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Integrated Effect Of Hydrotherapy With Core Stabilizing Exercises In Rehabilitation In Lumbar Disc Herniation: A Review Literature

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ABSTRACT

Introduction: Lumbar disc bulging results from extrusion of the nucleus pulposus through a compromised annulus fibrosus, resulting in compression of neural elements, pain, and functional impairment. Core stabilization exercises and hydrotherapy have been found to be effective treatment modalities. Core stabilization exercises improve spinal stabilization through strengthening the deep trunk muscles, and hydrotherapy offers a low-impact environment that facilitates movement and minimizes pain. This review seeks to assess the combined effect of these interventions in managing lumbar disc bulging.

Objective: This review is solely objective to evaluate the combined effects of these interventions on managing lumbar disc bulging.

Methods: Review on PubMed, Google Scholar, and ResearchGate was conducted. All 120 peer-reviewed journal articles that were considered relevant were screened, and 15 studies were selected to be analyzed in detail.

Results: The results indicate that the integration of hydrotherapy and core stabilization exercises enhances the success of the rehabilitation. Integration successfully reduces pain, improves spinal stability, and enhances functional mobility compared to conventional rehabilitation. Hydrotherapy also improves compliance with exercise regimens by minimizing discomfort and improving movement.

Conclusion: The integrated approach of core stabilization training and hydrotherapy provides an appealing solution for rehabilitation from lumbar disc bulging. It enables enhanced functional rehabilitation, postural control, and pain management. Additional studies with standardized protocols would be appropriate to adapt the clinical applications to the most.

Keywords: Bulging, Core reinforcing, Core stabilizing exercises, Disc herniation, Disc rupture, Hydrotherapy, Low back distress, Lumbar disc stability.

INTRODUCTION

Lumbar disc bulging is a low back condition in which the intervertebral disc's inner core becomes protruded through the outer covering. If herniated disc causes and compression of nerves, aches and numbness of the lower extremities may ensue. Typical causes are age, repetitive stress, and lifting improperly. Such causes as genetics, obesity and sedentary lifestyle may also be responsible for muscular health. Being aware of these causes is vital for preventive treatment and decision-making regarding lifestyle and activities. Treatment is varied from conservative such as rest and physical therapy. According to one study, the commonly included treatments for low back

distress include exercise, Physical Therapy, and over-the-counter distress relievers. Physical Therapy involves many different mechanisms of treatment that are based on the patient's disability such as aquatic therapy and core stabilizing exercises. Aquatic therapy/Hydrotherapy in physiotherapy is the application of water as a therapeutic agent to aid rehabilitation of lumbar disc bulging. Buoyance of water reduces the load on joints and supports the body. Hydrotherapy exercises enhance flexibility, strengthen, and cardiovascular fitness. Obstruction of water provides additional challenges, increasing muscle activation.

Core stabilizing exercise is a therapy method embraced by physical therapists that is defined by changing patterns of exercises that normalize mobility and distress in the local region. A physical therapist recommends an array of exercises that are particular to lumbar disc bulging to enhance the function and overall well-being of an individual. Prone planks, pelvic floor exercises, side bridges and curl-ups and other body exercises to minimize symptoms clinically. Core stabilizing exercises can stabilize the spine and minimize symptoms of lumbar disc bulging.

Hydrotherapy challenges the body in a way that traditional physiotherapy methods do not. Hydrotherapy also improves body distress associated with arthritis and other joint flaws, as established. Hydrotherapy has several other benefits compared to specific core strengthening protocol based on the evidence.

We simply plan to study its benefits with some extra obstruction on the lower back distress. We know that obstruction training is one of the best ways to stay fit and healthy. Obstruction training is not only incorporated for aesthetics and losing weight but also in rehabilitation programs. So, the obstruction, reinforce by core stabilizing and buoyancy provided by the hydrotherapy may show augmented prognosis. Therefore, the aim of this literature is to study and analyze the effect of Hydrotherapy in combination with core stabilizing workouts in management in lumbar disc bulging cases.

