(ISSN: 0973-7049(P))

The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES 21(3): S.I (3), 851-864, 2026 www.thebioscan.com

EFFECTIVENESS OF SUB-OCCIPITAL MUSCLE INHIBITION TECHNIQUE AND MUSCLE ENERGY TECHNIQUE ON HAMSTRING TIGHTNESS IN YOUNG VOLLEYBALL PLAYERS

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DOI: https://doi.org/10.63001/tbs.2026.v21.i03.S.I(3).pp851-864

KEYWORDS

Hamstring Tightness, Volleyball Players, Sub-occipital Muscle Inhibition Technique, Muscle Energy Technique, Active Knee Extension Test, Finger Floor Distance Test, Flexibility.

Article Info

Received:22-06-2026

Accepted:05-07-2026

Published:15-07-2026

Abstract

Background: Hamstring tightness is a common musculoskeletal problem among volleyball players and may adversely affect athletic performance while increasing the risk of injury. Sub-occipital Muscle Inhibition Technique (SMIT) and Muscle Energy Technique (MET) are commonly used physiotherapy interventions for improving hamstring flexibility; however, evidence comparing their effectiveness in young volleyball players is limited.

Objective: To compare the effectiveness of Sub-occipital Muscle Inhibition Technique and Muscle Energy Technique on hamstring tightness in young volleyball players.

Methods: A randomized controlled trial was conducted among 60 volleyball players aged 15–25 years with hamstring tightness. Participants were randomly allocated into two groups (n=30 each). Group A received Sub-occipital Muscle Inhibition Technique, while Group B received Muscle Energy Technique. Interventions were administered five sessions per week for four weeks. Hamstring flexibility was assessed using the Active Knee Extension Test (AKE) and Finger Floor Distance Test (FFD). Data were analyzed using paired and independent t-tests, with the level of significance set at $p<0.05$.

Results: Group A demonstrated significant improvement in AKE Right from 31.1±2.7 to 27.1±2.6, AKE Left from 30.2±4.8 to 24.5±5.0, and FFD from 7.8±2.01 cm to 4.8±1.9 cm. Group B showed significant improvement in AKE Right from 31.0±2.7 to 27.5±2.9 and FFD from 7.7±2.0 cm to 5.4±2.3 cm. Within-group analysis revealed highly significant improvements in both groups ($p<0.001$). Group A demonstrated greater overall improvement in flexibility outcomes compared to Group B.

Conclusion: Both Sub-occipital Muscle Inhibition Technique and Muscle Energy Technique were effective in improving hamstring flexibility among young volleyball players. However, Sub-occipital Muscle Inhibition Technique demonstrated superior improvement and may be considered a valuable intervention for the management of hamstring tightness in this population.

(ISSN: 0973-7049(P))

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Introduction

Volleyball is a physically demanding sport that requires strength, speed, agility, flexibility, balance, and coordination. During training and competition, players frequently perform activities such as jumping, landing, sprinting, blocking, and spiking. These repetitive movements place considerable stress on the muscles and joints of the lower limbs. As a result, volleyball players are prone to developing various musculoskeletal problems, among which hamstring tightness is commonly observed.

The hamstring muscle group consists of the biceps femoris, semitendinosus, and semimembranosus muscles. These muscles cross both the hip and knee joints and play an important role in activities such as running, jumping, and maintaining pelvic stability. Because of their continuous involvement during sports activities, the hamstrings are susceptible to fatigue, overuse, and shortening over time.

Hamstring tightness is defined as a decrease in the flexibility or extensibility of the hamstring muscles. It is commonly seen in athletes due to repetitive training, inadequate stretching, muscle fatigue, and insufficient recovery. In volleyball players, repeated jumping and landing place additional stress on the hamstrings, which may contribute to the development of tightness. Reduced hamstring flexibility can affect athletic performance by limiting movement efficiency, decreasing agility, and increasing the risk of muscle strain injuries.

Apart from affecting performance, hamstring tightness may also influence normal posture and movement patterns. Reduced flexibility of the hamstrings can alter pelvic position and lumbopelvic rhythm, increasing stress on the lower back, hips, and knees. Persistent tightness may therefore contribute to discomfort, reduced functional performance, and a greater risk of musculoskeletal injuries.

Various treatment approaches have been used to improve hamstring flexibility, including stretching exercises, proprioceptive neuromuscular facilitation techniques, strengthening exercises, and manual therapy interventions. In recent years, there has been increasing interest in treatment methods that target not only the local muscle but also the fascial and neuromuscular systems involved in movement and flexibility.

Sub-Occipital Muscle Inhibition Technique (SMIT) is a manual therapy technique applied to the muscles located at the base of the skull. The technique is based on the concept of the Superficial Back Line, which describes a continuous fascial connection extending from the plantar surface of the foot to the sub-occipital region. Gentle sustained pressure applied to the sub-occipital muscles is believed to reduce tension throughout the posterior fascial chain, thereby improving hamstring flexibility.

Muscle Energy Technique (MET) is another commonly used manual therapy intervention for improving muscle flexibility. In this technique, the patient performs a gentle isometric contraction against therapist resistance, followed by relaxation and stretching. MET works through mechanisms such as post-isometric relaxation and neuromuscular inhibition, which help reduce muscle tightness and improve extensibility.

Both SMIT and MET have shown positive effects on hamstring flexibility in previous studies. However, limited research is available comparing the effectiveness of these techniques specifically in young volleyball players. Since hamstring tightness is common in this population and may negatively affect performance and increase injury risk, it is important to identify the most effective treatment approach. Therefore, the present study was undertaken to compare the effectiveness of Sub-Occipital Muscle Inhibition Technique and Muscle Energy Technique on hamstring tightness among young volleyball players.

