

Impact of Yogic Asanas at Different Altitudes

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People search for simple, but ideal system of training the mind and body for complete fitness. This can be achieved through the ancient practice of yoga. Hatha yoga is the physical practice of yogic movement that involves moving in and out of different positions. In ancient India, there are hundreds of these exercises practiced by people to attain fitness and complete health. The practice involves controlled breathing and meditative exercises through the Yoga Sutras. Currently, there are many different styles of Yoga like Hatha Yoga, Astanga Yoga, Iyengar, Sivananda, Bikram Kripalu, Vinyasa, etc. The practice of Yoga is meant to challenge and inspire to greater physical, mental and spiritual heights. Yoga also focuses on breathing, which strengthens the cardiopulmonary system. Good posture develops greater skill and confidence in mind and body. And last, but not the least, yoga teaches one to relax the mind and body as a vital element of one's practice.

In this fast-paced, constantly moving world, practicing yoga allows time to stop and make the person aware about oneself. It is a time to be one with the body and to let go of all the distractions and worries of the world. Some hatha yoga postures can be risky and unwise for many people to practice like performing headstands, doing full backbends, and even crossing the legs too much can strain the neck, spine and knees. Yoga has positive impact on the body of the individual which is not limited to physical aspects only, but also covers mental, physiological and other aspects. The physiological functioning strengthens the internal organs and organ system to make the body fit. The relationship between oxygen consumption and heart rate in any individual is a measure of the amount of oxygen delivered per heart-beat, which in turn reflects the stroke

volume. When looking at population data, rather than individual data, at different work intensities, it has been established that the maximum possible heart rate and aerobic efficiency are age and sex related. Aerobic function tests should only be seen as giving a broad indication of any individual's aerobic capacity.

This study was conducted to assess the impact of yogic asanas in relation to the youth of different places. The youth from the different altitudes is tested in terms of physiological functioning and its effect on yoga training. Various studies were conducted on the effect of yoga in different groups of people.

Reviews

Jain and Talukdar (1993) studied the effects of a yoga therapy program on 46 patients of chronic bronchial asthma including exercise capacity, pulmonary functions and blood gases. Exercise capacity was measured by 3 tests: (i) 12 min Walk Test (ii) Physical Fitness Index by modified Harvard step test and (iii) Exercise-Liability index. Yoga therapy resulted in an increase in pulmonary functions and exercise tolerance. A one-year follow-up study showed a good to fair response with reduced symptoms scores and drug requirements in these subjects.

Innes, Bourguigno & Taylor (2005) reviewed research published between 1970 and 2004 on the effects of yoga on insulin resistance and cardiovascular disease. 70 studies were identified, including 1 observational study, 26 uncontrolled clinical trials, 21 non-randomized controlled clinical trials, and 22 randomized controlled clinical trials. These studies provide evidence that yoga can improve many physiological indicators of insulin resistance and cardiovascular disease, including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation, and cardiovagal function. Yoga is also associated with improvement in several clinical outcomes, such as need for drug therapy, progression of disease, and incidence of additional illness episodes.

Kirkwood, Rampes, Tuffrey, Richardson, Pilkington & Ramaratnam (2005) reviewed controlled clinical trials on the effectiveness of yoga for the treatment of anxiety and anxiety disorders. The review covered major databases, as well as organizations such as the International Association of Yoga Therapists and the Yoga Biomedical Trust. Only eight controlled clinical trials were identified.

The tradition/approach to yoga varied among studies, and studies focusing on meditation only were excluded. Most yoga interventions included asana, breathing, and relaxation. One study compared Kundalini yoga to mindfulness meditation and relaxation, and found that yoga was more effective in reducing anxiety than mindfulness meditation and relaxation. Several studies compared yoga to anti-anxiety medications, and reported greater improvements from yoga than medication.

Deng & Cassileth (2005) reported promising results in a preliminary study of yoga for insomnia. 20 participants (18 women, 2 men, ages ranging from 30-64) with chronic insomnia (experiencing insomnia for longer than 6 months) practiced yoga daily for eight weeks. Participants received only one yoga training session, and practiced on their own for the duration of the trial.

Methodology and Procedure

Total 399 subjects or youth were randomly selected from three different regions of the country in terms of altitude difference i.e. Shimla, Delhi and Mumbai. The subjects were identified with selected physiological parameters measurement followed by three-month Yogic asanas training and thereafter post physiological parameters measurement. The data was analyzed by the independent t-test followed by Kruskal – Wallis Non Parametric tests.

Result

Pre-test

The physiological parameters were compared for three altitude i.e. Pre-test.

Null Hypothesis, H_0 : There is no significant difference between this phase of Shimla (represented by 2), Delhi (represented by 5) and Mumbai (represented by 8) at 5% level of significance.

Alternate Hypothesis, H_1 : There is a significant difference between phase 2 of Shimla (represented by 2), Delhi (represented by 5) and Mumbai (represented by 8).

Test Criteria: Reject H_0 if the significant value is less than 0.05.

