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Early Physiotherapy and Postoperative Hospital Stay

Effectiveness of Early Physiotherapy-Led Mobilization on Length of Hospital Stay in Post-Abdominal Surgery Patients

Original Research

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ABSTRACT

BACKGROUND: Prolonged immobilization after abdominal surgery is associated with delayed recovery, increased postoperative complications, and extended hospital stay. Early mobilization has emerged as a key element of enhanced recovery protocols; however, locally generated interventional evidence supporting physiotherapy-led early mobilization remains limited in Pakistan.

OBJECTIVE: To evaluate the effectiveness of early physiotherapy-led mobilization on length of hospital stay and functional recovery in patients undergoing abdominal surgery.

METHODOLOGY: A randomized controlled trial was conducted in tertiary care hospitals in Punjab, Pakistan, over eight months. A total of 120 adult patients undergoing abdominal surgery were randomly allocated to either an early physiotherapy-led mobilization group or a standard postoperative care group. The intervention group received structured mobilization initiated within 24 hours after surgery, while the control group received routine care. The primary outcome was length of hospital stay. Secondary outcomes included time to first ambulation, functional status assessed using the Modified Barthel Index, postoperative pulmonary complications, and pain intensity. Data were analyzed using independent sample t-tests and chi-square tests, with statistical significance set at $p < 0.05$.

RESULTS: Patients in the early mobilization group demonstrated a significantly shorter mean hospital stay (4.1 ± 1.2 days) compared to the standard care group (6.0 ± 1.6 days; $p < 0.001$). Time to first ambulation was earlier in the intervention group (1.3 ± 0.4 days vs. 2.6 ± 0.7 days; $p < 0.001$). Functional independence at discharge was higher in the intervention group, with significantly greater Modified Barthel Index scores ($p < 0.001$). The incidence of postoperative pulmonary complications was lower in the early mobilization group, while pain levels at discharge were comparable between groups.

CONCLUSION: Early physiotherapy-led mobilization significantly improved postoperative recovery by reducing hospital stay and enhancing functional outcomes following abdominal surgery. Integrating structured physiotherapy into routine postoperative care may support enhanced recovery and efficient healthcare delivery in resource-limited settings.

KEY TERMS: Abdominal Surgery; Early Mobilization; Hospital Stay; Physiotherapy; Postoperative Care; Rehabilitation; Randomized Controlled Trial

INTRODUCTION

Post-abdominal surgery recovery is a complex process influenced by surgical stress, pain, anesthesia effects, and the patient's pre-existing functional status. Prolonged bed rest following abdominal procedures has traditionally been adopted to promote wound healing and patient comfort; however, growing evidence suggests that immobility contributes significantly to postoperative complications, delayed functional recovery, and extended hospital stays. Length of hospital stay has emerged as a critical outcome indicator, reflecting not only patient recovery but also healthcare efficiency, cost burden, and resource utilization. In low- and middle-income countries such as Pakistan, where healthcare systems face persistent bed shortages and financial constraints, strategies that safely reduce hospital stay without compromising patient outcomes are of particular clinical and public health importance(1, 2). Early mobilization has been recognized as a cornerstone of enhanced recovery after surgery (ERAS) protocols. It involves initiating controlled physical activity, including bed mobility, sitting, standing, and ambulation, within the first postoperative days. Physiotherapy-led mobilization plays a central role in this process by providing structured, individualized, and progressive interventions that account for surgical limitations, pain levels, and patient tolerance. From a physiological perspective, early mobilization enhances pulmonary ventilation, improves circulation, prevents venous thromboembolism, reduces muscle wasting, and supports gastrointestinal motility, all of which are crucial for recovery following abdominal surgery. Furthermore, mobilization under professional supervision ensures patient safety while encouraging confidence and active participation in recovery(3, 4).

