https://doi.org/ 10.33472/AFJBS.6.9.2024.1415-1428

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

MANUSCRIPT:

EFFECTIVENESS OF INSTRUMENTAL ASSISTED SOFT TISSUE MOBILIZATION IN FOOTBALL PLAYERS WITH HISTORY OF HAMSTRING STRAIN. AN EXPERIMENTAL STUDY.

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Article History
Volume 6,Issue 9, 2024
Received: 26-03-2024
Accepted : 28-04-2024
doi: 10.33472/AFJBS.6.9.2024.1415-1428

ABSTRACT:

OBJECTIVES: To find the effect of conventional treatment on hamstring's pressure pain threshold, USG, and strength in recreational football players with history of hamstring injury. To compare the efficacy of conventional therapy with and without IASTM in recreational football players with a history of hamstring injuries.

METHODS: A randomized control trial. includes two groups (A and B), with a total of 30 patients randomized into 15 in each group, with experimental group A (IASTM) and control group B (Nordic protocol). Knee Range, AKE, SLHB TEST, VAS, and TAMPA scales were used as outcome measures for pre and post therapy for two weeks, with six sessions provided.

RESULT: Data were input into Microsoft Excel, imported into Statistical Package for Social Sciences (SPSS) version 25, and analyzed with SPSS. The data was examined using descriptive and inferential statistics. Data are displayed as tables and graphs. Histograms and QQ plots were used to assess for normality in the data. The distribution is not normal, and the sample size for each group is fewer than 30. As a result, non-parametric tests were utilized. The data showed significant results for both the group(A&B) but Group A was highly significant than Group B.

CONCLUSION: Finally, both IASTM and stretching have significant use in rehabilitation and sports performance enhancement. Understanding each modality's specific benefits,
limitations, and appropriate uses is critical. Ultimately, the efficacy of treatment is determined by the individual's particular requirements, the practitioner's experience, and the incorporation of evidence-based methods into a holistic rehabilitation plan.In conclusion, IASTM combined with strengthening cryotherapy and warming outperforms stretching, strengthening, cryotherapy, and warmup alone.

KEYWORDS: IASTM, Hamstring strain, SLHB, Football players, AKE, Physiotherapy

INTRODUCTION

Hamstring strain injuries (HSIs), also known as "elongation contracture," "deep stretch," and, less commonly, "tear," are injuries to the hind segment of the thigh's muscles, which comprise the biceps femoris, semitendinosus, and semimembranosus, organized lateral to medial.[1,2]

These muscles are important in the gait cycle during walking and running because they pass through the hip and knee joints. These muscles, which inhibit knee extension during the heel strike, are hip extensors and knee flexors. The biceps femoris is the most commonly injured muscle during athletics, followed by the semimembranosus and semitendinosus.[1,2] In football, HSIs can occur during cutting or making sharp turns, as well as running at high speeds.

Muscle Imbalances: The biomechanics of the lower extremities can be changed by weakening or tightening other muscle groups, such as the quadriceps or hip flexors, which puts more strain on the hamstrings. Previous Injury: Due to the possibility of residual weakness, the creation of scar tissue, and changed movement patterns, those who have previously had hamstring strains are more likely to experience another incident.

Lack of Flexibility: Strain injuries are more likely to occur when the muscle-tendon unit is unable to extend and absorb stress due to a lack of flexibility in the hamstrings and surrounding muscles. Biomechanical Factors: Deviations in foot mechanics, pelvic alignment, or gait can all lead to abnormalities that exacerbate the load on the hamstring muscles when moving.

