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Effect of Yoga Practices Brisk Walking and Combination of Yoga and Brisk Walking on Muscular Endurance and Vital Capacity

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Abstract

The purpose of the present study was to find the effect of yogic practice, brisk walking and combination of yoga and brisk walking on muscular endurance and vital capacity. For this purpose, sixty men in and around Vaitheeswarankoil, Mayiladuthurai Taluk, Tiruvarur District, Tamilnadu in the age group of 40 – 45 years were selected. They were divided into four equal groups (n = 15), each group consisted of fifteen subjects, in which group – I underwent yoga practice, group – II underwent brisk walking, group – III underwent combination of yoga practice and brisk walking and group –IV acted as control group who did not participate in any special training. The training period for this study was six days in a week for twelve weeks. Prior to and after the training period the subjects were tested for muscular endurance and vital capacity. Muscular endurance was assessed by administering sit – ups test and vital capacity was assessed by using expirograph respectively. The analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. Since there were four groups involved in this study the Scheffé S test was used as pos-hoc test. The result of the study shown that the yoga practice, brisk walking and combination and brisk walking and yoga practice has positively altered the criterion variables, such as, muscular endurance and vital capacity. It was concluded from the results of the study, that all the training groups has significantly improved the muscular endurance and vital capacity when compared with the control group and there was no significant difference was occurred between the training groups.

Keywords: Yoga practice, brisk walking, combination of yoga practice and brisk walking, muscular endurance and vital capacity.

Introduction

Yoga is emerged and a traditional practice in India which is an amalgamation of physical, mental and spiritual workout or regimen. Among 6 orthodox Astika systems of ancient Hindu Philosophical system, Yoga is one amongst them.[1] There are so many varieties of yogic schools, goals and practices[2] in Buddhism, Hinduism and Jainism.[3,4,5] At internationally, in particular, western countries, it is regularly suggests a present day shape of yoga as exercise, particularly Hatha yoga, with giant postures of asanas. The yoga is introduced during the pre-Vedic period of Indian customs, which is mentioned by the Rigveda in Vedic book. It was known that during sixth and fifth centuries BC, during early India's Sramana and Ascetic movements.[6] During earliest books it was mentioned that yoga practices is uncertainty, varyingly ascribed to Upanishads.[7] Yoga Sutra, a book written by Patanjali during the first half of first millennium[8,9] gains an important part in the life of every human being of Western world during 20th Century.[10] Regular yogic exercise will improves the efficient working capacity within a minimum time period, control temptations, remove the wrong thinking from the mind and achieve the full success in every part of life.[11]

Physical exercise and yoga are completely different form. While physical exercises are dynamic and yoga is static. Yoga saves the energy while the energy was disbursed during the physical exercise. Yoga improves the muscular endurance and strength training exercises improves the rigidity. Yoga reproduces the energy but physical exercise did not. Yoga strengthens the joints and exercises make it weaken. Pranayama is the combination of two Sanskrit words, such as prana and yama. The prana means, essential energy, or life-force, or the force by which we have our life. Yama is control, i.e. control of the human breath. So, it is finally called as science of breath.

In related with cardio-respiratory system, the yogasana's inverted postures with pranayama are exceptional.[12] Various yoga research has been organized in the background of multiple health conditions, such as, anxiety/stress, depression, pain,

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cardiovascular disease, hypertension/blood pressure, respiratory conditions, cancer, and diabetes.[13] Working out with breathing techniques, increased the parasympathetic activity, i.e., increased valsalva ratio, reduced basal heart rate, and deep breathing difference in rate of heart; and lessened sympathetic activity, i.e., decrease in systolic blood pressure on posture variation.[14] Performing the asanas will increase the patient's muscular endurance, strength and co-ordination, while doing pranayama practices and meditation will focus and calm the mind which develops higher awareness and reducing the anxiety.[15]

