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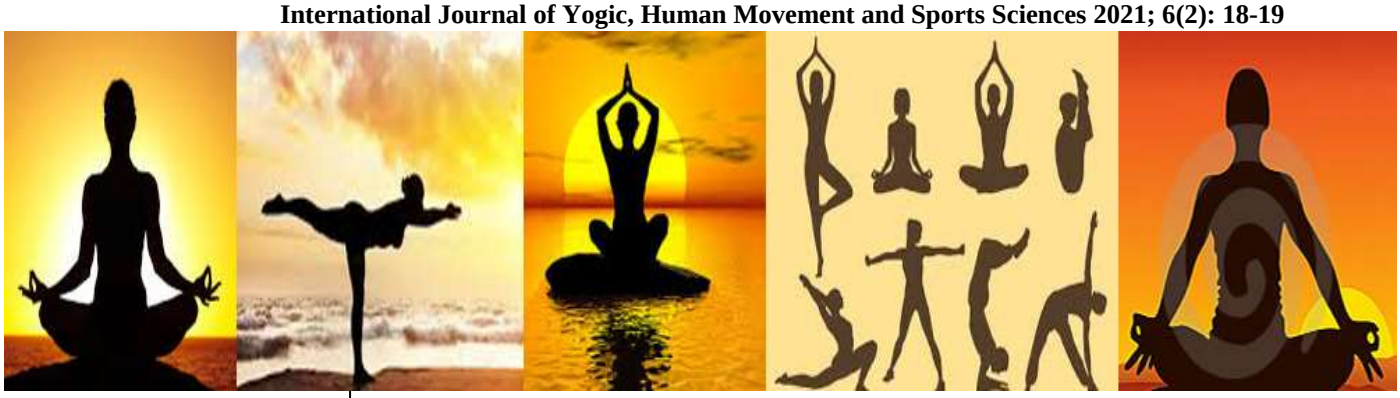

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Effect of yogic practices on muscular strength resting pulse rate and mean arterial pressure among badminton players

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Abstract
The purpose of the present study was to find the effect of yogic practice on muscular strength, resting pulse rate and mean arterial pressure. For this purpose, thirty badminton players studying in various classes and departments of Annamalai University, Chidambaram, Tamil Nadu, India in the age group of 18 – 25 years were selected. They were divided into two equal groups, each group consisted of fifteen subjects, in which group – I underwent yoga practice and group – II acted as control group who did not participate in any special training. The training period for this study was five days in a week for twelve weeks. Prior to and after the training period the subjects were tested for muscular strength, resting pulse rate, mean arterial pressure. Muscular strength was measured by conducting push-ups test, resting pulse rate was measured by counting the pulse per minute at resting condition and mean arterial pressure was measured by using a formula. The result of the study has shown that the yoga practice group has significantly improved the muscular endurance and also significant reduction in resting pulse rate and mean arterial pressure after the thirteen weeks of yogic practices.

Keywords: Yogic practice, muscular strength, resting pulse rate and mean arterial pressure

Introduction
Yoga is the science of right living and, as such, is intended to be incorporated in daily life. It works on all aspects of the person: the physical, vital, mental, emotional, psychic, and spiritual. Yoga aims at bringing the different bodily functions into perfect coordination so that they work for the good of the whole body.

Yogasanas are Indian's unique contribution to physical education. Yoga and physical education may be compared to two bullocks hitched to shaft as they are for the judicious blending of the education of the body and the mind. There is no denial of the fact that yoga and physical education attach importance by gaining the benefits of physical health, mental health, physical fitness and peace of mind through their regular practices. Physical education concerns with anatomical aspects of the physique with its physiological reactions for a given activity. The ultimate aim of which is to enjoy a good health and optimum fitness. Yoga is providing a multidimensional development and it has now become an adjunct to physical education.

Regular practice of asana maintains the physical body in an optimum condition and promotes health even in an unhealthy body. Through asana practice, the dormant energy potential is released and experienced as increased confidence in all areas of life. Yogasanas have a deeper significant value in the development of the physical, mental and spiritual personality, whereas pure exercises only have a physical effect on the muscles and bones.

Muscular strength Defined most simply as the ability to produce muscular force, muscular strength is often divided into muscular strength and muscular endurance. Muscular endurance is the ability of a muscle to contract repeatedly or continuously (as when carrying a child), whereas pure strength is the amount of force produced for one contraction (as when standing up from a chair). Most of us need a combination of the two—muscular endurance for posture muscles, and muscular strength in the trunk, legs, and arms for lifting many people start losing strength as they age or become inactive, although the loss is not irreversible (Rogers and Evans 1993).