IASTM is a technique that involves using tools to remove scar tissue from soft tissues that have been wounded and promote the creation of new extracellular matrix proteins, such collagen, to aid in the healing process. This tool has been used more frequently recently in the domains of athlete training and sports rehabilitation. IASTM has been shown in a few experimental studies and case reports to considerably reduce pain and enhance soft tissue function and range of motion after sports injuries. It is believed that IASTM can assist in reducing the amount of time that athletes and regular people who have had sports injuries must recover from their injuries and return to competition. This is based on earlier research. However, the bulk of papers have been case reports, with very few experimental investigations looking into the mechanics and consequences of IASTM. Future well-designed human experimental research should establish the scientific foundation for the dependability of IASTM.[14]

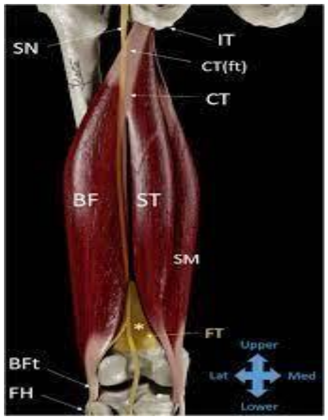


Fig 1: C.T. scan view of Hamstring muscle.

The figure 1 shows the C.T scan view of Hamstring muscle.

METHODOLOGY

The given study "A randomized control trial". includes two groups (A and B), with a total of 30 patients randomized into 15 in each group, with experimental group A (IASTM) and control group B (Nordic protocol). Knee Range, AKE, SLHB TEST, VAS, and TAMPA scales were used as outcome measures for pre and post therapy for two weeks, with six sessions provided.

The main purpose of this investigation is the research states that hamstring injuries are widespread among football players. Furthermore, studies show that the rate of re-injury is greater, which is mostly due to diminished flexibility, inadequate protocol, and warm-up sessions. IASTM has been proven to enhance flexibility, help in the organization of collagen alignment in soft tissue, and promote the formation of scar tissue. This can help to restore soft tissue alignment after injury. Various additional ways are utilized to treat hamstring strain, but it is important to understand which sort of treatment has the best results. There is a dearth of data supporting the use of IASTM in this situation, necessitating more investigation.

PROCEDURE

Subjects satisfying the inclusion and exclusion criteria was incorporated in the study. The aim of the study was be described and written permission was be obtained from the participants.

The patients were selected by simple random selection using a lottery approach and then divided into two groups: Group A (control group) and Group B (experimental group). Subjects having a history of hamstring strain were recruited for the research, with a one-month interval following injury. The advantages, dangers, and process of the research were then communicated to the volunteers in the best manner they could understand. The individuals were then evaluated for outcome measures using the VAS for pain, the AKE knee extension angle test for hamstring tightness, and the functional test SLHB [single leg hamstring bridge test] to determine the hamstring injury[10]. Two protocols were assigned to the experimental group and the control group. The treatment protocol was of 2 weeks with 3 session per week and the pre-assessment, immediate post- treatment assessment, and 2 week [15] post-treatment assessment

For group B the samples were told to do a warm up session for 5 min in which 5 mins of jogging was included. Then the treatment for the group B was done by using IASTM tool or blade which is given to the patient for 15 repetition for 15 minutes in prone position IASTM was given and while giving the treatment patient was also taken in functional SLR (straight leg raise) position. Afterwards the strengthening protocol which included the exercises specifically given for hamstrings strain and then in the last cryotherapy was given in the end of session for 5 minutes.

For Group A control group, the protocol for the session was of warm up, stretching, strengthening, cryotherapy which was same for both groups expect the stretching protocol which was not included in conventional group but only the SLR stretch.

The total time which was given to the rehabilitation was for 45 minutes.

The figure 2 shows the IASTM tool.

Fig.2 IASTM TOOL

PROTOCOL FOR GROUP A

WARM UP – slow jogging 5 mins

IASTM : Stretching in SLR position with IASTM (15 min)

STRENGTHENING PROTOCOL- (10 repetition with 5 sec hold.)

- hamstring isometric exercise
- forward backward and side stepping
- lumbopelvic isometric exercise such as prone bridging, side-bridging, supine knee bent bridging.

