus deformity, but reoccurrence or undercorrections are seen in 10% to 14% of cases; surgery may also cause postoperative complications [5]. The conservative management includes the use of supportive braces, taping techniques and modifications with the footwear.

Taping-like techniques, when used earlier, can prevent the worsening of deformity. A kinesiotaping application reduces oedema by improving lymph and blood circulation; it also helps by re-education of joints and muscles through increased proprioceptive input, reducing pain, better alignment and increased ranges [6]. Kim MH et al., study show that exercises also help correct hallux valgus [7]. Various studies on combining hallux valgus with kinesiotaping have results generalised to mild cases. As the severity of the condition increases, the modification of kinesiotaping will be required to address all components of hallux valgus. The chronicity and progressive nature of hallux valgus causes an increase in severity of condition. Regular kinesiotaping delivered will not be able to correct all biomechanical changes of foot. Hallux valgus is common deformity which leads to pain in foot. Various studies have been done on hallux valgus and kinesiotaping with result generalised to mild cases. As severity of the condition increases the modification of the kinesiotaping will be required to address all components of hallux valgus. In present study, kinesiotaping will be seen in moderate to severe cases with a modification to address maximum components. To check if modified kinesiotaping is able to address this problem highlights the need of present study.

The present study explored the role of kinesiotaping methods in moderate to severe cases of hallux valgus, addressing the correction of maximum components. The objective of the present study was to compare the effect of the conventional kinesiotaping technique and

modified kinesiotaping technique on the degree of hallux valgus, medial arch, great toe pronation, and balance (static and dynamic). The null hypothesis for the study was no difference on the degree of hallux valgus, medial arch, great toe pronation, and balance in hallux valgus patients treated using modified or conventional kinesiotaping technique. Whereas alternate hypothesis state there is a difference in effect on the degree of hallux valgus, medial arch, great toe pronation, and balance in hallux valgus patients treated using modified or conventional kinesiotaping technique.

MATERIALS AND METHODS

The present pilot study recruited subjects from Outpatient Department of Dr DY Patil College of Physiotherapy, Pune, Maharashtra, India. It was a six month study duration from September 2019 to February 2020. Permission was acquired from an Institutional, Sub-ethical Committee (DYPCPT/ISEC/33/2019). The subjects were informed about the study and invited to participate in it. Sixty-two subjects were screened among which 20 who gave written informed consent and had moderate to severe angle of hallux valgus were recruited.

These 20 participants for a pilot study were randomly allocated with convenience sampling technique into Group A (Corrective taping technique in moderate to severe hallux valgus) and Group B (kenso-kase taping technique).

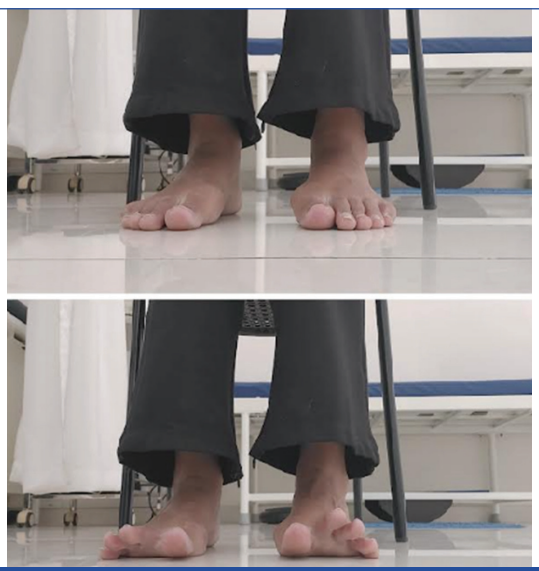
Inclusion and Exclusion criteria: Both genders, with ages between 18 to 65 years, not undergoing any other intervention and having hallux valgus angle 20-40, i.e., moderate and >40, i.e., severe, [8] were included in the study. Individuals with rheumatoid arthritis, osteoarthritis, foot surgeries, congenital hallux valgus, CNS injury, PNS injury, recent ankle sprain, recent foot fracture or dislocation were excluded. Materials required were a protractor app, Balance master Neurocom system version 9 (Natus Medical Incorporated, Seattle, USA), ruler 30 cm and kinesiotape.

