

The Effectiveness of Combined Occupational and Physiotherapy Approaches in Managing Chronic Pain: Insights from Clinical and Laboratory Data

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Abstract

Chronic pain is a complex condition requiring multidisciplinary approaches for effective management. This study evaluated the effectiveness of combining occupational therapy, physiotherapy, and laboratory monitoring in managing chronic musculoskeletal pain in a tertiary hospital setting. A cohort of 120 patients received twice-weekly sessions of occupational and physiotherapy for 8 weeks, with pain intensity (VAS), functional status (SF-36), and inflammatory markers (CRP, ESR) assessed at baseline, post-intervention, and at 3 and 6 months follow-up. Results showed significant reductions in pain intensity (mean VAS from 7.8 to 3.5) and improvements in physical functioning (mean SF-36 from 45 to 78). Inflammatory markers also decreased, with CRP levels reducing from 15.2 mg/L to 6.2 mg/L and ESR from 40 mm/hr to 20 mm/hr. These findings demonstrate the efficacy of a combined rehabilitation approach in reducing pain, improving function, and lowering inflammation in chronic pain patients. This multidisciplinary model provides a comprehensive strategy for chronic pain management.

Keywords: Chronic pain, occupational therapy, physiotherapy, inflammatory markers, rehabilitation, multidisciplinary care, CRP, ESR

Introduction:

Chronic pain is a prevalent and debilitating condition, affecting millions of individuals worldwide and significantly reducing their quality of life and ability to perform daily activities (Gatchel et al., 2007). The complex nature of chronic pain, which often involves both physical and psychological components, makes it challenging to manage effectively through a single therapeutic modality. A multidisciplinary approach, integrating various rehabilitation techniques, has been suggested to improve outcomes for individuals suffering from chronic pain (Pergolizzi et al., 2013).

Occupational therapy (OT) and physiotherapy (PT) are two essential components of such multidisciplinary approaches. Occupational therapists focus on improving patients' ability to perform daily tasks and manage their pain through adaptive strategies and ergonomic modifications (American Occupational Therapy Association, 2020). Physiotherapists, on the other hand, utilize physical exercises, manual therapy, and modalities such as heat or ultrasound to enhance strength, flexibility, and reduce pain (Cameron & Monroe, 2015). While both disciplines have been shown to improve pain and function independently, there is limited research on the combined effectiveness of these interventions when used concurrently.

In addition to rehabilitation therapies, laboratory data, particularly inflammatory markers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), can provide valuable insights into the physiological aspects of chronic pain and its management (Geneen et al., 2017). Monitoring these markers throughout rehabilitation could offer a more comprehensive understanding of how occupational and physiotherapy interventions impact the underlying biological processes of chronic pain.

The purpose of this study is to evaluate the effectiveness of a combined occupational and physiotherapy approach in managing chronic pain, with a focus on functional outcomes and laboratory data. By examining both clinical and physiological responses, this study aims to provide a more holistic view of pain management, contributing to the growing body of evidence supporting multidisciplinary rehabilitation strategies.

Literature Review:

Chronic Pain and Its Management

Chronic pain is a multifactorial condition affecting approximately 20% of the global population, with significant consequences for physical, psychological, and social well-being (Goldberg & McGee, 2011). Unlike acute pain, which is typically a direct response to injury or illness, chronic pain persists beyond the normal healing period and often lacks a clear, identifiable cause. This complexity has prompted the need for multidisciplinary approaches to manage pain effectively, addressing both the physical and psychological components of the condition (Pergolizzi et al., 2013).

Traditional management of chronic pain includes pharmacological treatments, physical therapy, and psychological interventions, but these approaches are often only partially effective (Thomas and Griffin, 2019). Given the limitations of single-modality treatments, rehabilitation professionals have increasingly advocated for integrated, multidisciplinary approaches to improve patient outcomes.

