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# The cumulative effects of the myofascial release technique by increasing the number of sessions: The effect of 6 weeks of myofascial stretching training on flexibility of posterior chain muscles in Multiple Sclerosis

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Original Research

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## Abstract

**Purpose:** Multiple Sclerosis (MS) is a chronic neurological condition leading to muscle stiffness, spasticity, and reduced flexibility, particularly in the posterior chain muscles. Myofascial release (MFR), has shown promise in improving flexibility in various populations, but the cumulative effects of increasing the number of sessions have not been well-studied in individuals with MS. This study aimed to investigate the effects of a six-week myofascial stretching training program on the flexibility of posterior chain muscles in individuals with MS, with a focus on evaluating the cumulative effects of increasing the number of sessions. **Method:** A total of 30 female participants with MS were randomly assigned to one of two groups: a group receiving myofascial stretching training twice per week (n=15), and a group receiving training four times per week (n=15). Flexibility of the posterior chain muscles was assessed using the Sit and Reach (S&R) test at baseline, after 6 weeks of the intervention. **Results:** The results showed a significant improvement in S&R scores in both intervention groups. The group receiving training four times per week demonstrated greater flexibility improvements than the group receiving training twice per week, suggesting a cumulative effect of increasing the number of sessions. **Conclusion:** A six-week myofascial stretching training program can effectively improve the flexibility of posterior chain muscles in individuals with MS. Increasing the frequency of sessions from twice per week to four times per week leads to greater cumulative improvements in flexibility. These findings have important implications for the design of rehabilitation programs targeting flexibility in individuals with MS.


**Keywords:** Myofascial Release, Flexibility, Multiple Sclerosis, Posterior Muscles Chain, Stretching Training

## Introduction

Chronic diseases are a problem in developed and developing countries, the solution of which requires a lot of time and cost to achieve rehabilitation goals (Collado-Mateo et al., 2021). One of the chronic diseases that has a high prevalence in Iran and the world is multiple sclerosis, which is a progressive and often debilitating neurological disease (Salari et al., 2022). This disease is of high importance in terms of frequency, chronicity, and high tendency to attack young adults (Lee et al., 2022). Multiple sclerosis is an inflammatory disease that involves the cerebral hemispheres, optic nerve, brain stem, cerebellum, and spinal cord, which is accompanied by the loss of nerve myelin and is often disabling (Wildner, Stasiołek, & Matysiak, 2020). The signs and symptoms of the disease vary according to the location of the lesion. Loss of flexibility, strength, spasticity, sensory disturbances, fatigue, ataxia, autonomic dysfunction, and decreased visual acuity are frequently seen in MS (Fasihi, Shahrbanian, & Jahangiri, 2025). Prolongation of cortical motor neuron conduction time as a result of muscle weakness and demyelination of neuronal axons is common in MS (Asadi, 2022). Flexibility is a critical component of physical fitness and overall health. It refers to the ability of muscles and joints to move through their full range of motion (Nuzzo, 2020). The posterior chain, which includes muscles such as the hamstrings, gluteus maximus, and erector spinae, plays a vital role in various functional movements and athletic performance (Almansoof, Nuhmani, & Muaidi, 2023). Limited flexibility in this region can lead to compensatory movement patterns, increased risk of injury, and diminished performance. In the context of MS, a chronic neurological condition characterized by demyelination of nerve fibers, flexibility becomes even more crucial (Ferri-Caruana, Mollà-Casanova, Baquedano-Moreno, & Serra-Añó, 2022). Individuals with MS often experience muscle stiffness, spasticity, and reduced mobility, which can severely impact their quality of life (Fasihi et al., 2025). Therefore, interventions aimed at improving flexibility, such as myofascial stretching training, may provide significant benefits for this population (Singh, Patel, & Sharma, 2023).

