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Effectiveness of Dynamic Neuromuscular Stabilization and Flexibility Exercises for Non-Specific Low Back Pain in Bharatanatyam Dancer: A Case Study

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Abstract

Background: Bharatanatyam, a classical Indian dance from Tamil Nadu, conveys religious stories through intricate steps and postures. Structural changes in the human body over time are crucial for injury prevention in dancers. Dynamic Neuromuscular Stabilization (DNS) is an approach that focuses on posture, breathing patterns, and joint alignment from a neurodevelopmental perspective. Flexibility is also essential for optimal biomechanical function, offering benefits like improved athletic performance, reduced injury risk, and better coordination. In Bharatanatyam, the fundamental position, araimandi, involves knee flexion with hip abduction and external rotation, requiring sufficient lower extremity muscle flexibility for balance and stability.

Objective: To assess the effectiveness of DNS and flexibility exercise for non specific low back pain in Bharatanatyam dancers. It aims to optimize neuromuscular function and enhance movement patterns through targeted interventions.

Methodology: 18 year female patient with low back pain who is also a Bharatanatyam dancer was provided an individualised therapy for 4 weeks. Outcome measures included the NPSR and Modified Owestry disability index.

Result: Finding demonstrated the neuromuscular function and enhances movement patterns through targeted interventions.

Conclusion: The NPRS and Modified ODI results after four weeks indicated enhanced movement patterns and reduced pain.

Keywords: Bharatanatyam dancer, Dynamic neuromuscular stabilization, Flexibility Exercises.

INTRODUCTION

Bharatanatyam, one of the many forms of Indian classical dance that originated in Tamil Nadu, a region in southern India. Dance is a profound expression of the soul, serving as a nonverbal form of

communication that engages the entire body[1]. Sophisticated moves in dancing styles that change can put strain on sensitive regions and raise the risk of injury. Training for an extended amount of time at a high intensity increases the chance of injury, as does overtraining. It is essential to evaluate how the human body evolves structurally over time in order to prevent injuries in dancers[2].

When poor posture is repeatedly practiced over a dancing career, it can cause long-term structural alterations that put undue strain on the spine, particularly the lumbar area, which can cause discomfort and impairment. Research indicates that low back discomfort may result from greater pelvic and lumbar inclination[3].

The full-squatting stances (aramandi and muzumandi) are part of Bharatanatyam methods. When doing aramandi correctly, the dancer must stoop deeply, keeping their back straight, placing their feet in a V shape, placing their heels on the floor, rotating their legs outward, and spreading their knees. The same stance is kept in muzumandi, but the heels come off the ground to form a complete squat. As a result, dancers have an increased risk of lower extremity and spinal musculoskeletal problems[4].

Professor Pavel Kolar created Dynamic Neuromuscular Stabilisation (DNS), an enhanced rehabilitation technique based on Vojta's seminal work on Reflex Locomotion[5]. DNS emphasises ideal joint alignment and synchronisation for maximal congruency by looking at posture, breathing patterns, and joint alignment from a neuro-developmental viewpoint. Professor Kolar incorporated the concepts of Reflex Locomotion by Vojta into DNS, with a focus on the recovery of athletes. Through focused therapies, DNS seeks to improve movement patterns and optimise neuromuscular function based on Developmental Kinesiology[5].

Before engaging in any deliberate exercise, emphasis is put on correctly engaging the diaphragm, keeping an appropriate breathing rhythm, and guaranteeing core stability. Dynamic Neuromuscular Stabilisation (DNS) is a modern and efficacious treatment for a multitude of disorders, including paediatric, musculoskeletal, neurological, and sports injuries[6].

Flexibility is essential for the best possible biomechanical performance in sports. A lack of flexibility increases the chance of injury, as well as producing early muscular tiredness and changing typical movement mechanics. Numerous benefits of flexibility have been shown in studies, including improved athletic performance, a decreased risk of injury, the avoidance or reduction of post-exercise soreness, and improved coordination[7].

