



# The Effectiveness of Modified Pilates Program with and without Kinesiotaping on Postnatal Urinary Stress Incontinence: A Randomized Clinical Trial

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## **Author's contribution**

*The sole author designed, analyzed, interpreted and prepared the manuscript.*

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## **ABSTRACT**

**Introduction:** Urinary Stress Incontinence is very common condition seen in postnatal woman. Without pelvic floor strengthening this condition will lead to social inhibition. The rate of urinary stress incontinence is more in normal vaginal delivery compared to C-Section. Few authors have demonstrated the effectiveness of Kegal exercise and Pilates on such woman with urinary stress incontinence. There is dirth in the literature related to effect of Kinesiotaping in reduction of urinary stress incontinence.

**Research Objective:** The objective of the research was to find out the effect of Kinesiotape along with the Modified Pilates program on subjects with postnatal urinary incontinence.

**Methodology:** This is an experimental study with randomised clinical trial design and the study

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setting was Bruhat Bangalore Mahanagar Palike, and the included 50 postnatal women who underwent vaginal delivery. The sample was divided into two groups: Group A (25) were subjected to Modified Pilates Program with Kinesiotaping and Group B (25) were subjected to Modified Pilates Program alone. The intervention was conducted for 6 weeks. The outcome measures like: PERFECT Scheme, Questionnaire for Urinary Incontinence Diagnosis and Urogenital Distress Inventory were assessed both pre and post therapy at 6th week.

**Results:** Pre therapy both groups showed no statistical significance. Post therapy; Group A showed significant result with respect to all three outcome measures PERFECT (<0.0001), QUID (<0.001) and UDI (<0.001) and Group B showed significance only with respect to PERFECT Scheme (<0.05).

**Conclusion:** The study concluded that Modified Pilates will no doubt strengthen the pelvic floor muscle; but Kinesiotape addition to it will improve the strength by maintaining it and thus increasing the quality of life of the patient. Thus, using kinesiotape during the pelvic floor rehabilitation of Postnatal women with stress incontinence will provide benefit to the patient.

**Summary:** The current article concludes that Modified Pilates will strengthen the pelvic floor because of the abdominal cylinder involved along with Kinesiotape will add on to reduction in urinary incontinence because of the stimulation of sacral plexus.

*Keywords: Modified pilates program; kinesiotape; postnatal; urinary stress incontinence.*

## 1. INTRODUCTION

Postnatal Urinary Stress Incontinence is one of the common problems experienced by women. As defined by the International Incontinence Society "It is the involuntary loss of urine that represents a hygienic or social problem to the individual" [1]. The prevalence of Urinary Incontinence in India was 21.8% in rural tribal region [2]. According to National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) there exists various factors which are associated with urinary incontinence like; age, childbirth, pregnancy, menopause, obesity, lifestyle habits, prolapse of pelvic organ, surgery, neurological problem, etc [3]. Along with Pregnancy which is the most established cause of urinary incontinence due to its impact on important structures of urinary tract urinary incontinence has noteworthy relation with BMI, Menstrual history, menstrual span, races, age, smoking, alcohol intake and physical activities [4].

Incontinence is broadly categorized as;

- a. Stress Incontinence
- b. Urge Incontinence
- c. mixed incontinence
- d. functional incontinence
- e. transient incontinence
- f. overflow incontinence

Major causative factor for Urinary incontinence is delivery as the foetus is pushed down from the uterus to the vagina which is anterior to the

bladder and urethra. In this entire pushing phase of delivery, impact of the force applied by the uterine contraction cause some damage to the uterus, urethra and pudendal nerve leading to its stretch as the fetal head compresses on it. This leads to weakening of pelvic floor muscles due to hypogastric nerve injury. During the delivery the pelvic floor muscles (Levator ani, Coccygeus and Pelvic fascia) get stretched to the extent of its tear. Studies have stated that common reason to be educed antenatal bladder neck mobility causing postpartum urinary inconsistency due to alteration in soft tissue biomechanics during pregnancy [5].

