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Research Article

Effect of Asana and Pranayama on physiological variables

■ R. AHILAN AND R. SENTHIL NATHAN

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See end of the article for authors' affiliations

Correspondence to :

R. AHILAN

Department of Physical Education, Annamalai University, Annamalainagar, CHIDAMBARAM (T. N.) INDIA

■ **ABSTRACT**

The purpose of the present investigation was to find out the effect of Asana and Pranayama training on physiological variables. To achieve this purpose, thirty boys were selected randomly as subjects. They were assigned randomly into two experimental groups. Group I underwent Asana training and group II underwent Panayama training group of fifteen each. All the subjects of two groups were tested on selected dependent variable such as VO_{2max} and resting pulse rate before and after the treatment. The data pertaining to the variables in this study were examined by using dependent 't' and analysis of covariance (ANCOVA). Two experimental groups' namely, Asana and Pranayama training groups chieved significant improvement on VO_{2max} and resting pulse rate. In view of improvement in VO_{2max} and resting pulse rate was concerned, the Pranayama training was best training when compared to Asanas training.

■ ***Key Words*** **:** Asana, Pranayama, $VO_{2max.}$ Resting pulse rate

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Yoga postures are the physical positions that coordinate breath with movement and with holding the position to stretch and strengthen different parts of the body. Asana practice is the ideal complement to other forms of exercise, especially running, cycling and strength training, as the postures systematically work all the major muscle groups, including the back, neck, and shoulders, deep abdominal, hip and buttocks muscles and even ankles, feet, wrists and hands.

By their very nature, Asanas affect major and minor muscle groups and organs as they simultaneously import strength, increase flexibility and bring nourishment to internal organs. Although most poses are not aerobic in nature, they do in fact send oxygen to the cells in the body by way of conscious deep breathing and sustained stretching and contraction of different muscle groups.

Our lifestyle and unhealthy habits cause restriction in our breathing pattern. Poor posture (hunching, slouching) reduces lung capacity. This results in fatigue caused by the decrease in blood circulation and insufficient supply of oxygen to the blood cells. We need to breathe slowly and deeply. Quick, shallow breathing results in oxygen starvation, which leads to reduced vitality, premature ageing, a poor immune system and fatigue. No one can live for more than a few minutes without breathing, yet how many of us are even aware of the importance of proper breathing. On the physiological level, Pranayama was designed by our Yogis by watching nature. They noticed how animals, whose breath was slow and steady, like the elephant and tortoise, lived longer. They also noticed that animals that breathed fast and erratically, like hunting lions or dogs, had a short lifespan. Further, they realised mental control could be achieved by reining in the breath as it linked body and mind. One simple illustration: when one exhales after prolonged breath retention, one goes beyond the habit of the mind, the desperation of the body for a deep breath. One calmly tells one's mind and body to follow one's command (Akthar, 2010).

Pranayama also helps to connect the body to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific techniques this vital energy, or prana, is released for physical, mental and spiritual rejuvenation. Regular practice removes obstructions, which

impede the flow of vital energy. When the cells work in unison, they bring back harmony and health to the system. 20 to 25 minutes every morning or evening of Pranayama practice increases lung capacity, breathing efficiency, circulation, cardiovascular efficiency, helps to normalize blood pressure, strengthens and tones the nervous system, combats anxiety and depression, improves sleep, digestion and excretory functions, provides massage to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for weight loss, improves skin tone and complexion (Sugumar and Raghavan, 2010).

■ METHODOLOGY

Thirty boys students were selected randomly from Kalaimagal High School, Perambalur. Selected subjects were divided into two experimental groups. The age of the subjects were ranged from 12 to 14 years. VO_{2max} and resting pulse rate were measured by using Astrond nomogram and radial pulse method.

Training programme :

During the training period, the experimental groups underwent their respective training programmes for three days per week on alternate days for twelve weeks. Group I underwent Asanas such as Trikonasana, Vrikshasana Paschimottanasana, Gomukasana, Bhujangasana and Navasana and group II underwent Pranayama such as programme Nadi shuddhi, Kapalapathi, Bhastrika, Bhramari and Surya bedhana. The duration of training session was one day with 40- 60 minutes approximately, for the excluding warming up.

