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THE EFFECT OF PHYSICAL THERAPY ON FUNCTIONAL IMPROVEMENT IN MULTIPLE SCLEROSIS PATIENTS

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ABSTRACT

Physical therapy plays an important role in providing care to patients with multiple sclerosis (MS) across different disease stages. In early MS, it is focused on identifying at-risk people and encouraging them to engage in health maintenance behaviors. In persons with ambulatory MS, physical therapy promotes task-oriented practice and exercise, incorporates functional rehabilitation into individualized interventions, and educates individuals about self-management. In late-stage MS, physical therapy manages symptoms that impact function, including contractures and secondary changes in body mechanics that cause pain. For all individuals with MS, part of the role of physical therapy is to offer education about the need for, and types of, exercise to avoid complications of inactivity and sedentariness, and also to provide education regarding self-management and coping strategies. Although evidence suggests that physical therapy interventions are beneficial early in the disease course and that exercise is beneficial in all stages of MS, ongoing research will guide clinical practice in the future.

KEYWORDS: In early MS, it is focused on identifying at-risk people and encouraging them to engage in health maintenance behaviors.

1. INTRODUCTION TO MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a chronic autoimmune condition that affects individuals' nervous systems. A variety of symptoms is evident, and it leads to an ultimate diagnosis of various presentations of neurological syndromes. It affects the central nervous system (brain and spinal cord) by disrupting the way the nerves send electrical signals to the rest of the body. The cause of MS is unknown, and there is currently no cure. It is a degenerative disease that incurs various amounts of damage that disrupts the movement between nerve fibers. When the fatty substance called myelin is degraded, the nerve fibers are bent, scars are formed, and the signals are weak or fail. This, in effect, leads to relapses or exacerbations. This review will focus on the relapsing-remitting form of MS (RRMS) that has an increase in symptoms throughout the years. (Akyuz et al. 2023)

Multiple sclerosis (MS) is a progressive disease affecting 2.3 million people worldwide, 686,000 of whom reside in the USA. The average onset begins between the ages

of 30 and 40. It can have a profound effect on the quality of life, comfort, presence, and functionality of these individuals. The purpose of this review is to demonstrate how physical therapy can enhance functionality and performance in these patients. Each patient is affected uniquely in their functional abilities, depending on the location in the brain or spinal cord that the nerves are disturbed or cannot receive signals. MS is a significant issue in today's society, and it is critical to enhance the quality of life through increased functionality in performing activities of daily living. Therefore, it is necessary to address any roadblocks in the way of enhanced quality of life. (Sciascia, 2022)

1.1. Definition and Pathophysiology of Multiple Sclerosis

Multiple sclerosis (MS) is a demyelinating disease characterized by the disruption of communication between the brain and the body. The exact pathophysiological processes by which this happens are not known. The underlying process results from these two responses that contribute to the development of the disease. Inflammation leads to the destruction of the myelin at the response sites in the CNS. This part of the disease influences the degree and variability of symptoms experienced by patients. While it seems that certain demyelination processes are reversible, studies suggest that some axonal injury can show partial resolution or recovery. As the disease progresses, the inflammatory component diminishes and the causes leading to neurodegeneration and atrophy are not well understood; therefore, the lesions do not resolve, and there is a resultant increase in gliosis and profound atrophy, especially lateral ventricular enlargement, followed by increasing physical and cognitive disabilities. The nature of this disease has also been categorized as a lifelong condition and, as such, it implicates physicians to provide much-needed support to the aforementioned individuals. (Lakin et al. 2021)

The exacerbations are associated with various unpredictable periods of remission and stagnation in 85% of patients in the initial period. Progressive disability begins at around 10 years and continues to progress thereafter in around 65% of patients. Since the brain is central in almost all aspects of human function, patients may also experience various issues including vision impairment, lethargy, tremors, hormone irregularity, and cognitive and attributive impairment. Importantly, it must be said that MS symptoms can substantially compromise one’s quality of life; many of these symptoms of the disease have been formally reviewed and include background symptoms that can involve spasticity, imbalance, fatigue, depression, and bowel and bladder irregularity. Clearly, MS is highly complex and the symptoms and disease pathways are variable. This may be why patients are reported as the 'poor MS partners for MS research.' It is also very important to understand that the aforementioned treatments may not have any significant impact on disease progression, and treatment adherence is required. Certainly, for those who do not experience reduced symptoms, rehabilitative interventions such as physical therapy exist, as this special supplement highlights. (Twomey et al. 2022)

