ScientificScholar®
Knowledge is power
Publisher of Scientific Journals

www.jmrionline.com

Journal of Medical Research and Innovation

Case Series

Low back pain oswestry disability index changes following 8-week movement proficiency exercise program – A retrospective cohort study

Brogan Samuel Williams[1], David Johnson[2]

[1]Department of Sports Science, The Strength Science Clinic, Auckland, New Zealand, [2]Department of Neurosurgery, City To Coast Neurosurgery, Brisbane, Australia.

***Corresponding author:**
Brogan Samuel Williams,
Department of Sports Science,
The Strength Science Clinic,
Auckland, New Zealand.

brogan.s.williams@gmail.com

Received : 20 December 2022
Accepted : 16 March 2023
Published : 30 May 2023

DOI
10.32892/JMRI.290

Quick Response Code:

ABSTRACT

Chronic low back pain (CLBP) is a worldwide epidemic, with a prevalence rate of 75–84% in developed countries. With the prevalence increasing, health-care professionals must question current best practice guidelines. In 2014, spinal neurosurgeon and back pain rehabilitation specialist Dr. David Johnson developed a unique back pain rehabilitation program referred to as NeuroHAB®. The program's uniqueness is founded on the principle that effective rehabilitation must eliminate the root cause of pain symptoms. The NeuroHAB® 8-week Movement therapy program aims to reverse movement dysfunction by restoring central nervous system-derived motor patterns based on proficient spinopelvic biomechanics for bending activities of daily living. To date, no other rehabilitation methodology adopts a movement dysfunction cause-based clinical model for back pain symptoms or includes a framework for what *healthy* lumbar pelvic movement should resemble. Over the course of the 8-week program, each participant is gradually upskilled, developing new default movement proficiency and improved biomechanics, in efforts to downregulate pain, improve disability, and increase functional movement capacity, creating a positive feedback loop for further progress. The leading question of this study is "*How does functional movement-based therapy impact chronic low back pain?*" Ten sets of participant details were selected at random and retrieved from the NeuroHAB® 8-week program database of 2020. All participants presented with CLBP, and two oswestry disability index (ODI) scores were documented – the first at the beginning of the 8-week program, and the second after the NeuroHAB® intervention. ODI scores were collated and the pre- and post-program results were measured and compared quantitatively through a paired *t*-test to determine the statistical significance of improvement. Results showed a two-tailed *P*=0.05 indicating that there was a significant difference between the pre- and post-data (0.0024). The pre- and post-group intervention *ODI* means were 25.80 and 13.30, respectively, resulting in a difference of 12.50 (95% CI: 5.73–19.27); determining the mean data between the pre- and post-intervention decreased by 48.4496%. The results from this study support the alternative hypothesis, concluding an *8-week intervention of functional movement therapy represented by* NeuroHAB® *results in a significant reduction of LBP ODI scores.*

Keywords: Movement dysfunction, Chronic low back pain, Pain, Functional movement therapy, NeuroHAB®

INTRODUCTION

Chronic low back pain (CLBP) is a worldwide epidemic, with a prevalence rate of 75–84% in developed countries.[1] As the leading global cause of YLDs ("years lived with disability" – a system used to track the impact an illness has on quality of life), chronic LBP is estimated to cost the economy $560–$630 billion annually, in the US alone.[2,3] With the statistics worsening, many

health-care professionals question whether the current medical guidelines are effective.[3,4] Spinal neurosurgeon and back pain rehabilitation Specialist Dr. David Johnson developed a unique back pain rehabilitation program referred to as NearoHAB®. The program's uniqueness is founded on the principle that effective rehabilitation must eliminate the root cause of pain symptoms. Dr. Johnson coined the term "*Movement Dysfunction*" which is considered to be the disease process that causes accumulative biomechanical stress that drives nociceptive and inflammatory pain that leads to progressive and accelerated compromise to the spinal structural integrity. To date, no other rehabilitation methodology adopts a movement dysfunction cause-based clinical model for back pain symptoms or includes a framework for what *healthy* lumbar pelvic movement should resemble. The NeuroHAB® 8-week movement therapy program aims to reverse movement dysfunction by restoring motor patterns based on proficient spinopelvic biomechanics for bending activities of daily living. Rehabilitation of the central nervous system-derived motor pattern functional skill is a unique characteristic and the basis for the name NeuroHAB®.

All patients participating in NeuroHAB® are progressively upskilled over the 8-week program eventually establishing default movement proficiency based on five key movement points of performance principles for bending comprised of

1. Hip centric rotation and minimizing lumbar centric flexion
2. Optimized neutral spine maintenance
3. Posterior kinetic chain powered movement
4. Unloaded knees position
5. Proficiency limited range of motion.

