Integrated Neuromuscular Inhibition Technique Versus Mulligan Mobilization on Functional Disability in Subjects With Nonspecific Low Back Pain: A Comparative Study

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Abstract

Background

Pain lasting more than three months is termed chronic pain. Treating chronic pain is always a challenge for the therapist. Low back pain (LBP) with a high prevalence is a point of concern. Various treatment methods are available. The two treatment methods are integrated neuromuscular inhibition technique (INIT) and Mulligan mobilization with movement (MWM). In this study, we have compared INIT with MWM.

Method

It was an interventional study carried out at Ravi Nair Physiotherapy College and Acharya Vinoba Bhave Rural Hospital. A total of 80 participants with nonspecific LBP were included in the study. The participants were randomly divided into two groups and treated for two weeks with three weekly sessions.

Statistical analysis and result

Statistical analysis was done post the completion of sampling. Paired and unpaired t-tests were used. A p-value of <0.05 was considered significant. The result was obtained after comparing the pre- and post-values of the numerical pain rating scale (NPRS), modified Oswestry disability index (MODI), and range of motion (ROM) of the lumbar joint. After two weeks of treatment, a reduction in functional disability and pain was seen in the INIT and MWM groups. ROM was increased after two weeks of treatment in both INIT and MWM groups. When compared, INIT showed better results than MWM.

Conclusion

In conclusion, we saw that the integrated neuromuscular inhibition technique might be a better technique than Mulligan mobilization with movement in terms of reducing pain and functional disability.

Introduction

The spine is constructed out of vertebrae, as well as intervertebral discs. The mobility is granted by the intervertebral discs, which will not endanger the vertebral column’s supportive strength [1]. The human vertebral column consists of 33 vertebrae classified as cervical, thoracic, lumbar, sacral, and coccyx [2,3]. For postural control and spinal stability, the spine is connected to the trunk’s muscles and ligaments [4,5]. The lumbar segment comprises five vertebral named L1-L5 [6]. They have a thick spinous process and large vertebral bodies in comparison to the size of the vertebra. The spinous process protrudes perpendicular to the body. The facets are curved articular surfaces [1,7]. As the lumbar region is less mobile and has a vast muscular structure, any derangement leads to pain and hampers the activities of daily living [8].

With the prevalence of eight and two-tenths percent worldwide in 1990 to seven and five-tenths percent in 2017, low back pain (LBP) needs attention [9]. People suffering from LBP should manage pain earlier to avoid biomechanical alteration. The low back pain where the cause is not known is nonspecific low back pain (NSLBP), and when the cause of pain is specific, it is referred to as specific low back pain. The pain that is mechanical in origin is mainly because of the muscles or the intrinsic factors; it is termed mechanical low back pain [10]. Mechanical low back pain is experienced due to sudden heavy lifting or prolonged sitting. Nerve root-associated LBP is due to the nerves getting compressed at the spinal level; the pain is sharp and burning in nature, radiating to the nerve course. Pathologic LBP is due to underlying pathology, which can

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be a pathology of the bones, muscles, or intervertebral disc. The prolapsed intervertebral disc is a common cause of LBP [2].

The treatment of LBP depends upon the cause of pain. So, therapists should use various maneuvers and identify the best method to manage low back pain. Integrated neuromuscular inhibition technique (INIT) and Mulligan mobilization with movement (MWM) are two techniques that can be used to manage LBP [11].

INIT is a method that includes three maneuvers in one [12]. The three techniques are trigger point release [13], strain counterstrain technique [14], and muscle energy technique (MET) [15]. In trigger point release, compression is given at the trigger point region and maintained for 15 seconds, while in strain counterstrain technique, the superficial fascia is stretched. MET works on the principle of reciprocal inhibition. MWM is a type of mobilization done with movement, which helps reduce joint stiffness [16]. Mulligan is used for both peripheral and spinal joints. Sustained natural apophyseal glide (SNAG) is the type of movement in which the subject performs active movement while the therapist applies sustained pressure on the area of hypomobility. Natural apophyseal glide is when the glide is involved but there is no functional movement taking place [17].