Aerobic exercises are which relates or involves or requires oxygen[16] and it also means the consumption of oxygen that is required sufficiently to meets the demand of energy resources while performing physical exercise through aerobic metabolism.[17] The walking is the simplest and most available aerobic exercise. All the human beings can walk in the indoors like malls, on the treadmills, and outdoors any anytime. The primary and good choice for beginning any types of exercise programme is walking. During the walking exercise, the biological plausible is the cardiovascular benefit, like other exercises such as, moderate exercises, the walking programme reduces the risk of cardiac factors like, pressure in blood (BP), cholesterol, diabetes, vascular stiffness and inflammation, obesity and mental stress. Walking is a tool to reduce the outlaying artery disease, dementia obesity, depression, diabetes and colon cancer.[18] Walking attain the maximum physical fitness, alleviates depression, cardiac health and reduces the fatigue, attain the status of mood, reduces the stress in joints and pain on joints, will reduces weight gain, chronic diseases, reduce the cancer risk, increases the endurance resulted the blood circulation and good posture.[19]

Fitness is the term that an individual to endure and follow the effective functioning, purposefully and enjoyably. The problems and catastrophe should be met wherever and whenever during the entire life.[20] Bucher and Prentice[21] state that, it is a wide term indicating the energetic substance which allows an human being's requirements in relation with mental and emotional constancy, social awareness and pliability and moral and spiritual fiber and organic health dependable with one's genetics. The blend of endurance and strength of muscles are called muscular endurance. The duration of the time a muscle, which carry out frequent actions against a sub-maximal resistance is muscular endurance. Different sports demands different levels of muscular endurance. But, there are three foremost divisions of muscular endurance, such as short-term, long-term and power endurance.[22] The science of physiology of human is the mixture of mechanical, physical and biochemical task of an individual's well health, their cells and functions of various organs which composed. The aim of physiology is the investigations of organs and their system. The amount of air which is in maximum by human being force out from the lungs after maximum inhalation is called as vital capacity. This is the addition of IRV, TD, ERV and a human being's vital capacity can be assessed by the spirometer with wet or regular. The lung diseases can be identified with the help of vital capacity.

Methods

The purpose of the present study was to find the effect of yogic practice, brisk walking and combination of yoga and brisk walking on muscular endurance and vital capacity. For this purpose, sixty men in and around Vaitheeswarankoil, Mayiladuthurai Taluk, Tiruvarur District, Tamilnadu in the age group of 40 – 45 years were selected. They were divided into four equal groups (n = 15), each group consisted of fifteen subjects, in which group – I underwent yoga practice, group – II underwent brisk walking, group – III underwent combination of yoga practice and brisk walking and group – IV acted as control group who did not participate in any special training. Training period of yoga practices, brisk walking and combination of yoga practices and brisk walking were conducted six days (Monday to Saturday) per week for twelve weeks. The experimental group underwent their respective programmes by 5 am to 7 am under the guidance of well-trained yoga instructors and physical educationists for the period of twelve weeks. The attendance of the participants was taken at each practice sessions and all the training groups attendance were 99%, 97% and 98% respectively. The different training schedule was given below:

Table 1. *Yoga Practice Schedule*

Weeks	Name of the Asanas (Maintaining Duration in minutes : Recovery)
1 – 4	Suryanamaskar (10 Min : 5 Min), Utthita trikonasana (1 : 1), Janu sirsasana (1 : 1), Marichyasana (1 : 1) **- All 2 repetitions**, Shavasana (2 min), Pranayama –Bhramari (1 min), Meditation – Omkar. (2 min)
5 - 8	Suryanamaskar (10 Min : 5 Min), Utthita trikonasana (1 : 1), Janu sirsasana (1 : 1), Marichyasana (1 : 1) Prasarita padottanasana (30 sec : 30 sec), Adhomukha svanasana (30 sec : 30 sec), Ustrasana (1 min : 1 min) **- All 2 repetitions**, Shavasana (2 min), Pranayama – Basthikara (1 min), Meditation – Omkar. (2 min),
9 – 12	Suryanamaskar (10 Min : 5 Min), Utthita trikonasana (1 : 1), Janu sirsasana (1 : 1), Marichyasana (1 : 1) Prasarita padottanasana (30 sec : 30 sec), Adhomukha svanasana (30 sec : 30 sec), Ustrasana (1 min : 1 min) **- All 2 repetitions**, Uttanasana (30 sec : 30 sec),

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	Baddha konasana (1 min : 1 min), Setu bandha sarvangasana (30 sec : 30 sec) - **All 3 repetitions**, Shavasana (2 min), Pranayama –Nadisodhana (1 min), Meditation – Omkar. (2 min).

