

**EFFECTIVENESS OF FASCIAL MANIPULATION TECHNIQUE
ON PAIN AND POSTURAL CONTROL IN ATHLETES WITH
ILIOTIBIAL BAND TIGHTNESS: A RANDOMIZED
CONTROLLED TRIAL**

by

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MPT II (Sports)

Dissertation Submitted to the

Utkal University, Bhubaneswar, Odisha

In partial fulfillment

of the requirements for the degree of

MASTER OF PHYSIOTHERAPY (MPT)

in

SPORTS

Under the guidance of

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2022 - 2024



DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation/thesis entitled “**Effectiveness of Fascial Manipulation Technique on Pain and Postural Control in Athletes with Iliotibial Band Tightness: A Randomized Controlled Trial**” is a bonafide and genuine research work carried out by me under the guidance of **Dr. Asifuzzaman Shahriyar Ahmed, Associate Professor**, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha.

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LIST OF ABBREVIATIONS USED

1. ABSMARI - Abhinav Bindra Sports Medicine and Research Institute
2. AUC – Area Under Curve
3. BMI – Body Mass Index
4. CCs- Centre of Coordination
5. CoP-Y – Centre of Pressure on Y- axis
6. CoP-X - Centre of Pressure on X - axis
7. EA – Ellipse area
8. ITB- Iliotibial Band
9. ICC- Intraclass correlation coefficient
10. MCID- Minimum clinically important difference
11. MDC- Minimal detectable change
12. NPRS- Numeric Pain rating Scale
13. PROM- Passive Range of Motion
14. SD- Standard Deviation
15. SPSS- Statistical Package for Social Science

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ABSTRACT

TITLE: Effectiveness of Fascial Manipulation Technique on Pain and Postural Control in Athletes with Iliotibial Band Tightness: A Randomized Controlled Trial.

BACKGROUND: Fascial manipulation is a manual therapy technique that targets specific areas of the fascial system to alleviate pain, restore mobility, and improve biomechanical function. Despite the growing clinical interest in fascial manipulation, limited research exists regarding its effectiveness in athletes with Iliotibial band tightness. The study aims to provide new insights into the potential role of fascial manipulation in optimizing athletic performance.

PURPOSE: This study aims to find out the effectiveness of the Iliotibial band fascial manipulation technique on pain and postural control in athletes.

METHODS: A randomized controlled trial study was conducted through purposive sampling to recruit 44 elite athletes aged between 18 and 30 years, who were randomly assigned to an experimental group (n = 22; fascial manipulation, 1 session per week for 3 weeks) and a control group (n = 22; stretching and foam rolling). The outcome measures included the NPRS and static ProKin.

RESULTS: The experimental group showed an improvement in NPRS ($p < 0.05$), EA ($p < 0.05$), COP-Y ($p < 0.05$), COP-X ($p < 0.05$) after 3 weeks of FM. These improvements were sustained at the follow-up assessment, indicating lasting benefits of FM.

INTERPRETATION AND CONCLUSION: Our results indicate that there is significant improvement observed in the NPRS, EA, COP-Y and COP-X of the experimental group compared to control group. Fascial manipulation is an effective treatment for reducing pain and improving postural control in athletes with iliotibial band tightness. This technique may be considered a valuable addition to the therapeutic options available for managing ITB tightness in athletes.

KEYWORDS: Force platform; ITB; NPRS; Postural control; Runners; Static ProKin;

Effectiveness of Fascial Manipulation Technique on Pain and Postural Control in Athletes with Iliotibial Band Tightness: A Randomized Controlled Trial.

INTRODUCTION

The Iliotibial band tract or IT band is a longitudinal fibrous sheath that runs along the lateral thigh and serves as an important structure involved in lower extremity motion. ⁽¹⁾ The IT band is a thick band of fascia formed proximally at the hip by the fascia of the gluteus maximus, gluteus medius, and tensor fascia latae muscles. ⁽²⁾ One of the most common injuries among runners is iliotibial band syndrome. ⁽³⁾ Due to repetitive motion activities in runners, cyclists, military recruits, and recreational players because of overuse, affected patients' reports of lateral knee pain. ⁽⁴⁾

Iliotibial band friction syndrome is an overuse disorder of the lateral knee. It is commonly reported in athletes, such as runners and cyclists, and refers to pain related to physical activity. ⁽⁵⁾ The IT band stabilizes the knee both in extension and in partial flexion and is therefore used constantly during walking and running. When a person is leaning forward with a slightly flexed knee, the tract is the knee's main support against gravity. ⁽⁶⁾

Fascial manipulation is a manual therapy that targets the deep muscular fascia. It involves applying deep pressure to particular locations that are determined by the method's biomechanical model. Luigi Stecco devised this biomechanical model. Many clinical disorders, including abnormal proprioception, changes in mechanical coordination, imbalance, and

discomfort, have been linked to facial dysfunction. ⁽⁷⁾ Certain sites known as centres of coordination (CCs) can be found using the fascial manipulation (FM) technique. They are the representation of the treatment matrix and the tensional network of our body. These sites are localized according to the concept of segments (e.g., neck, shoulder, or knee). CCs can be classified into sequences (a sequence of CC locations between segments) and are discovered when muscle forces converge. ⁽⁸⁾

Localized deep friction over CCs results in hyperaemia, which can alter the extracellular matrix and improve fascial gliding to instantly relieve pain and improve the affected joint's range of motion. FM is applied as a deep friction massage for three to eight minutes at a time to each painful, densified CC. In order to generate heat and start the inflammatory process, which would restore the physiological flexibility. ⁽⁹⁾

Postural control and associated strategies require the use of instrumented tests with several materials to enable kinetic, kinematic, and electrophysiological analysis. Force Platform (FP) typically measures ground reaction forces and ellipse area (EA), which are used to calculate force development and position of the center of pressure (CoP) on x and y axis. Force platforms are generally considered as the 'gold standard' in assessing postural control. ⁽¹⁰⁾

The Technobody™ Static ProKin 252 comprises a force platform with four force-transduction systems mounted to a flat, regular surface. The platform transmits the signals to a computer for offline processing and center of pressure (CoP) location detection. The point of application of forces with

regard to feet and ground is represented by the CoP. The tonic postural system's ability to maintain the centre of gravity nearer the intermediate position of balance is measured by the CoP area. ⁽¹¹⁾

Patients' self-reported pain intensity can be measured using the Numeric Pain Rating Scale (NPRS), a universal pain rating system (0–10, where 0 represents "no pain" and 10 represents "worst possible pain"). As a measure of pain intensity in groups with known pain, the NPRS is brief, simple to use, and validated. ⁽¹²⁾

NEED FOR STUDY

1. The need of the study is to understand the effects of fascial manipulation on IT band in terms of improving postural control and pain.
2. The need of the study is to introduce fascial manipulation as a useful intervention method for the iliotibial band as there are no studies done to find the effectiveness of fascial manipulation in the management of pain and postural control.
3. Fascial manipulation technique is highly necessary in symptomatic people in order to increase athletic performance since there are several research done on asymptomatic subjects already.
4. The long-term effect of fascial manipulation on Iliotibial band tightness needs to be addressed.

AIM OF THE STUDY

To find out the effectiveness of the Iliotibial band fascial manipulation technique on pain and postural control in athletes with ITB tightness.

OBJECTIVES OF THE STUDY

1. To find out the effectiveness of the Iliotibial band fascial manipulation technique on pain in athletes using the NPRS Scale.
2. To find out the effectiveness of the Iliotibial band fascial manipulation technique on postural control in athletes using the Static ProKin.

HYPOTHESIS

NULL HYPOTHESIS (H_0) -

H_{01} : There will be no significant effect of the Iliotibial band fascial manipulation technique and self-stretching on pain and postural control in athletes.

H_{02} : There will be no significant effect of self-stretching on athletes with Iliotibial band tightness.

ALTERNATIVE HYPOTHESIS (H_1) –

H_{11} : Fascial manipulation will be effective in improving pain and postural control in athletes.

H_{12} : Self-stretching will be effective on athletes with Iliotibial band tightness.

