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Comparison Of Aerobic Capacity Amongst Bharatnatyam And Kathak Dancers.

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Abstract: Bharatnatyam is one such very popular traditional Indian classical dance forms which is basically a low impact dancing. Kathak is distinguished by its swift spins, intricate footwork, narrative, and rapid footwork. Paucity of scientific literature are available for Indian dancing styles like Bharatanatyam and Kathak and their physiological impacts. Therefore, the purpose of this study is to compare Bharatanatyam and Kathak aerobic capacity. Aim was to compare the Aerobic Capacity in Bharatnatyam and Kathak dancers.Data were collected from different classical dance academy of Gandhinagar and Ahmedabad. Study design was observational study.Females with age group 18 to 50 were included. After obtaining consent Queens college step test was performed and Vo2 max calculated.Analysis was done by SPSS 22. Normality was checked by using Kolmogrov-smirnov test. Independent sample t-test was calculated to compare Vo2 max.Mean age of subjects for Bharatnatyam were 26.24 ± 8.82 and Kathak dancers 28.89 ± 9.68. The result shows that as $p<0.05$, there is statistical significant difference of aerobic capacity between Bharatnatyam and Kathak Dancers.The study concludes that Bharatnatyam and Kathak both type of classical dance forms improves aerobic capacity but Bharatnatyam dancers have better Aerobic capacity than Kathak Dancers.

Index Terms **-Bharatnatyam, Kathak, classical dancer, Aerobic Capacity, Vo2 max**

I. INTRODUCTION

Dance, in all of its forms, has drawn a lot of attention in the medical literature lately for its benefits to physical fitness. A growing body of research has connected obesity, a decreased level of cardiopulmonary fitness, and inactivity to cardiovascular diseases.1 Dances vary from functional movement to virtuoso techniques, such as Bharathanatyam, Kathak, Ballet, Aerobic dance, Kandyan dance, and so forth. They are also influenced by social, cultural, aesthetic, artistic, and moral constraints. It is a mental, emotional, and physical activity that also serves as a vehicle for expression and communication. Indian classical dances are very traditional and are dances of the mind and soul.

Indian classical dances have a rich historical background and are designed to improve the dancers' health. The most well-known Indian traditional dances are Kathak, Bharatanatyam, Kuchipudi, Manipuri, Kathakali, Odissi, and mohiniattam.2

Dancing is a well-liked, conventional form of physical recreation activity that requires planning an exercise regimen and music that has a specific tempo, rhythm, and dynamic.3

Bharatnatyam is very popular traditional Indian classical dance forms. Bharatanatyam is one of many forms of Indian classical dance that originated in Tamil Nadu, a region of southern India.4 It is famous for its precise technique, postures, rhythm as well as expressions. The term Bharatanatyam is broken up into four components: Bha for Bhava (expression), Ra for Raga (music), Ta for Tala (rhythm), and Natya (dance).5 Nirtta, Nritya, and Natya are skillfully combined in Bharatanatyam to convey social messages and mythological tales. Similar to other traditional Indian dance styles, Bharatanatyam incorporates a variety of body parts into each move. The dance routines frequently feature a complicated series of motions carried out at various tempos and energy levels. Flexibility, endurance, and cardiorespiratory efficiency everything

improves physiologically as a result of the type and length of the training and performance period. As muscles are worked, vascularization improves over time, increasing the muscles' ability to remove carbon dioxide and deliver oxygen6.

Bharatnatyam is one such very popular traditional Indian classical dance forms which is basically a low impact dancing. It is distinguished by its grace and style, it includes traditional poses, rhythmic foot stamping, jumps, pirouettes, and positions where the knees are in contact with the floor. It comprises a lot of finger and neck movements known as "mudras," as well as the adoption of various postures like sitting, bending, standing, and twisting that assist the body get ready to adopt the dancing style.

Kathak is a North Indian classical dance style. It is distinguished by its swift spins, intricate footwork, narrative, and rapid footwork.7 Although kathak dancers do not wear shoes, their technique, which stresses stamping and abrupt rhythmic alterations, may create a lot of noise.8 Kathak dance is an art that combines athleticism with artistry. In this dance

Everybody component moves with ease, and a high level of physical activity is required. There

are certain unique motions that improved posture and flexibility, such as skips, leaps, and rotations in all directions. When performing Kathak dance, the dancer places her entire body on the floor and taps her feet in time with ankle bells, or "ghunghroos," fastened around her ankles.

