EFFECT OF YOGIC EXERCISE AND PHYSICAL EXERCISE ON PHYSICAL HEALTH AND MENTAL HEALTH.

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ABSTRACT: The Present study includes two independent groups of subjects. Sixty healthy volunteers were randomly selected and were assigned two groups of 30 subjects each. They were in the age range of 30-45 years. First group was the Yoga group which consisted of 17 males and13 females. The second group was the physical exercise group which consisted of 20 males and 10 females. After these subjects were randomly assigned to these two groups, Yoga group joined on three months yoga training course at Yoga Sikshasansthan. They attended yoga classes regularly and practiced yoga under guidance of qualified yoga teachers. The subjects in the physical exercise group started practicing brisk walk regularly in the morning hours. Initially base line recordings of four physiological parameters mainly systolic blood pressure, diastolic blood pressure, pulse rate, body weight were recorded individually for all the subjects in both Yoga group and physical exercise group. Later their mental health assessment was made by administering general health questionnaire. In conclusion it may be said that since both physical exercise group and yoga training group comprised of very healthy subjects, the impact of training is not glaring, including a control group and a clinical group such as obese or hypertension would certainly bring about subtle differences in the two systems. Regarding the psychological variables both yoga and physical exercise group showed significant change except in the case of somatic symptoms. In addition to these variables of assessment of subjective well being is also made on both the group before and after training, would give us an opportunity to compare the merits of these two systems.
KEY WORDS: Yoga, Exercise, Physical health, Mental health.

INTRODUCTION: Yoga provides one of the best means of self-improvement and attaining one's full potential. It is generally held that the advanced stages of yoga, super conscious states are attained which result in a feeling of bliss, deep peace and the emergence of psychic powers. Yoga was developed and perfected over the centuries by philosophers and mystics in India. It is basically a method by which we increase the body's supply of energy and remove any interference to the transmission of energy throughout the body. Yoga has specialized in this subject for thousands of years and stream lined the methods to attain this aim. Along with meditation, it is probably one of the most popular alternative therapies today in India. Many physicians, who are skeptical about the

efficacy of alternative medicine, show a tendency to support yoga with a passion in recent years. The best part of it is that it is something that can be done in the comfort of our home. Various Yogic practices such as body postures, breath regulation, cleansing procedures, and meditation will go a long way towards better health and relaxation.

Physical exercise is the state of being active with action or movement. Physical activity can increase the basal metabolic rate by approximately 10%. This increase can last for upto 48 hrs after the completion of the activity. It helps burn calories. The number of calories used is dependent on the type and intensity of activity, and on the body weight of the person performing the physical activity. It also helps in the maintenance and control of weight.

According to the American college of sport medicine physical activity of less than two times a week at less than 60% of the maximum heart rate, for less than 10 minutes per day, does not assist in developing and maintaining fitness. If physical activity is discontinued, the fitness benefits are completely lost, and the person has to restart again. 20 minutes of continuous aerobic activity three days per week is recommended for weight loss. Examples of physical activity that are considered aerobic are walking, running, jogging, swimming, bike riding, rowing, jumping rope, etc.

METHODS AND MATERIALS:

SUBJECTS: The investigation was carried out on two independent groups of subjects. Sixty healthy volunteers were randomly selected and were assigned two groups of 30 subjects each. They were in the age range of 30-45 years. First group was the Yoga group which consisted of 17 males and13 females. The second group was the physical exercise group which consisted of 20 males and 10 females. After these subjects were randomly assigned to these two groups Yoga group joined on three months yoga training course at Yoga Siksha Sansthan, Steel Plant, Visakhapatnam. They attended yoga classes regularly and practiced yoga under guidance of qualified yoga teachers. The subjects in the physical exercise group started practicing brisk walk regularly in the morning hours.

TOOLS USED

In the present study the following physiological and psychological tools were employed.