REVIEW OF LITERATURE

1. Neha C. Kamani a, Shruti Poojari b, Raja G. Prabu c (2021)
“The influence of fascial manipulation on function, ankle dorsiflexion range of motion and postural sway in individuals with chronic ankle instability”
[Journal of Bodywork and Movement Therapies]

The myofascial sequences with the most painful and densified CCs points were identified by palpation and movements assessments. FM was performed as a deep friction massage with either elbow or knuckles for about three to 8 min at each painful, densified CCs point, to produce heat, thus initiating the inflammatory process and thereby restoring the physiological activity. The study concluded that FM targeting both CC and center of fusion points on the postural sway parameters is warranted.

2. Karthik Arumugam, Karvannan Harikesavan (2020)
“Effectiveness of fascial manipulation on pain and disability in musculoskeletal conditions. A systematic review”
[Journal of Bodywork and Movement Therapies]

Altered fascial stiffness leads to poor muscular biomechanics, altered muscle coordination and decreased strength, which leads to abnormal movement patterns causing excessive tissue strain on the capsule and cartilage. These altered fasciae or increased matrix stiffness could possibly lead to myofascial pain. This systematic review reported

moderate-quality evidence for the effect of FM in improving pain and disability in subjects with musculoskeletal pain conditions when it is carried out.

3. Eric J Strauss, Suezie Kim, Jacob G Calcei, Daniel Park (2011)

“Iliotibial Band Syndrome: Evaluation and Management”

[Journal of The American Academy of Orthopaedic surgeons]

Due to repetitive motion activities in runners, cyclists, military recruits, and recreational players because of overuse, affected patients’ reports of lateral knee pain.

4. Talin M Pepper, Jean-Michel Brismée, Phillip S Sizer Jr, Jeegisha Kapila, Gesine H Seeber, Christopher A Huggins, Troy L Hooper (2021)

“The Immediate Effects of Foam Rolling and Stretching on Iliotibial Band Stiffness: A Randomized Controlled Trial”

[International Journal of Sports Physical Therapy]

The study was done to examine effects of foam rolling and iliotibial complex stretching on ITB stiffness at 0° and 10° of hip adduction and hip adduction passive range of motion (PROM). The study concluded that a single episode of stretching and foam rolling does not affect short-term ITB stiffness.

5. Zuzanna Podstawka, Oliwia Pińkowska, Aleksandra Byś, Piotr Gawda (2020)

“Effectiveness of Fascial Manipulation Method (FM®)”

[Journal of Education Health and Sport]

The study stated that Fascial manipulation is a manual method of treatment created by Luigi Stecco that centers on the muscular fascia. FM technique bases on identification and therapy of specific points, which are located at the point of convergence of the vectorial forces of the muscles involved in every movement. The study concludes that Fascial manipulation therapy is worth considering in the treatment of pain disorders, orthopedic dysfunctions, and postural disabilities. Improvement after treatment, reduction of pain, and better functional outcomes in patients' conditions were figured.

6. Ian A. Young, James Dunning, Raymond Butts, Firas Mourad, Joshua A. Cleland (2019)

“Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms.”

[Physiotherapy Theory and Practice, An International Journal of Physical therapy]

A secondary psychometric analysis of 107 patients with NP without UE symptoms was done. Test-retest reliability, construct validity, area under the curve (AUC), minimum detectable change (MDC), and minimum clinically important difference (MCID) were calculated. The study concluded that NPRS exhibited moderate reliability (ICC = 0.67; [0.27 to 0.84]).

7. Srishti Jain, Shefali Walia, Stuti Khanna, Garima Wadhwa (2023)

“Validity and Reliability of ProKin 252N (Tecnobody) Balance System for Assessment of Standing Balance in Individuals with Incomplete Spinal Cord Injury”

[International Journal of Scientific Development and Research (IJS DR)]

The study is the first to examine the measurement properties of Prokin 252N for assessment of balance in SCI individuals. Test re-test reliability of ProKin 252N static balance test parameters were established (ICC=0.70- 0.92) in individuals with incomplete spinal cord injur

METHODOLOGY

A randomized controlled trial was performed on 44 athletes selected from Kalinga Athletic Stadium in Bhubaneswar. Ethical clearance was taken from the Institutional Ethical Committee of Abhinav Bindra Sports Medicine and Research Institute (ABSMARI), Pahal, Bhubaneswar before the commencement of the study. The protocol ID for approval was (ABS-IEC-2023-PHY-013). The participants selected were within the age group of 18-30 years with the presence of Iliotibial band tightness, and lateral knee pain for at least 1 week included in the study. The purposive sampling method was used for sampling. The players having any kind of recent injury, with a previous history of trauma or surgery within 1 year, female athletes, or NPRS score less than 4 were excluded from the study.

SAMPLE SIZE ESTIMATION

The sample size calculation was done by using the G*Power 3.1.9.4 Software, with

Effect size $d = 0.9$

α err prob = 0.05

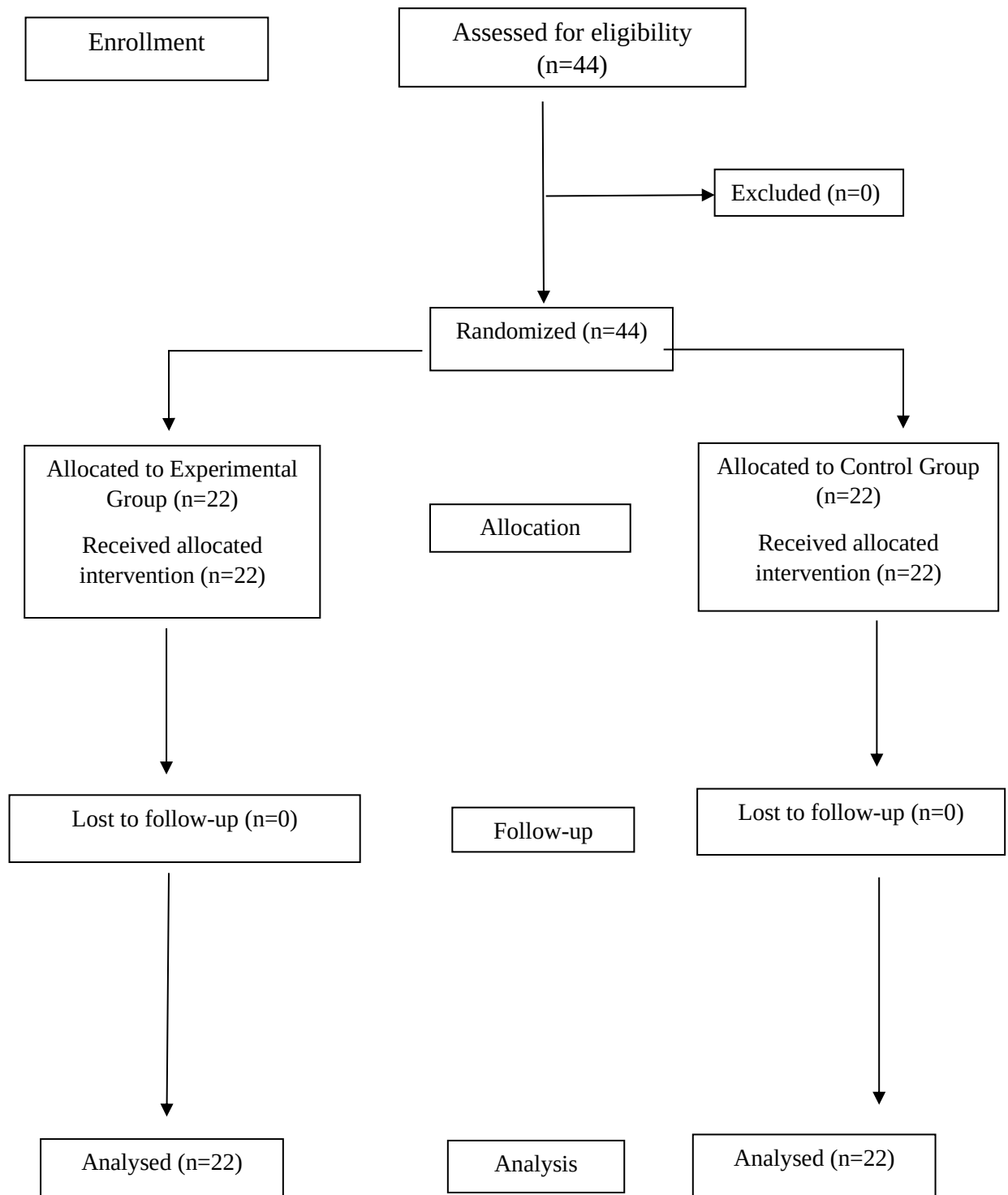
Power ($1-\beta$ err prob) = 0.90⁽⁹⁾

The total sample size calculated was 44.

