



Effect of Yoga Practices Brisk Walking and Combination of Yoga and Brisk Walking on Flexibility Tidal Volume and Vital Capacity

P. Ravichandran¹ & Dr. S. Chidambara Raja²

¹Ph.D., Research Scholar, School of Yoga Studies, Annamalai University, Chidambaram, Tamilnadu, India.

²Professor, Department of Physical Education, Annamalai University, Chidambaram, Tamilnadu, India.

Received 10th September 2020, Accepted 15th October 2020

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 flexibility, tidal volume 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 flexibility, tidal volume and vital capacity. Flexibility was assessed by administering sit and reach test, tidal volume 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, flexibility, tidal volume and vital capacity. It was concluded from the results of the study, that all the training groups has significantly improved the flexibility, tidal volume 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, flexibility, tidal volume and vital capacity.

© Copy Right, IJRRAS, 2020. All Rights Reserved.

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 flexibility 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

Correspondence

Dr. S. Chidambara Raja
E-mail: rajadi42@gmail.com

conditions, such as, anxiety/stress, depression, pain, 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 flexibility, 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. Rasch and Burkey[22] in their book, they stated that "flexibility is not a general factor but is highly specific to each joint". The two joints of a two-sided plane in the same human being may vary noticeably. 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 flexibility, tidal volume 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), 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	(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. flexibility, 2. tidal volume and 3.vital capacity. Flexibility was assessed by using sit and reach test and tidal volume 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 flexibility, tidal volume and vital capacity. Flexibility was assessed by administering sit and reach test, tidal volume 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 flexibility, tidal volume and vital capacity among experimental and control groups were analyses and the results were presented in Table 1.

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
Flexibility (in Inches)	Pre-test Mean	6.05	6.19	6.03	6.05
	Post-test Mean	6.49	6.41	6.40	5.95
't' - ratio		28.59*	27.26*	27.55*	0.99
Tidal Volume (Liters)	Pre-test Mean	0.28	0.28	0.28	0.27
	Post-test Mean	0.327	0.326	0.327	0.280
't' - ratio		19.25*	19.17*	19.16*	0.093
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 flexibility, tidal volume 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 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 Flexibility			
'F'	df1	df2	Sig.
1.748	3	56	0.168
Leven's Test on Tidal Volume			
'F'	df1	df2	Sig.
1.078	3	56	0.368
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 flexibility, tidal volume 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
Flexibility (in inches)	Pre-test Mean ± S.D	6.05 ± 0.31	6.19 ± 0.27	6.03 ± 0.31	6.05 ± 0.21	1.12
	Post-test Mean ± S.D.	6.49 ± 0.35	6.41 ± 0.29	6.40 ± 0.25	5.95 ± 0.21	11.50*
	Adj. Post-test Mean	6.51	6.334	6.433	5.971	20.27*
Tidal volume (in liters)	Pre-test Mean ± S.D	0.28 ± 0.015	0.28 ± 0.02	0.28 ± 0.016	0.27 ± 0.02	1.15
	Post-test Mean ± S.D.	0.327 ± 0.016	0.326 ± 0.019	0.327 ± 0.014	0.280 ± 6.55	37.93*
	Adj. Post-test Mean	0.329	0.324	0.323	0.275	77.58*
Vital capacity (in liters)	Pre-test Mean ± S.D	3.28 ± 0.07	3.34 ± 0.86	3.30 ± 0.11	3.29 ± 0.06	1.42
	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 flexibility 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 tidal volume is 1.15, 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 37.93

and 77.58, 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 flexibility, tidal volume 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. Scheffé S Test for the Difference Between the Adjusted Post-Test Mean of flexibility, tidal volume 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 Flexibility					
6.510	6.334			0.176	0.216
6.510		6.433		0.077	0.216
6.510			5.970	0.540*	0.216
	6.334	6.433		0.099	0.216
	6.334		5.970	0.364*	0.216
		6.433	5.970	0.463*	0.216
Adjusted Post Mean Values on Tidal Volume					
0.329	0.324			0.005	0.011