Study Procedure

Intervention: After demographic data, baseline outcome measures (hallux valgus angle, pes planes, great toe rotation and balance) were assessed and recorded in data collection form.

Group A (Experimental) was given TSO exercise (20 min/day for two weeks) and modified kinesiotaping technique (on the 1st, 4th, 7th, 10th, and 13th day).

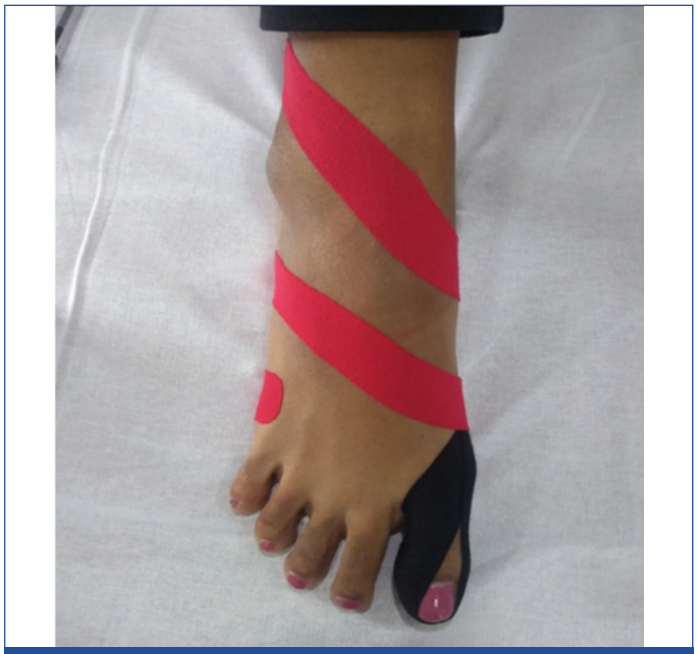
Group B was given TSO exercise (20 min/day for two weeks) and kenzo kase k-taping technique (on 1st, 4th, 7th, 10th, 13th day). TSO exercise [Table/Fig-1] involves the subjects to lift all toes with heel and heads of metatarsal on floor. Then they were instructed to push little tow down and outwards while big toe down and inwards [9].



[Table/Fig-1]: Toe Spread Out (TSO) exercise.

After implementation, patients were permitted to walk around for 15 minutes to get used to the tape and check the adverse effects of taping. Post two weeks session, outcome measures were reassessed.

1) Modified kinesiotaping method: 2 "I" strips of kinesiotape. Step 1) Length: Tape should be measured initially from midshaft of 1st metatarsal, rounding up great toe lateral to medial and ending up on mid-shaft again. Application: Apply 1.5-2 cm of tape without stretching just before the head of the 1st metatarsal on the medial aspect. Bring the great toe to a neutral position manually by supinating and adducting it. Round up the tape around the phalanx with 50-60% stretch and anchor it along the first ray. Step 2) Length: Tape should be measured initially from the dorsum aspect of the head of the 5th metatarsal, wrapping it twice around the foot and ending above the ankle joint line. Application: Start taping with no stretch on the 5th metatarsal, following a stretch of 40-50% along the sole towards the 1st metatarsal. Now lift the metatarsal, which will correct the pronation. Wrap the tape again from the lateral to the medial aspect and lift the navicular bone while maintaining the stretch. Anchor the tape above the ankle joint line [Table/Fig-2].



[Table/Fig-2]: Modified kinesiotaping technique for hallux valgus.

2) Kenso-kase taping technique (conventional) [10]: Two Y shaped pieces of k tape. Two Y-shaped kinesiotape pieces were used; the Y-shaped strip's base was placed on the base of the hallux. After the big toe was aligned to its estimated correct position (it was adducted by the practitioner manually) with a light to moderate tension, the tape was implemented through the first ray. This correction was done once during the implementation of the tape and took less than 10 seconds. No traction was used. The second tape piece was placed over metatarsophalangeal joints with a mechanical correction technique on hallux [Table/Fig-3].

