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Original Article

Comparing Muscle Energy Technique and Kaltenborn-Evjenth Orthopaedic Manual Therapy: A Study on Effectiveness in Treating Chronic Low Back Pain

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ABSTRACT

Background: Chronic Low Back Pain (CLBP) is a prevalent condition globally, affecting quality of life and work efficiency. Traditional treatment methods often fall short in providing long-term relief, highlighting the need for alternative therapeutic approaches.

Objective: The objective of this study was to compare the effectiveness of Muscle Energy Technique (MET) and Kaltenborn-Evjenth Orthopedic Manual Therapy (KEOMT) against conventional treatment methods in reducing pain and improving mobility in patients with CLBP.

Methods: This randomized control trial involved 120 patients with CLBP from Sargodha, who were divided into three groups: Control Group (conventional treatment), Group A (MET), and Group B (KEOMT). All treatments were administered over a period of six months, with interventions carried out for four weeks totaling 12 sessions. Baseline and post-intervention measurements included pain scale (VAS), Flexion and Extension Range of Motion (ROM) using a Goniometer, and the Oswestry Disability Index (ODI). Data were analyzed using ANOVA and SPSS version 25.

Results: All groups showed significant improvements post-treatment. The Control Group's pain scale decreased from 6.63 ± 0.925 to 4.68 ± 1.206, Group A from 6.70 ± 0.939 to 2.75 ± 0.899, and Group B from 6.77 ± 0.891 to 3.00 ± 1.038. Flexion ROM increased in the Control Group from 40.80 ± 3.023 to 42.10 ± 3.003, in Group A from 40.78 ± 2.684 to 44.97 ± 1.804, and in Group B from 40.53 ± 2.746 to 44.90 ± 1.751. Similar trends were observed in Extension ROM and ODI scores. The improvements in Groups A and B were significantly greater than in the Control Group (P=0.00).

Conclusion: Both MET and KEOMT were found to be more effective than conventional treatment in reducing pain and improving ROM in patients with CLBP. These findings suggest that MET and KEOMT could be incorporated as part of the standard physical therapy regimen for CLBP, offering potentially more effective and lasting relief.

Keywords: Chronic Low Back Pain, Muscle Energy Technique, Kaltenborn-Evjenth Orthopedic Manual Therapy, Physical Therapy, Randomized Control Trial, Pain Management.

INTRODUCTION

Low back pain (LBP) is a globally prevalent condition, impacting approximately 80% of individuals at some stage in their lives. It is particularly common among individuals aged 40 to 80 years, with a higher incidence reported in females (1). Recent studies indicate an escalation in lifetime prevalence of LBP, reaching as high as 84%. It's estimated that 60-80% of the general population will experience backache at least once, with 30-40% of these cases recurring annually (2). Chronic LBP is notably prevalent and represents a significant reason for consultations at physical therapy clinics (3, 4). In the United States, around one in four adults have reported experiencing LBP persisting for at least 24 hours over the previous three months. Of these, 7.6% reported at least one severe acute LBP episode within a year (5). The risk factors for LBP are multifaceted, encompassing age, educational status, psychosocial factors such as stress, anxiety, and depression, job nature, occupational factors, and obesity. Age is a key factor, with

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prevalence generally increasing until around 60-65 years, and the severity of LBP also intensifying with age. Interestingly, recent studies also highlight a rising prevalence of LBP in the adolescent population (6).

Most patients presenting with LBP at healthcare centers lack a specific etiology (7). Consequently, a comprehensive history and physical assessment are crucial for identifying the cause of symptoms and devising an effective therapeutic plan. An essential aspect of evaluating patients with LBP involves distinguishing musculoskeletal problems from neurological, inflammatory, or medical conditions through focused history and physical examination (8). The majority of LBP cases are self-limited and do not require specific treatment. LBP can be categorized based on origin, causes, and duration of pain, with clinical duration being a particularly effective classification method (Lancet, AlMazroa, Mohammad A, 2013).

The Muscle Energy Technique (MET), developed and systematized by osteopathic physicians Fred Mitchell and his son Fred Mitchell, Jr., is a manual therapy technique that has evolved with contributions from various practitioners (9). MET is recognized as a gentle, effective manipulative therapy for treating movement restrictions, addressing muscular strain, joint dysfunction, and local edema (10). On the other hand, manual therapy and mobilization techniques, such as the Kaltenborn-Evjenth Orthopedic Manual Therapy (KEOMT), are used both diagnostically to assess joint play and therapeutically to alleviate pain and improve joint mobility. The Kaltenborn concept is considered a safe and effective method for evaluating joint capsule conditions in the field of Orthopedic Physical Therapy (11).