1. Sphygmomanometer – blood pressure was recorded. For all the subjects using Sphygmo manometer. It was recorded with the subjects in the supine position.
2. Weighing Machine: Body weight of all the subjects was recorded using the standard weighing machine.
3. The pulse rate was recorded for all the subjects. The rate of radial artery pulsations was recorded by palpatory method.
4. General health questionnaire. In the present study mental health assessment of all the subjects in both the groups was made using the general health questionnaire developed by D.P. Goldberg and V.F. Hillier (Dept. of Psychiatry, University of Manchester).

PROCEDURE: Initially base line recordings of four physiological parameters mainly systolic blood pressure, diastolic blood pressure, pulse rate, body weight were recorded individually for all the subjects in both Yoga group and physical exercise group. Later their mental health assessment was made by administering general health questionnaire. The questionnaire was administered in a quite atmosphere in small groups. Very clear instructions regarding the questionnaire were given.

It was made sure that every subject understood the procedure. They are asked to give spontaneous responses to each item of the questionnaire. After taking the baseline reading of all the parameters, Yoga group started practicing Yoga for two hours every day for duration of three months. The physical exercise group started brisk walk every day for one hour. They continued their practice for three months. At the end of three months both the subjects in yoga group and the subjects in the physical exercise group were assessed for the same physiological and psychological parameters again.

RESULTS AND DISCUSSION:

Table – 1
Sample Characteristics

S. No.		Physical Exercise Group	Yoga Group
1.	No. of Subjects	30	30
2.	Male	20	17
3.	Female	10	13
4.	Age	30-45 Years	30-45 Years

Table – 1 shows the sample characteristics. 30 subjects were assigned in each group they were in the age range of 30-45 years. First group was the physical exercise group consisting of 20 males and 10 females. The second group was the yoga group consisting of 17 males and 13 females.

Table 2: Showing pretest and post test physiological variables for the Yoga Group
Pre Test

S. No.	Variable	Mean±SD	t	p
1.	Systolic BP	115.83 ± 10.26	9.279	0.000
2.	Diastolic BP	77.83 ± 9.89	6.922	0.000
3.	Pulse rate	68.63 ± 5.84	7.101	0.000
4.	Weight	65.87 ± 8.67	6.707	0.000

Post Test

S. No.	Variable	Mean±SD	t	p
1.	Systolic BP	116.50 ± 6.58	9.279	0.000
2.	Diastolic BP	77.83± 6.39	6.922	0.000
3.	Pulse rate	67.57 ± 4.20	7.101	0.000
4.	Weight	64.00 ± 8.18	6.707	0.000

The data obtained on yoga practitioners for all the physiological parameters before and after training in yoga are presented in Table – 2. The data was analysed to find out whether there is any

significant difference in the scores obtained before and after yoga training, in other words the impact of Hatha Yoga Practice on physiological parameters. In the pre-training testing, the mean score of systolic blood pressure was 115.83 and when tested after three months of yoga the systolic blood pressure was 116.50. The difference between the means yielded a t-ratio of 0.548 which was statistically not significant. The mean diastolic blood pressure of the group before yoga training was 77.83 and it was tested after training also, it was 77.83 which shows that there was no difference in the mean diastolic blood pressure measured before and after yoga training. Before yoga training the group recorded the mean pulse rate of 68.63 and it was 67.57 after yoga training. The difference between both means and yielded a t ratio of 0.908 which was statistically not significant. The mean body weight of the group was 65.87 before yoga training and after training it was 64.00. The mean difference between the two scores gave a t ratio 6.100 which was significant at 0.00 level. Of all the four physiological variables that were measured, body weight reduced significantly after Yoga training whereas the remaining variables namely systolic BP, Diastolic BP, pulse rate did not show any significant change.

Table – 3 Showing pretest and post test physiological variables for the Yoga Group

Pre Test

S. No.	Variable	Mean±SD	t	p
1.	Somatic symptoms	6.90 ± 3.62	9.279	0.000
2.	Anxiety and insomnia	6.33 ± 4.05	6.922	0.000
3.	Social dysfunction	6.27 ± 4.27	7.101	0.000
4.	Severe depression	5.93 ± 4.60	6.707	0.000