1.2. Prevalence and Impact on Functionality

The exact prevalence of multiple sclerosis (MS) is not known, fluctuating widely even within countries, depending on variances between ethnicities, sexes, and geographical areas. Its prevalence is universally, however, estimated to be high. In Europe, for example, with data estimating a prevalence of 350 cases per 100,000 people and prevalence rates of 100 to 200 in 100,000, MS is regarded as the most common single cause of physical disability among working-aged adults. It is also the most common and expensive neurological disease afflicting young people in America. One study of MS in Sweden observed that the disease has a major influence on the everyday activities of the relatively young patients that it predominantly affects. In that research, 98% of patients were impeded in at least one everyday activity. (Lakin et al. 2021)

The area of functionality in a person's living is adversely influenced by MS in numerous respects. Mobility impairments that contribute to important reductions in people’s taxes with significant effects on community economic output are one of the most problematic features of the condition. Training injuries may also have important repercussions in relation to personal independence, withdrawal from work, and family. Organizational issues, residing in terms of rate and complexity, and poor handling of emotional aspects are other problematic features associated with everyday life with a disability due to MS. It has been estimated that some socio-economic and personal impacts of MS are shared by people with MS regardless of the presence or severity of MS-related fatigue. The cost and health care expenses of MS can also be overwhelming, with direct average annual expenditure in the USA calculated at eleven thousand eight hundred and eleven dollars, and total average annual costs at 34,331. The prevalence and impacts of MS indicate a degree of urgency regarding this issue, particularly its episodic etiology, to raise the news of innovative, customized, inter-target, non-drug implementations. (Balasoiu et al., 2023)

2. Physical Therapy in Multiple Sclerosis Management

Multiple sclerosis is a chronic autoimmune inflammatory disease; it affects more than 2 million patients worldwide. It disrupts the functionality of the central nervous system and quickly becomes a debilitating issue. Most patients facing MS have difficulty rising, walking, and driving. To address these symptoms and their underlying issues, they require physical therapy and exercise. Although there is no cure for MS, the main goal of physical therapy is to enhance a patient's quality of life. For this, therapeutic methods including different exercises help to restore a patient's overall functionality,

which is vitally linked to their physical, psychological, and social state. (Duan et al., 2023)

The primary goal of physical therapy is to improve an individual patient's functional level through rehabilitation. Therapeutic objectives include the promotion of mobility and functional independence, enhancement of strength and coordination, prevention of secondary conditions, facilitation of successful compensatory strategies, and enhancement of overall psychological and physical well-being. A multidisciplinary or interdisciplinary approach towards the individual's treatment becomes extremely important. A tailored therapeutic exercise regimen may be capable of improving patients' walking ability, functionality, pulmonary functions, and quality of life. (Dantas et al. 2021)

A vital part of this can have some notable categories like strength training, cardiovascular exercises, endurance exercises, balance exercises, flexibility and stretching exercises, aerobic exercises, yoga, thermal interventions, proprioceptive training, balance disorders, biofeedback exercises, gait training, endurance suggestions, mental games, stress management, and aquatic exercises. In combination, the main purpose of these physical therapy interventions is to enhance the overall potential of a patient, boost their gait, and provide an ideal variation towards the improvement in a patient's walking function. (Jayakumar et al. 2021)

2.1. Goals and Objectives of Physical Therapy

The ultimate goal of physical therapy for multiple sclerosis (MS) is to improve patient functionality. In particular, the objectives of physical therapy are to improve mobility, specifically facilitated by walking, to decrease physical and central fatigue, and above all, to improve balance and coordination of the whole body or of the paretic/dyskinetic limb. The interventions carried out are aimed at minimizing the impact of secondary and tertiary impairments with particular attention to disability management. In fact, the main goal is to restore and/or maintain the highest level of independence in performing the patient's personal daily life activities in order to maximize their quality of life. (Hao et al. 2022)

