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COMPARATIVE STUDY OF FLAT FOOT PREVALENCE IN KATHAK VS BHARATNATYAM DANCERS

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Abstract : This cross sectional analytical study was to investigate the occurrence of flat foot in kathak and Bhartnatyam dancers and compare its prevalence between two group. The study included 60 female dancers with minimum 2 years of dance experience. . The outcome measures used were the MLA Angle and Navicular Drop Test . Flat foot was defined as an MLA Angle < 130 degrees or a Navicular Drop > 10 mm . Data were analyzed using descriptive statistics , independent t -tests and Mann whitney U tests. The results revealed an overall prevalence of flat foot at 61.7% among all dancers based on combined criteria, with rates of 63.3% for Bharatnatyam dancers and 60.0% for Kathak dancers. The statistical analysis of the study reveals that both Kathak and Bharatanatyam dancers exhibit a high prevalence of flat foot, with comparable rates between the two groups.

***Index Terms* - Bharatnatyam, Dancers, kathak, flat foot , Navicular Drop Test ,Medial Longitudinal Arch Angle.**

I INTRODUCTION

Dance is an art that combines athleticism with artistry, creating visual designs in space through continuous body movement.[1] Kathak is a classical dance form from North India, involving complex footwork with fast twists, quick, and rhythmical foot movements. The "V stance" in Kathak necessitates an extremely turned out foot stance, placing significant tension on the inner sides of the foot and potentially leading to functional hyper-pronated or flat foot.[2] Bharatnatyam originating in Tamil Nadu, demands rigorous footwork, including jumping, standing, and foot tapping on hard surfaces. Due to repetitive movements, Bharatnatyam dancers are prone to foot issues resulting in pain, arch flattening, ankle problems.[3]

Anatomy of the Foot: The bones of the ankle and foot consist of the distal tibia and fibula , seven tarsals , five metatarsals , and 14 phalanges. The foot is divided into three segments : the hindfoot, midfoot, and forefoot.[1] The normal foot possesses longitudinal and transverse arches, with the medial longitudinal arch being vital for weight distribution.[1] Flat feet are defined as a deformity where the arch on the inside border is flatter than normal, causing the entire sole to come into near-complete or complete contact with the ground.[1] Therefore , unusual or prolonged stress on the foot can affect the biomechanics and functioning of proximal joints , which commonly translates into pain at knee, hip , pelvis , and lower back.[4]

Therefore , unusual or prolonged stress on the foot can affect the biomechanics and functioning of proximal joints , which commonly translates into pain at knee, hip , pelvis , and lower back.[4] Flat feet deformity is a medical condition which is defined as a deformity where the arch on the inside border of the foot is more flat than normal and the entire sole of the foot comes into near – complete or complete contact with the ground.[7]

II NEED OF THE STUDY

Both these dancing involves foot stamping during dance , which lead to repeated stresses on foot architecture and soft tissues . Which dance form makes dancers more susceptible to flat foot.

III RESEARCH METHODOLOGY

Study Type : Cross sectional analytical
Participants : 30 Bharatnatyam dancers and 30 Kathak dancers, Aged 18 – 25[5]
Settings : Dance Academy in Pune.

Inclusion Criteria : Minimum dancing experience of 2 years.
Exclusion Criteria : Congenital flat foot, less than 18 years.
Assessments: Flat foot by Navicular drop test and Medial Longitudinal Arch Angle scale[6]
Data analysis: Chi-square tests confirmed that these differences were statistically non-significant ($p > 0.05$).

IV DEMOGRPHIC DATA OF PARTICIPANTS

Table 1 Demographic Characteristics of Participants (N =60)

Variable	Mean ± SD	Median	Minimum	Maximum
Age (years)	21.6 ± 1.93	22	18	25
Years of dancing	5.1 ± 1.4	5	3	9

Participants were homogeneous across groups in age and years of experience . All were female classical dancers with equal representation from Kathak and Bharatnatyam ensuring comparable groups for analysis.

V RESULT AND DISCUSSION

The study included 60 classical dancers divided equally into two groups: 30 Bharatnatyam dancers (Group 1) and 30 Kathak dancers(Group 2). Chi-square tests confirmed that these differences were statistically non-significant ($p > 0.05$). When both MLA and ND criteria were combined, the overall prevalence of flat foot among all dancers was 61.7%, with Bharatanatyam (63.3%) and Kathak (60.0%) showing nearly equal rates.

5.1 Major Findings

Table 2 Comparison of Mean Foot Angles and Navicular Drop between Dance Forms

NO OF PARTICIPANTS	PARAMETERS	Bharatnatyam(Mean + SD)	Kathak (Mean + SD)	P -value
30	**MLA Angle (Right)**	123.47 ± 10.93	124.57 ± 9.38	0.71
30	**MLA Angle (Left)**	125.27 ± 11.24	125.10 ± 8.66	0.94
30	**NDT (Right)**	9.50 ± 2.19	8.73 ± 2.72	0.29
30	**NDT(Left)**	8.80 ± 2.07	8.50 ± 2.40	0.6

No statistically significant difference was observed in mean MLA angle or Navicular drop between Bharatnatyam and Kathak dancers , confirming similar foot posture adaptations in both dance styles despite their differing movement patterns .

VI DISCUSSION

This study reveals a high prevalence of flat foot (61.7%) in Kathak and Bharatanatyam dancers, assessed through medial longitudinal arch (MLA) angle and navicular drop (ND). The comparable prevalence between Kathak (60.0%) and Bharatanatyam (63.3%) dancers, coupled with non-significant differences in mean MLA angles ($p = 0.71$ for right foot, $p = 0.94$ for left foot) and ND values ($p = 0.29$ for right foot, $p = 0.60$ for left foot), suggests that the mechanical stresses imposed by these classical Indian dance styles are largely equivalent. Repetitive stamping, a hallmark of both dance forms, may induce microtrauma to the plantar fascia and supporting ligaments, culminating in arch collapse over time. The slightly higher mean ND in Bharatanatyam dancers (9.50 mm right, 8.80 mm left) compared to Kathak (8.73 mm right, 8.50 mm left) could reflect subtle variations in training regimens, such as Bharatanatyam's focus on sustained poses versus Kathak's dynamic spins, though these differences did not reach statistical significance.

VII CONCLUSION

The statistical analysis of the study reveals that both Kathak and Bharatanatyam dancers exhibit a high prevalence of flat foot, with comparable rates between the two groups. No statistically significant differences were observed in MLA angles, navicular drop values, or categorical prevalence of flat foot between the dance forms.

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