Analysis of data :

The pre-test and post-test random group design was employed as experimental design for the study. Prior to and after the training programme the subjects were tested and data collected on VO_{2max} and resting pulse rate. The collected data were analyzed statistically by using dependent 't' and analysis of covariance (ANCOVA). The level of significance was fixed at 0.05 level of confidence. The summary of means and dependent 't' test for the pre- and post- test on selected variables of ATG and PTG have been given in Table 1. Analysis of covariance on selected variables of ATG and PTG have been given in Table 2.

■ OBSERVATIONS AND DISCUSSION

The obtained dependent t-ratio values were higher than the table value 2.14 with df 14 required for significance at 0.05 level. It indicates that there were significant difference between the pre-test and post-test means of Asana training and Pranayama training groups on resting pulse rate VO_{2max} (Table 1).

The adjusted post test means of asana training and pranayama training groups on resting pulse rate were 70.38 and 68.35, respectively. The obtained F ratio of 16.92 for adjusted post test means is greater than the table value of 4.21 for df 1 and 27 required for significance at 0.05 level of confidence on resting pulse rate.

The adjusted post-test means of Asana training and Pranayama training groups on VO_{2max} were 2.79 and 2.65, respectively. The obtained F ratio of 32.64 for adjusted post-test means is greater than the table value of 4.21 for df 1 and

Table 1 : The summary of means and dependent 't' test for the pre and post test on selected variables and PTG

Variables	Tests	ATG	PTG
Resting pulse rate	Pre- test	73.2	72.4
	Post- test	70.73	68.0
	't' test	6.15*	13.13*
VO_{2max}	Pre -test	2.46	2.48
	Post -test	2.78	2.65
	't' test	13.17*	14.67*

* indicate significance of value at p= 0.5, respectively *P<0.05. The table value required for 0.05 level of significant with df 14 is 2.145

Table 2 : Analysis of covariance on selected variables of ATG and PTG

Variables	Adjusted post test means		Source of variance	Sum of square	df	Mean square	F-ratio
	ATG	PTG					
Resting pulse rate	70.38	68.35	Between	30.712	1	30.712	16.92*
			Within	49.001	27	1.815	
VO_{2max}	2.79	2.65	Between	0.1559	1	0.1559	32.64*
			Within	0.1289	27	0.0047	

* indicate significance of value at p= 0.05, respectively *P<0.05. The table value required for significance at 0.05 level with df 1 and 27 is 4.21

27 required for significance at 0.05 level of confidence on aggression $VO_{2max.}$

The results of the study showed that there were significant improvements in VO_{2max} and resting pulse rate between the pre and post -test of the experimental periods. The result of the study implied that Pranayama training group (PTG) has got more improvement of VO_{2max} and resting pulse rate when compared to ATG.

The analysis of the data indicates that 12 weeks of Asanas training reduced the VO_{2max} and resting heart rate among the school boys. The above findings are very well supported by observations made by the studies conducted by Kaushik *et al.* (2006), Cowen, and Adams (2005), Sharma *et al.* (2007) and Smith *et al.* (2007). The results of the study indicated that 12 weeks of Pranayama training increased the VO_{2max} and reduced the resting heart rate among the school boys. Present findings also confirm the view point of Upadhyay *et al.* (2008), Pramanik *et al.* (2009), Srivastava *et al.* (2005) and Raghuraj and Telles (2008).

Conclusion :

From the analysis of the data, the following conclusions were drawn :

- Due to the influence of Asana and Pranyama training improved the VO_{2max} and resting pulse rate.
- Pranayama training was identified as the best training method for improving the VO_{2max} and resting pulse rate when compared to the Asanas training.
- Future research may also benefit from long term Asana and Pranayama practice studies. The current research looks only VO_{2max} and resting pulse rate changes in acute time frames.
- The results of the study may be recommended to the coaches and physical educators to adopt these findings to improve the VO_{2max} and resting pulse rate.

Authors' affiliations:
R. SENTHIL NATHAN, Department of Physical Education, Annamalai University, Annamalainagar, CHIDAMBARAM (T. N.) INDIA

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