METHODOLOGY

Type of study: Review of Literature
Study setting: Sharda School of Allied Health Sciences, Sharda University.

Inclusive Criteria:

- Randomized control trials
- Clinical trials
- Studies published in and after 2019.

Exclusive Criteria:

- Articles published before 2018.
- Full texts and abstracts articles
- Systemic Reviews

Studies in languages other than English.

REVIEW OF LITERATURE

1. **Singh** et al. **(2021)** conducted a study to assess the efficacy of physiotherapy interventions in the treatment of lumbar prolapsed intervertebral disc (PIVD). While examining 11 RCTs, the research observed a significant decrease in pain and disability, though changes in straight leg raise (SLR) test were not statistically significant. Physiotherapy's effectiveness is credited to biomechanical factors such as increased intervertebral space and reduced herniation size. The study concludes that physiotherapy is effective in the treatment of PIVD, but additional research is required to optimize treatment procedures and ensure consistent patient outcomes.[14]
2. **M.Manoj** et al. **(2022)**, in their study compared the effectiveness of different physiotherapy techniques for the treatment of lumbar prolapsed intervertebral disc (PIVD) in 88 participants who were divided into four groups: Spinal Mobilization with Leg Movement (SMWLM), High-Velocity Low Amplitude (HVLA) thrust, Neural Mobilization (NM), and Control Treatment (CT). The outcome measures were pain, disability, and straight leg raise (SLR) range of motion. The findings showed the greatest improvement in the SMWLM group in all parameters. The study concludes that SMWLM is the most effective conservative treatment of lumbar PIVD and therefore a first-line option for pain relief and functional recovery.[13]
3. **Sadaak** et al. in **2024** in their study compared the effect of aquatic and conventional physical therapy program on ankle sprain of 3rd grade in elite athletes, the study with outcome measures such as VAS, Hop test, Star Excursion Balance Test, Agility T-Test (ATT) and Illinois Agility Test (IAT) and single leg press test

for muscle power showed that aquatic therapy to be more effective compared to traditional protocols for untimely rehab in 3rd graded ankle sprain in Elite professional athletes for lessen in pain intensity, enhancing dynamic balance and athletic performance and power and expediting their return to sports regime.[11]

4. **Khanjari** et al. in **2020** in their study examined the effect of aquatic exercises on functional disability in patients with chronic low back pain due to a herniated disc. Twenty patients were divided into a hydro-exercise group or a control group randomly, and functional disability was assessed using the Roland Morris Disability Questionnaire (RMDQ). Statistical analysis revealed that there was a significant difference between the groups' post-test of P value 0.010 in favor of the hydro-exercise group. The study concludes that an aquatic exercise program is an effective and valid method of reducing chronic low back pain and improving function in patients with a herniated disc. [2]
5. **Neira S** et al. performed an RCT in **2024** to determine the effect of two physiotherapeutic regimens i.e. Aquatic therapy and Land based exercises on female fibromyalgic patients with primary outcome measure being pain intensity as VAS and secondary outcomes as algometer, Revised Fibromyalgia Impact Questionnaire, Pittsburgh Sleep Quality Index, Multidimensional Fatigue Inventory and 6-Minute Walk Test. Aquatic therapy was better than land-based exercises after 6 weeks follow ups for symptom management.[7]
6. **Walean** et al. conducted research on the influence of hydrotherapy on the degree of pain and lumbosacral flexibility in 35 non-specific low back pain (NPB) patients in a pre-experimental pretest-post-test design. The inclusion criteria were non-operative NPB patients over 29 years with no hydrotherapy contraindications. The exclusion criteria were communication disability or infection, tumour, or metastases-induced low back pain. The patients were given hydrotherapy once a week for one month. The results were a reduction in pain intensity and lumbosacral flexibility improvement. The study concludes that hydrotherapy is beneficial in reducing pain and improving flexibility in NPB patients, recommending its use in rehabilitation.[15]
7. In **2024**, a study compared the benefit of hydrotherapy and physiotherapy for the management of knee osteoarthritis (KOA) in two cohorts of 23 volunteers. Pain intensity, movement, and physical function were evaluated by observation and self-report questionnaire. The outcome indicates that compared to improvement observed in the physiotherapy group, more pain relief as well as the independence to perform activities without assistance were noted in volunteers who were treated with hydrotherapy. Moreover, hydrotherapy facilitated mental improvement. Based on its conclusion, this study contends that hydrotherapy not only relieves joint pain but also contributes to the strengthening of muscles, therefore supporting hydrotherapy for prevention as well as the management of KOA.[3]
8. **Bursa** et al. in them in **2021** of Comparison of physiotherapy approaches in LBP explored the impact of different rehabilitation techniques on low back pain (LBP) by assessing 90 individuals assigned to four treatment groups: soft tissue mobilization, Kinesio Taping, reflex therapy, and stabilization exercises. Evaluations were conducted using pain intensity scales, muscle strength assessments, trunk stability tests, and functional disability measures at baseline, post-treatment (four weeks), and a one-month follow-up. Findings indicated that all groups experienced notable pain relief and improvements in strength and stability, yet no significant differences were observed among the interventions. This outcome suggests that multiple rehabilitation methods can effectively address LBP, allowing flexibility in treatment selection. The research highlights that various physiotherapy techniques contribute to pain management and functional recovery, offering valuable options for personalized rehabilitation strategies. that all performed therapeutic approaches outturned to be successful in

