

## The effect of kinesio taping on Pain Pressure threshold in work related low back pain for computer professionals

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### ABSTRACT

**Background/aim:** In many countries low back pain is a long-term disability, where 90% of people suffer from it at some point of time. Low back pain has high prevalence rate and incidence of low back problems leads to disability, sickness further leads to sickness absenteeism, early retirement and lost working days. Computer work has generated a new genre of occupational health problems, i.e., of computer-related musculoskeletal disorder. Work related Musculoskeletal Disorders (WMSD) are damages caused to joint, muscle, tendon and ligament due to repeated strain given to the structure lead to musculoskeletal pain and discomfort and most common joint affected are neck, lower back, shoulder, elbow and wrist. Musculoskeletal discomfort can occur anywhere in the body and typically are not caused by a single traumatic event, but is due to micro trauma to tissues that does not heal during rest. Postural back pain is a major public and occupational health problem, especially in the information technology (IT) and BPO sectors. Various intervention strategy used to treat chronic back pain such as physical agents, exercise and back school program. The aim of this study was to determine the effect of Kinesio taping compared with rigid taping along with TENS and back exercise program on pain pressure threshold for subjects with work related low back pain in computer professionals.

**Methods and Materials:** 112 subjects satisfied the inclusion criteria had been selected from among the eligible participants of 196 subjects works in medium and large-scale IT industry reported with lower back pain for more than three months. Subjects were divided randomly in to two group and intervened by kinesio taping or rigid taping with common protocol of TENS and back exercise program. Pain pressure threshold was measured before and after treatment, compared the mean difference by ANOVA to find out the effect of intervention

**Results:** The data were analyzed by SPSS version 20.0 using descriptive statistics such as normality test, mean standard deviation and graphs and charts. Inferential statistics such as ANOVA. Both the groups improved in pain pressure threshold and kinesio taping group was better in improving pain pressure threshold with high statistical significance of  $P \leq 0.05$ .

**Conclusion:** kinesio taping compared with rigid taping along with TENS and core stability exercise found Kinesio tape is better than rigid tape in all parameters with the significance of  $p \leq 0.05$  except quadratus lumborum left and L2-L3 level were the significance was  $P=0.078$  and  $P=0.152$  respectively.

**Keywords:** work related musculoskeletal disorders; kinesio tape; rigid tape; pain pressure threshold; back exercise program; transcutaneous electrical nerve stimulation

### INTRODUCTION

Work related Musculoskeletal Disorders (WMSD) are the class of musculoskeletal disorders that include damage of tendons, tendon sheaths, synovial lubrication of tendon sheaths, bones, muscles, nerves of hands, wrists, elbows, shoulders, neck and back. It is otherwise known as Ergonomic Disorders, Cumulative Trauma Disorders (CTD) and Repetitive Strain Injuries. These disorders develop gradually over a period of week, months or even years due to repeated exertions and movements of the body. These musculoskeletal disorders induce a collection of health problems that are more prevalent among the working class than general population.

Work related musculoskeletal disorders constitute a major source of employee's disability and loss of wages. Thus, active surveillance of WMSD should continue as an essential component in an ergonomic program used to control and reduce human sufferings, lost workdays, wages and compensation claims. Computer professionals like IT and BPO employees are the most affected victims by work related musculoskeletal disorder because they lead a sedentary job profile which includes long sitting hours, repetitive motion of major joints and sustained posture.

Low back pain (LBP) is the commonest condition which is defined as pain and discomfort in the lumbosacral region, between the space of twelfth rib and the gluteal crease. The recommended 'diagnostic triage' defined three types of back pain: 1) non-specific low back pain; 2) back pain with nerve root symptoms; and 3) back pain resulting from serious pathology (e.g. malignancy, fracture, ankylosing spondylitis, infection). Among them, the Non-specific LBP, in which there is no known pathoanatomic basis, is usually a benign condition but without suitable management will turn into chronic low back pain (CLBP). Moreover, the traditional classification system, classifies LBP according to its duration from the onset, as acute (<6 weeks), sub-acute (6 weeks - 12 weeks), and chronic (>12 weeks)<sup>1,2</sup>.