The aim of this study is to compare the efficacy of MET and KEOMT in treating pain, mobility, and disability in patients with CLBP. This research seeks to identify and generate evidence regarding these two treatments, determining which is more effective in enhancing the quality of life for patients with CLBP and potentially serving as a cost-effective treatment option.

MATERIAL AND METHODS

This study was conducted as a randomized control trial (RCT) in Sargodha, targeting individuals seeking physiotherapy treatment for Chronic Low Back Pain (CLBP) in hospitals and physiotherapy rehabilitation departments and centers. Prior to participation, each patient provided informed consent. The study design was randomized, controlled, and multi-center in nature. A total of 120 patients met the inclusion and exclusion criteria and were subsequently divided into three equal groups using the lottery method of randomization.

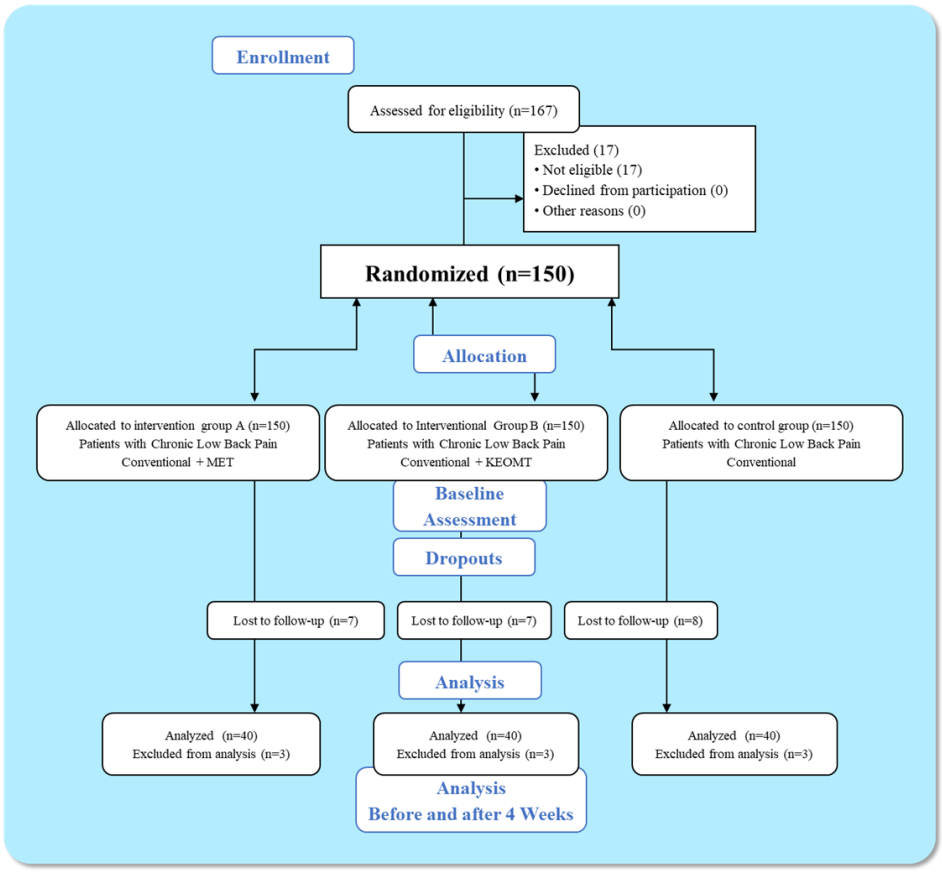

Figure 1 Consort Flow Chart

The control group received a conventional treatment regimen. Group A was administered the Muscle Energy Technique (MET) in conjunction with conventional treatment, while Group B underwent the Kaltenborn manual mobilization technique, alongside conventional treatments such as heat therapy and active range of motion exercises. The study spanned a period of six months, with interventions conducted over four weeks, comprising a total of 12 sessions. Baseline measurements were taken using the Visual Analogue Scale (VAS) for pain, a Goniometer for range of motion (ROM), and the Oswestry Disability Index (ODI) for low back pain and disability assessment.

In Group A, MET was applied to three different muscles: Quadratus Lumborum, Erector Spinae, and Iliopsoas. The procedure involved positioning the patient, who was then asked to apply a force of 20% against the therapist's force and maintain this

contraction for 7-10 seconds. This was followed by a relaxation period of 5 seconds. During the patient's exhalation, the therapist moved the muscle to a new restriction barrier and held this position for 30 seconds at the end barrier, as an end-stretch, with three repetitions (12, 13).