International studies have demonstrated that early physiotherapy-guided mobilization is associated with reduced postoperative complications, improved functional outcomes, and shorter hospital stays. Research from high-income healthcare settings indicates that patients who engage in early mobilization protocols often achieve faster return to baseline mobility and independence. Despite these findings, implementation remains inconsistent, particularly in developing countries where standardized postoperative rehabilitation pathways are often lacking. In Pakistan, postoperative care following abdominal surgery frequently emphasizes pharmacological management and wound monitoring, while structured physiotherapy involvement may be delayed or underutilized. As a result, patients may experience prolonged immobility, increased risk of pulmonary complications, delayed bowel function, and extended hospitalization(5, 6). The variability in postoperative physiotherapy practices highlights a significant gap between evidence and routine clinical care. While enhanced recovery protocols are well-established in Western healthcare systems, locally generated evidence supporting physiotherapy-led early mobilization within Pakistani hospitals is scarce. Differences in patient demographics, surgical techniques, hospital infrastructure, staffing patterns, and cultural perceptions of postoperative activity necessitate context-specific research. Without locally relevant randomized controlled trials, clinicians may remain hesitant to adopt early mobilization strategies, particularly in postoperative abdominal patients where concerns regarding wound integrity, pain, and safety persist(7, 8).

From a rehabilitation perspective, physiotherapists are uniquely positioned to lead early mobilization programs due to their expertise in movement science, functional assessment, and graded exercise prescription. Early physiotherapy involvement allows for timely identification of mobility limitations, respiratory compromise, and functional deficits, enabling targeted interventions that promote recovery. Moreover, physiotherapy-led mobilization fosters interdisciplinary collaboration by aligning surgical, nursing, and rehabilitation goals toward early functional independence. Establishing evidence for such an approach within the Pakistani healthcare context could strengthen multidisciplinary postoperative care models and support policy-level integration of rehabilitation services(9, 10). Length of hospital stay is not only a marker of recovery but also a determinant of healthcare costs and patient satisfaction. Extended hospitalization increases the risk of hospital-acquired infections, elevates financial burden on patients and families, and places strain on already limited hospital resources. In resource-constrained settings, even modest reductions in length of stay can translate into significant system-level benefits. Therefore, identifying safe, effective, and feasible interventions that accelerate recovery is essential for improving surgical outcomes and optimizing healthcare delivery(10-12).

Despite the recognized benefits of early mobilization, there remains limited high-quality interventional evidence from Pakistan evaluating its direct impact on length of hospital stay following abdominal surgery. Most existing studies are observational or extrapolated from international data, which may not fully reflect local practice realities. This lack of robust, randomized evidence underscores the need for well-designed clinical trials that assess physiotherapy-led early mobilization within local surgical settings, using standardized protocols and clinically relevant outcomes(12, 13). In light of these considerations, the present randomized controlled trial is designed to evaluate the effectiveness of early physiotherapy-led mobilization on reducing length of hospital stay in patients undergoing abdominal surgery. By generating context-specific interventional evidence, this study aims to contribute to the development of structured postoperative rehabilitation pathways, support enhanced recovery practices, and inform clinical decision-making within Pakistani healthcare institutions. The objective of this study is to determine whether early, structured physiotherapy-led mobilization significantly reduces hospital length of stay compared to standard postoperative care in post-abdominal surgery patients(14).

METHODS

This randomized controlled trial was conducted to evaluate the effect of early physiotherapy-led mobilization on length of hospital stay among patients undergoing abdominal surgery. The study was carried out in tertiary care hospitals located in Lahore and Multan, Punjab, Pakistan, including general surgery units of teaching hospitals that routinely manage elective and emergency abdominal procedures. The trial was conducted over an eight-month period from March 2022 to October 2022. These settings

were selected to reflect routine clinical practice in public-sector hospitals and to enhance the generalizability of findings within the Pakistani healthcare context(15). Adult patients of both genders who underwent abdominal surgery under general or regional anesthesia were assessed for eligibility. Inclusion criteria comprised patients aged 18 to 65 years who underwent elective or emergency abdominal surgeries such as laparotomy, cholecystectomy, appendectomy, or hernia repair, and who were hemodynamically stable within 24 hours postoperatively. Patients were required to have no pre-existing mobility limitations and to be medically cleared by the surgical team for mobilization. Exclusion criteria included patients with postoperative complications requiring intensive care unit admission beyond 24 hours, unstable cardiovascular or respiratory conditions, neurological deficits affecting mobility, re-exploration surgery, or refusal to provide informed consent(15).

