

## **EFFECTIVENESS OF ISOKINETIC EXERCISE VS ISOINERTIAL EXERCISE ADJOINING WITH K-TAPING IN CASE OF DISCOMFORT IN LOWER BACK. A COMPARATIVE WITH RCT STUDY**

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### **ABSTRACT**

**Background:** When back discomfort persists, isokinetic and isoinertial exercises are frequently used to maintain muscle power and enhance the stability of the core muscles. the understanding of the potential benefits of various exercise regimens with biochemical effects for those suffering from persistent lower back pain (LBP). Additionally, K-tapping is a technique that stabilizes muscles to aid in their recovery from trauma.

**Objective:** To determine and contrast the physiological and biological consequences for individuals with persistent low back pain of isokinetic vs isoinertial exercise with tapping

Design: randomized controlled trial studies

Setting: ANS hospital jaipur.

Participants: 50 lower back pain patients were randomly assigned to two groups, each consisting of 25 individuals, for this study. For 20 days in a row, Gp-A received isokinetic training with tapping, whereas Gp-B received isoinertial training with tapping.

Outcome measures: VAS for pain, BPFS for functional score, were measured at base line and after 10th day, and at post intervention.

**Results:** For persistent LBP, isokinetic exercise is more advantageous than isoinertial exercise. Physical therapists' understanding and clinical evaluation abilities about LBP can be enhanced by implementing the current study.

**Keywords:** lbp, isokinetic exercise, isoinertial exercise, VAS, BPFS, Tapping.

### **1. Introduction**

The most prevalent consequence of deterioration in this function is likely to be lumbar back trouble (LBP), which is closely connected to trunk balance control. (2) Research has shown that trunk balance control mechanisms may be impacted by muscular and proprioceptor impairments sustained during athletics(3). In the end, LBP is caused by a decrease in trunk balance control, which can happen as a result of technology advancements, inappropriate physical activity, pathological alterations, or bad sports training(4,5). As a result of its prevalence, the high cost of treatment, and the impairment it brings about, Pain in the lower back is an epidemic in rich countries. (5) Someone's way of life is significantly diminished when they suffer from persistent backaches, which causes a host of physical, social, and psychological issues. (6,7). Findings showing that asymptomatic people's trunk muscles are stronger than those of patients with persistent lumbar backaches are in line with the beneficial impact of workout on these patients(8,9). Due to its ability to alleviate

pain and enhance activity, physical therapy is recommended by many clinical recommendations for the care of individuals with persistent pain in the back. (10,11) Backache is a prevalent symptom that exercise therapy helps alleviate, but there is a large variety of exercises that can be employed for this purpose. A fairly new idea, isoinertial education with centrifugal devices has been supported by research showing its efficacy as a rehabilitation approach since the early 1990s. (Colliander and Tesch, 1990; Dudley et al., 1991). Isoinertial exercises were first recommended to alleviate neuromuscular impairments and concomitant wasting of the musculoskeletal system in astronauts induced by the lack of gravity throughout long-duration space travel (Dudley et al., 1991; Berg and Tesch, 1994; Norrbrand et al., 2008). Until then, a plethora of studies have sought to shed light on the structural variations, training consequences, and neurophysiological processes underlying isoinertial activity. Until then, a plethora of studies have sought to shed light on the structural variations, training consequences, and neurophysiological processes underlying isoinertial activity as both acute and chronic conditioning strategies, while also describing the mechanical advantages of the isoinertial devices (Maroto-Izquierdo et al., 2017; Tesch et al., 2017; Beato et al., 2019d). Both academics and professionals in the field of sport science are increasingly intrigued by the potential benefits of isoinertial workouts for performance-related areas in sports enhancement, injury mitigation, and clinical rehabilitation due to the preliminary and encouraging proof (Tous-Fajardo et al., 2006, 2016; de Hoyo et al., 2015; Tesch et al., 2017; Beato et al., 2019a).