MATERIALS AND METHODS

Study Design

A randomized controlled trial was conducted to compare the effectiveness of Sub-occipital Muscle Inhibition Technique (SMIT) and Muscle Energy Technique (MET) on hamstring tightness among young volleyball players.

Study Setting

The study was conducted in the Outpatient Department of Physiotherapy, Pacific Medical College and Hospital, Udaipur, Rajasthan, India.

Study Population

The study population consisted of male and female volleyball players aged 15–25 years who demonstrated hamstring tightness and fulfilled the inclusion criteria.

Sample Size

A total of 60 participants were recruited and randomly allocated into two groups of 30 participants each.

Group A (n=30): Sub-occipital Muscle Inhibition Technique (SMIT)

Group B (n=30): Muscle Energy Technique (MET)

Sampling Technique

Participants were selected using simple random sampling and allocated into two groups using the lottery method.

INCLUSION CRITERIA

1. Volleyball players aged 15–25 years.
2. Minimum 6 months of regular volleyball training.
3. Presence of hamstring tightness (<70° on Active Knee Extension Test).
4. Willingness to participate in the study.

EXCLUSION CRITERIA

1. Recent lower limb injury within the previous three months.
2. History of spinal pathology or spinal surgery.
3. Neurological disorders affecting lower limb function.
4. Musculoskeletal disorders affecting the lower extremities.
5. Participation in any other clinical trial during the study period.

OUTCOME MEASURES

Primary Outcome Measure

Active Knee Extension Test (AKE)

The Active Knee Extension Test was used to assess hamstring flexibility. Participants were positioned in supine lying with the hip flexed to 90°. A universal goniometer was used to measure the angle of knee extension. Lower values indicated greater hamstring tightness, whereas higher values represented improved flexibility.

Secondary Outcome Measure

Finger Floor Distance Test (FFD)

The Finger Floor Distance Test was used to assess functional flexibility of the posterior chain. Participants were instructed to bend forward with knees fully extended, and the distance between the fingertips and floor was measured in centimeters. Lower values indicated improved flexibility.

INTERVENTION PROTOCOL

Group A: Sub-occipital Muscle Inhibition Technique (SMIT)

Participants were positioned comfortably in supine lying. The therapist applied gentle sustained pressure beneath the sub-occipital muscles using the finger pads. The pressure was maintained until tissue relaxation was perceived. The intervention was applied for approximately 2–3 minutes per session.

Group B: Muscle Energy Technique (MET)

Participants were positioned in supine lying. The

(ISSN: 0973-7049(P))
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hamstring muscle was passively stretched to the initial barrier. Participants then performed an isometric contraction against therapist resistance at approximately 20–30% of maximum effort for 5–10 seconds, followed by relaxation and further stretching. The procedure was repeated 3–5 times during each session.

Treatment Duration

Both groups received treatment five sessions per week for four weeks.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were used to summarize demographic characteristics. Paired t-tests were used to compare pre- and post-intervention values within each group, while independent t-tests were used to compare outcomes between groups. Statistical significance was set at $p<0.05$.

RESULTS

Table 1 Distribution of Age Group A

Age	Number of Patients	Percentage
15-20	17	56.6%
20-25	11	36.6%
25-30	2	6.66%
Total	30	100%

Most patients are concentrated in the 15–20 age group (56.6%), with a decreasing proportion observed as age increases.

Diagram 1 Showing The Bar Diagram Distribution of Age Group A

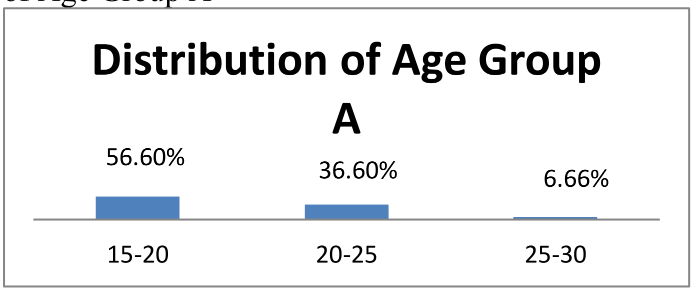

Table 2 Distribution of Gender

Gender	Number of Patients	Percentage
Male	23	76.6%
Female	7	23.4%
Total	30	100%

The majority of patients are male (76.6%), indicating a significantly higher representation compared to females (23.4%).

Diagram 2 Showing The pie Diagram Distribution of Gender

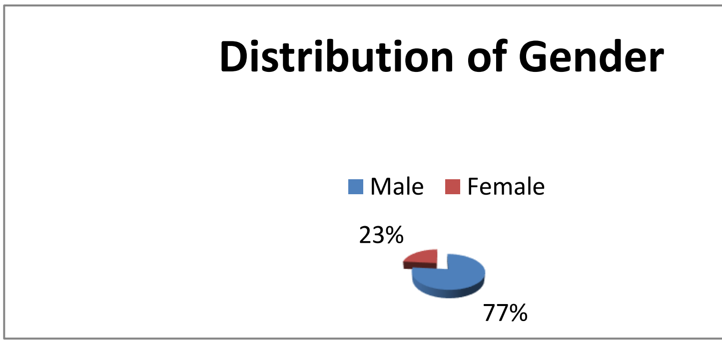

Table 3 Distribution of Area

Area	Number of Patients	Percentage
Urban	19	63.3%
Rural	11	36.6%
Total	30	100%

The majority of patients are from urban areas (63.3%), indicating higher representation compared to rural areas (36.6%).