Non-specific LBP was defined as "not attributed to identifiable known specific pathology (e.g. infection, inflammatory process, tumor, osteoporosis, fracture or radicular syndrome)<sup>3</sup>. Chronic non-specific low back pain (CNSLBP), is considered to be a complex multidimensional bio-psycho-social pain disorder, where precise etiology remains undefined<sup>4</sup>

The strong correlation between the incidence of WMSD and their working conditions is well known, particularly the physical risk factors associated with individual's jobs e.g., awkward postures, high repetitive motions of the joints, excessive force, static work, and the vibration. As per WHO and the researchers there are multifactorial etiology for WMSD which includes work intensification, stress and psychosocial factors.

A wide array of physical modalities is commonly included as a part of physiotherapeutic interventions for back pain. These include transcutaneous electrical nerve stimulation (TENS), heat/cold, traction, laser, ultrasound, short wave, interferential therapy, corsets and collars. There is limited evidence to suggest that electrotherapy (laser therapy, therapeutic ultrasound and TENS) is not effective for reducing neck and back pain. However, the overall conclusion from systematic reviews is that there is too little evidence from good-quality studies to either support or refute the clinical use of physical medicine modalities for patients with back or neck pain. The placebo effects of passive modalities probably account for most of the benefits that are gained.

This randomised single blinded experimental study compared two different treatment techniques such as Kinesio taping and Rigid taping on pain pressure threshold for the low back. Computer professionals with more than 3years of working experience and with WRMSD of the low back were considered for the study. Therefore, the aim of the study was to compare the effects of two different taping techniques along with TENS and a back exercise program.

## **MATERIALS AND METHODS**

This was a randomised single blinded experimental study, Before the commencement of this study, ethical approval was obtained from the Ethical Committee of Garden City University. The participants were informed about the nature of the study and an informed consent form was taken from them. Thereafter, the pre assessment were carried out, and the participants who met the inclusion criteria were a part of the study. The outcome measure was pain pressure threshold. A total of 196 subjects were assessed for eligibility and 84 were excluded from the study as they did not meet the inclusion criteria. Subjects who were diagnosed with IVDP, deformity in spinal column, recent back surgery, any pathological or spinal conditions, Fibromyalgia, radiculopathy, Spondylolisthesis, previous treatment with Kinesio Tape or Rigid tape Peripheral nervous system diseases subjects undergoing regular core exercise program, subjects with frequent travelers and person allergic with kinesio or Rigid tape were excluded from the study.

Demographic data including name age, gender and a detailed evaluation was done. All subjects were screened for nonspecific mechanical low back pain caused due to work related Musculo skeletal disorder. Pain pressure threshold was evaluated using Baseline Dolorimeter. The Baselin Dolorimeter of model 60-pound gauge (27.22 kg) No:12-1443 which has the ability of measuring 200g as minimum difference between readings was used. Inter spinus region L1-L2, L2-L3, L3-L4, L4-L5, L5-S1 and quadratus lumborum both sides were assessed for PPT. All the subjects were evaluated by Pressure algometer, as pretest measure. Device was held in the palm between thumb and index finger. Placing the rubber-tipped stylus over the predetermined trigger point or area of palpable tenderness wish to measure. The force dial is perpendicular to the skin surface. A constant pressure was applied at a 1 Kg/sec until patients reported pain or discomfort. The reading was expressed in Kg/cm<sup>2</sup> and its standardized values, validity, and reproducibility have been demonstrated in normal muscles. During assessment, the subject was instructed to say "stop" as soon as the pressure sensation became painful, and then that pressure level was recorded<sup>5</sup>.

A total of 112 samples were divided into two experimental groups Group-A(n=56) Kinesio tape and Group-B (n=56) Rigid tape intervention group.