CRYOTHERAPY – 5 mins

PROTOCOL FOR (GROUP B)

WARM UP - slow jogging 5 mins

STRECHING - single leg hamstring stretching for 30 sec

straddle groin and hamstring stretching for 30 sec

Side-Straddle groin and hamstring stretching for 30 sec

Pelvic Tilt hamstring stretching for 30 sec

STRENGTHENING PROTOCOL- (10 repetition with 5 second)

hamstring isometric exercise

forward backward and side stepping

lumbopelvic isometric exercise such as prone bridging, side-bridging, supine knee bent bridging

CRYOTHERAPY – 5mins

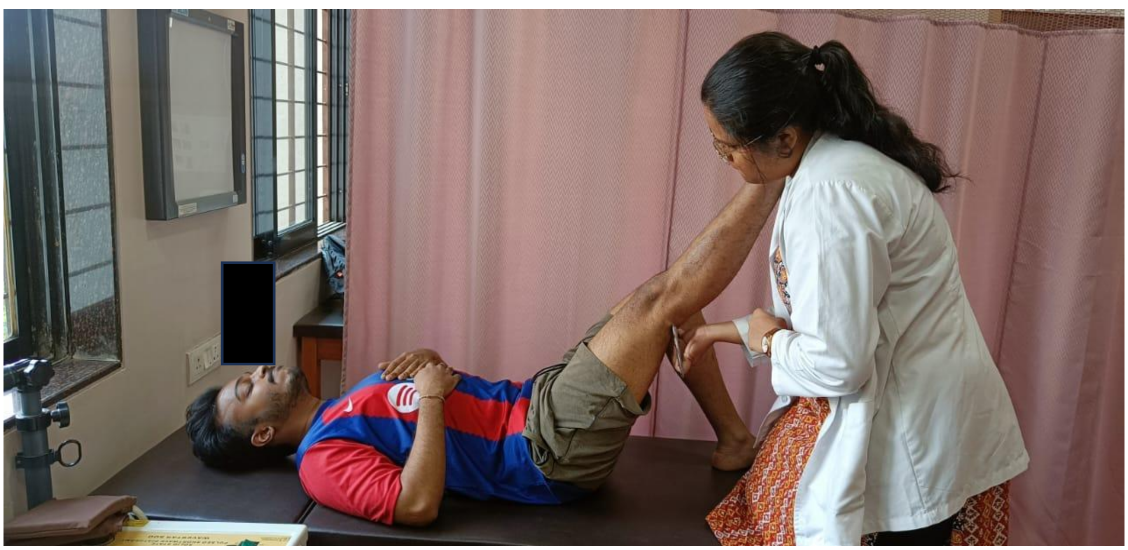


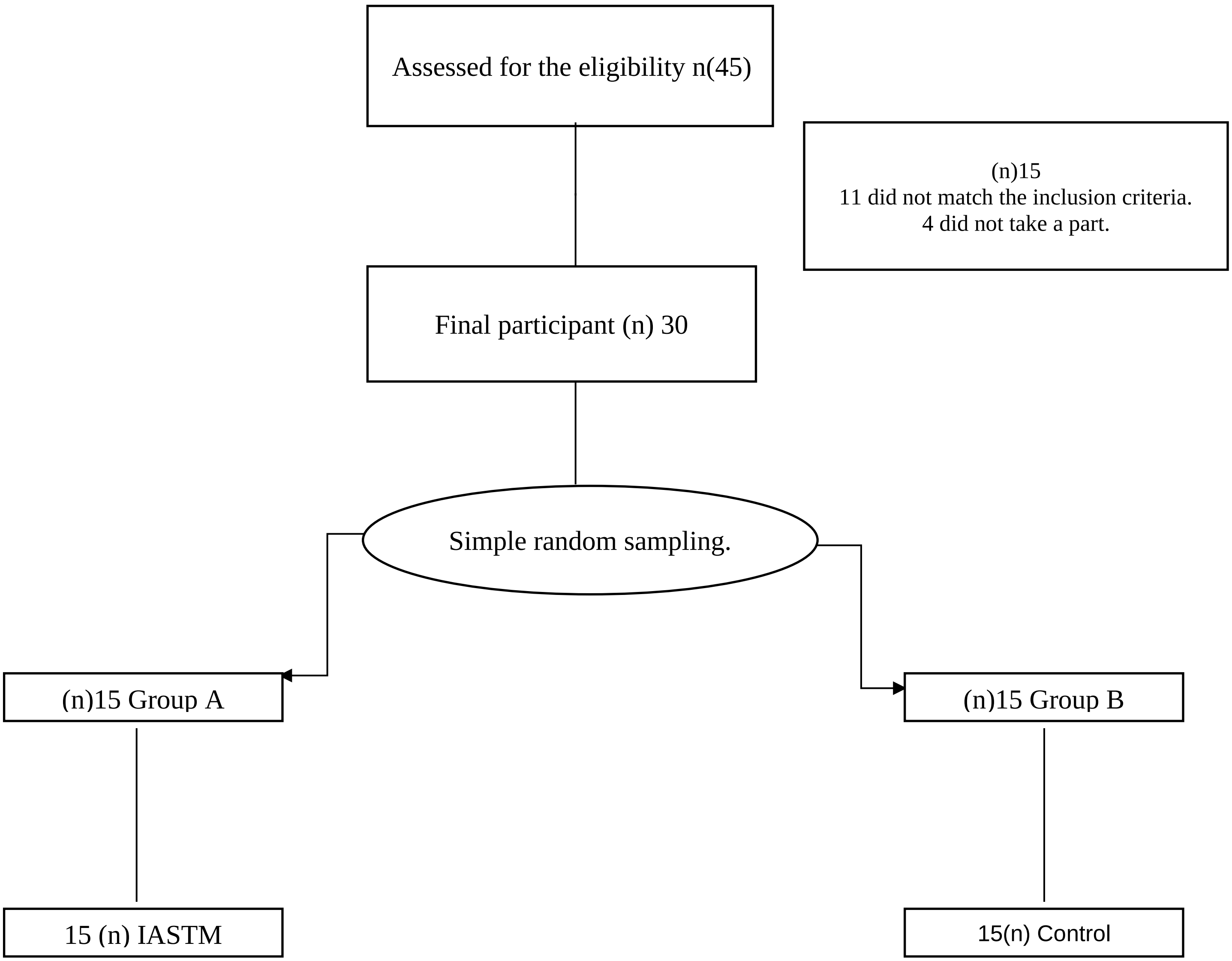
Fig.3 IASTM IN SLR POSTION

The Figure 3 shows the IASTM in SLR position.

Fig.4. IASTM in prone position

The Figure 4 shows the IASTM in prone position

Figure 5: Assessed for Eligibility



The Figure 5 represents Assessed for Eligibility

RESULT:

Age	Group A	Group B
Mean+/-SD	20.13+/-2.47	21.73+/-2.46

Table.1

The mean age of the population was 20.13+/-2.47 years in group A and 21.73+/-2.46 years in group B.