Diagram 3 Showing The Pie Diagram Distribution of Area

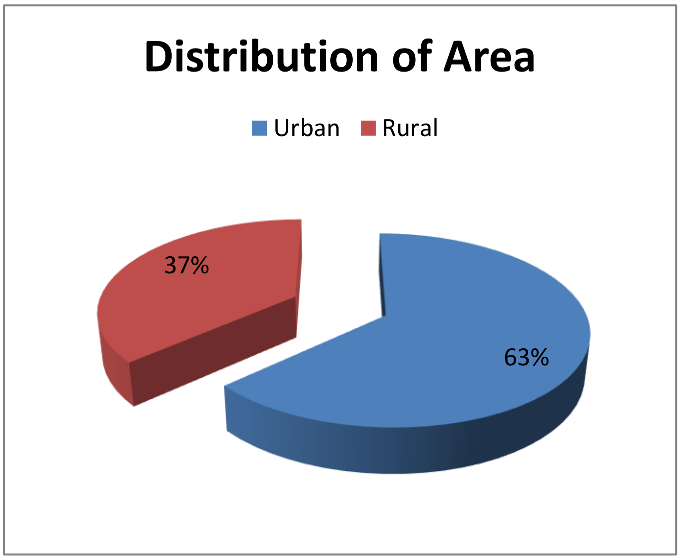

Table 4 Distribution of AKE Right

AKE Right	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre AKE Right	31.1 ±2.7	9	36	27
Post AKE Right	27.1 ± 2.6	9	31	22

The mean AKE Right decreased from 31.1 ± 2.7 (pre) to 27.1 ± 2.6 (post), indicating an overall reduction after the intervention.

Diagram 4 Showing The Bar Diagram Distribution of AKE Right

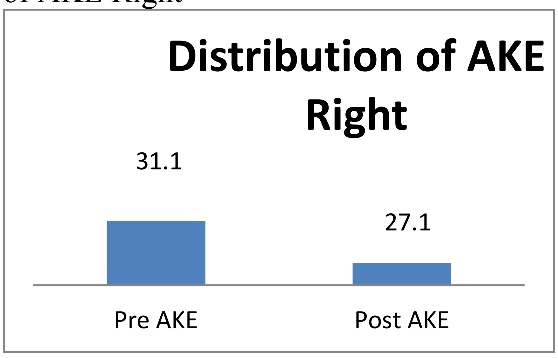

Table 5 Distribution of AKE Left

AKE Left	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre AKE Left	30.2 ± 4.8	9	36	27
Post AKE Left	24.5 ± 5.0	9	31	22

The mean AKE Left decreased from 30.2 ± 4.8 (pre) to 24.5 ± 5.0 (post), indicating an overall reduction after the intervention.

Diagram 5 Showing The Bar Diagram Distribution of AKE Left

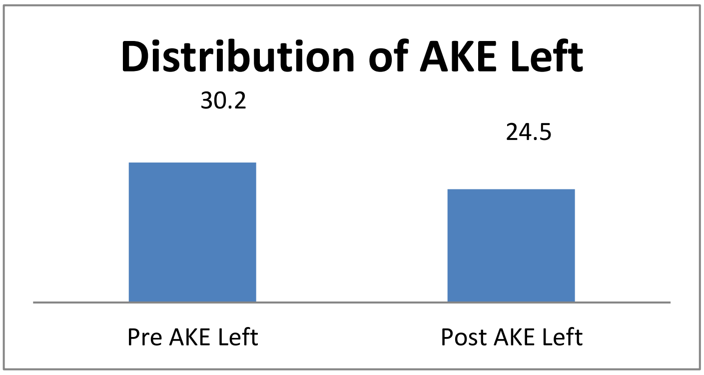

Table 6 Distribution of FFD

FFD	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre FFD	7.8 ± 2.01	7	12	5
Post FFD	4.8 ± 1.9	8	10	2

The mean FFD decreased from 7.8 ± 2.01 (pre) to 4.8 ± 1.9 (post), indicating an overall improvement after the intervention.

Diagram 6 Showing The Bar Diagram Distribution of FFd

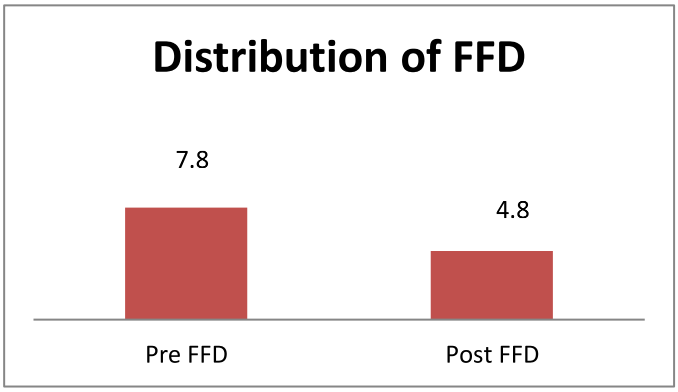

Table 7 Distribution of Age Group B

Age	Number of Patients	Percentage
15-20	16	53.3%
20-25	12	40%
25-30	2	6.66%
Total	30	100%

Most patients are in the 15–20 age group (53.3%), with a decreasing proportion in higher age groups.

