RESEARCH PAPER

Physical Barriers to Exercise Adherence in Patients Undergoing Orthopedic Surgeries: A Scoping Review

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ABSTRACT
Objective: This scoping review sought to identify and synthesize the most predominant physical barriers inhibiting postoperative rehabilitation among patients following orthopaedic surgery, thereby impeding optimal recovery.
Design: The review was performed according to the framework by Arksey and O'Malley and in line with PRISMA-ScR, ensuring a comprehensive and systematic synthesis of the existing evidence.
Methods: A literature search was done on PubMed, Scopus and PEDro databases. The search generated articles from the year 2000 to 2025. With strict inclusion parameters, six studies entered the review.
Results: The following were identified by the review as the most obvious physical barriers to recovery: pain, fatigue, muscle weakness and fear of movement or of falling – with the latter two items holding a psychological component. Other impediments such as difficulties with balance would also prevent recovery which is a reflection of the multi-factorial nature of recovery.
Conclusion: Physical barriers are considerable roadblocks to postoperative recovery. While the process of identification and subsequent reduction of these physical barriers using methods such as pain control, patient communication, and loading techniques can help reduce the impact and even maximize recovery, the work of creating interventions based on the detailed mapping of physical barriers to patient recovery is essential.
Keywords: *Orthopedic surgery, Post-operative rehabilitation, Physiotherapy, Exercise therapy, Early post-operative phase*
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1. INTRODUCTION

Exercise and rehabilitation programs are the keys for patients to return to full recovery after undergoing orthopedic surgery. Evidence has shown that early mobilization is effective in achieving the improvement of movement, strength and endurance, as well as preventing

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complications like deep vein thrombosis, stiffness and atrophy (1,2). This indicates the significance of immediate post-operative rehabilitation for patients. Patients who undergo structured post-operative rehabilitation find themselves with better outcomes than patients who do not. However, many patients do not adhere to the rehabilitation protocols properly (3), which can be quite frustrating for therapists and surgeons, because the outcome of the surgery depends on patient adherence to the rehabilitation. With a lack of exercise adherence, it has been repeatedly shown that there is slower recovery, longer hospital stays and poorer quality of life (3,4).

When exercise protocols are not followed, their consequences are observed immediately. Prolonged bed rest after surgery rapidly causes deconditioning across different body systems (5). During the initial periods of immobilisation the patient becomes weaker by losing muscle mass and strength. Age also plays a role as this loss of muscle strength happens quicker in older patients in contrast to younger ones (6). Similarly, prolonged bed rest can increase the risk of problems with deep vein thrombosis, pneumonia and pressure ulcers (7). Repeated studies have shown early movement can prevent these complications and accelerate the recovery process for these patients. This makes the importance of post-operative rehabilitation crucial (7).

Pain is the most common physical barrier that is observed. It discourages patients from moving and feeds the idea of potential re-injury into their mind (5). If pain is not managed adequately early on, patients may associate pain with injury and lowering their confidence to participate in rehabilitation (3). Confidence is key because progress only happens if the patient participates in the rehabilitation process. Furthermore, fatigue and weakness can reduce endurance and exercise tolerance; fatigue and weakness can be caused by anesthesia, blood loss, or continuous bed rest (5). These issues are quite prevalent in older patients who have gone through major lower limb surgeries (6).

A problem with weakness and balance can be concerning because even basic activities such as standing or ambulating can be somewhat perilous (5). Together with fear of falling, it makes the patient non-functional and creates a vicious cycle of inactivity, contributing to even greater deconditioning (8). The concept of kinesiophobia (fear of movement) explains why patients behave this way. According to the fear avoidance model, patients who interpret pain as a warning sign are extra cautious regarding movement. They limit their movements and avoid exercising delaying recovery (9). Reassurance that the pain is harmless does not prevent patients from fixating on it as a sign of malice, resulting in complete avoidance of movement.

Joint stiffness and contractures represent a significant challenge in the postoperative recovery process (10). Joint stiffness begins hours after being immobile and the situation worsens, until it worsens a few weeks after. Once the joints have stiffened, movement and therefore compliance with exercise, becomes a challenge. It is said that the first few weeks are the most crucial period for building the habits of consistent exercise adherence (2). If the patients do not adhere early on, they are unlikely to do so later. Therapists need to identify why patients do not adhere to exercise and create methods to build their confidence (5). This scoping review aims to focus on the physical barriers that are common to the broad range of orthopedic surgical types.

