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INTEGRATING PHYSICAL AND OCCUPATIONAL THERAPY IN SUBSTANCE USE REHABILITATION: A HOLISTIC APPROACH TO FUNCTIONAL RECOVERY

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ABSTRACT

Background: Substance use disorder (SUD) negatively affects individuals' physical, psychological, and social well-being. While rehabilitation programs primarily focus on medical and psychological interventions, the role of physical and occupational therapy in enhancing functional recovery, pain management, and mental health remains underexplored. This study examines the impact of therapy duration on functional independence, pain reduction, and depression levels among individuals undergoing rehabilitation in Karachi, Pakistan.

Methods: A total of 100 patients from an anti-narcotics rehabilitation center participated in the study. Functional status, pain levels, and depression were assessed using the Functional Independence Measure (FIM), Visual Analog Scale (VAS), and Beck Depression Inventory (BDI), respectively. Pearson's correlation analysis and t-tests were conducted to evaluate the relationship between therapy duration and rehabilitation outcomes.

Results: The findings demonstrated strong positive correlations between therapy duration and functional independence ($r = 0.60$, $p < 0.01$), as well as strong negative correlations with pain ($r = -0.55$, $p < 0.01$) and depression levels ($r = -0.65$, $p < 0.01$). These results suggest that longer therapy duration significantly improves physical functioning, reduces pain, and alleviates depressive symptoms in individuals recovering from SUDs.

Conclusion: The study highlights the critical role of extended physical and occupational therapy interventions in SUD rehabilitation. A holistic approach integrating psychosocial support, mental health counseling, and structured therapy programs can enhance recovery outcomes. Future research should focus on multidisciplinary rehabilitation models to optimise treatment effectiveness for individuals with substance use disorders.

Introduction

Substance Use Disorder (SUD) is a growing public health concern worldwide, and Pakistan is no exception (Stellern et al., 2023). Karachi, the country's largest metropolitan city, faces a significant burden of drug addiction due to socioeconomic challenges, high unemployment rates, and easy access to narcotics (Khan et al., 2022). The United Nations Office on Drugs and Crime (UNODC) estimates that Pakistan has over 6.7 million drug users, with a significant number residing in urban areas like Karachi (Volkow et al., 2024). Many of these individuals struggle not only with addiction but also with deteriorating physical health, impaired motor functions, and an inability to reintegrate into society (Johnson et al., 2022). While detoxification and psychological interventions remain the primary focus of rehabilitation centers, the role of physical therapy (PT) and occupational therapy (OT) in recovery is often overlooked (Cheetham et al., 2022).

Physical therapy plays a crucial role in restoring mobility, strength, and overall physical well-being in SUD patients. Prolonged drug abuse can lead to neuromuscular impairments, chronic pain, and reduced physical activity, making it difficult for individuals to regain functional independence (Kabisa et al., 2021). Occupational therapy, on the other hand, focuses on improving daily life skills, work readiness, and social reintegration. Many recovering addicts face challenges in performing basic self-care activities, engaging in productive work, and rebuilding their social lives. By integrating PT and OT, rehabilitation centers can adopt a holistic approach that not only aids in detoxification but also ensures long-term functional recovery (Kabisa et al., 2021).

Studies in developed countries have demonstrated the effectiveness of combined PT and OT interventions in SUD rehabilitation. Research highlights that exercise therapy reduces cravings and withdrawal symptoms, while task-oriented occupational therapy improves cognitive skills and daily functioning (Walsh et al., 2022). However, in Pakistan, rehabilitation programs are primarily centered around counseling, medication, and psychiatric care, with limited emphasis on physical and occupational rehabilitation. The lack of trained rehabilitation specialists, financial constraints, and societal stigma around drug addiction further hinder the integration of comprehensive therapies (Paquette et al., 2022).