Diagram 7 Showing The Bar Diagram Distribution of Age Group B

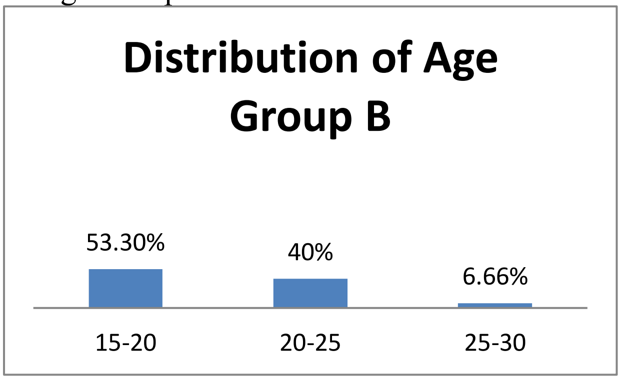

Table 8 Distribution of Gender

Gender	Number of Patients	Percentage
Male	19	63.3%
Female	11	36.6%
Total	30	100%

The majority of patients are male (63.3%), indicating higher representation compared to females (36.6%).

Diagram 8 Showing The Pie Diagram Distribution of Gender

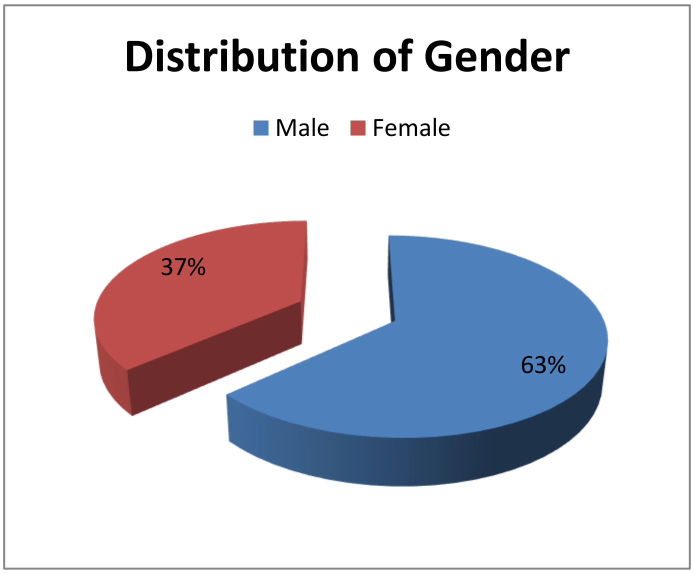

Table 9 Distribution of Area

Area	Number of Patients	Percentage
Urban	17	56.6%
Rural	13	43.3%
Total	30	100%

A higher proportion of patients are from urban areas (56.6%) compared to rural areas (43.3%).

Diagram 9 Showing The Pie Diagram Distribution of Area

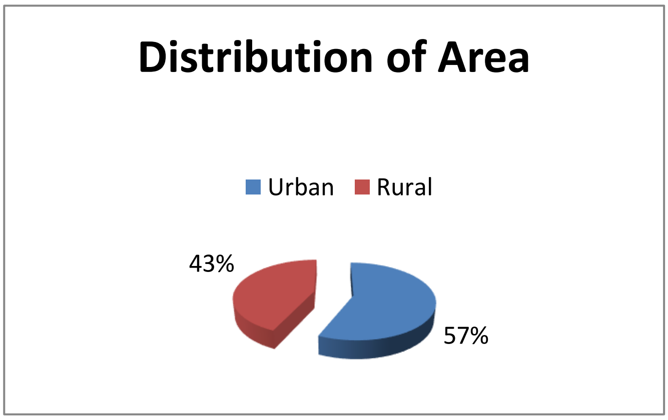

Table 10 Distribution of AKE Right

AKE Right	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre AKE Right	31.0 ±2.7	9	36	27
Post	27.5 ±	10	33	22

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AKE Right	2.9			

The mean AKE Right decreased from 31.0 ± 2.7 (pre) to 27.5 ± 2.9 (post), indicating an overall reduction following the intervention.

Diagram 10 Showing The Bar Diagram Distribution of AKE Right

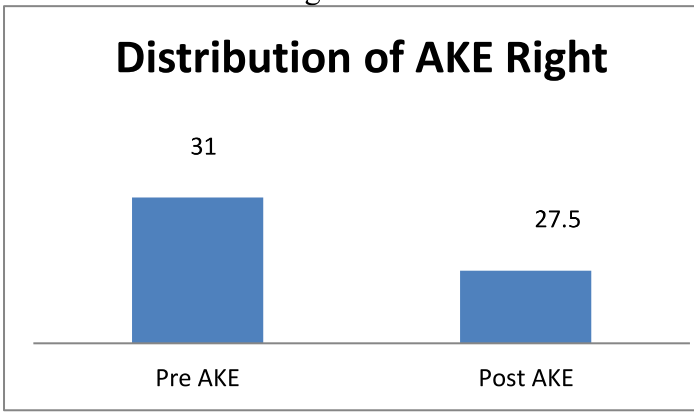

Table 11 Distribution of AKE Left

AKE Left	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre AKE Left	30.2 ± 4.2	9	36	27
Post AKE Left	30.3 ± 5.0	10	33	22

The mean AKE Left decreased from 30.2 ± 4.2 (pre) to 30.3 ± 5.0 (post), indicating an overall reduction following the intervention.