2. METHODS

2.1 Study Design

This scoping review was conducted using the framework proposed by Arksey and O'Malley, with guidance from later methodological refinements. The reporting of this review followed the PRISMA-ScR guidelines to ensure clarity and transparency. The review process involved identifying the research question, searching for relevant studies, selecting eligible studies, extracting data, and summarising the findings.

2.2 Review Question

The review aimed to answer the following question:

What physical barriers affect exercise adherence in patients during the acute post-operative phase following orthopedic surgery?

2.3 Search Strategy

A literature search was carried out using three electronic databases: PubMed, Scopus, and PEDro. Studies published between 2000 and 2025 were considered, and only articles available in English were included. The search terms are: "orthopedic surgery", "rehabilitation", "exercise adherence", "acute post-operative", and "physical barriers". These terms were combined using Boolean operators such as "AND" and "OR". The search approach was slightly modified for each database depending on its requirements. In addition to database searching, the reference lists of selected studies were reviewed to identify any additional relevant articles.

2.4 Eligibility Criteria

The inclusion and exclusion criteria were defined based on the Population–Concept–Context (PCC) approach.

Inclusion Criteria:

- Adults aged 18 years and above who had undergone orthopedic surgery
- Studies reporting physical or functional barriers to exercise or rehabilitation
- Studies conducted during the acute or early post-operative inpatient phase
- Articles published in English

Exclusion Criteria:

- Studies focusing only on psychological or non-physical barriers
- Studies involving pediatric populations
- Studies conducted in outpatient or home-based rehabilitation settings

- Conference abstracts or studies without full-text access

2.5 Study Selection

All identified articles were compiled, and duplicate records were removed. The screening process was carried out by members of the research group. Titles and abstracts were first reviewed to identify potentially relevant studies. These were then assessed in full text using the predefined eligibility criteria. Where there were differences in opinion regarding inclusion, these were discussed within the group until a consensus was reached. The overall selection process was documented using a PRISMA flow diagram (Refer Fig 1).

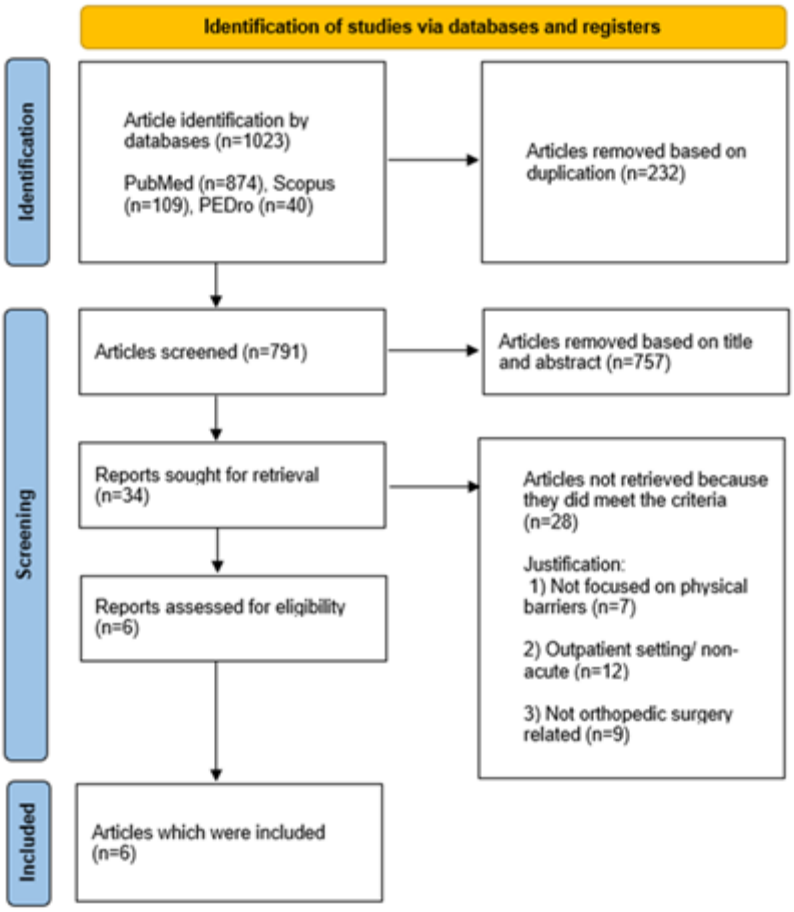

Figure 1: PRISMA flow diagram

2.6 Data Extraction and Charting

A structured data charting form was used to extract relevant information from the included studies. The data collected included author details, year of publication, country, study design, characteristics of the study population, type of surgery, phase of rehabilitation and the physical barriers reported. Data extraction was carried out by members of the research group and reviewed collectively to maintain consistency. Any differences were resolved through discussion.