Goals in physiotherapy must be functional, attainable, modulable over time, and shared by the patient and the therapist. In this regard, patient-centered therapeutic interventions, which involve the patient in the active search for the goals to be achieved, together with the physician, and the measurement of the eventual disability achieved, are more efficacious for improving physical performance. In fact, the rehabilitation goals established in collaboration with patients based on their felt needs and rated by them have been found to predict long-term functioning better and quicker than other tests or therapist-rated variables. Relatively worse MS-related fatigue and gait dysfunction are linked to a dissociation between people's personal goals and concerns about disease progression and current medical concerns. To optimize the outcomes, goal setting must also include patient education on the topic and the co-creation of strategies concerning the behavior change necessary to achieve the goals. (Marques et al. 2021)

2.2. Types of Physical Therapy Interventions

Various methods for physical rehabilitation have been suggested in connection to MS management. Suggested methods traditionally focusing on exercise has stressed the need for an overarching multi-modal approach, which can encompass modes such as aerobic conditioning, resistance training and flexibility. The majority of interventions outlined in systematic reviews have been proven to be effective in ameliorating symptoms associated with MS, such as fatigue, balance, motor, and gait impairments. (Hadoush et al. 2022)

The basis of any physical therapy intervention is to utilize interventions that are evidence-based and tailored to the ability of the patient. A multimodal approach should be taken to best tailor interventions, including walking and gait interventions, stretching and flexibility exercises, neuromuscular electrical stimulation followed by active exercises, and a strength training component specific to the deficits of each patient. Interventions for gait training have included strategies to improve energy efficiency, body weight support treadmill training, constraint-induced movement therapy, cool suits, and training in gait under different conditions. (Sparks et al., 2022)

The use of balance exercises, especially with the assistance of aquatic therapy and other relaxation techniques, can also have a role in improving the function of MS patients, as it could possibly decrease spasticity and unwanted muscle activity. In patients with balance impairments, gait and balance training together occurred in three of the included studies of the review. The findings indicated a favorable impact of upper limb functional exercises combined with occupational therapy techniques on unimanual control and dexterity for patients to provide additional strength, unilateral steadiness, and on other skills further than just grasp strength. Moreover, technology-assisted gadgets have demonstrated success in enhancing upper extremity ability like VR gaming, robotics, and exoskeletal suits. (Salari et al. 2022)

3. Benefits of Physical Therapy for Patients with Multiple Sclerosis

A multitude of benefits has been widely reported regarding physical therapy for individuals with MS. Structured intervention through PT demonstrated outcomes of significant improvements in motor and non-motor functions, as well as balance and mobility among both less severe and moderate to severe patients. Pain and therapeutic management of all chronic, intermittent, or musculoskeletal-related symptoms have been noted to subside with personalized therapeutic interventions.

Patients have reported that through their therapeutic sessions, where specific interventions took place, they felt as though they experienced enhanced stamina and endurance post-therapy session. This can have a direct impact on the patients' functional mobility, therefore increasing their overall quality of life. Decreases in patients' BMI, increased muscle strength, as well as decreases in resting HR, have all been established through structured physical therapy. (Rabini et al. 2024)

The literature seemed to point to the psychological benefits of physical therapy sessions. Several case studies, along with self-reported experiences by patients, have been identified, stating that interventions led to an enhanced mood. Patients felt more socialized receiving physical therapy services and exercising with a group. While improving mood, patients noted functional improvements as well. Anxiety decreased for some individuals and was replaced with a feeling of being surrounded by a support system. Having the support network of individuals with similar aspirations, goals, and symptoms gave some patients a sense of belonging and camaraderie. Of equal importance is the therapeutic relationship the patient has established with the PT, exercising with a purpose. It is crucial that a good patient-practitioner relationship is developed so that the patient feels comfortable giving a true understanding of expected and unexpected symptoms. (Obeagu and Akinleye, 2024)