Research indicates that isokinetic therapy (IKE) has a significant and persistent impact on chronic non-specific discomfort in lower back (LBP), with a favorable link with core muscle weakness (12,13). These exercises are often supplied by isokinetic gadgets, which are employed to train and rehabilitate various orthopedic disorders in a rehab setting. The gadget generates multiple levels of resistance, allowing the movement to proceed at a steady speed regardless of how much effort the patient applies. According to studies, these workouts enhance an illness by increasing muscular strength across the range of motion (14). Although IKE offers benefits, it requires competent operators and a well-established setup to administer therapy to patients. Consequently, studies in this area are not well-done. Furthermore, exercise regimens other than conventional strength exercise have been shown to lower pain intensity and enhance bodily activity in CNLBP patients (15). KT can be a useful technique for rapid pain relief, especially in people suffering from lumbar a degenerative disc condition who are in intermediate to severe pain; consequently, it can be utilized as a supplemental treatment for acute non-specific discomfort in lower back.(16) Kinesio tapping could provide a unique, simple, and effective way to treat low back problems. In coming years, we will eventually be prepared to assess the value of kinesio tapping in a clinical context, demonstrating its promise as a treatment for backache in the lower back. (17)

## 2. Materials & Method

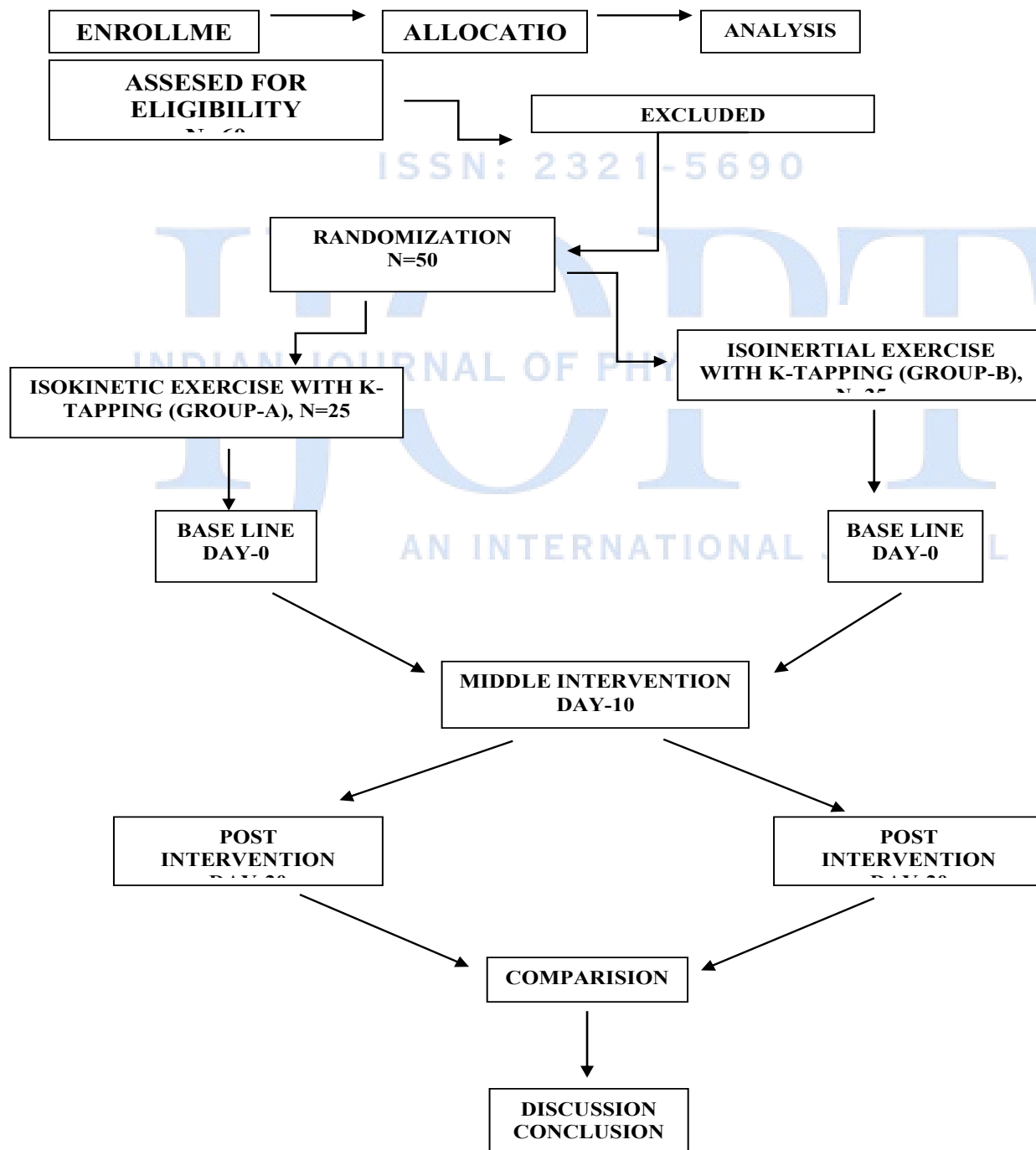
**Trial study:** The research project represented a double-blind randomized control trial, and the individuals received randomization and assigned evenly in accordance to the computer random table approach in 1:1ratio in 2 groups. Fifty (N = 50), The individuals in the trial were randomized and distributed to isokinetic movement and K-taping. (n = 25), isoinertial exercise and K-taping (n = 25) groups. The Regional Scientific Ethical Council authorized the research, which was carried out in accordance with ethical principles. All work was done transparently and in accordance with CONSORT's guidelines. The research was carried out in the Department of Physical Therapy and Rehabilitation at ANS Hospital in Jaipur, Rajasthan. The on-site therapist at the ANS Hospital assessed patients for inclusion in the study using recognized standards.