The aerobic and anaerobic metabolic pathways are two of the many ways from where the body gets energy.9 Fundamentally, the aerobic route is how food is broken down by oxygen to produce energy. Conversely, the anaerobic route produces metabolites like lactic acid when there is no oxygen present to produce energy, which speeds up exhaustion. When engaging in endurance activity, such as a lengthy dance performance, the aerobic route is crucial because it prevents muscular exhaustion from setting in. Assessing an individual's aerobic pathway involves measuring their aerobic capacity, which is the sum of their ability to use oxygen that their skeletal muscles can produce and the oxygen that their cardiorespiratory system can deliver. Environmental and genetic factors, such as exercise and smoking habits, might affect an individual's aerobic capacity.10,11

The gold standard for assessing aerobic capacity is VO2max, a measure of maximal oxygen consumption or cardiovascular endurance, which can be measured by direct as well as indirect methods. The direct method is a complex process requiring equipment that is expensive and not routinely available. Hence, indirect methods like the modified Canadian Aerobic Fitness tests, and Queen's College step test are good alternatives.12,13
Paucity of scientific literature are available for Indian dancing styles like Bharatanatyam and Kathak and their physiological impacts. Therefore, the purpose of this study is to compare Bharatanatyam and Kathak aerobic capacity.

Aims and Objectives

Aim: To compare the Aerobic Capacity in Bharatnatyam and Kathak dancers

Objectives:

1. To assess the Aerobic Capacity in Bharatnatyam Dancers by using Queen's college step test.
2. To assess the Aerobic Capacity in Kathak Dancers by using Queen's college step test.
3. To compare the Aerobic Capacity (Vo2 max) estimated from Queen's College step test in Bharatnatyam and Kathak dancers.

Subjects and Methods:

Ethical approval was obtained from Institutional Research and Ethics Committee. Bharatnatyam and Kathak dancers were selected from various classical dance academies. Those fulfilling the inclusion criteria were selected. Nature of the study was explained and informed written consent was obtained. The study design was Observational Study. The age group of 18 to 50 years were included. Inclusion criteria for dancers included those with Bharatanatyam dance training of 3 years or more and current dancer practice of minimum 2 hours in a week. Exclusion criteria for dancer were athletes, presence of chronic pulmonary diseases like chronic obstructive pulmonary disease, asthma, lung fibrosis, and respiratory distress, Subjects who have undergone any major surgery in last 6 weeks, recent lower limb musculoskeletal injuries, that may hinder the test performance and subjects with severe musculoskeletal, cardiopulmonary or neurological deficiency. Demographic data including age, years since beginning to dance, frequencies of practice sessions per week have also been included. Participants were divided into two groups- Group I, Bharatanatyam Dancers(N=120) and Group II, Kathak Dancers(N=120). The purpose of the study and test procedure was explained to the participants and a written consent was taken. The participants were evaluated for BMI and resting pulse rate

was recorded. The subjects underwent Queens College Step Test as per the standard guidelines. Metronome was set so as to allow the subject to make contact with a foot on each beep in an up-up-down-down manner for 3 min. At the end of 3min recovery heart rate was recorded. VO2 max was obtained using prediction equation.

VO2max [ml/kg/min]=65.81- [0.1847×post HR bpm] [12]

Results:

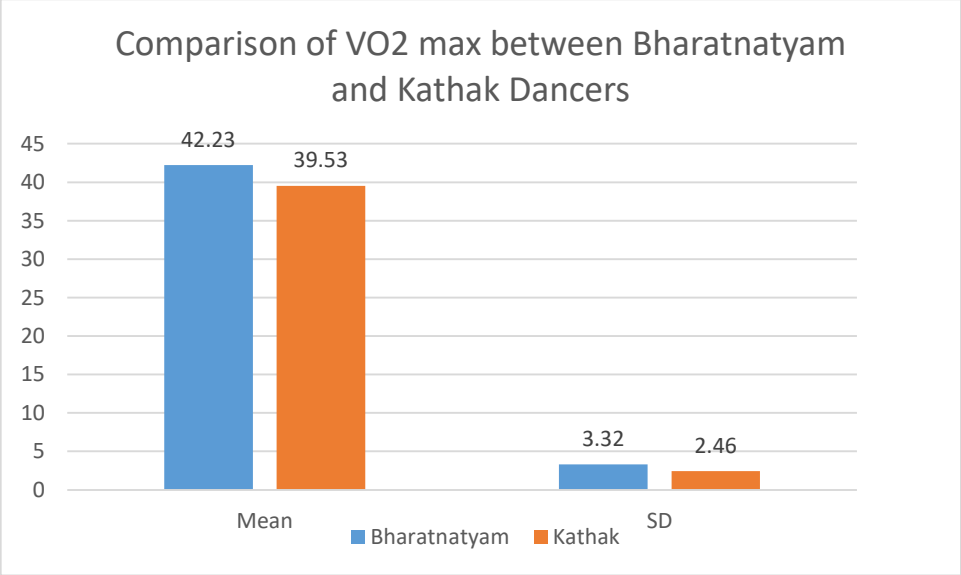
Statistical analysis was performed by using SPSS 22 statistical software. The scores were analysed using statistical tests. Mean, standard deviation of all the values were calculated. The observed differences were tested at 95% level of significance. Mean age of subjects for Bharatnatyam were 26.24 ± 8.82 and Kathak dancers 28.89 ± 9.68. Normality was checked by using Kolmogorov-smirnov test and as data were normally distributed , the inter group results were compared by Independent t-test.