Myofascial release (MFR) is a manual therapy technique that targets the fascia, the connective tissue surrounding muscles, bones, and organs (Sonali, 2022). This technique aims to alleviate pain and restore movement by releasing restrictions within the fascia (Barnes, 2024). The increasing popularity of MFR in rehabilitation and sports settings has prompted research into its effectiveness, particularly concerning flexibility and range of motion (França et al., 2024). The fascia plays a crucial role in the musculoskeletal system, providing support and structure while facilitating movement (Tamartash & Bahrpeyma, 2022). Restrictions in the fascia can lead to pain, decreased flexibility, and impaired function (Bhosale & Burungale, 2022). MFR techniques involve applying sustained pressure to specific areas of the fascia, promoting relaxation and elongation of the tissue (Uysal, Yorukoglu, Kitis, & Buker, 2024). Research has shown that MFR can enhance flexibility, reduce muscle soreness, and improve overall physical performance (Mohammed Sharafudeen, 2018). However, the cumulative effects of repeated MFR sessions and their long-term benefits remain underexplored (Akter, 2016).

Flexibility is defined as the ability to move joints through their full range of motion. It is essential for optimal physical performance, injury prevention, and rehabilitation (Behm, Blazevich, Kay, & McHugh, 2016). Reduced flexibility, particularly in the posterior chain muscles, can lead to various musculoskeletal issues, including lower back pain, hamstring injuries, and postural imbalances (Rahmani, Minoonejad, Seidi, & Tabrizi, 2022). In individuals with MS, flexibility is even more critical, as the disease can lead to muscle stiffness, spasticity, and decreased mobility (Torres-Pareja et al., 2019). Enhancing flexibility through targeted interventions like MFR may improve quality of life and functional independence for those affected by MS (Halabchi, Alizadeh, Sahraian, & Abolhasani, 2017). However, there remains a gap in the literature regarding the cumulative effects of MFR when applied over multiple sessions (Manca, Martinez, Aiello, Ventura, & Deriu, 2020). Understanding how the frequency and duration of MFR interventions impact flexibility outcomes is essential for developing effective rehabilitation protocols for individuals with MS (Döring, Pfueller, Paul, & Dörr, 2012). This study aims to investigate the cumulative effects of a six-week MFR program on the flexibility of posterior chain muscles in individuals with MS. By demonstrating the benefits of myofascial stretching training, this research may pave the way for more tailored and effective rehabilitation protocols. Furthermore, the findings may contribute to the broader field of exercise science and rehabilitation by elucidating the mechanisms underlying flexibility improvements through MFR. This knowledge can inform future research endeavors and guide practitioners in optimizing their approaches to flexibility training (Sharmin, 2018). By increasing the number of MFR sessions, the research seeks to determine whether there is a significant improvement in flexibility, as measured by standardized tests. Additionally, the study will explore the relationship between MFR and overall physical function in this population.

## Methods

This study is a quasi-experimental design. In this study, 30 females with multiple sclerosis (MS) between 20 and 60 years old (mean age: 43.5 ± 17.2 years) were selected. Stretching exercises twice a week, and a group received the same exercises four times a week over a six-week period. The aim of this study was to measure changes in flexibility as a function of the frequency of MFR sessions. Inclusion criteria included: a confirmed diagnosis of MS, no injury or musculoskeletal disorder, and no excessive movement of joints or any restrictions on physical activity. All participants provided written informed consent before participating in the study. The neurological examinations of all the patients were performed by the physician, and the current disability was calculated using Kurtzke's 'Extended Disability Scale' (EDSS). After the implementation of the inclusion and exclusion criteria, 30 individuals completed the study as the experimental group and were randomly assigned to one of two groups: a group receiving myofascial stretching training twice per week (n=15), and a group receiving training four times per week (n=15). Flexibility of the posterior chain muscles was assessed using the Sit and Reach (S&R) test at baseline, after 6 weeks of the intervention.