MATERIALS USED

1. Cream/lotion
2. Towel
3. Couch
4. Stopwatch
5. Foam roller
6. Static ProKin machine

Consort Flow Diagram



PROCEDURE

The present study was reviewed and approved by the Institutional Ethical Committee. A total of 44 samples were selected by using the purposive sampling method based on the inclusion criteria and exclusion criteria.

The study protocol was explained to all the participants and their informed consent was obtained.

Baseline assessments of the participants were taken, including the demographic data (age, gender, history of injury, height, weight,). The Ober's Test was done for the inclusion in the study.

Pre-test was done which included assessment of Postural control using the Static ProKin and pain was assessed using the Numeric Pain Rating Scale. A total of 44 participants (44 males) were included in the study. Group A (Experimental, n=22) took intervention i.e. Fascial Manipulation for a total of 3 weeks, 1 session per week. Group B (Control, n=22) was explained about the self-stretching and foam roller release of ITB. At the end of the 3rd week, post-intervention data was collected and the data was analyzed.

No adverse events were reported during the training sessions.

FASCIAL MANIPULATION (FM)

The technique involved deep friction over specific points mapped by Luigi Stecco named centre of coordination (CC). Each subject in the treatment group received three sessions 1 session/week lasting 45min each. Treatment

was provided by the same physiotherapist at weekly intervals over three weeks.

Table 1

Location of CCs (Stecco, 2004) CC points of the myofascial sequences of the lower extremity.

CC	Location	Location
AN-CX	Over Pectineus and Iliopsoas below the inguinal ligament	RE-CX Over the Gluteal maximus muscle above the sacrotuberous ligament
AN-GE	Over Vastus intermedius, at the mid- part of the thigh.	RE-GE Medial to the Biceps femoris, mid-part of thigh.
AN-TA	Over Tibialis anterior muscle, mid-part of the leg	RE-TA Over Gastrocnemius towards the peroneal muscle.
ME-CX	Anterior to gracilis at the proximal 1/3 of thigh	LA-CX Over the muscle belly of Tensor fascia lata
ME-GE	Over the gracilis and distal part of sartorius	LA-GE Over the iliotibial tract, near origin of short head of Biceps femoris
ME-TA	At the junction of medial gastrocnemius and soleus	LA-TA Over the Extensor digitorum longus where peroneus tertius originates
IR-CX	Over the apex of the femoral triangle	ER-CX Over the piriformis
IR-GE	Over the subsartorius muscle and sub sartorial fascia	ER-GE Lateral intermuscular septum where short head Biceps femoris originates
IR-TA	Medial part of the deep transverse fascia where Tibialis posterior attaches	ER-TA Over Peroneus longus and brevis at the mid-part of the leg
IR-PE	Over the anterior part of Abductor hallucis	ER-PE Over Extensor digitorum brevis in front of the lateral malleoli

Fig 1: Locations of CCs ⁽⁹⁾



Fig 2: FM treatment in the densified CC points (LA-GE).



Fig 3: FM treatment in the densified CC points (AN-TA).

SELF STRETCHING AND FOAM ROLLER RELEASE

The participants were provided with a verbal explanation of the Self-stretching and foam roller release of ITB as well as a demonstration by the investigator.

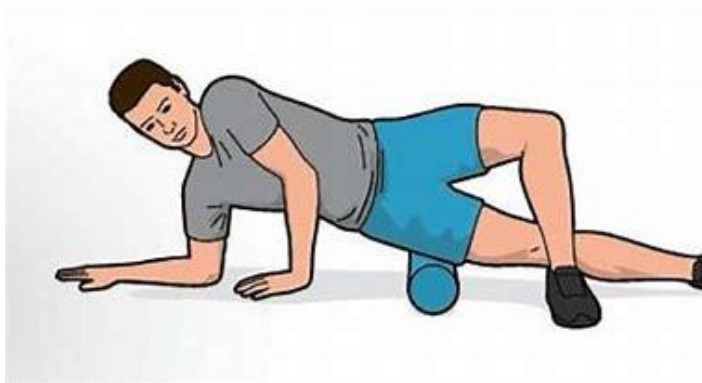


Fig 4: ITB release with foam roller



Fig 5: ITB self-stretch

NUMERIC PAIN RATING SCALE (NPRS)

The Numeric Pain Rating Scale has shown adequate reliability ($ICC=0.67$)⁽¹³⁾. The participants were shown the pain rating scale with 11 items. The 11-point numeric scale was explained to the participants which ranges from '0' representing no pain to '10' representing the worst pain imaginable. The participants were asked to rate the intensity of the pain before the intervention and after the intervention. The pain scores were registered and were used for the data analysis.

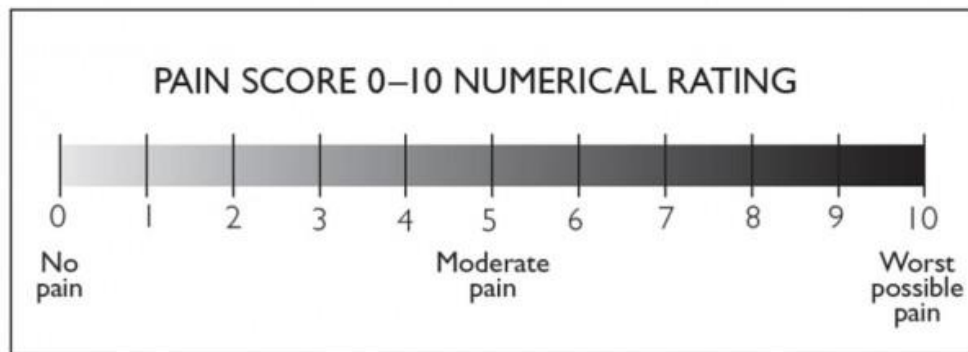


Fig 6: Numeric Pain Rating Scale

STATIC ProKin:

The Prokin 252 has shown adequate reliability ($ICC=0.70-0.92$)⁽¹⁴⁾. The Technobody™ Static ProKin 252 was utilized for the postural control assessment. The postural control was measured by three components; Center of Pressure (CoP)x, (CoP)y, and Ellipse area (EA). An increase in CoP in either forward/backward or medial/lateral direction is indicative of postural disturbance. Ellipse area implies that the smaller the ellipse area, the better the postural control. The participants were asked to place the lower extremity in unipedal stance with eyes open at a 30-second test

duration. Subjects were asked to maintain visual focus on an “+ mark” placed on an eye-level screen from the subject’s face. Subjects placed their hands on their hips and the unweighted leg was maintained at 45 degrees of knee flexion during the test. Contact was not allowed between the raised limb and the stance limb. The results were saved as a participant’s report for the data analysis.