3.1. Improvement in Mobility and Balance

It is widely regarded that mobility – the ability to move safely and effectively in a variety of directions or postures – plays an essential role in daily life. A range of physical therapeutic interventions exist to enhance mobility for individuals with MS. Rehabilitation methods are designed to enhance the functional mobility of the patient to assist with ambulation and transfers. It is frequently the focus of these interventions. MS patients often have balance problems. Proprioception is the sense that indicates whether our body is moving with the required velocity and at the required angle, and is instrumental in providing information to balance centers in the spinal cord and brain. Preliminary evidence suggests that balance problems precede gait impairments in MS by several years. Balance is regulated by a constellation of MS-related intrinsic impairments. A prognosis of functional mobility can be inferred from scores on certain balance tests. (Friedrich et al., 2021)

In a randomized controlled clinical study, a significantly greater improvement in BBS was seen over 10 weeks in patients in the exercise and manual therapy group compared with the control group. At the end of the study, patients in the exercise and manual therapy group also showed significantly greater improvements in various functional measurements related to mobility and upper-extremity functioning. Improving strength, range of joint motion, hand-eye coordination, vision, and proprioception are several other approaches that can be used to influence each individual's functional balance and stability. (Jahanpeyma et al. 2021)

It is noted that, along with improving balance and preventing falls, these improvements can have a considerable psychological effect, in that the patient may be less anxious and become more active since they feel more steady and confident in light of being more stable while standing and moving. Another study found that a group of women with MS who participated in a group-based exercise and discussion program scored higher on three balance questionnaires and reported fewer pre- and post-balance problems compared to controls, while another study also found that an exercise program that focused on strength, balance, stretching, and the promotion of leisure activities decreased fall rates in men with MS. The findings of these studies indicate that balance can be improved and that either primarily or in some cases, postural stability might be independent of a person's ambulation, as significant improvements in stand times with both feet joined together shall be noted when utilizing ultrasound and electrical stimulation. (Galperin et al. 2023)

3.2. Pain Management and Fatigue Reduction

Physical activity and physical therapy are treatment options for patients with pain and fatigue, the two most common symptoms of MS. Lifestyle physical activity and a regular exercise program can provide relief from chronic pain and perhaps disability. Chronic pain is a factor in causing poor physical functioning. Physical therapy utilizes therapeutic exercises to improve function and decrease pain. Physical therapists can prescribe exercises to stretch tight muscles, strengthen weak muscles, increase endurance, and work on balance control. They can also oversee an appropriate aerobic conditioning program that is within the individual's energy window. Stretching exercises and specialized yoga classes can help reduce spasticity. The physical therapist can provide a home exercise program for individuals to continue after beginning osteoporosis treatment. (McDonough et al. 2021)

MS patients commonly report fatigue. It is not related to the level of disability or the amount of physical activity. Fatigue limits functional ability and social activity. Several clinical studies have shown that physical activity and exercise can decrease fatigue. Exercising to maintain a fitness level and regular moderate exercise can help produce a "second wind," decreasing fatigue. Fatigue and well-being are inversely related to depression. Depression reduced MS physical and social functions, including a decrease in the ability to ambulate. Aerobic and strengthening exercises often lift mood. Physical therapy can help avoid injury and pain that may lead to depression. Twenty-six women with MS demonstrated a slower gait walking speed and a greater step length after a treadmill walk. Walking faster and with a better step length demonstrated increased mobility and walking endurance. It is a well-established fact that

cardiovascular endurance is related to fatigue and the ability to work longer. (Jha and Ghewade, 2022).

4. Challenges and Considerations in Physical Therapy for Multiple Sclerosis

One of the primary reasons working with individuals with multiple sclerosis (MS) is so challenging involves the fluctuating and progressive nature of the disease. Clients may often be doing quite well one day, only to be feeling poorly the next due to a cold virus or other illness. Individuals with MS may experience relapses, remissions, and/or constant progression of symptoms. In light of these changes, the only constant in the physical therapy management of someone with MS is the need for constant assessment of the person's dysfunction. This must be done during every treatment session, regardless of the client's perceived capabilities or how "predictable" the client may be in their functioning. The objective of the assessment is to identify what needs to be done on that day, at that time, to help the individual develop, maintain, or improve the highest level of function of which they are capable. It is also important for the therapist to understand that because MS affects each person differently, every patient will require a different therapy regimen and frequent reassessment based on their changing needs. (McDonough et al. 2021)