Diagram 11 Showing The Bar Diagram Distribution of AKE Left

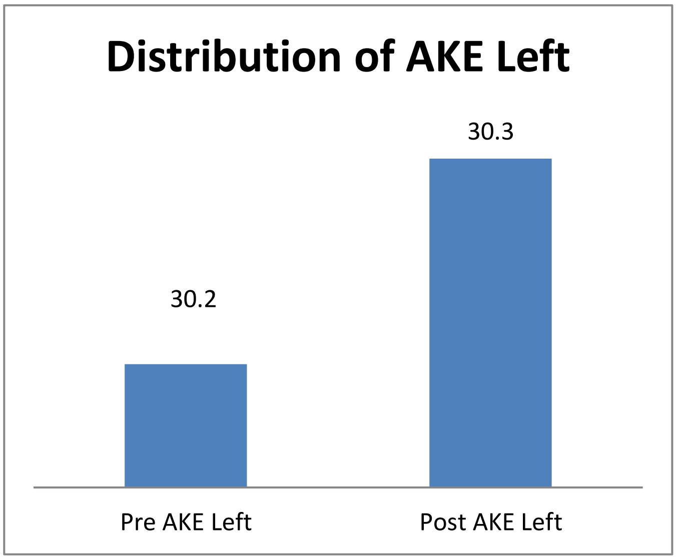

Table 12 Distribution of FFD

FFD	Mean ± SD (n=30)	Range	Maximum	Minimum
Pre FFD	7.7 ± 2.0	7	12	5
Post FFD	5.4 ± 2.3	9	10	1

The mean FFD decreased from 7.7 ± 2.0 (pre) to 5.4 ± 2.3 (post), indicating overall improvement after the intervention.

Diagram 12 Showing The Bar Diagram Distribution of FFd

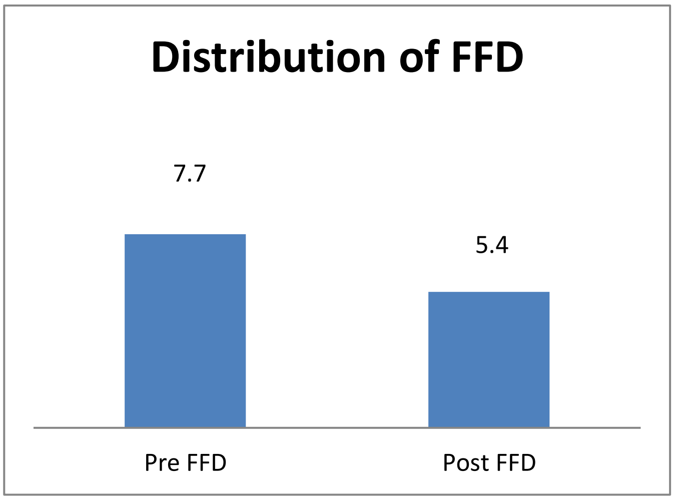

Table 13 Comparison of Age-wise Distribution between Group A and Group B

Ag	Group A	Group B (n=30)	Statistic

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e	(n=30)				al Test Value
	Number of Patients	Percentage	Number of Patients	Percentage	X2 = 0.07 P = 0.9 P<0.01(NS)
15-20	17	56.6%	16	53.3%	
20-25	11	36.6%	12	40%	
25-30	2	6.66%	2	6.66%	
Total	30	100%	30	100%	

There was no statistically significant difference in age-wise distribution between Group A and Group B ($\chi^2 = 0.07$, p = 0.9).

Diagram 13 Showing The Multiple Bar Diagram Distribution of between Group A and Group B

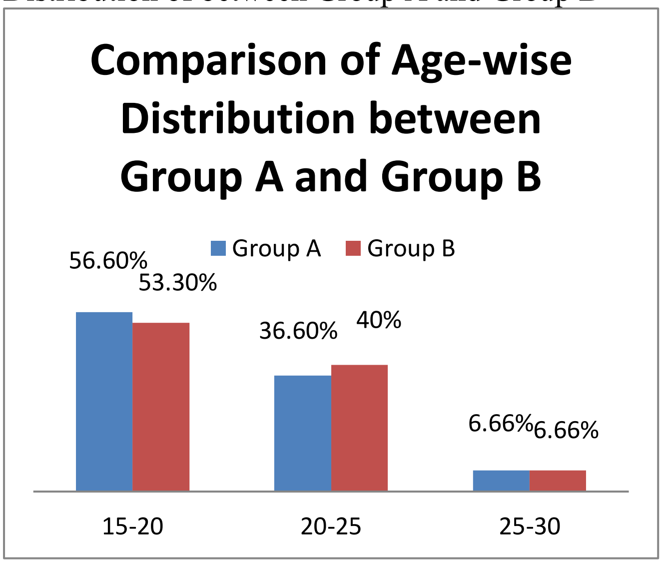

Table 14 Gender-wise Distribution of Patients in Group A and Group B

Gender	Group A		Group B		Statistical test value
	Number of Patients	Percentage	Number of Patients	Percentage	X2 = 1.2 P = 0.2 P<0.01(NS)
Male	23	76.6%	19	63.3%	
Female	7	23.4%	11	36.6%	
Total	30	100%	30	100%	

There was no statistically significant difference in gender distribution between Group A and Group B ($\chi^2 = 1.2$, p = 0.2).