## CONSORT Flow Diagram

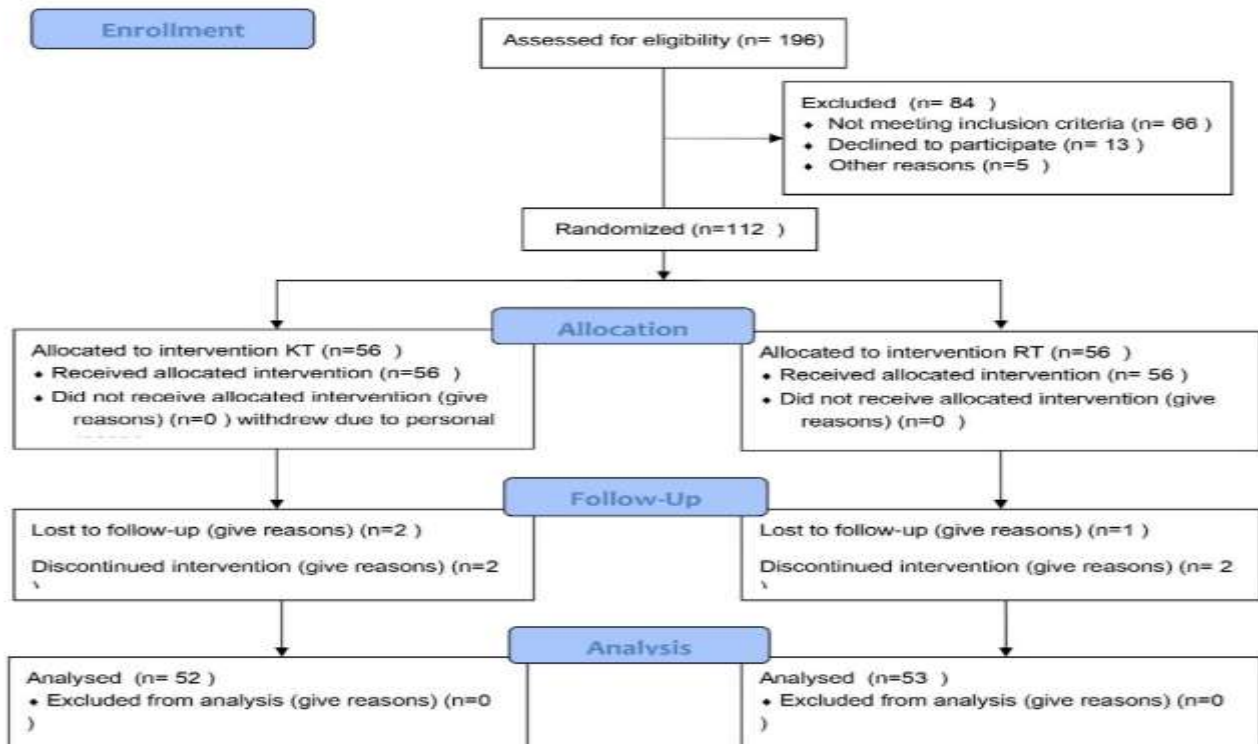


FIGURE 1: Consort Flow Chart

**Group A:** All subjects underwent allergic test before starting treatment whereas KT tape patch was applied in anterior surface of elbow and observed after 48 hours for any allergic reaction if anyone found allergic to KT tape were excluded from this study. The area to be treated was cleaned, free of hair and the tape was measured while the lumbar spine was flexed to the maximum. Three I-Tapes were applied from the origin of the lumbar erector spinae (iliocostalis lumborum) to its insertion. In the case of flexion disturbances, the patient was able to support himself/herself during flexion. The first 4 cm to 5 cm of tape was carefully removed from its paper backing. The base of the tape was applied to the sacrum in the neutral position. The patient was asked to perform a maximum flexion of the spine and the paper backing of the tape was removed, except for the final 4 cm to 5 cm the tape was used on one side paravertebral in the direction of the cranium, with slight traction. Finally, the final 4 cm to 5 cm of the tape was applied without traction. The same procedure was then applied to the other side. Third strip was applied horizontally where maximum pain was observed. The tape was rubbed by hand several times to warm the adhesive film to attach with skin surface the tape was retained for 48 hours before changing to next session.

**Group B:** Subjects Maintains neutral to extended lumbar lordosis to avoid pain provoking positions and facilitates a more extended posture. Hypo allergic under tape 50-mm strapping tape used over taping area before rigid tape was applied. Subjects were in lying prone or standing position whereas Patient must be able to achieve a relaxed and pain free extended lumbar posture (lordosis) while the tape was being applied and the tape was retained for 48 hours before changing to next session. Spine in neutral to slightly extended position with lumbar curvatures maintained, anchor strips were applied to the top and bottom of the area to be taped. An X was formed across the lumbar region from the top anchor to the bottom anchor, with the center of the X overlying L2-3 region. The top and bottom of the X were then re anchored. Movements were assessed for pain free range of motion in flexion and side flexion.