2.7 Data Synthesis

The extracted data were summarised using a descriptive and thematic approach. Similar barriers reported across studies were grouped into broader categories such as pain, fatigue, muscle weakness and balance impairments. Patterns across studies were then examined to identify the most commonly reported barriers affecting exercise adherence. The findings were presented in both tabular form and narrative summaries to provide a clear overview of the results.

DATA SYNTHESIS AND REPORTING

3.1 Results

Six studies made it into this scoping review (based on the inclusion and exclusion criteria). There were quite a few studies which had a similar theme (barriers to exercise) but did not fulfil one or two of inclusion/exclusion criteria. These studies were conducted across a diverse range of geographical locations. These locations include Saudi Arabia, the Netherlands, Spain, United Kingdom, Turkey, and Denmark. This diversity covers a wide range of different population types (based on ethnicity) and different rehabilitation approaches that are common or widely used in that part of the world.

Most of these studies were about older individuals recovering from lower limb orthopedic procedures like hip fractures and lower limb amputations. It is known that older individuals are more susceptible to fractures (because of less bone density) and may be affected to a higher degree by physical (and non-physical) barriers than younger people owing to less strength and pain tolerance in general. All these studies were between 2000-2024, suggesting that this topic has gained some traction and importance in the medical community recently. However, we were only able to get six studies (a limiting factor of the review), so there is still more room for research around this topic.

Regarding the designs of the studies, there were some variations. Two studies were qualitative and the remaining four were quantitative. This mix provided both measurable data (quantitative information) and subjective insights (qualitative information) about the physical barriers patients face following orthopedic surgeries. Throughout these six studies, physical barriers were consistently identified as reasons for poor exercise adherence. Additionally, the authors emphasized that patients with similar fears require additional support and encouragement.

Table 1: Table showing the Descriptive Characteristics of Included Studies

Serial No.	Author and Year	Population	Type of Study	Country	Phase of Rehab	Physical Barriers	Non-Physical Barriers	JBI checklist score
1	Turabi et al., 2024[11]	Older adults after hip fracture surgery	Qualitative	Saudi Arabia	Early post-operative (48h)	Pain; Fear of injury/falling; Weakness; Obesity; Weight-bearing intolerance	Uncertainty about post-op; Motivation; Family concerns	10/10 (Qualitative study checklist)
2	Berger et al., 2024[12]	Lower extremity amputation	Prospective cohort	Denmark	First few days PT	Residual limb pain; Fatigue; Fear of mobilization; Weakness; Nausea	Low motivation; Psychological distress; Low confidence	10/11 (Cohort study checklist)
3	Rosas Hernández et al., 2020 [13]	Hip fracture	Prospective cohort	Spain	Inpatient admission-discharge	Pain; Weakness; Fatigue; Balance impairments; Fear of falling; Anemia	Pre-fracture disability; Living situation; Cognitive impairment; Socioeconomic factors	10/11 (Cohort study checklist)
4	Al-Dahan et al., 2024[15]	Hip fractures	Retrospective audit	UK	Early post-operative (24-72h)	Low hemoglobin; Pain; Hypotension; Fatigue; Weakness	Delirium; Dementia; Psychological factors	4/8 (Cross-sectional study checklist)
5	Bulut & Vatansever, 2022[14]	Knee/hip arthroplasty	Descriptive correlational	Turkey	Early post-operative (24-72h)	Pain; Fatigue; Weakness; Low hemoglobin; Nausea; Obesity; Drain/catheter; Defecation difficulties	Low motivation; Anxiety; Low confidence; Environmental; Social factors	7/8 (Cross-sectional study checklist)
6	Wattel et al., 2024[16]	Geriatric ortho rehab	Qualitative	Netherlands	Inpatient rehabilitation	Pain; Fear of falling; Weakness; Fatigue; Inactivity; Comorbidities; Balance impairments	Environmental limitations; Equipment/staffing; Social; Cultural factors	7/10 (Qualitative study checklist)

