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Impact of 8 Weeks of Hatha Yoga Sadhana and Natya Yoga Training On Flexibility and Cardiovascular Endurance for Women

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ABSTRACT
BACKGROUND:
The physical wellbeing of women is most important aspect of today's modern world.Women undergo various health issues due to lack of physical wellness. To bring health to its optimum, the important factor is Physical activity.Yoga and Traditional Dance is a highly prevalent type of physical activity for women which also bring harmony to themselves as well as to the society. TheHatha Yoga Sadhana and Natya Yoga Training are the traditional practiceshelps toenhancethe physical fitness components like flexibility and cardiovascular endurancefor women practitioners.
AIMS AND OBJECTIVE:
The aim and objectivewere to study the impact of 8 weeks of Hatha Yoga Sadhana and Natya Yoga Training on Flexibility andCardiovascular Enduranceforwomen.
KEYWORDS: Hatha Yoga, Natya Yoga, Flexibility, Cardiovascular Endurance, Women.

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I. INTRODUCTION:

Yoga is an Indian ancient practice, which is from the six darshans. The term yoga means "to unite", the union of the individual self with the infinite ,which is to combine our body, mind, and soul to attain the oneness.(Mazhar et al., 2020). Haṭha yoga is one of the branches of Yoga, which is a complete spiritual path by itself.(Burge et al., 2014). The word Hatha can be translated as being dynamic or the yoga of activity. It involves a series of practices like Asana, Pranayama, Mudra, Bandhas, Relaxation, and Meditation. The practices are helpful in improving overall wellness in an individual.

The Traditional dance is aexperience which provides opportunities for enjoyment, self-expression, and relaxation. (Bortnyk, 2018). Not only benefits an individual but also Cultural heritages are reflected in and passed on through dance activities.Natya yoga is a divine yogic practice along with traditional dance, which is a blend of Bharatanatyam and Traditional Hatha yoga. Its fundamental spiritual text is the Natya Shastra, a written version of the "NatyaVeda" which was said to have been synthesized into the four main Vedas.(Tambe, 2015). It involvespractices like Bharatanatyam steps along with Yoga asanas. These practices are well designed along with the feet tapping, music, and beats used as a means to develop fitness. It is one of the best ways to enjoy a fitness program and also a way to achieve better health.

Cardiovascular endurance is the most important fitness component which shows the efficiency of the heart and lungs to supply oxygen-rich blood to the working group of muscles. Improving the overall exercise capacity with cardiovascular endurance will increase life expectancy and significantly reduce the chances of several heart diseases.(Bagchi et al., 2019). Research suggests that by doing regular exercise and physical activity that improves the cardiovascular endurance, individuals can reduce many risk factors associated with heart diseases. This is especially true for women. The Hatha yoga and Natya yoga practices are great tools which brings not only physical fitness but also a stability in mind.

Flexibility is defined as the ability to move the muscles and joints in our body through their full range of motion. The practice of hatha yoga and Natya yoga consists of sequences of yogic practices were all the targeted and supporting muscle groups are engaged were thewhole body and mind are connected helps in increasing the flexibility. Connecting breathing mechanics to an engaged musculoskeletal system while performing the poses provides a holistic challenge to the whole body. (Polsgrove et al., 2016)

HYPOTHESES:

1. Practices of Hatha Yoga group causes significant improvement in Flexibility for Womenthan controlgroup.
2. Practices of Hatha Yoga group causes significant improvement in Cardiovascular Endurance for Women than controlgroup.
3. Practices of Natya Yoga group causes significant improvement in Flexibility for Women than control group.
4. Practices of Natya Yoga group causes significant improvement in Cardiovascular Endurance for Women than control group.