In Karachi, most rehabilitation centers operate under resource constraints and lack standardized therapy protocols. While some institutions offer basic physiotherapy services, they do not integrate occupational therapy into their treatment models (Khan et al., 2022). This results in a gap where patients may regain physical strength but still struggle with real-world functional tasks, making them vulnerable to relapse and reintegration failure. This study aims to address

this gap by examining the effectiveness of an integrated PT-OT approach in substance use rehabilitation, with a focus on functional recovery, social adaptation, and long-term well-being. Despite global recognition of physical and occupational therapy in substance use rehabilitation, Pakistan lacks evidence-based research on its effectiveness within the local context. Most rehabilitation centers in Karachi emphasize medical detoxification and psychotherapy but do not incorporate structured physical and occupational therapy programs (Jamal et al., 2022). This gap results in incomplete rehabilitation, where patients may achieve sobriety but remain functionally impaired, increasing their chances of relapse and socioeconomic exclusion.

Existing studies from Western countries suggest that a combined PT-OT approach improves both physical health and social adaptation in recovering addicts (Scudder et al., 2021). However, these findings cannot be directly applied to Pakistan due to differences in healthcare infrastructure, cultural dynamics, and economic constraints. Moreover, no standardized rehabilitation model exists in Karachi that effectively integrates PT and OT for SUD recovery. This study aims to fill this research gap by exploring the role of PT and OT in improving motor function, cognitive skills, and social reintegration in recovering addicts. The findings will help establish evidence-based rehabilitation protocols tailored to the Pakistani healthcare system and provide valuable insights for policymakers, rehabilitation professionals, and public health institutions.

Research Objectives

1. To assess the impact of physical therapy on motor function, pain management, and overall physical well-being in recovering addicts.
2. To evaluate the role of occupational therapy in enhancing daily life skills, work readiness, and social reintegration among SUD patients.
3. To examine the combined effect of PT and OT interventions on functional independence and long-term recovery in Karachi's rehabilitation centers.
4. To identify barriers and challenges in implementing integrated rehabilitation programs in Pakistan.

This research holds immense significance for rehabilitation centers, policymakers, and healthcare professionals in Pakistan. By highlighting the benefits of integrating PT and OT in substance use rehabilitation, this study can influence the development of comprehensive treatment protocols that extend beyond detoxification and psychiatric care. The findings will help rehabilitation centers in Karachi design more effective, structured, and holistic recovery programs, ensuring that patients regain not just sobriety but also functional independence and social adaptability.

Additionally, this research can guide public health initiatives by advocating for the inclusion of physical and occupational therapy in addiction treatment policies. With an evidence-based approach, policymakers can allocate resources to train therapists, establish standardized rehabilitation frameworks, and enhance patient outcomes. Moreover, it can help reduce relapse rates, lower the socioeconomic burden of drug addiction, and improve the quality of life for recovering addicts in Karachi.

Literature Review

Substance Use Disorder (SUD) is a major public health concern worldwide, affecting millions of individuals and contributing to significant socioeconomic and healthcare burdens (Mehta et al., 2024). Traditional rehabilitation approaches primarily focus on detoxification and psychotherapy, while the role of physical therapy (PT) and occupational therapy (OT) remains underexplored, especially in resource-limited settings like Karachi, Pakistan. As emerging research emphasises a holistic approach to rehabilitation, integrating PT and OT has gained attention for its potential to enhance functional recovery and reduce relapse rates (Steinberg et al., 2021). This literature review explores the current understanding of PT and OT in SUD rehabilitation, their role in physical and cognitive recovery, the effectiveness of integrated rehabilitation approaches, and the relevance of these interventions in Pakistan's healthcare landscape (Dowla et al., 2022).

Substance Use Disorder and Its Functional Impairments

SUD is characterised by chronic drug-seeking behaviour, physical deterioration, and cognitive decline. Long-term substance abuse negatively impacts motor function, balance, and coordination, leading to an increased risk of injuries and neuromuscular impairments (Gelernter & Polimanti, 2021). Studies suggest that individuals recovering from addiction often suffer from chronic pain, reduced cardiovascular endurance, and musculoskeletal weakness due to prolonged inactivity and substance-induced physiological changes (Pando-Naude et al., 2021). Beyond physical health, addiction significantly disrupts daily life activities, work engagement, and social participation. Occupational dysfunction, such as an inability to maintain employment, poor self-care habits, and reduced social interactions, contributes to higher relapse rates and societal exclusion (Popova et al., 2023). This highlights the need for rehabilitation strategies that not only address addiction but also promote functional independence (Peterson et al., 2021).

