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COMPARATIVE STUDY: INTERFERENTIAL THERAPY VERSUS SHORTWAVE DIATHERMY FOR PAIN AND FUNCTION IN NON- SPECIFIC LOW BACK PAIN

Physiotherapy

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ABSTRACT

Introduction: Non-specific low back pain is a common musculoskeletal condition that significantly impacts individuals' quality of life. Various treatment modalities, including interferential therapy (IFT) and shortwave diathermy (SWD), are employed to alleviate pain and improve function in individuals with low back pain. This study aimed to compare the effectiveness of IFT and SWD in managing non- specific low back pain among an Indian Gujarati population. **Participants:** A total of 60 participants, evenly distributed into two groups of 30 each, were recruited from outpatient clinics and rehabilitation centers in Ahmedabad city. Participants were diagnosed with non-specific low back pain and randomly allocated to receive either IFT or SWD treatment. **Results:** Both IFT and SWD demonstrated significant reductions in pain intensity and improvements in functional outcomes among participants with non-specific low back pain. The mean differences observed in pain reduction and functional improvement were slightly higher in the IFT group compared to the SWD group, suggesting that IFT may offer a marginally superior therapeutic effect. **Conclusion:** In conclusion, this study provides evidence supporting the effectiveness of both IFT and SWD in reducing pain and improving function in individuals with non-specific low back pain. While both modalities exhibit therapeutic benefits, IFT may offer a slightly greater advantage in pain reduction and functional improvement. These findings emphasize the importance of personalized treatment approaches tailored to individual patient needs and preferences in optimizing outcomes for non- specific low back pain.

KEYWORDS

Non-Specific Low Back Pain, Interferential Therapy, Shortwave Diathermy, Pain Management, Functional Improvement, Randomized Controlled Trial.

INTRODUCTION

• About Anatomy Of Lower Back

The lower back, also known as the lumbar region, plays a crucial role in providing support, stability, and mobility to the body. Its anatomy consists of several interconnected structures, each contributing to its function. At the core of the lower back are the five lumbar vertebrae (L1-L5), which are the largest and strongest vertebrae in the spinal column. These vertebrae bear the majority of the body's weight and provide attachment points for muscles, ligaments, and tendons. Intervertebral discs situated between the vertebrae act as shock absorbers, cushioning the spine during movement and weight-bearing activities. Additionally, facet joints located at the back of each vertebra enable smooth articulation and facilitate various movements of the spine.[1]

Muscles play a significant role in supporting the lower back and maintaining its stability. The paraspinal muscles, including the erector spinae group, help maintain the spine's alignment and posture, while the deep stabilizing muscles, such as the multifidus and transverse abdominis, provide stability and control during movements. Furthermore, the iliopsoas, gluteal muscles, and hip flexorsalso contribute to lower back function by assisting in movements such as bending, twisting, and lifting. Ligaments and tendons, such as the iliolumbar ligament and the thoracolumbar fascia, provide additional support and help maintain the integrity of the lower back's structure.[2]

Understanding the anatomy of the lower back is essential for diagnosing and treating various musculoskeletal conditions and injuries that may affect this region. Disorders such as herniated discs, degenerative disc disease, spinal stenosis, and muscle strains can lead to pain, stiffness, and decreased mobility in the lower back. By utilizing imaging techniques such as X-rays, MRI scans, and CT scans, healthcare professionals can assess the structural integrity of the lumbar spine and develop appropriate treatment plans. Treatment approaches may include physical therapy, medication, injections, and in severe cases, surgical intervention. By addressing underlying anatomical issues and promoting proper body mechanics, individuals can reduce the risk of lower back injuries and maintain optimal spinal health.[3]