II. REVIEW OF LITERATURE:

The intention of the study was to compare the flexibility among Yoga and Bharatanatyam practicing students. To achieve this purpose of the study 20 Yoga practicing students were selected from Peace and Cure Yoga centre, Puducherry and 20 Bharatanatyam practicing students were selected from Sri Saravanan Dance School, Puducherry. Student's age ranged from 10 to 15. They were named into two groups which was Yoga practicing students (YPS) considered as Group I and Bharatanatyam practicing students (BPS) considered as group II. Speed is the criterion variable which was measured by 50 mts dash. Flexibility was measured by 'V' sit reach test. From the results of the study it concluded that there is significant difference thus, the result clearly indicates that the flexibility in the Yoga practicing students were better than the Bharatanatyam practicing students.(Jagadeeswari, 2017)

The study attempts to identify lower extremity muscle flexibility parameters prevailing among bharatanatyam dancers and analyze if there is any significant difference exist between normal and injured dancers in flexibility parameters. Four hundred and one female dancers and 17 male dancers were participated in this study. Flexibility parameters (hamstring tightness, hip internal and external rotation and tendoachilles in supine and sitting posture) were measured using goniometer. Results of our study it is evident that injured female bharathnatyam dancers had significantly ($p < 0.05$) high hamstring tightness on left side lower extremity compared to normal female dancers.(V. Anbarasi et al., 2012)

The objective of the study was to assess the effect of Zumba & Aerobics exercises on physical fitness variables of college girls 18-24 years. Thirty (30) girls, aged from 18-24 years, were volunteered as subjects for this study. The selected variable for the study was cardiovascular endurance and BMI and for measuring cardiovascular endurance and BMI Harvard Step Test and skinfold measurement were taken into consideration.(Kumar & Priyanka, 2016)

The effects of yoga postures and breathing exercises on vital capacity, are measured Using the Spiropet spirometer. Vital capacity determinants were taken near the beginning and end of two 17-week semesters. A total of 287 college students, 89 men and 198 women. Intervention Subjects were taught yoga poses, breathing techniques, and relaxation in two 50-minute class meetings for 15 weeks.The main Outcome Measures are Vital capacity over time for smokers, asthmatics, and those with no known lung disease.(Birkel & Edgren, 2000)

The purpose of this study was to investigate the effect of yoga exercise on the health-related physical fitness of school-age children with asthma. The study employed a quasi-experimental research design in which 31 voluntary children (exercise group 16; control groupl5) aged 7 to 12 years were purposively sampled from one public elementary school in Taipei County. The yoga exercise program was practiced by the exercise group three times per week for a consecutive 7 week period. Each 60-minute yoga session included 10 minutes of warm-up and breathing exercises, 40 minutes of yoga postures, and 10 minutes of cool down exercises. Fitness scores were assessed at pre-exercise (baseline) and at the seventh and ninth week after intervention completion. The GEE analysis showed that yoga exercise indeed improved BMI, flexibility, and muscular enduranceand cardiopulmonary fitness.(Chen et al., 2009)

Postsecondary dance education is at a crucial juncture in its history in academe. Emerging from women's physical education programs in the 1930s, the profession's realignment with the arts broadly and arts-based education specifically has been characterized by ambitious goals and steady growth through the 1990s. However, a number of critical developments over the past decade have displaced many previous gains and undermined the overall stability and integrity of the field. Four primary challenges are investigated in this article: curricular equity, expansive dance education programs, graduate study opportunities, and national leadership. I urge dance educators and administrators to re-envision and expand P–12 dance education in the liberal arts tradition to include private studio, commercial-sector, dance in community and related teaching professions. This article provides recommendations and strategies for developing relevant and resonant twenty-first-century dance education programs beyond current confines.(Risner, 2010)

The effects of a 12-week Hatha yoga intervention on cardiorespiratory endurance, muscular strength and endurance, and flexibility in Chinese adults were measured with 173 adults with yoga intervention group (n=87) or the waitlist control group (n=86). The results concludes, 12-week Hatha yoga intervention has

favourable effects on cardiorespiratory endurance, muscular strength and endurance, and flexibility in Chinese adults.(Lau et al., 2015)

The experimental group received the 8-week Hatha yoga course. The Perceived Stress Scale and heart rate variability assessed stress reduction effectiveness. Results showed the postintervention HRV and PSS of the experimental group decreased significantly more than the control group.(Huang et al., 2013)

The aim of this study was to access the flexibility of the spine in women practicing yoga as a part of the "University for Health" project. The study included 56 women ranging in age between 50–79 and attending 90 minutes hatha yoga sessions once a week. The measurements were performed twice at the beginning of the project and after its completion, i.e., after 20 weeks of classes. This study showed that the applied yoga exercises increased spinal mobility and flexibility of the hamstring muscles regardless of age. It concludes that the Yoga exercises should be recommended to the elderly to make their muscles more flexible.(Grabara & Szopa, 2015)