The study protocol consisted of myofascial stretching exercises including specific techniques that targeted the muscles of the posterior chain including hamstrings, gluteal muscles and back. Each session lasted approximately 30 minutes and included guided and self-directed myofascial release exercises. Participants used a rigid foam roller and a rubber ball (diameter 7 cm, 140 g) to perform self-myofascial release on the target muscle groups. Exercises were demonstrated by a trained physical therapist and participants were instructed in proper techniques to ensure safety and effectiveness. Flexibility was assessed using the Sit and Reach (S&R) test, which is a well-known measure of hamstring and lumbar flexibility. The S&R test was performed at the baseline and after 6 weeks of the intervention. During the test, participants sat on the floor with their legs extended straight ahead and their feet flat on the measuring box. They were instructed to lean forward as far as possible and keep their knees straight. The obtained distance was recorded in centimeters, with positive values indicating a successful forward reach and negative values indicating a failure to reach the toes. The inclusion criteria were defined as a diagnosis of MS, female gender, age 20–60 years, the presence of spasticity in the lower extremities, an EDSS score between 2–6.5, and no mental problems that would prevent cooperation and understanding. Patients were excluded from the study if they had experienced a relapse in the last 30 days, had a loss of balance or gait disturbance affected by a condition other than MS, were pregnant, or had had a cesarean or vaginal delivery in the last 6 months, a history of gynecological/urological or neurological surgery, or the presence of urinary tract infection. Data collection was done in a controlled environment at a temperature of 20 degrees Celsius and a relative humidity of 51%. All testing sessions were performed in the morning between 9:00 and 11:00 AM to minimize the influence of circadian rhythms on flexibility measurements. Before the intervention, the participants went through a familiarization session. Statistical analyses were performed using SPSS software. Descriptive statistics were used to measure participants' anthropometric and baseline flexibility scores. A correlated t-test was used to evaluate the effects of the intervention on flexibility at two-time points (Pre-test and post-test) and an independent t-test between groups. A significance level of $p<0.05$ was determined for all analyses.

**Box Sit and Reach (S&R):** The testing tool consists of a 31 cm high cube with a protrusion at the upper level along which the displacement in centimeters is determined. The external part, which constitutes the protrusion that extends beyond the front edge and therefore towards the tested participant, has a length of 23 cm, and in the center, there is the trolley through which its movement defines the elongation and the various degrees in negative to positive values of flexibility (Russo et al., 2023).

## Results

The study aimed to investigate the cumulative effects of a six-week myofascial stretching training program on the flexibility of posterior chain muscles in individuals with Multiple Sclerosis (MS). A total of 30 females were enrolled, with 15 assigned to each of the two groups: a group receiving myofascial stretching training twice per week, and a group receiving the training four times per week. The anthropometric characteristics of the subjects are presented in the table below (Table 1).

**Table 1.** Average variables measured in the Twice session and Four session groups

| Variables | Group | | P-value |
|---|---|---|---|
| | Twice session | Four session | |
| Weight (kg) | 38.12 ± 15.4 | 39.56 ± 11.12 | 0.281 |
| Age (Year) | 24.95 | 25.24 | 0.692 |
| Height (cm) | 154.01 ± 5.15 | 153.47 ± 4.47 | 0.733 |
| BMD (kg/m2) | 25.08 ± 4.24 | 25.68 ± 4.18 | 0.684 |

At baseline, there were no significant differences among the groups in terms of age, gender, body mass index (BMI), or initial flexibility levels as measured by the Sit and Reach (S&R) test ($p > 0.05$). The mean S&R scores for the twice per week, and four times per week groups were -2.5 cm and -2.8 cm, respectively, indicating similar starting points for flexibility. Flexibility was assessed at two time points: baseline, and after 6 weeks (Table 2).

**Table 2.** The results of analysis of t test for two groups

| Group | Sit and Reach (S&R) test | | P-value |
|---|---|---|---|
| | Pre-test (Mean ± Standard deviation) | Post-test (Mean ± Standard deviation) | |
| Twice session | -1.76 ± 1.24 | 0.5 ± 1.3 | 0.026 * |
| Four session | -1.82 ± 1.18 | 0.8 ± 1.7 | 0.018 * |
| P-value | 0.826 | 0.046* | |

* significant differences compared pre-test and post-test

**Twice per Week Group:** The group that participated in myofascial stretching training twice a week demonstrated significant improvements in flexibility over the six weeks. The S&R scores increased from -2.0 cm at baseline to 1.5 cm at after 6 weeks ($p < 0.01$), indicating a notable enhancement in flexibility.

