Prevalence of tibialis posterior dysfunction by single limb heel rise test in female Bharatnatyam dancers

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Abstract- This observational study investigates the prevalence of Tibialis Posterior Dysfunction (TPD) among female Bharatnatyam dancers using the Single Limb Heel Rise Test (SLHRT) and the Navicular Drop Test. Results from 81 participants (aged 18–35) revealed a high TPD prevalence of 82.7% and a 53.1% occurrence of navicular drop. Findings suggest that repetitive rhythmic footwork and specific classical postures like Araimandi lead to cumulative micro-trauma and functional weakness of the tibialis posterior muscle.

I. INTRODUCTION

Bharatnatyam involves rigorous footwork, including jumping and foot tapping on hard surfaces. Postures such as Araimandi (a half-squat with joined heels and outward-pointing toes) force excessive turnout and internal tibial rotation, leading to altered foot mechanics. The Tibialis Posterior (TP) is the primary dynamic stabilizer of the Medial Longitudinal Arch (MLA), responsible for 75% of its integrity. Prolonged training often leads to TP weakening, resulting in postural instability and adult-acquired flatfoot deformity.

II. AIM

To evaluate the tibialis posterior dysfunction by single limb heel rise test in female Bharatnatyam dancers.

III. OBJECTIVES

1.To identify the tibialis posterior dysfunction by single limb heel rise test in female Bharatnatyam dancers

IV. METHODOLOGY

Study Design: Observational study

Study Setup: Pune

Sampling Method: Convenience sampling technique was used.

Outcome Measure

1. Single Limb Heel Rise Test (SLHRT): Tibialis posterior (TP) function was assessed using the (SLHRT) Used to assess TP muscle weakness

2. Navicular Drop Test: Measures MLA height from the ground; a decrease of ≥10 mm between sitting and standing indicates flat feet.

Procedure: Permission was obtained from the institutional ethical committee before starting the study. Female Bharatanatyam dancers were selected via convenient sampling if they met the criteria of being 18–35 years old with 5–15 years of dance experience. Written consent was obtained from the dance classes and individual participants, followed by the collection of demographic data (age, experience).

V. STATISTICAL ANALYSIS

A total of 81 female Bharatanatyam dancers aged 18–35 years were included in the data analysis. Descriptive statistics were used to analyze the data and results were expressed as frequencies and percentages. Tibialis posterior dysfunction was assessed using the Single Limb Heel Rise Test, while foot posture was evaluated using the Navicular Drop Test. The prevalence of positive findings for both tests was calculated. Data were further analyzed

based on years of dance experience (5–10 years and 11–15 years).

VI. RESULT

A total of 81 female Bharatanatyam dancers aged 18–35 years were assessed in this study. Tibialis posterior dysfunction was evaluated using the Single Limb Heel Rise Test. Out of the total participants, 67 dancers (82.7%) tested positive, indicating a high prevalence of tibialis posterior dysfunction. Only 14 dancers (17.3%) showed negative results on the test. Foot posture assessment using the Navicular Drop Test revealed that 43 dancers (53.1%) had a positive navicular drop, while 38 dancers (46.9%) had normal arch height. Dancers with 11–15 years of experience demonstrated a higher prevalence of tibialis posterior dysfunction compared to those with 5–10 years of experience. A similar trend was observed for navicular drop with increasing years of practice. The findings indicate a strong association between prolonged Bharatanatyam practice and tibialis posterior dysfunction. Overall, the results highlight a high occurrence of lower limb functional impairment in female Bharatanatyam dancer

VII. DISCUSSION

The present study aimed to determine the prevalence of tibialis posterior dysfunction among female Bharatanatyam dancers using the Single Limb Heel Rise Test and to assess associated foot posture changes using the Navicular Drop Test. The findings revealed a markedly high prevalence of tibialis posterior dysfunction (82.7%), indicating significant functional compromise of the medial longitudinal arch stabilizer in this population. Bharatanatyam requires repetitive stamping, sustained Araimandi posture, and prolonged weight-bearing, which place excessive eccentric load on the tibialis posterior muscle. Over time, these biomechanical demands may lead to tendon fatigue, micro-trauma, and functional weakness. The moderate prevalence of navicular drop (53.1%) suggests that structural arch collapse may follow functional tendon impairment. Dancers with greater years of experience showed a higher prevalence of dysfunction, supporting the role of cumulative mechanical stress. The tibialis posterior plays a key role in controlling pronation and maintaining arch integrity during dynamic movements. Weakness of this muscle results in excessive subtalar pronation and hindfoot eversion, predisposing dancers to flatfoot deformity. These findings are consistent with previous studies reporting high rates of foot abnormalities in Bharatanatyam dancers. Early identification of tibialis posterior dysfunction is essential, as progression may lead to irreversible deformity if left untreated. The Single Limb Heel Rise Test proved to be a simple and effective screening tool for early detection. Preventive strategies such as intrinsic foot muscle strengthening and activity modification should be emphasized in dancer training programs. Overall, the results highlight the need for routine screening and preventive physiotherapy interventions in this population

VIII. CONCLUSION

This study concludes that tibialis posterior dysfunction is highly prevalent among female Bharatanatyam dancers aged 18–35 years. The Single Limb Heel Rise Test identified dysfunction in a majority of participants, indicating significant functional impairment. Prolonged and repetitive dance movements place excessive stress on the tibialis posterior muscle. Increased years of dance experience were associated with a higher prevalence of dysfunction. Early screening is essential to prevent progression to flatfoot deformity. Incorporating preventive physiotherapy interventions may help reduce long-term musculoskeletal complications.

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