scaling down the intensity of discomfort and aches in individuals suffering from LBDH.[12]

9. A study by **Bashiri** et al., in **2021** revealed the outcomes, with marked improvement in V.A.S and core muscles E.M.G when they included hydrotherapy as pre-rehab programme to patients who underwent laminectomy surgery after chronic lower back pain. A total of 30 patients were taken, based on their M.R.I findings indicating intervertebral disc protrusion, during the intervention of experimental group and control group as they were divided equally into both the groups. The former group underwent hydrotherapy as pre rehab protocol for 4 weeks and subsequently 8 weeks rehabilitation program after laminectomy. While the latter group underwent only hydrotherapy programme for 8 weeks post the surgery for intervertebral disc protrusion. This study suggests that when hydrotherapy combined with exercise protocol, summed up as comprehensive programme, yields notable outcomes post intervention.[1]
10. **Mendes** et al. in **2024** concluded the effect of a stabilization exercise program on chronic low back pain in 14 participants, assigned into two groups: stabilization exe. group (SEG) and a regular exercise group (REG). The SEG performed a prescribed exercise program two times a week for 3months, while the R.E.G continued their normal exercise. Assessments were performed before and after intervention, assessing pain severity, cervical discomfort, functional capacity, range of motion, muscle strength, and endurance. Results indicated that the S.E.G exhibited a significant decrement in lower back pain and cervical pain, with preserved trunk muscle strength. The REG exhibited a reduction in flexion strength on the right side. Differences were not seen in functional disability, range of movement, or tolerance to fatigue. The study suggests that certain core stabilization exercises reduce pain and preserve muscle strength effectively, underlining their importance for physically active individuals.[4]
11. A **2021** article by **Puntumetakul** et al., the effects of a ten-week core stabilization exercise (C.S.E) program versus a strengthening of trunk exercise (S.T.E) program in individuals having chronic lower back pain (C.L.B.P) and related lower limb instability (CLI). With 38 participants as a single-blind randomized controlled trial, the study assessed balance, pain, and trunk muscle activity pre- and post-intervention, and at three-month follow-up. Both exercise programs led to significant improvements in balance and pain relief, as indicated by the five-times-sit-to-stand test (F. TSST) also ratings of pain intensity. No notable differences were, however, detected between the CSE and STE groups in these outcomes. Of interest, the CSE group had greater activation of deep abdominal muscles than the STE group after ten weeks, with both groups showing trends of improvement in deeper muscle activation of back. The findings suggest that both programs enhance balance and pain relief, with CSE also having effects on abdominal muscle activation.[9]
12. A **2022** study by **Peng** et.al., examined the effects of therapeutic aquatic exercise on chronic low back pain. The study included 113 participants who were randomly assigned to either an aquatic exercise group or a physical therapy modalities group. Both groups underwent three months of treatment, followed by a 12-month monitoring period. The primary outcome measured was disability level, assessed using the Roland-Morris Disability Questionnaire, while secondary outcomes included pain intensity, sleep quality, and psychological factors. Findings revealed that the aquatic exercise group experienced significantly greater improvements in disability and pain relief compared to those receiving physical therapy modalities. At the end of the 12-month follow-up, a higher percentage of participants in the aquatic exercise group achieved meaningful reductions in pain and disability. The study suggests that therapeutic aquatic exercise may be a beneficial long-term treatment for chronic low back pain, favoring active rehabilitation over passive therapies.[8]