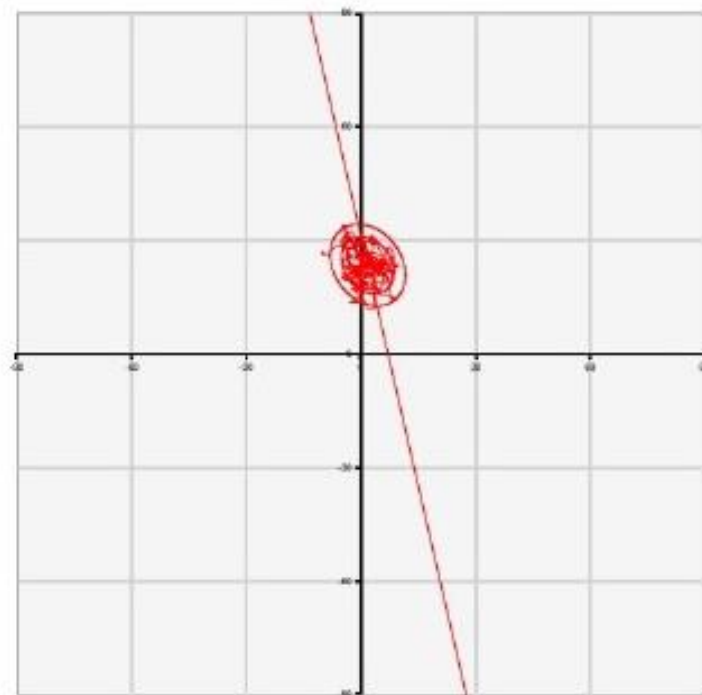


Fig 7: Stabilometric Sway result showing the Ellipse area



Fig 8: Static ProKin



Fig 9: Participant performing the unipedal stance on the Static ProKin

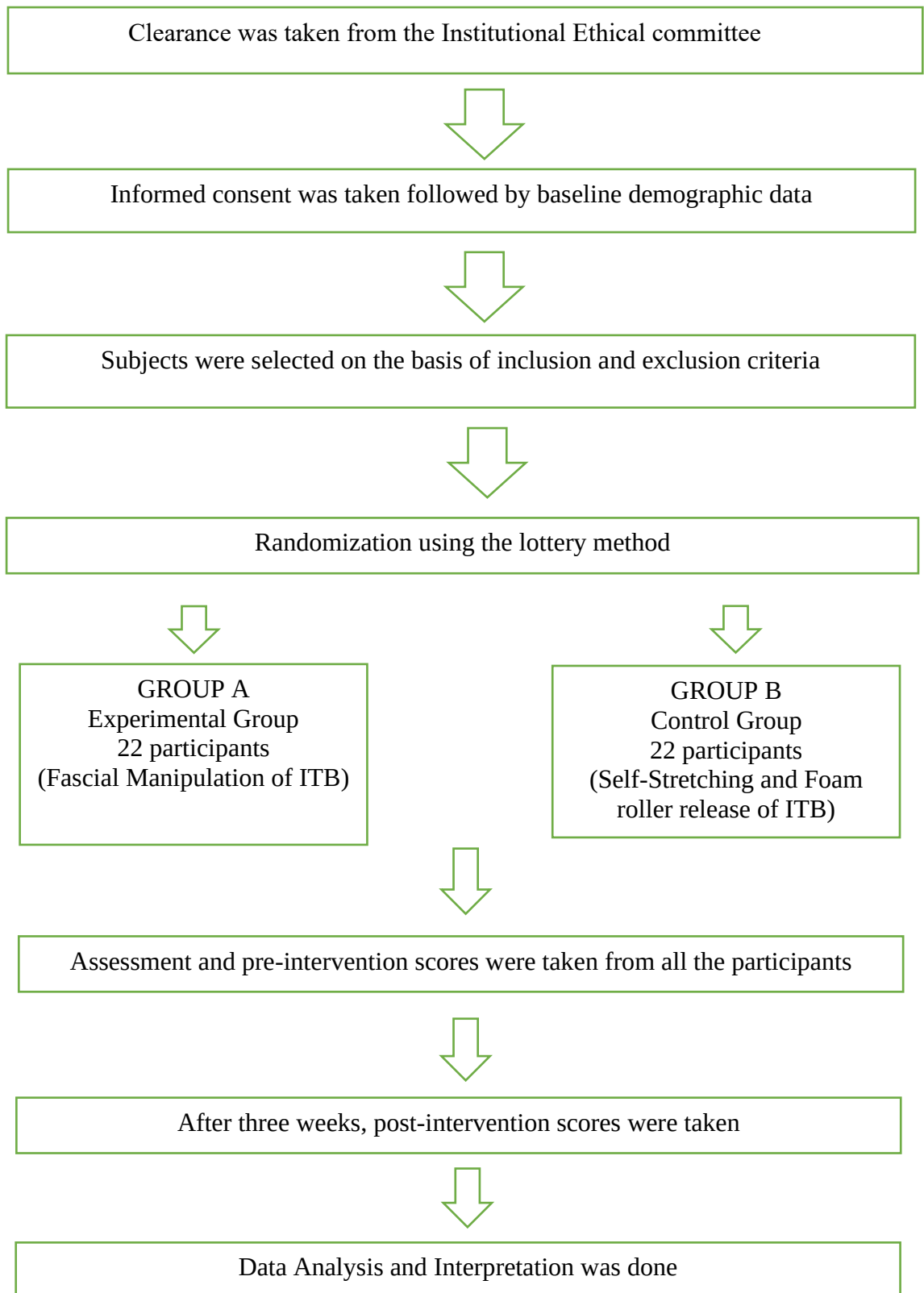


Fig 10: Flow chart of the study procedure

STATISTICAL ANALYSIS

The statistical analysis was performed using SPSS statistical package of social science version 25. The level of significance was set at $p < 0.05$. The normality of data was calculated using Shapiro-Wilk test. Descriptive statistics was done to assess the mean and standard deviation of the specific groups. The inferential statistics that is the Paired t-test was used for analysis within the group and for the between group analysis Unpaired t-test was done.

RESULTS

- Table and figure show the mean and standard deviation of demographic data.

TABLE: Mean and standard deviation of demographic data

	Experimental Group	Control Group
Age (Years)	21.23±2.33	22.36±2.74
Weight (kg)	65.77±9.32	61.68±4.68
Height (cm)	171.73±6.35	169.41±6.76
BMI ((kg m ⁻²))	22.3±2.87	21.49±0.94

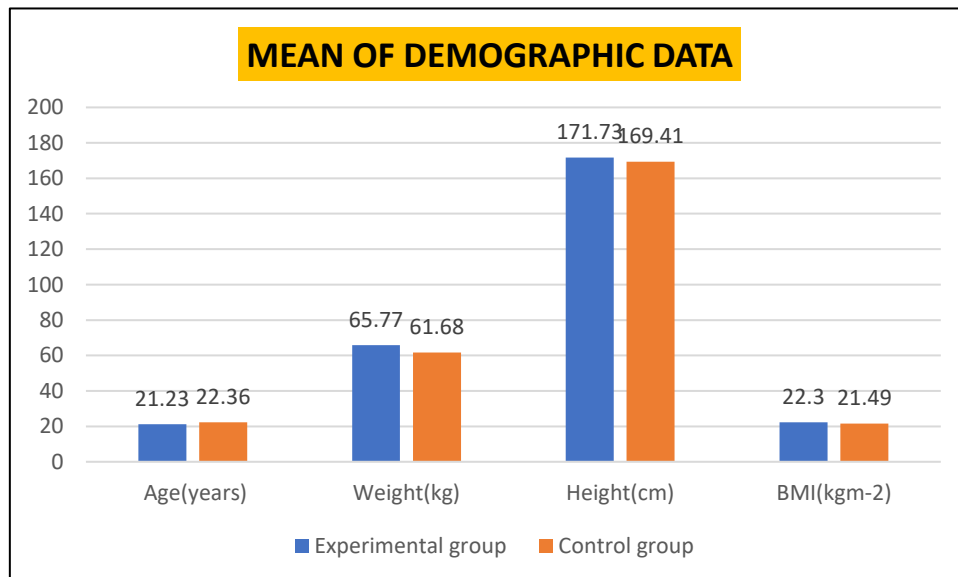


Fig 11: Mean Demographic data

- In within group comparison of NPRS, the experimental and control groups both showed statistically significant difference with ($p < 0.05$).

Table: Within group comparison of NPRS

Outcome measure	N	Group	Mean		Mean Difference	P Value
			PRE	POST		
NPRS	22	Experimental	6.27	2.55	3.72	<0.05
	22	Control	6.5	5.64	0.86	<0.05

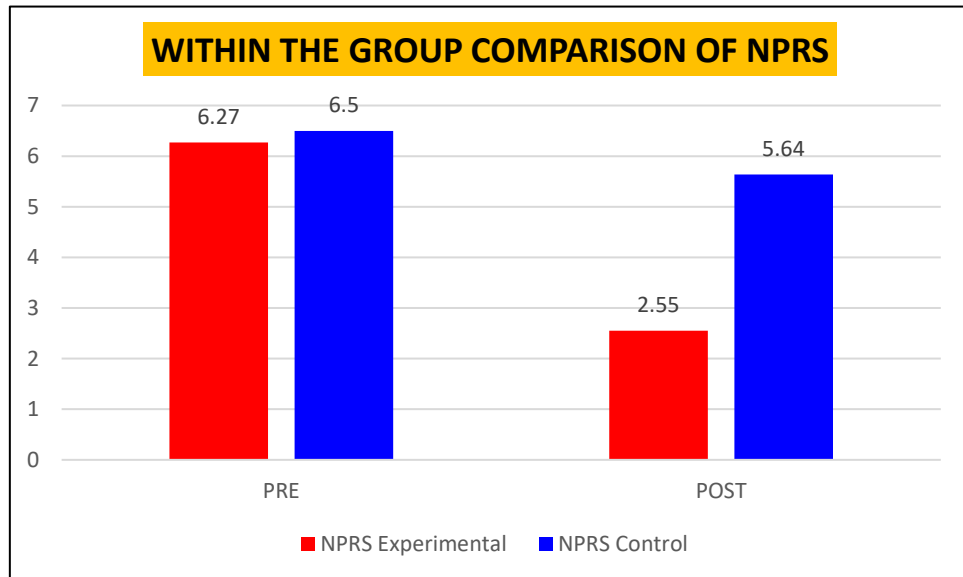


Fig 12: Graphical representation of within group comparison of NPRS

- In within group comparison of Ellipse Area, the experimental group showed statistically significant difference with ($p < 0.05$) but the control group showed no statistically significant difference with ($p > 0.05$)