**Patient involvement:** During the first phase, an analysis data sheet was used to teach and clarify the research issues, study design, intervention techniques, outcome measurements, study duration, and the advantages and drawbacks of the research. Basic screening was used for final selection of research participants who read the material and gave their agreement.

**Participants:** Before being eligible for enrollment, the participants must agree to the research and sign a written agreement authorized by the ethics committee. Hospital outdoor patients between the ages of 30 and 50 who had chronic ( $\geq 3$  months) lower back pain (LBP), a visual analog scale (VAS) rating for discomfort of 4 to 8, and a healthcare professional's diagnosis of LBP and referral for physical therapy were all eligible. Participants in previous weight and balance training sessions, those anticipating spine surgery, those misusing drugs or alcohol, and those with substantial musculoskeletal, neurological, somatic, and mental issues were

forbidden to participate in the study. Individuals with supplementary cutaneous injuries, fractures of the lower extremities and pelvic bone, and anomalies were likewise excluded from this study.

**Interventions:** The ethics committee approved the 20-day rehabilitation regimens for both groups. A knowledgeable and experienced physiotherapist with five years of experience guided the therapy session. Ten candidates were disqualified according to the exclusion criteria. Before engaging in exercise, participants in isokinetic exercise group A and isoinertial exercise group B were instructed to get warm up for five minutes before slowly extending their back extensors and flexors. In order to conduct Gp-A, the subject must stand vertically in an isokinetic dynamometer. For Gp-B, the subject must complete isoinertial trunk rotation and isoinertial squats while executing concentric and eccentric thigh and glute contractions. To stop the exertional motions, the knees were a little bent and the fixation bands were fastened around the knee, thigh, pelvis, chest, and scapula. Maintain the whole range of adaptation in the trunk's flexion and elongation. By watching model film and having the chance to do so, the responders were ready for the assignment. Once they grasped the task throughout instruction, they were allowed to carry it out. Following the activity, both groups were exposed to K-taping. Throughout the training, a higher-up oversaw and guided the participants. An examiner with experience using all the equipment evaluated the result parameters (18).



**Outcome variables:** (Pain intensity) The VAS, defined is a 10-cm horizontal axis with one end indicating "no difficulty at all" and the reverse end signifying "as horrible as possible it could be," was used to assess the degree of pain. The length on a line is used to calculate the score. Each participant was asked to input the line according to how much pain he felt. VAS's validity and reliability in treating musculoskeletal disorders were both strong.<sup>19</sup> (state of functionality) The BPFS, which encompasses 12 items (such as putting on shoes, lifting, and sleeping) experiencing an overall rating of 0 to 5, was used to assess the well-being of patients with back pain. Higher scores indicate greater function.

**Sample size:** N = 50 people were needed for the investigation, with n = 25 in every group. This was reached by a pilot investigation that assumed 70% efficiency with 30% fluctuations in pain intensity (VAS), with an expected deviation of 2 and a significance threshold of 5%.

**Randomization:** The randomized trial occurred using a person who wasn't engaged in the data collecting. The individuals are divided into two groups according to a simple random table in a 1:1 ratio for "isokinetic exercise, isoinertial exercise." All potential participants who met the qualifying requirements were permitted to take part.

**Statistical analysis:** The Levene test was used to determine the homogeneity of the research by measuring the demographic features of the subjects. The average and variance of the final result data were shown, and significant differences within and between groups were determined using the paired and unpaired t tests, respectively. A significance criterion of  $P < 0.05$  was established. For every assessment of statistics, JASP software was utilized.