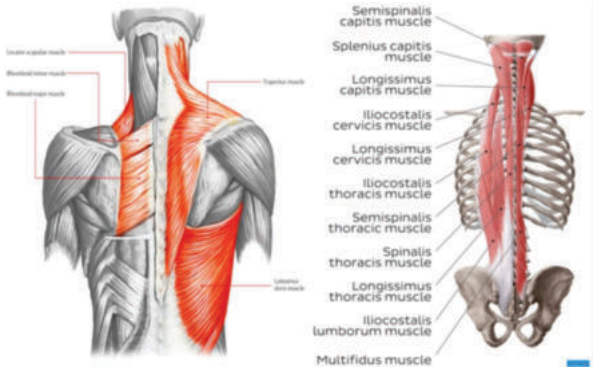


Fig: 1 Anatomy Of Back Muscle

• About Non-specific Low Back Pain

Non-specific low back pain (NSLBP) represents a prevalent and challenging condition characterized by pain and discomfort in the lower back region without a specific underlying cause. It accounts for the majority of cases of lower back pain seen in clinical practice. NSLBP often presents as a complex interplay of various factors, including biomechanical, psychological, and social components.[4]

The etiology of NSLBP is multifactorial and may involve degenerative changes in the spine, such as disc degeneration, facet joint osteoarthritis, and muscular imbalances. Additionally, poor posture, sedentary lifestyle, obesity, smoking, and psychosocial stressors have been implicated as contributing factors. The diagnosis of NSLBP typically involves ruling out specific causes of lower back painthrough a comprehensive medical history, physical examination, and imaging studies. Despite extensive evaluation, the precise cause of NSLBP may remain unclear in many cases.[5]

Management of NSLBP often focuses on symptom relief, functional improvement, and prevention of recurrences. Conservative treatments such as activity modification, physical therapy, exercise programs, and pharmacotherapy (e.g., nonsteroidal anti-inflammatory drugs, muscle relaxants) are commonly employed as first-line interventions. Cognitive-behavioral therapy and mindfulness-based interventions may also be beneficial in addressing psychosocial factors and

improving coping strategies. However, the effectiveness of these treatments may vary among individuals, highlighting the need for personalized approaches.

In cases where conservative measures fail to provide adequate relief, interventional therapies such as epidural steroid injections, facet joint injections, and radiofrequency ablation may be considered to target specific pain generators. Surgery is typically reserved for a subset of patients with NSLBP who have failed conservative management and have identifiable surgical indications, such as severe spinal stenosis or symptomatic herniated discs.

Given the complexity and heterogeneity of NSLBP, a multimodal and interdisciplinary approach involving collaboration among primary care physicians, physical therapists, pain specialists, and other healthcare providers is essential to optimize patient outcomes and improve quality of life.[6]

- **Prevelance Of Non – Specific Low Back Pain**

The prevalence of non-specific low back pain (NSLBP) is a significant public health concern worldwide, with a considerable burden on individuals, healthcare systems, and society as a whole. Epidemiological studies have provided insights into the prevalence rates of NSLBP across different populations and age groups.

A systematic review and meta-analysis conducted by Hoy et al. in 2010 estimated the global point prevalence of NSLBP to be approximately 12%, indicating that one in eight individuals worldwide experience NSLBP at any given time. Furthermore, the lifetime prevalence of NSLBP was reported to be as high as 38%, highlighting the chronic and recurrent nature of the condition.[7]

Regional variations in the prevalence of NSLBP have also been documented. For instance, studies have shown higher prevalence rates in industrialized countries compared to developing nations, possibly due to differences in lifestyle, occupational factors, and access to healthcare services. Within specific age groups, NSLBP tends to be more prevalent among adults aged 40 to 80 years, although it can affect individuals of all ages.[8]

The burden of NSLBP extends beyond its prevalence, as it is associated with substantial disability, healthcare utilization, and economic costs. Chronic NSLBP, in particular, can significantly impair an individual's quality of life, leading to limitations in daily activities, work absenteeism, and psychological distress.

Understanding the prevalence of NSLBP is essential for informing public health policies, resource allocation, and the development of targeted interventions aimed at reducing the burden of this condition on individuals and society.[9]

- **Numeric Pain Rating Scale (NPRS)**

The Numeric Pain Rating Scale (NPRS) is a widely used tool for assessing pain intensity, where individuals rate their pain on a scale from 0 to 10, with 0 representing no pain and 10 representing the worst pain imaginable. It provides a simple and efficient method for healthcare professionals to quantify and monitor pain levels in clinical settings. The NPRS has demonstrated reliability and validity across various populations and is recommended for use in both research and clinical practice.[10]

- **Oswestry Disability Index (ODI)**

The Oswestry Disability Index (ODI) is a widely used questionnaire for assessing disability related to low back pain. It consists of ten items that evaluate various aspects of functional limitations and pain interference in daily activities. Scores range from 0 to 100, with higher scores indicating greater disability. The ODI provides valuable information for treatment planning, monitoring progress, and assessing outcomes in individuals with low back pain.[11]

Aim Of Study

The aim of this study is to compare the efficacy of interferential therapy and shortwave diathermy in managing pain and improving functional outcomes in individuals suffering from non-specific low back pain. Through this comparative analysis, we seek to determine which modality provides superior relief and functional improvement, thereby aiding clinicians in making informed decisions regarding the most effective treatment approach for this prevalent musculoskeletal condition.