The rapidly improved biomechanics express for literally thousands of repetitions of trivial bending tasks enables the down-regulation of pain and disability and increase in functional capacity which sets up a positive feedback loop for further progress. Exercise is widely acknowledged to have significant health benefits, but research is beginning to indicate that movement-specific resistance training is absolutely necessary in addition to regular exercise. Research shows that resistance training not only improves muscle mass and strength output but significantly reduces the risk factors for cardiovascular disease, as well as all-cause and cardiovascular mortality.[5] It also demonstrates how proprioception, kinesthetic awareness, stability, and coordination can all be improved through constantly varied functional movement under relative load, all of which are essential for the treatment of low back pain (LBP).[6-9]

RESEARCH QUESTION AND HYPOTHESIS

Research question

How does functional movement-based therapy impact persistent LBP?

Null hypothesis

An 8-week intervention of functional movement therapy has no impact on LBP oswestry disability index (ODI) scores.

Alternative hypothesis

An 8-week intervention of functional movement therapy results in a significant reduction of CLBP ODI scores.

METHODS

Ten sets of participant details were selected at random and retrieved from the NeuroHAB® 8-week program database of 2020. All participants presented with CLBP. ODI scores were documented before and after the NeuroHAB® intervention (See Table 1 for the Oswestry Disability Index ranges). The first is at the beginning of the 8-week program, and the second is after the program. ODI scores were collated and the pre- and post-program results were measured via Microsoft Excel and compared quantitatively through a paired *t*-test to determine the statistical significance of improvement. Further descriptive statistical analyses were carried out to obtain further data. The sample size was determined appropriate for a preliminary pilot study and no power analysis was conducted. Data were collected by fully trained NeuroHAB® staff and was kept highly confidential - consent was given by each participant. Participants were coached through the 8-week program by qualified NeuroHAB® Movement Therapists [Figure 1].

RESULTS

The *t*-test was used to determine statistical significance after ODI scores were collected before and after the 8-week intervention. Results showed a two-tailed P=0.05 indicating

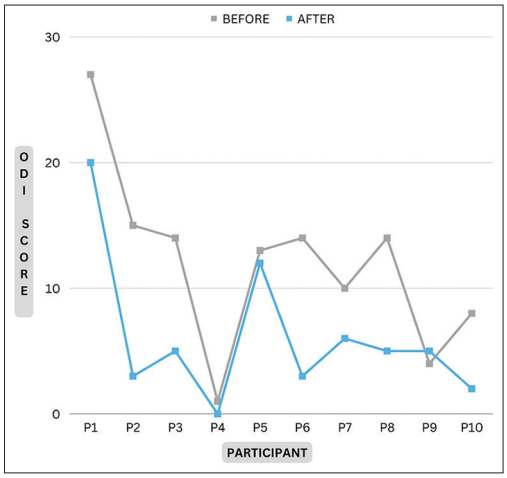

Figure 1: Pre-/post-intervention oswestry disability index data.

that there was a significant difference between the pre- and post-data (0.0024). As seen in Table 2, the pre- and post-group intervention *ODI* means were 25.80 and 13.30, respectively, resulting in a difference of 12.50 (95% CI: 5.73–19.27); determining the mean data between the pre- and post-intervention decreased by 48.4496%.

DISCUSSION

Following the NeuroHAB® 8-week functional movement therapy program, participants showed a significant decrease in LBP ODI scores (48%). Pre- and post-mean differences were concluded to be significant via a two-tailed *t*-test and $P > 0.05$ (0.0024). The results from this study are extremely valuable as the need for effective conservative care is immense. The current guidelines around CLBP are widely questioned and are often considered "*noneffective*" or not viable as a long-term solution.[10] Without the root cause, or the "*Movement Dysfunction*" being addressed, many patients display poor outcomes following current conventional rehabilitation methodologies. An observation is the very high levels of pre-intervention disability in this randomly selected cohort, with a mean ODI score of 25.8 reflective of severe disability. This may be due to the cohort of patients being derived from a tertiary care referral source. Noting that patients are presenting with CLBP and through referral for specialist spinal surgery care. The cohort, therefore, is biased toward poor outcomes based on this referral and entry process for the NeuroHAB® rehabilitation. Failure of effective rehabilitation or "Failed Rehabilitation Syndrome" increases the risk of accelerated degeneration or "degeneritis," which increases the likelihood that a patient will require an invasive structural intervention with spinal decompressive or stabilizing surgery in the future. Avoidable issues such as adjacent segment disease may be the consequence of failure to eliminate the causative biomechanical disease of movement dysfunction postoperatively.[11,12] Neuromuscular or active, passive, and proprioceptive coordination of spinal structure and movement, respectively, comprise and optimize spinal motion segment stability. This is hypothesized to be a crucial aspect of spine health dating back to Panjabi (1992) with the "*Neutral Zone and Instability Hypothesis.*"[13] Furthermore, studies in LBP patients have revealed a decline in function and atrophy of the important trunk and low back deep musculature responsible for stability and coordination in particular the Multifidus muscle, a critical intersegmental lumbar spinal stabilizer.[14-16] In alignment with this research, the 8-week NeuroHAB® program places a priority on retraining and reversing dysfunctional spinal, pelvic, and hip movement (Movement Dysfunction) by enhancing skill and stability compromised of the inter-related elements of coordinated-movement proficiency of the active musculature supported by the passive periarticular soft tissues.[17]

Table 1: ODI.