Ranks

	Phase	N	Mean Rank
BMI	2	83	53.42
	5	23	99.74
	8	33	90.97
	Total	139	
Fat	2	83	68.33
	5	23	75.54
	8	33	70.35
	Total	139	
BMR	2	83	44.66
	5	23	102.91
	8	33	110.80
	Total	139	
W_H	2	83	47.10
	5	23	97.87
	8	33	108.18
	Total	139	
PR	2	83	68.13
	5	23	78.22
	8	33	68.98
	Total	139	
S_BP	2	83	66.70
	5	23	72.22
	8	33	76.76
	Total	139	
D_BP	2	83	65.37
	5	23	84.09
	8	33	71.83
	Total	139	
TLC	2	83	67.76
	5	23	12.00
	8	33	116.06
	Total	139	

Test Statistics^{a,b}

	BMI	Fat	BMR	W_H	PR	S_BP	D_BP	TLC
Chi-Square	35.559	.582	82.130	67.665	1.158	1.560	3.993	91.167
Df	2	2	2	2	2	2	2	2
Asymp. Sig.	.000	.748	.000	.000	.560	.458	.136	.000

a. Kruskal Wallis Test

b. Grouping Variable: Phase

Conclusion:

The significant values for all the variables except Fat, PR, S_BP and D_BP are less than 0.05 hence we reject Ho and conclude that the first phases of the three cities differ significantly from each other for all variables except Fat, PR, S_BP and D_BP.

Post Test

The post test result analysis was carried out i.e. after exposure to three month Yogic asanas training to the subjects.

Null Hypothesis, Ho: There is no significant difference between phase 3 of Shimla (represented by 3), Delhi (represented by 6) and Mumbai (represented by 9) at 5% level of significance.

Alternate Hypothesis, H1: There is a significant difference between phase 3 of Shimla (represented by 3), Delhi (represented by 6) and Mumbai (represented by 9).

Test Criteria: Reject Ho if the significant value is less than 0.05.

Ranks

	Phase	N	Mean Rank
BMI	3	83	53.55
	6	23	99.09
	9	33	91.09
	Total	139	
Fat	3	83	64.65
	6	23	80.20
	9	33	76.35
	Total	139	

	Phase	N	Mean Rank
BMR	3	83	45.26
	6	23	103.46
	9	33	108.91
	Total	139	
W_H	3	83	50.77
	6	23	83.54
	9	33	108.94
	Total	139	
PR	3	83	68.37
	6	23	77.09
	9	33	69.15
	Total	139	
S_BP	3	83	64.04
	6	23	78.26
	9	33	79.24
	Total	139	
D_BP	3	83	63.29
	6	23	92.52
	9	33	71.18
	Total	139	
TLC	3	83	67.86
	6	23	13.65
	9	33	114.67
	Total	139	

Test Statistics^{a,b}

	BMI	Fat	BMR	W_H	PR	S_BP	D_BP	TLC
Chi-Square	34.894	3.760	78.026	52.511	.862	4.557	9.622	85.876
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.000	.153	.000	.000	.650	.102	.008	.000

a. Kruskal Wallis Test

b. Grouping Variable: Phase

Conclusion

The significant values for all the variables except Fat, PR and S_BP are less than 0.05 hence we reject Ho and conclude that the first phases of the three cities differ significantly different from each other for all variables except Fat, PR and S_BP.

Phase wise comparison for exercise regime 'Yoga' taking grouping variable 'city':

The significant p-values for the variables are as follows:

Variable	Phase	Phase(Pre test)	Phase 3(Post test)
BMI	.000	.000	.000
Fat%	.572	.748	.153
BMR	.000	.000	.000
WHR	.000	.000	.000
PR	.566	.560	.650
SBP	.313	.458	.102
DBP	.045	.136	.008
TLC	.000	.000	.000

Under phase of pre-test, there is significant difference between mean ranks of all the variables in three cities except for the variables Fat, PR, SBP and DBP.

Under phase of post-test, there is significant difference between mean ranks of all the variables in three cities except for the variables Fat, PR and SBP.

Main findings and discussion of result:

The study was conducted on youth of three altitudes viz. High (Shimla) Plane (Delhi) and Costal (Mumbai) for their physiological parameters viz. BMI, Fat%, BMR, WHR, PR, BP (SBP & DBP) and TLC in respect to the available fitness regime viz. Yogasana, Aerobics and Aeroyoga.

Total 300 youth (subjects) were randomly selected for three-month Yogic asanas training from three altitudes. Though the environmental conditions, fitness of participants, their socioeconomic conditions etc. were kept in abeyance as matter of limitation of the study, moreover the ratio between male

and female were also treated as insignificant for the study.

The entire subjects were treated with three-months Yogic asanas training. The entire lot of students were again evaluated physically and physiologically with standard equipment.

The statistical analysis of the variance (Physiological Parameters: BMI, Fat%, BMR, WHR, PR, BP (SBP & DBP) and TLC) were done among three groups (Altitude wise: Shimla, Delhi & Mumbai). The result reveals that there was a significant difference among the three altitudes in BMI, BMR, WHR and TLC before and after Yogic asanas training; whereas there was no significant difference in Fat% and PR.