4. Summary of Individual Studies (Table 1)

Turabi et al. (2024)[11]conducted a qualitative study in Saudi Arabia exploring barriers to early mobilization after

hip fracture surgery. The patients in this study were postoperative patients who were encouraged to begin physiotherapy soon after surgery. A large proportion of them found it difficult to follow through with physiotherapy. The most prominent barriers were pain during movement, fear of falling and unclear exercises instructions. Environmental obstacles consist of patients receiving vague guidance and instruction for exercise and as a result have extreme reluctance and wariness towards all movement due to believing that they may exacerbate the current state of their condition (i.e., exacerbate pain leading to additional harm). It demonstrates the correlation between the psychological fear of movement and physical discomfort and pain while performing certain types of movement. Additionally, the authors emphasized that patients with similar fears require additional support and encouragement.

Berger et al. (2024)[12] studied rehabilitation experiences of patients following major dysvascular lower-extremity amputation in Denmark. The cohort had several significant physical barriers. First, 23.8% of patients had residual limb pain on the first day of rehabilitation. Second, 44% of patients experienced fatigue, which limited bed-to-chair transfers and prolonged bed rest. Third, 33% of patients showed a fear of mobilization, which further limited transfers, prolonged bed rest, and delayed the initiation of physiotherapy. Moreover, the fact that most of the patients had physical incapability and fear of prostheses also worked as a delaying factor for the entire recovery process. Another important factor, which surfaced in the study, is that the complications in the residual limb, like edema and hypersensitivity, hampered the physiotherapy to a considerable extent. Thus, such factors need to be taken into serious consideration while treating the patient for the amputation of the lower limb. The authors explained that pacing of the treatment is an important aspect in keeping with the tolerance of the patient. The authors recommended the pacing of the treatment to be individual, as it may lead to better results. Another important factor, which the authors pointed out, is the emotional support that the patients needed.

Al-Dahan et al. (2024)[15] conducted an analysis in 2024 on the application of early mobilization in patients who had hip surgery in the United Kingdom. The results demonstrated the implication in the literature review that patients experience pain and fatigue among the physical factors creating barriers to patients complying with physical activity. Biologically, the patients had low hemoglobin because of blood loss during surgery. The presence of postoperative delirium, meaning sudden confusion and/or agitation immediately following surgery, had an incidence rate of 32.6% in patients with late mobization. The authors mention that while early mobilization results in significant advantages, its application cannot always be realized without proper pain management and periods of rest. Thus, therapists should moderate their expectations based on clinical judgement and check the readiness of the patient before imposing exercise quotas.

Wattel et al. (2024)[16] investigated barriers and facilitators to physical fitness training in geriatric orthopedic rehabilitation centers in the Netherlands. The authors identified factors such as muscle weakness, low endurance, pain, fear of falling, and environmental limitations (such as lack of available equipment or staff supervision) to be culpable for reduced participation in rehabilitation. Some patients may be motivated, but they cannot engage in active rehabilitation efficiently if they are not guided with expertise. This paper points to the interconnection of physical and environmental barriers. Although the review focuses on physical barriers, a more holistic approach-one that encompasses environmental barriers-is what is truly needed if patients are to achieve their rehabilitation potential.

Bulut & Vatansever (2022)[14] conducted a descriptive correlational study in Turkey where they examined the factors that affected early mobilization after knee and hip arthroplasty. The cohort was a group of 60 patients. When examining the factors, they found that pain, fatigue, weakness, low hemoglobin, and obesity substantially affected mobilization time; the average was 19 hours to mobilize post-operatively. BMI is negatively correlated with mobilization time ($r=-0.528$). In essence, the higher the BMI, the longer it took to mobilize them. BMI is seen as a factor for grossly determining healthiness in individuals and even has implications in post-surgical rehabilitation. Some other factors that were found to delay mobilizations include: nausea, vomiting, and drains/catheters. To conclude this study, it is propounded that physical barriers impact the effectiveness of post-operative rehabilitation. Comorbidities and nutritional status also play important roles.