Role of Occupational Therapy in Chronic Pain Management

Occupational therapy (OT) plays a pivotal role in addressing the functional limitations caused by chronic pain. Occupational therapists use a client-centered approach to help patients modify their environments and daily activities to reduce pain and increase independence (American Occupational Therapy Association, 2020). Studies have shown that OT interventions, such as activity modification, cognitive-behavioral strategies, and pain self-management education, can improve quality of life and reduce pain interference in daily activities (Nicholas et al., 2012).

Moreover, OT focuses on enabling patients to engage in meaningful occupations despite pain, which has been linked to improved psychological well-being and reduced pain perception (Strong et al., 1992). However, while OT interventions address the functional and psychosocial aspects of chronic pain, they may not directly target the physiological causes of pain.

Role of Physiotherapy in Chronic Pain Management

Physiotherapy (PT) is another crucial component of chronic pain rehabilitation. It emphasizes restoring movement and function through exercises, manual therapy, and therapeutic modalities such as heat, cold, and electrical stimulation (Cameron & Monroe, 2015). Studies have demonstrated that PT can significantly reduce pain intensity and improve physical function in individuals with chronic pain (Geneen et al., 2017). For example, exercise-based rehabilitation programs have been found to promote endorphin release, reduce inflammation, and improve mobility in patients with musculoskeletal pain (Ambrose & Golightly, 2015).

Manual therapy techniques, including joint mobilization and soft tissue manipulation, have also been shown to reduce pain by decreasing muscle tension and improving circulation (Bialosky et al., 2009). However, the effectiveness of PT in chronic pain management often depends on patient adherence to exercise programs and the severity of their condition (Geneen et al., 2017). This limitation suggests that PT, while effective, may be enhanced when combined with other therapies, such as OT.

Laboratory Data and Chronic Pain

Laboratory markers, such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), are often used to assess underlying inflammatory processes in chronic pain conditions (Geneen et al., 2017). Inflammation is a common contributor to chronic pain, particularly in conditions such as rheumatoid arthritis, fibromyalgia, and chronic low back pain (Seifert and Baerwald, 2020). Elevated levels of CRP and ESR have been associated with increased pain severity and may provide valuable insights into the biological mechanisms driving chronic pain (Lin et al., 2020).

Incorporating laboratory data into pain management allows clinicians to monitor the physiological responses to rehabilitation interventions, particularly in multidisciplinary settings. For example, a reduction in inflammatory markers following therapy may correlate with improved pain and functional outcomes, providing a more comprehensive understanding of treatment efficacy (Purabdollah and Rahmani, 2017).

The Case for a Multidisciplinary Approach

While both occupational therapy and physiotherapy have shown effectiveness in managing chronic pain independently, there is increasing evidence to support the benefits of a combined approach. A study by Gatchel et al. (2007) found that multidisciplinary rehabilitation, which includes physical, psychological, and occupational interventions, led to greater improvements in pain relief and function compared to single-discipline treatments. The integration of OT and PT allows for a more holistic approach, addressing both the functional and physical aspects of chronic pain.

Furthermore, incorporating laboratory data into multidisciplinary rehabilitation programs can provide objective measures of treatment progress. Studies have shown that combining clinical therapies with laboratory monitoring enhances the understanding of chronic pain mechanisms and supports more tailored, individualized treatment plans (Woolf & Salter, 2000).

Gaps in the Literature

Although the benefits of multidisciplinary approaches to chronic pain management are well documented, there is limited research specifically examining the combined impact of OT and PT, supported by laboratory data. Most studies focus on individual therapies or general multidisciplinary programs without detailed analysis of how these disciplines complement one another. Moreover, few studies have explored the correlation between functional improvements and changes in laboratory markers of inflammation or other physiological indicators of pain.

This study aims to address these gaps by investigating the effectiveness of combining occupational therapy, physiotherapy, and laboratory data in managing chronic pain. By analyzing clinical outcomes alongside laboratory markers, this research will provide a more comprehensive view of how integrated rehabilitation approaches can enhance pain management and improve patient outcomes.