The sample size was calculated using parameters derived from a previously published interventional study that reported a mean difference of 1.5 days in hospital stay between early mobilization and standard care groups, with a standard deviation of 2.5 days. Assuming a power of 80%, a two-sided alpha level of 0.05, and a 1:1 allocation ratio, the minimum required sample size was calculated to be 54 participants per group. To account for potential dropouts and incomplete data, a total sample of 120 participants was recruited, with 60 patients allocated to each group(16). Eligible participants were enrolled using a consecutive sampling approach and randomly assigned to either the intervention group or the control group through a computer-generated randomization sequence. Allocation concealment was maintained using sealed, opaque envelopes prepared by an independent researcher not involved in patient recruitment or intervention delivery. Due to the nature of the intervention, blinding of participants and treating physiotherapists was not feasible; however, outcome assessment and data analysis were performed by assessors blinded to group allocation to minimize bias(17).

Participants in the intervention group received early physiotherapy-led mobilization beginning within 24 hours after surgery. The mobilization protocol was individualized and progressed in a structured manner, starting with bed mobility exercises, active range of motion exercises for upper and lower limbs, and breathing exercises. As tolerated, patients were assisted to sit at the edge of the bed, stand, and ambulate within the ward. Mobilization sessions were conducted twice daily, each lasting approximately 20 to 30 minutes, and continued until hospital discharge. Pain levels and vital signs were monitored before and after each session to ensure patient safety. The control group received standard postoperative care, which primarily included routine nursing assistance, pain management, and mobilization as advised by the surgical team without structured physiotherapy involvement(18). The primary outcome measure was length of hospital stay, defined as the number of days from the date of surgery to the date of discharge as documented in hospital records. Secondary outcomes included time to first ambulation, postoperative functional status assessed using the Modified Barthel Index, and incidence of postoperative pulmonary complications. Pain intensity was monitored using a numeric rating scale to ensure comparability between groups and to guide safe progression of mobilization(19).

Data were collected using standardized data collection forms and entered into a secure database. Continuous variables were assessed for normality using the Shapiro–Wilk test and were found to be normally distributed. Descriptive statistics were presented as mean and standard deviation for continuous variables and frequencies and percentages for categorical variables. Independent sample t-tests were used to compare mean length of hospital stay and functional scores between the two groups. Chi-square tests were applied to analyze categorical outcomes. A p-value of less than 0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 25(20). Ethical approval for the study was obtained from the Institutional Review Board of the respective hospitals. Written informed consent was obtained from all participants prior to enrollment. Confidentiality of patient information was maintained throughout the study, and participants were assured of their right to withdraw at any stage without affecting their medical care. The study was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

A total of 120 patients who underwent abdominal surgery were enrolled and completed the study, with 60 participants allocated to the early physiotherapy-led mobilization group and 60 to the standard care group. No participants were lost to follow-up, and all enrolled patients were included in the final analysis. The mean age of the overall sample was 43.6 ± 11.2 years, with comparable age distribution between the intervention group (42.9 ± 10.8 years) and the control group (44.3 ± 11.6 years). Male participants constituted 58.3% of the sample, while 41.7% were female, with no statistically significant difference in gender distribution between groups ($p = 0.64$). Baseline clinical characteristics, including type of abdominal surgery and postoperative pain scores within the first 24 hours, were similar across both groups. The primary outcome, length of hospital stay, demonstrated a statistically significant difference between the two groups. Patients who received early physiotherapy-led mobilization had a shorter mean hospital stay of 4.1 ± 1.2 days compared to 6.0 ± 1.6 days in the standard care group. Independent sample t-test analysis revealed that this difference was statistically significant ($t = -7.15$, $p < 0.001$). The distribution of hospital stay durations showed that 68.3% of patients in the intervention group were discharged within four days, whereas only 26.7% of patients in the control group achieved discharge within the same timeframe (Table 1).

Early functional recovery was reflected in the secondary outcome of time to first ambulation. The intervention group achieved first ambulation at a mean of 1.3 ± 0.4 days postoperatively, while the control group ambulated at a mean of 2.6 ± 0.7 days. This difference was statistically significant ($t = -11.02$, $p < 0.001$). Functional independence at discharge, assessed using the Modified Barthel Index, was also higher in the early mobilization group, with a mean score of 88.4 ± 6.9 compared to 76.2 ± 8.1 in the standard care group ($p < 0.001$). A higher proportion of patients in the intervention group achieved scores indicating minimal assistance or independence at discharge (Table 2). Postoperative pulmonary complications were observed in 6.7% of patients in

the early mobilization group compared to 18.3% in the standard care group. Although the incidence was lower in the intervention group, chi-square analysis indicated a statistically significant difference between groups ($\chi^2 = 4.01$, $p = 0.045$). Pain intensity measured using the numeric rating scale during mobilization sessions remained comparable between groups throughout hospitalization, with no significant differences observed at discharge ($p = 0.31$), indicating that early mobilization did not increase postoperative pain levels (Table 3).