[Table/Fig-3]: Kenzo-Kase kinesiotaping technique (Conventional) for hallux valgus.

Outcome Measures

1) Hallux valgus angle: The hallux valgus angle [Table/Fig-4] was measured using a joint protractor app [11]. The fixed arm was placed on the longitudinal line of the first metatarsal bone, fulcrum medially to the MTP joint, and the movable arm was placed on the longitudinal line of the great toe. The value of the hallux angle between these two lines was recorded.

[Table/Fig-4]: Measurement of hallux valgus angle using protractor app.

2) Pes planus: Pes planus was assessed with Navicular drop test. The patient was positioned in standing, so there was full weight-bearing through the lower extremity. The distance between the location of the navicular tuberosity and the supporting surface (floor or step) was measured. The patient was asked to relax, and then the amount of sagittal plane excursion of the navicular was measured with a ruler. Alternatively, the test can also be performed in reverse, i.e., measuring from a relaxed position up to a talar neutral [12].

3) Great toe pronation: Using joint protractor app the nail floor angle was obtained with patients standing barefoot on a rigid platform so that the nail of the big toe was on the same plane as the free edge of the platform. The stationary arm was parallel to the floor, and the movable arm was pointed towards the edge of the nail of the great toe [13].

4) Balance: The static and dynamic balance was assessed using the Neurocom balance master. For static balance assessment, unilateral stance was considered a functional test, including eye open and eye close parameters. With the hands resting on the hip standing, the subject lifts the unsupported foot at 30 degrees of hip flexion and 90 degrees of knee flexion. The therapist evaluated it first with eyes open and then closed. The tests assess the mean centre of gravity sway velocity measured in degrees per second. Dynamic balance was evaluated using the forward lunge functional test. While standing in a tandem stance, the subjects flexed the hip and knee joint with the affected leg as if stepping forward while maintaining a limb on the platform. The distance (the forward movement of the centre of gravity in lunging was calculated as a percentage of distance stepped forward relative to participant height), contact time (time lapsed between lunging leg contacting and leaving force plate), impact index (maximum vertical force by lunging leg) and force impulse (total vertical force by lunging leg) [14].

STATISTICAL ANALYSIS

A total of 20 subjects were included in the study (10 in each Group A & B). Data recording was done at baseline before the 1st session and at end of 13th day. Data analysis and interpretation was performed by SPSS 17.0. For within group the data was normally distributed for all variables except Force impulse in Group A and eye open in Group B. For between groups comparison data was normally distributed for all variables except great toe rotation, eyes open, contact time and force impulse. If the data was normally distributed then intragroup comparison was done by using paired t-test and inter group comparison was done using unpaired t-test. If data was not normally distributed then Wilcoxon signed test or Mann-Whitney U test have been used for intragroup and intergroup comparison.

RESULTS

A total of 20 subjects (12 females, 8 males) with mean age 29.5±3.68 participated in the pilot study. In [Table/Fig-5], the hallux valgus angle of the participants in Group A (p=0.001) and Group B (p=0.015) shows statistically significant difference. This shows that both the taping techniques were effective on the medium to severe hallux valgus angle. The great toe rotation was reduced only in Group A (p=0.015) and shows no significant reduction in Group B (p=0.602), whereas, navicular drop reduced in Group A as well as Group B with p-value less than 0.05.

In [Table/Fig-6], comparison between day 1st and day 15th for Group A and Group B showed no significant difference for parameters of static balance and dynamic balance except force impulse in Group A (p=0.018) and Group B (p=0.003) and for distance (p=0.0001) in Group B.

[Table/Fig-7] demonstrates the effect of two different taping techniques. Significant difference for hallux valgus angle (p=0.046), navicular drop (p=0.003) and great toe rotation (p=0.038) was seen when Group A compared with Group B. This suggests that the modified taping techniques performed in Group A was more effective taping technique considering hallux valgus angle, navicular drop and great toe rotation.

In [Table/Fig-8], no significant difference (p>0.05) for parameters of static balance and dynamic balance was seen. There was no significant improvement in static as well as dynamic balance when both the groups were compared.