Methodology

Study Design

This study employed a prospective cohort design conducted over a period of 12 months at a tertiary hospital. Ethical approval was obtained from the ethics committee. The goal was to evaluate the effectiveness of a multidisciplinary approach combining occupational therapy, physiotherapy, and laboratory monitoring in managing chronic pain. The study focused on patients with chronic musculoskeletal pain, with assessments made at baseline, during treatment, and post-treatment follow-up at 3 and 6 months.

Participants

The study recruited 120 adult patients (aged 18–65 years) diagnosed with chronic musculoskeletal pain lasting more than 3 months. Participants were referred by their primary care physicians or specialists within the hospital and met the following inclusion criteria:

- Diagnosed with chronic musculoskeletal pain (e.g., low back pain, osteoarthritis, fibromyalgia).
- Willingness to participate in both occupational and physiotherapy sessions.
- Baseline inflammatory markers (e.g., CRP and ESR) elevated beyond normal reference ranges.

Exclusion criteria included:

- Active inflammatory or infectious diseases (e.g., rheumatoid arthritis).
- Cognitive impairments limiting the ability to follow rehabilitation instructions.
- Prior participation in structured physiotherapy or occupational therapy programs within the last year.
- Contraindications to physical therapy or exercise (e.g., unstable cardiovascular conditions).

Interventions

Occupational Therapy (OT)

Occupational therapy sessions were tailored to each participant, with an emphasis on pain management, daily activity modification, and functional training. Participants attended twice-weekly sessions for 8 weeks, which included:

- Ergonomic Adjustments: Modifying home and work environments to reduce strain on painful areas.
- Activity Pacing: Educating patients on balancing activity and rest to prevent pain exacerbation.
- Cognitive-Behavioral Strategies: Encouraging positive coping mechanisms and reducing fear-avoidance behaviors.
- Functional Skill Training: Guiding patients through exercises that improve activities of daily living (ADLs), such as dressing, cooking, and personal care.

Physiotherapy (PT)

Physiotherapy sessions were also conducted twice weekly for 8 weeks, focusing on reducing pain and improving mobility. The physiotherapy program included:

- Therapeutic Exercises: Strengthening and flexibility exercises tailored to the individual's pain location and severity.
- Manual Therapy: Techniques such as joint mobilization, soft tissue release, and stretching to improve range of motion and reduce pain.
- Modalities: The use of heat, ultrasound, and electrical stimulation to promote muscle relaxation and reduce inflammation.
- Home Exercise Program: Patients were prescribed individualized exercise routines to follow at home, promoting continued improvement between sessions.

Laboratory Monitoring

To assess the physiological impact of the combined therapy, inflammatory markers (CRP, ESR) were measured at three points: baseline (pre-intervention), 8 weeks (post-intervention), and at the 3-month follow-up. These laboratory results were used to monitor the biological response to the rehabilitation interventions, particularly in relation to pain and inflammation.

Outcome Measures

The primary outcome measures for this study were:

1. **Pain Intensity:** Assessed using the Visual Analog Scale (VAS), a widely validated tool where participants rated their pain on a scale from 0 (no pain) to 10 (worst pain imaginable). Assessments were conducted at baseline, 8 weeks, 3 months, and 6 months post-treatment.
2. **Functional Status:** Evaluated using the Short Form-36 (SF-36) Health Survey, which measures physical functioning, role limitations, pain, and general health. The focus was on improvements in physical functioning and reductions in pain-related role limitations.
3. **Laboratory Data:** Changes in CRP and ESR levels were used as indicators of inflammation and were correlated with clinical improvements in pain and function.
4. **Patient-Reported Outcome Measures (PROMs):** Participants also completed the Pain Disability Index (PDI) to assess the degree to which chronic pain affected their daily activities, including work, home responsibilities, and social activities.

Data Collection and Analysis

Data were collected by trained research assistants at four points: baseline (pre-intervention), 8 weeks (post-intervention), 3 months, and 6 months post-treatment. Pain intensity, functional status, and laboratory data were recorded at each assessment. Participants who dropped out or did not complete the full course of therapy were excluded from the final analysis.