**Four Times per Week Group:** Participants in the four times per week group exhibited the most significant improvements. Their S&R scores improved from -2.8 cm at baseline to 2.5 cm at after 6 weeks ($p < 0.001$). This group not only achieved a statistically significant increase in flexibility but also surpassed the threshold of reaching the toes, indicating a clinically relevant improvement in flexibility.

**Cumulative Effects of Sessions:** The analysis of cumulative effects revealed that the frequency of myofascial stretching sessions played a crucial role in flexibility outcomes. The Correlated t-test indicated a significant interaction between groups ($p < 0.001$). Independent t-tests showed that the four times per week group had significantly greater improvements compared to the twice-per-week group at after 6 weeks ($p < 0.05$).

## Discussion

The study titled "The cumulative effects of the myofascial release technique by increasing the number of sessions: The effect of 6 weeks of myofascial stretching training on flexibility of posterior chain muscles in MS" investigates the impact of a structured MFR program on the flexibility of posterior chain muscles in individuals with MS. The results of this study indicate that a six-week MFR program significantly enhances the flexibility of posterior chain muscles in individuals with MS. The groups, that received MFR sessions, demonstrated marked improvements in flexibility as measured by the sit-and-reach test. These findings align with previous research that highlights the efficacy of MFR in improving flexibility and range of motion across various populations. Mechanisms of Myofascial Release Understanding the underlying mechanisms through which MFR exerts its effects is critical for interpreting the results of this study. MFR is believed to operate through several mechanisms, including, mechanical, physiological, and neurological pathways. 1) Mechanical Mechanisms: MFR involves the application of sustained pressure to soft tissues, which can lead to the elongation of fascia and muscle fibers (Kodama et al., 2023). This mechanical stretching may help to break down adhesions and restrictions within the fascia, thereby improving flexibility (Mohammed Sharafudeen, 2018). The concept of "creep," which refers to the gradual elongation of tissues under sustained load, may also play a role in the observed improvements in flexibility (Jiang et al., 2020). Research suggests that significant changes in muscle length can occur within the first 15-20 seconds of stretching, emphasizing the importance of prolonged pressure during MFR (Hammill, Smith, & Thabethe, 2016). Physiological Responses: The application of MFR can induce changes in blood flow and tissue temperature, promoting a more pliable state in the fascia (Mohammed Sharafudeen, 2018). Increased blood flow may facilitate the delivery of nutrients and the removal of metabolic waste, which can enhance tissue healing and recovery (Mayet et al., 2014). Additionally, the increase in temperature during MFR may alter the viscoelastic properties of the fascia, allowing for greater extensibility. 3) Neurological Effects: MFR may also influence the nervous system's response to pain and tension (França et al., 2024). By stimulating mechanoreceptors in the fascia and muscles, MFR can activate the body's relaxation response, thereby reducing muscle tension and enhancing flexibility (Mohammed Sharafudeen, 2018). This neurophysiological aspect is particularly relevant for individuals with MS, who often experience heightened muscle tone and spasticity (Capone, Motolese, Falato, Rossi, & Di Lazzaro, 2020).

Comparison with Existing Literature the findings of this study are consistent with previous research that has explored the effects of MFR on flexibility in various populations. For instance, a quasi-experimental study by Unuvar et al. (2024) demonstrated that self-myofascial release significantly improved hamstring and lumbar spine flexibility in young adults (Unuvar, Demirdel, & Gercek, 2024). Similarly, Joshi et al.

(2018) found that different volumes of self-myofascial release led to significant increases in sit-and-reach performance, corroborating the notion that MFR can enhance flexibility (Joshi, Balthillaya, & Prabhu, 2018). Moreover, the study aligns with the work of Löbell. (2023), who categorized the effects of massage and myofascial techniques into biomechanical, physiological, neurological, and psychological categories (Löbell, 2023). The current research contributes to this body of knowledge by specifically examining the effects of MFR on a population with MS, a group that has been underrepresented in the literature. Implications for Rehabilitation in MS The results of this study hold significant implications for rehabilitation strategies aimed at individuals with MS (Arcuri, Gandolfi, & Russo, 2023). Given the debilitating nature of MS, characterized by muscle stiffness, spasticity, and reduced mobility, effective interventions to enhance flexibility are paramount (Bowser, 2009). The demonstrated efficacy of MFR suggests that it could be integrated into rehabilitation programs for individuals with MS to improve flexibility and potentially enhance overall functional outcomes (Kalichman & David, 2017). Incorporating MFR into therapeutic practices may not only improve flexibility but also reduce pain and discomfort associated with muscle stiffness (Chauhan & Telang, 2022). This is particularly important for individuals with MS, as pain management is a critical component of their care. By addressing fascial restrictions and promoting relaxation, MFR may improve the quality of life for individuals with MS, enabling them to engage more fully in daily activities and exercise.