Table: Within group comparison of Ellipse Area

Outcome measure	N	Group	Mean		Mean Difference	P Value
			PRE	POST		
EA	22	Experimental	337.28	236.74	100.54	<0.05
	22	Control	410.08	399.03	11.05	>0.05

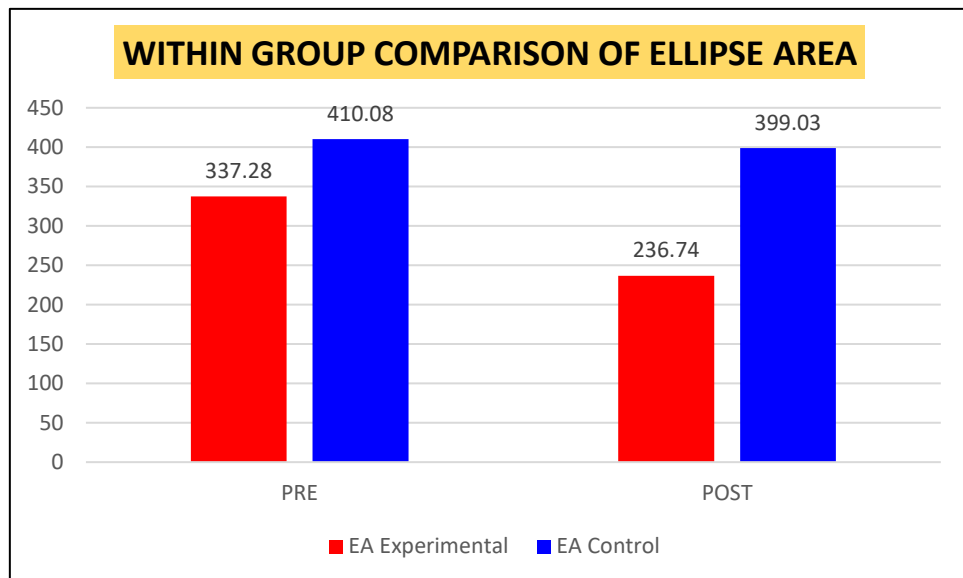


Fig 13: Graphical representation of within group comparison of Ellipse Area

- In within group comparison of CoP-Y, the experimental group showed statistically significant difference with ($p < 0.05$) but the control group showed no statistically significant difference with ($p > 0.05$)

Table: Within group comparison of CoP-Y

Outcome measure	N	Group	Mean		Mean Difference	P Value
			PRE	POST		
CoP-Y	22	Experimental	24.12	13.79	10.33	<0.05
	22	Control	24.74	23.58	1.16	>0.05

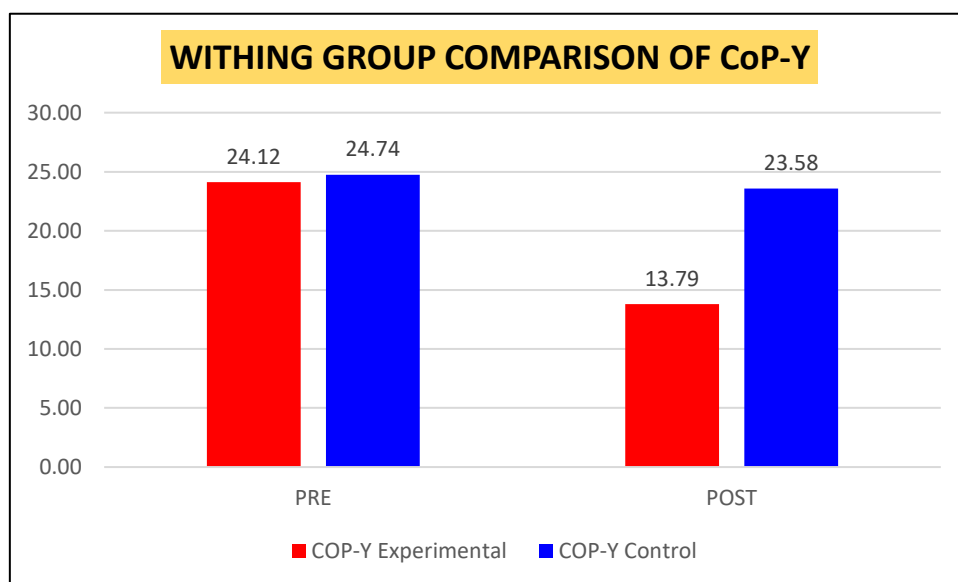


Fig 14: Graphical representation of within group comparison of CoP-Y

- In within group comparison of CoP-X, the experimental as well as the control group showed no statistically significant difference with ($p>0.05$)

Table: Within group comparison of CoP-X

Outcome measure	N	Group	Mean		Mean Difference	P Value
			PRE	POST		
CoP-X	22	Experimental	3.93	2.86	1.07	>0.05
	22	Control	9.02	8.44	0.58	>0.05

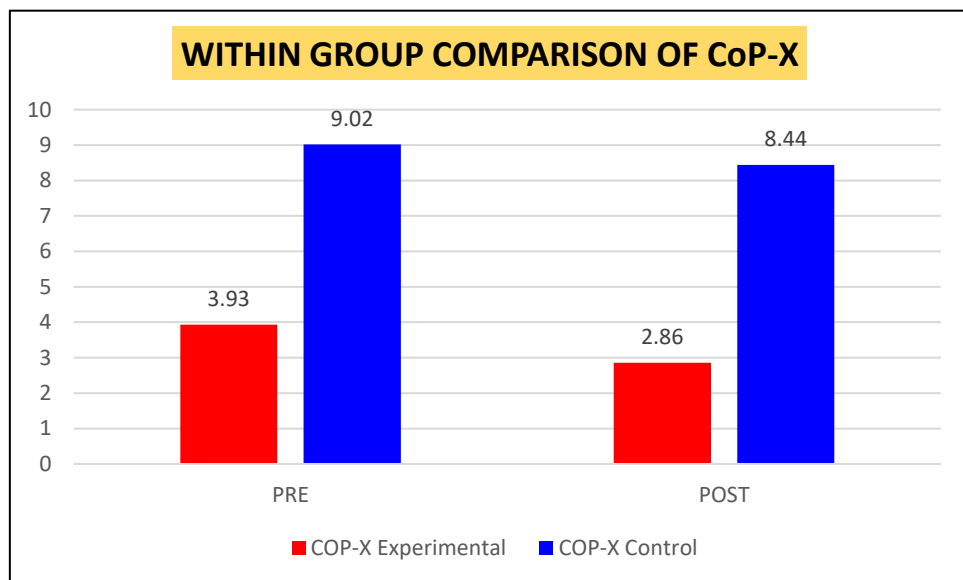


Fig 15: Graphical representation of within group comparison of CoP-X

- In between group comparison of NPRS, EA, CoP-Y, CoP-X, the experimental as well as the control group showed statistically significant difference with ($p < 0.05$)

Table: Between group comparison of NPRS, Ellipse Area, CoP-Y, CoP-X

Outcome measure	N	Group	Mean		Mean Difference	P Value
			PRE	POST		
NPRS	22	Experimental	6.27	2.55	3.72	<0.05
	22	Control	6.5	5.64	0.86	
EA	22	Experimental	337.28	236.74	100.54	<0.05
	22	Control	410.08	399.03	11.05	
CoP-Y	22	Experimental	24.12	13.79	10.33	<0.05
	22	Control	24.74	23.58	1.16	
CoP-X	22	Experimental	3.93	2.86	1.07	<0.05
	22	Control	9.02	8.44	0.58	