Dancers need to have enough muscular flexibility in their lower extremities to maintain balance and stability. The range of mobility of a joint within its normal plane is referred to as flexibility. The range of motion that a joint or group of joints may achieve is known as static flexibility, and the comfort with which one can move within this range is known as dynamic flexibility[8].

CASE STUDY

18 year old female Bharatanatyam dancer presented with low back pain that interfered with her ability to bend while dancing and sleeping after her performance four years ago. The Numeric Pain Rating Scale (NPRS) indicated that the pain was severe (7). It worsened with side flexion, half sitting, full-squatting position, rotation, and supine reclining. With a score of 56% on the Modified Oswestry Disability Index (ODI), there was a considerable functional disability.

Exercises for dynamic neuromuscular stabilisation were administered including the Baby Rock (supine 90-90), Quadruped, Oblique Sit, Tripod Stance, Standing Squat, Bear posture with walking, and posture transitions between developmental stages. To improve stability and control, focus on diaphragmatic

breathing and intra-abdominal pressure (IAP) throughout each exercise. In order to increase range of motion and lessen tension on the lumbar spine, further hip flexibility exercises were included, such as the 90/90 stretch, butterfly exercise, and high seated hip walking front and backwards. The treatment approach aimed to improve function, reduce discomfort, and enable a return to pain-free dancing by focusing on hip flexibility and core stability.

RESULT

Outcome measures based on the scores, the patient's Modified Oswestry Disability Index (ODI) score was 56% before to therapy, which indicates a substantial disability. Following therapy, the ratings significantly improved to 17%, indicating significant improvements in function. The scores on the Numeric Pain Rating Scale (NPRS) dropped from 8 to 2, signifying a significant decrease in pain intensity. The treatment approach aims to restore function and minimise discomfort by emphasising hip flexion and core stability, allowing the patient to resume pain-free dancing. To get the best results for the patient, it will be essential to follow the exercises and to pay close attention to posture and technique.

Table: Modified ODI and NPRS Pre and Post Scores

	Pre score	Post score
Modified ODI	56%	17%
NPRS	8	2

DISCUSSION

The current study was performed with a goal of achieving improved function, reduce discomfort, and enable a return to pain-free dancing by focusing on hip flexibility and core stability. There were 20 sessions. The exercises included diaphragmatic breathing and a variety of postures and transitions. The patient in the flexibility exercises concentrated on simple movements to increase the strength and flexibility of their trunk muscles. As a result, every single patient is responding favourably to the treatments.

Both the ODI and NPRS ratings significantly improved following therapy, indicating significant improvement in function and pain reduction. The goal of the treatment was to restore overall functioning and enable a return to pain-free dancing by emphasising hip flexibility and core stability. To get the best results for the patient, meticulous attention to the recommended exercise was required, along with thorough observation of good form and alignment.

The results of intergroup comparison after dynamic neuromuscular stability training by Eshan Alvani et.al showed a significant difference in improving dynamic balance and functional disability in the experimental group compared to the control group.

CONCLUSION

This study concluded that dynamic neuromuscular stabilization and flexibility e exercise scan improve low back pain Bharatanatyam dancers' performance and functional balance. The study also leaves space for future research, which can be conducted in a larger population with longer duration, with different outcome measures and with different exercise therapy interventions.

Conflict of interest: None

LIMITATION

The study might have a limited sample size, which could affect the findings to a broader population. Lack of follow-up beyond the six-week intervention period may limit understanding of the sustainability of treatment effect. Limited resources or infrastructure may restrict the implementation of more rigorous study designs or comprehensive assessments. Addressing these limitations in the discussion section of the thesis can demonstrate a critical evaluation of the study's methodology and findings, paving the way for future research improvements.

FUTURE SCOPE

Conducting a follow-up study to assess the sustainability of treatment effects beyond the initial six-week intervention period could provide valuable insights into the long-term benefits of DNS exercises and SFE. Investigating whether certain subgroups of patients, such as those with specific types of back pain or demographic characteristics, respond better to one type of exercise over the other could help tailor treatment approaches for individual patients.

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