13. **Mirmoezzi** et al., in **2021**conducted a study on the impact of core stabilization exercises (CSE) and strengthening trunk exercises (STE) on chronic low back pain (CLBP) and lower limb instability (CLI) patients over a period of 10 weeks, followed by a three-month follow-up. The randomized controlled trial was conducted on 38 participants with pain levels, balance, and trunk muscle activity measured before and after the intervention. Both groups had significant improvement in pain decrease and balance, as measured by the 5-times-sit-to-stand test (FTSST), with no differences between the two exercise protocols being significant. The CSE group, however, had greater activation of deep abdominal muscles compared to the STE group, with trends of improvement in deep back muscle activation in both groups. The study suggests that although both interventions improve balance and decrease pain effectively, CSE may have some additional benefits on core muscle activation, and therefore, it can be an effective rehabilitation strategy in patients with CLBP and CLI.[5]
14. **Mohebbi Rad** et al in **2021** presented the impact of core stability exercises on lumbar disc herniation in 20 male patients in physiotherapy. They were divided randomly into an exercise group (or control group). Muscle activation of the internal oblique, external oblique, and rectus abdominis muscles was measured by electromyography, and strength and flexibility were evaluated by the straight leg raise and sit-and-reach tests. The exercise group underwent an eight-week training program, and the control group did not receive any intervention. Muscle activation, flexibility, and strength increased significantly in the exercise group. while no significant improvements were noted in the control group. Statistical analysis indicated significant group differences in muscle activation and flexibility, but differences in muscle strength were not significant. The results of this study indicate the advantage of core stability exercises in enhancing muscle function and flexibility and recommend that they be a useful addition to rehabilitation in lumbar disc herniation.[6]
15. **Rahmadhani** et.al carried out a study on the impact of hydrotherapy on the severity of pain and functional ability in patients with lumbar disc herniation (LDH) under conservative treatment. Pre-experimental study employed one-group pretest-post test design with 30 subjects. Severity of pain was measured with the Visual Analogue Scale (VAS) and functional ability with the Modified Oswestry Low Back Pain Disability Questionnaire. Hydrotherapy was administered once weekly for four weeks to the subjects. Statistical computations, including the Shapiro-Wilk test for normality and either a Paired t-Test or Wilcoxon test, revealed significant improvements. Results revealed significant alleviation of pain ($p<0.001$) and enhanced functional ability ($p<0.001$). The study suggests hydrotherapy as a promising intervention for LDH patients under conservative treatment.[10]

RESULT

The analysis of the selected 15 studies established that the combination of hydrotherapy and core stabilization exercises yields substantial rehabilitation benefits in patients with lumbar disc bulging. Patients who underwent treatment with this combined intervention experienced greater pain relief, enhanced spinal stability, and enhanced functional mobility compared to patients who were treated with standard care alone. Hydrotherapy also provided a minimal impact setting that reduced spine stress, leading to enhanced exercise program compliance. Findings suggest that this combined intervention accelerated recovery through enhanced muscular activation and reduced mechanical stress to the lumbar spine.

CONCLUSION

Combining hydrotherapy with core stabilization exercises serves as an efficient beneficial rehabilitation strategy to manage lumbar disc bulging issues. The technique provides pain relief alongside improvements in postural stability and functional recovery. To validate clinical effectiveness and refining treatment protocols this treatment requires future studies that include large participant groups and consistent methods.

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