Rosas Hernández et al. (2020)[13] conducted a prospective observational in Spain, involving 509 patients undergoing a rehabilitation program post-hip fracture. Among the physical factors considered as barriers to rehabilitation were balance problems, weakness, fatigue, pain, and pre-fracture disability. These factors affect the patients' personal adoption of exercise recommendations. Many patients felt annoyed that they could not personally move. This could potentially affect their psychological well-being. However, a valid recommendation was presented: patients could potentially overcome these barriers if consistent feedback and encouragement from therapists could be sustained. Increased patient adoption of the rehab program correlated with functional success as well as survival in one year.

5. THEMATIC SYNTHESIS

Pain is a Central Barrier

Pain is a common physical barrier present in all six studies. This attribute results in physiologically painful conditions as well as psychologically fearful states that affect patients' ability to move. Pain is interpreted as a sign

of potential risk that makes patients perceive physiologically risky instances of movement. Pain can be minimal due to physiologically painful conditions that make it difficult to distinguish between physiologically undesirable instances of pain. Turabi et al. (11) and Al-Dahan et al. (15) explain that inadequate analgesia during the early stages of rehabilitation automatically results in lower levels of participation. Berger et al. (12) again confirm that there is a significant effect of pain to amputees that makes patients delay mobility as well as use prosthetic devices.

These collectively point out the fact that pain has not only a sensory but also a psychological dimension in influencing motivation and confidence in exercising. Pain management along with reassurance and guidance by therapists should facilitate the patients in adhering to the rehabilitation goals.

Fatigue and Low Energy

Fatigue is a key physical barrier that repeatedly showed up in the studies. Fatigue was linked to anaemia, muscle deconditioning, and the overall stress of surgery and hospitalization. Al-Dahan et al. (15) found that low hemoglobin levels were contributing to reduced energy levels and less tolerance of exercises. Wattel et al. (16) observed that older individuals generally lacked the endurance for repetitive exercises (for example multiple sets of sit-to-stand); this could be since older individuals tend to be less fit than their younger counterparts. The problem with fatigue is that it is harder to manage directly, unlike pain which can be managed pharmacologically or with electrotherapeutic modalities. It is suggested that scheduling shorter but more frequent sessions may help prevent patients from being physically overwhelmed. Fatigue (like pain) is also multifaceted and extends beyond physical tiredness. It can cause patients mental fatigue as well.

Muscle Weakness and Balance Impairment

Muscle weakness and impaired balance were reported as barriers in several studies. This was particularly the case among older adults recovering from hip fractures. Rosas Hernandez et al. (13) and Wattel et al. (16) demonstrated that weakness is a limiting factor for physical capacity and also for the confidence to start with exercise. Often, patients need support and aids to perform simple movements that would easily have been performed without support before surgery. This necessity may provoke frustration or shame in the concerned patient. In order to minimize these negative effects, a gradual progression of exercises, simplification of tasks, and early incorporation of balance training can result in a significant improvement in muscular strength as well as in patient confidence. Even though muscle weakness is an unavoidable post-surgical sequela, some preoperative and postoperative measures can be initiated that can improve prognosis.

Fear of Movement (Kinesiophobia)

It serves as more than a physical constraint because kinesiophobia is both a psychological condition and an emerging theme that has been implicated in limited adherence to exercise in many studies, including those that included pain or previous falls. Patients are afraid of damaging newly repaired surgical sites due to increased bodily awareness and a perception that too much movement will be harmful. Amputees were found to fear falling during early mobility training by Berger et al. (12) and Turabi et al. (11) uncovered similar fear among patients following hip fractures. Fear is a psychological constraint that presents as a physical one as patients impose their own limits on themselves that restrict the testing of functional abilities. Physiotherapists, therefore, also become key figures in the gradual exposure of patients to exercises as well as the reassurance that pain and discomfort do not harm the surgical repair.

Environmental and Systemic Barriers

This review focuses on physical barriers, but it is also important to note that other studies report environmental and systemic barriers. Environmental barriers have an indirect impact on the rehabilitation process. Wattel et al. (16) found that a lack of equipment and limited staff supervision meant that patients could not carry out their exercises safely and effectively. A high therapist-to-patient ratio was also linked to less individual feedback and decreased attention for each patient, which might enhance feelings of uncertainty or stalemate. Continuous therapist prompting to keep patients on task and fully active-rather than allowing unattended practice-seems advantageous, as unattended conditions can result in patients engaging in self-directed experimentation.