In addition, women lose more strength than men do, especially from the upper body (perhaps because they may be less active when they are younger).

The mean arterial pressure (MAP) or mean blood pressure in the arteries supplying the body is a result of the heart pumping blood from the veins back into the arteries. At high heart rates, MAP is more closely approximated by the arithmetic mean of systolic and diastolic pressures because of the change in shape of the arterial pressure pulse. MAP is considered to be the perfusion pressure seen by organs in the body. It is believed that a MAP of greater than 60 mmHg is enough to sustain the organs of the average person under most conditions.

Materials and Methods

This study under investigation involves the experimentation of yogic practices on muscular strength, resting pulse rate and mean arterial pressure. Only thirty badminton players studying in various classes and departments of Annamalai University, Chidambaram, Tamil Nadu, India and aged between 18 and 25 years were selected. The selected thirty subjects were randomly divided into two groups of fifteen each, out of which group - I (n = 15) underwent yogic practices and group - II (n = 15) remained as control, which did not participate any special activities. The training programme was carried out for five days per week during morning session only (6 am to 8 am) for thirteen weeks. The descriptions of yogasanas were given in the appendix. Muscular strength was assessed by conducting push-ups test, resting pulse rate was measured with counting the pulse rate during resting condition for one minute and mean arterial pressure was measured by using a formula as:

MAP = Diastolic BP+ 1/3 (systolic BP - diastolic BP).

Analysis of data

The data collected prior to and after the experimental periods on muscular strength, resting pulse rate and mean arterial pressure on yoga practice group and control group were analysed and presented in the following table - I.

Table 1: Analysis of Covariance and 'F' ratio for Muscular Strength, Resting Pulse Rate and Mean Arterial Pressure for Yoga Practice Group and Control Groups

Variable Name	Group Name	Yoga Practice Group	Control Group	'F' Ratio
Muscular Strength (Numbers/min)	Pre-test Mean ± S.D	27.367 ± 0.22	27.340 ± 0.19	0.126
	Post-test Mean ± S.D.	29.67 ± 0.26	27.293 ± 0.17	27.543*
	Adj. Post-test Mean ± S.D.	30.68	27.3032	60.69*
Resting Pulse Rate (Numbers/min)	Pre-test Mean ± S.D	70.47 ± 1.64	70.87 ± 2.26	0.307
	Post-test Mean ± S.D.	68.00 ± 1.56	70.93 ± 2.60	6.088*
	Adj. Post-test Mean ± S.D.	68.184	70.749	13.627*
Mean Arterial Pressure (in mmHg)	Pre-test Mean ± S.D	84.908 ± 1.752	85.262 ± 2.00	0.266
	Post-test Mean ± S.D.	83.0647 ± 0.96	85.3527 ± 1.80	18.853*
	Adj. Post-test Mean ± S.D.	83.180	85.237	52.612*

* Significant at .05 level of confidence

The table value required for significance at .05 level of confidence with df 1 and 28 and 1 and 27 were 4.20 and 4.21 respectively

Results

The training intensity for yogic practice was shown in appendices. Before applying the experiment all the subjects of the yoga practice and control groups were attended the pre-test, which was conducted a day prior to the commencement of the training and the data were collected on muscular strength, resting pulse rate and mean arterial pressure. After thirteen weeks of training the post-test was conducted one day after the training period to find out any changes in the criterion variables.

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. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as an appropriate. After applying the analysis of covariance, the result of this study showed that there was a significant difference among yoga practice and control groups on muscular strength, resting pulse rate and mean arterial pressure after thirteen weeks of yogic practices. The criterion variables such as, muscular strength was improved for yoga practice group, and resting pulse rate and mean arterial pressure were significantly decreased after the yoga practice period. Basically the yoga practice has tremendously improves the physical fitness and physiological variables.

Conclusions

Muscular strength has improved for yogic practice group, when compared with the control group. The results of this study also shown that there was a significant reduction in resting pulse rate for yogic practice group. The mean arterial pressure was decreased in yogic practice group when compared with the control group.

Appendices

Selection of Yogasanas

The experimental factor selected is the yogasanas and it's been innumerable. So, the scholar consulted with experts in the field of Yogasana, than selected the following yogasanas:

Yogasanas: Suryanamaskar, Sarvangasana, Vrksasana, Trikonasana, Padmasana, Vajrasana, Bhujangasana, Shalabhasana, Paschimottanasana, Ardha Matsyendrasana, Halasana, Sasankasana, savasana

Pranayama: Anuloma-Viloma, Brahmari and Bhastrika

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