Common Protocol for both group: Transcutaneous electrical nervous stimulator stimulates peripheral nerves via skin surface electrodes at well-tolerated intensities. TENS delivers the low frequency current through superficial electrodes placed on the skin around the affected area which induce a tingling sensation and disrupt the pain signal in the surrounding area. The dual channel TENS unit was used, out of which one channel is placed Para spinally at the level of origin of sciatic nerve and the other two electrodes are placed at the inferior angle of the scapula. The machine Acupuncture-like TENS used, at low frequency (5-10Hz) for the duration of 30 minutes. Tens is used to induce muscle relaxation and tetanic contractions which in turn reduce the pain. Exercise program mainly concerned over strengthening core muscles such as Major muscles included are the pelvic floor muscles, transverses abdominals, multifidus, internal and rectus abdominis, erector spaine (sacrospinalis) especially the longissimus thoracis, and quadratus Lumborum Following exercise were taught to subjects and performed five session per week for about two weeks Supine Abdominal Draw In, Abdominal Draw In with Double Knee to Chest, Supine Twist, Prone Bridging on Elbows, Side Bridging on Elbow, Quadruped Opposite arm/leg, Supine Butt Lift with Arms at Side, above given exercise performed 10 to 20 repetition per session.

**RESULTS:** The data were analyzed by SPSS version 20.0 using descriptive statistics such as normality test, mean standard deviation and graphs and charts. Inferential statistics such as ANOVA.

The study comprised of 54 males and 41 females in total. While group A had 30 male and 22 female, Group B had 34 males and 19 females.

**TABLE 1:** Distribution of subjects into two groups

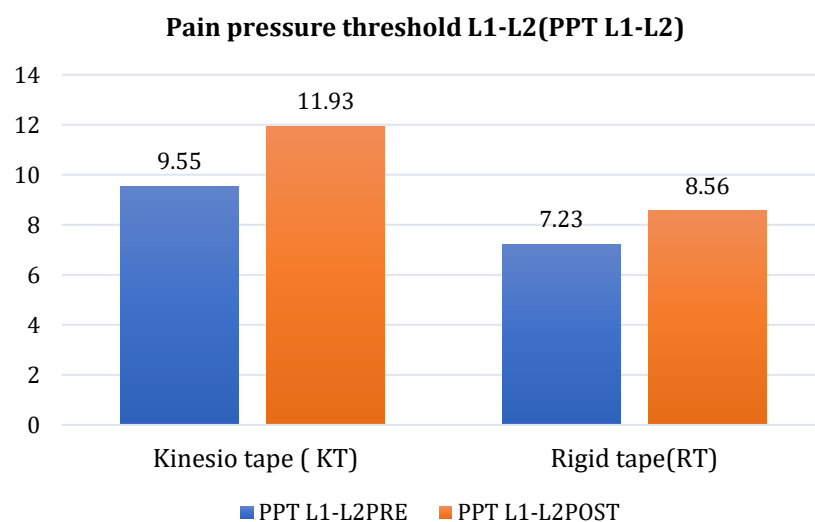
Gender	Group A(KT)	Group B (RT)
Male	30(57.7%)	34(64.2%)
Female	22(42.3%)	19(35.8%)
Total	52	53

**TABLE 2:** Pain pressure threshold L1-L2 Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	9.55±2.94	7.23±2.29	31.965	0.001
Post test	11.93±2.85	8.56±2.71		
F value	125.712			
P Value	0.001			

TABLE 2 shows the mean and standard deviation of baseline and post test data of Pain Pressure threshold at L1-L2 level for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group p=0.001 and when compared between group KT group was better increasing Pain Pressure threshold then RT group p=0.001 level.

**GRAPH 1**



**TABLE 3:** Pain pressure threshold L2-L3 Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	11.20±2.91	7.91±2.74	2.086	0.152
Post test	12.20±2.43	11.74±2.71		
F value	4.480			
P Value	0.037			

TABLE 3 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at L2-L3 level for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group  $p=0.037$  and when compared between group there was no significant difference between both group  $P=0.152$

