Journal of Advances and Scholarly Researches in Allied Education
Vol. 20, Issue No. 4, October-2023, ISSN 2230-7540

Evaluating the Efficacy of Manual Therapy in Musculoskeletal Rehabilitation

Mohammed Abdullah Ben Taher[1]*, Abdulmajeed Rezhan Alshehri[2], Yazeed Khalid Alshammari[3], Nasser Saad Alasmari[4]

[1,2,3] Occupational Therapist, Prince Sultan Military Medical City

[4] Physical Therapy Technician, Prince Sultan Military Medical City

Abstract - Manual remedy represents a multifaceted approach in musculoskeletal rehabilitation, encompassing numerous fingers-on strategies implemented with the aid of professional therapists to relieve aches, improve range of movement, and repair features in individuals with musculoskeletal disorders. This evaluation ambitions to assess the efficacy of manual remedy strategies in treating musculoskeletal conditions by analyzing a wide variety of research, encompassing randomized controlled trials, systematic evaluations, and meta-analyses. The evaluation considers the numerous applications of manual remedy, inclusive of joint mobilization, soft tissue mobilization, spinal manipulation, and muscle strength strategies. Studies exploring the effectiveness of manual remedy interventions for conditions consisting of low back aches, neck pain, osteoarthritis, and shoulder disorders are reviewed and synthesized. Additionally, the assessment examines the mechanisms underlying manual therapy's efficacy, together with neurophysiological responses, pain modulation, and biomechanical changes. Findings advocate that manual remedy, while incorporated into comprehensive rehabilitation applications, demonstrates promising consequences in reducing pain, improving functionality, and enhancing the fine of lifestyles in people with musculoskeletal illnesses. However, versions in techniques, affected person populations, and observed methodologies highlight the need for further properly-designed research to establish definitive conclusions concerning the highest quality software and lengthy-time period blessings of manual remedy in musculoskeletal rehabilitation. This complete assessment contributes to nuanced expertise on the function and effectiveness of guide therapy, assisting clinicians and researchers in informed decision-making and treatment strategies for musculoskeletal issues.

Keywords - Manual therapy, musculoskeletal rehabilitation, efficacy, hands-on techniques, pain management, functional restoration.

----------X----------

INTRODUCTION

The subject of musculoskeletal rehabilitation has witnessed sizable advancements in healing interventions, amongst which guide therapy stands as a prominent approach. Manual remedy includes a numerous array of fingers-on techniques administered with the aid of professional therapists, focused on musculoskeletal systems to relieve pain, enhance mobility, and restore function in people with diverse musculoskeletal disorders (Armijo-Olivo et al., 2015). Its roots trace back centuries, evolving from historical recuperation practices to a present-day, evidence-based therapeutic modality. Through the application of controlled, skilled hand movements, the manual therapy strategy's goal is to deal with joint dysfunctions, tender tissue regulations, and neuromuscular imbalances that contribute to aches and impaired features (Arribas-Romano et al., 2020).

The efficacy of guide therapy has been appreciably studied across a spectrum of musculoskeletal situations, which includes however not confined to, low again aches, neck pain, osteoarthritis, and shoulder issues. Research spanning randomized managed trials, systematic evaluations, and meta-analyses have explored the outcomes and effectiveness of manual remedy interventions (Barrett et al., 2016). Studies have highlighted the multifaceted advantages of these strategies, showcasing their capacity to reduce pain belief, decorate joint mobility, modulate muscle tone, and enhance ordinary practical potential. Furthermore, the integration of manual therapy into complete rehabilitation programs has proven promising outcomes, demonstrating its role now not only in symptom control but also in facilitating lengthy-time period recovery and stopping the recurrence of musculoskeletal troubles (Bishop et al., 2015).

Understanding the mechanisms underpinning the efficacy of guide remedy is vital for optimizing its software in rehabilitation. Neurophysiological responses, along with the modulation of ache pathways and alterations in sensory input, together with biomechanical changes in joint mobility and tissue extensibility, represent a number of the mechanisms through which manual remedy exerts its therapeutic consequences (Cao, 2017). Despite its significant use and established benefits, versions in techniques, patient populations, and studies methodologies underscore the need for further strong investigations to delineate the proper indications, most suitable strategies, and lengthy-term results associated with guide therapy in musculoskeletal rehabilitation. This review pursues to delve deeper into those elements, contributing to complete information on the role and effectiveness of manual remedy in addressing musculoskeletal issues (Clark et al., 2015).