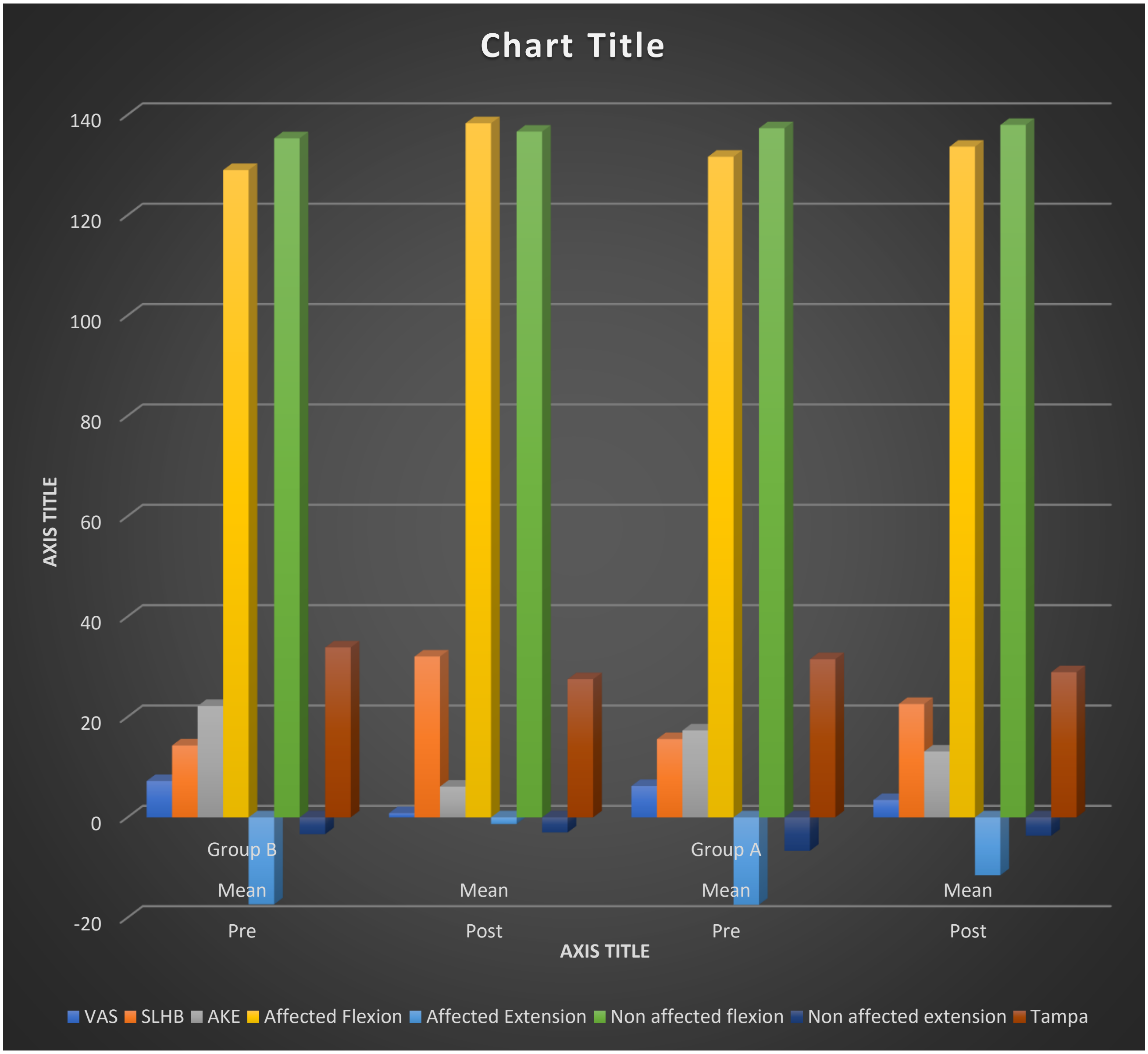
Wilcoxon signed rank test

	Pre			Post			P value	z
	Mean+/-SD	Standard error	Median	Mean+/-SD	Standard error	Median		
	Group A							
VAS	6.24+/-2.03	0.52	5.5	3.46+/-1.14	0.29	3.9	0.001*	-3.411
SLHB	15.6+/-2.89	0.74	16	22.6+/-2.72	0.7	22	0.001*	-3.413
AKE	17.33+/-3.06	0.79	15	13.13+/-2.26	0.58	14	0.001*	-3.329
Affected Flexion	131.66+/-4.49	1.16	130	133.66+/-3.51	0.9	135	0.014*	-2.449
Affected Extension	-17.4+/-2.52	0.65	-16	-11.53+/-3.52	0.9	-10	0.001*	-3.235
Non affected flexion	137.33+/-2.58	0.66	135	138+/-2.53	0.65	140	0.157	-1.414
Non affected extension	-6.66+/-4.87	1.25	-5.0	-3.66+/-3.51	0.9	-5	0.039*	-2.060
Tampa	31.53+/-2.87	0.74	32	28.93+/-2.43	0.62	28	0.015*	-2.439
	Group B							
VAS	7.24+/-1.23	0.31	7	0.84+/-0.8	0.2	1	0.001*	-3.413
SLHB	14.33+/-2.74	0.7	14	32.06+/-3.93	1.01	30	0.001*	-3.411
AKE	22.2+/-4.41	1.13	20	6.13+/-3.04	0.78	5	0.001*	-3.429