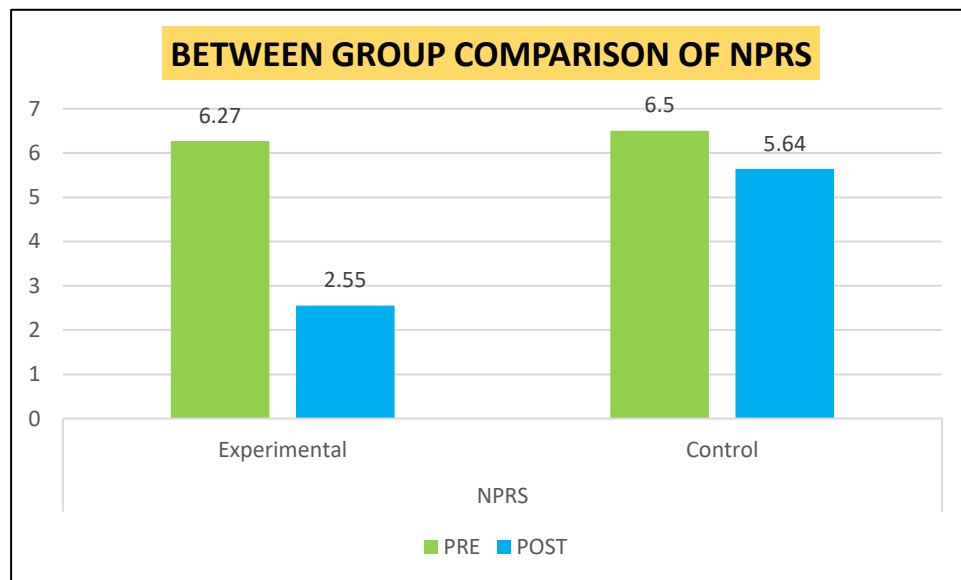


Fig 16: Graphical representation of between group comparison of NPRS

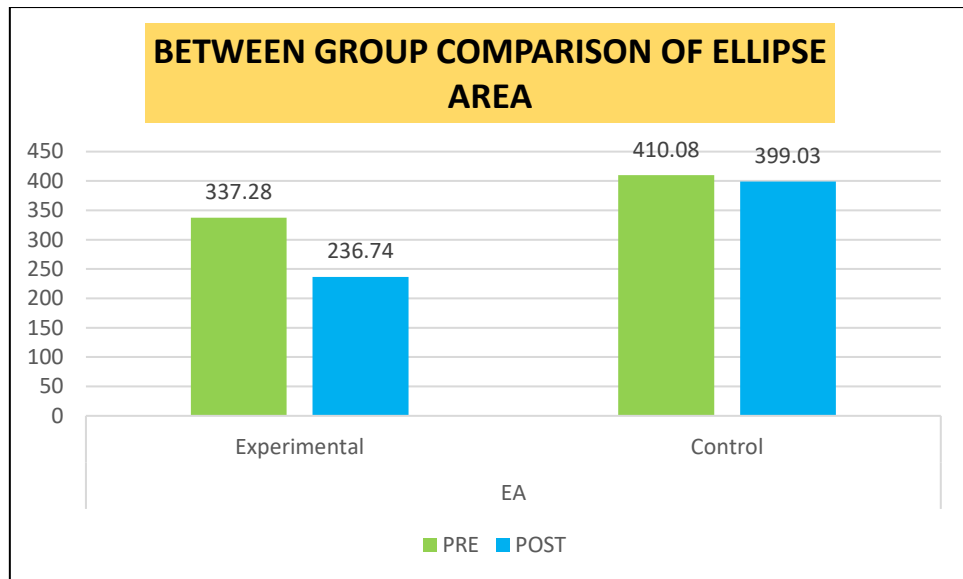


Fig 17: Graphical representation of between group comparison of Ellipse Area

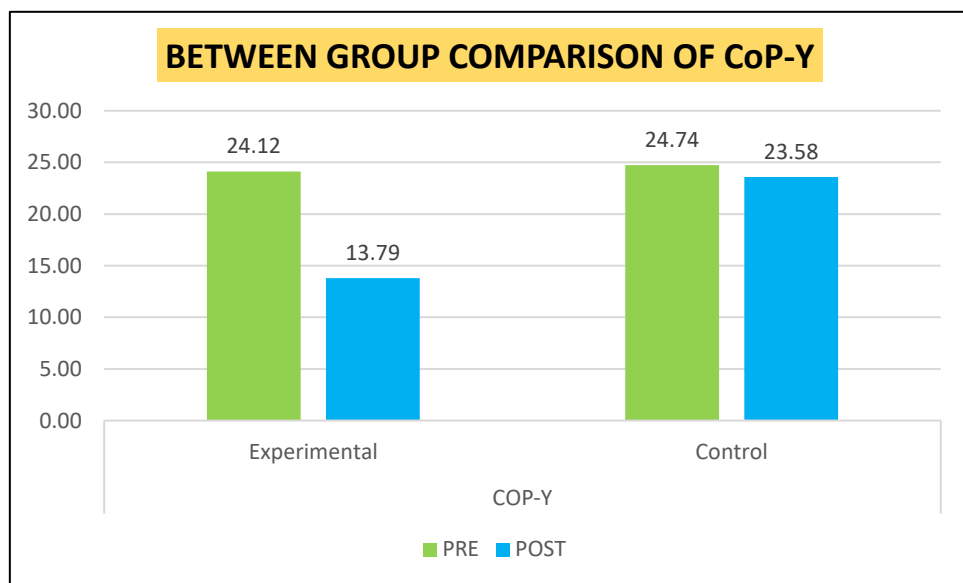


Fig 18: Graphical representation of between group comparison of CoP-Y

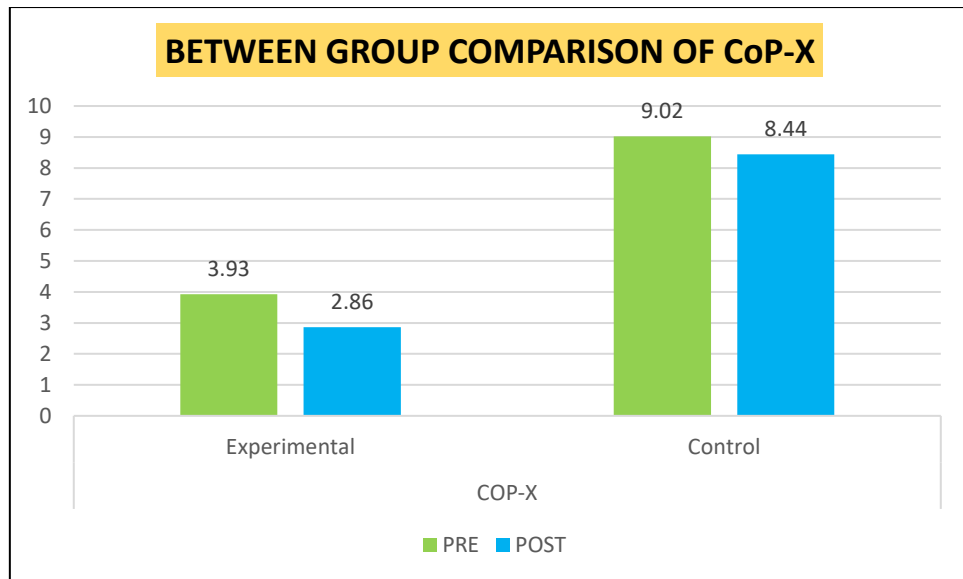


Fig 19: Graphical representation of between group comparison of CoP-X

DISCUSSION

The aim of the current study was to find out the effectiveness of the ITB fascial manipulation technique on pain and postural control in athletes with ITB tightness. We measured the pain using NPRS, and the postural control using static ProKin, both pre- and post-intervention. The participants selected were within the age group of 18–30 years. The findings provide valuable insights into the efficacy of FM as a potential treatment for managing ITB tightness, which is a common issue among athletes.

The results of this study revealed that pain measured using the outcome measure NPRS and postural control measured using the Static ProKin improved in both groups, i.e., the experimental (FM) and control groups. But statistically significant improvement was seen in the FM group. The control group did not show significant improvements when compared to the FM (experimental) group.