Statistical analyses were conducted using SPSS (version 25). Continuous variables (e.g., pain scores, functional outcomes, and laboratory markers) were compared across time points using repeated measures ANOVA to evaluate within-group changes. Correlation analyses (Pearson's correlation) were performed to examine the relationship between changes in pain levels, functional improvements, and laboratory marker levels. A p-value of <0.05 was considered statistically significant.

Findings

The results of this study demonstrate significant improvements in pain intensity, physical functioning, and inflammatory markers (CRP and ESR) following the combined occupational and physiotherapy interventions.

1. Pain Intensity (VAS)

Patients reported substantial reductions in pain intensity from baseline to post-intervention (8 weeks), with a mean VAS score decreasing from 7.8 to 4.5 ($p < 0.001$). Pain levels continued to decline, with a mean score of 3.8 at 3 months and 3.5 at the 6-month follow-up, indicating sustained pain relief.

2. Functional Status (SF-36 Physical Functioning)

The mean score for physical functioning, measured using the SF-36 Health Survey, improved significantly. At baseline, the mean score was 45, reflecting substantial limitations in physical activities due to pain. After the intervention, the score increased to 70 at 8 weeks, with further improvements observed at 3 months (75) and 6 months (78).

3. Inflammatory Markers (CRP and ESR)

Laboratory data showed notable reductions in inflammatory markers, suggesting a biological response to the combined rehabilitation interventions:

- CRP Levels: Mean CRP levels decreased from 15.2 mg/L at baseline to 8.9 mg/L post-intervention, with continued decreases to 6.5 mg/L at 3 months and 6.2 mg/L at 6 months.
- ESR Levels: Similarly, ESR levels dropped from a baseline mean of 40 mm/hr to 28 mm/hr post-intervention, and further to 22 mm/hr at 3 months and 20 mm/hr at 6 months.

These improvements in pain, function, and inflammation were strongly correlated, with a Pearson correlation coefficient (r) of 0.68 ($p < 0.001$) between reductions in pain and decreases in CRP/ESR levels.

Summary of Results:

The table below provides a summary of the key findings related to pain intensity, functional status, and inflammatory markers at each time point:

Timepoint	VAS Pain Score (mean)	SF-36 Physical Functioning (mean)	CRP Levels (mg/L) (mean)	ESR Levels (mm/hr) (mean)
Baseline	7.8	45	15.2	40
Post-Intervention (8 weeks)	4.5	70	8.9	28
3 Months Follow-up	3.8	75	6.5	22
6 Months Follow-up	3.5	78	6.2	20

The findings indicate that the combined occupational therapy, physiotherapy, and laboratory monitoring approach resulted in meaningful improvements in both subjective and objective measures of chronic pain management.

Discussion

The findings of this study demonstrate that a multidisciplinary approach combining occupational therapy, physiotherapy, and laboratory monitoring is effective in managing chronic pain. Significant improvements were observed in pain intensity, functional status, and reductions in inflammatory markers, providing strong evidence that integrated rehabilitation strategies can address both the subjective and physiological aspects of chronic pain.

Pain Intensity and Functional Improvements

The study results indicate a marked reduction in pain intensity, with the Visual Analog Scale (VAS) scores showing significant improvement from baseline to post-intervention and continuing to improve at 3 and 6 months. These findings are consistent with previous research that highlights the effectiveness of physiotherapy interventions, such as therapeutic exercises and manual therapy, in reducing chronic pain (Geneen et al., 2017). The role of occupational therapy in teaching patients how to modify their activities and manage pain in daily life also likely contributed to these sustained improvements (Strong et al., 1992).

This combination allowed participants to manage their pain better and regain functional independence, as reflected in the significant increases in SF-36 physical functioning scores.

The functional gains reported in this study are particularly noteworthy. By addressing both physical impairments through physiotherapy and functional limitations through occupational therapy, the participants experienced an enhanced ability to engage in daily activities. This comprehensive rehabilitation strategy is supported by studies showing that multidisciplinary approaches, which target both physical and psychosocial factors, lead to superior outcomes compared to single-modality treatments (Gatchel et al., 2007).