References

1. Berger, B. G. & Owen, D. R. (1992). Mood alteration with yoga and swimming: aerobic exercise may not be necessary. *Perceptual Motor Skills* 75, 1331-1343.
2. Birkel D. A. & Edgren L. (2000). Hatha yoga: improved vital capacity of college students. *Alternative Therapies in Health & Medicine* 6, 55-63.
3. Boyle, C.A., Sayers, S.P., Jensen, B.E., Headley, S.A. & Manos, T.M. (2004). The effects of yoga training and a single bout of yoga on delayed onset muscle soreness in the lower extremity. *Journal of Strength and Conditioning Research*, 18, 723-9.
4. Butler. D - Ten Minute yoga
5. Donohue, B., Miller, A., Beisecker, M., Houser, D., Valdez, R., Tiller, S. & Taymar, T. (2006). Effects of a brief yoga exercises and motivational preparatory interventions in distance runners: results of a controlled trial. *British Journal of Sports Medicine*, 40, 60-3.
6. Gharote, M. L. Effect of yogic training on physical fitness.
7. Hegde, K.S., and W. Selvamurthy. Effects of yogic asanas and physical exercise on body flexibility in middle aged men. *The Yoga Review, Summer & Autumn* 1983, 3(2&3):75-79.
8. Jense, P. & Kenny, D. (2004). The effects of yoga on the attention and behavior of boys with Attention-Deficit/ hyperactivity Disorder (ADHD). *Journal of Attention Disorder*, 7, 205-16.
9. Khanam, A. A., Sachdeva, U., Guleria, R., and Deepak, K. K. (1996). Study of pulmonary and autonomic functions of asthma patients after yoga training. *Indian Journal of Physiology & Pharmacology* 40, 318-324
10. Khumar, S. S, Kaur P. & Kaur S. (1993). Effectiveness of Shavasana on depression among university students. *Indian Journal of Clinical Psychology* 20, 82-87.
11. Kristal, A., Littman, A., Benitez, D. & White, E. (2005). Yoga practice is associated with attenuated weight gain in healthy, middle-aged men and women. *Alternative Therapy Health Medicine*, 11, 28-33.

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12. Lalvani, V - Classic Yoga
13. Lalvani, V - Complete Book of Yoga
14. Latha, D & Kaliappan, K. V. (1992). Efficacy of yoga therapy in the management of headaches. *Journal of Indian Psychology* 10, 41-47.
15. Mandanmohan, J. & Udupa, K. (2003). Effect of yoga training on handgrip, respiratory pressures, and pulmonary function. *Indian Journal of Physiology and Pharmacology*, 47, 387-392.
16. Makwana, K., Khirwadkar, N., & Gupta, H. C. (1988). Effect of short term yoga practice on ventilatory function tests. *Indian Journal of Physiology & Pharmacology* 32, 202-208.
17. Malathi A. Damodaran A. Shah N. Patil N. Maratha S. (2000). Effect of yogic practices on subjective well being. *Indian Journal of Physiology & Pharmacology*. 44, 202-6.
18. Malhotra, V., et al. (2002). Study of yoga asanas in assessment of pulmonary function in NIDDM patients. *Indian J Physiol Pharmacol* 46(3):313-20.
19. Malhotra, V., et al. (2002). Effect of Yoga asanas on nerve conduction in type 2 diabetes. *Indian J Physiol Pharmacol* (3):298-306.
20. McCaffrey, R., Ruknui, P., Hatthakit, U., Kasetsoomboon, P. (2005). The effects of yoga on hypertensive persons in Thailand. *Holistic Nursing Practices*, 19(4), 173-180.
21. Parshad, O. (2004). Role of yoga in stress management. *West Indian Medical Journal*, 53, 191-194.
22. Reddy, B R, S. Madhavi, K. V. Prasad, M. V. Reddy, M. E.. K. Sahay, and K. J. Murthy. Comparison of effects of yoga & physical exercise in athletes. *Indian Journal of Medical Research*, Aug 1994, 100:81-87.
23. Sivasankaran, S., Pollard-Quintner, S., Sachdeva, R., Pugeda, J., Hoq, S., & Zarich, S. (2006). The effect of a six-week program of yoga and meditation on brachial artery reactivity: Do psychosocial interventions affect vascular tone? *Clinical Cardiology*, 29, 393-399.
24. Visweswaraiah, N. & Telles, S. (2004). Randomized trial of yoga as a complementary therapy for pulmonary tuberculosis. *Respirology*, 9, 96-101.
25. Yadav Y.P - Art of Yoga
26. Yang, K. (2007). A review of yoga programs for four leading risk factors of chronic disease. *Evidence-based Complementary and Alternative Medicine*, 4(4), 487-491.
27. Yoga-Mimamsa, 1973, 15(4):31-35.
28. Yoga. (2006). In Dictionary. Retrieved October 10, 2008, from <http://dictionary.com>
29. Yogendra, J., et al. (2004). Beneficial effects of yoga lifestyle on reversibility of ischaemic heart disease: caring heart project of International Board of Yoga. *J Assoc Physicians India* 52:283-9.