Exercise therapy like; kegals exercise, Pilates, yogananas, and low frequency electrotherapeutic devices like TENS and faradic currents strengthen the pelvic floor muscle in the postnatal phase significantly helped in reduction of the urinary stress incontinence. The exercises either directly or indirectly strengthen the weakened pelvic floor muscles helping in reduction of this stress incontinence experienced by postnatal women. The reason given were increase in the pelvic floor muscle strength, pelvic stability, decrease in the depression and improvement in the quality of life. A study demonstrated that, kegals works efficiently in postnatal women by increasing the strength of the pelvic floor muscles [6]. Another study established that; Pilates increased the strength of the core and significantly reduced the rate of urinary stress incontinence [7].

According to authors knowledge there are very few studies related to application of

Kinesiotaping and its effects on overactive bladder [9]. Kinesiotape is an elastic tape usually used in athletic rehabilitation either in order to strengthen the muscle or inhibit a muscle. Several studies are conducted on various effects of kinesiotape depending on the technique it is used for. The tape can be used for muscle inhibition technique, muscle strengthening technique, trigger point release technique, edema reduction technique and ligament technique. The study concludes that the improvements in overactive bladder subjects may be due to the regulation of the myofascial tone with KT in the bladder reflex region. There is dearth in literature suggestive of kinesiotape and its effects when used in stress urinary incontinence. Hence, this study is being undertaken.

Thus the study aims at investigating the effect of Kinesiotape with Pilates on reduction of stress urinary incontinence. Objectives of the study would be;

- i. To compare the post effect of Pilates and Kinesiotaping in urinary stress incontinence
- ii. To investigate the quantitative analysis of urinary stress incontinence post Pilates with and without Kinesiotape application in postnatal women
- iii. To investigate the qualitative analysis of urinary stress incontinence post Pilates with and without Kinesiotape application in postnatal women

## 2. METHODOLOGY

This is an experimental study with randomised clinical trial design. The study setting was Bruhat Bangalore Mahanagar Palike, and the study included 50 postnatal women who underwent vaginal delivery. The study approval was attained from Institutional Ethical committee with Ethical Number:DSU/FACULTY/2022/010. The inclusion criteria were Age: 25-35years, Women who have undergone Normal Vaginal Delivery and Positive Stress urinary incontinence score not more than 18 on QUID. The subjects with LSCS, Patients diagnosed with skin allergies, Neurogenic bladder, Transient bladder, Vaginal prolapse, Uterine prolapse, Assisted vaginal delivery, Any diagnosed neurological deficits, Any diagnosed malignancy, Any traumatic injury to the lower extremity and spine were excluded. Sample size: The sample size required for the study was calculated with the G Power according to the number of voids/night. In order to obtain 80% power with  $d = 0.4$  effect size,  $\alpha = 0.05$  type I

error,  $\beta = 0.20$  type II error, it was determined that at least 22 patients would be required for each group [8].

Once recruitment was done on the basis of inclusion and exclusion criteria; Demographic details like: Age, Height, Weight, BMI, Menstrual history, menstrual span, races, age, smoking, alcohol intake of each subject was recorded, the study protocol was explained to the participants and baseline values of outcome measure in all the participants were taken down prior to the intervention. The participants were then divided into two groups by envelop method. Each participant was given two envelopes to choose in which designated group alphabets were written. The choice was made by the randomly by the participant of the study. Whichever envelope the study participant picked, he/she was allocated in that particular group. The study hypothesized that whether Modified Pilates Program with and without Kinesiotaping on Postnatal Urinary Stress Incontinence was efficient or not.