### 3. Results

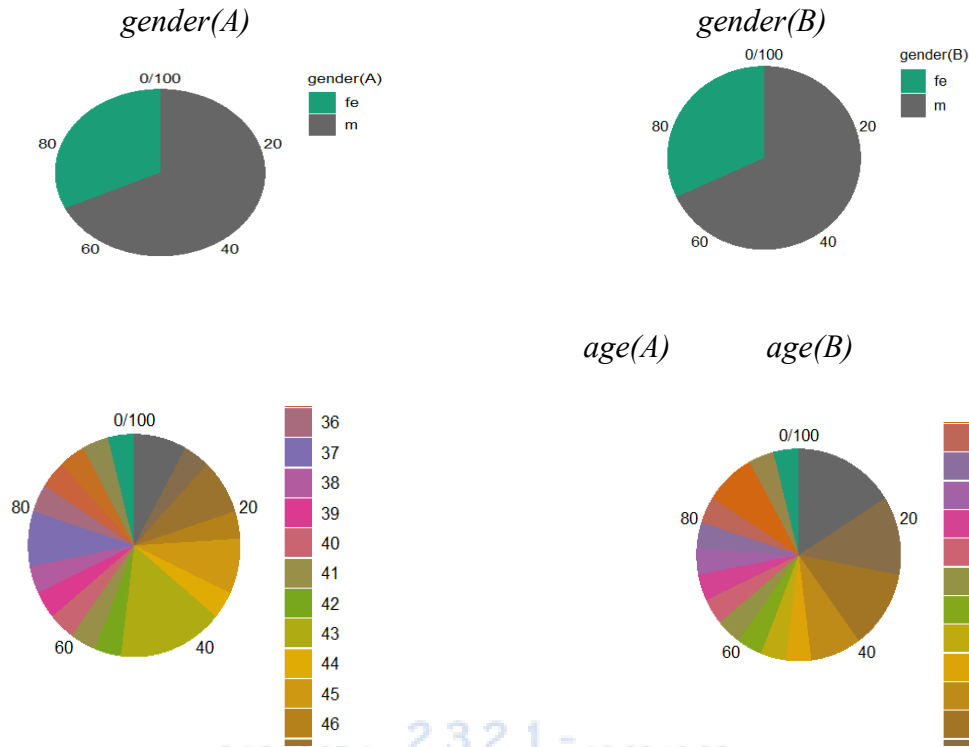
**Participants:** Fifty of the sixty individuals that were screened were chosen and divided equally (n = 25) into isokinetic and isoinertial groups in accordance with the determined parameters. At the outset, both groups' general demographics, including age, height, and weight, were assessed and displayed as averages and standard deviations. There is no significant difference ( $P > .05$ ) between these features in all groups according to the unpaired t test, indicating research homogeneity. Additionally, clinical characteristics including pain and activity level were assessed to determine the relevance. These clinical indications, like the demographic data, did not initially show a significant difference ( $P > .05$ ) compared the two groups.

**Pain intensity:** The isokinetic plus K-taping and isoinertial plus K-taping groups' initial level of pain (VAS) assessments did not differ statistically ( $P > .05$ ), indicating a homogeneous population. After 20 days of the therapy, an intergroup comparison between the two groups reveals a significant change ( $P < .05$ ).

**Functional status:** In the homogeneous community, there is not a statistically significant variance comparing the initial evaluations of the isokinetic with K-taping and isoinertial with K-taping group of functional capability (BPFS) ( $P > .05$ ). After 20 days of therapy, an intergroup comparisons among the two groups reveals a significant distinction ( $P < .05$ ).

Descriptive Statistics									
		gender(A)		gender(B)		age(A)		age(B)	
Valid		25		25		25		25	
Missing		0		0		0		0	
Mean						41.480		42.520	
Std. Error of Mean						1.093		1.339	
Std. Deviation						5.463		6.697	
Variance						29.843		44.843	
Range						20.000		20.000	
Minimum						30.000		30.000	
Maximum						50.000		50.000	

## Pie charts



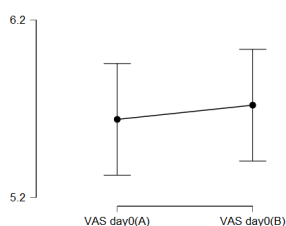
Paired Samples T-Test											
Measure 1				Measure 2				t	df		p
age(A)			-	age(B)				0.715	24		0.481
VAS day0(A)			-	VAS day0(B)				0.371	24		0.714
VAS day10(A)			-	VAS day10(B)				2.116	24		0.045
VAS day20(A)			-	VAS day20(B)				2.388	24		0.025
bpfs day0(A)			-	bpfs day0(B)				0.157	24		0.877
bpfs day10(A)			-	bpfs day10(B)				3.647	24		0.001
bpfs day20(A)			-	bpfs day20(B)				3.781	24		0.0006