Diagram 14 Showing The Multiple Bar Diagram Distribution of between Group A and Group B

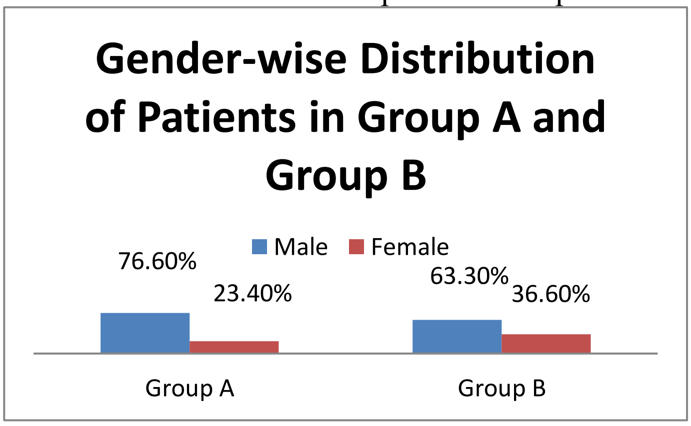

Table 15 Area-wise Distribution of Patients in Group A and Group B

Area	Group A		Group B		Statistical test value
	Number of Patients	Percentage	Number of Patients	Percentage	X2 = 0.2 P = 0.5 P<0.01(NS)
urban	19	63.3%	17	56.6%	
Rural	11	36.6%	13	43.3%	
Total	30	100%	30	100%	

There was no statistically significant difference in area-wise distribution between Group A and Group B ($\chi^2 = 0.2$, p = 0.5).

Diagram 15 Showing The Multiple Bar Diagram Distribution of between Group A and Group

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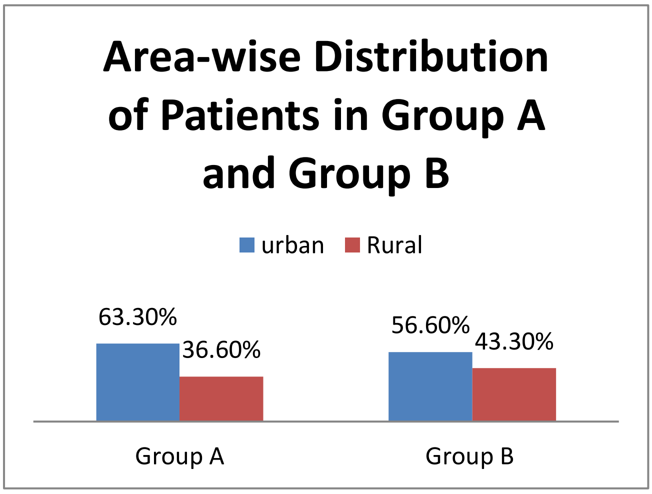

Table 16 Distribution of AKE Right in Group A and Group B pre and post Intervention

AKE Right	Group A	Group B
	Mean ± SD(n=30)	Mean ± SD(n=30)
Pre AKE Right	31.1 ±2.7	31.0 ±2.7
Post AKE Right	27.1 ± 2.6	27.5 ± 2.9

Both Group A and Group B showed a similar reduction in AKE from pre to post intervention, with no marked difference between groups.

Diagram 16 Showing the Multiple Bar Diagram Distribution of between Group A and Group B

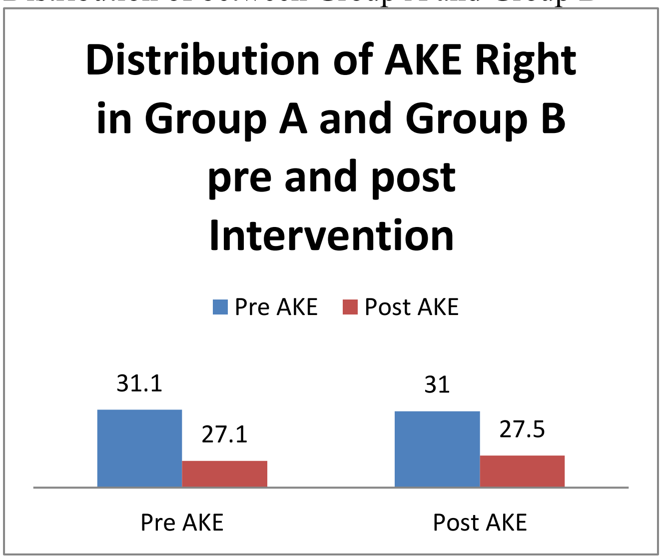

Table 17 Distribution of AKE left in Group A and Group B pre and post Intervention

AKE Left	Group A	Group B
	Mean ± SD(n=30)	Mean ± SD(n=30)
Pre AKE Left	30.2 ± 4.8	30.2 ± 4.8
Post AKE Left	24.5 ± 5.0	30.3 ± 5.0

Both Group A and Group B showed a similar reduction in AKE Left from pre to post intervention, with no marked difference between groups.

Diagram 17 Showing the Multiple Bar Diagram Distribution of between Group A and Group B

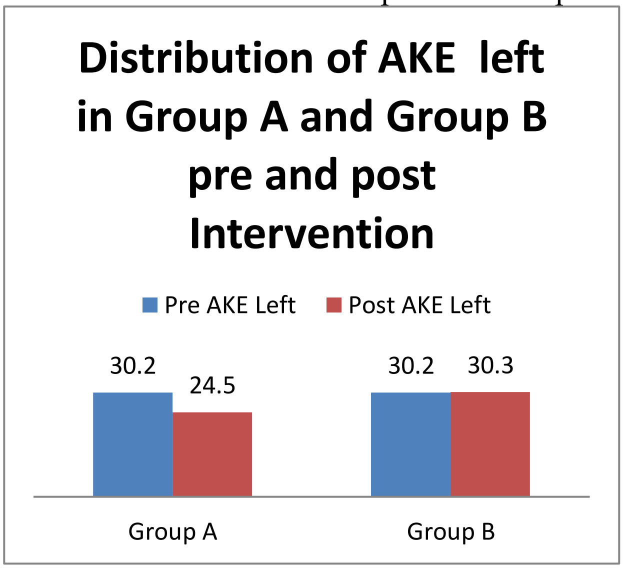

Table 18 Distribution of FFD in Group A and Group B pre and post Intervention

FFD	Group A	Group B
	Mean ± SD(n=30)	Mean ± SD(n=30)
Pre FFD	7.8 ± 2.01	7.7 ± 2.0
Post FFD	4.8 ± 1.9	5.4 ± 2.3