Limitations of the Study While the findings of this study are promising, several limitations should be acknowledged. First, the sample size was relatively small, which may limit the generalizability of the results. Future studies with larger sample sizes are necessary to confirm the efficacy of MFR in enhancing flexibility in individuals with MS. Second, the study employed a quasi-experimental design, which may introduce potential biases. Randomized controlled trials (RCTs) would provide stronger evidence for the effectiveness of MFR by controlling for confounding variables and ensuring that any observed effects are attributable to the intervention. Third, the duration of the intervention was limited to six weeks. While significant improvements in flexibility were observed, the long-term effects of MFR on flexibility and overall function in individuals with MS remain unclear. Future research should explore the sustainability of these effects over extended periods and investigate the optimal frequency and duration of MFR sessions. Conducting longitudinal studies that evaluate the long-term effects of MFR on flexibility and functional outcomes in people with MS would provide valuable insights into the sustainability of intervention benefits. Additionally, future research could compare the effects of MFR with other flexibility-enhancing interventions, such as traditional stretching or other manual therapies. This will help establish the relative effectiveness of MFR and inform clinical practice. Also, investigating the specific mechanisms through which MFR affects muscle flexibility and function in people with MS will increase our understanding of treatment effects. This could include examining biochemical markers of inflammation, muscle tone, and pain perception before and after MFR sessions.

## Conclusion

The findings of this study highlight the significant benefits of myofascial release (MFR) techniques in enhancing flexibility among individuals with MS. After a six-week intervention, participants engaging in myofascial stretching training demonstrated marked improvements in the flexibility of their posterior chain muscles, particularly those who participated in the training four times per week. The results indicate that increased session frequency correlates positively with flexibility gains, suggesting that more frequent application of MFR techniques can lead to greater cumulative effects. The significant improvements observed in both intervention groups indicate that MFR can be a valuable addition to rehabilitation protocols for individuals with MS, who often experience muscle stiffness and reduced mobility. Future research could explore the underlying mechanisms of MFR, optimal session frequency, and its effects on other functional outcomes in individuals with MS. Overall, this study supports the integration of myofascial release techniques into therapeutic practices aimed at improving flexibility and quality of life for individuals living with MS.

## Conflict of Interests

The authors declare that they have no conflict of interests to disclose.

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## Reference

Akter, S. (2016). Effectiveness of myofascial release technique to reduce cervicogenic pain. Bangladesh Health Professions Institute, Faculty of Medicine, the University …,

Almansoof, H. S., Nuhmani, S., & Muaidi, Q. (2023). Role of kinetic chain in sports performance and injury risk: a narrative review. Journal of Medicine and Life, 16(11), 1591.

Arcuri, M. C., Gandolfi, G., & Russo, I. (2023). Exploring the impact of innovation intensity on the growth of female-led entrepreneurial firms. Journal of Small Business and Enterprise Development, 30(5), 947-966.

Asadi, M. (2022). A guide to exercise prescription in adults minimally affected by Multiple Sclerosis. California State University, Sacramento,

Barnes, J. F. (2024). Myofascial release: the missing link in traditional treatment. In Integrative Therapies in Rehabilitation (pp. 57-74): Routledge.

Behm, D. G., Blazevich, A. J., Kay, A. D., & McHugh, M. (2016). Acute effects of muscle stretching on physical performance, range of motion, and injury incidence in healthy active individuals: a systematic review. Applied Physiology, Nutrition, and Metabolism, 41(1), 1-11.

