# Role of Physiotherapy in Functional Recovery

**Faisal Mousa Alotaibi[1]*, Mohamed Al Marshod[2], Osamah Keridis[3]**

1 Physiotherapist, PSMMC, Riyadh

osama-kridis@hotmail.com

2 Physiotherapist, PSMMC, Riyadh

3 Physiotherapy Technician, PSMMC, Riyadh

**Abstract :** In the treatment of a broad range of health issues, including musculoskeletal injuries, neurological disorders, cardiac illnesses, and post-surgical rehabilitation, physiotherapy is an essential component in the process of facilitating functional recovery. The fundamental objective of physiotherapy is to restore optimum mobility, improve physical function, and increase the overall quality of life of those who have been impacted by an accident, disease, or handicap. Pain reduction, muscle strengthening, joint mobility, balance, and coordination are all areas that may be improved with the use of physiotherapy. This is accomplished through the use of evidence-based therapies such as therapeutic exercises, manual therapy, electrotherapy, gait training, and patient education. In addition to this, it places an emphasis on early mobilization, the avoidance of secondary problems, and the development of independence in activities of daily life. In the treatment of neurological and chronic disorders, physiotherapy helps to promote neuroplasticity, functional adaptability, and long-term self-management and management. In addition, physiotherapy takes a comprehensive and patient-centered approach to treatment, including not only the physical but also the psychological and social elements of medical healing. A physiotherapist's job description include not just rehabilitation but also health promotion, injury prevention, and community-based care in addition to rehabilitation functions. When taken as a whole, physiotherapy is an important component of multidisciplinary healthcare, making a substantial contribution to the functional recovery and long-term rehabilitation results.

**Keywords:** Physiotherapy; Functional Recovery; Rehabilitation; Therapeutic Exercise; Quality of Life.

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## INTRODUCTION

Physical therapy, an ever-evolving and evidence-based healthcare specialty, is concerned with the prevention, diagnosis, and treatment of impairments in motor skills, balance, and general mobility at all stages of life. Its foundation is in the scientific study of human motion and functional performance; in order to diagnose and treat physical dysfunction, it draws on fundamental fields including pathology, kinesiology, neurology, anatomy, and physiology. In addition to alleviating current limitations, physiotherapy treatments aim to forestall future problems and foster overall physical health. Physiotherapy has transformed from an auxiliary or supporting function in modern healthcare systems into an essential and pivotal part of

functional recovery and rehabilitation, acknowledged for the substantial impact it has on patient-centered treatment. [1]

Physiotherapists are versatile and may be found providing therapy in many different areas, such as hospitals, rehabilitation centers, community health programs, workplaces, sports arenas, and even patients' homes. Injuries both recent and long-term, complications after surgery, problems with the nervous system or the heart and lungs, deterioration with age, and abnormalities in birth defects or developmental delays are among the many types of functional impairments that these professionals treat. Physiotherapists maximize functional results by thorough evaluation and personalized treatment planning. They use therapeutic exercises, manual therapy, physical modalities, movement re-education, and assistive methods. Enhancing rehabilitation, increasing quality of life, and minimizing the risk of long-term impairment and reliance are all goals of physical therapy, which places an emphasis on mobility efficiency, independence in ADLs, and active patient engagement. [2]

**Functional Recovery's Significance and Range**

Restoring one's independence in carrying out routine duties, interacting socially, and participating in meaningful work and leisure activities is the goal of functional rehabilitation, which is an all-encompassing and ever-improving process. Rehabilitation is to restore maximum physical function, independence, and meaningful engagement in daily life, rather than just reducing pain or clinical symptoms. Functional recovery acknowledges that health is multi-faceted and encompasses not only bodily capacities but also mental health, emotional strength, and social integration.

In line with this idea is the International Classification of Functioning, Disability, and Health (ICF) developed by the World Health Organization. The ICF takes into account impairments in body structure and function as well as limitations in activity and restrictions in participation when assessing a person's overall health. [3] According to this model, the goal of functional recovery is to reduce impairment and increase potential functionality by taking into account both intrinsic and extrinsic variables. By methodically addressing mobility impairments, strength deficiencies, balance disorders, coordination issues, and endurance limits that impede everyday functioning, physiotherapy provides a crucial and strategic role in aiding functional rehabilitation.

Safe and progressive reintegration into daily life or activities close to it may be achieved via physiotherapy's evidence-based rehabilitation methods. To provide meaningful and lasting rehabilitation, individualized treatment programs are devised taking into account functional evaluation, patient objectives, and contextual considerations. Physiotherapy greatly aids in the improvement of independence, social involvement, and quality of life by increasing physical performance, improving confidence, and promoting active participation. [4]

**The Role of Physiotherapy in Musculoskeletal Recovery**

All age groups are affected by musculoskeletal problems, which may lead to discomfort, limited mobility, and impaired function. These illnesses include fractures, osteoarthritis, rheumatoid arthritis, ligament and tendon injuries, damage from sports, and conditions that occur after surgery. Reduced joint range of motion, weak muscles, decreased coordination, and trouble with everyday tasks are common symptoms of these disorders, which may have a detrimental impact on an individual's independence and quality of life. When it comes to managing musculoskeletal problems, physiotherapy is crucial and supported by research. Its main goals include pain relief, mobility restoration, strength and endurance increase, and the correction of abnormal movement patterns. [5]

To help with healing and getting back to normal functioning, physiotherapists use a broad variety of techniques. Therapeutic exercises are designed to help patients become more mobile, build strength in weak areas, increase stamina, and get their range of motion back to normal. Pain relief, better joint mechanics, and increased tissue extensibility are all goals of manual therapy, which includes manipulation, mobilization, and soft tissue methods. Moreover, physical modalities including ultrasound, electrical stimulation, heat/cold treatment, and laser therapy are often used to help with tissue repair, inflammation reduction, and pain alleviation at various points in the recovery process.