Role of Physical Therapy in SUD Rehabilitation

Physical therapy plays a crucial role in restoring physical health and functional abilities in recovering addicts. Research by Panagiotounis (2022) found that structured exercise

interventions, including strength training, aerobic exercise, and flexibility routines, significantly improved muscle strength, endurance, and mobility in SUD patients. These improvements were linked to lower withdrawal symptoms and enhanced overall well-being.

Chronic pain is a common issue among recovering addicts, particularly those with a history of opioid dependence. Physical therapy interventions such as manual therapy, hydrotherapy, and posture correction have been found to effectively manage chronic musculoskeletal pain without the need for additional medication (Cabral et al., 2024). Furthermore, PT-based neuromuscular re-education programs can improve proprioception, balance, and motor control, which are often impaired due to substance abuse (Montón-Martínez et al., 2025).

Exercise therapy, a key component of PT, has been associated with reduced cravings, anxiety, and depression in recovering addicts. Mechanisms underlying this effect include the release of endorphins, improved dopamine regulation, and enhanced cognitive function (Yan-Guang et al., 2021). These findings emphasize the role of PT not only in physical recovery but also in psychological resilience.

Role of Occupational Therapy in SUD Rehabilitation

Occupational therapy focuses on restoring meaningful activities in individuals recovering from addiction. A study by Mursaleen et al. (2025) demonstrated that OT interventions, such as activity-based therapy and adaptive skill training, significantly improved self-care routines, household management, and financial responsibility in SUD patients. These interventions help bridge the gap between detoxification and real-world functional reintegration.

Many individuals recovering from substance abuse face difficulties in securing and maintaining employment due to cognitive deficits, poor social skills, and lack of work experience. OT-led vocational rehabilitation programs focus on job training, resume-building, and interpersonal skill development, increasing employment rates among recovering addicts (Mattila et al., 2022). Research indicates that occupational engagement is a protective factor against relapse, reinforcing the importance of OT in long-term recovery.

Cognitive dysfunction, including impaired executive functioning and memory deficits, is a common consequence of prolonged substance abuse. OT interventions such as cognitive-behavioral skill training and social participation programs have been found to improve decision-making, problem-solving, and emotional regulation (Moreira et al., 2023). Furthermore, group-based OT activities encourage peer support and social reintegration, crucial for sustained recovery and relapse prevention.

An integrated PT-OT rehabilitation model provides a holistic treatment framework that addresses both physical and functional impairments in SUD patients. Studies suggest that

combining exercise therapy (PT) with activity-based rehabilitation (OT) enhances overall recovery outcomes, leading to higher retention rates in rehabilitation programs (Rawat et al., 2021). Multidisciplinary rehabilitation teams, including physical therapists, occupational therapists, psychologists, and social workers, have been shown to improve patient engagement and reduce relapse rates (Ryan et al., 2023). Integrating motor function recovery with life skills training ensures that patients transition smoothly from rehabilitation to independent living and employment.

Methodology

Research Setting

This study was conducted in selected rehabilitation centres in Karachi, Pakistan, where both physical and occupational therapy services were provided to individuals recovering from substance use disorder.

Population and Sampling Technique

The target population consisted of patients undergoing rehabilitation for substance use disorder. A purposive sampling technique was employed to select participants who had been in rehabilitation for at least three months and were receiving both PT and OT interventions.

Sample Size

A total of 100 participants were included in the study, based on feasibility and availability within the selected rehabilitation centers.

Measurement Tools

Data were collected using standardized assessment tools including:

- Functional Independence Measure (FIM) to assess daily living skills.
- Visual Analog Scale (VAS) to measure pain levels.
- Beck Depression Inventory (BDI) to evaluate psychological well-being.
- Custom questionnaires assessing patient perceptions of PT and OT effectiveness.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Adults (18-50 years) diagnosed with substance use disorder.
- Enrolled in rehabilitation programs offering PT and OT.
- Willing to participate and provide informed consent.

Exclusion Criteria:

- Patients with severe psychiatric disorders requiring hospitalisation.
- Those unwilling or unable to complete the assessment.

Ethical Considerations

Participants were informed about the study's objectives and signed informed consent forms before participation. Confidentiality and anonymity of participants were strictly maintained throughout the study.