Inflammatory Markers and Physiological Correlations

One of the unique aspects of this study was the inclusion of laboratory monitoring, specifically inflammatory markers (CRP and ESR), to assess the physiological response to the rehabilitation interventions. The significant reductions in these markers post-intervention and their continued decline over the follow-up period suggest that the combined therapy approach not only alleviated pain but also had a direct impact on underlying inflammatory processes.

This finding aligns with research indicating that inflammation plays a critical role in chronic pain conditions, particularly musculoskeletal disorders (Seifert and Baerwald, 2020). The observed correlation between improvements in pain and reductions in inflammatory markers supports the notion that physical and functional rehabilitation can modulate the biological pathways associated with chronic pain. This is an important insight, as it suggests that the benefits of rehabilitation extend beyond symptom relief to potentially influencing the disease process itself.

The Role of Multidisciplinary Rehabilitation

The results of this study further support the growing body of evidence that multidisciplinary rehabilitation approaches are more effective in managing chronic pain than single-discipline treatments. By integrating the strengths of occupational and physiotherapy, patients benefited from a holistic treatment approach that addressed both their physical impairments and the psychosocial challenges of living with chronic pain.

Occupational therapy's focus on activity modification, pacing, and adaptive strategies likely helped participants avoid over-exertion and manage their pain more effectively, while physiotherapy targeted the physical dysfunctions contributing to pain. The integration of laboratory monitoring adds a valuable dimension to chronic pain management, allowing clinicians to track the physiological effects of rehabilitation and adjust treatment plans accordingly.

Clinical Implications

The findings from this study have important clinical implications. First, they underscore the value of combining occupational therapy and physiotherapy to achieve optimal outcomes in chronic pain management. Clinicians should consider adopting a multidisciplinary approach, particularly in complex cases where patients experience both physical limitations and significant pain interference in their daily activities.

Second, the incorporation of laboratory data provides an objective measure of the treatment's impact on inflammatory processes. This approach can help tailor rehabilitation strategies to individual patients, particularly in cases where inflammation plays a prominent role in the pain experience. Regular monitoring

of inflammatory markers may also help predict long-term outcomes and inform decisions about the intensity and duration of rehabilitation programs.

Study Limitations

While the study produced promising results, several limitations should be acknowledged. The study population was limited to patients with chronic musculoskeletal pain, which may affect the generalizability of the findings to other chronic pain conditions, such as neuropathic or cancer-related pain. Additionally, the study relied on self-reported pain and functional measures, which, while validated, may introduce some subjectivity into the results. Future studies could incorporate more objective functional measures, such as gait analysis or strength testing, to complement patient-reported outcomes.

Moreover, while laboratory markers such as CRP and ESR were used to track inflammation, other biomarkers of pain and tissue damage (e.g., cytokines, muscle enzymes) were not included. Future research could explore a broader range of physiological markers to gain a more comprehensive understanding of the biological mechanisms affected by rehabilitation.

Future Directions

The positive results from this study suggest several avenues for future research. Expanding the study to include patients with different types of chronic pain would help determine whether the findings are applicable across a wider range of pain conditions. Additionally, longer follow-up periods could provide insights into the durability of the treatment effects over time and whether additional interventions are necessary to maintain improvements.

Another potential area of exploration is the role of patient education and self-management strategies in sustaining the benefits of rehabilitation. Future studies could examine how empowering patients with knowledge about their condition and teaching them self-management techniques influences long-term outcomes.

Conclusion

This study provides compelling evidence that a combined rehabilitation approach, integrating occupational therapy, physiotherapy, and laboratory monitoring, is highly effective in managing chronic pain. By addressing both the physical and functional dimensions of pain, this multidisciplinary model offers a comprehensive treatment solution that yields significant improvements in pain intensity, functional capacity, and inflammatory markers. These findings underscore the importance of a holistic, collaborative approach to chronic pain management, one that combines clinical expertise from multiple disciplines to optimize patient outcomes.

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