ORIGINAL ARTICLE

Effectiveness of Mulligan mobilization and Kinesio-taping technique on the anterior innominate dysfunction in females

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Abstract

Objective: To determine the effects of Mulligan mobilisation with Kinesio Tex tape on pain and disability in anterior innominate dysfunction in females.

Method: The quasi-experimental study was conducted from March to August 2018 at the Allied Hospital and Javeed Medical Complex, Faisalabad, Pakistan, and comprised women with anterior innominate dysfunction. The subjects were divided into group A, which was treated with therapeutic ultrasound, Mulligan mobilisation and Kinesio taping, and group B, which was treated with therapeutic ultrasound and Mulligan mobilisation. Data was taken at baseline and after 10 days to measure pain and disability using visual analogue scale and Modified Oswestry Disability Questionnaire. Data was analysed using SPSS 20.

Result: Of the 30 women, there were 15(50%) in group A with a mean age of 32.80±6.02 years and 15(50%) in group B with a mean age of 34.20±6.51 years. Both groups showed significant improvement in pain and disability post-treatment ($p<0.05$), with group A showing more improvement than group B in terms of disability ($p=0.001$), but not in terms of pain ($p=0.20$).

Conclusion: Both Mulligan mobilisation along with Kineso Tex tape and Mulligan mobilisation alone were found to be effective in reducing pain and disability, with the tape showing better improvement in pain and disability compared to those receiving mobilisation alone.

Keywords: Sacroiliac joint dysfunction, Anterior innominate dysfunction, Kinesio taping, Mulligan mobilisation, Therapeutic ultrasound, Modified Oswestry Disability Questionnaire. (JPMA 71: 1716; 2021)

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Introduction

Low back pain (LBP) is a common complaint among adults[1] that affect 70-80% of people at some point in their lifetime.[2] Sacroiliac joint is a common source of LBP[3] and buttock pain.[4] Sacroiliac joint pain (SIJP) has numerous causes, including osteoarthritis (OA), post-traumatic arthritis and ankyloses. But the main reason of SIJP is sacroiliac joint dysfunction (SIJD).[5] SIJD is a condition in which pain arises from the sacroiliac joint and is caused by the abnormal movement of ilium around the sacrum and abnormal function of the SIJ structures, like ligaments, muscles, capsules.[6] The prevalence of SIJP has been stated to be up to 75% in LBP patients.[7] Common SIJD is anterior innominate rotation which is the major risk factor for idiopathic LBP. Anterior innominate dysfunction (AID) is only vulnerable in SIJ.[8]

In AID, innominate bones move anteriorly on the sacrum that is in the counter-nutation. Unilateral AID occurs when musculature of hip flexors, trunk extensors, hip extensors and abdominal muscles are unbalanced[1] AID may be unilateral or bilateral.[7] In the standing position, the line of gravity passes posterior to the hip so that the body weight falls on the dorsal aspect of pelvis. Dysfunction occurs when the line of gravity shifts ventrally, causing the ilium to rotate anteriorly. Anterior sacroiliac ligament does not provide adequate support during trunk flexion when the ilium rotates ventrally due to inactivation of abdominal muscles and increased stress on SIJ.[1] In the absence of anterior pelvic support, reduced tension on the sacrotuberous ligament releases the self-bracing mechanism that causes the innominate bones to rotate anteriorly.[9] Clinical diagnosis of SIJD is difficult and is based on patient history and physical examination.[6] Pain provocation test is used to diagnose SIJD, including compression test, distraction test, thigh thrust test, sacral thrust test, Gaenslen test and Patrick test. The Patrick test is used to differentiate between SIJD and hip pathology.[7] Stork test is used to find out AID and assess the inter-pelvic motion.[9,10] Physiotherapy techniques are used to correct SIJ mal-alignment manually by restoring the normal function and balance of lumbar and pelvic muscles and ligaments.[6] Mulligan described the positional fault theory in which articular mal-alignment leads to altered kinematics and eventual dysfunction.[11] Mobilisation with Movement (MWM) is used to correct the joint track, positional fault and mechanical malfunction. Positional faults were suggested as changes in orientation, joint surface configuration, musculotendinous components,

