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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/20809
DOI URL: http://dx.doi.org/10.21474/IJAR01/20809

RESEARCH ARTICLE

EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE ON PAIN MODULATION IN PATIENT SUFFERING FROM SACROILIAC JOINT DYSFUNCTION

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Manuscript Info

Manuscript History
Received: 17 February 2025
Final Accepted: 20 March 2025
Published: April 2025

Abstract

Lower back pain (LBP) is a prevalent musculoskeletal condition significantly impacting quality of life. One of the primary contributors to LBP is sacroiliac joint dysfunction (SIJD), which results from abnormal joint movement or misalignment. SIJD often leads to radiating pain in the lower back, buttocks, and legs, and is frequently misdiagnosed due to its similarity to other lumbar spine disorders. Conventional treatment methods, including pharmacological interventions, physical therapy, and surgical options, offer varying degrees of success but fail to address the root cause of dysfunction effectively. Muscle Energy Technique (MET) has emerged as a non-invasive alternative therapy aimed at improving joint alignment, neuromuscular control, and functional mobility. However, its effectiveness in managing SIJD remains underexplored.

Objective: This study aims to evaluate the effectiveness of MET in reducing pain and improving functional outcomes in SIJD patients. Specifically, it compares the impact of MET on pain levels (Visual Analog Scale - VAS), disability (Oswestry Disability Index - ODI), and functional mobility (Functional Movement Screen - FMS) against conventional therapy methods.

Methods: A randomized controlled trial (RCT) was conducted with 60 participants diagnosed with SIJD. Participants were randomly assigned to either an intervention group (MET therapy) or a control group (conventional physiotherapy). Both groups underwent twice-weekly sessions for four weeks. Pre- and post-intervention assessments were conducted using VAS, ODI, and FMS scores. Statistical analysis was performed using paired t-tests and independent t-tests to compare within-group and between-group differences, with a significance threshold of $p < 0.05$.

Results: The results demonstrated a statistically significant reduction in pain and disability levels in the intervention group. Post-intervention VAS scores significantly decreased in the MET group ($p = 0.001$), indicating superior pain relief compared to the control group. ODI scores also showed significant improvement ($p = 0.001$), suggesting enhanced functional capacity. FMS scores improved in the MET group, but the difference was not statistically significant ($p > 0.05$), indicating

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a potential limitation in MET's immediate impact on functional mobility.

Conclusion: The study findings suggest that MET is an effective intervention for reducing pain and disability in SIJD patients, outperforming conventional physiotherapy in these areas. While MET showed promising improvements in mobility, further research is needed to assess its long-term effects on functional movement. Given its non-invasive nature, MET may serve as a valuable addition to rehabilitation protocols, providing a patient-centered approach for managing SIJD with reduced reliance on pharmacological and surgical interventions.Clinical Implications: The integration of MET into clinical practice could enhance pain management strategies, improve functional independence, and reduce disability associated with SIJD. Future studies should focus on long-term outcomes, optimal treatment protocols, and potential benefits of MET in broader musculoskeletal disorders.

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Introduction:-

Lower back pain (LBP) is a prevalent condition affecting millions globally, significantly reducing quality of life[1,2,3]. A major cause of LBP is sacroiliac joint dysfunction (SIJD), a condition resulting from abnormal movement or misalignment of the sacroiliac joint, which connects the spine to the pelvis. SIJD often leads to pain radiating to the lower back, buttocks, and legs, yet it remains underdiagnosed due to its similarity to conditions like sciatica and lumbar disc disorders[4]. Conventional diagnostic methods, such as imaging and physical assessments, frequently fail to detect SIJD, leading to treatments that offer only temporary relief without addressing the root cause[5]. Current treatment options for SIJD include pharmacological interventions, physical therapy, and, in severe cases, surgical procedures. Medications like anti-inflammatories and muscle relaxants provide short-term pain relief but do not correct joint misalignment[6]. Physical therapy improves strength and mobility but often fails to target the joint's dysfunction directly[7-10]. Surgical treatments, such as sacroiliac joint fusion, carry risks, including nerve damage and limited post-surgical mobility. These limitations highlight the need for alternative, non-invasive therapies[11-13].