4.1. Disease Progression and Fluctuating Symptoms

The fluctuation of symptoms and progression characteristic of Multiple Sclerosis (MS) is challenging both for patients and clinicians. Patients find the uncertainty of the disease progression and symptoms to be difficult. When symptoms are inconsistent, it becomes challenging to track how the disease progresses or how effective treatment is overall. Each patient has different symptoms, different rates of progression, and different disease courses. So personalized treatment plans should be developed. More tailored approaches to treatment, for instance, separating "acute" inflammatory processes and chronic processes, could help improve MS treatment plans. One example of such an approach might be monitoring clinical signs of demyelination to titrate the dose of an anti-inflammatory drug accordingly.

(Henschke et al.2021)(Wenk et al.2024) By regularly monitoring physical exams and MRI scans, clinicians will be able to evaluate the disease burden and adjust the treatment plan. The course of MS is characterized by acute exacerbations and periods of remission. During this period, symptoms — including those from co-existing conditions — can surge and drop suddenly. That means we need to modify the treatment methods. An example is facilitation of skills or exercises that require coordination, muscle strength, and/or spasticity management during the remission phase, and exercises that activate recovery programs during the relapse phase if fatigue is tolerable. The fluctuating symptoms make patients with MS vulnerable. Cognitive and endurance problems, anxiety, and depression are common symptoms in MS. (Ullah et al. 2023)

The course of the disease, solutions, and adaptations change over time, which might be experienced as a burden. Therefore, suggestions may change over time. Management should be time-efficient and patient-oriented. Monitoring the signs of corticospinal tract functioning may provide insights if the intensity of a therapy should be adapted because exercising at suprathreshold levels can accelerate either remission or recovery or progression or damage the nervous system. The role of a physical therapist is teaching a patient how to predict the impact of physical activity. Many patients with MS experience a lack of understanding and/or empathy regarding their physical and psychological problems. This might lead to social isolation. Patients experience that networking between the different disciplines is important to achieve an optimal quality of life. (Zolkefley et al. 2021)

4.2. Adherence and Motivation

Rehabilitation services encourage individuals affected by multiple sclerosis (MS) to live an active life despite problems arising from health conditions. In most cases, during the course of MS progression, patients need to adhere to physical therapy treatment protocols to maintain physical capacity and prevent secondary impairments. Good adherence to physical therapy is needed to achieve long-term benefits related to the functionality and well-being of patients. There are common issues that therapists face in the context of adherence to physical therapy in MS. Motivation is a critical factor for a healthy and active lifestyle, and to ensure that an individual sustains that motivation, a therapist has to garner a better understanding of barriers to adherence. A few studies provide some evidence and suggestions to strengthen motivation. (Pedretti et al. 2023)

Several studies and theoretical frameworks suggest that patients are more likely to engage in therapy if they are supported by a health professional who attends to these issues. Indeed, the commitment of therapists to form collaborative relationships with patients often leads to better adherence to physical therapy and greater success in goal attainment. Most commonly, patients are more likely to signal helplessness, dejection, isolation, and frustration. These issues influence how the therapists collaborate with their patients and tailor their rehabilitation services. Educational packets on MS and the positive effect of adherence can help improve regular physical therapy and how to maintain it for a period, and can cultivate management organizations among individuals. (Atif et al.2022)(Lattie et al., 2022)(Boucher et al. 2021)

5. Innovations and Future Directions in Physical Therapy for Multiple Sclerosis

Recently, multiple technological innovations have been applied in neurorehabilitation, with indications for use for people with multiple sclerosis. Virtual reality

technologies bring an experiential aspect to physical therapy that was formerly unattainable and guide more interactive training sessions. Advanced robotics provide precision control over patient training while also relieving effort on the part of the therapist. Telehealth and apps provide access to physical therapy from anywhere, from the classroom to the home training environment. Despite these new and meaningful applications for rehabilitation practice, there are some limitations to these tools. However, the potential for development in the future of these technologies seems strong, and future adaptations could allow for unforeseen expansion, as these innovations are still young. (Iodice et al. 2023)