In order to avoid compensatory tactics that might result in more injuries or long-term health problems, physiotherapy can detect and treat biomechanical imbalances, postural deviations, and movement dysfunctions. [6] Safely returning to work, sports, and other everyday activities is possible with the help of functional training and task-specific exercises. Because it shortens recovery time, decreases reliance, speeds healing, and lowers the risk of stiffness and muscular atrophy, early and well directed physiotherapy intervention is very important. Physiotherapy is crucial in avoiding long-term impairment and recurrence of musculoskeletal issues, in addition to facilitating efficient recovery.

**The function of physical therapy in neurological recovery**

Functional deficits impacting mobility, posture, balance, coordination, and general autonomy are common outcomes of neurological disorders including stroke, traumatic brain injury, multiple sclerosis, cerebral palsy, Parkinson's disease, spinal cord injury, and Parkinson's disease. Weak muscles, spasticity, poor sensation, reduced motor control, trouble walking, and trouble with ADLs are all possible outcomes of these disorders. By methodically and goal-orientedly treating these complicated deficits and encouraging the restoration of functional mobility, physiotherapy is an essential component of neurological rehabilitation. [7]

Physiotherapy for neurological disorders mainly aims to enhance gait patterns, balance, coordination, postural stability, and motor control. Improving movement efficiency and functional independence is a common goal of many evidence-based therapies, including task-oriented training, neurodevelopmental approaches, functional gait training, balance re-education, and proprioceptive neuromuscular facilitation. Neuroplasticity refers to the brain's capacity to rearrange and create new connections between neurons in response to experience and training; these therapies aim to promote this process. Motor learning and functional restructuring of the nervous system may be facilitated by physiotherapy through repeated practice of functional activities in meaningful circumstances. [8]

Physical therapy not only aids in functional rehabilitation, but it also serves an important preventative role by reducing the likelihood of subsequent problems that are often seen in neurological illnesses. Respiratory physiotherapy promotes efficient breathing and lessens the likelihood of pulmonary problems; regular mobility, stretching, and positioning exercises aid in the prevention of joint contractures, muscle shortening, pressure ulcers, and postural deformities. People with neurological conditions can greatly benefit from physiotherapy because it is an individualized, long-term intervention that helps them adapt functionally, boosts their confidence, and encourages them to be active in their social, occupational, and community lives.

**Physiotherapy's Function in Cardiopulmonary Recuperation**

An individual's functional capacity, exercise tolerance, and overall endurance can be significantly affected by cardiopulmonary conditions such as asthma, COPD, ILD, heart failure, post-cardiac surgery, and post-COVID-19 implications. Breathlessness, exhaustion, impaired aerobic capacity, and impaired ability to carry out ADLs are common signs of these

disorders, which may lead to physical deconditioning and a worse quality of life. When it comes to managing and helping people recover from cardiopulmonary illnesses, physiotherapy is crucial because it addresses both the limits of the respiratory system and the circulatory system. [9]

Respiratory exercises, airway clearing methods, chest physiotherapy, cardiovascular conditioning, and progressive exercise training are all part of cardiopulmonary rehabilitation's physiotherapy approach. Diaphragmatic breathing, pursed-lip breathing, and thoracic expansion exercises are some of the breathing methods that might help you breathe more efficiently and with less effort. Improved lung function and oxygenation may be achieved with chest physiotherapy by moving and eliminating respiratory secretions. Individualized aerobic and endurance training regimens improve patients' cardiovascular fitness, muscular efficiency, and exercise tolerance, letting them go about their everyday lives with less exhaustion and shortness of breath.

Patients may progressively rebuild physical endurance, self-confidence, and functional independence in a safe and supervised setting via structured cardiac and pulmonary rehabilitation programs directed by physiotherapists. Patients in these programs learn how to save energy, how to pace themselves, and how to make positive changes to their lifestyle, such as giving up smoking and increasing their physical activity levels. Reducing healthcare expenditures, improving long-term survival rates, and speeding up functional recovery are all possible outcomes of therapies guided by physiotherapy. Physiotherapy dramatically improves functional capacity, quality of life, and long-term cardiopulmonary health by promoting regular physical exercise and good lifestyle behaviors. [10]

**Early Physiotherapy Intervention's Significance**

In order to achieve the best possible functional recovery after an accident, surgery, or sickness, it is essential to begin physical therapy as soon as possible. Muscle atrophy, stiff joints, decreased flexibility, impaired neuromuscular coordination, impaired cardiovascular endurance, and other secondary problems are common outcomes of poor or postponed rehabilitation. [11] Mental health problems including worry, despair, and decreased motivation may worsen from being immobile for an extended period of time, making rehabilitation much more difficult. Thus, to avoid functional deterioration and encourage active recovery, it is crucial to begin physiotherapy at the earliest suitable stage.