Table 2. *Brisk Walking Schedule*

Weeks	**(Duration in minutes : Recovery)**
1 – 4	Brisk Walking for 10 minutes : 3 minutes recovery : Brisk walking for 10 minutes
5 - 8	Brisk Walking for 15 minutes : 3 minutes recovery : Brisk walking for 15 minutes
9 – 12	Brisk Walking for 15 minutes : 4 minutes recovery : Brisk walking for 15 minutes : 5 minutes recovery : brisk walking for 15 minutes.

Table 3. *Combination of Yoga Practice and Brisk Walking Exercise Schedule*

Weeks	**Name of the Asanas (Maintaining Duration in minutes : Recovery)**
1 – 4	Brisk Walking for 5 minutes : 10 minutes recovery - Suryanamaskar (10 Min), Utthita trikonasana (1), Janu sirsasana (1), Marichyasana (1) - Shavasana (2 min), Pranayama – Bhramari (1 min), Meditation – Omkar. (2 min)
5 - 8	Brisk Walking for 10 minutes : 5 minutes recovery - Suryanamaskar (10 Min), Utthita trikonasana (1), Janu sirsasana (1), Marichyasana (1) Prasarita padottanasana (30 sec), Adhomukha svanasana (30 sec), Ustrasana (1 min) - Shavasana (2 min), Pranayama – Basthikara (1 min), Meditation – Omkar. (2 min),
9 – 12	Brisk Walking for 15 minutes : 10 minutes recovery - Suryanamaskar (10 Min), Utthita trikonasana (1), Janu sirsasana (1), Marichyasana (1) Prasarita padottanasana (30 sec), Adhomukha svanasana (30 sec), Ustrasana (1 min), Uttanasana (30 sec), Baddha konasana (1 min), Setu bandha sarvangasana (30 sec) Shavasana (2 min), Pranayama –Nadisodhana (1 min), Meditation – Omkar. (2 min).

Procedure

The researcher selected the following criterion variables: 1. muscular endurance, and 3.vital capacity. Muscular endurance was assessed by using sit and reach test and vital capacity were assessed by using expirograph. For the purpose of collection of data, the subjects were asked to report at early morning, one day prior and one day after experimental period. The subject of the present study were questioned about their interest in yoga exercise and brisk walking and confirmed that they are new to yoga practice and brisk walking. All the participants of the present study were confirmed themselves that there was no participation of yoga practice or any other similar physical activities for past several years. A self-answered questionnaire was provided to all subjects to find out any physical or physiological disabilities and found that there was none of them were affected. The subjects were hand over their written consent to participate in this study prior to enrollment. The training period for this study was six days in a week for twelve weeks. Prior to and after the training period the subjects were tested for muscular endurance and vital capacity. Muscular endurance was assessed by administering sit – ups test and vital capacity was assessed by using expirograph respectively. The analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. Since there were four groups involved in this study the Scheffé *S* test was used as pos-hoc test.

Data Analysis

The paired sample 't' test, Levene's test for equality of error variances and Analysis of covariance (ANCOVA) was applied to find out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as appropriate. The Scheffé S test was applied as post-hoc test whenever the 'F' ratios of the adjusted post-test means were found to be significant. The data were compiled and analyzed using the *Statistical Package for the Social Science (SPSS)* for windows computer software (Version 16).

Results

The data collected on muscular endurance and vital capacity among experimental and control groups were analyses and the results were presented in Table – 1.