DISCUSSION

Presence of moderate hallux valgus alters kinematics of foot. The associated biomechanical changes become more prominent as severity increases. Kinesiotaping as a conservative treatment prevents worsening of condition seen as excessive valgus angulation,

Groups	Variables	Pre	Post	Mean difference±SD	t-value	p-value
Group A	Hallux valgus angle (degree)	21.92	17.18	4.74±3.128	4.59	0.001*
	Great toe rotation(degree)	15.24	10.44	4.8±5.09	2.9	0.015*
	Navicular drop (mm)	13.4	7.2	6.2±2.044	9.59	0.00001*
Group B	Hallux valgus angle (degree)	21.19	19.06	2.13±2.68	2.98	0.015*
	Great toe rotation (degree)	14.37	13.53	0.84±4.91	0.54	0.602
	Navicular drop (mm)	12.7	10.8	1.9±1.37	4.38	0.002*

[Table/Fig-5]: Within group difference for foot parameters in Group A (n=10) and Group B (n=10).
p-value<0.05 *statistically significant; Statistical test used-Student paired t test; (t-value) and Wilcoxon signed test (w value) SD-Standard deviation, % bwt - Percent of body weight, % bwt-sec - Percent of body weight multiplied by time in seconds

Parameters	Group A						Group B					
	Pre	Post	Mean difference±SD	t-value	w	p-value	Pre	Post	Mean difference±SD	t-value	w	p-value
Static balance												
Eye open (degree/second)	1.2	1.02	0.18±0.40	1.4	-	0.19	1.52	1.18	0.34±0.89	-	13	0.9
Eye close (degree/second)	2.31	2.19	0.12±0.61	0.61	-	0.55	2.63	2.26	0.37±0.79	1.47	-	0.17
Dynamic balance												
Distance (%body height)	48.8	52.63	3.83±7.99	1.51	-	0.16	48.1	56.9	8.8±4.59	-6.06	-	0.0001*
Contact time (seconds)	1.951	0.944	1.007±1.62	1.96	-	0.07	1.198	0.931	0.26±0.43	1.92	-	0.08
Impact index (%bwt)	38.66	35.99	2.67±10.54	0.8	-	0.44	43	49.9	-6.9±12.71	-1.7	-	0.12
Force impulse (%bwt-sec)	216.43	105.6	110.8±158.3	-	47	0.018*	142.8	98.3	44.5±35.51	3.96	-	0.003*

[Table/Fig-6]: Within group difference in parameters of static and dynamic balance in Group A.
p-value<0.05 *statistically significant; Statistical test used-Student paired t-test (t-value); SD-Standard deviation, mm=millimeter

Variables	Group A Mean diff	Group B Mean diff	Mean difference	t-value	U value	p-value
Hallux valgus angle (degree)	4.74	2.13	2.61	2.14	-	0.046*
Great toe rotation (degree)	4.8	0.84	3.96	-	22	0.038*
Navicular drop(mm)	6.2	1.9	4.3	3.41	-	0.003*

[Table/Fig-7]: Between group difference for foot parameters in Group A and Group B.
p-value<0.05 *statistically significant; Statistical test used-Student unpaired t-test (t-value) and Mann-Whitney U test (U value); mm: millimeter

Parameters	Group A Mean diff	Group B Mean diff	Mean difference	t-value	U value	p-value
Static balance						
Eye open (degree/second)	0.18	0.36	0.16		47.5	0.84
Eye close (degree/second)	0.12	0.37	0.25	-0.241		0.8
Dynamic balance						
Distance (%body height)	3.83	8.8	4.97	-1.78		0.09
Contact time (seconds)	1.007	0.26	0.74		41	0.49
Impact index (%bwt)	2.67	6.9	4.23	-1.86		0.07
Force impulse (%bwt-sec)	110.8	44.5	66.3		47.5	0.85

[Table/Fig-8]: Between group difference in parameters of static and dynamic balance.
Statistical test used- Student unpaired t-test (t-value) and Mann-Whitney U test (U value).
% bwt - Percent of body weight, % bwt-sec - Percent of body weight multiplied by time in seconds

great toe rotation and pronated feet. This study concentrates on correction of these components.