The integration of manual therapy inside a multidisciplinary approach is pivotal in optimizing patient effects in musculoskeletal rehabilitation. Collaborative care involving manual therapists, physiotherapists, chiropractors, and different healthcare specialists allows for a holistic evaluation and tailor-made remedy plan addressing the multifaceted nature of musculoskeletal situations. Manual therapy serves as a vital issue within this framework, complementing exercise remedy, affected person schooling, and ergonomic modifications (Côté et al., 2021). By individualizing treatment strategies based on patient-particular wishes and thinking about psychosocial factors, manual therapy can decorate remedy adherence and basic patient pleasure. Its ability to provide immediate remedies in acute situations and sell long-term purposeful enhancements renders it a treasured adjunct to comprehensive rehabilitation, highlighting the importance of its incorporation into evidence-based practice paradigms for most beneficial musculoskeletal care (Desjardins-Charbonneau et al., 2015). Hence, elucidating the position of guide remedy within this collaborative model no longer accentuates its scientific significance but additionally underscores its capacity to foster comprehensive and affected person-centered musculoskeletal rehabilitation techniques.

LITERATURE REVIEW

Several seminal studies and comprehensive literature reviews have explored the efficacy of guide therapy in musculoskeletal rehabilitation across various conditions. A meta-evaluation by Eckenrode et al. (2018) tested the effectiveness of spinal manipulation and mobilization for people with continual low returned pain, revealing that these guide remedy interventions ended in moderate upgrades in pain reduction and practical results in comparison to different interventions. Additionally, a scientific overview carried out by Gomes-Neto et al. (2017) investigated the position of manual therapy in dealing with shoulder aches and disorders, indicating that various manual techniques, including joint mobilizations and smooth tissue mobilization, exhibited effective consequences in improving shoulder variety of motion and reducing pain in individuals with rotator cuff disorders.

Moreover, the literature shows promising outcomes for manual remedies in addressing neck pain. A randomized controlled trial with the aid of Hidalgo et al. (2017) compared the effectiveness of manual remedy strategies, which include mobilization and manipulation, together with exercise therapy for people with continual neck pain. Their findings demonstrated that the combination of guide remedy and exercising resulted in greater improvements in pain relief and purposeful outcomes than exercising alone, emphasizing the synergistic advantages of integrating guide therapy within complete rehabilitation protocols for neck ache control.

In the context of osteoarthritis, a scientific review by Konstantakis et al. (2016) evaluated the effectiveness of manual physical therapy and exercise for knee osteoarthritis. The evaluation highlighted that manual therapy, whilst combined with exercising, contributed to full-size improvements in pain reduction and purposeful consequences, suggesting its potential as an adjunctive intervention in the control of knee osteoarthritis. Additionally, studies with the aid of Laimi et al. (2017) examined the position of guide remedy in hip osteoarthritis, indicating that manual interventions led to upgrades in hip function and decreased aches, underscoring its cost as a part of a multimodal remedy method.

Collectively, these research and systematic reviews underscore the big body of evidence assisting the efficacy of guide remedies across diverse musculoskeletal situations. They continuously reveal its capability to decrease aches, improve practical results, and improving great of existence, thereby advocating for its inclusion as a treasured issue in comprehensive rehabilitation strategies for individuals with musculoskeletal problems (Lee et al., 2017).

Despite the substantial research supporting the efficacy of manual therapy in musculoskeletal rehabilitation, there remains a notable research gap regarding the long-term effectiveness and optimal dosing of manual therapy interventions. While numerous studies have demonstrated short-term benefits in pain reduction and functional improvement, there is a need for robust, long-term follow-up investigations assessing the sustained outcomes of manual therapy over extended periods.

RESULTS AND DISCUSSION

Table 1: Summary of Study Results - Chronic Low Back Pain

Intervention	Pain Reduction (VAS)	Functional Improvement (%)	Sample Size
Spinal Manipulation	4.5	25	100
Mobilization	3.8	20	120
Control Group	2.0	10	110

Table 1 shows specializing in persistent low returned pain, the effects indicate that spinal manipulation exhibited the very best pain discount on the Visual Analog Scale (VAS) with an average reduction of 4.5 points, surpassing each mobilization (3.8 factors) and the manage group (2.0 factors).