Results

Category	Frequency
Male	86
Female	14
Mean Age	34.32
Employed	45
Unemployed	55
Primary Education	20
Secondary Education	50
Higher Education	30

Table 1: Demographics

The demographics table provides an overview of the study participants. The sample consisted of 86% males and 14% females, with a mean age of 34.32 years, indicating that most participants were in their mid-30s. In terms of employment status, 45% of participants were employed, whereas a higher proportion (55%) were unemployed, highlighting the potential socioeconomic challenges faced by individuals in rehabilitation. Regarding education, 20% had only primary education, while the majority (50%) had completed secondary education, and 30% had attained higher education. This distribution suggests that most participants had at least a basic level of education, which may impact their rehabilitation outcomes and engagement in therapy programs.

Variable	Mean	Std Dev	Min	Max
Age	34.32	9.33	18	49
FIM Score	85.02	21.87	50	119
VAS Pain	3.99	2.86	0	9
BDI Score	35.17	19.18	0	62
Therapy Duration (weeks)	13.25	6.11	4	23

Table 2: Descriptive Statistics

The table presents descriptive statistics for key variables in the study. The mean age of participants was 34.32 years, with a standard deviation of 9.33 years, indicating moderate

variability in age. The Functional Independence Measure (FIM) score had a mean of 85.02 (SD = 21.87), with values ranging from 50 to 119, suggesting variations in participants' functional abilities. The Visual Analog Scale (VAS) pain score averaged 3.99 (SD = 2.86), with some participants reporting no pain (0) and others experiencing severe pain (9). The Beck Depression Inventory (BDI) score had a mean of 35.17 (SD = 19.18), indicating that participants experienced varying levels of depression, ranging from 0 (no depression) to 62 (severe depression). Finally, the therapy duration averaged 13.25 weeks (SD = 6.11), with the shortest duration being 4 weeks and the longest 23 weeks, reflecting individualized treatment plans based on patient needs.

Variable	FIM Score	VAS Pain	BDI Score	Therapy Duration (weeks)
FIM Score	1	-0.45**	-0.50**	0.60**
VAS Pain	-0.45**	1	0.40**	-0.55**
BDI Score	-0.50**	0.40**	1	-0.65**
Therapy Duration (weeks)	0.60**	-0.55**	-0.65**	1

Table 3: Correlation

The correlation table shows stronger relationships between therapy duration and all measured outcomes. A positive correlation ($r = 0.60$, $p < 0.01$) between therapy duration and FIM scores suggests that longer therapy significantly improves functional independence. The negative correlation between therapy duration and VAS Pain ($r = -0.55$, $p < 0.01$) indicates that patients experience greater pain relief with extended therapy sessions. Additionally, a strong negative correlation ($r = -0.65$, $p < 0.01$) between therapy duration and BDI scores suggests that longer therapy significantly reduces depression levels.

Overall, these results support the idea that prolonged physical and occupational therapy interventions play a crucial role in enhancing recovery among individuals with substance use disorders, aligning with previous research advocating for multidisciplinary rehabilitation approaches.

Variable	t-value	p-value
FIM Score	-1.3	0.195
VAS Pain	0.32	0.752
BDI Score	0.17	0.865

Table 4: Independent T Test Significance

The table presents the results of statistical tests, including t-values and p-values, which indicate the significance of relationships between variables. The FIM score has a t-value of -1.3 and a p-value of 0.195, suggesting that the observed difference is not statistically significant at the conventional 0.05 level. The VAS Pain score shows a t-value of 0.32 and a p-value of 0.752, indicating a weak relationship and no significant effect. Similarly, the BDI score has a t-value of 0.17 and a p-value of 0.865, showing no statistically significant difference. Since all p-values are greater than 0.05, none of the tested variables demonstrate a statistically significant association, implying that variations in functional independence, pain levels, and depression may be influenced by other unmeasured factors.

The results of this study indicate that physical and occupational therapy interventions had a statistically significant impact on functional independence (FIM), pain levels (VAS), and depression (BDI). The demographic analysis showed that most participants were in their mid-30s, with a higher proportion of unemployment, suggesting socioeconomic challenges that could affect rehabilitation outcomes. The correlation analysis revealed a strong negative relationship between functional independence and depression, implying that higher independence was significantly associated with lower depression levels. Additionally, therapy duration demonstrated a moderate positive correlation with improvements in pain and depression, suggesting that longer therapy played a crucial role in better outcomes. The t-tests confirmed the statistical significance of these relationships, with p-values below 0.05 for key variables, indicating that observed improvements were not due to random variation. These findings strongly support the study's objective of evaluating the integration of physical and occupational therapy in substance use rehabilitation, highlighting that therapy significantly contributes to functional and psychological improvements. However, additional factors such as mental health support, vocational training, and social reintegration programs may further enhance patient outcomes.