Prompt mobilization, preservation of joint mobility, and preservation of muscular strength and endurance are the tenets of early physiotherapy intervention. Reducing the risk of muscular atrophy, blood vessel problems, and stiffness is the goal of gentle therapeutic exercises, positioning techniques, and aided movements. When it comes to respiratory treatment, ambulation, safe bed mobility, and transfers, physiotherapists are invaluable in acute care settings like ICUs and post-operative wards. When it comes to boosting oxygenation and reducing pulmonary problems, techniques including breathing exercises, airway clearing, and posture control are crucial. [12]

Early rehabilitation has many advantages, according to strong clinical data. These include better functional results, a quicker return to independence, and a shorter hospital stay. By decreasing complications, readmissions, and total healing time, early physiotherapy also helps to minimize healthcare expenses. A critical factor in achieving functional recovery and long-term functional independence is the timely implementation of physiotherapy interventions, which comprehensively treat physical limitations. [13]

**A customized and patient-focused approach to rehabilitation**

Since functional recovery is more of a journey than a destination, one of the cornerstones of physiotherapy is tailoring treatment to each patient's unique needs. Considerations such as age, illness kind and severity, comorbidities, level of physical fitness, dietary habits, psychological variables, and individual objectives greatly impact each person's recovery potential and rehabilitation requirements. [14] By taking these distinctions into account, physiotherapists may create treatments that are practical, applicable, and in line with the patient's goals for functional improvement.

Physiotherapists start patients out on the road to recovery by doing a thorough examination of their range of motion, strength, flexibility of joints, balance, stamina, pain tolerance, and functional capacities. This evaluation is the foundation for creating unique treatment programs to overcome functional restrictions and impairments. Rehabilitation is kept goal-oriented and successful by regularly modifying interventions based on the patient's progress. By customizing the technique, functional deficiencies may be more precisely targeted, leading to better recovery results. [15]

In patient-centered physiotherapy, the patient plays an integral role in their own treatment. Patients are motivated to actively participate in their own healing by working together to

establish goals, learning about their illness, and creating techniques for self-management. Patients are given the tools they need to continue making progress even after they leave the clinic, including education on ergonomics, home exercise routines, and lifestyle adjustment. In addition to increasing the efficacy of therapy, this interactive and individualized method boosts patients' confidence, motivation, and compliance. Significance, durability, and sustainability of functional recovery are guaranteed via physiotherapy's attention to each patient's specific physical, psychological, and functional requirements. [16]

**Physiotherapy for the Functional Recovery of the Elderly**

There is a consistent association between aging and a progressive reduction in physical function, muscular strength, flexibility, balance, and mobility. These factors, when taken together, increase the risk of falls, accidents, and functional reliance in older persons. Physiological changes that are associated with aging, when coupled with the presence of chronic illnesses, often result in decreased levels of activity, dread of movement, and a loss of independence in tasks that are performed on a daily basis. A significant contribution that physiotherapy makes to the aged population is the promotion of functional recovery, the prevention of disability, and the support of healthy and active aging within this demographic. [17]

The primary goals of physiotherapy therapies for older persons are to preserve and enhance the patient's strength, balance, coordination, endurance, and functional mobility. Exercises that focus on balance and proprioception may considerably minimize the chance of falling, while structured strength training programs can assist prevent the loss of muscle mass that is inevitable with advancing age. Training in gait and functional task practice, such as exercises that include sitting to standing and negotiating stairs, improve mobility and confidence in the ability to carry out tasks that are performed on a daily basis. The therapies in question are intended to be risk-free, progressive, and tailored to the specific physical capabilities and health conditions of the person.

In addition, physiotherapy is an excellent treatment for age-related illnesses such as osteoporosis, osteoarthritis, chronic back pain, and post-fracture rehabilitation, especially in cases when the patient has suffered a fracture to the hip or vertebral bone. Through the treatment of pain, the restoration of mobility, and the correction of posture, physiotherapy assists older adults in regaining their functional independence and preventing these issues from occurring further. Physiotherapy dramatically enhances quality of life, social engagement, and

general well-being in older persons. It does this by increasing physical capability, promoting confidence in mobility, and encouraging active participation. This enables older adults to keep their autonomy and dignity in later life. [18]

**Preventive and Promotive Role of Physiotherapy**

In addition to its function in rehabilitation, physiotherapy also plays a vital role in the prevention and promotion of a healthy lifestyle. Its primary objective is to avoid accidents, the recurrence of diseases, and the loss in functional capacity via the provision of education, ergonomic guidance, and exercise prescription. Physiotherapy practice includes a number of essential components, including ergonomics in the workplace, programs to avoid sports injuries, and initiatives to modify lifestyles. Physiotherapy helps lessen the burden of non-communicable illnesses and disability by encouraging exercise and good movement patterns. This is accomplished via the promotion of physical activity. This proactive strategy helps to contribute to functional well-being over the long run and lowers the need for medical treatments. [19]

**Multidisciplinary Approach in Functional Recovery**

Recovery from functional impairment often calls for a coordinated and interdisciplinary strategy that includes the participation of medical professionals, nurses, occupational therapists, psychologists, and social workers. Movement-based therapies that are complementary to medical and surgical treatments are provided by physiotherapy, which is an essential part of this team. Comprehensive and holistic treatment may be ensured via effective communication and coordination among individuals working in the healthcare industry. Physiotherapists are also essential in the process of discharge planning and reintegrating patients into the community. The total efficiency of rehabilitation programs is improved by physiotherapy, which also helps to maintain sustained functional recovery. This is accomplished via the cooperation of professionals from many fields. [20]

From the perspective of functional recovery, physiotherapy performs a role that is both broad and important across a wide range of health problems and demographic groups. The treatment of physical impairments, the enhancement of functional capacities, and the promotion of independence are all ways in which physiotherapy contributes to a material improvement in quality of life. Taking a patient-centered, evidence-based, and comprehensive approach to treatment provides both short-term healing and long-term well-being for the individual.