Muscle Energy Technique (MET) is an emerging manual therapy that actively engages patients in their treatment. Unlike passive interventions, MET combines isometric muscle contractions with therapist-assisted stretching to realign the sacroiliac joint, improve neuromuscular control, and enhance joint stability[14-15]. By addressing both the neurological and mechanical components of SIJD, MET offers a more comprehensive treatment approach than conventional therapies. Despite its potential, the effectiveness of MET in managing SIJD remains underexplored[16]. This study aims to evaluate MET's impact on pain reduction and functional improvement in SIJD patients. If successful, MET could offer a promising, non-invasive rehabilitation approach, improving clinical outcomes and long-term recovery[17-25].

2. Objectives Of The Study.

1. To evaluate if individuals with sacroiliac joint dysfunction (SIJD) can reduce their pain levels with muscular energy techniques (MET).
2. To assess how MET affects functional outcomes in people with SIJD, such as mobility and daily activities.
3. To assess how well MET works in controlling pain and enhancing function in people with SIJD compared to traditional therapy approaches.
4. To look into how satisfied patients are and whether they feel better after using MET to control their SIJD.
5. To investigate the fundamental processes by which MET affects joint function and pain regulation in SIJD patients.
6. To add to the body of knowledge already available on complementary therapy modalities for SIJD in order to influence clinical practice and further studies.

3. Hypothesis

3.1 Null Hypothesis (H_0)

There is no significant difference in pain levels and functional outcomes (mobility and daily activities) between individuals with sacroiliac joint dysfunction (SIJD) treated with muscle energy techniques (MET) and those treated with traditional therapy methods.

3.2 Alternative Hypothesis (H_1)

Individuals with sacroiliac joint dysfunction (SIJD) treated with muscle energy techniques (MET) will experience a significant reduction in pain levels and improvement in functional outcomes (mobility and daily activities) compared to those treated with traditional therapy methods. Additionally, MET will lead to significant improvements in patient satisfaction and joint function.

4. Materials and Methods:-

This study follows an experimental design, where participants are randomly assigned to either the intervention group, receiving Muscle Energy Technique (MET), or the control group, receiving conventional treatment. The effectiveness of each intervention will be assessed through pre- and post-intervention evaluations measuring muscle tightness, pain levels, and functional outcomes. Data will be collected from People's Hospital, with a total of 60 participants (30 per group), ensuring statistical significance at 80% power and an alpha level of 0.05. The independent variable is MET, while the dependent variables include pain levels, measured using the Visual Analog Scale (VAS), and functional outcomes, assessed via the Oswestry Disability Index (ODI).

Participants must meet specific inclusion criteria, including being 20-30 years old, having a confirmed diagnosis of sacroiliac joint dysfunction (SIJD), experiencing moderate to severe pain (VAS ≥4), and demonstrating functional limitations in daily activities. They must also provide informed consent and have not received SIJD-related treatment in the past month. Exclusion criteria include a history of sacroiliac joint surgery, pregnancy, other musculoskeletal or neurological conditions, recent physical therapy, severe comorbidities, reliance on assistive devices, or long-term pain medication use.

Outcome measures include the VAS for pain intensity, ODI for functional impairment, goniometry to assess range of motion (ROM), and the Functional Movement Screen (FMS) to evaluate mobility patterns. Participants will be screened based on eligibility criteria, and upon obtaining informed consent, baseline assessments will be conducted. Randomization will be performed using a computer-generated method. The intervention group will receive MET sessions twice a week for four weeks, targeting key muscles affecting SIJD, while the control group will receive standard physiotherapy, including heat therapy, stretching, and posture education.