6. DISCUSSION

The aim of our scoping review was to gather evidence regarding physical barriers that prevented exercise adherence in post-operative orthopedic patients. Across these six studies, some patterns emerged regarding the type of physical barriers that were present. Pain was the most common barrier and was mentioned in all studies. It is described as one of the main reasons patients avoided movement (1,2). Pain affects patients on a physical level (“I can’t do this because it hurts too much”) and on a psychological-pain catastrophizing level (“I’m afraid I’m damaging my surgical site because it hurts so much”). In the Saudi Arabian study (Turabi et al.), hip fracture patients reported pain and fear of further injury as major reasons for delaying mobilization (11). Lower limb amputees from the Danish study (Berger et al.), also had similar experiences but with context to amputation, where 23.8% of them reported residual limb pain and avoided physiotherapy because of discomfort or fear (12). The Spanish cohort study (Rosas Hernandez et al.) points out that pain, weakness, and poor balance were strong determinants of non-adherence. They were also linked with slower recoveries and a higher one-year mortality (13). Weakness and poor balance will make exercising and mobilizing very difficult and may instill fear into the patients that something might go wrong. These findings show that pain directly restricts the movement of patients and slows down the pace of rehabilitation. This leads to longer disability (8).

Fatigue was another key physical barrier. In one study, 44% of amputees said fatigue limited their mobility during initial physiotherapy sessions (12). In the Turkish study Bulut and Vatansever (14) showed that both fatigue and weakness delayed early mobilization. Fatigue and weakness go together because fatigue reinforces the feeling of weakness. A fatigued patient cannot use their maximum strength capacity. Low hemoglobin levels and comorbidities contributed to this fatigue (14). The UK audit (Al-Dahan et al.) showed that delirium and anemia contributed to slower physical recovery (15). Delirium is a condition where the patients are confused and even agitated. If the patient is delirious, rehabilitation cannot progress as intended. In relation to fatigue, anemia and low hemoglobin stood out as often over-looked factors when it comes to poor exercise tolerance in standard rehab protocols (13-15). Not enough attention was given to these factors which worsened fatigue. This ought to be addressed because fatigue is a major physical barrier to adherence. Identifying the exact cause of fatigue is of paramount importance. If a patient is anemic, no amount of motivation or analgesics can help the patient get out of the anemic-induced slump.

All these studies support the overarching idea that physical barriers rarely exist in isolation. They are often present in combinations and interact with each other. For example, pain can cause kinesiophobia, fatigue can reduce exercise tolerance, and in turn, both outcomes cause more weakness and deconditioning the muscle (11,12). All these physical barriers are interlinked. Removing or addressing them in isolation solves only a part of the problem. Previous research has shown a dose-response relationship between exercise adherence and functional outcomes (3). Every extra therapy session a patient attends improves strength and lowers hospital readmission rates (4). Early mobilization also lowers complications of comorbidities. Studies have reported reductions in deep vein thrombosis, pneumonia, and pressure ulcers because of early mobilizations (7). Getting out of bed and moving can reduce extended pressure on the body, which prevents deep vein thrombosis. The Enhanced Recovery After Surgery (ERAS) pathways emphasize the same principle; It promotes effective pain control and graded early exercises and mobilizations to improve outcomes and make inpatient stays shorter (17,23). Physiotherapists must deal with physical barriers, environmental barriers and mental blocks together as a whole, rather than focusing on them separately as independent factors. A holistic approach can be gained by understanding when and how the barriers actually appear so that interventions for a particular stage can be designed effectively (13, 16). Despite the current evidence, future studies must be performed on how to deal with physical barriers in orthopedic postoperative rehabilitation.

7. CONCLUSION

This scoping review has concluded the major physical barriers for rehabilitation among patients post-orthopedic surgery as pain, fatigue, weakness, imbalance and fear of movement. In most cases, the physical barriers may be in a combined form affecting the continuation of the recommended exercise regimes and patient confidence levels; this may finally affect the general negative aspects of the rehabilitation program. Their management is quite comprehensive and includes optimal pain control strategies like effective analgesics, carefully designed patient pacing regimes, patient education and support programs along with frequent patient reassurance. Early patient identification of all the afore-mentioned barriers by a physiotherapist plays a very important role in the alleviation of effects of the short-term as well as long-term consequences and periods required for attaining independence improving overall well-being. Further research work should encompass the study of other population groups and databases.

8. CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to the conduct, authorship, or publication of this scoping review. The authors have no financial, personal, academic, or institutional relationships that could have influenced the work reported in this manuscript.

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