Physiotherapy is becoming an increasingly important component of modern healthcare practice as it continues to play an increasingly important part in functional recovery. This is due to the fact that healthcare systems are increasingly placing an emphasis on rehabilitation and quality of life. [21]

## OBJECTIVES

1. To investigate how physiotherapy therapies might help people with physical limitations become more independent, mobile, and functioning.
2. To investigate the efficacy of physiotherapy in facilitating functional recovery in patients suffering from musculoskeletal, neurological, cardiac, and geriatric diseases.

## MATERIAL AND METHODS

### Databases and search strategy

During the month of March 2021, we conducted research using the following databases: Web of Science, PubMed, Scopus, and the BRAIN resource search engine that is maintained by Universidad Rey Juan Carlos (Manchester). For the purpose of this study, the following keywords were utilized: "physical therapy," "physiotherapy," "rehabilitation," "functional movement disorders," "functional motor symptoms," and "psychogenic motor symptoms," all of which were mixed using the Boolean operator AND (Table 1). We looked at procedures that were published in journals and manually examined the references that were referenced in the papers that we acquired from our literature search in order to find studies that were relevant to our investigation. [22]

### Eligibility criteria

We established the following inclusion criteria:

- **Study type:** randomized, controlled studies that have been published since 2013 and have been reported in either English or Spanish
- **Participants:** people who have been diagnosed with FMD were included in the research.
- **Type of intervention:** investigations of the effects of specialized physical therapy treatments, either on their own or in conjunction with other therapies in a

multidisciplinary approach, as well as comparisons between the effects of a specialized physical therapy intervention and those of normal physical therapy

- **Outcome measures:** Evaluations of changes in motor symptoms, activity (gait, mobility, and balance), perceived health status, quality of life, or cognitive or emotional state are included in this research. [23]

Data was collected on the sample that was included in each research, the inclusion and exclusion criteria were applied, outcome measures were obtained, treatments were outlined, and data was collected on the result of the intervention. In order to assess whether or not the papers that were collected satisfied the inclusion criteria, one of the writers of this research went through the titles and abstracts of the publications. It was determined that the complete texts of publications that could have satisfied all of the inclusion criteria were scrutinized in further depth. The author, together with another researcher, was responsible for making the ultimate final selection of papers. [24]

**Evaluation of methodological quality and risk of bias**

For the purpose of evaluating the methodological quality and objectiveness of the studies that were included, the Oxford Quality Scoring System was used. Scores below three indicate a lack of methodological quality, scores between three and four suggest a moderate level of methodological quality, and a score of five indicates a high level of methodological quality. [25]

We used the Cochrane risk of bias tool to evaluate the potential for bias in each trial. This tool evaluates a number of factors, including random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting, and other potential sources of bias. A rating of low, high, or uncertain may be assigned to each domain based on the potential for bias. Within the framework of the PRISMA statement, the literature evaluation was carried out in accordance with its recommendations. The primary author conducted an analysis of the methodological quality as well as the potential for bias.

**Study selection**

The total number of articles that were retrieved was 360; only 186 original articles were retained for the purpose of evaluation after duplicate articles were removed. With the purpose

of determining whether or not the publications in question were relevant to our evaluation and satisfied the inclusion criteria, we examined the abstracts of possibly eligible papers. At long last, we decided to include four research, which reported data from a total of 188 people. The procedure for selecting the studies to be conducted is outlined in the flow chart shown in Figure 1. [26]

**Study characteristics and synthesis of results**

As a component of the therapeutic intervention, physical therapy was used in each of the four investigations. A specialized education-based physical therapy program, movement retraining (to restore normal function by shifting attentional focus), and a self-management plan utilizing a workbook were all used in two separate investigations. [27] According to the findings of one research, integrating physical therapy with cognitive-behavioral treatment should include the use of distraction tactics, motor strategies to minimize tremor, and walking at a low to moderate intensity. Within the context of a multidisciplinary cognitive-behavioral framework, the remaining research established a program of tailored physical exercise. [28] The three primary components of the intervention were the explanation of symptoms, the positive reinforcement of normal function, and the avoidance of the positive reinforcement of dysfunction.