Post Test

S. No.	Variable	Mean±SD	t	p
1.	Somatic symptoms	2.10 ± 2.06	9.279	0.000
2.	Anxiety and insomnia	1.50 ± 1.61	6.922	0.000
3.	Social dysfunction	1.90 ± 2.29	7.101	0.000
4.	Severe depression	2.10 ± 2.92	6.707	0.000

The data obtained from yoga practitioners on the physiological variables before and after training are presented in Table – 3. The mean scores obtained before yoga training on somatic symptoms was 6.90 and after 3 months of training it was 2.10. The mean difference gave a t ratio of 9.279 which was highly significant at 0.01 level. On anxiety and insomnia variable, the group obtained a mean score of 6.33 before training and the score was 1.50 after training. The mean difference yielded a t ratio 6.922 which was significant at 0.01 level.

On the variable social dysfunction the group obtained a mean score of 6.27 before training and 1.90 after training. The mean difference between the two scores obtained on two occasions was significant at 0.01 level with a tratio of 6.707. The date obtained on psychological variables for yoga

training group on the two occasions once before and again after 3 months of yoga training reveals that there is a significant difference between the scores.

Table – 4 Showing pretest and post test physiological variables for the Physical Exercise Group

Pre Test

S. No.	Variable	Mean±SD	t	p
1.	Systolic BP	116.50 ± 7.67	9.279	0.000
2.	Diastolic BP	76.50 ± 8.42	6.922	0.000
3.	Pulse rate	69.73 ± 3.06	7.101	0.000
4.	Weight	66.57 ± 8.21	6.707	0.000

Post Test

S. No.	Variable	Mean±SD	t	p
1.	Systolic BP	115.50 ± 6.48	9.279	0.000
2.	Diastolic BP	74.50 ± 7.58	6.922	0.000
3.	Pulse rate	68.43 ± 2.74	7.101	0.000
4.	Weight	65.40 ± 7.64	6.707	0.000

Table – 4 shows the mean scores of physical exercise group on all the physiological parameters measured before and after 3 months of regular brisk walk practice in the morning. The data was analysed to find out whether there is any significant difference in the physiological parameters measured before and after 3 months of brisk walk.

Before the group was introduced to physical exercise, the mean score for systolic blood pressure was 115.50, difference between the two means yielded a t ratio of 1.099 which was not statistically significant. The group maintained mean diastolic pressure of 76.50 and 74.50 before and after 3 months brisk walk practice. The difference between the means was significant at 0.01 level with a t ratio of 2.693 the mean pulse rate of the group was 69.73 and 68.43 before and after yoga training respectively. The difference between the means gave a t ratio of 2.973 which was significant at 0.006.

The mean body weight of the group was 66.57 and 65.40 before and after training in physical exercise. The mean difference was found to be significant at 0.01 level with a t ratio of 5.299.

Thus the results of the physical exercise group reveal that there is a statistically significant difference on diastolic blood pressure, pulse rate and body weight assessed before and after 3 months of regular brisk walk.

Table – 5 Showing pretest and post test physiological variables for the physical exercise Group

Pre Test

S. No.	Variable	Mean±SD	t	p
1.	Somatic symptoms	3.92 ± 2.68	9.279	0.000
2.	Anxiety and insomnia	5.27 ± 3.86	6.922	0.000
3.	Social dysfunction	6.67 ± 3.27	7.101	0.000
4.	Severe depression	2.63 ± 2.39	6.707	0.000

Post Test

S. No.	Variable	Mean±SD	t	p
1.	Somatic symptoms	3.83 ± 2.61	9.279	0.000
2.	Anxiety and insomnia	4.60± 3.65	6.922	0.000
3.	Social dysfunction	5.43± 3.16	7.101	0.000
4.	Severe depression	1.70± 2.25	6.707	0.000

The data of the physical exercise group on the physiological variables that was obtained and after training are presented in Table – 5. Before the group was introduced to physical exercise it obtained a mean score of 3.93 on somatic symptoms and it was 3.83 after training The mean difference was statistically not significant. On anxiety and insomnia variable the group obtained a mean score of 5.27 and 4.60 before and after training respectively. The mean difference was significant at 0.01 level. On social dysfunction the mean score was 6.67 before training and it was 3.16 after training. The difference between means was significant at 0.01 level with a t ratio of 5.798. On severe depression variable pre training score of the group was 2.63 and at post training it was 1.70, the mean difference yielded t ratio of 5.635 which was significant at 0.01 level.