### 2.1 Outcome Measure

#### Primary outcome measures:

1. Pelvic floor muscle testing by manual palpation using PERFECT Scheme [10]
  - **P-** Power- of the muscles by Modified oxford scale where 0= no contraction, 1= flicker of contraction, 2=weak, 3=moderate, 4=good, 5=strong.
  - **E-** Endurance- by measuring how long is the hold time of maximal voluntary contraction
  - **R-** Repetitions- How many maximal voluntary contractions they hold with a rest between them,
  - **F-** Fast- The number of 1 second maximal voluntary contractions
  - **E-C-T-** Every Contraction Timed - a reminder to time every contraction

#### Secondary Outcome Measure:

1. **QUID:** The Questionnaire for Urinary Incontinence Diagnosis (QUID) is a self-administered tool consisting of 6-item and is designed to distinguish between Stress Urinary Incontinence and Urge Urinary Incontinence. The QUID is valid and reliable tool in diagnosing the type of incontinence. The scoring system of Questionnaire for Urinary Incontinence is

given as 0-6. There are 6 points which has to be scored from 0-6. In the end addition of all the score will give a total score. Scores from 0-3 suggests stress insentience and 4-6 suggests over active bladder [11].

2. UDI SF-6: It is a self administered 6 questionnaire with scores ranging from 0-3. Each score stand for different interpretation [12].

## 2.2 Procedure

Group A= Pilates along with Kinesiotaping (n=25) and Group B= Pilates (n=25)

**Intervention:** Modified Pilates Program (Common treatment) was given to both the groups with Group A having additional therapy of Kinesiotaping. Modified Pilates Program (Common treatment) to all the individuals in the study:

Modified Pilates group of exercises mentioned below [13] are performed by all the individuals in the study. 3 exercises of 10 minutes each per day x 3 times a week for 6 weeks.

The exercises performed for 6 weeks by each patient were as follows [13];

### Kinesiotaping application:

Four I-shaped Kinesio tapes with a width of 5 cm and thickness of 0.5 mm were used. Star-shaped KT was applied on the sacral region (S2-S4), which is a reflex area of the bladder, along with the ligament technique (75-100% stretch) in standing position by an experienced physical therapist (Figure 1). KT was performed 2 days per week for 6 weeks [9].

Data analysis was carried out after the final tabulation of all scores.

### List 1. Exercise description

Week	Exercises	Exercise Description[13]
1	1,2,3,4,5,6,7	1.Four point one leg stretch/four point swimming (level 1)
2	1,2,8,11,9,4,5,6,7	2.Cat Stretch
3	1,2,10,8,3,9,14,14,5,12,7,6,	3.Calm (level 1)
4	1,2,10,8,11,9,14,5,12,13,7,6	4.Heel slide/one leg stretch (level 1)
5	1,2,10,8,3,9,14,5,12,13,7,6	5.Supine knee lift/modified scissor (level 1)
6	1,2,10,8,12 or 15,5, 9,14, 5, 13,7.6	6.Thomas stretch
		7.Glut stretch
		8.Modified swan dive (level 1)
		9.Bent knee fall out/hip twist (level 1)
		10.Prone leg kick (level 1) / Swimming (level 1)
		11.Lift and lower/ side lying leg lift (level 1)
		12.Side lying forward leg kick/side kick (level 1)
		13.Abdominal preparation (level 1)
		14.Heel slide/one leg stretch with arm scissors (level 1)
		15.Side lying forward leg kick/side kick (level 2)



Fig. 1. Application of kinesio tapes

### 3. RESULTS

The data after completion of the study was tabulated and subjected to statistical analysis under software SPSS 16.0. Normality of the data was assessed by kolomogorov smirnov test which predicted data to be not normal distributed,

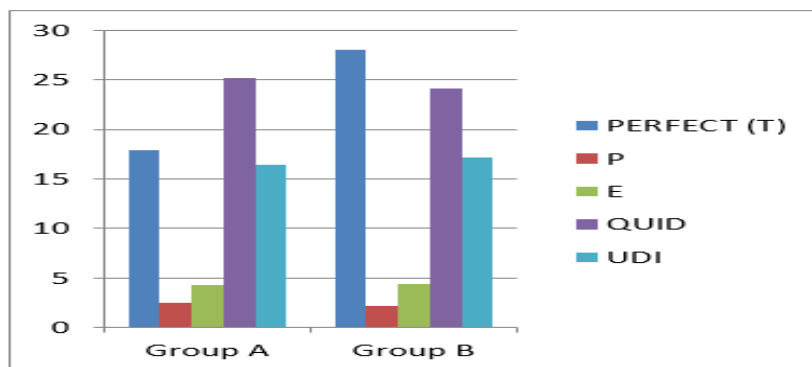
thus student test was used to analyse the data. The probability values was set for  $p < 0.05$  to be statistically significant. Wilcoxon Paired T test was used for analysis of within group results and Mann Whitney U Test was used for analysis of between group results.