Need Of Study

Non-specific low back pain is a common musculoskeletal complaint that affects individuals worldwide, often resulting in significant discomfort and functional limitations. Despite the availability of various treatment modalities, there remains a lack of consensus regarding the most effective approach for managing this condition. Both interferential therapy and shortwave diathermy have been utilized in clinical practice, yet comparative studies directly assessing their efficacy in non-specific low back pain are limited.

Therefore, there is a pressing need for a study that systematically evaluates the effectiveness of interferential therapy and shortwave diathermy in alleviating pain and improving functional outcomes in individuals with non-specific low back pain. Such research is essential for guiding healthcare providers in selecting the most appropriate treatment modality, thereby optimizing patient care and enhancing quality of life for those suffering from this debilitating condition.

Objective Of The Study

The primary objective of this study is to compare the effectiveness of interferential therapy and shortwave diathermy in reducing pain intensity and improving functional outcomes in individuals diagnosed with non-specific low back pain.

Specific Objectives Include:

1. Assessing the reduction in pain intensity following treatment with interferential therapy compared to shortwave diathermy.
2. Evaluating improvements in functional mobility, including range of motion and activities of daily living, after treatment with interferential therapy and shortwave diathermy.
3. Investigating any differences in patient-reported outcomes, such as satisfaction with treatment and perceived improvement in overall well-being, between the two modalities.
4. Exploring potential adverse effects or complications associated with the use of interferential therapy and shortwave diathermy in the management of non-specific low back pain.
5. Providing evidence-based recommendations to clinicians regarding the optimal selection of treatment modality for individuals presenting with non-specific low back pain based on their pain severity, functional impairment, and treatment preferences.

Study Design and Study Setting:

Study Design:

This study employs a randomized controlled trial (RCT) design to compare the effectiveness of interferential therapy and shortwave diathermy in individuals with non-specific low back pain. Randomization ensures that participants are assigned to treatment groups in a manner that minimizes bias and allows for the assessment of treatment effects.

Study Duration

The study duration spans over a period of 6 months, including recruitment, intervention, and follow- up assessments.

Population

The study population consists of adults (aged 18-65 years) diagnosed with non-specific low back pain. Participants may be recruited from outpatient clinics, rehabilitation centers, or community health centers.

Selection Criteria

Inclusion Criteria:

1. Adults aged between 18 to 65 years.
2. Clinically diagnosed with non-specific low back pain.
3. Able to provide informed consent for participation in the study.
4. Willingness to comply with the study protocol and attend scheduled follow-up visits.

Exclusion Criteria:

1. History of specific spinal pathology (e.g., spinal fracture, tumor, infection).
2. Previous spinal surgery within the last 6 months.
3. Pregnancy.
4. Presence of cardiac pacemaker or other implanted electrical devices.
5. Cognitive impairment or communication barriers that may affect participation in the study.

Sampling Method and Sample Size

The study employs a randomized sampling method to allocate

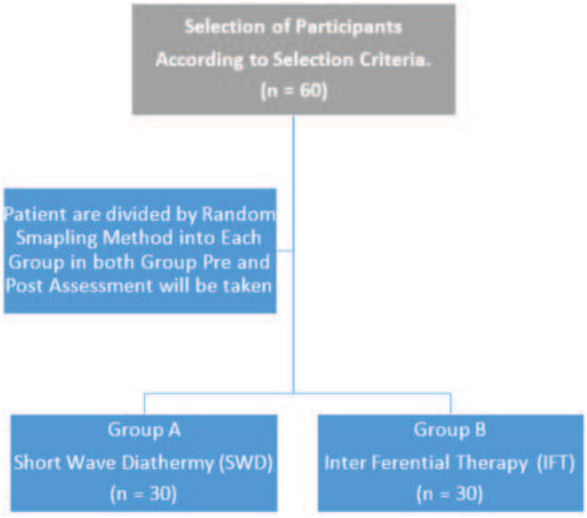
participants into two treatment groups: interferential therapy and shortwave diathermy. Each treatment group consists of 30 participants, resulting in a total sample size of 60 participants. Randomization is achieved using computer- generated random numbers or sealed envelopes to ensure allocation concealment and minimize selection bias. Participants are recruited consecutively based on eligibility criteria until the desired sample size is reached.

