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Research Article

Effects of Suryanamaskar on Cardio-Respiratory and Reaction Time Among Final Year Medical Students

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Abstract: Suryanamaskar is a part of yogic practices composed of dynamic muscular movements synchronised with deep rhythmic breathing. Surya namaskar is believed to be an all-round exercise of series of twelve physical postures. These alternating backward and forward bending postures flex and stretch the spinal column through their maximum range giving a profound stretch to the whole body. Surya Namaskar has a deep effect in detoxifying the organs through copius oxygenation and has a deeper relaxing effect. The aim of the Present Study was conducted to see the efficacy of regular Practice of Suryanamaskar in Improving The Cardio-Respiratory Fitness reaction time among final year medical year students. The present study was conducted on 50 subjects, (30 males and 20 females). The surya namaskar session was conducted for 6 days weekly for 3 months. Cardio respiratory Parameters and reaction time has been assessed. It was observed that 3 months of regular suryanamaskar practice decreases resting pulse rate and blood pressure. It increases Vital capacity (ml), MVV (L/min), FEV1 (sec) and Respiratory muscle endurance. At the same time it increases cardio-respiratory efficiency and respiratory capacity and various lung functions tests, among the subjects. And immediately it decreases both Auditory reaction time (ART) and visual reaction time (VRT) of ($P<0.001$) which is statistically significant.
Keywords: Surya Namaskar**,** Cardio-respiratory efficiency, visual reaction time (VRT), auditory reaction time (ART).

INTRODUCTION

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 [3] Hence the present study was undertaken to study effects of suryanamaskar practice on cardio-respiratory fitness parameters in young healthy subjects. It has been reported that changes in breathing period produced by voluntary control of inspiration are significantly correlated to changes both visual reaction time (VRT) and auditory reaction time (ART) [4].

MATERIALS AND METHODS

The study was carried out at Stanley medical college and hospital in the year 2008. The study period was between February – September Their age range of the subjects were between 18 to 20 years. They were all informed regarding the nature of the study and written consent was obtained. The baseline data was collected for all the subjects. Vital data included name, age, sex, height and weight of the subject were collected. Each subject was asked to lie down comfortably in supine position for 5minutes. Then resting pulse was taken for complete 1 minute and resting bloodpressure was measured by using mercury sphygmomanometer. All subjects were given adequate exposure to the equipment on 2 different occasions to familiarize them with the procedure. To ensure objectivity, HR was recorded using non-invasive semi-automatic BP monitor having range from 60 to 190 beats/min and accuracy± 5%. Respiratory muscle endurance was measured by 40mm endurance test .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). Aerobic capacity was measured by bicycle ergometer. A standard protocol for continuous bicycle ergometry was followed and the results were expressed as VO2 max in L/min/kg body weight. ART was recorded for auditory beep sound and VRT for red light. Subjects were instructed to release response key with dominant hand as soon as they perceived the

stimulus given from the front to avoid effect of lateralised stimulus [5, 6]. After recording of these parameters for all the subjects, Suryanamaskar training was given to them by the yoga experts for three months 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 1stday and the number was gradually increased to 24 over next 15 days. This practice of 24 cycles of suryanamaskar daily was performed for 6 days a week and continued for 3 months. After 3months 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 Shows the effect of various parameters before and after performance of surya namaskar. Pulse rate, systolic Bp, Diastolic BP (mmHg), HR, ART, VRT decreases after the performance of suryanamaskar of p value < 0.001 which is found to be statistically significant .Vital capacity (ml), MVV (L/min), FEV1 (sec), VO2 max (L/min/Kg) 40mmendurance (sec) VRT increases after the performance of surya namaskar of p value < 0.001 which is found to be statistically significant.

Table-1: Showing Mean values of various parameters before and after surya namaskar (n=50)

Parameter	Mean ± SD(Before SN)	Mean ± SD (After SN)	p value
Pulse (beat / min)	81.65 ± 6.13	74.9 ± 3.24	< 0.001
Systolic BP (mmHg)	117.6 ± 5.32	110.8 ± 4.28	< 0.001
Diastolic BP (mmHg)	80.5 ± 4.43	74 ± 6.53	< 0.001
HR	79.52±2.47	74.81±2.04	< 0.001
Vital capacity (ml)	3145.5 ± 271.15	3592.91 ± 452.34	< 0.001
MVV (L/min)	83.37 ± 9.15	103.72 ± 8..02	< 0.001
FEV1 (sec)	84.63 ± 4.47	92.81 ± 3.82	< 0.001
VO2 max (L/min/Kg)	28.65 ± 2.46	36.43 ± 4.23	< 0.001
40 mmendurance (sec)	23.95 ± 3.57	32.73 ± 3.41	< 0.001
ART	212.04±8.13	187.44±8.26	< 0.001
VRT	236.80±6.93	210.82±4.8	< 0.001

DISCUSSION

Suryanamaskar is attributed to increased vagal tone and decreased sympathetic activity[7]. 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 [8]. 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 leading to decrease in sympathetic tone and peripheral resistance and hence the diastolic blood pressure. Regular yogic practices strengthen the respiratory muscles increases the excursions of diaphragm and lungs as well as thoracic compliance decrease airway resistance [9] 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 among the subjects after regular practice of Suryanamaskar. Recent studies confirms that practice of surya namaskar increase in VO2 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 VO2 max after regular practice of suryanamaskar. It has been previously reported that SN produces an increase inVO2 max indicating improved aerobic capacity and that it exerts only moderate stress on cardio-respiratory system as it keeps the practitioner within their lactate and anaerobic threshold [12]. Decrease in RT signifies improvement in central neuronal processing ability and this may be attributed to greater arousal and faster rate of information processing along with improved concentration. Previous studies have demonstrated Exchanges around somato-sensory and pariet l areas of cerebral cortex suggesting affective arousal occur through strong stimulation of somatic and splanchnic receptors [13]

CONCLUSION

From our study we conclude that regular suryanamaskar practice improves cardiopulmonary efficiency in healthy adolescents and is beneficial on cardiovascular, respiratory efficacy and reaction time parameters Such yogic practices can be advised to those interested in improving cardiovascular efficiency but cannot undergo strenuous physical exercise.

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