Pain Reduction

One of the primary outcomes of this study was the significant reduction in pain levels among participants who received FM compared to the control group. This aligns with existing literature suggesting that FM can reduce myofascial pain by addressing fascial dysfunctions contributing to muscle tightness and discomfort. Studies have shown decreased pain and increased range of motion in the knee and hip after applying FM indeed normalised gliding commonly results in improved function. (Pedrelli et al., Busato et al.) ^(13,14)

After manipulation, the free nerve endings embedded in the fascia would no longer be activated at a lower threshold and the patient commonly reports pain reduction with the normal sensation of pressure being perceived. Pain reduction may also be explained by conditioned pain modulation (CPM) through the activation of endogenous pain inhibitory mechanism (Bjorkedal et al.)⁽¹⁵⁾

The pain reduction observed in the intervention group could be attributed to the decompression of the fascial layers and the restoration of normal tissue glide, leading to decreased tension on the ITB and surrounding structures. These findings are particularly relevant for athletes, as pain management is crucial for maintaining performance levels and preventing injury recurrence.

Improvement in Postural Control

Another significant finding of this study was the improvement in postural control in the FM group. Athletes often experience compromised postural stability due to ITB tightness, which can affect their performance and increase the risk of injuries. The improvement in postural control following FM treatment may be due to the enhanced proprioceptive input resulting from the release of fascial restrictions. FM may facilitate better alignment and coordination of the lower limb muscles, leading to improved postural stability.

No studies have been done on FM addressing the ITB tightness. Our study states that the dual benefit of pain reduction and improved postural control highlights the potential of FM as a holistic treatment approach for athletes with ITB tightness.

A study conducted by Stecco et al. ^(16,17), where the postural evaluation was done before and after FM, showed significant improvements in CoP parameters where the measurements were taken with the subjects in the double limb stance for the ankle. In contrast, in our study, the measurements were taken in a single-limb stance, and there were significant postural sway changes by targeting CC points for the ITB tightness.

Comparison with Other Treatment Modalities

When comparing FM with other common treatment modalities for ITB tightness, such as stretching, foam rolling, and manual therapy, FM appears to offer distinct advantages. While traditional methods primarily focus on lengthening the ITB or reducing muscle tightness, FM directly targets the fascial network, addressing the underlying causes of tightness and dysfunction. This comprehensive approach may explain the superior outcomes observed in the FM group in terms of both pain reduction and postural control.

Thus, from the results of this study, it can be stated that pain and postural control can be improved by fascial manipulation techniques in male athletes.

CONCLUSION

In conclusion, this randomized controlled trial demonstrates that FM is an effective treatment for reducing pain and improving postural control in athletes with ITB tightness. The findings suggest that FM may offer a valuable alternative or complement to traditional treatment, particularly for athletes seeking to maintain optimal performance levels while managing musculoskeletal conditions. Further research is needed to confirm these results and explore the broader applications of FM in sports medicine.

LIMITATIONS AND RECOMMENDATIONS

Limitations:

1. The sample size was relatively small, which may limit the statistical power and generalizability of the results.
2. The study did not assess the long-term effects of FM, leaving uncertainty about the sustainability of the observed benefits over time.
3. The study included only male participants, which limits the generalizability of the findings to female athletes. The effects of FM on pain and postural control may differ between genders due to physiological and biomechanical differences.

Recommendations/ Scope for Future Study:

1. Future research should aim to include larger sample sizes and longer follow-up periods to confirm the long-term efficacy of FM in managing ITB tightness.
2. Moreover, while the study focused on pain and postural control, other relevant outcomes, such as muscle strength, range of motion, and athletic performance, were not evaluated. Including these parameters in future studies could provide a more comprehensive understanding of the impact of FM on athletes with ITB tightness.
3. It is necessary to do more research evaluating the impact of various treatment approaches on the parameters of postural sway in the therapy of iliotibial band tightness associated with lateral knee pain and

FM targeting both CC and center of fusion locations. Furthermore, research on dynamic balance would be more applicable and useful.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationship that could be constructed as a potential conflict of interest.

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ANNEXURE 1

CONSENT FORM

Study Title: Efficacy of Plyometric Training on Dynamic Leap Balance and Jump Performances in Recreational Players: A Single-group Experimental Study

Study Number:

Subject's Name:

Date of Birth / Age:

Address of the Subject:

Occupation:

(i) I confirm that I have read and understood the information sheet dated above study and have had the opportunity to ask questions.

(ii) I understand that my participation in the study is voluntary and that I am [] free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

(iii) I understand that the Sponsor of the clinical trial, others working on the [] Sponsor's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published.

(iv) I agree not to restrict the use of any data or results that arise from this [] study provided such use is only for scientific purpose

(v) I agree to take part in the above study

Signature of the Subject:

Signatory's Name:

Signature of the Investigator:

Date: Study Investigator's Name:

ANNEXURE 2

ETHICAL COMMITTEE CLEARANCE CERTIFICATE



ABSMARI ETHICS COMMITTEE

ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE,
BHUBANESWAR, ODISHA

Prof. (Dr.) E. Venkata Rao
Chairperson

Mr. Chinmaya Kumar Patra
Member Secretary

ABSMARI/IEC/2023/065

02/09/2023

Ref. No. _____

APPROVAL LETTER
APPENDIX- VIII

Date: _____

To,

Harshit Jain

ABSMARI
273, PAHAL, BHUBANEWAR-752101

MEMBERS

Dr. Smaraki Mohanty,
Clinician

Dr. Satyajit Mohanty,
Basic Medical Scientist

Dr. Ashok Singh Chouhan
Basic Medical Scientist

Mr. Shib Shankar Mohanty
Legal Expert

Ms. Annie Hans,
Social Scientist

Ms. Subhashree Samal,
Lay Person

Mr. Deepak Ku. Pradhan,
Scientific Member

IEC-SECRETARIAT

Mr. Gouranga Ku. Padhy
Mr. Susant Ku. Raychudamani

Protocol Title: Effectiveness of Fascial Manipulation Technique on Pain and Postural Control in Athletes with Iliotibial Band Tightness: A Randomized Controlled Trial

Protocol ID.: ABS-IEC-2023-PHY-030

Subject: Approval for the conduct of the above referenced study

Dear Mr./Ms./Dr **Harshit Jain**

With reference to your Submission letter dated 12/08/2023 the ABSMARI IEC has of the Ethics reviewed and discussed your application for conduct of clinical trial on dated 02/09/2023 (Sat Day).

The following documents were reviewed and discussed

S.N.	Documents	Document (Version/Date)
1	IEC Application Form	08-08-2023
2	Informed Consent Form	08-08-2023
3	Undertaking form PI	08-08-2023
4	CRF	08-08-2023
5	COI from the Investigators	08-08-2023

The following members were present at meeting held on 02-09-2023

S.N.	Name of the Member	Designation & Qualification	Representation as per NDCT 2019	Gender (M/F)	Affiliation with the Institution (Y/N)
1	Prof. Dr. E. Venkata Rao	Professor (MBBS, MD, Dept. of Community Med.) IMS & Sum Hospital, BBSR	Chair Person	M	N
2	Dr. Satyajit Mohanty	Director-Medicare Hospital, BBSR	Basic Medical Scientist	M	N
3	Dr. Ashok Singh Chouhan	PhD, Pharmacology, Assoc. Prof, Dept. of Pharmacology, Hi-Tech Medical College & Hospital, BBSR	Basic Medical Scientist	M	N



1

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ABSMARI ETHICS COMMITTEE

ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE,
BHUBANESWAR, ODISHA

Prof. (Dr.) E. Venkata Rao
Chairperson

Mr. Chinmaya Kumar Patra
Member Secretary

Ref. No. ABSMARI/IEC/2023/065

Date: 02/09/2023

MEMBERS

Dr. Smaraki Mohanty,
Clinician

Dr. Satyajit Mohanty,
Basic Medical Scientist

Dr. Ashok Singh Chouhan
Basic Medical Scientist

Mr. Shib Shankar Mohanty
Legal Expert

Ms. Annie Hans,
Social Scientist

Ms. Subhashree Samal,
Lay Person

Mr. Deepak Ku. Pradhan,
Scientific Member

IEC-SECRETARIAT

Mr. Gouranga Ku. Padhy
Mr. Susant Ku. Raychudamani

S.N.	Name of the Member	Designation & Qualification	Representation as per NDCT 2019	Gender (M/F)	Affiliation with the Institution (Y/N)
4	Dr. Smaraki Mohanty	Asst. Prof-IMS & Sum Hospital/MBBS, MD (Community Med)	Clinician	F	N
5	Mr. Chinmaya Kumar Patra	Principal-ABSMARI, MPT	Member Secretary	M	Y
6	Mr. Shiba Sankar Mohanty	Junior Counsel-Lt. Ramachandra Sarangi's Chamber / BA LLB	Legal Expert	M	N
7	Ms. Annie Hans	Disability Inclusive Development Co-Ordinator in Humanity and Inclusion (India/Nepal/Srilanka). /MA in Social Work	Social Scientist	F	N
8	Ms. Subhashree Samal	Ret. Reader-Pol Sc.	Lay Person	F	N
9	Mr. Deepak Kumar Pradhan	Asst. Prof-ABSMARI, MPT	Scientific Member	M	Y

This is to confirm that only members who are independent of the Investigator and the Sponsor of the trial have voted/ provided opinion on the trial.