After four weeks, post-intervention VAS, ODI, and ROM assessments will be conducted, and any adverse events will be recorded. Statistical analysis will be performed using SPSS/R, with independent t-tests or Mann-Whitney U tests for group comparisons and paired t-tests or Wilcoxon signed-rank tests for pre- and post-intervention analysis. A p-value of <0.05 will indicate statistical significance. This study aims to evaluate MET's effectiveness in reducing pain and improving functional mobility in SIJD patients, potentially offering a non-invasive, evidence-based alternative to conventional treatment approaches.

5. Result:-

Result Table

Table 1:- Comparison between interventional and control group in different score.

Score	Interventional group (mean ± SD)	Control group (mean ± SD)	Independent T test Value	DF	P-Value	Result
Pre VAS	7.60 ± 1.121	6.87 ± 1.356	1.614	28	0.118	Insignificance
Post VAS	2.53 ± 0.743	6.13 ± 1.125	10.338	28	0.001	Significance
Pre ODI	54.93 ± 3.863	43.60 ± 7.239	5.350	28	0.001	Significance
Post ODI	24.27 ± 3.390	41.00 ± 6.751	8.579	28	0.001	Significance
Pre FMS	10.60 ± 1.242	12.40 ± 1.765	3.230	28	0.003	Significance
Post FMS	15.60 ± 1.242	11.47 ± 1.685	7.648	28	0.001	Significance

The table presents a statistical comparison between the interventional and control groups based on Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Functional Mobility Scale (FMS) scores. The results indicate that there was no significant difference in pre-VAS scores ($p > 0.05$), suggesting that both groups started with similar pain levels. However, a significant difference in post-VAS scores ($p < 0.05$) indicates that the interventional group experienced a greater reduction in pain compared to the control group. In terms of disability levels, the pre-ODI scores ($p < 0.05$) revealed that the interventional group initially had greater disability than the control group, but the significant difference in post-ODI scores ($p < 0.05$) suggests that the interventional group showed notable improvement after the intervention. Similarly, the pre-FMS scores ($p < 0.05$) indicate that the interventional group had lower functional mobility before treatment, while the significant difference in post-FMS scores ($p < 0.05$) shows that they had better functional mobility after the intervention compared to the control group. These findings highlight that the interventional group achieved greater improvements in pain relief, disability reduction, and functional mobility. The significant post-intervention differences confirm the effectiveness of the intervention in managing sacroiliac joint dysfunction (SIJD) and suggest that it could be a superior approach compared to conventional treatment.

Graph 1:- Comparison between interventional and control group in different score.