**Table 1. Age and BMI comparison among groups**

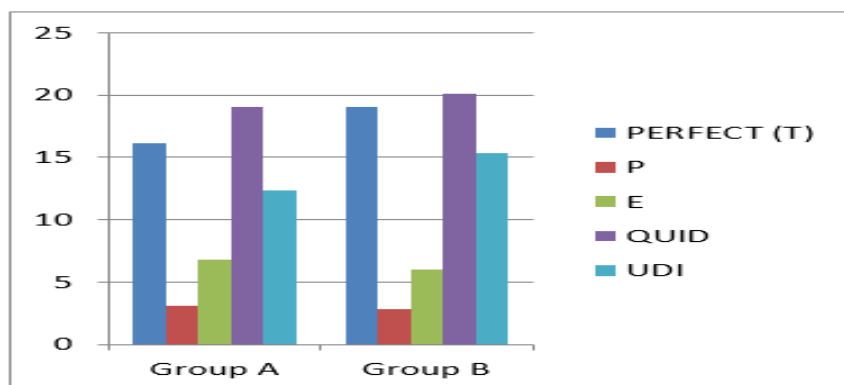
AGE	Group A	%	Group B	%	Total	%
25-30	14	51.851	13	56.521	25	50
31-35	11	40.740	12	52.173	25	50
<b>Total</b>	<b>27</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>50</b>	<b>100</b>

**Table 2. Comparison of Groups A and B with pre-test and post-test PERFECT total Power, Endurance, QUID and UDI by Wilcoxon Paired test**

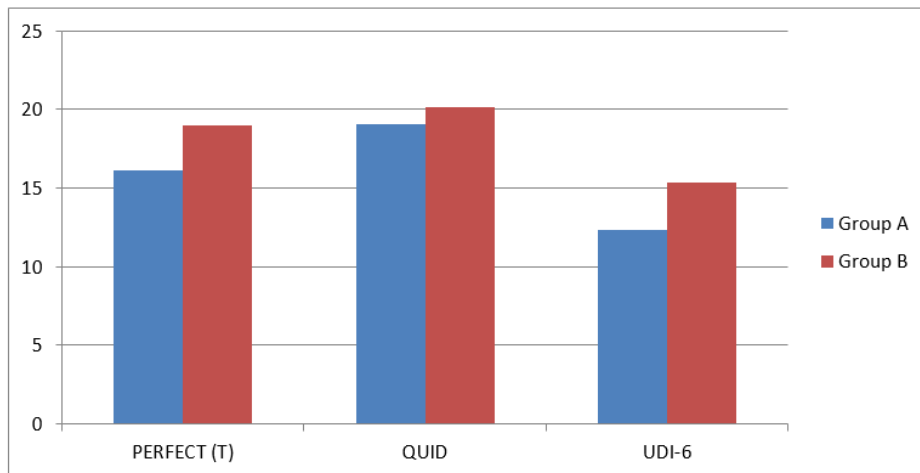
Parameter	Group A		p value	Group B		p value
	Pre test	Post test		Pre test	Post test	
PERFECT(T)	17.87±1.34	16.12±2.17	<0.0001*	28±1.56	19±2.51	0.136
P	2.45±0.72	3.12±0.99	<0.041*	2.12±0.52	2.82±0.12	<0.039*
E	4.26±2.72	6.77±2.96	<0.034*	4.36±2.71	5.96±2.89	<0.027*
QUID	25.13±1.89	19.07±1.58	<0.0012*	24.12±2.13	20.21±1.92	<0.031*
UDI	16.36±1.91	12.36±1.21	<0.0018*	17.13±2.37	15.33±2.19	0.173



