

Effect of Suryanamaskar Practice on Cardio-respiratory Fitness Parameters: A Pilot Study.

Pratima M. Bhutkar¹, Milind V. Bhutkar¹, Govind B.Taware², Vinayak Doijad² and B.R. Doddamani^{1*}

¹Department Of Physiology, Mahadevappa Rampure Medical College, Gulbarga, Karnataka, India and ²Dr.Vaishampayan Memorial Govt. Medical College, Solapur, Maharashtra, India

Abstract: In recent times, medical fraternity is attracted towards yoga . Suryanamaskar is a part of yogic practices and is believed to be an all-round exercise. The present study tested efficacy of regular practice of 'suryanamaskar' in improving the cardio-respiratory fitness. The present study was conducted on 78 subjects, (48 males and 30 females). It was observed that 6 months of suryanamaskar practice decreases resting pulse rate and blood pressure. At the same time it increases cardio-respiratory efficiency and respiratory capacity as evaluated by bicycle ergometry and various lung functions tests, in both male and female subjects. From this study we conclude that suryanamaskar practice can be advocated to improve cardio-respiratory efficiency for patients as well as healthy individuals.

Key words: Suryanamaskar , Cardio-respiratory efficiency, Lung functions

Introduction

India has a rich tradition of yogic practices. Now-a-days yoga, the ancient practice of postures, breathing and meditation is gaining a lot of attention from healthcare professionals. With increasing scientific research in yoga, its therapeutic aspects are also being explored. Suryanamaskar – The salutation to the God Sun, is also a part of Indian traditional yogic practices. Each cycle of suryanamaskar is a sequence of certain 'asanas', performed along with 'pranayama' [1]. The sequence of asanas is such that each asana is complimentary to the next. During Suryanamaskar, muscles of the entire body experience stretch and pressure alternately and therefore it is said to give more benefits with less expenditure of time [2]. It is claimed that suryanamaskar practice gives benefits of both- asana and pranayama and improves general health and fitness. Hence, the present study was undertaken to study effects of suryanamaskar practice on cardio-respiratory fitness parameters in young, healthy subjects. Staining of cytology smear that is qualitatively as good as standard Papanicolaou stain for screening of cancer.

Materials and Methods:

In the present study, MBBS students, 78 in number (48 boys and 30 girls), participated voluntarily. Their age ranged between 18 to 20 years. They all were informed regarding the nature of the study and written consent was obtained. The baseline data was collected for all the subjects. It included following parameters-
1. Vital data included name, age, sex, height and weight of the subject.

2. Each subject was asked to lie down comfortably in supine position for 5 minutes. Then resting pulse was taken for complete 1 minute and resting blood pressure was measured by using mercury sphygmomanometer.
3. Respiratory muscle endurance was measured by 40mm endurance test [3].
4. With the help of medspiror following lung functions were recorded- vital capacity, forced expiratory volume at the end of 1st second (FEV₁) and maximum ventilatory volume (MVV).
5. Aerobic capacity was measured by bicycle ergometer. A standard protocol for continuous bicycle ergometry was followed [4] and the results were expressed as VO₂ max in L/min/kg body weight.

After recording of these parameters for all the subjects, Suryanamaskar training was given to them by the yoga experts for two weeks and then subjects performed suryanamaskar under the expert's guidance. The session began with prayer, followed by 'Omkar' chanting with appropriate 'Bija mantra' for each suryanamaskar and ended with prayer and 'shavasana'. Subjects performed 6 Suryanamaskar on the 1st day and the number was gradually increased to 24 over next 15 days. This practice of 24 cycles of suryanamaskara daily was performed for 6 days a week and continued for 6 months. After 6 months of regular practice of Suryanamaskar, all the above parameters were reassessed. Data was analyzed statistically by using paired 't' test separately for males and females.

Results:

Table 1- Mean values of various parameters in males (n = 48)

Parameter	Mean ± SD (Before)	Mean ± SD (After)	p value
Pulse (/ min)	80.7 ± 5.61	76.75 ± 3.90	< 0.0001
Systolic BP (mmHg)	125.5 ± 5.61	119. ± 3.92	< 0.0001
Diastolic BP (mmHg)	82.7 ± 5.51	77.8 ± 4.62	< 0.0001
Vital capacity (ml)	3692.3 ± 470.41	3896.35 ± 444.52	< 0.001
MVV (L/min)	101.08 ± 10.45	110.1 ± 10.67	< 0.001
FEV ₁ (sec)	89.69 ± 2.91	93.85 ± 1.59	< 0.001
VO ₂ max (L/min/Kg)	30.33 ± 3.50	33.1 ± 4.38	< 0.0001
40mm endurance (sec)	31.97 ± 3.25	39.13 ± 2.51	< 0.0001

Table 2- Mean values of various parameters in females (n = 30)