This Committee approves the documents and the conduct for the trial in the presented form with necessary recommendation.

The ABSMARI IEC must be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and requests to be provided a copy of the final report.

The ABSMARI IEC follows procedures that are in compliance with the requirements of ICH (International Conference on Harmonization) guidance related to GCP (Good Clinical Practice) and applicable Indian regulations.



Yours sincerely,

Mr. Chinmaya Kumar Patra
Member Secretary

ABSMARI Ethics Committee
Pahal, Bhubaneswar

Member Secretary
ABSMARI ETHICS COMMITTEE

2

📍 **Utkal Signature, Plot No.-273,**
Ground Floor, Pahal, Bhubaneswar-752101

☎ **+91-63707-03654**

✉ **iec@absmari.com**

ANNEXURE 3

SUBJECT EVALUATION FORM AND DATA SHEET

Name:

Age:

Gender:

Occupation:

Height:

Weight:

History of injury:

Treatment Leg:

Study Group: Experimental/Control

NPRS SCORE:

Pre-Intervention	Post-Intervention

STATIC ProKin DATA:

	Pre-Intervention	Post-Intervention
Ellipse Area		
CoP-Y		
CoP-X		

MASTERCHART

Experimental Group

SR. NO.	AGE (yrs)	GENDER	WEIGHT(kg)	HEIGHT(cm)	BMI	TREATMENT LEG	PRE-NPRS(10)	PRE-FORCE PLATFORM DATA			POST-NPRS(10)	POST-FORCE PLATFORM DATA		
								ELLIPSE AREA (mm ²)	AVERAGE COP Y (mm)	AVERAGE COP X (mm)		ELLIPSE AREA (mm ²)	AVERAGE COP Y (mm)	AVERAGE COP X (mm)
1	26	Male	56	159	22.15	Right	7	230.48	67.63	12.75	5	198.5	43.2	7.53
2	20	Male	58	173	19.38	Right	6	333.35	14.16	-3.23	3	230.43	5.63	2.86
3	18	Male	57	168	20.20	Right	6	535.27	4.37	-13.56	2	325.94	3.25	-7.63
4	19	Male	52	164	19.33	Right	5	118.85	7.63	12.02	2	88.52	3.54	-0.17
5	19	Male	60	186	17.34	Left	5	759.14	-1.42	4.35	2	650.44	-10.75	0.92
6	21	Male	64	174	21.14	Right	6	509.26	12.97	-10.12	3	445.88	8.43	6.19
7	20	Male	66	163	24.84	Right	5	111.84	13.49	5.41	2	96.77	11.78	3.3
8	22	Male	62	170	21.45	Right	8	658.55	51.23	20.36	4	367.96	22.74	8.94
9	22	Male	62	178	19.57	Left	7	376.92	15.63	-2.54	2	198.54	10.34	-0.23
10	24	Male	72	178	22.72	Right	7	267.45	72.34	14.25	2	196.6	42.2	8.22
11	20	Male	65	171	22.23	Right	6	343.78	15.62	-2.43	2	204.33	4.23	1.34
12	22	Male	80	173	26.73	Right	5	293.49	46.32	-4.59	2	235.44	30.6	-1.32
13	24	Male	72	178	22.72	Left	6	350.88	23.37	4.4	3	157.66	10.41	0.12
14	23	Male	86	182	25.96	Right	7	360.66	31.22	-0.89	3	247.6	21.46	1.86
15	22	Male	74	171	25.31	Right	8	454.64	40.89	8.7	4	325.56	25.94	4.31
16	26	Male	71	174	23.45	Right	6	426.77	22.11	11.73	2	326.1	13.99	6.54
17	21	Male	67	165	24.61	Left	6	231.76	23.89	6.65	3	139.21	13.4	7.89
18	22	Male	82	170	28.37	Right	7	332.34	12.42	4.33	2	276.66	6.52	2.11
19	20	Male	60	174	19.82	Right	6	221.87	10.63	-5.8	3	152.39	5.42	-2.87
20	19	Male	50	166	18.14	Left	5	117.51	7.42	6.7	1	89.11	4.72	5.11
21	19	Male	64	171	21.89	Left	7	187.11	11.54	5.32	2	111.21	6.44	3.42
22	18	Male	67	170	23.18	Right	7	198.32	27.12	12.67	2	143.41	19.93	4.46

Control Group

	AGE (yrs)	GENDER	WEIGHT(kg)	HEIGHT(cm)	BMI	TREATMENT LEG	PRE-NPRS(10)	PRE-FORCE PLATFORM DATA			POST-NPRS(10)	POST-FORCE PLATFORM DATA		
								ELLIPSE AREA (mm ²)	AVERAGE COP Y (mm)	AVERAGE COP X (mm)		ELLIPSE AREA (mm ²)	AVERAGE COP Y (mm)	AVERAGE COP X (mm)
1	19	Male	58	167	20.80	Right	6	555.67	34.1	-12.78	5	525.9	30.27	-10.66
2	21	Male	60	170	20.76	Right	7	432.88	56.98	10.86	6	393.54	50.99	9.81
3	22	Male	61	172	20.62	Left	8	574.83	34.87	-8.96	6	523.28	28.47	-5.87
4	25	Male	63	174	20.81	Right	5	327.54	21.65	6.7	4	353.23	25.37	6.34
5	24	Male	57	160	22.27	Left	6	198.54	27.31	9.28	5	186.65	23.44	8.32
6	21	Male	56	162	21.34	Right	6	241.87	19.78	5.32	6	209.46	15.23	4.9
7	20	Male	64	179	19.97	Right	7	327.65	9.22	14.76	6	298.64	8.16	12.83
8	19	Male	55	165	20.20	Left	7	421.45	17.21	10.77	6	386.87	15.52	8.86
9	18	Male	59	168	20.90	Left	7	456.67	12.88	19.33	5	421.59	9.73	18.17
10	27	Male	67	178	21.15	Right	7	543.57	7.87	22.43	7	653.87	10.22	18.87
11	25	Male	64	173	21.38	Right	8	367.25	58.12	-7.87	7	445.76	64.1	-6.1
12	22	Male	68	181	20.76	Right	6	324.31	11.78	17.53	6	311.65	8.63	15.2
13	23	Male	62	170	21.45	Right	7	432.62	28.67	6.44	7	479.27	35.37	8.32
14	21	Male	59	161	22.76	Right	6	223.54	22.12	11.8	6	209.94	18.35	10.9
15	20	Male	57	160	22.27	Left	6	656.11	36.65	5.66	5	589.5	32.14	6.3
16	26	Male	62	166	22.50	Left	5	333.56	18.36	4.21	4	317.51	12.44	4.3
17	28	Male	70	177	22.34	Right	8	228.54	9.87	8.56	7	198.76	7.18	7.35
18	23	Male	63	175	20.57	Left	7	693.77	43.67	12.21	6	655.54	35.24	9.72
19	20	Male	61	168	21.61	Right	6	586.32	42.26	8.32	6	613.6	65.86	10.27
20	21	Male	54	157	21.91	Right	5	276.72	13.22	18.26	4	256.99	11.12	16.34
21	22	Male	67	169	23.46	Right	6	465.76	8.25	20.32	5	413.45	5.32	16.39
22	25	Male	70	175	22.86	Right	7	352.65	9.45	15.32	5	333.61	5.65	15.1