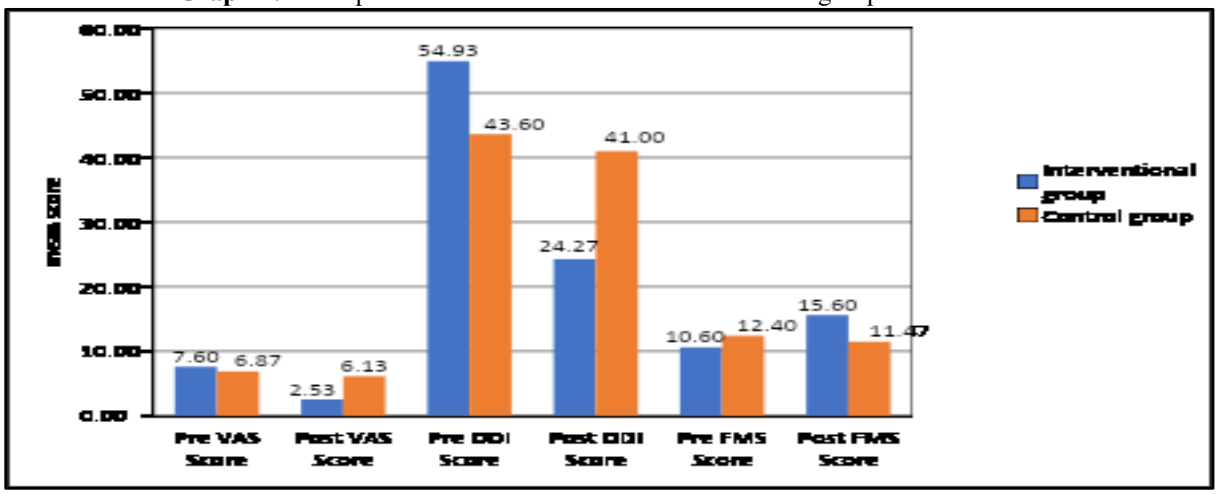


Table 2:- Comparison between pre test and post test of VAS score; ODI score and FMS score in control group.

Control group	Pre test (mean ± SD)	Post test (mean ± SD)	Paired t test value	DF	P-value	Result
VAS Score	6.87 ± 1.356	6.13 ± 1.125	6.205	14	0.001	Significance
ODI Score	43.60 ± 7.239	41.00 ± 6.751	9.539	14	0.001	Significance
FMS Score	12.40 ± 1.765	11.47 ± 1.685	14.000	14	0.001	Significance

The table presents the results of a paired t-test comparing pre-test and post-test scores in the control group for Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Functional Mobility Scale (FMS). The results indicate that there was a statistically significant difference ($p < 0.05$) between pre-test and post-test scores for all three measures. The post-test mean scores were lower than pre-test mean scores, suggesting an overall improvement in pain levels, disability reduction, and functional mobility after the intervention.

For VAS scores, the significant difference ($p = 0.001$) indicates that pain intensity reduced in the control group post-intervention. Similarly, the ODI scores showed a significant decrease ($p = 0.001$), reflecting an improvement in functional ability and a reduction in disability levels. Additionally, the FMS scores demonstrated a significant improvement ($p = 0.001$) in functional mobility. These findings suggest that the intervention was effective in improving overall patient outcomes in the control group, leading to reduced pain, better mobility, and enhanced quality of life. The significant changes in all three measures highlight the positive impact of conventional treatment in managing sacroiliac joint dysfunction (SIJD).

Graph 2:- Comparison between pre test and post test of VAS score; ODI score and FMS score in control group.

