

Effect of Knee Joint Mulligan Taping On Balance in Stroke Patients

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Abstract

Purpose: This study was aimed at determining the effect of Knee joint Mulligan Taping on balance in Stroke patients. **Subjects:** 15 ambulatory Stroke patients were included in the study. Mulligan taping was applied on the knee joint of the hemiplegic side (n=15). MiniBESTscale⁽¹³⁾ and TUG test⁽¹⁴⁾ were used to assess their static and dynamic balance as well as gait speed. Both tests were performed pre and post taping. **Results:** There was a significant improvement in the TUG test⁽¹⁴⁾ (100%) of the patients. Other components like one leg standing, standing on foam surface with eyes open and closed, standing on inclined foam surface also showed significant improvement. Other components showed less significant improvement. **Conclusion:** The results showed that Mulligan taping is effective in improving static and dynamic balance in ambulatory stroke patients. Thus, this method is potentially significant for rehabilitation of Hemiplegic patients.

Keywords: Stroke, Mulligan taping, static and dynamic balance.

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I. Introduction

Stroke is a neurological disorder that occurs abruptly due to loss of brain function followed by an abnormal decrease in blood supply, and is often accompanied by profound memory and attention impairments^(1,2). Stroke victims often exhibit symptoms such as spasticity along with sensory and motor dysfunction. Additionally, gait dysfunction and balance disruption are frequently observed. Stroke patients often appear to have their Centre of Gravity shifted to the unaffected side due to the instability on the affected side. Their hip and ankle strategies are also affected due to muscle weakness. They may also have balance affected due to hemi-neglect⁽¹⁾. Therefore, one of the rehabilitation goals for Stroke patients is to recover balance and restore gait.^(1,3)

For improving the balance and gait in Stroke patients, various treatment methods are currently in use in clinics and studies. These techniques include weight shift training using visual feedback^(1,4), virtual reality exercises^(1,5), lower trunk strengthening training^(1,6), stair gait exercise^(1,7), task orientation training^(1,8), and traditional ankle-foot orthosis (AFO). Taping is also used to improve motor function. The application of tape supports the joint and enables functional movement by providing soft-tissue protection. This type of external support increases joint stability by enhancing ligament strength and restricting undesirable movement^(1,9). Such taping can help Stroke patients improve their gait and increase activities of daily living (ADL) performance.^(1,10)

Mulligan taping with non-elastic tape has been applied in the past to provide increase motor function and stability in joints. The tape is attached parallel or vertically to the joint for limiting normal physiological movement that causes pain. Additionally, Mulligan taping can continuously increase dynamic stability during active exercise, such as dynamic stability^(1,11).

Previous studies of taping interventions were conducted with healthy people and patients with musculoskeletal disorders^(1,9,10). Other investigations were performed to evaluate taping as a way to increase upper limb functioning in patients with neurological issues.^(1,11) However, the application of Mulligan taping for intervening the ambulatory disabilities faced by hemiplegic patients has not been studied. Thus, the purpose of the present study was to assess whether Mulligan taping at the knee joint improves the dynamic balance and gait of individuals who have suffered subacute Stroke.

II. Methodology

The study was performed in the research lab of the K. J. Somaiya College of Physiotherapy, Neuro OPD, of a tertiary care centre in Mumbai. The design of the study was experimental. Study proposal was approved by the Institutional Review Board. Ambulatory Stroke patients between the age group of 25-65 years

coming to Neuro OPD were included in the study .A sample size of 15 was taken. Both males and females were included in the test. A consent form was filled by the subjects and duly signed.Sampling method was Convenient sampling. Demographic data, duration of Stroke, and MMSE score was recorded. Patients with visual impairments and those who were wheelchair bound were excluded from the study. The entire procedure was explained to the patients.Patient’s TIMED UP AND GO⁽¹⁴⁾ and MiniBEST scores⁽¹³⁾ were taken pre and post taping. Materials used were Mulligan tape, Chair, Stabilitytrainer, Obsctacles, measuringtape, stopwatch. Mulligan taping was applied around the knee joint of the affected side. The difference in the scores were noted.

Method of taping:

Tape was applied while participants stood with the affected leg in full tibiofemoral internal rotation and 20° of knee flexion. Tape began at the neck of the fibula and was applied in a spiral fashion in an anteromedial direction inferior to the tibial tuberosity and medial knee joint line, across the popliteal fossa to the anterolateral thigh.

The data was analysed using GRAPH PAD INSTAT.Wilcoxon signed rank test was used.Mean and standard deviation were used to summarize the data.