Table 1 : Comparison of Vo2 max between Bharatnatyam and Kathak dancers

Sr. No	Groups	Sample size	Mean	Standard deviation	t-value	p-value
1	Bharatnatyam	120	42.23	3.32	7.13	0.008
2	Kathak	120	39.53	2.46		

The result shows that as $p<0.05$, there is statistical significant difference of aerobic capacity between Bharatnatyam and Kathak Dancers.

Graph: Between Group Analysis of VO2 max for Bharatanatyam and Kathak dancers



Discussion:

The study compared the aerobic capacity in Bharatnatyam and Kathak Dancers. Bharatnatyam dancers showed significantly higher VO2 max as compared to Kathak dancers. This can be correlated with the type of dance and physical activity involved in both the groups. The effect of any aerobic capacity is dependent on different intensity, duration, and frequency of physical activity[13]

Bharatnatyam includes complex steps in different postures with expressions which involve each and every part of the body of the dancer.[14] Kathak form of classical dance involves mainly vigor of dynamic foot work and pin point spins, the subtle movements of the face blended with miming of stories of all kinds.[14] Gaikwad et al in their study compared aerobic capacity in Indian classical dancers with regular physical exercise group, concluded that mean VO2max was higher in Indian Classical Dancers (38.59ml/kg/min) than the ones engaged in gymnasium (33.77 ml/ kg/min).

Bharatnatyam comprises three aspects, Nritta, Nritya and Natya. Nritta – are rhythmical and repetitive elements, i.e. it is dance proper. Natya (Abhinaya) – is the dramatic art, and is a language of gestures, poses and mime. Nritya – is a combination of Nritta and Natya. Nritta in Bharatnatyam type includes complex steps in different postures with expressions which involve each and every part of the body of the dancer. In Nritta

the whole body was made the instrument to produce action. The solar plexus at the naval forms the centre from which all movements originate and are controlled by breath. The vibrations generated by Nritta lead to correction of energy imbalance in the body by acting upon nervous flexes or chakras a result of biochemical changes. Natya, Nritya and music were helpful in reducing the stress and increasing the functions of limbic system, reticular activating system, probably by releasing the neurotransmitters. This might help to elevate the mood and to keep the mind calm and alert.[14]

In Kathak physical activity is based on bhav (mood), raga (melody) and tala (rhythmic beat) mainly. Kathak dance is an art which has mainly vigor of dynamic foot work and pin point spins the subtle movements of the face and blended with miming of stories of all kinds. In Kathak workload is only by "bells" around the ankles, leg exercise by tapping of feet in a high speed rhythm called "Tatkar".[14]

Shankarashis Mukherjee et al. concluded that receiving training in Bharatanatyam dancing, for at least a period of five years, facilitates females in achieving healthier body composition and increase physical fitness and thus consequently reducing the probability of cardiovascular risk factors.[15] Sabaananth et al., stated that, Aerobic Bharatanatyam and Kandyan dancers are effective methods to improved pulmonary function in respect of vital capacity for female dancers.[16]

K. Bharathi et al done study comparing the significance of anthropometric parameters on aerobic capacity among dancers. This study was attempted to compare the body mass index and waist-hip ratio on aerobic capacity in Hip-Hop dancers and Indian classical dancers. According to the results, there is no significant difference in body mass index on aerobic capacity (VO2max) of the Indian classical dancers (p=0.320) and hip-hop dancers (p=0.940).[17]

Conclusion:

The study concludes that Bharatnatyam and Kathak both type of classical dance forms improves aerobic capacity but Bharatnatyam dancers have better Aerobic capacity than Kathak Dancers.

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