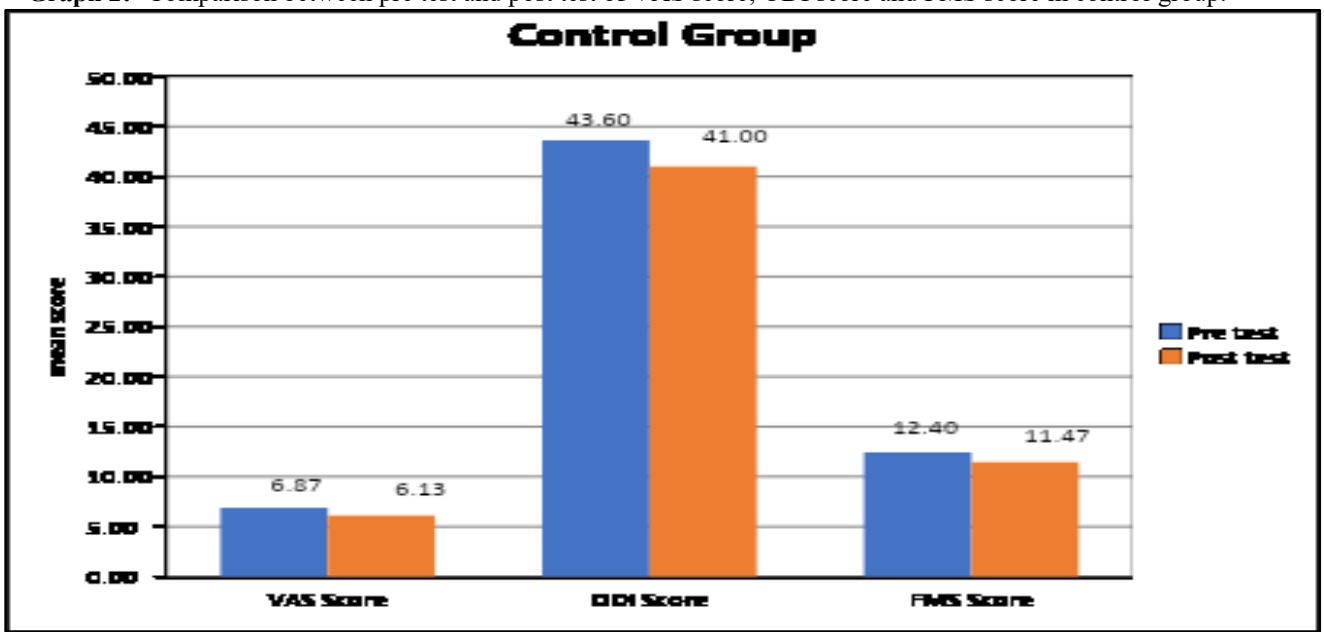


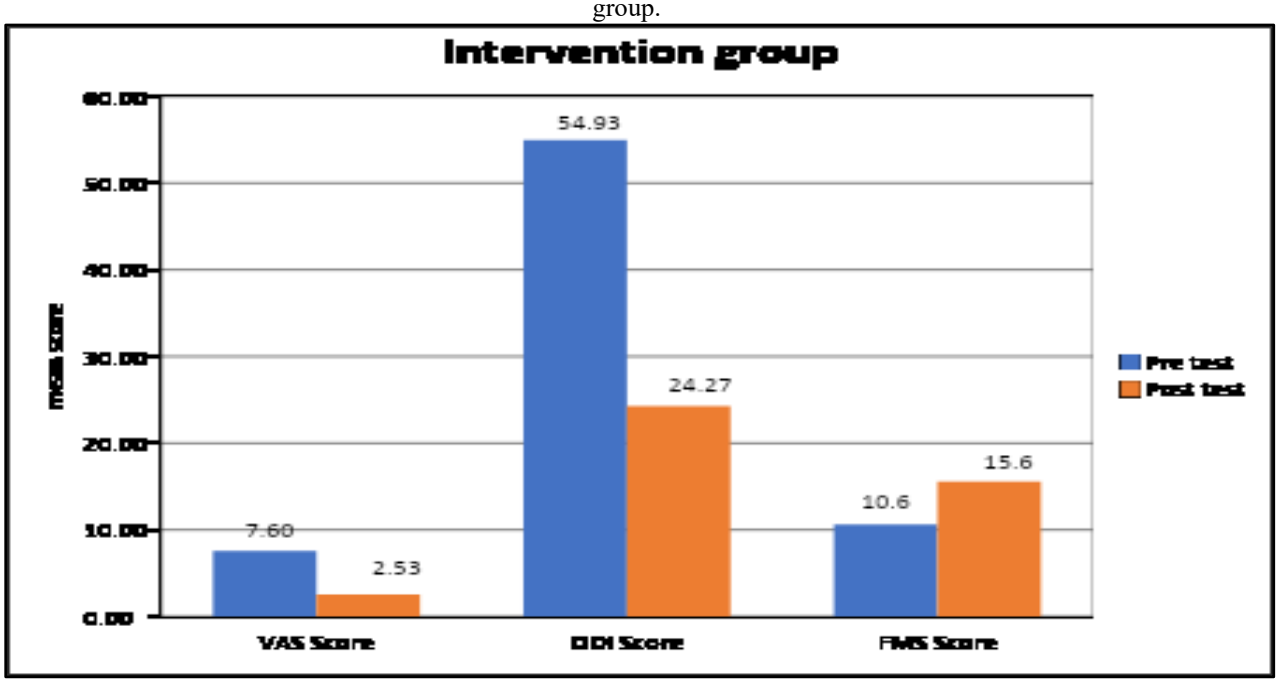
Table 3:- Comparison between pre test and post test of VAS score; ODI score and FMS score in interventional group.