III. Results

Table No 2:Comparison of all the variables pre and post taping

TEST	PRE TAPING		POST TAPING		STATISTICAL TEST	P VALUE	INTERPRETATION
	MEAN	SD	MEAN	SD			
MINIBEST SCALE ⁽¹³⁾	17.8	1.568	22.87	0.915	WILCOXON SIGNED RANK TEST	<0.0001	EXTREMELY SIGNIFICANT
TIMED UP AND GO ⁽¹⁴⁾	33.87	23.04	25.53	19.83	WILCOXON SIGNED RANK TEST	<0.0001	EXTREMELY SIGNIFICANT

Table no 3:Demographic characteristics

AGE (mean) years	51±12.4
Sex(M/F)	2:1
Duration of stroke(mean) months	17.2±8.52
Side of involvement (lt/rt%)	1:2

SR.NO	MINIBEST SCORE ⁽¹³⁾		TIMED UP AND GO ⁽¹⁴⁾	
	PRE TAPING	POST TAPING	PRE TAPING	POST TAPING
1	19	24	25	20
2	18	22	30	19
3	19	22	14	10
4	16	23	35	26
5	18	22	59	37
6	19	24	18	13
7	19	24	25	20
8	19	23	20	15
9	15	24	78	57
10	20	24	15	10
11	15	22	90	83
12	18	22	24	19
13	18	23	23	15
14	16	22	26	21
15	18	22	26	18

There was a significant improvement in the scores of the outcome measures with p value<0.0001.

FOR MiniBESTscale⁽¹³⁾, the changes observed were
SIT TO STAND showed 40% of improvement in the score.

RISE TO TOES-46% improvement.

ONE LEG STANDING= On affected leg-80%

On non affected leg-63%

FORWARD ,BACKWARD AND LATERAL REACH-26%

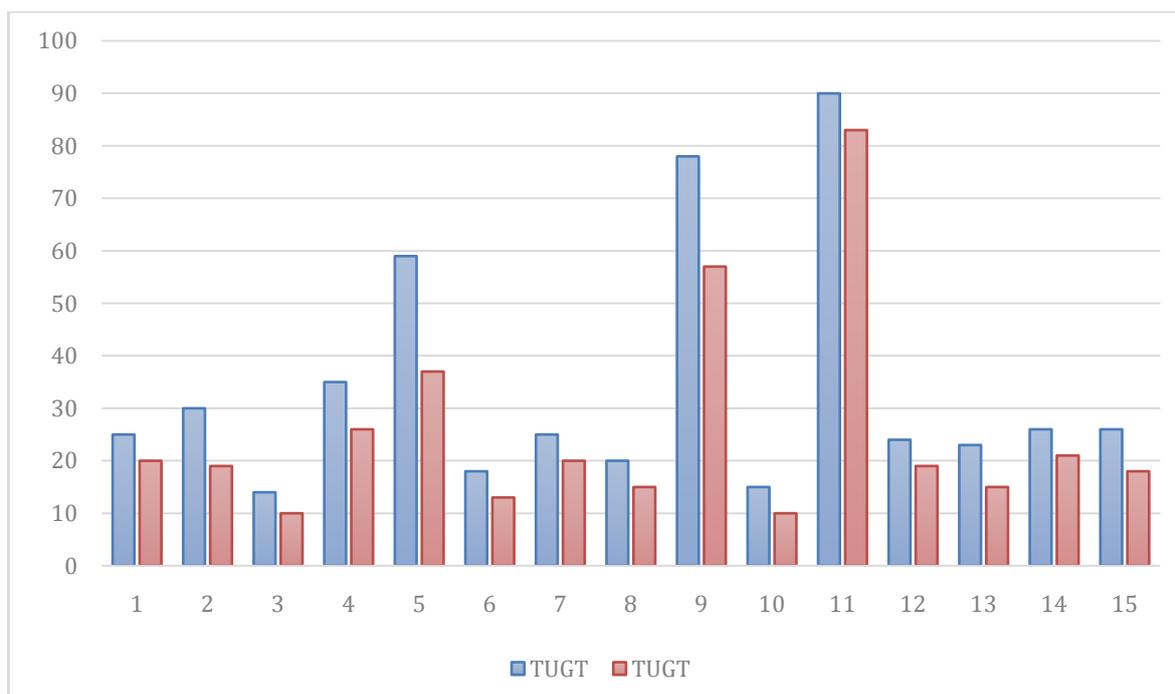
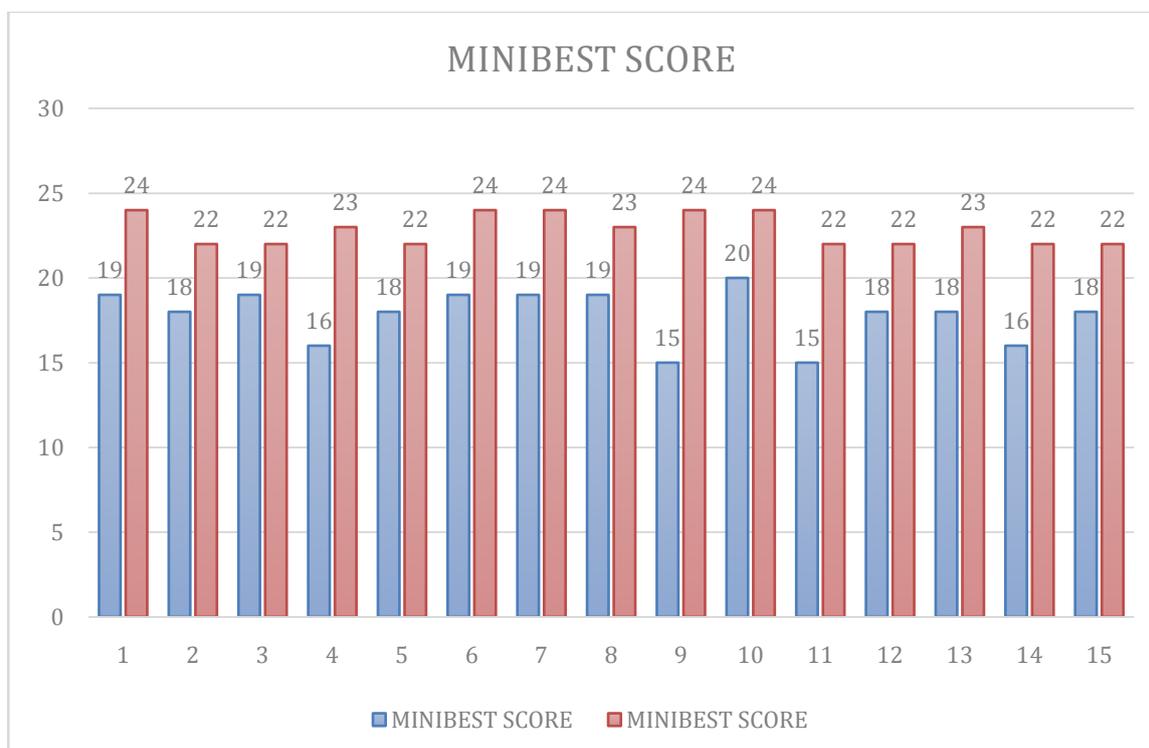
STANCE EYES OPEN FIRM SURFACE-80%