Both Group A and Group B demonstrated a reduction in FFD after intervention, with Group A showing a slightly greater improvement than Group B.

Diagram 18 Showing the Multiple Bar Diagram Distribution of between Group A and Group B

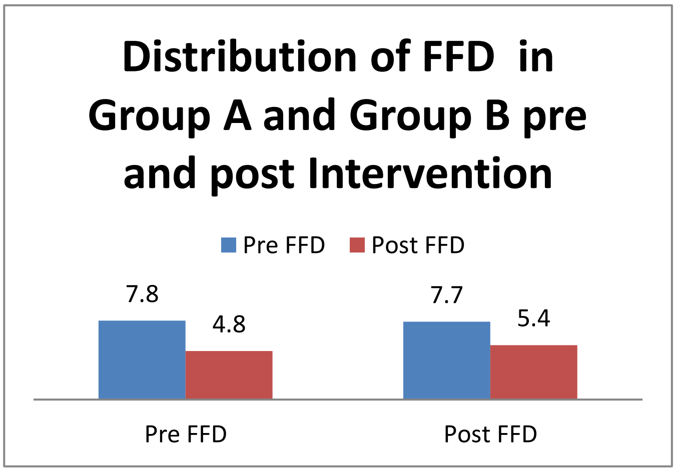

Table 19 Comparison of AKE Right Between and Within Group A and Group B

AKE Right	Group A Mean ± SD(n=30)	Group B Mean ± SD(n=30)	Statistics test value
Pre AKE	31.1 ±2.7	31.0 ±2.7	t = 0.1,P = 0.8,P<0.01 (NS)
Post AKE	27.1 ± 2.6	27.5 ± 2.9	t = 0.5,P = 0.5,P<0.01 (NS)
Statistics test value	t = 15.4, P = 0.0001,P<0.001(S)	t = 5.9,P = 0.0001,P<0.001(S)	

There was no significant difference between Group A and Group B at baseline or post-intervention, but both groups showed a highly significant improvement within groups in AKE ($p < 0.001$).

Table 19 Comparison of AKE Left Between and Within Group A and Group B

AKE Left	Group A Mean ± SD(n=30)	Group B Mean ± SD(n=30)	Statistics test value
Pre AKE Left	30.2 ± 4.8	30.2 ± 4.8	t = 0.0,P = 1,P<0.01(NS)
Post AKE Left	24.5 ± 5.0	30.3 ± 5.0	t = 4.4,P = 0.0001,P<0.001(S)
Statistics test value	t = 13.9, P = 0.0001,P<0.001(S)	t = 0.12,P = 0.9,P<0.001(NS)	

There was no significant difference between Group A and Group B at baseline or post-intervention, but both groups showed a highly significant improvement within groups in AKE ($p < 0.001$).

Table 20 Comparison of FFD Between and Within Group A and Group B

FFD	Group A Mean ± SD(n=30)	Group B Mean ± SD(n=30)	Statistics test value
Pre FFD	7.8 ± 2.01	7.7 ± 2.0	t = 0.1,P = 0.8,P<0.01 (NS)
Post FFD	4.8 ± 1.9	5.4 ± 2.3	t = 1.1,P = 0.2,P<0.01 (NS)
Statistics test value	t = 4.4, P = 0.0001,P<0.001(S)	t = 4.09,P = 0.0001,P<0.001(S)	

There was no significant difference between Group A and Group B in FFD at baseline or post-intervention, while both groups showed a highly significant within-group improvement ($p < 0.001$).

INTERPRETATION OF RESULTS

The present study was conducted to compare the effectiveness of Sub-Occipital Muscle Inhibition Technique (SMIT) and Muscle Energy Technique (MET) on hamstring tightness among young volleyball players. A total of 60 participants were included in the study and were equally divided into two groups. Group A received SMIT, while Group B received MET.

At baseline, both groups were similar in terms of age, gender, and area of residence. Statistical analysis showed no significant differences between the groups before the intervention, indicating that the participants were comparable and that any improvements observed after treatment were likely due to the interventions provided.

Hamstring flexibility was assessed using the Active Knee Extension (AKE) Test and Finger Floor Distance (FFD) Test. Following the intervention, both groups showed significant improvements in flexibility. In Group A, the mean AKE Right value improved from 31.1 ± 2.7° to 27.1 ± 2.6°, while in Group B it improved from 31.0 ± 2.7° to 27.5 ± 2.9°. These findings indicate a reduction in hamstring tightness and an increase in muscle flexibility. The improvement observed within both groups was statistically significant ($p < 0.001$).

Similarly, improvements were noted in AKE Left values. Group A demonstrated greater improvement compared to Group B, suggesting that SMIT may have a stronger effect on hamstring flexibility. This improvement may be related to the influence of SMIT on the myofascial and neuromuscular systems through the superficial back line.