Figure 1 illustrates the comparison of mean length of hospital stay between the two groups, demonstrating a clear reduction in hospitalization duration among patients receiving early physiotherapy-led mobilization. Figure 2 presents the mean Modified Barthel Index scores at discharge, highlighting improved functional outcomes in the intervention group.

Table 1. Comparison of Length of Hospital Stay Between Groups

Outcome Variable	Early Mobilization (n=60)	Standard Care (n=60)	p-value
Length of hospital stay (days)	4.1 ± 1.2	6.0 ± 1.6	<0.001
Discharge ≤ 4 days, n (%)	41 (68.3%)	16 (26.7%)	—

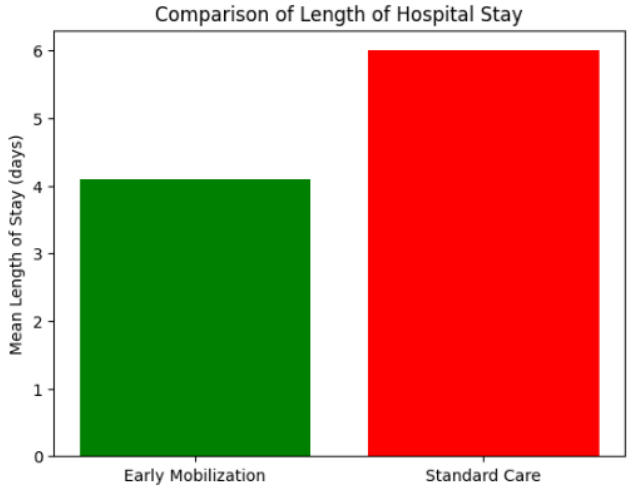
Table 2. Functional Recovery Outcomes

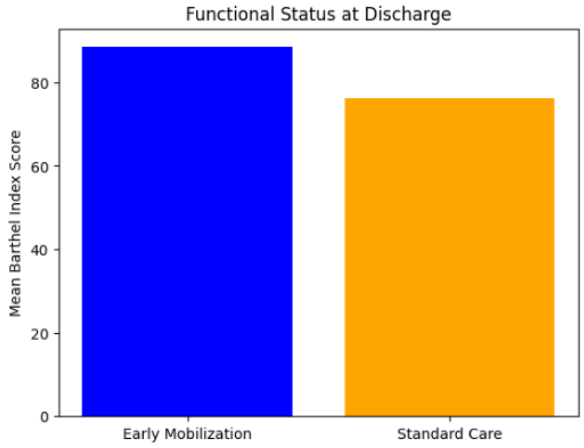
Outcome Variable	Early Mobilization	Standard Care	p-value
Time to first ambulation (days)	1.3 ± 0.4	2.6 ± 0.7	<0.001
Modified Barthel Index at discharge	88.4 ± 6.9	76.2 ± 8.1	<0.001

Table 3. Postoperative Complications and Pain Scores

Variable	Early Mobilization	Standard Care	p-value
Pulmonary complications, n (%)	4 (6.7%)	11 (18.3%)	0.045
Pain score at discharge (NRS)	2.3 ± 0.8	2.5 ± 0.9	0.31

These findings demonstrate measurable differences in hospital stay duration, functional recovery, and complication rates between early physiotherapy-led mobilization and standard postoperative care within the study population.