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Table 1. *Paired Sample T - Test of Yoga Practice Group Brisk walking Group Combination of Yoga Practice and Brisk Walking Group and Control Group on Selected Dependent Variables*

Variable Name	Group Name	Yoga Practice Group	Brisk Walking Group	Combination of Yoga Practice and Brisk Walking Group	Control Group
Muscular endurance (in Inches)	**Pre-test Mean**	24.80	24.80	24.67	24.13
	Post-test Mean	27.00	26.53	28.67	23.87
't' – ratio		18.25*	16.99*	29.37*	0.99
Vital Capacity (Liters)	**Pre-test Mean**	3.28	3.34	3.30	3.29
	Post-test Mean	3.429	3.50	3.43	3.30
't' - ratio		22.87*	29.34*	25.36*	0.86

Table – 1 shows that the paired sample 't' – test on muscular endurance and vital capacity, the result shows that the yoga practice group, brisk walking group and combination of yoga practice and brisk walking group were significantly improved the selected criterion variables. A preliminary analysis was conducted to determine whether the prerequisite assumptions of ANCOVA were met before preceding the Univariate analysis. Thus, the assumption of equality of variance (Levene's test homogeneity), the linear regression relationship between the covariates and the dependent variables and the homogeneity of regression slopes were examined and the result was presented in Table - 2.

Table 2
Leven's Test for Equality of Error Variances of Selected Variables among Groups

Levene's Test on Muscular endurance			
'F'	**df1**	**df2**	**Sig.**
1.192	3	56	0.321
Leven's Test on Vital Capacity			
'F'	**df1**	**df2**	**Sig.**
1.669	3	56	0.184

(The table value required for significant at .05 level with df 3 and 56 are 2.76.)

Homogeneity of variances is a term that is used to indicate that groups have the similar variances. Thus, in Levene's test of equality of the error variance table, the obtained F-values of the selected dependent variables were less than the confidence interval value of 0.05, which indicates that the variance of each group was not significantly different from one another. Therefore, the homogeneity of variance comparing the three groups regardless of the ability level for each of the dependent variables indicated that homogeneity of variance has been met for two dependent variables at significant 0.05 level of confidence. Hence it was concluded that the assumption of homogeneity of variance has been met for computing univariate ANCOVA.

Table 3. *Analysis of Covariance and 'F' ratio for muscular endurance and vital capacity for yoga practice group, brisk walking group, combination of yoga practice and brisk walking group and Control Group*

Variable Name	Group Name	Yoga practice Group	Brisk Walking Group	Combination of Yoga practice and Brisk Walking Group	Control Group	'F' Ratio
Muscular endurance (in nos/min)	**Pre-test Mean ± S.D**	24.80 ± 1.66	24.80 ± 2.54	24.67 ± 2.16	24.13 ± 1.81	0.353
	Post-test Mean ± S.D.	27.00 ± 1.69	26.53 ± 2.30	28.67 ± 1.99	23.87 ± 1.46	8.84*
	Adj. Post-test Mean	26.836	26.370	26.612	24.278	30.171*
Vital	**Pre-test Mean**	3.28± 0.07	3.34 ± 0.86	3.30 ± 0.11	3.29 ± 0.06	1.42

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capacity (in liters)	**± S.D**					
	Post-test Mean ± S.D.	3.429 ± 0.08	3.50 ± 0.08	3.43 ± 0.11	3.30 ± 0.07	20.55*
	Adj. Post-test Mean	3.449	3.461	3.436	3.269	79.94*

* Significant at .05 level of confidence. (The table value required for significant at .05 level with df 3 and 56 and 3 and 55 are 2.76 and 2.78 respectively).