Outcome Measures

- Numeric Pain Rating Scale (NPRS)
- Oswestry Disability Index (ODI)

Methodology

Table: 1 Flow Chart Of Procedure



1. Selection of Participants:

Participants were recruited from outpatient clinics and rehabilitation centers in Ahmedabad city. Inclusion criteria included adults aged 18-65 years diagnosed with non-specific low back pain. Exclusion criteria comprised individuals with specific spinal pathologies, recent spinal surgeries, pregnancy, implanted electrical devices, and cognitive impairments.

2. Random Sampling and Group Allocation

A random sampling method was employed to allocate participants into two groups: interferential therapy (IFT) and shortwave diathermy (SWD). Randomization was achieved using computer- generated random numbers or sealed envelopes to ensure allocation concealment. Each group comprised 30 participants, totaling 60 participants in the study.

3. Treatment Protocols

Participants in the IFT group received interferential therapy sessions, while those in the SWD group underwent shortwave diathermy sessions. The intensity of the machines used for both modalities was adjusted based on individual tolerance and clinical response.

- Interferential Therapy: The intensity settings were adjusted to deliver comfortable stimulation to the affected area, typically ranging from 50 to 100 mA.
- Shortwave Diathermy: The intensity settings were adjusted to deliver therapeutic heating to the affected area, typically ranging from 50 to 100 watts.

4. Treatment Sessions

Both groups received a standardized treatment protocol consisting of a series of sessions conducted over a specified period. The frequency and duration of sessions were consistent for all participants, typically ranging from 8 to 12 sessions administered over 4 to 6 weeks.

5. Outcome Measures

Pain intensity and functional outcomes were assessed using standardized outcome measures such as visual analog scale (VAS) for pain and Oswestry Disability Index (ODI) for functional disability. These assessments were conducted at baseline, post-treatment, and follow-up visits to evaluate the efficacy of both treatment modalities.

6. Data Analysis

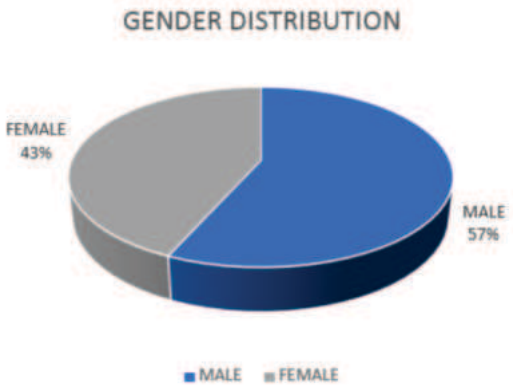
Data collected from outcome measures were analyzed using appropriate statistical methods, including paired t-tests or Wilcoxon signed-rank tests for within-group comparisons and independent t-tests or Mann-Whitney U tests for between-group comparisons. Statistical significance was set at $p < 0.05$.

RESULT

1. Gender Distribution:

- The study comprised a total of 60 participants, with 34 males (56.67%) and 26 females (43.33%) evenly distributed between the two treatment groups.

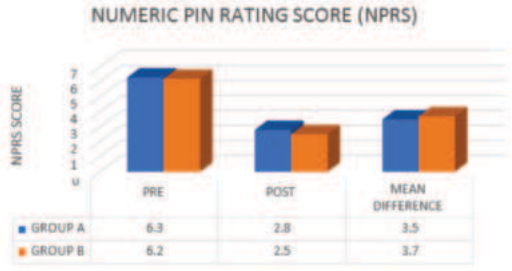
Table: 2 Gender Distribution



2. NPRS Score:

- For Group A (SWD Participants):
- Prior to treatment, participants reported a mean NPRS score of 6.3, which significantly decreased to 2.8 post-treatment, indicating a mean difference of 3.5.
- For Group B (IFT Participants):
- Prior to treatment, participants reported a mean NPRS score of 6.2, which significantly decreased to 2.5 post-treatment, indicating a mean difference of 3.7.