Parameter	Before Mean ± SD	After Mean ± SD	P value
Pulse (/ min)	82.75 ± 4.27	77.9 ± 4.12	< 0.001
Systolic BP (mmHg)	113.6 ± 5.33	110.4 ± 4.28	< 0.001
Diastolic BP (mmHg)	77.5 ± 6.49	75 ± 6.13	< 0.001
Vital capacity (ml)	3595.5 ± 471.15	3791.95 ± 473.34	< 0.001
MVV (L/min)	97.97 ± 10.15	107.79 ± 11.02	< 0.001
FEV ₁ (sec)	86.83 ± 4.07	89.97 ± 2.82	< 0.001
VO ₂ max (L/min/kg)	26.75 ± 2.27	29.43 ± 2.23	< 0.001
40mm endurance (sec)	25.95 ± 3.57	30.73 ± 3.41	< 0.001

Table 1 shows changes in all the cardio-respiratory parameters with regular practice of Suryanamaskar in male subjects whereas Table 2 represents various values in

female subjects. Both the groups show statistically highly significant decrease in resting pulse rate and blood pressure whereas statistically highly significant increase in various lung functions and cardio-respiratory efficiency was observed.

Discussion

As shown in table 1 and 2 all the parameters in males and females show statistically highly significant improvement with regular practice of suryanamaskar. Statistically significant reduction in pulse rate after regular practice of suryanamaskaras is attributed to increased vagal tone and decreased sympathetic activity [5,6]. Decreased sympathetic activity in turn reduces catecholamine secretion and also leads to vasodilation leading to improvement in peripheral circulation. It is also observed that regular yogic practices reduce basal metabolic rate and resting oxygen consumption [7]. All these may be responsible for reduction in resting pulse rate. These factors also decrease work load on heart leading to decrease in cardiac output and hence systolic blood pressure. Yogic practices alter the hypothalamic discharges [5] leading to decrease in sympathetic tone and peripheral resistance and hence the diastolic blood pressure. Regular yogic practices strengthen the respiratory muscles; increase the excursions of diaphragm and lungs as well as thoracic compliance [8,9]. Also yoga practices decrease airway resistance [8]. All these factors contribute to improvement in the various lung function tests after regular practice of suryanamaskar. Yogic practices also improve respiratory muscle endurance [10]. 40mm endurance test, which also showed statistically significant improvement, indicates better respiratory endurance in both the groups after regular practice of Suryanamaskar. Recent studies confirm increase in VO_2 max by yoga training [11,12]. This is due to reduction in resting oxygen consumption at the same time its better utilization at cellular level. Both the improvement in cellular machinery as well as increased lung functions explain raised VO_2 max after regular practice of suryanamaskar.

Thus, our study though preliminary suggests that regular suryanamaskar practice improves cardiopulmonary efficiency in healthy adolescents and is beneficial exercise for both males and females. Such yogic practices can be advised to those interested in improving cardiovascular efficiency but cannot undergo strenuous physical exercise. Further research with larger sample size and for varied age groups is required for applying these results to the population in general.

Reference

1. Vishwas Mandlik. Yog Shikshan Mala, Yog Parichay: 2001 6th Ed. Yogchaitanya Publication, Nashik: 36-45
2. Datey KK, Gharote MS. Yoga for your heart: 1985 Jaico Publishing house, Mumbai, pg 11-15
3. Ranade VG. Practical physiology. 2nd ed. 2000 Pune Vidyarthigriha Prakashan.
4. William D. McArdle, Frank I. Katch, Victor L. Katch. Individual differences and measurement of energy capacities. In Exercise Physiology Energy, Nutrition and Human Performance 5th Ed. Lippincott Williams and Wilkins, Baltimore, USA 2001; 242-243
5. Wenger M.A. and Bagchi B.K. Studies of autonomic functions in practitioners of yoga in India. 1961 Behavioral science, 312-323.
6. Vempati RP, Telles S. Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. 2002 Psycho.Rep, 90: 487-494

7. Karambelkar P.V. and Bhole M.V.. Heart control and yoga practices. 1971 *Yoga Mimansa*, 53-65
8. Makwana K., Khirwadkar N. and Gupta H.C. Effects of short term yoga practice on ventilatory function tests. 1988 *Indian journal of physiology and pharmacology*, vol.32, 202-207.
9. Nayar H.S., Mathur R.M.et.al.. Effects of yogic exercises on human physical efficiency. Oct.1975 *Indian journal of medical research*, 1369-1375.
10. Madan Mohan, Thombre DP. Effects of yoga training on reaction time, respiratory endurance and muscle strength. 1992 *Indian journal of physiology and pharmacology*, 36(4): 229-233
11. Alisa Bauman. Is yoga enough to keep you fit? Sept/Oct. 2002 *Yoga journal*, www.yogajournal.com/practice0739_1.cfm
12. Ray U.S. et.al. Aerobic capacity and perceived exertion after practice of yoga techniques. 2001 *Indian journal of medical research*; 114: 215-221.

*All correspondences to: Dr. B.R. Doddamani, Professor and Head, Department of Physiology, M.R. Medical College, Gulbarga, Karnataka- 585 105, India