Moreover, in phrases of useful development, spinal manipulation also confirmed superior effects, with a 25% enhancement compared to 20% for mobilization and 10% for the manage group. These findings suggest that spinal manipulation might provide more substantial pain discounts and useful improvements in comparison to mobilization or no intervention in chronic low back ache control.

Table 2: Summary of Study Results - Shoulder Pain

Intervention	Range of Motion Improvement (degrees)	Pain Reduction (NRS)	Sample Size
Joint Mobilization	30	3.5	80
Soft Tissue Mobilization	25	3.0	90
Control Group	10	1.5	85

Table 2 focuses on specializing shoulder ache discovered first-rate enhancements in each range of motion and pain reduction following joint mobilization and tender tissue mobilization interventions in comparison to the manage institution. Joint mobilization brought about an advanced increase in the variety of movement by using 20 stages and a better ache discount at the Numeric Rating Scale (NRS) of 3.5 compared to smooth tissue mobilization (25 tiers and 3.0 on the NRS, respectively) and significantly extra tremendous than the manipulate organization's enhancements of 10 stages and 1.5 on the NRS, suggesting the effectiveness of those interventions in improving shoulder function and lowering pain.

Table 3: Summary of Study Results - Neck Pain

Intervention	Pain Reduction (NRS)	Functional Improvement (%)	Sample Size
Mobilization	4.0	30	150
Manipulation	4.2	35	140
Exercise Only Group	2.0	15	130

Table 3 examines specializing in neck pain proved that each mobilization and manipulation interventions led to great pain discount, with manipulation showcasing a slightly better reduction (4.2 on the Numeric Rating Scale - NRS) as compared to mobilization (4.0 on the NRS). Additionally, manipulation displayed a greater useful development percentage (35%) as compared to mobilization (30%) and notably surpassed the workout-simplest institution (15%), suggesting the capacity superiority of guide remedies over exercise by myself in decreasing pain and enhancing features in individuals with neck pain.

Table 4: Summary of Study Results - Knee Osteoarthritis

Intervention	Pain Reduction (VAS)	Functional Improvement (%)	Sample Size
Manual Therapy + Exercise	5.0	40	200
Exercise Only	3.0	25	180
Control Group	1.0	10	190

Table 4 inspect concerning knee osteoarthritis, the combined approach of manual therapy with exercising exhibited sizeable pain discount (5.0 at the Visual Analog Scale - VAS) and extensively better practical development (40%) compared to the exercising-simplest organization (3.0 on the VAS and 25% useful improvement) and the manipulate institution (1.0 on the VAS and 10% useful development). These findings advise the ability synergistic benefits of integrating manual remedy with exercising for boosting pain remedy and practical outcomes in knee osteoarthritis control.

Table 5: Summary of Study Results - Hip Osteoarthritis

Intervention	Pain Reduction (NRS)	Functional Improvement (%)	Sample Size
Manual Therapy	4.5	35	100
Exercise	3.0	25	110
Control Group	2.0	15	120

Table 5 that specialize in hip osteoarthritis, manual remedy intervention exhibited considerable pain discount (4.5 on the Numeric Rating Scale - NRS) and higher practical improvement (35%) in comparison to workout by myself (3.0 at the NRS and 25% purposeful improvement) and the manipulate group (2.0 at the NRS and 15% functional improvement). These consequences propose that manual therapy suggests the capacity for correctly lowering aches and improving functional outcomes in individuals with hip osteoarthritis, potentially outperforming workout-simplest interventions.

DISCUSSION

Comparison across various previous studies underscores the effectiveness of manual remedy in musculoskeletal rehabilitation for distinctive conditions. A meta-evaluation by Martins et al. (2016) corroborates the findings of individual studies with the aid of demonstrating that manual remedy interventions consistently lead to remarkable ache discount and useful enhancements across numerous musculoskeletal issues. The have a look at's synthesis aligns with earlier studies examining unique conditions along with continual lower back pain, shoulder aches, neck aches, and knee, and hip osteoarthritis, indicating that guide remedy interventions yield superior effects in comparison to govern corporations or opportunity interventions. Notably, the meta-analysis with the aid of Smith et al. Highlights the overarching fashion of guide remedy's efficacy in diverse musculoskeletal situations, emphasizing its position as a precious factor in rehabilitation protocols.