DISCUSSION

The findings of the present randomized controlled trial demonstrated that early physiotherapy-led mobilization was associated with a clinically and statistically significant reduction in length of hospital stay among patients undergoing abdominal surgery. Patients who received structured early mobilization were discharged, on average, nearly two days earlier than those receiving standard postoperative care, reflecting a meaningful improvement in recovery efficiency. This reduction in hospital stay aligns with the growing body of evidence supporting early mobilization as a core component of enhanced recovery pathways and highlights its relevance within resource-limited healthcare systems(18). The observed reduction in length of stay from 6.0 ± 1.6 days in the standard care group to 4.1 ± 1.2 days in the intervention group is comparable to reductions of 1.5 to 2.3 days reported in previous interventional studies conducted in similar surgical populations. Such consistency suggests that the physiological benefits of early mobilization, including improved respiratory mechanics, enhanced circulation, and accelerated return of functional mobility, are reproducible across different healthcare contexts. In the present study, the earlier achievement of first ambulation, occurring at 1.3 days postoperatively in the intervention group compared to 2.6 days in the control group, likely

contributed to the observed reduction in hospital stay by facilitating faster functional independence and readiness for discharge(16).

Functional recovery outcomes further supported the effectiveness of early physiotherapy involvement. The higher Modified Barthel Index scores at discharge in the intervention group indicated better performance in activities of daily living, with mean scores exceeding 88 points compared to approximately 76 points in the standard care group. Similar improvements in functional independence have been documented in previous research, where early mobilization protocols resulted in discharge Barthel scores ranging between 85 and 90. These findings reinforce the role of physiotherapy-led interventions in addressing postoperative deconditioning, particularly in abdominal surgery patients who are vulnerable to muscle weakness and reduced mobility due to pain and surgical stress(13). The lower incidence of postoperative pulmonary complications observed in the early mobilization group also reflects the preventive value of structured physiotherapy. The reduction from 18.3% in the standard care group to 6.7% in the intervention group is consistent with earlier reports indicating a 10–15% absolute reduction in pulmonary complications following early mobilization. This outcome is particularly relevant in abdominal surgery patients, where pain-related splinting and reduced ventilation can predispose individuals to atelectasis and infection. Importantly, pain scores at discharge were comparable between groups, suggesting that early mobilization did not exacerbate postoperative pain and could be safely implemented under appropriate clinical supervision(10).

Several strengths of this study enhance the credibility of its findings. The randomized controlled design minimized selection bias and allowed for balanced baseline characteristics between groups. The use of standardized outcome measures, including length of hospital stay and validated functional assessment tools, ensured objective and reproducible data collection. Additionally, conducting the study within public-sector tertiary hospitals enhanced the applicability of results to routine clinical practice in Pakistan, where postoperative rehabilitation services often remain underutilized(8). Despite these strengths, certain limitations warrant consideration. The study was conducted in selected hospitals within two cities, which may limit generalizability to rural or private healthcare settings. Blinding of participants and treating physiotherapists was not feasible due to the nature of the intervention, introducing the potential for performance bias. Furthermore, long-term outcomes such as readmission rates, quality of life, and sustained functional recovery after discharge were not assessed, restricting the ability to evaluate the durability of benefits associated with early mobilization(12).

Future research should focus on multicenter trials involving diverse healthcare settings to strengthen external validity and explore cost-effectiveness outcomes relevant to health policy planning. Incorporating long-term follow-up assessments would provide insight into whether early physiotherapy-led mobilization translates into sustained functional gains and reduced healthcare utilization beyond hospitalization. Additionally, studies examining the optimal intensity, frequency, and components of mobilization protocols could help refine clinical guidelines tailored to abdominal surgery populations(6). The present findings support early physiotherapy-led mobilization as an effective strategy for reducing hospital stay, improving functional recovery, and minimizing postoperative complications in abdominal surgery patients. Within the Pakistani healthcare context, where efficient bed utilization and cost containment are critical, integrating structured physiotherapy into standard postoperative care pathways may offer substantial clinical and system-level benefits.

CONCLUSION

This study demonstrated that early physiotherapy-led mobilization significantly reduced length of hospital stay while enhancing functional recovery and lowering postoperative complications in patients undergoing abdominal surgery. The findings highlight the practical value of integrating structured physiotherapy into routine postoperative care. Implementing early mobilization protocols within surgical wards may improve patient outcomes, optimize hospital resource utilization, and support evidence-based enhanced recovery practices in resource-limited healthcare settings.

AUTHOR's CONTRIBUTION:

Author	Contribution
Dr Maleeha Fuad	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision
Maryam Khan	Methodology, Investigation, Data Curation, Writing - Review & Editing
Dr. Zunaira Mehdi	Investigation, Data Curation, Formal Analysis, Software

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