GRAPH 2

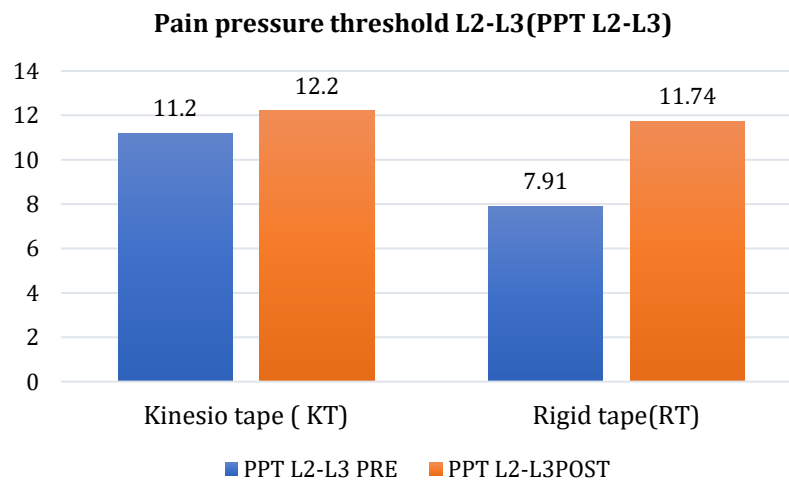


TABLE 4: Pain pressure threshold L3-L4 Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	10.03±2.83	8.32±3.03	21.221	0.001
Post test	12.43±2.40	9.15±3.02		
F value	184.716			
P Value	0.001			

TABLE 4 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at L3-L4 level for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group  $p=0.001$  and when compared between group KT group was better increasing Pain Pressure threshold then RT group  $p=0.001$  level.

GRAPH 3

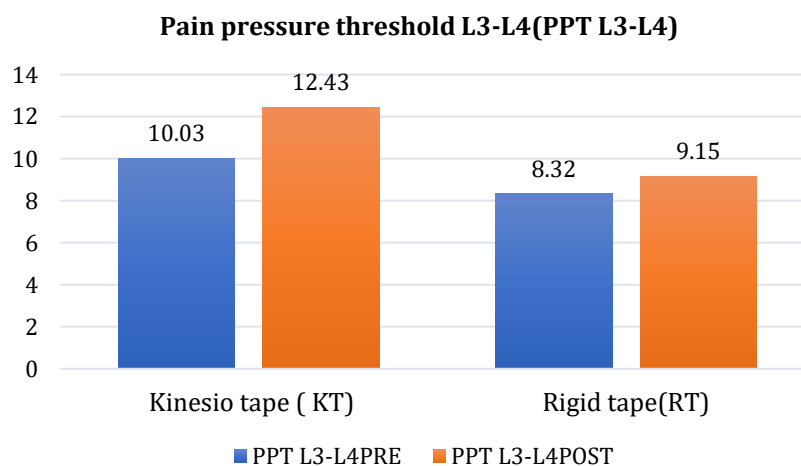


TABLE 5: Pain pressure threshold L4-L5 Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	8.05±3.09	7.40±2.95	4.633	0.034
Post test	10.24±2.79	8.44±2.90		
F value	300.348			
P Value	0.001			

TABLE 5 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at L4-L5 level for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group p=0.001 and when compared between group KT group was better increasing Pain Pressure threshold then RT group p=0.034 level.

GRAPH 4

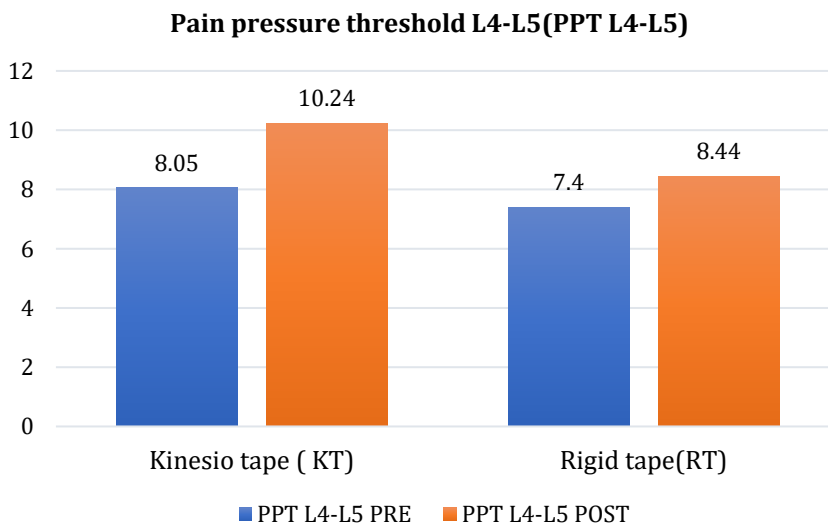


TABLE 6: Pain pressure threshold L5-S1 Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	9.30±2.79	8.28±3.36	10.175	0.002
Post test	11.95±2.48	9.41±3.44		
F value	82.907			
P Value	0.001			

TABLE 6 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at L5-S1 level for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group p=0.001 and when compared between group KT group was better increasing Pain Pressure threshold then RT group p=0.002.