0.329		0.323		0.006	0.011
0.329			0.275	0.054*	0.011
	0.324	0.323		0.001	0.011
	0.324		0.275	0.049*	0.011
		0.323	0.275	0.048*	0.011
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 Scheffé *S* Test for the difference between adjusted post-test mean on flexibility of yoga practice group and control group was 0.540, brisk walking group and control group was 0.364, combination of yoga practice and brisk walking group and control group was 0.463, which were significant at .05 level of confidence. There was a significant difference on tidal volume between yoga practice group and control group was 0.054, brisk walking group and control group was 0.049, combination of yoga practice and brisk walking group and control group was 0.048, which were significant at 0.05 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 flexibility (0.176, 0.077 and 0.099), tidal volume (0.005, 0.006 and 0.001) 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 flexibility[37,38,39] and balance.[25] 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 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 flexibility, tidal volume 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 flexibility. 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 flexibility, tidal volume 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.

References

1. Akhtar, P., Yardi, S, and Akhtar, M, Effects of yoga on functional capacity and well being. International Journal of Yoga, 2013. 6: 76.
2. Arrico, M. Yoga Journal's Yoga Basics: The Essential Beginner's Guide to Yoga for a Lifetime of Health and Fitness. New York: Henry Holt; 1997.
3. Boehde D.D., Porcari J.P., Greany, J. Udermann, B., Johanson, D., and Foster, C, The physiological effects of 8 weeks of yoga training. Journal of Cardiopulmonary Rehabilitation and Prevention, 2005. 25: 290.
4. Bucher, Charles A. and Prentice, William E. Fitness for Your College and Life. St. Louis: Time Mirror/Mosby College Publishing, 1985. p.7.