To evaluate effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychologic profile, and melatonin secretion. Yogic practices for 3 months resulted in an improvement in cardiorespiratory performance and psychologic profile. The plasma melatonin also showed an increase after three months of yogic practices. The systolic blood pressure, diastolic blood pressure, mean arterial pressure, and orthostatic tolerance did not show any significant correlation with plasma melatonin.
(Harinath et al., 2004)

The purpose of this study to investigate the effect of Ujjayi Pranayam on the selected physiological variables among female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior. Random group design was used for the purpose of the present study. First the subjects were divided into two equal groups by drawing a lot. Group "A" acted as experimental group and Group "B" acted as Control group. Both groups consist of fifteen subjects each. Prior to the administration of test pre test scores for all the selected variables were collected. After eight weeks of training post test scores were collected on each of the selected variables. Experimental group perform Ujjayi pranayam daily for 30 minutes. No training was imparted to the control group. There was significant difference in Resting Heart Rate and Resting Pulse Rate. It was observed from the above findings that eight week training programme of Ujjayi Pranayama was found to be effective in case of Resting Heart Rate and Resting Pulse Rate where as it was not effective in case of Resting Respiratory Rate, Blood Pressure, Vital Capacity, Maximum Breath Holding Time, Peak Flow Rate and Cardio Vascular Endurance. (Tomar & Singh, 2011)

An average increase of 157 ml. in vital capacity and of 15 seconds in breath holding time were observed in males after three weeks of training in yogic physical culture recommended by N. F. C. Programme.(Karambelkar, P. V; Bhole, M. V.; Gharote, 1972)

III. METHODOLOGY:

SUBJECTS:

The study was conducted with 45womenparticipants,from Vethathiri Maharishi College of Yoga in TiruvanmiyurChennai. The age of subjects would be ranged from 20 to 28 years only, who are freshers and not practiced yoga beforeandthey were randomly assigned into three groups, Hatha Yoga Group (HYG) (n = 15), Natya Yoga Group (NYG) (n = 15), and control group CG (n = 15).

TRAINING:

The subjects are selected such a way that they have no form of any physical exercises for the previous 6 months. Also were instructed to refrain from any other form of exercise while participating in the training program. Over a 8-week of training period, HYG took part in Hatha yoga sessions 5 days in a week (Monday to Friday) timings 3-4 pm. The training involves sequencelike Opening Prayer, yogic SukshmaVayayama, Suryanamaskaram, Asanas, Pranayama, Relaxation and Meditation for the durations for 60 Minutes. And NYG took part in Natya yoga sessions 5 days in a week (Monday to Friday) timings 12-1pm, The training involves the sequence like Opening Prayer, NatyaYoga warmups, Natya yoga Suryanamaskaram, Asanas with music and beats, Relaxation and Meditation for the period of 60 Minutes.. The Subjects were encouraged to do all exercises in complete training period as accurately as possible, and also advised to maintain their comfortable positions at all times.while a control group (CG) were not engaged in any activity.

EVALUATION:

Measurements of Flexibility and Cardiovascular Endurance are measured by Sit and Reach Test (SR) and the Harvard Step Test (HST) , before and after the training period.Measurements were made a day prior and

a day after the 8-week training program. All practices and posturesare demonstrated and well explained the benefits and contraindication to get the maximum results out of the training.

IV. RESULTS AND DISCUSSIONS

STATISTICAL ANALYSIS :

The Data pertaining to the variable collected from the two groups before and after the training period were statistically analysed by using Analysis of covariance (ANCOVA) to determine the significant difference and tested at 0.05 level of confidence. Scheffe's Post Hoc Test was used to find out the paired mean differences.

RESULTS ON FLEXIBILITY :

The obtained F - ratio value for Flexibility was greater than the table value, it indicates that there was a significant difference in Flexibility among the post-test and adjusted post-test means of the HYG, NYG than the Control Group, is presented in the Table-I.