GRAPH 5

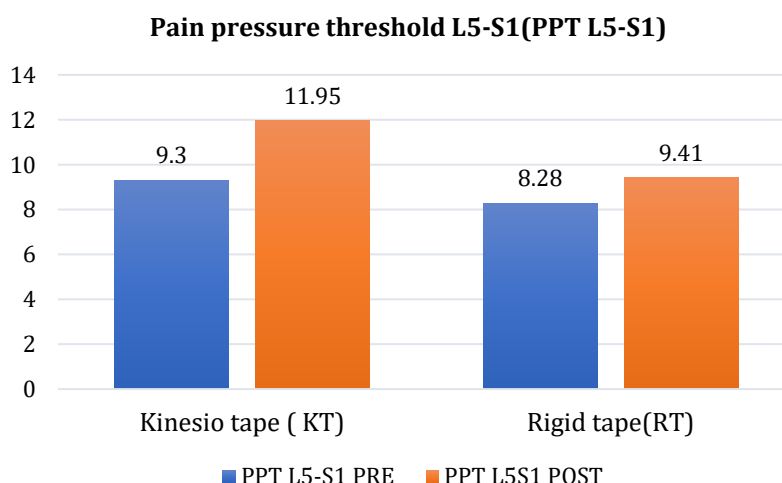
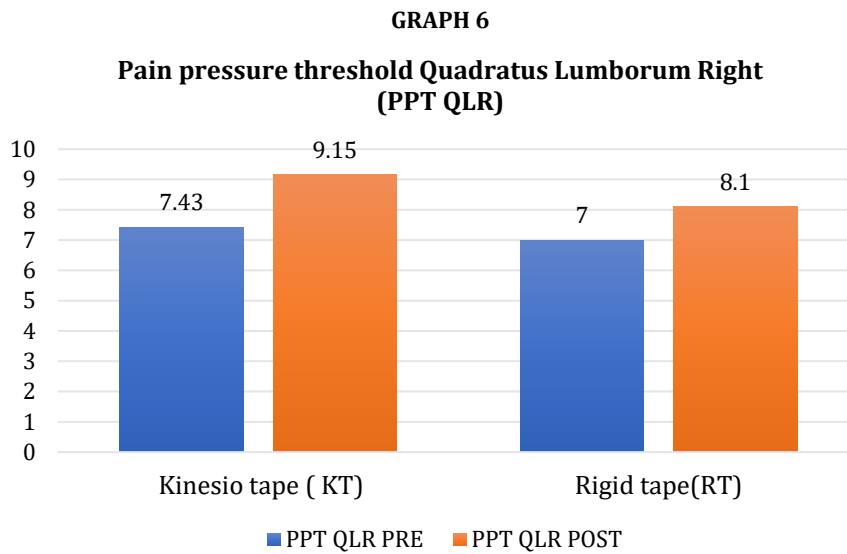


TABLE 7: Pain pressure threshold Quadratus Lumborum(R) Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	7.43±1.66	7.00±1.62	7.415	0.008
Post test	9.15±1.13	8.10±1.43		
F value	180.109			
P Value	0.001			

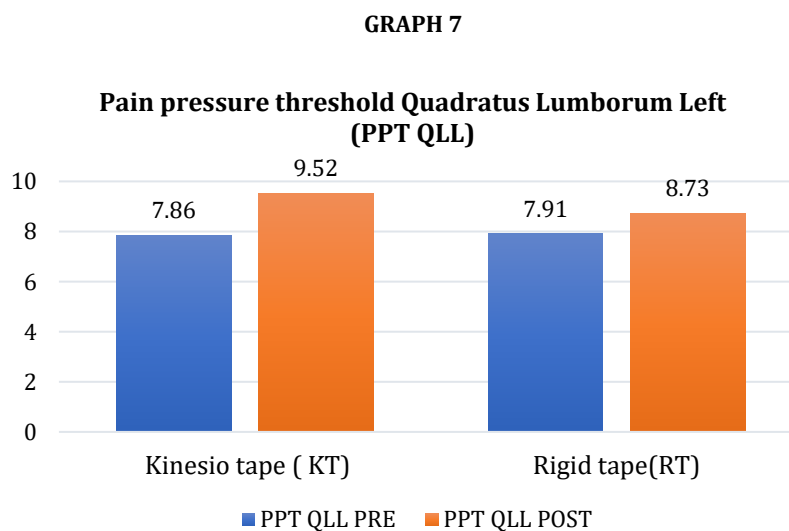
TABLE 7 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at Quadratus lumborum @ muscle for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group  $p=0.001$  and when compared between group KT group was better increasing Pain Pressure threshold then RT group  $p=0.008$  level.