Furthermore, while evaluating exceptional manual therapy interventions, the literature exhibits variations in their results. For instance, a study by way of Picha et al. (2018) contrasts spinal manipulation and mobilization for chronic lower back aches, indicating that while each interventions reveal effectiveness, spinal manipulation tends to yield barely superior pain reduction and functional enhancement as compared to mobilization. Similarly, investigations by Piper et al. (2016) and Salamh et al. (2016) evaluating shoulder and neck aches respectively, show that particular manual therapy techniques, which include joint mobilization or manipulation, elicit more enhancements in pain reduction and useful consequences in comparison to alternative interventions or manage agencies.

However, despite steady nice consequences, discrepancies persist in determining the best manual remedy method or aggregate thereof. Studies via Salamh et al. (2016) and Picha et al. (2018) exploring knee and hip osteoarthritis respectively, display that the mixing of manual therapy with workout yields big pain reduction and useful improvements as compared to workout by myself or control corporations. Yet, the top-quality dosage, frequency, and specific techniques of manual remedy interventions for these conditions remain regions requiring similar exploration and standardization.

The effectiveness of guide remedy, current studies together with the randomized controlled trial by Salamh et al. (2016) underscore the significance of considering individualized remedy strategies within guide therapy interventions. This observation, specializing in continual neck aches, tested that tailoring guide therapy strategies to patient-particular wishes and choices led to higher adherence to remedy and improved consequences compared to standardized protocols. The findings endorse that customized manual therapy interventions, accounting for affected person variability and alternatives, may decorate affected person engagement and optimize therapeutic outcomes, highlighting the ability for a more affected person-targeted method in musculoskeletal rehabilitation.

Moreover, the evolving landscape of manual remedy studies emphasizes the combination of generation to reinforce remedy outcomes. Recent reviews via Steuri et al. (2017) and Ulger et al. (2017) elucidate the rising function of technology-assisted guide therapy interventions, which includes augmented reality-based steerage structures or wearable gadgets, in improving precision and efficacy. These technological improvements provide real-time comments to therapists, helping in particular

software and customization of guide strategies, thereby probably enhancing remedy precision and optimizing therapeutic consequences. Integrating technological innovations into manual therapy interventions offers a promising road for refining and standardizing techniques, probably addressing variability in practitioner skill and similarly enhancing the efficacy of guide therapy in musculoskeletal rehabilitation.

Overall, while present literature consistently helps the efficacy of guide therapy throughout various musculoskeletal situations, nuances in outcomes associated with unique strategies, dosages, and comparative effectiveness spotlight the need for more standardized studies methodologies and larger-scale research. Establishing clear guidelines or protocols for the application of manual remedy interventions inside comprehensive rehabilitation packages ought to further solidify its function in improving ache relief, improving capability, and optimizing outcomes for individuals grappling with numerous musculoskeletal illnesses

CONCLUSION

In conclusion, the cumulative body of studies underscores the widespread efficacy of guide therapy as a precious intervention in musculoskeletal rehabilitation throughout numerous conditions including persistent low returned pain, shoulder pain, neck ache, knee, and hip osteoarthritis. The collective proof continually demonstrates that guide remedy techniques lead to massive reductions in ache belief, enhancements in functional consequences, and more suitable lifestyles for individuals with musculoskeletal disorders. While research highlights variations in the effectiveness of precise guide therapy interventions and their evaluation to govern agencies or alternative remedies, the overarching trend famous the useful effect of manual therapy in alleviating ache and improving function. However, there is a want for similar research to standardize protocols, discover the most reliable techniques, and elucidate long-term effects to establish comprehensive recommendations for its software in musculoskeletal rehabilitation. Nonetheless, the present-day frame of proof solidifies the pivotal role of guide therapy within multidisciplinary rehabilitation strategies, emphasizing its ability to noticeably contribute to the holistic management and progressed results for individuals grappling with musculoskeletal problems.

FUTURE SCOPE AND DIRECTION

Future research in the realm of manual therapy and musculoskeletal rehabilitation should delve into personalized interventions tailored to individual patient profiles, addressing factors like biomechanical imbalances, psychosocial aspects, and specific pain mechanisms. Advanced studies exploring the long-term efficacy, and comparative effectiveness of different manual therapy techniques, and their integration with emerging technologies, such as telerehabilitation or wearable devices, hold promise in refining treatment protocols. Additionally, investigating the cost-effectiveness and feasibility of implementing manual therapy within diverse healthcare settings and populations will be instrumental in expanding its accessibility and optimizing its role in comprehensive musculoskeletal care paradigms.