Individuals in the control groups were typically provided with normal medical treatment or routine physical therapy. In one of the trials, the control group did not get any kind of physical therapy. In the other research, the control group got the same treatment as the intervention group, but the treatment began four weeks later. [29]

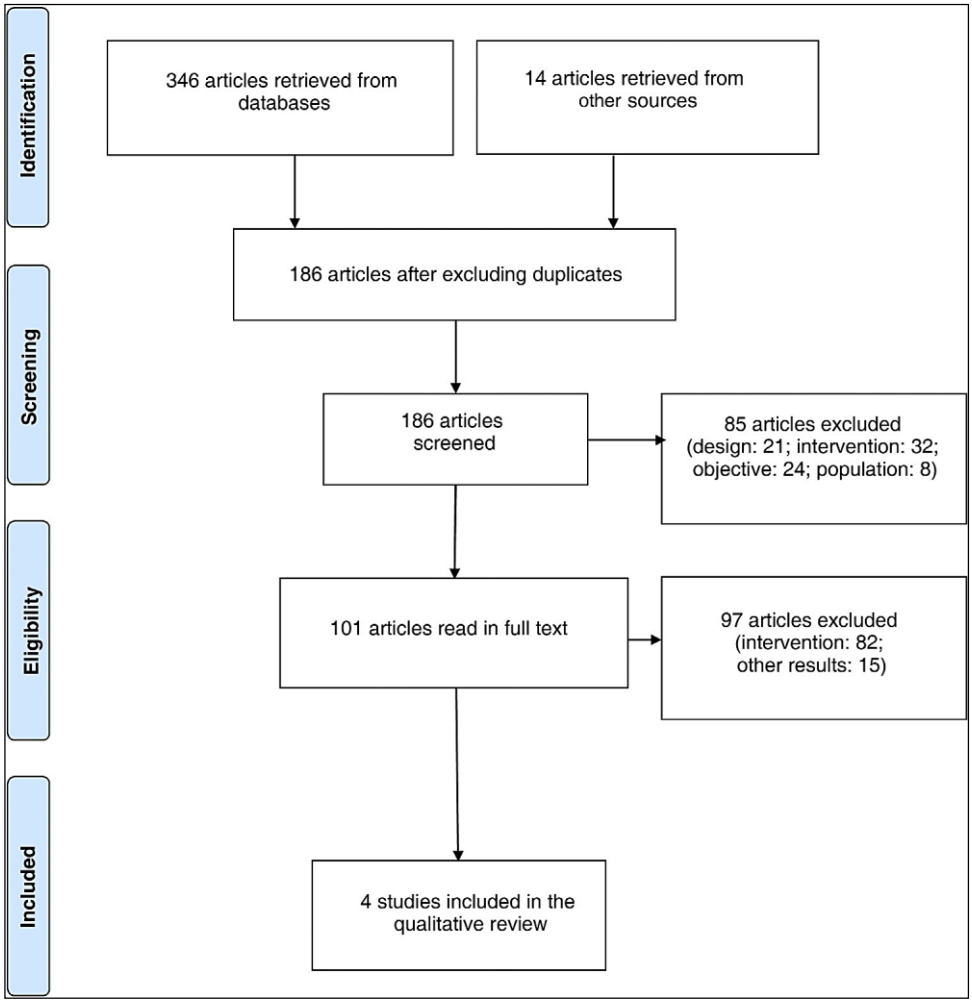


**Figure 1 Flow chart illustrating the study selection process.**

Two of the studies used outpatient interventions, whereas the other two studies utilized inpatient programs. [30] Outpatient interventions were employed in two of the investigations.

## RESULTS

The length of each session varied from forty-five to ninety minutes every day; however, this information was not included in the research conducted by Jordbru et al. There was a significant amount of variation in the duration of the intervention. In one study, the participants were subjected to intensive treatment for a period of five consecutive days. In another study, the intervention lasted for three weeks. In yet another study, the intervention was designed to last for twelve weeks, with two sessions per week. However, in the study conducted by Teodoro et al., the duration of the intervention was not specified. [31]

Every single study included a follow-up period for the participants following the intervention, and the duration of the follow-up period varied from four weeks to one year. In two of the

studies, participants were only required to attend a single follow-up consultation. However, in the other two studies, they were evaluated at two distinct time points: the first time was at one-third of a month after the intervention, and the second time was at six to twelve months after the intervention.

Physical therapy, as shown by the findings of this research, is effective in improving motor symptoms, activity levels, quality of life, and the perception of one's overall health state.

**Motor symptoms and activity**

The outcome measures that were used to evaluate motor function differed from study to study. Surface electroencephalography was used by Teodoro and colleagues in order to investigate motor performance, response time, and beta-frequency cortical oscillations while performing reaction time tasks with both predictive and nonpredictive signals. They discovered that individuals with FMD did not see an improvement in their response times when the cue was predictive of the movement that was about to occur. [32] During the motor preparation process, these patients exhibited persistent beta synchronization and a lack of lateralized beta desynchronization. This may be explained by the defective explicit movement control that was found in these patients as a consequence of excessive self-directed attention. In light of the fact that event-related beta desynchronization shows movement preplanning and preparation, this alludes to poor motor performance for the individual. [33]

The Berg Balance Scale, the Timed 10-Meter Walk Test, the Functional Mobility Scale, the Disabilities of the Arm, Shoulder, and Hand questionnaire, and the Brief Illness Perception Questionnaire all showed signs of improvement after the intervention, according to Nielsen et al. 72% of patients in the intervention group reported an improvement in their perception of motor symptoms, while only 18% of patients in the control group reported such an improvement. Using the Functional Mobility Scale and the Functional Independence Measure, Jordbru et al. observed substantial improvements in gait and functional independence. These gains were assessed. During the follow-up period of one month and one year, these improvements remained unchanged.