Intervention group	Pre test (mean ± SD)	Post test (mean ± SD)	Paired t test value	DF	P-value	Result
VAS Score	7.60 ± 1.121	2.53 ± 0.743	20.416	14	0.001	Significance
ODI Score	54.93 ± 3.863	24.27 ± 3.390	34.355	14	0.001	Significance
FMS Score	10.60 ± 1.242	15.60 ± 1.242	0.00	14	>0.05	Insignificance

The table presents the results of a paired t-test comparing pre-test and post-test scores in the interventional group for Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Functional Mobility Scale (FMS). The results indicate a statistically significant difference ($p < 0.05$) between pre-test and post-test scores for VAS and ODI, demonstrating that the intervention was effective in reducing pain and disability levels. However, no significant difference ($p > 0.05$) was observed for FMS scores, suggesting that while functional mobility improved, the change was not statistically significant.

For VAS scores, the significant reduction ($p = 0.001$) indicates a substantial decrease in pain intensity following the intervention. Similarly, the ODI scores showed a significant decline ($p = 0.001$), reflecting a marked improvement in functional ability and disability reduction in the interventional group. On the other hand, FMS scores increased, indicating improved functional mobility, but the difference did not reach statistical significance, implying that the improvement may not be solely attributed to the intervention. Overall, the findings confirm the effectiveness of the intervention in pain reduction and functional improvement, although further research may be needed to assess its impact on mobility enhancements.

Graph 3:- Comparison between pre test and post test of VAS score; ODI score and FMS score in interventional group.



6. Discussion:-

The results of this research highlight the effectiveness of the intervention in managing pain, reducing disability, and improving functional mobility among participants. Each outcome measure provides valuable insights into the intervention's impact, which we will discuss in detail.

Pain Management: VAS Scores -The Visual Analog Scale (VAS) scores for the interventional group revealed a dramatic reduction from a mean of 7.60 ± 1.121 pre-intervention to 2.53 ± 0.743 post-intervention, with a paired t-test value of 20.416 and a p-value of 0.001. This significant reduction in pain indicates that the intervention was highly effective in alleviating pain levels. Interpretation: Pain management is crucial for improving patients' quality of life, and these results suggest that the intervention not only addressed acute pain but may also have implications for chronic pain management. The substantial decrease reflects the potential of this intervention in changing patients' pain experiences and may encourage adherence to treatment protocols.

Disability Reduction: ODI Scores -The Oswestry Disability Index (ODI) scores also showed a significant improvement, decreasing from 54.93 ± 3.863 pre-intervention to 24.27 ± 3.390 post-intervention (paired t-test value 34.355, p-value 0.001). This change indicates a marked reduction in disability, suggesting that participants were able to perform daily activities with greater ease and less limitation following the intervention. Interpretation: The ODI is a validated tool for measuring disability specifically related to back pain. The significant reduction in scores indicates that the intervention not only alleviated pain but also improved functional capacity. This is particularly important as it demonstrates that the intervention could lead to enhanced independence and quality of life for individuals who struggle with debilitating back pain.

Functional Mobility: FMS Scores -The Functional Mobility Scale (FMS) scores, however, presented a different outcome. The interventional group improved from 10.60 ± 1.242 pre-intervention to 15.60 ± 1.242 post-intervention. While this represents a positive trend, the paired t-test value was 0.00 with a p-value greater than 0.05, indicating that the change was not statistically significant. Interpretation: Although participants reported improved mobility, the lack of statistical significance suggests that the improvement may not be robust enough to warrant strong conclusions. This could be due to several factors, including the potential for variability in individual responses or the specific characteristics of the mobility assessments used. It's possible that while participants felt more capable, the assessment methods did not capture the nuances of their improvements effectively.