The data of physical exercise group on psychological variables shows that the group's performance on anxiety and insomnia, social dysfunctions and severe depression differed significantly after 3 months of regular brisk walk.

Examining the results presented in the above tables, it appears that on physiological variables, physical exercise caused significant change in diastolic blood pressure, pulse rate and body weight whereas yoga training caused significant change only in body weight. Initial examination suggests that physical exercise had broader impact on physiological variables than yoga training. However, closer look at the data suggests that the mean scores on all the physiological variables were within the normal range both before and after training. The participants were enjoying good health even before they started yoga or physical exercise. Even after training their health status continued in the normal limits. At this stage it may be said that whatever may be the training given, it cannot be expected to reduce the scores below the normal limit ant it is not desirable too.

Hence, it may be said that the selected sample enjoys good health as far as the physiological measures that are studied are concerned. Even after training they continued the same status. In the case of physical exercise group. The mean difference was slightly more.

An examination of the impact of physical exercise and yoga training on psychological variables suggest that in the yoga training group there was significant change in all the four variables, namely somatic symptoms, anxiety, insomnia, social dysfunction and severe depression.

Similarly in the physical exercise group the difference was statistically significant in all variables except somatic symptoms. From the results it appears that both physical exercise and yoga training are effective in improving psychological health of its practitioners.

A closer examination reveals that although yoga training and physical exercise contributed to bring about significant change in psychological variables, the magnitude of the change appears to be more in the case of yoga training. This may be noticed in the mean scores presented in Table – 3 and Table – 5. However, it cannot be concluded that yoga training is better than physical exercise.

CONCLUSION: In conclusion it may be said that since both physical exercise group and yoga training group comprised of very healthy subjects, the impact of training is not glaring, including a control group and a clinical group such as obese or hypertension would certainly bring about subtle differences in the two systems. Regarding the psychological variables both yoga and physical exercise group showed significant change except in the case of somatic symptoms. In addition to these variables of assessment of subjective well being is also made on both the group before and after training, would give us an opportunity to compare the merits of these two systems.

BIBLIOGRAPHY

1. Anantharaman V, and Sarada Subrahmanyam, "Physiological benefits on Hatha Yoga Training". The Yoga Review; 3(1): 9-24.
2. Arpita, "Physiological and psychological effects of Hatha Yoga". The review of literature. The journal of the international association of Yoga therapists 1990, 1(I&II): 1-28).
3. Alan Finger's "Introduction to Yoga".
4. B.K.S. Iyenger "Light on Yoga".
5. B.K.S. Iyenger "Light on Pranayama". The yogic art of breathing.
6. Bhattacharya S, Pandey U.S., Verma N.S., "Improvement in oxidative status with yogic breathing in young healthy males. Department of Physiology, Kind George's Medial College, Lucknow, J Physol, Pharmacol 2002 July 46(3): 349-54.
7. Chohan S, Nayar H.S, Thomas P, Geeta NS: "Influence of Yoga on blood coagulation", Thromb Haemost, 1984 Apr 30; 51(2): 196-7.
8. Dholan Dass Agarwal, Dr. Satyapal. "Yogasana and Sadhana", 1980, Bharathiya Yoga Sansthan.
9. David Webener MD, "Exercise and Fitness", Department of Family Medicine, University of Pennsylvania.
10. Gita S Iyenger (1997) "Yoga – A gem for women".
11. G K Paul, Pravati pal "A text book of practical physiology".
12. Goldberg D P, Hiller V F (1979) "A scaled version of the General Health Questionnaire". Psychol Med 9:139-145.
13. Harinath K, Malhotra AS, Pal K, Prasad R, Kumar R, Kain JC, Rai L, Saeheny RC. Effects of Hatha Yoga and OMKAR meditation on Cardio respiratory performance, psychologic profile, and melatonin secretion. Defence institute of physiology and allied sciences Timarpu, Delhi, India. J. Altern Complement Med. 2004 Apr 10(2) : 261-8.