TABLE-I
ANALYSIS OF CO-VARIANCE (ANCOVA) OF THE MEANS OF HYG,NYGAND THE CONTROL GROUP IN FLEXIBILITY IN (Scores in cm's)

Test	Hatha Yoga Group (HYG)	Natya Yoga Group (NYG)	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Sum of Squares	F-Ratio
Pre	19.20	19.87	Between	2	16.18	8.09	0.93
			With in	42	363.73	8.66	
Post	21.00	21.80	Between	2	86.98	43.49	**5.40***
			With in	42	338.13	8.05	
Adjusted Post	20.96	21.20	Between	2	35.25	17.62	**9.64***
			With in	42	74.95	1.83	

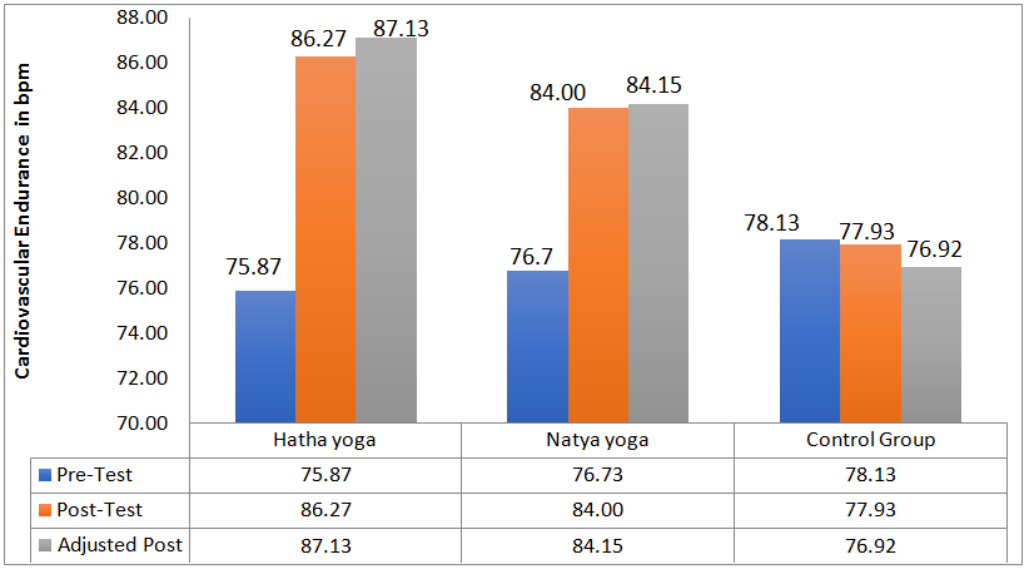
***Significant at 0.05 level of confidence.(The table value for significance at .05 level of confidence with df 2 and 42 is 3.22, and the table value for df 2 and 41 is 3.23)**

SCHEFFE'S POST HOC TEST FOR FLEXIBILITY (IN cm's)

Adjusted post mean			**Mean difference**	**Critical difference**
Hatha Yoga Group (HYG)	Natya Yoga Group (NYG)	**Control Group**		
20.96	21.20	–	0.23*	1.25
–	21.20	19.18	-2.02*	1.25
20.96	–	19.18	-1.79*	1.25

***Significant at .05 level of confidence.**

GRAPHICAL REPRESENTATION OF MEAN VALUES OF TWO EXPERIMENTAL GROUPS AND THE CONTROL GROUP ON FLEXIBILITY (IN cm's)



RESULTS ON CARDIOVASCULAR ENDURANCE :

The obtained F - ratio value for Cardiovascular Endurance was greater than the table value, it indicates that there was a significant difference in Flexibility among the post-test and adjusted post-test means of the HYG, NYG than the Control Group, is presented in the Table-II

TABLE-II

ANALYSIS OF CO-VARIANCE (ANCOVA) OF THE MEANS OF HYG,NYG AND THE CONTROL GROUP IN CARDIOVASCULAR ENDURANCE IN (Scores in bpm)

Test	Hatha Yoga Group (HYG)	Natya Yoga Group (NYG)	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Sum of Squares	F-Ratio
Pre	75.87	76.73	Between	2	39.24	19.62	0.93
			With in	42	1084.40	25.82	
Post	86.27	84.00	Between	2	556.93	278.47	**7.98***
			With in	42	1465.87	34.90	
Adjusted Post	87.13	77.93	Between	2	798.49	399.25	**22.70***
			With in	42	721.12	17.59	

