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A COMPARATIVE STUDY OF FOOT POSTURE DEVIATIONS IN YOUNG FEMALE KATHAK AND BHARATNATYAM DANCERS.

Physiotherapy

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ABSTRACT

Background : Indian classical dance has since long been practised in India. Kathak and Bharatnatyam are two of the commonest dance forms in India which involve Tapping of the feet. Impact forces produced during dancing may cause biomechanical change in the feet which in turn cause injury to various ligaments, tendons and fascia affecting balance and intricate movements of the feet.

Method : Foot evaluation of 44 Kathak Dancers, 44 Bharatnatyam Dancers and 44 Non Dancers in the age group of 15-25 years was done using Foot Posture Index – 6 Scale and the Groups Were Compared using Non Parametric ANOVA Test .

Conclusion: There was no significant difference in foot of Kathak and Bharatnatyam Dancers .However Foot of Dancers deviated from that of Non Dancers.

KEYWORDS

Foot posture, Bharatnatyam, Kathak, Foot rehabilitation, flat foot , ankle and foot injuries.

INTRODUCTION

Dance is a unique art which is mastered with years of practice having health benefits .Bharatnatyam and kathak are ancient dance forms .These dance forms involve tremendeous foot work and attainment of various postures involving the hip and knee joints along with the vertebral column .

Bharatnatyam involves 'TATTA ADAVU' means tapping of the foot against the floor , this is usually done in two positions one being ARAIMANDI which is half squatting with heels joined and feet pointing in opposite direction.[2] Other being MUZHUMANDI which is sitting on toes with knee bent, heels joined and hands behind the waist.[2] This demands dancers to achieve various positions which demands great flexibility and tremendeous stress on the musculoskeletal system[2]

Kathak is another popular dance form that is known for its exceptional footwork . It is a dance form using various statuesque postures and mudras. There is pounding of the feet which in long term may lead to foot postural deviations.[5]

In both these dance forms there is high ground reaction force while tapping of foot,which may alter the foot posture and increase the probability of injuries and mal-alignment of the foot .This may differ as different lower extremity positions are acquired in different dance forms.

The high demand placed on the foot of these dancer leads to injuries over a period of time than spontaneous[10] and this can be attributed to overuse injuries, fatigue of the foot muscles.The Foot Posture Index-6 can which can be used to effectively assess and identify deviations in foot posture of the dancers.[9] [10][12]

FPI is one of the commonly used tools to assess foot for clinical as well as diagnostic purposes.It helps to identify the type of foot in various populations. It is a simple and reliable method of assessing the foot.[4]

Therefore the aim of this study was to compare how differently these dance forms had an impact of the foot of these dancers .Also how foot of dancers deviated from that of non dancers .

MATERIAL AND METHODOLOGY

Institutional Review Board approval was taken before starting the research. Research was conducted at various Classical Dance Academies across Mumbai City and K.J. Somaiya College of Physiotherapy. Consent was taken from each participant and the procedure was duly explained. Both right and left Feet were analyzed using Foot Posture Index – 6 scale . Based of the score of FPI-6 foot was classified into pronated , neutral , supinated . Foot type According to FPI-6 Score[12]Highly Supinated (-5 to -12), Supinated (-1 to -4), Normal (0 to +5), Pronated (+6 to +9), Highly Pronated (10+).[12]

Description of Method

The subject is asked to stand relaxed on a firm surface with double limb support. The subject should stand still with upperlimb relaxed by the side of the body. The forefoot and Hindfoot should be accessible to the assessor. The aspects evaluated in Foot Posture Index are Talar Head Palpation, Supra and infra lateral malleolar curvature, Inversion / Eversion of the calcaneus, Buldge in the region of talonavicular joint, Height and congruence of the medial longitudinal arch, Abduction/ Adduction of forefoot on the rearfoot.[12]

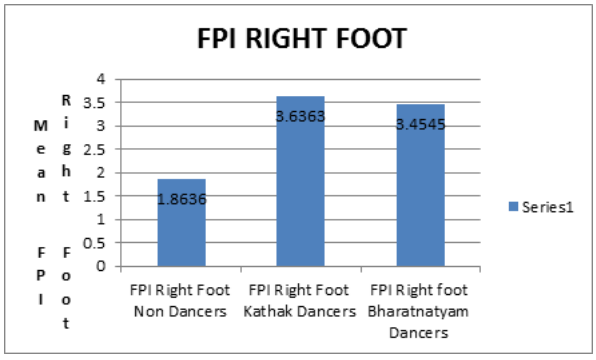
RESULT

The data collected was analyzed using Graph Pad Instat 3.10.The demographic data such as Age, BMI, FPI of Right Foot, FPI of Left Foot was analyzed using Kruskal Wallis Test (Non Parametric ANOVA) as 3 groups were involved and the data collected did not pass normality.The test used for comparison of Number of Years of Dancing and Number of Hours of Dancing was Mann Whitney Test as this information was collected only from kathak and bharatnatyam dancers.

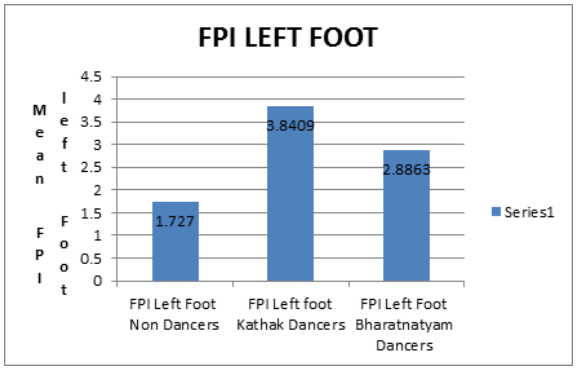
The results analyzed thus suggested that there was no difference in the foot posture of Kathak and Bharatnatyam Dancers. Even though the mean of FPI were within the normal range for both the classical dancing groups the values were more towards the positive side of the range suggesting foot may go into pronation.