STANCE EYES CLOSED FOAM SURFACE-90%

INCLINE FOAM SURFACE-70%

GAIT WITH VARIYING SPEED,TURNS-50%
 PIVOT TURNING-85%
 OBSTACLES CROSSING-40%
 TUG⁽¹⁴⁾ WITH SINGLE AND DUAL TASK -100%

Although there are no evidences regarding an established minimum clinically important difference(MCID) for Timed up and go test⁽¹⁴⁾ and MiniBEST⁽¹³⁾ readings in Stroke patients,a minimal detectable change(MDC) as established by Alghadir et al (2017) for this population for timed up and go was 2.9 seconds which has very evidently been surpassed by the average difference in timed up and go time that we found post Mulligan taping.⁽¹²⁾



IV. Conclusion

From the study, we concluded that Mulligan Taping applied around knee joint improves static as well as dynamic balance in Stroke patients.

V. Discussion

The purpose of this study was to assess the influence of Mulligan knee joint taping on static and dynamic balance in Stroke patients between the age group of 25-65. The application of the tape effectively improved the balance. There was a significant improvement in the scores of the outcome measures with p value < 0.0001 .

Stroke patients show decreased motor function accompanied with sensory deficit causing difficulties with posture control and maintenance^(15,18). Compromised postural control, decreased joint mobility, impaired proprioception, and muscle weakness reduces the ability to maintain a balance, and this abnormality negatively influences ADL and gait pattern increasing the risk of secondary injuries, for example, caused by falls^(16,18).

Taping stimulates the proprioceptors in the joints and causes softening of the soft tissues and also improves the alignment. Taping the knee joint with proper patella alignment effectively improves balance and lower limb function⁽¹⁹⁾. Knee joint stabilization with pressure taping was determined to be an important factor that influences dynamic standing balance. This is based on the same concept as the use of assistive ambulatory devices to improve the balance of Stroke patients, and the results from the provision of lower limb joint stability⁽²⁰⁾. This taping is an effective intervention to recover joint re-alignment and to help with postural adjustment⁽²¹⁾. Taping treatment stimulates muscle spindles and Golgi tendon organs, with increases the transverse muscle area. It has also been reported that fine pressure directed from the skin to muscles affects Muscle spindle and Golgi tendon organs, leading to tendon muscle relaxation, muscle strengthening and pain relief^(17,18). The ultimate purpose of the taping treatment is to support protect joints by limiting their movement and compensating for the function of ligament, which is necessary for effective functional movement^(11,18).

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