**Graph 1. PRE test parameters by wilcoxon paired test**



**Graph 2. Post test parameters by Wilcoxon Paired test**



**Graph 3. Comparison of Groups A and B with post-test Perfect Total, QUID and UDI-6 by Mann-Whitney U test**

**Table 3. Comparison of Groups A and B with post-test Perfect total, QUID and UDI-6 by Mann-Whitney U test**

Parameter	Pre-test		P value	Post-test		P value
	Group A	Group B		Group A	Group B	
PERFECT	12.12±1.24	13.12±2.17	0.187	16.12±2.17	19±2.51	0.141
QUID	15.18±2.81	16.07±1.27	0.178	19.07±1.58	20.21±1.92	0.00192*
UDI	10.36±1.21	11.36±1.45	0.197	12.36±1.21	15.33±2.19	0.00291*

#### 4. DISCUSSION

Urinary Incontinence is a significant complain post vaginal delivery and also leads to significant reduction in quality of life post delivery. A study by Singh U et al, demonstrated the definite urine leakage after normal vaginal delivery was comparatively more significant to C section as the stretch of the pelvic floor muscle reaches to the limit so that after normal vaginal delivery the strength of the pelvic floor muscle gets poor thus leading to reduction in muscle power [2].

The study by Pavithralochani V. et al. conducted to compare the effectiveness of Kegel exercises and Pilates in subjects with urinary incontinence during pregnancy with 30 samples of second trimester with urinary urinary incontinence between the age 21-25 were divided into two group (Group A: Pilates and Group B: Kegel exercise) and the therapy was delivered respective to that group. Outcome measures used were Questionnaire for urinary incontinence diagnosis and Urogenital Distress Inventory Short form. The study concluded that, the frequency of urine leakage was reduced significantly in Pilates group when compared to the Kegel exercise group. The reason given for

this was; Pilates not only improved pelvic floor muscles and core strengthening, it also helps in relaxation and flexibility [7]. Similar results were achieved by the current study; the Pilates group with and without Kinesiotaping definitely showed significant improvement in the Pelvic floor muscle strength. Hence it becomes very important for a physiotherapist to rehabilitate a pregnant lady and a post delivery women.

A study by Celenay S et al compared the effectiveness of Kinesiotaping and external electrical stimulation in addition to pelvic floor muscle exercise (PFME) and sole PFME in women with overactive bladder. Patients were divided into 3 groups: PFME, PFME+KT and PFME+ES and the treatments were carried out for 6 weeks. The outcome measures used were OAB symptoms with voiding diary and Overactive Bladder-Version8 (OAB-V8), pelvic floor muscle strength (PFMS) with perineometer, quality of life with King's Health Questionnaire (KHQ). The study concluded that; the addition of Kinesio taping or external electrical stimulation to pelvic floor muscle exercise was more effective in improving overactive bladder symptoms, quality of life, and perception of improvement than pelvic floor muscle exercise alone. Thus it

can be used as complimentary treatment along with the exercises to strengthen the Pelvic floor muscle [8]. Similar results were seen in the current study. The addition of Kinesiotaping to the Pilates exercise showed more control over urine leakage when compared to Pilates exercise alone. Thus; Kinesiotaping acts as a complimentary treatment along with Pilates exercise in controlling the urine leakage in postnatal women.

## 5. CONCLUSION

The Present study concluded that though Pilates is known to increase the pelvic floor muscle strength, addition of kinesiotape will act as a complimentary treatment. this complimentary treatment will infact give a good result as it adds to the therapy of Pilates thus maintaining the strength of the muscles.

## CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The study approval was attained from Institutional Ethical committee with Ethical Number: DSU/FACULTY/2022/010.

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## COMPETING INTERESTS

Author has declared that no competing interests exist.

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