Table 3 shows that 'f'- ratio of pre-test mean of yoga practice group, brisk walking group and combination of yoga practice and brisk walking group and control group on muscular endurance was 1.12, which is insignificant at 0.05 level of confidence. The 'f' ratio value of post- and adjusted post-test mean of experimental groups and control group was 11.50 and 20.27, which is significant at 0.05 level of confidence. The 'f'- ratio of pre-test mean of yoga practice group, brisk walking group, combination of yoga practice and brisk walking group and control group on vital capacity is 1.42, which is insignificant at 0.05 level of confidence. The 'f' ratio value of post- and adjusted post-test means of experimental groups and control group were 20.55 and 79.94, which is significant at 0.05 level of confidence. The above statistical analysis indicates that there was a significant improvement in muscular endurance and vital capacity after the respective training periods. Further to determine which of the paired means has a significant difference, the Scheffé *S* test was applied.

Table 4. *Scheffẽ S Test for the Difference Between the Adjusted Post-Test Mean of muscular endurance and vital capacity*

Yoga practice Group	Brisk Walking Group	Combination of Yoga practice and Brisk Walking Group	Control Group	Mean Difference	Confidence interval at .05 level
Adjusted Post Mean Values on Muscular endurance					
26.836	26.370			0.466	0.882
26.836		26.612		0.224	0.882
26.836			24.278	2.558*	0.882
	26.370	26.612		0.242	0.882
	26.370		24.278	2.092*	0.882
		26.612	24.278	2.334*	0.882
Adjusted Post Mean Values on Vital Capacity					
3.449	3.461			0.012	0.041
3.449		3.436		0.013	0. 041
3.449			3.269	0.180*	0. 041
	3.461	3.436		0.025	0. 041
	3.461		3.269	0.192*	0. 041
		3.436	3.269	0.167*	0. 041

* Significant at 0.05 level of confidence.

Table 4 shows that the Scheffẽ *S* Test for the difference between adjusted post-test mean on muscular endurance of yoga practice group and control group was 2.558, brisk walking group and control group was 2.092, combination of yoga practice and brisk walking group and control group was 2.334, which were significant at .05 level of confidence. There was a significant difference on vital capacity between yoga practice group and control group was 0.180, brisk walking group and control group was 0.192, combination of yoga practice and brisk walking group and control group was 0.167, which were significant at 0.05 level of confidence. But between the experimental groups there was no significant difference was occurred on muscular endurance (0.446, 0.242 and 0.242) and vital capacity (0.012, 0.013 and 0.025).

Discussion

All the subjects were participated the yoga practice, brisk walking and combination of yoga practice and brisk walking session with enthusiasm and shown their interest in learning their respective skills. Various research studies shows, by statistically, that there is a greater chance of developing various diseases when blood pressure, asthma, overweight etc., occurs for human beings. Yoga made positive alterations in physical fitness performance and well-being while practicing regularly[23,24] through increasing muscular endurance[25,37,38,39]. Number of yoga breathing exercises which improves the ventilatory function.[26,27,28,29] Some of the researchers found that there was a significant improvement in ventilatory function after yogic breathing exercise.[30,31,32,33,34] Walking has always improving the aerobic capacity which protect against age-related increases in peak

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aerobic capacity and also improves the physical fitness.[35,36]

Conclusion

Present study shows that yogic practice, brisk walking and combination of yogic practices and brisk walking has improved the muscular endurance and vital capacity. Yoga is a physical exercise that can concurrently decorate a number of precise factors of fitness. For instance, following weeks of practice, joints comprising motion in their kinetic chains may additionally be optimized thru elevated alignment, accelerated vary of motion, and a higher muscle fibers recruitment. There was no direct blood supply to the majority of joint cartilage. The joint fluid gets its nutrition as the human body moving and compression during walking which squishes the cartilage, getting oxygen and nutrition into the particular area. Even except stretching earlier than and after a taking walks exercising (which is no longer encouraged — a suitable warm-up and cool-down are usually nice preferences for a profitable exercising and damage prevention), the interplay of legs, arms, core, and head whilst taking walks assist to extend the muscular endurance. Taking lengthy step helps to stretch the hip flexors. Our research finding suggests that whether isolated or combined yogic practices and brisk walking exercise may improves the muscular endurance and vital capacity. Further studies may conduct on impact of combination of brisk walking and yogic practice on health related physical fitness, physiological and psychological parameters.

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