**TABLE 8:** Pain pressure threshold Quadratus Lumborum (L) Mean comparison within and between group

	KT Group	Rigid Group	F value	P Value
Pre test	7.86±1.48	7.91±1.22	3.160	0.078
Post test	9.52±0.64	8.73±0.99		
F value	245.471			
P Value	0.001			

Table 8 shows the mean standard deviation of baseline and post test data of Pain Pressure threshold at Quadratus lumborum (L) muscle for Kinesio tape group as well as Rigid tape group and also it indicates the level of significance for mean difference within and between group. The result of the study proves Pain Pressure threshold is increased considerably in both group  $p=0.001$  and when compared between group there was no significant difference between both group  $P=0.078$



**DISCUSSION**

Effectiveness of intervention was measured by Pain pressure threshold by using algometer. Unlike numerical rating scale Pain pressure threshold was best evaluated objectively by Dolorimeter. There are certain pain points subjects with Chronic low back pain always complains tenderness in specific points such as inter vertebral joint between L1 to S1, Quadratus Lumborum muscle. These pain points were evaluated by Baseline Dolorimeter All pain pressure points improved its tolerance by both intervention  $P=0.001$  But when compared between group except L2-L3 and Quadratus lumborum left side all other showed Kinesio tape group was better in managing pressure threshold statistical significant was less than 0.005.

In this present study the attempt was made to identify weather conventional method of back pain treatment such as exercise program and TENS along with kinesio tape was effective. The afferent neural structure are stimulated through TENS induces analgesia and additionally decreases the inflammation induces dorsal horn sensitisation<sup>6</sup> (Sabino 2008), neurotransmitters like gamma amino butyric acid and glycine which are also involved in inhibition of nociceptive traffic<sup>7</sup>, and modulation of the activity of the cells by supporting structure (glial cells) in the medulla spinalis<sup>8</sup>, TENS may produce all above effects to control pain.

The combination of TENS and core stability exercise program along with application of kinesio tape or rigid tape were effective for chronic low back pain who are in sedentary job. Kinesio tape supports injured muscles and joints and helps to relieve pain by lifting the skin by improved blood and lymph flow. In a research study suggested that the kinesio taping with regular home exercise program for strengthening and flexibility reduces pain and disability<sup>9</sup> This present study found out rigid taping technique used for 2 weeks in lower back region Reduced pain and disability effectively, Rigid tape help to support lower lumbar region and tabilize Para spinal muscles in contrast kinesio tape helps to facilitate the back muscles and also reducing inflammation and promoting healing by improving blood circulation and lymphatic drainage<sup>10</sup>. Kinesio tape believed to reduce paravertebral muscle fatigue so it may be assumed to reduce musculoskeletal injury in computer professionals and also, facilitatory application provide adequate anticipatory postural control in back muscles to maintain correct posture during working hours<sup>11</sup> Kinesio tape along with TENS and exercise was effective in work related low back pain for computer professionals. The statistical difference in improvement of pain was better in kinesio tape than rigid tape group

## CONCLUSION

Group A treated by kinesio tape, transcutaneous electrical nerve stimulation and core stability exercise improved the pain pressure threshold with high statistical significance  $p$  is equal to or less than 0.05. Similarly, group B was treated by rigid tape, transcutaneous electrical nerve stimulation and core stability exercise improved PPT with a statistically significant difference and pre post mean comparison and a high statistical significance  $P$  is equal to are less than 0.05

When both groups were compared to find out the effect of kinesio tape with rigid tape whereas TENS and core stability exercise where a common protocol the results found that Kinesio tape is better than rigid tape in all parameters with the significance of  $p$  is equal or less than 0.05 except quadratus lumborum right and L2-L3 level PPT measure with the significance  $P=0.078$  and  $P=0.152$  respectively

So, this study is concluded that both kinesio tape group and rigid tape group were helpful to reduce pain for subjects with work related chronic low back pain in Computer professionals but kinesio tape group was better than rigid tape group when compared for effectiveness.

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