Affected Flexion	129+/-3.87	1	130	138.33+/-2.43	0.62	140	0.001*	-3.373
Affected Extension	-17.33+/-2.58	0.66	-15	-1.33+/-3.99	1.03	0.0	<0.0001*	-3.497
Non affected flexion	135.33+/-3.51	0.9	135	136.66+/-3.61	0.93	135	0.102	-1.633
Non affected extension	-3.33+/-4.08	1.05	0	-3+/-3.68	0.95	0	0.317	-1.00
Tampa	33.86+/-2.89	0.74	34	27.53+/-1.12	0.29	27	0.001*	-3.431

Table .2

*p value<0.05 significant.



Graph1.1: shows the comparison of Mean in between group A and B for VAS, SLHB, AKE, Affected knee flexion and extension Non Affected knee flexion and extension and Tampa scale

The above graph 1.1 shows the comparison of Mean in between group A and B for VAS, SLHB, AKE, Affected knee flexion and extension Non Affected knee flexion and extension and Tampa scale. Data were input into Microsoft Excel, imported into Statistical Package for Social Sciences (SPSS) version 25, and analyzed with SPSS. The data was examined using descriptive and inferential statistics. Data are displayed as tables and graphs. Histograms and QQ plots were used to assess for normality in the data. The distribution is not normal, and the sample size for each group is fewer than 30. As a result, non-parametric tests were utilized. The data showed significant results for both the group(A&B) but Group A was highly significant than Group B.

DICUSSION

Running, leaping, and kicking are just a few of the sports movements that require the hamstrings. The majority of sport-related activities depend on the function of the hamstrings, especially when quick running is necessary. 15 Hamstring injuries account for 10% of all injuries in field-based team sports, with 13% of players suffering hamstring injuries over a 9-month period, the majority of which occurred during matches. More work is needed to lower the number of hamstring injuries in field-based team sports. Football players, particularly recreational players, are more susceptible to get hamstring strains because they do not warm up correctly and have weak muscles. As a consequence, the population of these players was determined.

The relationship between the biceps femoris and hamstring strains is significant, as the biceps femoris is one of the three muscles that make up the hamstring group, along with the semitendinosus and semimembranosus. Understanding this relationship is crucial in the context of injury prevention, rehabilitation, and performance optimization in activities such as sports and exercise. Biceps Femoris: The biceps femoris is a two-headed muscle located on the back of the thigh. It originates from two points on the pelvis (the ischial tuberosity and the Linea aspera of the femur) and inserts on the fibula and tibia. Hamstring Group: The hamstring group comprises three muscles: the biceps femoris, semitendinosus, and semimembranosus. These muscles work together to flex the knee and extend the hip. Function: Knee Flexion: the primary function of the biceps femoris, along with the other hamstring muscles, is to flex the knee. This action is crucial in activities such as walking, running, and jumping. Extension: Additionally, the biceps femoris contributes to hip extension, which is important for movements such as sprinting and hip hinge exercises. Injury: Strains:

Mechanism: Hamstring strains typically occur when the muscle is forcibly stretched beyond its limits or subjected to excessive eccentric loading (lengthening under tension). This can happen during activities such as sprinting, kicking, or sudden changes in direction. Risk Factors: Factors such as inadequate warm-up, muscle imbalances, poor flexibility, fatigue, and previous injury can increase the risk of hamstring strains, including those involving the biceps femoris.

The relationship between the biceps femoris and hamstring strains underscores the importance of understanding the anatomy, function, and mechanics of the hamstring muscles in injury prevention and rehabilitation. By addressing risk factors, implementing appropriate training strategies, and providing targeted interventions, individuals can reduce the likelihood of hamstring strains and optimize performance in various activities.