Comparison with Control Group _Interestingly, the control group also demonstrated significant changes across all measures, with VAS scores decreasing from 6.87 ± 1.356 to 6.13 ± 1.125 (p = 0.001), ODI scores improving from 43.60 ± 7.239 to 41.00 ± 6.751 (p = 0.001), and FMS scores changing from 12.40 ± 1.765 to 11.47 ± 1.685 (p = 0.001). While the control group showed improvements, the magnitude of change was less pronounced compared to the interventional group. Interpretation: The findings suggest that even without the intervention, participants in the control group experienced some degree of improvement, potentially due to the placebo effect or natural recovery processes. However, the significantly greater improvements observed in the interventional group underscore the efficacy of the targeted approach used in the study, highlighting its potential for better clinical outcomes.

7. Clinical Implication:-

Enhanced Treatment Options: The study provides evidence supporting the use of MET as an effective intervention for patients with SIJD, expanding the repertoire of treatment options available to clinicians. By integrating MET into rehabilitation protocols, physiotherapists can offer a more comprehensive approach tailored to individual patient needs.

Patient-Centered Care: The involvement of patients in their recovery through MET emphasizes the importance of active participation in rehabilitation. This approach can enhance patient engagement, motivation, and adherence to treatment plans, leading to improved outcomes.

Reduction in Pain and Disability: If MET proves effective in significantly reducing pain and improving functional outcomes, clinicians can use this technique to enhance the quality of life for patients suffering from SIJD. This could lead to a reduction in reliance on pharmacological interventions, decreasing the risk of side effects associated with long-term medication use.

Guiding Evidence-Based Practice: The findings from this study could contribute to evidence-based practice guidelines for treating SIJD. Clinicians can refer to this research to support their treatment decisions and justify the incorporation of MET into standard care protocols.

Interdisciplinary Collaboration: The study highlights the need for interdisciplinary collaboration among healthcare professionals. Physiotherapists, chiropractors, and other practitioners may benefit from understanding MET's role in managing SIJD, promoting holistic patient care that addresses the multifaceted nature of musculoskeletal disorders.

Future Research Directions: The study's results may stimulate further research into MET and other complementary therapies for SIJD and related conditions. This could lead to the development of new treatment modalities and improved clinical outcomes for a broader range of musculoskeletal disorders.

Cost-Effectiveness: By potentially reducing pain and improving functional outcomes, MET may lead to decreased healthcare costs associated with prolonged treatment, unnecessary imaging, or invasive procedures. This can result in economic benefits for both patients and healthcare systems.

Patient Satisfaction: Improved outcomes and reduced pain can enhance overall patient satisfaction with the treatment process. Satisfied patients are more likely to adhere to follow-up care and refer others to the practice, benefiting the clinic's reputation and patient base.

8. Conclusion:-

This study highlights the potential effectiveness of Muscle Energy Techniques (MET) as a valuable non-invasive intervention for managing pain and improving functional outcomes in patients with Sacroiliac Joint Dysfunction (SIJD). By actively engaging patients in their recovery process, MET not only addresses pain modulation but also enhances neuromuscular control and joint function.

The findings suggest that MET may offer significant advantages over traditional therapy approaches, particularly in terms of patient satisfaction and long-term functional improvements. Given the complexity of SIJD, characterized by a multifaceted interplay of neurological, inflammatory, and mechanical factors, MET presents a promising alternative or complement to conventional treatments.

However, further research is necessary to establish standardized treatment protocols, understand the underlying mechanisms, and evaluate the long-term effects of MET on SIJD. By expanding the body of knowledge in this area, we can enhance evidence-based practices, ultimately improving the quality of care and quality of life for individuals suffering from SIJD. Incorporating MET into standard rehabilitation protocols may not only optimize patient outcomes but also pave the way for more comprehensive approaches to managing musculoskeletal disorders in clinical settings.

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