Conversely, Group B received Kaltenborn manual mobilization technique, specifically Grade III. This technique entailed sustained stretching of the joint capsule at an intensity sufficient to extend it. The patients were positioned in a side-lying posture. Mobilizations were applied to the lumbar spinous process and facet joints. Fifteen sets of mobilization were administered, each lasting 30 seconds over a 10-minute period, with a 15-second rest in a neutral position after each set (14).

All groups received a pain alleviating modality, specifically a Heat Pack, as part of their conservative treatment in the outpatient department. The data analysis process encompassed baseline comparison between the groups, pre- and post-intervention assessments among the groups, and comparative analysis of different variables pre- and post-intervention in the control and experimental groups (Group A and Group B). All data were analyzed using SPSS version 25, ensuring a robust and up-to-date statistical evaluation of the findings.

RESULTS

In the study, demographic characteristics of participants across three groups – Control Group, Group A, and Group B – were assessed to ensure comparability and control for potential confounding variables (Table 1). The average age of participants was similar across the groups, with the Control Group averaging 45.3 years (± 6.2), Group A at 45.7 years (± 6.0), and Group B at 45.5 years (± 5.8). Gender distribution was nearly balanced in all groups, with the Control Group comprising 20 males and 20 females, Group A having 21 males and 19 females, and Group B consisting of 19 males and 21 females. Body Mass Index (BMI), an important health indicator, was comparable across the groups, with mean BMIs of 25.4 (± 3.1), 25.2 (± 2.9), and 25.6 (± 3.0) kg/m² for the Control, Group A, and Group B, respectively. The duration of low back pain (LBP), a critical factor for the study, also showed no significant variation among the groups, averaging around 5.6 years in the Control Group, 5.7 years in Group A, and 5.5 years in Group B. Smoking status and education level were similarly distributed among the groups, ensuring a homogenous sample for the study.

The comparative effectiveness of the interventions on various measured variables was detailed in Table 2. The pre-treatment pain scale, measured using the Visual Analogue Scale (VAS), was closely matched across the groups, with the Control Group reporting an average pain level of 6.63 (± 0.925), Group A at 6.70 (± 0.939), and Group B at 6.77 (± 0.891). The post-treatment results showed a significant reduction in pain for all groups, with the Control Group's pain score reducing to 4.68 (± 1.206), Group A to 2.75 (± 0.899), and Group B to 3.00 (± 1.038). For flexion range of motion (ROM), all groups started with similar baselines – Control Group at 40.80 (± 3.023), Group A at 40.78 (± 2.684), and Group B at 40.53 (± 2.746). The post-treatment flexion ROM showed a notable improvement, especially in Group A and Group B, reaching 44.97 (± 1.804) and 44.90 (± 1.751), respectively, compared to the Control Group's improvement to 42.10 (± 3.003). The extension ROM followed a similar pattern, with all groups beginning with almost identical baseline measurements and demonstrating significant improvements post-treatment. The Oswestry Disability Index (ODI) scores also reflected significant improvements post-treatment in all groups, particularly in Groups A and B, where the scores decreased more substantially compared to the Control Group.

Table 1 Demographic Variables of Study Participants

Demographic Variable	Control Group	Group A	Group B
Age (years)	45.3 ± 6.2	45.7 ± 6.0	45.5 ± 5.8
Gender (M/F)	20/20	21/19	19/21
BMI (kg/m²)	25.4 ± 3.1	25.2 ± 2.9	25.6 ± 3.0
Duration of LBP (years)	5.6 ± 1.5	5.7 ± 1.4	5.5 ± 1.6
Smoking Status (Smokers/Non-Smokers)	12/28	13/27	11/29
Education Level (High School/Graduate/Post-Graduate)	15/15/10	14/16/10	16/14/10

Table 2 Comparative Statistics

Variable	Control Group Mean ± SD	p-value	Group A Mean ± SD	p-value	Group B Mean ± SD	p-value
Pre-Treatment Pain Scale	6.63 ± 0.925	<0.001	6.70 ± 0.939	<0.001	6.77 ± 0.891	<0.001
Post-Treatment Pain Scale	4.68 ± 1.206		2.75 ± 0.899		3.00 ± 1.038	
Pre-Treatment Flexion ROM	40.80 ± 3.023	<0.001	40.78 ± 2.684	<0.001	40.53 ± 2.746	<0.001