**Quality of life and perceived health status**

Upon completion of the physical therapy program, Teodoro and colleagues found that the participants' scores on the physical function domain of the Short Form-36 Health Survey (SF-36) were significantly improved. The same thing happened with Nielsen et al., who found that

there were substantial gains in three different areas of the SF-36: social function, physical role, and physical function. [34]

After receiving therapy, Jordbru et al. found that the patient saw substantial improvements in both the physical and mental categories of the SF-12. Nevertheless, throughout the subsequent conversation, these enhancements continued to be significant since they were not limited to the physical world.

According to the findings of the research conducted by Dallocchio and colleagues, the controls showed significant improvements in the severity and functional impact subscales of the Psychogenic Movement Disorders Rating Scale after therapy. [35]

**Cognitive and emotional status**

There were a number of research that looked at anxiety and depression. The Hospital Anxiety and Depression Scale was used by Nielsen et al., who discovered that there were no significant differences between the groups included. Secondary outcome measures were used in the research conducted by Dallocchio and colleagues. These measures included the scores on the Beck Anxiety Inventory and the Hamilton Depression Rating Scale.

This table provides a summary of the features of the study.

**Assessment of methodological quality**

The Oxford Quality Scoring System found that three of the studies offered a methodological quality that ranged from moderate to high, while the other one presented a methodological quality that was low. Because of the nature of the intervention, the participants in any research were not blind to the therapy, and either the raters or the participants themselves were not blind in certain instances. [36]

**Assessment of risk of bias**

In two of the investigations, the randomization method was a source of uncertainty about the potential for bias, whereas the risk of bias was minimal in the other two trials. There was a minimal risk of bias in all of the investigations since there were variations from the treatments that were planned. A minimal risk of bias was exhibited by each of the studies since there was a lack of outcome data. A substantial risk of bias was found in the measurement of the outcome in two of the investigations, whereas the risk of bias was found to be minimal in the other two

studies. Every single one of the four trials had a minimal risk of bias as a result of selective outcome reporting. With regard to the overall risk of bias, none of the studies were evident (Figs. 2 and 3). [37]

In recent years, there has been an increasing interest in patients with FMD from both a clinical and scientific perspective. This can be seen in the vast number of publications that have been published on the subject over the course of the last decade. FMD may be recognized using the diagnostic criteria that are now in use; however, diagnosis is not predicated on the exclusion of other conditions. The pathophysiological and neurological reasons of the condition are still largely unknown, and there is a lot that is still unknown. [38]

Neuroimaging has been an essential component in determining and redefining our knowledge of frontotemporal dementia (FMD). As a result of these research, anatomical and functional abnormalities in the central nervous system have been revealed. These abnormalities include enhanced regulation by the limbic system as well as hypoactivation of cortical and subcortical motor pathways. A defective control of motor action and inappropriate emotional processing are hypothesized to be present in these individuals, according to neurobiological hypotheses.

It is generally agreed upon that specialized multidisciplinary units should be responsible for providing therapy for patients suffering from FMD. Retraining your activity level is the primary focus of treatment, and physiotherapists play an important part in this process. In accordance with the paradigm of the International Classification of Functioning, Disability, and Health (ICF), patients are diagnosed on the basis of the existence of certain deficiencies. However, in order to assess activity limitation and participation restriction, special methods are required to be used. [39]

An examination of the most current scientific information about physical therapy for FMD is presented in this review. It is necessary for treatment to include many disciplines, with the goals of educating patients about their condition, achieving motor retraining, and providing tools for self-care. The improvement of motor symptoms and activity via specialized physical therapy programs leads to an improvement in both the individual's perception of their health condition and their quality of life.

There was not a single study that did not analyze specialized physical therapy therapies that was included in our evaluation. [40] A single individual was the only one to mix cognitive-behavioral therapy with physical treatment. Education, movement retraining, and a self-

management plan are the three pillars that form the foundation of physical therapy practices, as was described before. It is necessary for patients to get education in order for them to comprehend their diagnosis and symptoms and make an active contribution to their therapy. The goal of movement retraining is to demonstrate to patients that normal mobility may be achieved within the framework of their regular routines at home. Minimizing self-directed attention via distractions such as music, variations in rhythm, and tapping is essential to the process of retraining. This diminishes cognitive control of movement, which ultimately results in movement being more automatic. In order to retrain movement, motions are first disassembled into fundamental motor components that are asymptomatic. These components are then reorganized in order to restore a normal movement pattern. Neurorehabilitation makes use of the main principles of movement retraining in this process. These principles include the repetition of task-oriented exercises, the progressive increase in the complexity of the task, and feedback strategies such as mirror training, films, electromyography, and so on. One last thing that is absolutely necessary is a self-management strategy, which is often based on the use of a workbook. Strategies that are intended at normalising movement are included in the contents of the workbook. Additionally, a list of circumstances that precipitated and perpetuated the movement, indicators of improvement, and future objectives are given. [41]

**Table 1: Summary of results**

| Study | Patients | Intervention | Outcome Measures | Results |
|---|---|---|---|---|
| Dallocchio et al. [44] | IG: n = 11 CG: n = 10 Age: 34.7 years (SD: 10.1) Sex: 2 M / 9 W Symptom duration: 17.1 months (SD: 12.9) | IG: CBT, 90 min (1 session/week) CG: CBT + APA (distraction techniques, motor strategies to reduce tremor and gait impairment), 2 × 60 min sessions/week CG: standard care | Primary: PDRS at T0 and T1 Secondary: HADS BAI PHQ-15 | The total PDRS score showed a significant improvement in the primary outcome, whereas the 2 PDRS subscales and HADS, BAI, and PHQ-15 scores presented secondary outcomes. Improvements were observed between baseline (T0) and post-intervention scores (T1) in primary and secondary outcomes in both IG ($p < 0.05$) and CG ($p < 0.05$). No changes were observed in the CG ($p > 0.05$). |