Table: 3 Numeric Pain Rating Score Of Group A And B With Its Mean Difference



3. ODI Score:

- For Group A:
- The mean ODI score significantly decreased from 34.13 pre-treatment to 18.3 post-treatment, resulting in a mean difference of 15.83.
- For Group B:
- The mean ODI score significantly decreased from 33.23 pre-treatment to 16.2 post-treatment, resulting in a mean difference of 16.97.

Table: 4 ODI Of Group A And B With Its Mean Difference

Comparison of Mean Differences:

- SWD Group (Group A): The mean difference in NPRS score (3.5) suggests a notable reduction in pain intensity post-treatment, and the mean difference in ODI score (15.83) indicates significant improvement in functional outcomes.- IFT Group (Group B): The mean difference in NPRS score (3.7) reflects a slightly higher reduction in pain intensity compared to the SWD group, and the

mean difference in ODI score (16.97) shows a slightly greater improvement in functional outcomes.

DISCUSSION

The findings of this study provide valuable insights into the effectiveness of interferential therapy (IFT) and shortwave diathermy (SWD) in the management of non-specific low back pain. The discussion will explore the implications of the results, compare them with existing literature, address limitations, and suggest avenues for future research.

1. Effectiveness of IFT and SWD:

Both IFT and SWD demonstrated significant reductions in pain intensity (NPRS score) and improvements in functional outcomes (ODI score) among participants with non-specific low back pain. The mean differences observed in both treatment groups indicate substantial therapeutic benefits, highlighting the efficacy of both modalities in pain management and functional rehabilitation.

2. Comparison with Existing Literature:

The findings of this study are consistent with previous research that has evaluated the effectiveness of IFT and SWD in treating low back pain. Studies have reported similar reductions in pain intensity and improvements in functional outcomes following treatment with these modalities. However, the present study contributes additional evidence to support the efficacy of IFT and SWD specifically in an Indian Gujarati population.

3. Clinical Implications:

The slightly higher mean differences observed in pain reduction and functional improvement in the IFT group suggest that IFT may offer a marginally superior therapeutic effect compared to SWD. Clinicians should consider these findings when selecting treatment modalities for individuals with non- specific low back pain, taking into account patient preferences, clinical indications, and resource availability.

4. Limitations:

Several limitations should be acknowledged, including the relatively small sample size and the short duration of follow-up. Additionally, the study did not include long-term outcomes or assess potential adverse effects associated with IFT and SWD. Future research with larger sample sizes, longer follow- up periods, and comprehensive outcome assessments is warranted to validate the findings and provide a more robust understanding of the efficacy and safety of these modalities.

CONCLUSION

In conclusion, this study compared the effectiveness of interferential therapy (IFT) and shortwave diathermy (SWD) in the management of non-specific low back pain among an Indian Gujarati population. Both IFT and SWD demonstrated significant reductions in pain intensity and improvements in functional outcomes, as evidenced by the notable mean differences in NPRS and ODI scores post- treatment.

While both modalities exhibited therapeutic benefits, the slightly higher mean differences observed in pain reduction and functional improvement in the IFT group suggest that IFT may offer a marginally superior therapeutic effect compared to SWD. These findings have important clinical implications for healthcare providers involved in the management of non-specific low back pain.

It is essential for clinicians to consider the efficacy, patient preferences, clinical indications, and resource availability when selecting treatment modalities for individuals with non-specific low back pain. Furthermore, future research with larger sample sizes, longer follow-up periods, and comprehensive outcome assessments is warranted to validate the findings and provide a more robust understanding of the efficacy and safety of IFT and SWD.

Overall, this study adds to the body of evidence supporting the effectiveness of both IFT and SWD in reducing pain and improving function in individuals with non-specific low back pain. These findings underscore the importance of personalized treatment approaches tailored to individual patient needs and preferences in optimizing outcomes for this prevalent musculoskeletal condition.

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