Ultimately, personalized treatment approaches are the latest development in physical therapy designed to account for the complexity of the specific patient's profile, and their accurate application, as recommended by evidence-based practice, may lead to a model that supports these microsystems across the country. A novel way to think about physical therapy in multiple sclerosis is to approach the concept of personalized practice. Physical therapy for patients with multiple sclerosis takes advantage of new technological possibilities. VR has gradually transformed the face of physiotherapy. For patients with multiple sclerosis, VR has been used to increase postural stability during balance training sessions. In terms of postural stability as well as perceived fatigue, only VR physical therapy showed higher improvements compared with ordinary physical therapy. In both intelligence and dynamic equilibrium, non-significant increased differences were shown. Therefore, there is still limited evidence of VR benefits compared to fitness therapy only, and more research is warranted. (Frizziero et al. 2021)

5.1. Technological Advancements in Rehabilitation

Technological Developments in Rehabilitation The rapid technological advancements are influencing the rehabilitation field by providing us the ability to offer personalized therapy experiences for people with MS. Wearable technologies such as sensors, fitness bracelets, smartphone apps, and virtual platforms have been developed to monitor and track any signs of impairments or symptoms from the patient. These tools have opened a whole new way of integrating the patient into therapy and can provide a wealth of personalized data for the onset and development of new interventions. In a more recent boom of technological developments, robotics have been increasingly used for physical therapy. The robotic physical treatment system combines the essential characteristics of devices and virtual reality. It can provide patients, especially those with MS, with a highly realistic, playful, and physically and psychologically interactive environment. Thus, under the guidance of medical personnel, it makes patients highly engaged and adaptive, becoming the motivation for the intervention. (Duan et al., 2023)

The integration of technology in rehabilitation looks attractive, and some of the breakthroughs and evidence of its applicability in several neurological conditions have already been shown. For instance, a case report with two patients with progressive MS using a gaming platform reported improved balance, hand grip strength, and walking speed, hence proving the technology's potential in physical therapy. In conclusion, technology can facilitate a more patient-tailored approach in physical therapy. The evidence displays the successful use of commercially available technology to address the needs of individuals with MS in multiple components geared toward rehabilitation, particularly improving functional mobility. The integration of technology further shows promising benefits in terms of patient engagement, adherence, and sensory aspects of common physical therapy, enhancing therapy effects via adaptations of the intensity not found in traditional therapy. Despite the many advantages of apps and wearable devices, and case reports showing their potential, therapists have reported barriers due to a lack of evidence and a lack of interest in keeping up to date with new technologies. (Sconza et al. 2021)

5.2. Personalized Treatment Plans

In recent years, more nurture and attention has been given to the concept of personalized rehabilitation programs for MS patients. This rehabilitation approach takes into consideration the strong heterogeneity of MS symptoms and the heterogeneity of disease-associated factors. Each individual patient's rehabilitation program should, therefore, be adapted and chosen on the basis of careful patient examination, assessments, and clinical considerations. One of the most important aspects of the multiple sclerosis patient during the rehabilitation program development phase is the input and involvement of the patient himself or herself in this plan. A cooperative approach will increase the motivation and compliance of the patient, while simultaneously allowing the identification of the motor skills and mental abilities acquired, achieving the best possible chance of maintaining or improving balance, performing daily living activities, and reducing fatigue. (Tacchino et al. 2023)

6. CONCLUSION AND RECOMMENDATIONS

Look into the Discoveries. For MS patients, physical therapy is essential. The physical therapy helped improve the functional status of the MS patients, especially in pain and mobility. Mobility that improves your life and reduces pain can give you back your life. So the positive impact of exercise for MS patients isn't just physiological but should also consider the person's psychosocial factors. Ultimately, evidence has demonstrated that physical therapy, as well as exercise, provides symptomatic relief of various MS symptoms and improvement in quality of life overall.