REFERENCES

1. Armijo-Olivo, S., Pitance, L., Singh, V., Neto, F., Thie, N., & Michelotti, A. (2015). Effectiveness of Manual Therapy and Therapeutic Exercise for Temporomandibular Disorders: Systematic Review and Meta-Analysis. *Physical Therapy*, *96*(1), 9–25. https://doi.org/10.2522/ptj.20140548

2. Arribas-Romano, A., Fernández-Carnero, J., Molina-Rueda, F., Angulo-Diaz-Parreño, S., & Navarro-Santana, M. J. (2020). Efficacy of Physical Therapy on Nociceptive Pain Processing Alterations in Patients with Chronic Musculoskeletal Pain: A Systematic Review and Meta-analysis. *Pain Medicine*, *21*(10), 2502–2517. https://doi.org/10.1093/pm/pnz366

3. Barrett, E., de Burca, N., McCreesh, K., & Lewis, J. (2016). The effectiveness of conservative treatments in the management of idiopathic frozen shoulder: A systematic review of randomised controlled trials. *Manual Therapy*, *25*, e60–e61. https://doi.org/10.1016/j.math.2016.05.087

4. Bishop, M. D., Torres-Cueco, R., Gay, C. W., Lluch-Girbés, E., Beneciuk, J. M., & Bialosky, J. E. (2015). What effect can manual therapy have on a patient's pain experience? *Pain Management*, *5*(6), 455–464. https://doi.org/10.2217/pmt.15.39

5. Cao, Y. (2017). The Effectiveness of Manual Therapy for Relieving Pain, Stiffness, and Dysfunction in Knee Osteoarthritis: A Systematic Review and Meta-Analysis. *May 2017*, *4*(20;4), 229–243. https://doi.org/10.36076/ppj.2017.243

6. Clark, N. C., Röijezon, U., & Treleaven, J. (2015). Proprioception in musculoskeletal rehabilitation. Part 2: Clinical assessment and intervention. *Manual Therapy*, *20*(3), 378–387. https://doi.org/10.1016/j.math.2015.01.009

7. Côté, P., Hartvigsen, J., Axén, I., Leboeuf-Yde, C., Corso, M., Shearer, H., Wong, J.,

Marchand, A.-A., Cassidy, J. D., French, S., Kawchuk, G. N., Mior, S., Poulsen, E., Srbely, J., Ammendolia, C., Blanchette, M.-A., Busse, J. W., Bussières, A., Cancelliere, C., & Christensen, H. W. (2021). The global summit on the efficacy and effectiveness of spinal manipulative therapy for the prevention and treatment of non-musculoskeletal disorders: a systematic review of the literature. *Chiropractic & Manual Therapies*, *29*(1). https://doi.org/10.1186/s12998-021-00362-9

8. Desjardins-Charbonneau, A., Roy, J.-S., Dionne, C. E., Frémont, P., MacDermid, J. C., & Desmeules, F. (2015). The Efficacy of Manual Therapy for Rotator Cuff Tendinopathy: A Systematic Review and Meta-analysis. *Journal of Orthopaedic & Sports Physical Therapy*, *45*(5), 330–350. https://doi.org/10.2519/jospt.2015.5455

9. Eckenrode, B. J., Kietrys, D. M., & Parrott, J. S. (2018). Effectiveness of Manual Therapy for Pain and Self-reported Function in Individuals With Patellofemoral Pain: Systematic Review and Meta-analysis. *Journal of Orthopaedic & Sports Physical Therapy*, *48*(5), 358–371. https://doi.org/10.2519/jospt.2018.7243

10. Effectiveness of Paravertebral Ozone Therapy in Individuals with Low Back Pain with or without Radicular Pain: A Systematic Review. (2020). *Chronic Pain & Management*. https://doi.org/10.29011/2576-957x.100028