INIT has been proven effective in treating neck pain, but no pieces of evidence are seen for the low back region yet. Mulligan mobilization with movement is proven effective in reducing pain in the lower back region. This study will be conducted to see if integrated neuromuscular inhibition effectively reduces functional disability and pain in nonspecific low back pain and which technique out of INIT and MWM is better.

Materials And Methods

This experimental trial was performed at Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences (DMIMS), Sawangi (Meghe), Wardha, musculoskeletal outpatient department. Approval was from the Institutional Ethical Committee of Datta Meghe Institute of Medical Sciences (DMIMS). Deemed to be University at Wardha (DMIMS (DU)), Sawangi (Meghe), Wardha (DMIMS (DU)/IEC/2021/241) and the Clinical Trials Registration of India (CTRI/2021/05/033461). Participants who gave consent to participate were included in the study. A total of 80 individuals with nonspecific chronic LBP were included using simple random sampling. Each group had 40 individuals, and allocation was done using envelop method.

Inclusion and exclusion criteria

Participants of both genders aged 18-25 with no neurological impairment and willingness to participate were included in the study. Participants treated for LBP with some form of surgical intervention or with a history of trauma to the back region or acute pain or individuals with lumbar radiculopathy were excluded.

Procedure

Participants were screened according to the inclusion and exclusion criteria. Those who fulfilled the requirements and were willing to participate were included in the study. They were divided into groups A and B. Group A received INIT, whereas group B received Mulligan SNAG. INIT and Mulligan SNAG followed standard protocol for treatment. Both groups received conventional physiotherapy protocol, which included interventional therapy for 20 minutes [18] and back strengthening exercises [19,4]. The treatment was provided by the physiotherapist for two weeks with three sessions per week. Modified Oswestry disability index (MODI) [20-22], numerical pain rating scale (NPRS) [23,24], and modified Schober’s test [25,26] were taken as outcome measures before the treatment and at the end of the treatment.

Results

Statistical analysis was performed using descriptive and inferential statistics, including Student’s paired and unpaired t-test and the software Statistical Product and Service Solutions (SPSS) (IBM SPSS Statistics for Windows, Armonk, NY) v7.0.0 version and GraphPad Prism (GraphPad Software, San Diego, CA) 7.0 version, with a p-value of less than 0.05 assumed to be the significance level. Paired t-test was used to compare pre-data with post-data within the group, while an unpaired t-test was used to compare the post-mean between the groups in age-wise distribution. The mean value of the INIT group is 21.3, with a standard deviation of 2.5, while the mean value of the Mulligan group was 21.46, with a standard deviation of 2.202. According to the groups in age-wise distribution. The mean value of the INIT group is 21.3, with a standard deviation of 2.5, while the mean value of the Mulligan group was 21.46, with a standard deviation of 2.202. According to the standards, and standard error in group A and group B for NPRS, MODI, and range of motion (ROM) are mentioned in Table 1. The mean difference in the INIT group was significantly reduced in NPRS, MODI, and ROM. INIT outperformed MWM demonstrating a significant difference between the two treatments. The mean difference of MODI in the INIT and Mulligan groups was 18.575 and 13.025, respectively (Figure 1). The mean difference in lumbar extension in INIT and Mulligan groups was 0.6875 and 0.4275, respectively (Figure 2).
| Group     | Outcome measure | N  | Mean  | Standard deviation | Standard error mean | T-value | P-value |
|-----------|-----------------|----|-------|--------------------|---------------------|---------|---------|
| INIT      | NPRS            | 40 | 2.125 | 0.812              | 0.13                | 2.3933  | 0.0191  |
| Mulligan  | MODI            | 40 | 1.675 | 0.8482             | 0.14                |         |         |
| INIT      | Lumbar flexion  | 40 | 0.9275| 0.6364             | 0.102               | 4.3808  | 0.001   |
| Mulligan  | Lumbar extension| 40 | 0.4275| 0.3025             | 0.048               | 2.9065  | 0.0047  |

**TABLE 1: Comparison of mean difference in NPRS, MODI, lumbar flexion, and lumbar extension in two groups**

NPRS: numerical pain rating scale; INIT: integrated neuromuscular inhibition technique; MODI: modified Oswestry disability index; N: number of samples