The present study supports the use of the modified kinesiotaping technique along with foot exercises for improving hallux valgus, great toe rotation and navicular drop but with respect to balance no significant changes were seen. TSO exercises were adjunct to this kinesiotaping technique. A research found out the positive effect of TSO exercise on hallux valgus angle. The Abductor Hallucis muscle is involved not only in abduction but also in plantar flexion of the first MTP joint. Therefore, the present study involves TSO exercises as it covers diagonal movements combining both abduction and flexion of the big toe. This exercise improved the cross-sectional area of abductor hallucis muscle which has positive co-relation with strength and angle of joint [7]. A study by Bayar B et al., (2011) had shown greater beneficial effect on hallux valgus angle using taping with exercise [15]. Another study by Zlobinski T et al., (2021) had found kinesiology taping effective in reducing hallux valgus angle along with resulting in improvement of associated pain [16].

The elasticity of the kinesiotaping allows for overall joint movement, creating a deformation of the skin and increasing stimulation of cutaneous mechanoreceptors [17]. A study reported increased bioelectric activity in healthy adults following kinesiotaping on vastus medialis [18]. Thus, kinesiotaping application might have improved the function of the abductor hallucis muscle and caused the abduction of great toe. Even if the hallux were to deviate toward the second toe, the tension used during application produces a recoil effect of the kinesiology tape, which may have acted to abduct the hallux and gradually reduce the hallux valgus [19]. There can be an association between hallux valgus and pronation of foot [20].

Pronation occurs due to plantar flexion of talus and sinking of navicular bone [21]. In the present study, modified taping technique showed improvement as navicular drop was prevented. Also, evidence showed that taping reduces pronation by shifting forces medial to lateral and distributing equally [22]. In the present study, the Group A showed more significant improvement when compared to Group B with evidence that the first ray plays an important part in maintaining normal biomechanics of foot. Failure anywhere along the first ray, from distal phalanx to talonavicular joint, can result in hallux valgus. Considering the hallux valgus angle, great toe rotation and navicular drop the present study mainly focuses on the correction of these components by modified K-taping technique.

Static balance showed insignificant result for both the groups individually as well as on comparison. Son J-S et al., found positive effect of rigid taping on static balance in patients with hallux valgus [23], but in the present study, the results were negative maybe because of the use of elastic tape instead of non-elastic tape.

Significant results were only reported in force impulse among the dynamic parameter of balance master. The vertical force exerted by the lunging leg during the landing and pushing force determines the force impulse (percentage body weight x second force was exerted) [24]. Feet affected with hallux valgus deformity showed a load shift to lateral aspect of foot and decreased weight bearing of great toe leading to increase in force impulse [25]. Taping technique showed improvement in both the groups because of equal distribution of load and thereby decreasing the force impulse. A study by Lee SM and Lee JH (2016) had suggested improvement in moderate hallux valgus after using balance taping with kinesiology tape [26].

For balance when assessed on balance master it showed no significant changes. This may be due to the insufficient change in angle because of short duration of the protocol. Though, the change was clinically significant.

Limitation(s)

Hallux valgus could be objectively evaluated using radiography which is a gold standard with excellent reliability for measuring the valgus angulation. Also, long-term effect was not evaluated in this study.

CONCLUSION(S)

Hallux valgus shows more improvement in modified than conventional kinesiotaping technique in moderate to severe hallux valgus than kenso-kase taping technique. Moreover, correction of navicular drop and great toe pronation has an added effect on improvement in hallux valgus. Present study highlights kinesiotaping along with TSO exercises as an effective conservative treatment in moderate to severe hallux valgus. Also, as the severity of the hallux valgus increases, the modification of the kinesiotaping technique shows improvement in hallux valgus angle, great toe rotation and navicular drop. Future studies can see the long-term effect of modified kinesiotaping taping on pain and balance. Also, studies could provide detailed information about the activation patterns of foot muscles during balance task.

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- Manual Googling: Jul 28, 2025
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