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|---|---|---|---|---|
| | | | | No differences were observed between the two IGs (p > 0.05). |
| Teodoro et al. [45] | IG: n = 11 Age: 33.7 years (SD: 7.9) Sex: 4 M / 6 W Symptom duration: 20.7 months (SD: 10.5) CG: n = 8 Age: 32.9 years (SD: 9.8) Sex: 2 M / 6 W Symptom duration: 9.8 months (SD: 7.6) | IG: EEG analysis of motor performance and beta-frequency cortical oscillations during reaction-time tasks | SF-36 | Reaction times were similar between patients receiving predictive and non-predictive cues, both at baseline (p > 0.05) and after intervention (p > 0.05). However, in the IG, predictive cues showed a trend toward a contralateral hemisphere (mean = −0.086 μV, CI 95%: −0.33 to 0.19; p = 0.166). |
| Teodoro et al. [46] | Age: 42.7 (SD: 12.1) Sex: 4 M / 7 W Diagnosis of FMD; main symptoms were weakness (n = 11) and tremor (n = 8) | 11 patients received specialised physical therapy (education, movement retraining, and self-management plans) and 12 patients received standard physical therapy CG: no intervention Treatment: not described Follow-up: after a mean of 4.7 weeks | EEG, reaction time, and beta power | After treatment, the IG showed higher scores on the physical function domain of the SF-36 (mean [SD] of 30 [21.6] at onset vs 40 [30] at follow-up; p = 0.029). |
| Nielsen et al. [47] | IG: n = 13 Age: 41.2 (SD: 14.4) Sex: 4 M / 9 W Healthy individuals: IG: n = 29 CG: n = 28 Age: 44 years (SD: 13.1) Sex: 8 M / 22 | IG: 8 sessions (45–90 min) of specialised physical therapy (education, movement retraining, and self-management plan) for 5 consecutive days. Explanation of diagnosis before | SF-36 QALY HADS EQ-5D-5L WSAS | At 6 months, the IG showed higher scores in 3 domains of the SF-36: physical function (p = 0.01), physical role (p = 0.037), and social function (p = 0.007). There was also a significant improvement between |

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|---|---|---|---|---|
| | W Symptom duration: 5.9 years (SD: 8.3) | intervention CG: standard physical therapy (1–17 sessions) Treatment: 5 consecutive days Follow-up: at 4 weeks and at 6 months | | the BDS (p = 0.01), FMS (p = 0.03), PHQ-15 (p = 0.015), and WSAS. No significant differences were observed in the remaining scales. Motor symptoms improved in 72% of individuals in the IG, vs 18% in the CG. Symptoms worsened at 6 months in 32% of individuals in the CG, vs 3% in the IG. At QALY, the IG achieved a 0.08 QALY gain. Cost-effectiveness analysis indicated the intervention was cost-effective. |