**FIGURE 1: Comparison of mean difference in modified Oswestry disability score in two groups**

INIT: integrated neuromuscular inhibition technique
FIGURE 2: Comparison of mean difference in lumbar extension score in two groups

INIT: integrated neuromuscular inhibition technique

Discussion

The study was conducted to explore the effect of INIT and Mulligan lumbar SNAGs on pain and disability in NSLBP and to compare the effect of INIT and Mulligan lumbar SNAG. A population aged 18-25 was selected to avoid degenerative changes, which occur with advancement in age. The exclusion included any deformities, tumors, new or old fractures, pregnancy, surgeries around the back and thorax, and radiculopathies or neurological defects. Participants were equally divided into two groups, 40 per group. The therapist gave interferential therapy and back-strengthening exercises to both groups. Group A received INIT, while group B received Mulligan lumbar SNAG. The treatment was given for two weeks with three sessions in one week, so the therapist gave a total of six sessions to each patient. Pain, disability, and the range of motion were monitored using NPRS, MODI, and modified Schober's test, respectively.

LBP was considered for this study as it also appears to be frequent in youngsters [26]. Nonoccupational intensive physical exercise has been linked with an enhanced prevalence of LBP, although recreational activities were already linked to a protective effect. It is a symptom rather than a disease: the pain is the product of several pathologic practices that result in this recurring condition. The human spine is a complex structure that holds us upright and allows us to move in various directions in space; it is also subject to numerous forces working on our body, whether we stand, walk, lift, carry, or push/pull weights [27]. Several components in the system might produce pain. However, without invasive validation, it may be challenging to attribute pain to a specific structure (or structures) in a given case [28,29]. Some jobs need extended periods spent in one posture. This leads to the weakening and tightening of some muscles, leading to lower cross syndrome resulting in back pain. This prolonged posture leads to musculoskeletal disorders forming trigger points in specific muscles. Trigger points may manifest a decreased range of motion and LBP [30].

Tawrej et al. studied the effect of MET on quadratus lumborum muscle in subjects with NSLBP. The therapist gave a hot pack along with MET. The author concluded that thermotherapy increases soft tissue flexibility. The author added that hot fermentation could reduce LBP by blocking the pain signal [31]. Dayanur et al. compared three manual therapy techniques for chronic NSLBP; it involved myofascial trigger points (MTrPs) [32]. The signs of MTrPs were the existence of a taut band that was palpable in the muscle, a hyperirritable spot in the muscle band, a reaction of local twitch elicited on the palpation of the muscle, and the replication of pain upon palpation. Manual therapy techniques such as MTrP decrease pain severity, pressure pain threshold (PPT), and disability due to pain, depression, and anxiety and improve active range of motion (AROM) in patients with chronic NSLBP [32].

Many times, LBP is nonspecific. NSLBP can be managed by taking measures to avoid heavy lifting, correcting sitting posture, and doing exercises [2]. Money reviewed trigger points and myofascial pain syndrome, and their pathophysiology mentioned that MTrPs are tender spots in the muscle [33]. They are indications of myofascial pain, which involves stiffness of the muscle, pain, and tenderness that radiates to other locations, which are also described as referred pain. MTrPs are active or latent. Active trigger points inflict muscle pain most of the time, whereas MTrP, which are painful only on pressure, are latent. Trigger points are linked to muscle dysfunction, weakening, and reduced range of motion. One theory holds that trigger points are caused by muscle injury, overuse, and spasm. Another hypothesis is that trigger points are
directly due to nerve pain from the spine. Yet, another theory is that maintaining incorrect posture for an extended period induces trigger points to occur [33].

Researchers could expand the study in the future by using INIT in a different group of muscles. A longer duration of treatment can be considered to achieve better results. This study had a smaller sample size of 80 and did not include an equal number of male and female samples. The therapist did not maintain follow-up in this study, which was a significant limitation.