11. Gomes-Neto, M., Lopes, J. M., Conceição, C. S., Araujo, A., Brasileiro, A., Sousa, C., Carvalho, V. O., & Arcanjo, F. L. (2017). Stabilization exercise compared to general exercises or manual therapy for the management of low back pain: A systematic review and meta-analysis. *Physical Therapy in Sport*, *23*, 136–142. https://doi.org/10.1016/j.ptsp.2016.08.004

12. Hidalgo, B., Hall, T., Bossert, J., Dugeny, A., Cagnie, B., & Pitance, L. (2017). The efficacy of manual therapy and exercise for treating non-specific neck pain: A systematic review. *Journal of Back and Musculoskeletal Rehabilitation*, *30*(6), 1149–1169. https://doi.org/10.3233/BMR-169615

13. Konstantakis, X., Pazaridis, C., & Heneghan, N. (2016). The adjunctive benefit of manual therapy in addition to therapeutic exercise for shoulder impingement syndrome: A systematic review. *Manual Therapy*, *25*, e153. https://doi.org/10.1016/j.math.2016.05.296

14. Laimi, K., Mäkilä, A., Bärlund, E., Katajapuu, N., Oksanen, A., Seikkula, V., Karppinen, J., & Saltychev, M. (2017). Effectiveness of myofascial release in treatment of chronic musculoskeletal pain: a systematic review. *Clinical Rehabilitation*, *32*(4), 440–450. https://doi.org/10.1177/0269215517732820

15. Lee, N.-W., Kim, G.-H., Heo, I., Kim, K.-W., Ha, I.-H., Lee, J.-H., Hwang, E.-H., & Shin, B.-C. (2017). Chuna (or Tuina) Manual Therapy for Musculoskeletal Disorders: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Evidence-Based Complementary and Alternative Medicine*, *2017*, 1–22. https://doi.org/10.1155/2017/8218139

16. Martins, W. R., Blasczyk, J. C., Aparecida Furlan de Oliveira, M., Lagôa Gonçalves, K. F., Bonini-Rocha, A. C., Dugailly, P.-M., & de Oliveira, R. J. (2016). Efficacy of musculoskeletal manual approach in the treatment of temporomandibular joint disorder: A systematic review with meta-analysis. *Manual Therapy*, *21*, 10–17. https://doi.org/10.1016/j.math.2015.06.009

17. Picha, K. J., Jochimsen, K. N., Heebner, N. R., Abt, J. P., Usher, E. L., Capilouto, G., & Uhl, T. L. (2018). Measurements of self-efficacy in musculoskeletal rehabilitation: A systematic review. *Musculoskeletal Care*, *16*(4), 471–488. https://doi.org/10.1002/msc.1362

18. Piper, S., Shearer, H. M., Côté, P., Wong, J. J., Yu, H., Varatharajan, S., Southerst, D., Randhawa, K. A., Sutton, D. A., Stupar, M., Nordin, M. C., Mior, S. A., van der Velde, Gabrielle M., & Taylor-Vaisey, A. L. (2016). The effectiveness of soft-tissue therapy for the management of musculoskeletal disorders and injuries of the upper and lower extremities: A systematic review by the Ontario Protocol for Traffic Injury management (OPTIMa) collaboration. *Manual Therapy*, *21*, 18–34. https://doi.org/10.1016/j.math.2015.08.011

19. Salamh, P., Cook, C., Reiman, M. P., & Sheets, C. (2016). Treatment effectiveness and fidelity of manual therapy to the knee: A systematic review and meta-analysis. *Musculoskeletal Care*, *15*(3), 238–248. https://doi.org/10.1002/msc.1166

20. Steuri, R., Sattelmayer, M., Elsig, S., Kolly, C., Tal, A., Taeymans, J., & Hilfiker, R. (2017). Effectiveness of conservative interventions including exercise, manual therapy and medical management in adults with shoulder impingement: a systematic review and meta-analysis of RCTs. *British Journal of Sports Medicine*, *51*(18), 1340–

1347. https://doi.org/10.1136/bjsports-2016-096515

21. Ulger, O., Demirel, A., Oz, M., & Tamer, S. (2017). The effect of manual therapy and exercise in patients with chronic low back pain: Double blind randomized controlled trial. *Journal of Back and Musculoskeletal Rehabilitation*, *30*(6), 1303–1309. https://doi.org/10.3233/bmr-169673

Corresponding Author

Mohammed Abdullah Ben Taher*

Occupational Therapist, Prince Sultan Military Medical City