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Variable	Control Group Mean ± SD	p-value	Group A Mean ± SD	p-value	Group B Mean ± SD	p-value
Post-Treatment Flexion ROM	42.10 ± 3.003		44.97 ± 1.804		44.90 ± 1.751	
Pre-Treatment Extension ROM	14.95 ± 0.815	<0.001	14.87 ± 0.992	<0.001	14.95 ± 1.037	<0.001
Post-Treatment Extension ROM	16.08 ± 2.093		17.75 ± 1.532		18.05 ± 1.463	
Pre-Treatment ODI	44.72 ± 5.918	<0.001	44.75 ± 5.550	<0.001	45.03 ± 5.842	<0.001
Post-Treatment ODI	26.15 ± 8.170		13.43 ± 4.976		14.33 ± 4.428	

Overall, the results indicated a statistically significant improvement in pain, flexibility, and disability scores for all treatment groups, with Group A (Muscle Energy Technique) and Group B (Kaltenborn-Evjenth Orthopedic Manual Therapy) showing more pronounced improvements compared to the Control Group receiving conventional treatment.

DISCUSSION

The discussion of the study's findings, conducted using SPSS for data analysis and determining the level of statistical significance, delved into the effectiveness of different treatments for Chronic Low Back Pain (CLBP). The study was pivotal in understanding the therapeutic approaches for a condition that not only impairs physical functionality but also affects the quality of life and work efficacy of individuals. CLBP, often associated with abnormalities in the muscles and joints of the back, has increasingly been the focus of physical therapy research, as evident in the current study, rather than solely relying on medical management.

The analysis of variance (ANOVA) applied in the study revealed significant improvements in pain level, Range of Motion (ROM), and Oswestry Disability Index (ODI) scores across all three groups: the Control Group receiving conventional treatment, Group A treated with Muscle Energy Technique (MET), and Group B with Kaltenborn-Evjenth Orthopedic Manual Therapy (KEOMT). Notably, Groups A and B demonstrated a statistically significant improvement compared to the Control Group (P=0.00), highlighting the efficacy of both MET and KEOMT in reducing pain, enhancing ROM, and lowering functional disability in CLBP patients (15).

When examining the reduction in pain intensity, all three groups showed statistically significant decreases post-intervention. However, a more pronounced reduction in pain was observed in Groups A and B compared to the Control Group, as indicated by ANOVA for multiple comparisons. The comparison between Groups A and B revealed no statistically significant difference (P>0.05), suggesting that MET and KEOMT are equally effective in alleviating pain. These results align with existing literature, where studies (16, 10) have demonstrated the effectiveness of exercises, mobilizations, and specifically MET in reducing pain in patients with non-specific LBP. Additionally, findings on the efficacy of KEOMT in reducing pain in conditions like Frozen Shoulder further corroborate our results (17). The decrease in pain is hypothesized to be a result of neurophysiological effects, potentially altering pain perception through manual contact and applied movement (18).

Similarly, significant improvements in flexion and extension ROM post-intervention were observed across all groups. However, Groups A and B showed greater increases in ROM compared to the Control Group, with this difference being statistically significant (P=0.00). The correlation between pain reduction and increased ROM is supported by previous findings, such as those by (14) and (12), which reported improvements in ROM in patients with chronic neck pain and CLBP, respectively. Further support for KEOMT's effectiveness in enhancing lumbar spine mobility is found in study (19). Moreover, the efficacy of MET in improving hamstring extensibility was also noted in patients with hamstring injuries (20, 21).

This study's strengths lie in its methodical approach, including the use of randomized control trials and comprehensive data analysis. However, there are limitations, including the study's focus on a specific population, which may affect the generalizability of the results. Moreover, the study did not account for long-term follow-up, which is crucial in understanding the sustained effectiveness of these treatments.

The study provides substantial evidence for the effectiveness of MET and KEOMT in treating CLBP, with both techniques showing significant improvements in pain reduction and ROM. Future research should focus on broader populations and include long-term follow-up to assess the sustained benefits of these treatments. Additionally, exploring the underlying neurophysiological mechanisms of these therapies could provide deeper insights into their effectiveness and guide more targeted treatment strategies for CLBP.

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CONCLUSION

The study conclusively demonstrated that both Muscle Energy Technique (MET) and Kaltenborn-Evjenth Orthopedic Manual Therapy (KEOMT) are effective in significantly reducing pain and increasing range of motion in patients with Chronic Low Back Pain (CLBP), compared to conventional treatment methods. These findings hold substantial implications for the field of physical therapy, suggesting that incorporating these specific manual therapies could enhance treatment outcomes for CLBP. This insight is particularly relevant for practitioners seeking alternative or complementary approaches to traditional pain management strategies, emphasizing the potential of MET and KEOMT as valuable tools in the therapeutic arsenal against CLBP. However, it's important to consider the need for further research, including long-term follow-up studies, to fully understand the durability of these benefits and to explore the underlying mechanisms contributing to their effectiveness.

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