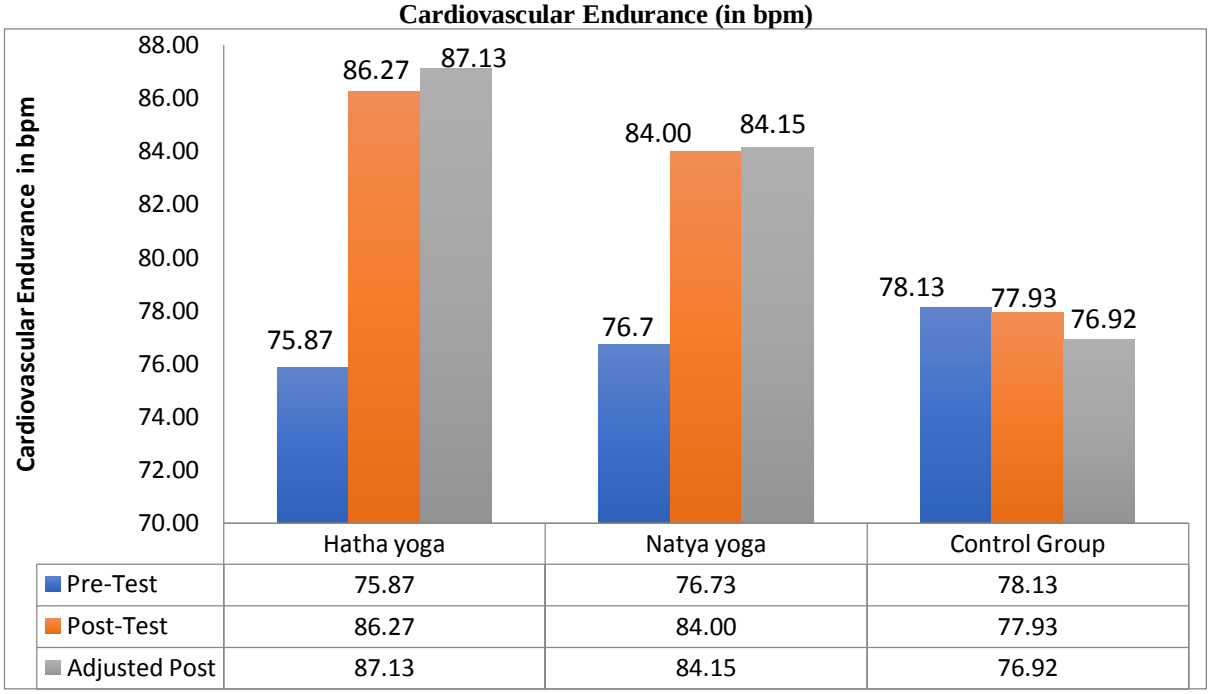
***Significant at 0.05 level of confidence.(The table value for significance at .05 level of confidence with df 2 and 42 is 3.22, and the table value for df 2 and 41 is 3.23)**

SCHEFFE'S POST HOC TEST FOR CARDIOVASCULAR ENDURANCE (IN bpm)

Adjusted post mean			**Mean difference**	**Critical difference**
Hatha Yoga Group (HYG)	Natya Yoga Group (NYG)	**Control Group**		
87.13	84.15	–	2.98*	3.89
–	84.15	76.92	7.23*	3.89
87.13	–	76.92	10.21*	3.89

***Significant at .05 level of confidence.**

Graphical Representation of Mean Values of Two Experimental Groups and the Control Group on Cardiovascular Endurance (in bpm)



	Hatha yoga	Natya yoga	Control Group
Pre-Test	75.87	76.73	78.13
Post-Test	86.27	84.00	77.93
Adjusted Post	87.13	84.15	76.92

Findings:
Significant improvement was observed in the HYG and NYG on flexibility and cardiovascular endurance for womenand no significant improvement were observed in CG on flexibility and cardio vascular endurancefor women.The above results were substantiated by the observations made by Lau, (et al.,2015).

V. CONCLUSIONS:

Results suggest that a 8-week ofHatha Yoga Sadhana and Natya Yoga Training is an effective intervention toimprove the Flexibility and Cardiovascular Endurance for Women.

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