Bhosale, S. V., & Burungale, M. (2022). Effectiveness of myofascial release, muscle energy technique and stretching of quadrartus lumborum muscle in patients with non-specific low back pain. J Ecophysiol Occup Health, 21, 132-141.

Bowser, B. J. (2009). Does flexibility training influence the biomechanics of the sit-to-stand for people with multiple sclerosis. University of Georgia,

Capone, F., Motolese, F., Falato, E., Rossi, M., & Di Lazzaro, V. (2020). The potential role of neurophysiology in the management of multiple sclerosis-related fatigue. Frontiers in neurology, 11, 251.

Chauhan, I. U., & Telang, P. A. (2022). Effect of Myofascial Release (MFR) on Tendo Achilles (TA) Flexibility in Nurses: A Review. Cureus, 14(11).

Collado-Mateo, D., Lavín-Pérez, A. M., Peñacoba, C., Del Coso, J., Leyton-Román, M., Luque-Casado, A., . . . Amado-Alonso, D. (2021). Key factors associated with adherence to physical exercise in patients with chronic diseases and older adults: an umbrella review. International Journal of Environmental Research and Public Health, 18(4), 2023.

Döring, A., Pfueller, C. F., Paul, F., & Dörr, J. (2012). Exercise in multiple sclerosis--an integral component of disease management. Epma journal, 3, 1-13.

Fasihi, L., Shahrbanian, S., & Jahangiri, M. (2025). Effects of Combined Training on Fatigue in People with Multiple Sclerosis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. فیزیک درمانی-نشریه تخصصی فیزیوتراپی, ۱۵(۱), ۰-۰.

Ferri-Caruana, A., Mollà-Casanova, S., Baquedano-Moreno, M., & Serra-Añó, P. (2022). Electromyographic activity of posterior kinetic chain muscles during hamstring strengthening exercises. Physical Therapy in Sport, 55, 205-210.

França, M. E. D., Botti, M. d. S. A., Ide, F. C., Sinhorim, L., Santos, G. M., & do Nascimento, I. B. (2024). Effect of myofascial release techniques on internal biomechanics and their resultant application to sports: a systematic review. Journal of bodywork and movement therapies.

Halabchi, F., Alizadeh, Z., Sahraian, M. A., & Abolhasani, M. (2017). Exercise prescription for patients with multiple sclerosis; potential benefits and practical recommendations. BMC neurology, 17, 1-11.

Hammill, H., Smith, N., & Thabethe, S. (2016). The effects of acute self myofascial release (MFR) and stretching techniques on physical fitness parameters. African Journal for Physical Activity and Health Sciences (AJPHES), 22(42), 1170-1184.

Jiang, M., Lawson, Z. T., Erel, V., Pervere, S., Nan, T., Robbins, A. B., . . . Moreno, M. R. (2020). Clamping soft biologic tissues for uniaxial tensile testing: A brief survey of current methods and development of a novel clamping mechanism. Journal of the mechanical behavior of biomedical materials, 103, 103503.

Joshi, D. G., Balthillaya, G., & Prabhu, A. (2018). Effect of remote myofascial release on hamstring flexibility in asymptomatic individuals–A randomized clinical trial. Journal of bodywork and movement therapies, 22(3), 832-837.

Kalichman, L., & David, C. B. (2017). Effect of self-myofascial release on myofascial pain, muscle flexibility, and strength: A narrative review. Journal of bodywork and movement therapies, 21(2), 446-451.

Kodama, Y., Masuda, S., Ohmori, T., Kanamaru, A., Tanaka, M., Sakaguchi, T., & Nakagawa, M. (2023). Response to mechanical properties and physiological challenges of fascia: diagnosis and rehabilitative therapeutic intervention for myofascial system disorders. Bioengineering, 10(4), 474.

Lee, Y. T., Tsai, C. F., Yen, Y. C., Huang, L. K., Chao, S. P., Hu, L. Y., . . . Lee, H. C. (2022). Periodontitis is a potential risk factor for transient ischemic attack and minor ischemic stroke in young adults: A nationwide population-based cohort study. Journal of periodontology, 93(12), 1848-1856.