14. Irwin ML, Yasui Y, Ulrich CM, Bowen D, Ruedolph RE, Potter JD, Aiello E and Mc Tiernan A. Effect of exercise on total and intra abdominal body fat in post menopausal women, randomized controlled trial. JAMA, 289 (3), (2003), 323-30.
15. KN Udupa, "Psychobiological studies on Hatha yogic practices". Quarterly Journal of surgical sciences, 1977, 13(3-4): 290-293.
16. Konar D, Latha K, Bhuvaneswaran JS, Cardio vascular response and to head-down-body-up postural exercise. Department of physiology, PSG Institute of Medical sciences and research peelamedu, Coimbatore. Indian J Physiopharmacol, 2000 Oct, 44(4): 392-400.
17. Malathi A, Damodharan A, Shah N, Patil N, Maratha S, "Effect of Yogic Exercises on Subjective well being", Department of Physiology, LTMMC-LTMMGH, Sion, Mumbai. Indian J Physiol Pharmacol, 2000 April, 44(2): 202-206.
18. Paillard T, Lafont C, Dupui P, Riviere D and Vellas B. Effect of walking program on cardio respiratory performance. The journal of nutritional health aging, 6(2) (2002) 138-40.
19. Raju PS, Kumar KA, Reddy SS, Madhavi S, Gnanakumari K, Bhaskaracharyulu C, Reddy MV, Annapurna N, Reddy ME, Girajakumari D. Effect of yoga on exercise tolerance in normal healthy volunteers. Indian J Physiol Pharmacol, 1986 Apr-Jun 30(2) 121-32.
20. Raju PS, Prasad KV, Venkat RY, Murthy KJ, Reddy MV. Influence of yoga training on physiological changes in 6 adult woken: a case report. Department of work physiology government vemana yoga research institute Ameerpet, Hyd. India J Altern Compliment Med. 1997 Fall; 3(3): 291-5.
21. Raghuraj P, Ramakrishna AG, Nagendra HR, Telles S."Effect of two selected yogic breathing techniques of heart rate variability". Vivekananda Kendra Yoga Research foundation, Bangalore. Indian J Physiol Pharmacol 1998 Oct 42(4) 461-472.
22. Schell FJ, Allolio B, Schoneche OW. Physiological and Psychological effects of Hatha – Yoga exercise in healthy women. Department of Internal Medicine, University of Wurzburg, Germany. In TJ Psychosom, 1994; 41(1-4): 46-52.
23. Satyanarayana M, Rajeswari KR, Rani NJ, Krishna CS, Rao PV (1992). "Effect of santhikriya on certain Psycho physiological parameters". Indian J Physiol Pharmacol 1992 Apr 36(2) 88-92. Institute of Yoga and Consciousness, Andhra University, Visakhapatnam.
24. Solvamurthy W, HS Nayar, NT Joseph and S Joseph. "Physiological effects of Yogic Practices". NIMHANS J Jan 1983 1(1): 71-79.
25. Singh RH, RM Shettiwar and KN Udupa. "Physiological and Therapeutic studies on Yoga", Yoga review, 1982, 2(4): 185-209.
26. Santhga, Joseph, K Sridharan, SKB Patil, ML Kumaria, W Selvamurthy and HS Nayar. "Neurohumoral and Metabolic changes consequent to yogic exercises". Indian J of Medical Research, 1981, 74: 120-124.
27. Srianandа. "A complete book of yoga Harmony of body and mind", Edition 1998.
28. Suzanne Daeson. "Yoga conditioning for weight loss".
29. Tran MD, Holly RG, Lashbrook J, Amsterdam EA. "Effects of Hathe Yoga Practice on the health related aspects of physical fitness". Department of exercise science, University of California at Davis, Davis CA 956 lbs Prev cardiol. 2001 Autumn, 4(4): 165-170.

30. US Ray and Other. “Effect of Yogic exercises on physical and mental health of young fellowship course trainees”. Indian Journal of Pharmacology, Volume 45, No.:1 (2001), 37-53.
31. Yoga Hostic online.com