Based on the new evidence that physical therapy techniques can greatly increase mobility, decrease pain,

and improve quality of life for patients with MS, we as clinicians must proceed with caution and prudently formulate strategies for delivering optimal patient-centered care. New clinical findings continue to emerge regarding the benefits of physical therapy for patients with MS. As such, it is important that physical therapists continue to stay current and informed in order to provide the best, quality care to MS patients. Therapists must remain current on the techniques and information available for patient treatment, as well as remain current on all the treatments for all different diagnoses, ensuring they are solidly treating all aspects of care for the patient. Interdisciplinary care will help ensure the patient is receiving the best quality of care for all their many symptoms. The comprehensive model of care now being utilized in patient care will ensure that the patient is receiving maximum benefit. Future research should focus on indicating the additional benefits and efficacy of physical therapy techniques for treating the disease symptoms associated with Multiple Sclerosis in order to further refine and advance patient care.

Final Thoughts Physical therapy techniques for MS have an overall positive impact, specifically in regards to leg function. This last piece of information will continue to help progress and influence future of patient care in our world today. Overall it is important to advocate for interdisciplinary and aggressive care, ensuring that multi system care is the main implantation for all plans regarding the treatment of patient care, specifically ones with MS. In an ideal world, an interdisciplinary team would include but not be limited to many health care professionals such as: primary care physician, physical therapist, occupational therapist, speech therapist, physiatrist, exercise physiologist, dietician, psychologist, case management, and patient educator. With responsive, proactive care, care needs are less frequent and avoid recurring emergencies and therefore, cost-effective and proper treatment is continually in place.

6.1. Summary of Key Findings

Physical therapy can have an extensive role in the corpus of health care services delivered to patients with multiple sclerosis and can be crucial in improving some negative features. Providing more information to these patients can help in coping with disabilities and symptoms arising from the disease. Furthermore, special therapeutic and aerobic training or physical activity programs can bring about changes in some of the physical fitness and self-body perceptions of the patients. They can decrease the risks of these individuals in relation to secondary health problems, and this affects the quality of their lives in these directions.

The results of the studies within the range of information-providing programs, physical training programs, and the study results in terms of general effect have been compiled and marked with the number of the study and the year performed in the related areas of discussion under this topic and are listed in a table and then presented individually. These studies reveal that the exercise and physical activity programs can increase the personal levels of the patients in relation to life standards, life qualities, balance, muscle strength, fatigue, depression, motivation, self-body perceptions, and the levels of physical activity, as well as decreasing joint pain, spasticity, risk of falls, and the overall risks of the patients. At the end of this study, we firmly believe that physical therapy should be a significant member of the health care team that works with multiple sclerosis patients. Exercise and physical therapy programs should be advised to patients with multiple sclerosis, as these tools provide significant contributions in terms of improving the variance, especially physical fitness and negative features, and maintaining the improvements in the patients.

6.2. Recommendations for Clinical Practice

It is important for healthcare providers to provide an individualized approach to patients in physical therapy. Consequently, it is necessary to update therapists' knowledge continuously as the scientific evidence evolves. It is recommended to include technological tools, if possible, to enhance treatment effectiveness and adherence. Further studies could aim to test how to foster patient adherence and determination in using the technological tools at their disposal. In order to handle this, other studies should be performed to understand what barriers and facilitators therapists specializing in neuro-rehabilitation perceive in using telerehabilitation.

Updated knowledge of pathogenic mechanisms, neuromuscular complications, and physical therapeutic strategies could increase the quality of care in physical therapy and, consequently, reduce the care load imposed on individuals with MS as a result of motor symptoms. Moreover, the mindset of the population with MS is generally changing. For this reason, healthcare providers and facilities should be able to provide the most effective treatments that use all the tools available and the most recent guidelines to obtain the best results that reflect on the health of the population. Physical therapeutic programs should include (I) exercises targeting balance and gait based on personalized graduated exercises and including dual tasks or perturbative and reactive exercises, (II) active range of movement, stretching, and compressive and fascial treatments for spasticity, (III) strengthening including body weight support exercises and resistance exercises with elastic bands, (IV) posture training based on trunk control, and (V) endurance exercises according to the patient's goals, for instance walking, cycling, or swimming.

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