According to current studies, IASTM is beneficial at reducing discomfort and improving range of motion, as well as increasing muscular strength. IASTM enables deeper penetration and more focused therapy, and its usage is thought to provide the therapist a mechanical advantage and reduce the strain on their hands. It is predicted that employing instruments for soft tissue mobilization will increase the patient's and clinician's sense of vibration. The increased vibration perception may assist the patient become more aware of the changing feelings in the treated tissues and help the doctor uncover altered tissue properties, such as tissue adhesions.[16]

Many studies claim that IASTM increases muscle strength, but there is little evidence to support this claim, and no research has been done on hamstring strains. Cheatham SW[Author] et al.'s systematic review presents one case study on calf strains where effective increases in muscle strength were observed, as well as an in vitro study that shows improved muscle strength following the use of IASTM's Garston technique.[13]
The reason for doing this particular study on a male group was the sample size available and the frequency of gender bias differences.[17] Football players are more likely to get hamstring strains, thus the category was created appropriately. We utilized the IASTM to determine the success of hamstring muscle recovery since it performs well in cases of sport-specific injuries.[13]
The debate between Instrument-Assisted Soft Tissue Mobilization (IASTM) and stretching is an interesting one, as both techniques have their merits and are often used in rehabilitation and sports medicine settings. IASTM involves using instruments to precisely target and break down scar tissue, adhesions, and fascial restrictions. This targeted approach can be highly effective in addressing specific areas of dysfunction or injury. Immediate Results: Some practitioners and patients report immediate improvements in range of motion, pain reduction, and function following IASTM treatment sessions. Stretching aims to improve flexibility and range of motion by elongating muscles and connective tissues throughout the body. It can be effective in addressing overall tightness and improving muscle length. Regular stretching over time can lead to lasting improvements in flexibility and joint mobility, which can reduce the risk of injury and enhance athletic performance.
Professional Guidance IASTM should ideally be performed by trained professionals to ensure proper technique and safety. When performed incorrectly or with excessive force, it can potentially cause bruising, discomfort, or further tissue damage. Stretching: Risk of Overstretching: Stretching too aggressively or beyond one's current range of motion can lead to muscle strains, ligament sprains, or joint instability. It's important to stretch within one's limits and avoid bouncing or jerking movements. Individual Variability: Not all stretches are suitable for everyone, and some individuals may have specific limitations or conditions that require modifications or alternative technique, Combination Approach: Complementary Modalities: In many cases, IASTM and stretching can be used synergistically to enhance treatment outcomes. For example, a session may begin with IASTM to address specific adhesions or restrictions, followed by stretching to further improve flexibility and restore optimal movement patterns. Individualized Care: The choice between IASTM and stretching, or the integration of both, should be based on the individual's condition, goals, preferences, and response to treatment. A personalized approach ensures the best possible outcomes and minimizes the risk of complications.
The Nordics protocol (Warp UP, stretching, strengthening, and cryotherapy) was utilized for hamstring strain in Group A, the control group, and IASTM for Group B, the conventional group (Warp UP, IASTM with SLR position, strengthening, and cryotherapy). According to Table 1, the population's mean age was 21.73+/-2.46 years in group B and 20.13+/-2.47 years in group A. Table 2 presents the results of the statistical analysis for Group A, including the VAS, AKE, SLHB, and ROM (knee flexion and extension), where the data was significant (*p value<0.05). The Wilcoxon

signed rank test was performed to compare the groups within the group. The mean, standard deviation, standard error, p value, and z value for each parameter are provided in the above table.

Conclusion

In conclusion, both IASTM and stretching have their place in rehabilitation and sports performance enhancement. Ultimately, the effectiveness of treatment depends on factors such as the individual's specific needs, the expertise of the practitioner, and the integration of evidence-based practices into a comprehensive rehabilitation plan. [18] By combining IASTM, stretching, and other therapeutic interventions as needed, practitioners can optimize outcomes and support their clients' journey toward improved mobility, function, and overall well-being.

In the final statement after comparing the treatments we can say that IASTM with strengthening cryotherapy and warmup shows better results than only stretching, strengthening, cryotherapy and warmup.

LIMITATION:

- There was no long-term follow-up.
- Only adults subjects were taken into the study other age groups were not taken under consideration.

FUTURE SCOPE:

- Ultrasonography can be done for knowing the muscle strength and fascia integrity.
- EMG Study can be done for future scope to assess the muscle activity and its MUP for

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