Conclusions

Living with LBP is something to be concerned about as it leads to functional disability and reduced range of motion. The most typical causes of LBP are MTRP, muscle tightness, and overuse injury. In this study, we compared the effect of INIT and Mulligan lumbar SNAG. The INIT group showed a reduction in pain and improvement in range of motion leading to decreased functional disability. Mulligan lumbar SNAG also proved to reduce pain and functional disability. When compared, it was seen that INIT helps significantly in reducing pain and functional disability. Thus, INIT was found more effective than MWM in managing NSLBP.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. The Institutional Ethical Committee of Datta Meghe Institute of Medical Sciences issued approval DMIMS (DU)/IEC/2021/241.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Frost BA, Camarero-Espinosa S, Foster EJ: Materials for the spine: anatomy, problems, and solutions . Materials (Basel). 2019, 12:253. 10.3390/ma12020253
2. Maher C, Underwood M, Buchbinder R: Non-specific low back pain. The Lancet. 2017, 389:736-47. 10.1016/S0140-6736(16)30970-9
3. Fatmawati V: Reduction of pain and disability with integrated neuromuscular inhibition techniques (INIT) and massage effleurage in myofascial trigger point syndrome upper trapezius muscle (Article in Indonesian). Sport Fit J. 2015, 1;60-71.
4. Ahmed A, Waqas MS, Ijaz MJ, Aideel M, Haider R, Ahmed MI: Effectiveness of core muscle stabilization exercises with and without lumbar stretching in non-specific low back pain. Ann King Edw Med Univ. 2017, 23:10.21649/akem.v23i5.2020
5. Lomeli-Rivas A, Larrinua-Betancourt JE: Biomechanics of the lumbar spine: a clinical approach . Acta Ortop Mex. 2019, 33:185-91.
6. de Wijs J, Steenks MH, de Leeuwe R, Bosman F, Holders PF: Symptoms of the cervical spine in temporomandibular and cervical spine disorders. J Oral Rehabil. 1996, 23:742-50. 10.1046/j.1365-2842.1996.d01-187.x
7. AliAbdulwhab SS, Kachenathu SJ: Effects of body mass index on foot posture alignment and core stability in a healthy adult population. J Exerc Rehabil. 2016, 12:182-7. 10.12965/er.1622600.300
8. Asiri F, Tedla JS, Alshahrani MS, Ahmed I, Reddy RS, Gular K: Effects of patient-specific three-dimensional lumbar traction on pain and functional disability in patients with lumbar intervertebral disc prolapse. Niger J Clin Pract. 2020, 23:498-502. 10.4103/njcp.njcp_285_19
9. Diab AA, Moatafa IM: Lumbar lordosis rehabilitation for pain and lumbar segmental motion in chronic mechanical low back pain: a randomized trial. J Manipulative Physiol Ther. 2012, 32:246-53. 10.1016/j.jmpt.2012.04.021
10. Costa IA, Dyson A: The integration of acetic acid iontophoresis, orthotic therapy and physical rehabilitation for chronic plantar fasciitis: a case study. J Can Chiropr Assoc. 2007, 51:166-74.
11. Wu A, March L, Zheng X, 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.
10.21037/atm.2020.02.175
12. Jothi S, Ram PS, Sivakumar VP: The efficacy of core muscle release technique in mechanical low back pain a quasi experimental study. Int J Clin Ski. 2017, 11:10.4172/Clinical-Skills.100124
13. Buran Çirak Y, Yurdaişik I, Elbaşi ND, Tütüneken YE, Köçe K, Çinar B: Effect of sustained natural aponeurosis glides on stiffness of lumbar stabilizer muscles in patients with nonspecific low back pain: randomized controlled trial. J Manipulative Physiol Ther. 2021, 44:445-54. 10.1016/j.jmpt.2021.06.005
14. Metgud SC, Monteiro SS, Hegammavar A, D’Silva PV: Effect of integrated neuromuscular inhibition technique on trigger points in patients with nonspecific low back pain: randomized controlled trial. Indian J Phys Ther Res. 2020, 2:99. 10.4105/iptr.iptr_49_19
15. Wong CK: Strain counterstrain: current concepts and clinical evidence . Man Ther. 2012, 17:2-8. 10.1016/j.math.2011.10.001