Table No.1

GROUPS	MEAN		STANDARD DEVIATION		P value		STATISTICAL TEST (FOR LEFT AND RIGHT FOOT)	TEST RESULTS	
	Right foot	Left foot	Right foot	Left foot	Right foot	Left Foot		RIGHT FOOT	LEFT FOOT
NON DANCERS	1.8636	1.727	2.007	1.676	P<0.001	P value<0.001	Kruskal-Wallis Test (Nonparametric ANOVA)	Non Dancers vs Kathak- significant	Non Dancers vs Kathak- significant
KATHAK	3.6363	3.8409	2.103	2.302	P<0.01	P value>0.05			
BHARATNATYAM	3.4545	2.8863	3.084	3.286	P>0.05	p value >0.05		Non dancers vs Bharatnatyam- significant	Non dancers vs Bharatnatyam- Not significant
								Kathak vs Bharatnatyam – Not Significant	Kathak vs Bharatnatyam – Not Significant



Graph no.1



Graph No.2

DISSCUSSION

Indian classical dance forms have deep roots in Indian culture since ancient years. Kathak and Bharatnatyam are two such dance forms which are practiced commonly in Indian and round the globe. Both these dance forms express stories and ancient scriptures through their dance. The composition of these dance forms exhibit facial expressions, upper limb movements and enormous foot work [5].This as a whole places high physical demand on the human body of Kathak and Bharatnatyam dancers.

The samples in this study were selected according to the inclusion criteria and the study and involved multiple centers. Demographic data from the dancing and non dancing groups were included i.e. age, years of dancing, hours of dancing per week, BMI.

This study was mainly designed to study and compare the foot posture in young female Kathak and Bharatnatyam dancers as both there dance forms involve tremendous foot work i.e tapping of feet. However in bharatnatyam the dancing is mostly performed with half squat (araimandi) or full squat(muzhumandi)[2] whereas in Kathak dance involves straight tapping of the feet and rotations.

There has been limited research on foot in classical dancers. The constant load on the foot during attainment of various postures have made the dancers vulnerable to ankle and foot injuries. [9] [13]

The impact forces generated due to constant tapping of foot on such hard surface in both these dance forms places stresses on the delicate joints of the foot. This may change the structural integrity of the foot leading to microtrauma of the soft tissue, joints and ligaments.[1] The abnormally high loading may be due to 4 to 5 times the ground reaction force that is experienced on the foot while dancing. However these changes develop over a period of time due to years of dancing leading to cumulative trauma making them prone to injuries.[7]

The normal values for foot posture haven't been established yet, however studies state that the resting position of the foot lies in slight pronation [11].

Through this study it was found that the FPI score for non dancers was in the normal range having a mean of 1.8636 for right feet and 1.727 for the left feet.

However the FPI for that of Kathak and Bharatnatyam dancers though were found to be in the normal range it is more towards the positive score indicating some changes in feet of these dancers towards pronation.

There was no difference found when comparing foot posture of Kathak and Bharatnatyam dancers no significant difference. The reason could be both these dance forms placed similar kind of stress on the foot.

However, since the foot posture index of these dancers lie more or less within the normal range, the reason for this could be the impact forces acting on the foot. The impact forces help signaling the muscle preparing it for the next episode of tapping . This activation of muscle just before the next contact reduces the stress on the foot because of muscle activation along with the cushioning effect of the plantar fascia acting as excellent shock absorber. [8]

Dancers develop injuries over a period of time than spontaneous.[10] Due to cumulative microtrauma and degenerative changes these dancers could develop various balance and overuse injuries if appropriate warm and stretching exercises are not performed before and after a dancing session.[1]
The altered biomechanics could lead to abnormal rolling of ankle and landing to the foot . In reduced medial arch the ankle rolls medial adding to the load on the medial aspect of the foot whereas in supinated feet the raised medial arch the ankle roll laterally stressing the lateral aspect of the foot.[2]

Therefore it can be said that the foot posture of Kathak and Bharatnatyam dancers does not vary much however there is deviation in the foot posture of these dance forms when compared to non dancers and it is more towards the pronation aspect. However as it is seen that there is no significant difference between the left foot of Bharatnatyam dancers as compared to non dancers as there were few subjects with supinated foot. The reason for pronation cannot be complete attributed to tapping of the feet. The other factors that could be responsibe are the ground reaction forces, the dancing surface, hours of dancing years of dancing and whether the dancer is professional dancer or is pursuing it as a recreational activity.

CONCLUSION

This study concluded that the foot of Kathak and Bharatnatyam Dancers vary from that of Non Dancers. It has been found that there is no significant difference in the foot posture of Kathak and Bharatnatyam dancers. Both the dance forms having mean value (kathak : right foot 3.6363 left foot 3.8409, Bharatnatyam Right foot: 3.4545 left foot: 2.8863) more positive than non dancers (refer table no.1) suggesting more chances of pronated feet in years to come which could be due to dancing. In long term this could lead to dance related injuries of ankle and foot.

Suggestions

A longitudinal study can be done in Kathak and Bharatnatyam Dancers to see how the foot posture of these dancers changes over years.

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