FFD scores also improved in both groups. In Group A, the mean FFD value decreased from 7.8 ± 2.01 cm to 4.8 ± 1.9 cm, whereas in Group B it decreased from 7.7 ± 2.0 cm to 5.4 ± 2.3 cm. Since lower FFD values indicate better flexibility, these results show that participants were able to bend forward more effectively after treatment.

The improvement observed in the SMIT group may be explained by the release of tension along the superficial back line and the relaxation of the posterior fascial chain. In contrast, the positive effects seen in the MET group may be attributed to post-isometric relaxation and neuromuscular inhibition mechanisms, which help improve muscle extensibility and reduce tightness.

Overall, the results of the study indicate that both SMIT and MET are effective interventions for improving hamstring flexibility in young volleyball players. Although both techniques produced significant improvements, the SMIT group showed slightly better outcomes in some measures. Therefore, both interventions can be recommended for the management of hamstring tightness, with SMIT demonstrating a small advantage in improving flexibility among young volleyball players.

DISCUSSION

The present study compared the effectiveness of Sub-Occipital Muscle Inhibition Technique (SMIT) and Muscle Energy Technique (MET) on hamstring tightness in young volleyball players. The results showed that both interventions significantly improved hamstring flexibility, as evidenced by improvements in Active Knee Extension (AKE) and Finger Floor Distance (FFD) scores.

Participants in the SMIT group demonstrated significant improvements in hamstring flexibility following the intervention. This improvement may be attributed to the effect of SMIT on the superficial back line, which helps reduce fascial tension and improve muscle extensibility. Similar findings have been reported by Aparicio et al. and Ajimsha et al., who observed improvements in hamstring flexibility following sub-occipital release techniques.

The MET group also showed significant improvements in flexibility. These results may be explained by mechanisms such as post-isometric relaxation and autogenic inhibition, which help reduce muscle tightness and increase muscle length. Previous studies by Gaur et al., Shadmehr et al., and Majeed et al. have also reported positive effects of MET on hamstring flexibility.

Although both interventions were effective, the SMIT group demonstrated slightly greater improvement in some outcome measures compared to the MET group. This suggests that addressing fascial restrictions through the posterior fascial chain may provide additional benefits in improving hamstring flexibility.

Overall, the findings indicate that both SMIT and MET are effective treatment options for reducing hamstring tightness in young volleyball players. However, SMIT may offer a slight advantage and can be considered a useful intervention in sports physiotherapy practice.

CONCLUSION

The present study compared the effectiveness of Sub-occipital Muscle Inhibition Technique (SMIT) and Muscle Energy Technique (MET) on hamstring tightness among young volleyball players. The findings demonstrated that both interventions were effective in improving hamstring flexibility, as evidenced by significant improvements in Active Knee Extension Test (AKE) and Finger Floor Distance Test (FFD) scores following four weeks of intervention.

Within-group analysis revealed statistically significant improvements in both treatment groups ($p<0.001$). However, participants receiving Sub-occipital Muscle Inhibition Technique demonstrated greater overall improvement in flexibility outcomes compared to those receiving Muscle Energy Technique. These findings suggest that SMIT may be a valuable intervention for reducing hamstring tightness and enhancing flexibility in young volleyball players.

Therefore, both SMIT and MET can be recommended as effective physiotherapy interventions for the management of hamstring tightness. However, Sub-occipital Muscle Inhibition Technique may provide additional clinical benefits and can be considered a useful treatment option in sports rehabilitation and injury prevention programs.

CLINICAL IMPLICATIONS

1. Sub-occipital Muscle Inhibition Technique can be effectively used to improve hamstring flexibility in young volleyball players.
2. Muscle Energy Technique remains an effective intervention for reducing hamstring tightness and improving muscle extensibility.
3. Improved hamstring flexibility may contribute to enhanced sports performance, better movement efficiency, and reduced injury risk.
4. Both techniques can be incorporated into physiotherapy rehabilitation and athletic conditioning programs.
5. Sports physiotherapists may consider using SMIT as an adjunctive intervention when managing flexibility deficits in athletes.

LIMITATIONS

1. The study was conducted on a relatively small sample size of 60 participants.
2. Participants were recruited from a single geographical region, limiting the generalizability of the findings.
3. Long-term follow-up was not performed; therefore, the sustainability of treatment effects could not be determined.
4. Only flexibility-related outcome measures were assessed.
5. Athletic performance variables such as sprint speed, agility, vertical jump height, and injury incidence were not evaluated.

RECOMMENDATIONS

1. Future studies should include larger sample sizes to improve generalizability.
2. Long-term follow-up assessments should be conducted to determine the retention of treatment effects.
3. Similar studies should be performed in athletes participating in different sports.
4. Future research should include additional outcome measures such as agility, balance, jump performance, and injury prevention outcomes.
5. Comparative studies involving other manual therapy techniques may further enhance the evidence base for the management of hamstring tightness.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to all the participants who voluntarily participated in this study. The authors also extend their heartfelt thanks to the faculty members and staff of Pacific College of Physiotherapy, Pacific Medical University, Udaipur, for their continuous support, guidance, and encouragement throughout the study. Special thanks are extended to the research supervisor for valuable suggestions and expert guidance during the conduct of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this study.

SOURCE OF FUNDING

No external funding was received for this study.

ETHICAL APPROVAL

Ethical approval for the study was obtained from the Institutional Ethical Committee of Pacific Medical University, Udaipur. Written informed consent was obtained from all participants prior to their inclusion in the study.

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