16. Frankie H, Fryer G, Ostelo RW, Kamper SJ: Muscle energy technique for non-specific low-back pain. Cochrane Database Syst Rev. 2015, CD009852. 10.1002/14651858.CD009852.pub2
17. Vicenzino B, Paungmali A, Toys P: Mulligan’s mobilization-with-movement, positional faults and pain relief: current concepts from a critical review of literature. Man Ther. 2007, 12:98-108. 10.1016/j.math.2006.07.012
18. Seo UH, Kim JH, Lee BH: Effects of Mulligan mobilization and low-level laser therapy on physical disability, pain, and range of motion in patients with chronic low back pain: a pilot randomized controlled trial. Healthcare (Basel). 2020, 8:237. 10.3390/healthcare8030337
19. Albornoz-Cabello M, Maya-Martín J, Domínguez-Maldonado G, Espejo-Antúnez L, Heredia-Rizo AM: Effect of interventional current therapy on pain perception and disability level in subjects with chronic low back pain: a randomized controlled trial. Clin Rehabil. 2017, 31:242-9. 10.1177/0269215516659623
20. Jung DK, Chang YJ: The effect of a hip joint strengthening exercise using PNF on balance, sit-to-stand movement, and gait in a tibia fracture patient with skin defects—a single case study. PNF Mov. 2018, 16:317-32. 10.21598/JPKNFA.2018.16.3.317
21. Fritz [M], Irrgang JJ: A comparison of a modified Oswestry low back pain disability questionnaire and the Quebec back pain disability scale. Phys Ther. 2001, 81:776-88. 10.1093/ptj/81.2.776
22. Vianin M: Psychometric properties and clinical usefulness of the Oswestry disability index. J Chiropr Med. 2008, 7:161-5. 10.1016/j.jcm.2008.07.001
23. Denteneer L, Van Daele U, Truijen S, De Hertogh W, Meirte J, Deckers K, Stassijns G: The modified low back pain disability questionnaire: reliability, validity, and responsiveness of a Dutch language version. Spine (Phila Pa 1976). 2018, 43:E292-8. 10.1097/BRS.0000000000002304
24. Childs JD, Piva SR, Fritz JM: Responsiveness of the numeric pain rating scale in patients with low back pain. Spine (Phila Pa 1976). 2005, 30:1351-4. 10.1097/01.brs.0000164999.92211.29
25. Francis R, Dheerendra S, Natall G, Sivaraman A: Schober’s test: revisited. Orthop Proc. 2010, 92:563. 10.1002/0142060000.C2010.92.0563c
26. Tosignani M, Poulins L, Marchand S, Vioa A, Place C: The modified-modified Schober test for range of motion assessment of lumbar flexion in patients with low back pain: a study of criterion validity, intra- and inter-rater reliability and minimum metrically detectable change. Disabil Rehabil. 2005, 27:553-9. 10.1080/09638280400018411
27. Balagué F, Mannion AF, Pellisé F, Cedraschi C: Non-specific low back pain. The Lancet. 2012, 379:482-91. 10.1016/S0140-6736(11)60612-9
28. Cutler HS, Guzman JZ, Al Maaieh M, Connolly J, Skovrlj B, Cho SK: Patient reported outcomes in adult spinal deformity surgery: a bibliometric analysis. Spine Deform. 2015, 3:312-7. 10.1016/j.jspd.2014.12.004
29. Ajimsha MS, Daniel B, Chithra S: Effectiveness of myofascial release in the management of chronic low back pain in nursing professionals. J Bodyw Mov Ther. 2014, 18:273-81. 10.1016/j.jbmt.2013.05.007
30. Alvarez DJ, Rockwell PG: Trigger points: diagnosis and management. Am Fam Physician. 2002, 65:655-60.
31. Tawref P, Kaur R, Ghioe S: Immediate effect of muscle energy technique on quadratus lumborum muscle in patients with non-specific low back pain. Indian J Physiother Occup Ther. 2020, 14:5.
32. Dayanur IO, Birinci T, Kaya Mutlu E, Akcetin MA, Akdemir AO: Comparison of three manual therapy techniques as trigger point therapy for chronic nonspecific low back pain: a randomized controlled pilot trial. J Altern Complement Med. 2020, 26:291-9. 10.1089/acm.2019.0435
33. Money S: Pathophysiology of trigger points in myofascial pain syndrome. J Pain Palliat Care Pharmacother. 2017, 31:158-9. 10.1080/15532888.2017.1298688