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capsular and cartilaginous thickness.[6] MWM technique, when applied to SIJ facilitates successful load transfer by restoring the posterior rotation of innominate in relation to the sacrum. MWM of SIJ utilises the end range of lumbar movement or end range of hip movement to restore SI movement.[12] Kinesiology, or Kinesio Tex, tape (KT) application is another treatment, and its use is gradually increasing in orthopaedic, neuromuscular rehabilitation and sports medicine. It is used for various musculoskeletal and neuromuscular problems. Its elastic quality helps to maintain the desired position after correcting the positional fault, supports the structure and prevents from further injury.[9]

KT with I stripe cut is applied from the anterior superior iliac spine (ASIS) to posteriro superior iliac spine (PSIS) with 75% tension which acts as a preload in the end-of-motion positions, resisting the end position of anterior tilt and assisting the posterior tilt of the innominate.[13]

A 2017 study revealed that Mulligan mobilisation (MM) is more effective than muscle energy technique in the treatment of chronic SIJD.[6] A 2018 study showed that muscle energy technique in combination with MM decreases pain and disability, increases range of motion (ROM), and improves functional status in patients with SIJD.[2] Studies described that the application of posterior pelvic tilt taping with KT is effective for treatment of LBP to decrease anterior pelvic tilt angel.[9] A study assessed 1-day application of posterior pelvic tilt taping with KT which reduced the anterior pelvic tilt.[5]

The current study was planned to evaluate the efficacy of MM with KT on pain and disability in females with AID.

Patients and Methods

The quasi-experimental study was conducted from March to August 2018 at the Allied Hospital and Javeed Medical Complex, Faisalabad, Pakistan, and comprised women with AID. After approval from the institutional ethics review committee, the sample size was calculated using the formula for continuous data[14,15] where population mean in the treatment group was kept 4.06, group 2 4.55, difference wished to be detected -0.49, population variance 1.22, conventional multiplier for alpha 0.05 and conventional multiplier for power 0.80.

The sample was raised using non-probability convenience sampling technique from among LBP patients at physiotherapy department and outpatient department (OPD) who were screened for SIJD with anterior innominate using the Stork and standing forward bending tests. Those included were female patients aged 20-45 years with pain and tenderness at SIJ, and positive for SIJP. Those excluded were subjects in whom ultrasound was contraindicated, such as those having infections, pregnant women, hip, lumbar vertebrae compression fracture, SIJ hypermobility, hip joint pathology and scoliosis.

After taking informed consent from the subjects, demographical data, including age, gender, height, weight, occupation and duration of symptoms, was collected. After taking baseline visual analogue scale (VAS) and Modified Oswestry Disability Questionnaire (MODQ) scores at baseline, the sample was divided into group A, which was treated with therapeutic ultrasound, MM and KT, and group B, which was treated with therapeutic ultrasound and MM.

Therapeutic ultrasound with pulsed mode was used for 5 minutes with an intensity of 1W/cm2 and 1.5 MHz frequency.

MM with 3 sets of 3 repetitions each were given in the first session and 3 sets of 10 repetitions each of MM were given for 10 consecutive days. After assessment, the patients were asked to perform movements causing pain, like getting up from prone, sit to stand, and walking. The therapist fixated the sacrum with the border of one hand while the other was placed on ASIS of the affected side of SIJ involved. The therapist pulled the ilium on the sacrum, held this position, and asked the patient to perform the painful movement 10 times. The remaining 2 sets were conducted after that.

KT with a 5cm wide cut was used for 10 consecutive days. I strap was used for mechanical correction. Patient was in the standing position with upper limb crossed over the shoulder. The therapist fixated the sacrum with one hand, while the other was placed on the ASIS of the involved SIJ. The therapist pulled the ilium on the sacrum, and 5cm-wide I strap was applied from the ASIS to PSIS with mechanical correction technique. KT was left for 48 hours. At the end of 10th treatment session VAS and MODQ readings were recorded in both groups.