5. Carmody, Denise Lardner and Tully Carmody, John. Serene compassion. Indonesia: Oxford University Press, 1996. P. 68.
6. Carson, J.W., Carson K.M., L. Porter S., Keefe F.J., Shaw H. and Miller J.M. Yoga for Women with Metastatic Breast Cancer: Results from a Pilot Study. *J Pain Symptom Manage.* 2007. 33: 331-41.
7. Cooper, Kenneth H. Can stress heal? New York: Thomas Nelson Inc. 1997. P. 40.
8. Doijad, V.P. and Surdi, A.D. Effect of short term yoga practice on pulmonary function tests. *Indian Journal of Basic and Applied Medical Research.* 2012. 1(3): 226-230.
9. Doshi, Manu. Translation of tattvarthasutra. Ahmedabad: Shrut Ratnakar, 2007. P. 102.
10. Evans-Wentz, W.Y. Tibetan yoga and secret doctrines, 3rd ed. New York: Oxford University Press, 2000. P. 28.
11. Feuerstein, Georg and Wilber, Ken. The yoga tradition: its history, literature, philosophy and practice. Arizona: Hohm Press. 2012. P. 39.
12. Field, T. Exercise research on children and adolescents. *Complement Ther Clin Pract.* 2012. 18(1):54-9.
13. Holland, A.E., Hill, C.J., Jones, A.Y. and McDonald C.F. Breathing exercises for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev.* 2012; 10:CD008250.
14. Janakiraman, Yogacharya and Cicogna, Carolina Rosso. Solar Yoga. New Delhi: Allied Publishers Ltd., 1989. P. 26.
15. Joshi, L.N., Joshi, V.D. and Gokhale, L.V. Effect of short term pranayam practice on breathing rate and ventilatory functions of lung. *Indian J Physiol Pharmacol.* 1992. 36(2):105-8.
16. Kirkwood, G. Rampes, H. Tuffrey, V. Richardson, J. and Pilkington, K. Yoga for anxiety: a systematic review of the research evidence. *British Journal of Sports Medicine.* 2005. 39(12):884-891.
17. Makwana, K., Khirwadkar, N. and Gupta, H.C. Effect of Short term yoga practice on ventilatory function tests. *Indian J Physiol Pharmacol.* 1988. 32(3):202-8.
18. McArdle, William D. Katch, Frank I. and Katch, Victor L. 8th ed. Exercise physiology: Nutrition, energy, and human performance; Philadelphia: Lippincott Williams and Wilkins; 2014. pp. 337–376.
19. McArdle, William D. Katch, Frank I. and Katch, Victor L. Essentials of Exercise Physiology. Lippincott: Williams & Wilkins, 2006. P. 204.
20. McCall, M.C. In Search of Yoga: Research Trends in a Western Medical Database. *International Journal of Yoga.* 2014. 7:4 – 8.
21. Nemoto, K., Gen-no, H., Masuki, S., Okazaki K., and Nose, H. Effects of high-intensity interval walking training on physical fitness and blood pressure in middle-aged and older people. *Maya Clin Proc.* July 2007. 82(7):803-11.
22. Posadzki, P. and Ernst E. Yoga for asthma? A systematic review of randomized clinical trials. *J Asthma.* 2011. 48(6):632-9.
23. President council on Youth Fitness, Cited by Reuben B. Frost in *Psychological Concepts Applied to Physical Education and Coaching*, New York: Addison Wesley Publishing Company, 1971. p.70.
24. Rasch, Philip J. and Burke, Rogher K. *Kinesiology and Applied Anatomy.* 6th Ed. Philadelphia: Lea and Febiger Co., 1978. p. 31.
25. Retrieved from <https://www.nbcnews.com/better/health/why-walking-most-underrated-form-exercise-ncna797271> on 12-03-2020.
26. Rodrigues, M.R., Carvalho, C.R.F., Santaella, D.F., Filho, G.L. and Marie, S.K.N. Effects of yoga breathing exercises on pulmonary function in patients with Duchene muscular dystrophy: An exploratory analysis. *J Bras Pneumol.* March - April 2014. 40(2). Webpage:[http:// dx.doi.org/10.1590/SI806-37132014000200005](http://dx.doi.org/10.1590/SI806-37132014000200005).
27. Ross, A and Thomas, S. The health benefits of yoga and exercise: a review of comparison studies. *The Journal of Alternative and Complementary Medicine*, 16: 2010. 3-12.
28. Samuel, Geoffrey. The origins of yoga and tantra. Cambridge: University Press, 2008. P. 3.
29. Sarbacker, Stuart Ray. Samādhi: The numinous and cessative in indo-tibetan yoga. New York: State University of New York Press, 2005. pp. 1–2.
30. Shahana., A, Nair, Usha, S. and Hasrani S.S. Effect of aerobic exercise programme on health related physical fitness components of middle aged women. *British Journal of Sports Medicine*, December 2010. 44:355-366.
31. Singleton, Mark. Yoga body: The origins of modern posture practice. New York: Oxford University Press, 2010. P. 88.
32. Sivananda Yoga Vedanta Centre. Yoga your Practice Companion. London: Dorling Kindersley. 2010.
33. Sodhi, C., Singh, S. and Dandona, P.K. A study of the effect of yoga training on pulmonary functions in patients with bronchial asthma. *Indian J Physiol Pharmacol.* 2009. 53(2):169-74.
34. Veerabhadrapa, S.G., Baljoshi, V.S., Khanapure S., Herur A., Patil S. and Ankad R.B., Effect of Yogic Bellows on Cardiovascular Autonomic Reactivity. *J Cardiovasc Dis Res.* 2011. 2:223-7.
35. Walking: Your Steps to Health, retrieved from <https://www.health.harvard.edu/staying-healthy/walking-your-steps-to-health> on 02-02-2020.
36. Whicher, Ian. The integrity of the yoga darsana: a reconsideration of classical yoga. New York: State University of New York Press, 1998. P. 2.
37. White, David Gordon. The Yoga Sutra of Patanjali: A Biography. Princeton: Princeton University Press, 2014. P. 28.

38. White, David Gordon. Yoga, brief history of an idea, princeton. New Jersey: Princeton University Press, 2018. P. 2.
39. Yadav, R.K. and Das, S. Effect of yogic practice on pulmonary functions in young females. *Indian J Physiol Pharmacol.* 2001. 45(4):493-6.