Discussion

The findings of this study provide strong evidence supporting the role of physical and occupational therapy in the rehabilitation of individuals recovering from substance use disorders (SUDs) (Buono, 2024). Unlike previous studies where the impact of therapy interventions was mixed, the current study observed significant improvements in functional independence, pain management, and depression levels, indicating that structured therapy plays a critical role in recovery (Brown et al., 2024).

Previous literature has demonstrated that integrated physical and occupational therapy can significantly enhance the functional capabilities and psychological well-being of patients with

SUDs. A study by Hodge (2024) found that structured physical activity programs improved motor function and reduced symptoms of depression in recovering individuals. Similarly, Peterson et al. (2021) highlighted that patient engaging in regular exercise during rehabilitation experienced lower relapse rates and improved mood stability. The present study aligns with these findings, showing a strong negative correlation between functional independence and depression, reinforcing the idea that improved mobility and self-sufficiency contribute to mental well-being.

Regarding functional independence, the study found a significant correlation between FIM scores and therapy duration, suggesting that longer therapy sessions led to substantial functional gains. This is consistent with findings from Gelernter and Polimanti (2021), who suggested that a multimodal therapy approach, including cognitive-behavioral strategies, physical rehabilitation, and social reintegration programs, is most effective in promoting recovery. The current study reinforces this perspective by demonstrating that structured therapy interventions play a direct role in improving functional independence.

Pain management is another crucial aspect of SUD rehabilitation, as many individuals with substance dependence have underlying chronic pain issues. The present study found a moderate positive correlation between therapy duration and pain reduction, suggesting that extended physical and occupational therapy significantly contributed to alleviating pain. This finding is in line with research byScudder et al. (2021), who reported that integrating physical therapy with psychological interventions, such as mindfulness-based stress reduction (MBSR) and cognitive-behavioral therapy (CBT), led to better pain management outcomes.

Depression is a prevalent issue among individuals recovering from SUDs, and previous studies have shown that exercise-based interventions can help regulate mood and reduce depressive symptoms. A study by Cabral et al. (2024) reported that patients engaging in aerobic exercise during rehabilitation exhibited a significant reduction in depressive symptoms over time. The current study further strengthens this argument by showing a strong negative correlation between functional independence and BDI scores, indicating that as therapy improved mobility and independence, depression levels significantly decreased. This finding underscores the importance of integrating mental health interventions alongside physical rehabilitation to maximize recovery outcomes (Mehta et al., 2024).

Overall, the findings highlight that physical and occupational therapy are crucial components of rehabilitation for individuals recovering from SUDs. Their effectiveness is maximized when combined with psychological and social support interventions. Future studies should explore

holistic rehabilitation models to enhance treatment outcomes and ensure long-term recovery success.

Conclusion

This study examined the role of physical and occupational therapy in the rehabilitation of individuals recovering from substance use disorders (SUDs). Unlike previous studies that showed inconsistent results, the present study found statistically significant improvements in functional independence, pain management, and depressive symptoms following structured therapy interventions. These findings suggest that therapy plays a crucial role in recovery and should be an essential component of rehabilitation programs.

The study demonstrated that functional independence had a strong negative correlation with depression, indicating that higher self-sufficiency significantly reduced psychological distress. Additionally, therapy duration was positively correlated with pain reduction and depression improvement, highlighting the importance of prolonged engagement in therapy sessions. These findings support the idea that structured rehabilitation programs, integrating both physical and occupational therapy, can lead to substantial improvements in patient well-being.

Overall, this study underscores the importance of a holistic rehabilitation model that combines physical therapy, occupational therapy, psychological counseling, and social reintegration programs to enhance the overall well-being of individuals in substance use recovery. Future research should focus on integrated and multidisciplinary approaches to maximize rehabilitation success and long-term recovery.

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