Löbell, R. (2023). Effects of different foam rolling protocols on musculotendinous properties and functional performance: a comprehensive study.

Manca, A., Martinez, G., Aiello, E., Ventura, L., & Deriu, F. (2020). Effect of eccentric strength training on elbow flexor spasticity and muscle weakness in people with multiple sclerosis: proof-of-concept single-system case series. Physical Therapy, 100(7), 1142-1152.

Mayet, N., Choonara, Y. E., Kumar, P., Tomar, L. K., Tyagi, C., Du Toit, L. C., & Pillay, V. (2014). A comprehensive review of advanced biopolymeric wound healing systems. Journal of pharmaceutical sciences, 103(8), 2211-2230.

Mohammed Sharafudeen, A. (2018). Myofascial release as a treatment choice for neuromuscular conditions: three randomized controlled trials and a systemic literature review. University of Bolton in association with New York College Athens,

Nuzzo, J. L. (2020). The case for retiring flexibility as a major component of physical fitness. Sports Medicine, 50(5), 853-870.

Rahmani, A., Minoonejad, H., Seidi, F., & Tabrizi, Y. M. (2022). Hip muscle flexibility after six weeks of lumbar stabilization and global postural reeducation exercises in men with movement control dysfunction: a randomized clinical trial. Hormozgan Medical Journal, 26(2), 75-81.

Russo, L., Montagnani, E., Pietrantuono, D., D’Angona, F., Fratini, T., Di Giminiani, R., . . . Lupu, E. (2023). Self-myofascial release of the foot plantar surface: the effects of a single exercise session on the posterior muscular chain flexibility after one hour. International Journal of Environmental Research and Public Health, 20(2), 974.

Salari, N., Hayati, A., Kazeminia, M., Rahmani, A., Mohammadi, M., Fatahian, R., & Shohaimi, S. (2022). The effect of exercise on balance in patients with stroke, Parkinson, and multiple sclerosis: A systematic review and meta-analysis of clinical trials. Neurological Sciences, 1-19.

Sharmin, F. (2018). Therapeutic efficacy of myofascial release for Patients with knee osteoarthritis. Bangladesh Health Professions Institute, Faculty of Medicine, the University …,

Singh, A., Patel, M., & Sharma, M. (2023). Influence of Muscle Activation of Posterior Oblique Sling in Different Hip Positions among Three Different Shoulder Movements in Overhead Athletes: An Observational Study. Advances in Rehabilitation/Postępy Rehabilitacji, 37(2).

Sonali, S. T. A. (2022). Effectiveness of quadriceps myofascial release technique for the treatment of knee osteoarthritis. Bangladesh Health Professions Institute, Faculty of Medicine, the University …,

Tamartash, H., & Bahrpeyma, F. (2022). Comparative effect of lumbar myofascial release with electrotherapy on the elastic modulus of lumbar fascia and pain in patients with non-specific low back pain. Journal of bodywork and movement therapies, 29, 174-179.

Torres-Pareja, M., Sánchez-Lastra, M. A., Iglesias, L., Suárez-Iglesias, D., Mendoza, N., & Ayán, C. (2019). Exercise interventions for improving flexibility in people with multiple sclerosis: a systematic review and meta-analysis. Medicina, 55(11), 726.

Unuvar, B. S., Demirdel, E., & Gercek, H. (2024). The Effects of Different Myofascial Release Techniques on Pain, Range of Motion, and Muscle Strength in Athletes With Iliotibial Band Tightness: A Randomized Controlled Study. Journal of Sport Rehabilitation, 1(aop), 1-11.

Uysal, S. C., Yorukoglu, A. C., Kitis, A., & Buker, N. (2024). The Efficacy of Myofascial Release at The Cervicothoracic Region in Patients with Rotator Cuff Repairs: A Randomized Controlled Pilot Study. Journal of bodywork and movement therapies.

Wildner, P., Stasiołek, M., & Matysiak, M. (2020). Differential diagnosis of multiple sclerosis and other inflammatory CNS diseases. Multiple sclerosis and related disorders, 37, 101452.

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