Interpretation	ODI score	Percentage
Minimal disability	0–10	0–20
Moderate disability	11–20	21–40
Severe disability	21–30	41–60
Crippled	31–40	61–80
Bed bound	41–50	81–100

ODI: Oswestry disability index

Table 2: Descriptive statistics.

	Pre	Post
Mean	25.80	13.30
SD	15.69	12.94
SEM	4.96	4.09
n	10	10

SEM: Standard error of mean, SD: Standard deviation

CONCLUSION

The results from this study support the alternative hypothesis, concluding an *8-week intervention of functional movement therapy represented by* NeuroHAB® *results in a significant reduction of LBP ODI scores*. This study has shown conclusive data and a step in the right direction toward the need paradigm shift in CLBP Rehabilitation. The limitations of this pilot study are the small sample size and lack of a control group. More research is required to draw stronger conclusions on this matter; however, the severe pre-intervention ODI of this cohort biased to poor outcomes that improved by approximately 50%, instills confidence that the methodology of functional movement therapy delivered early in primary care is likely to be an exceedingly powerful methodology for resolving LBP symptoms definitively.

Ethical approval and patient consent

Approval was granted by Dr. David Johnson, director of NeuroHAB®. All participants permitted consent in writing. All information was treated as extremely confidential and personal details were NOT shared.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Thiese MS, Hegmann KT, Wood EM, Garg A, Moore JS, Kapellusch J, *et al*. Prevalence of low back pain by anatomic location and intensity in an occupational population. BMC Musculoskeletal Disord 2014;15:283.
2. Wu A, March L, Zheng X, Huang J, Wang X, Zhao J, *et al*. Global low back pain prevalence and years lived with disability from 1990 to 2017: Estimates from the Global Burden of Disease Study 2017. Ann Transl Med 2020;8:299.
3. Gatchel RJ. The continuing and growing epidemic of chronic low back pain. Healthcare (Basel) 2015;3:838-45.
4. Traeger AC, Buchbinder R, Elshaug AG, Croft PR, Maher CG. Care for low back pain: Can health systems deliver? Bull World Health Organ 2019;97:423-33.
5. Lopez-Jaramillo P, Lopez-Lopez JP, Tole MC, Cohen DD. Muscular strength in risk factors for cardiovascular disease and mortality: A narrative review. Anatol J Cardiol 2022;26:598-607.
6. Aman JE, Elangovan N, Yeh IL, Konczak J. The effectiveness of proprioceptive training for improving motor function: A systematic review. Front Hum Neurosci 2015;8:1075.
7. Behm DG, Sanchez JC. Instability resistance training across the exercise continuum. Sports Health 2013;5:500-3.
8. Freeman M, Woodham M, Woodham A, Skeate JG. Long-term lumbar multifidus muscle atrophy changes documented with magnetic resonance imaging: A case series. J Radiol Case Rep 2014;8:27-34.
9. Myrtos CD. Low back disorders. Evidence-based prevention and rehabilitation. J Can Chiropr Assoc 2012;56:76.
10. Arnau JM, Vallano A, Lopez A, Pellisé F, Delgado MJ, Prat N. A critical review of guidelines for low back pain treatment. Eur Spine J 2006;15:543-53.
11. Johnson D, Hanna J. Why we fail, the long-term outcome of lumbar fusion in the Swedish Lumbar Spine Study. Spine J 2017;17:754.
12. Radcliff KE, Kepler CK, Jakoi A, Sidhu GS, Rihn J, Vaccaro AR, *et al*. Adjacent segment disease in the lumbar spine following different treatment interventions. Spine J 2013;13:1339-49.
13. Panjabi MM. The stabilizing system of the spine. Part II. Neutral zone and instability hypothesis. J Spinal Disord 1992;5:390-6; discussion 397.
14. Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain. A motor control evaluation of transversus abdominis. Spine (Phila Pa 1976) 1996;21:2640-50.
15. Freeman MD, Woodham MA, Woodham AW. The role of the lumbar multifidus in chronic low back pain: A review. PM R 2010;2:142-6; quiz 1 p following 167.
16. Naghdi N, Mohseni-Bandpei MA, Taghipour M, Rahmani N. Lumbar multifidus muscle morphology changes in patient with different degrees of lumbar disc herniation: An ultrasonographic study. Medicina (Kaunas) 2021;57:699.
17. Admin. Movement Disorder Functional Movement Training Centre FMTC. Back Pain Functional Movement. Available from: https://www.fmtc.com.au/movement-disorder [Last accessed on 2022 Nov 27].

How to cite this article: Williams BS, Johnson D. Low back pain oswestry disability index changes following an 8-week movement proficiency exercise program – A retrospective cohort study. J Med Res Innov 2023;7:1-4.