Descriptives									
		N		Mean		SD		SE	
age(A)		25		41.480		5.463		1.093	
age(B)		25		42.520		6.697		1.339	
VAS day0(A)		25		5.640		1.036		0.207	
VAS day0(B)		25		5.720		1.061		0.212	
VAS day10(A)		25		3.600		0.816		0.163	
VAS day10(B)		25		3.080		0.909		0.182	
VAS day20(A)		25		1.680		0.748		0.150	
VAS day20(B)		25		1.200		0.707		0.141	
bpfs day0(A)		25		13.720		4.208		0.842	
bpfs day0(B)		25		13.760		4.206		0.841	
bpfs day10(A)		25		28.640		5.438		1.088	
bpfs day10(B)		25		25.640		4.982		0.996	
bpfs day20(A)		25		42.040		5.697		1.139	
bpfs day20(B)		25		45.160		4.259		0.852	

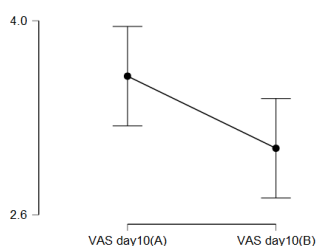


### Descriptives Plots

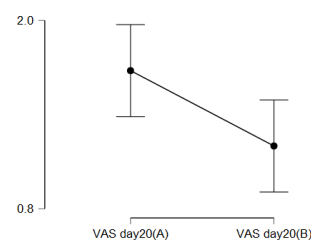
VAS day0(A) - VAS day0(B)



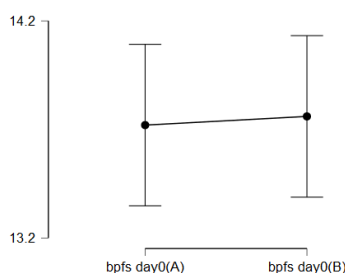
VAS day10(A) - VAS day10(B)



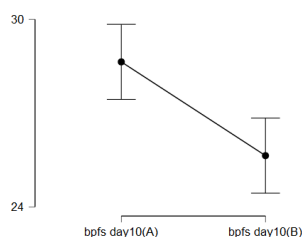
VAS day20(A) - VAS day20(B)



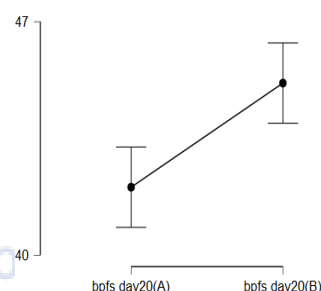
bpfs day0(A) - bpfs day0(B)



bpfs day10(A) - bpfs day10(B)



bpfs day20(A) - bpfs day20(B)



## 4. Discussion

The pre- intervention data showed no statistical significance ( $P \geq 0.05$ ) difference between the groups, but the post-intervention showed significant statistical difference ( $P < 0.05$ ) between the groups after 20 days of intervention. However, greater evidence of improvement in pain and functional status was noted in post intervention period. From above analysis the isoinertial exercise placed a better effect than isokinetic exercise in chronic lower backache.

Isokinetic exercise + K-tapping	Isoinertial exercise + K-tapping
<p>Isokinetic exercise: Using an isokinetic dynamometer, the trunk flexor and extensor muscles are contracted at an unchanged angular velocity.</p> <p>Kinesio taping (KT): Apply to the lumbar paraspinals/abdominals to relieve discomfort, increase proprioception, and improve control over posture.</p> <p>Isokinetic exercise Provides Controlling movement speed and providing resistance across the lumbar range of motion reduces shear stresses on the spine.</p> <p>K-tapping Controls pain through sensory stimulation. Enhancing proprioceptive consciousness and promoting lumbar stimulation of muscles</p>	<p>Isoinertial exercise: Trunk muscle groups perform against a steady load. The speed of movement changes with the output of force.</p> <p>K-Tapping supports spinal stability and pain modulation.</p> <p>Isoinertial workout. Promotes efficient core muscle activation. Improves spinal strain bearing.</p> <p>K-Tapping: Providing posture corrective cues Increasing mobility assurance. Lowering muscle protection</p>

## 5. Conclusion

All things considered, our findings indicate that strengthening exercises using the isokinetic training concept raises pain and functional ability. Isoinertial exercise does, however, also improve performance and lessen pain. Comparatively speaking, isoinertial exercise has a greater impact on reduced back pain than isokinetic exercise. While isoinertial activity with Kinesio taping offers longer-term aligned spines and extra psychological advantages, especially for people with chronic lower backaches, isokinetic exercise with

Kinesio taping offers an effective and constantly tracked strategy for beginning rehabilitation in lower back issues by increasing trunk strength and lowering inflammatory markers.

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