Data was analysed using SPSS 20. Shapiro-Wilk test was suggested data normality, and parametric tests of analysis were subsequently applied. Intra-comparison analysis was done using paired sample t-test, while inter-group comparison was done using independent sample t-test. Statistical significance was set at $p<0.05$.

Results

Of the 30 women, there were 15(50%) in group A with a mean age of 32.80±6.02 years, 15(50%) in group B with a mean age of 34.20±6.51 years (Table-1).

Table-1: Age, height, weight and body mass index (BMI) values in study groups.

Age and Anthropometric variables.				
Group	Age (Years)	Height(m)	Weight (Kg)	BMI (Kg/m^2)
A	32.80 ±6.02	1.60 ±0.07	68.06 ±9.46	26.49 ±3.34
B	34.20 ±6.51	1.63 ±0.04	78.46 ±15.18	29.15 ±4.811

Table-2: Intra-group analysis of Visual Analogue Scale (VAS) scores.

Group	Pre-treatment	Post-treatment	Mean Difference	P value
A	6.33±1.11	2.00±1.00	4.33±0.72	< 0.001
B	6.60±1.12	3.06±1.33	3.53±0.99	< 0.001

Table-3: Intra-group analysis of Modified Oswestry Disability Questionnaire (MODQ) scores.

Group	Pre-treatment	Post-treatment	Mean Difference	P value
A	49.73±17.33	17.80±12.09	31.93±8.42	< 0.001
B	54.86±14.40	32.13±12.53	22.73±9.04	< 0.001

Table-4: Inter-group comparison of Visual Analogue Scale (VAS) and Modified Oswestry Disability Questionnaire (MODQ).

Group	VAS		MODQ	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
A	6.33 ±1.11	2.00 ±1.00	49.73 ±17.33	17.80 ±12.09
B	6.60 ±1.12	3.06 ±1.33	54.86 ±14.40	32.13 ±12.53
P value	0.51	0.20	0.38	< 0.001

Both groups showed significant improvement in pain and disability post-treatment (Tables-2, 3). Group A showed significantly more improvement than group B in terms of disability (p=0.001), but not in terms of pain (p=0.20) (Table-4).

Discussion

Although several studies have worked on either MM or KT in treating SIJD literature is scarce in terms of applying both the techniques at the same time SIJD location. KT used as an adjunct treatment with MM has been helpful in maintaining the MM effect on other joints, such as trapezio-metacarpal osteoarthritis[16] and painful shoulder.[17] The current study showed alleviation in pain and improvement in disability with MM along with KT application that corrected the anterior innominate positional fault.

KT improves pelvic symmetry, but more studies are needed for its assessment. One study reported that anterior pelvic tilt reduces temporarily with KT application in females with SIJP.[5] According to another study, KT offered significant improvement in pain, disability and ROM in the short term, but pain alleviation could not be sustained in the long term.[18]

Participants in the current study were only females because anterior pelvic tilt is greater among them. Pain and anterior pelvic tilt were found to be highly correlated in females compared to males.[19]

Mulligan's concept about positional fault focuses on injury or strain and is more applicable in reducing pain with movement while performing functional activities. MWM corrects this positional fault by repositioning the joint.[6,20] A study assessed the effectiveness of MM and muscle energy technique (MET) in SIJD patients in reducing pain and disability, and in enhancing functional status and ROM, showing significant improvement through a combination of the two techniques rather than MET alone.[2]

One study comparing the effect of MM and MET revealed MMI was more effective than MET in patients with SIJD.[6]

Comparison of the current study with literature could not be done extensively due to lack of studies involving KT and MM in SIJD.

Conclusion

Both MM along with KT and MM alone were found to be effective in reducing pain and disability. MM with KT showed significantly better improvement in pain and disability compared to MM alone.

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Conflict of Interest: None.

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