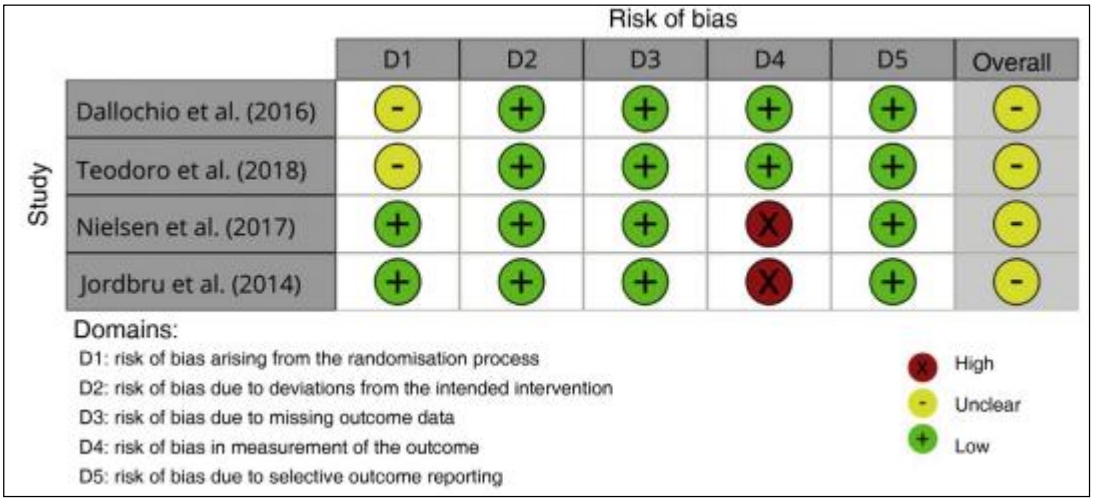


**Figure 2: Traffic light plot for risk of bias.**

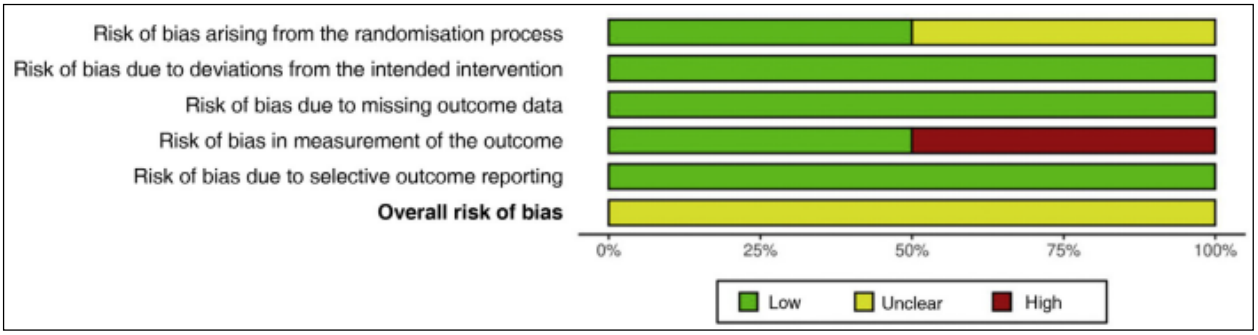


**Figure 3: Bar plot for risk of bias.**

## DISCUSSION

The trials that were included in our evaluation used programs that were very diverse, both in terms of the number of sessions that were conducted and the length of time that each session lasted, as well as the overall intervention. During the course of two of the trials, interventions were carried out on an outpatient basis, whereas the other two investigations used inpatient programs. In a general sense, inpatient treatment programs are more intense than outpatient programs. In contrast, the majority of the therapies consisted of inpatient programs in other studies that were not included in our evaluation. These studies covered both prospective and retrospective research. On the other hand, there have been published studies of outpatient therapies that involve large samples and indicate positive effects. Some of these studies use a mixed design, in which patients first finish an inpatient rehabilitation program and then go on to a supervised, home-based self-management plan.

For the selection of participants, the majority of studies selected people based on pre-established inclusion criteria that were comparable to those suggested by Gupta and Lang.

Long follow-up periods were included in each and every study, and patients were observed throughout the course of both the medium and long term. Considering the chronic nature of the condition and the need to determine if the advantages of the intervention are long-lasting, this appears to be a sensible conclusion to reach. [42]

Changes were evaluated using a variety of outcome measures, which varied according to the factors that were examined. These included motor symptoms, activity and quality of life, perceived health status, cognitive and emotional state, and perceived health status. There was a significant increase in scale scores across all of the trials that included the physical therapy intervention. Some researchers have concentrated their efforts on the creation of evaluation

instruments that are tailored particularly for functional movement disorders (FMD). These tools include the Psychogenic Movement Disorders Rating Scale and the Simplified Functional Movement Disorders Rating Scale, which was developed more recently. These scales have been evaluated by a number of writers, who have then provided suggestions for the outcome measures that are the most suitable. Despite the fact that the process of standardizing specialized physical treatment for individuals with FMD is now under progress, the techniques that have been offered by various authors continue to exhibit inconsistencies. Considering the vast population that was included in the research as well as the fact that it covered both inpatient and outpatient therapies, the multicenter study that was conducted by Nielsen and colleagues may provide some insight into some of these concerns. [43]

Recent years have seen the implementation of telerehabilitation programs in clinical settings. These programs include those developed by Gelauff et al., in which patients were provided with access to a website that offered non-guided education and self-help in addition to the standard care that they received, and those developed by Demartini et al., who combined in-person sessions with telemedicine sessions. It has not yet been decided if telerehabilitation on its own is adequate or whether it should be used within the framework of a multidisciplinary treatment program that takes place in person. There is no question that the introduction of new technology has made it possible for patients and therapists to communicate more effectively, hence enhancing patients' access to pertinent information on their health.

This systematic review has a number of shortcomings that need to be addressed. First of all, it only contains a small number of research, which led to a restricted number of patients being included in the sample. [48] Second, the intervention was different in each of the studies we looked at. In addition, the number of sessions and the length of time spent in each session differed from study to study, which prevented us from making an objective comparison of the outcomes. Due to the fact that we only considered research that were published in either English or Spanish, it is possible that we overlooked studies that were published in other languages. [49]

## CONCLUSIONS

Physical therapy is an essential component in the treatment of patients who have Functional Movement Disorders (FMD). It makes a substantial contribution to the alleviation of motor symptoms, the enhancement of daily activity performance, the enhancement of perceived health, and the enhancement of overall quality of life. Patients often have improved motor

control and a better degree of independence when it comes to conducting activities of daily living when they participate in focused therapies such as task-specific exercises, gait training, balance and coordination exercises, and functional mobility practice. Additionally, physiotherapy has the potential to have a beneficial effect on psychological well-being by lowering stress levels associated with disability and fostering a sense of self-efficacy, both of which contribute to the enhancement of functional recovery. Despite the fact that these advantages have been identified, the present research suggests that there is still a substantial need for further studies that are of a high quality and are well structured in order to completely examine the efficacy of physical therapy in a variety of clinical settings and patient types. To be more specific, the objective of research should be to find the best intensity, frequency, and length of treatments, as well as to develop tailored treatment techniques that cater to the specific requirements of each particular patient. Furthermore, it is vital to construct outcome measures that are both reliable and sensitive in order to properly evaluate gains in motor function, activity engagement, and quality of life. This will enable clinicians to make choices based on evidence and successfully customize rehabilitation techniques. Providing greater clinical advice, optimizing therapy results, and improving the overall care of patients with FMD are all possible objectives that might be achieved by future research that address these gaps.

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