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Effects of pranayama on sleep behaviour, respiratory volumes and capacities

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Abstract

The purpose of the present study was to find the effect of pranayama practice on sleep, tidal volume, inspiratory reserve volume and vital capacity.

Method: For this purpose, thirty male students studying bachelor degree in various departments of Govt. College Sampla, Rohtak, those who were not familiar with pranayama with the age group of 19 – 23 years were selected. They were divided into two equal groups, each group consisted of fifteen subjects, in which group – I underwent pranayama practices and group – II acted as control group who did not participate in any special training. The training period for this study was six days in a week for six weeks. The selected criterion variables such as, tidal volume, inspiratory reserve volume and vital capacity were assessed by using the wet spirometer. The effect on sleep was observed based on the interviews with the participants.

Statistical Analysis: Prior to and after the training period the subjects were tested for tidal volume, inspiratory reserve volume and vital capacity and analysis of covariance (ANCOVA) was applied as statistical tool.

Conclusion: It was concluded after the pranayama practices, that training group have significantly increased the level of tidal volume (inspiratory reserve volume and vital capacity ($p>0.05$)) and pranayama should be continued with increased level to strengthen the lung muscles and to get desired results also the control group had sound sleep and better relaxation when compared with the other group.

Keywords: Pranayama, sleep behaviour, respiratory volumes, capacities

Introduction

Yoga is a complete science of life that originated in India many thousands of years ago. It is the oldest system of personal development in the world, encompassing body, mind and spirit. The ancient yoga had a profound understanding of man's essential nature and of what he needs to live in harmony with himself and his environment. They perceived the physical body as a vehicle, with the mind as the driver, the soul as man's true identity, and action, emotion and intelligence as the three forces which pull the body-vehicle. In order for there to be integrated development these three forces must be in balance. Taking into account the interrelationship between body and mind, the yogis formulated a unique method for maintaining the balance – a method that combines all the movement you need for physical health with the breathing and meditation techniques that ensure peace of mind. (Swami Vishnu Devananda, 2000).

The Sanskrit word comes from the root “Yug” which means to unite and it represents both a process and a state of unity. The state of yoga is the culmination of synchrony: it is a state devoid of the limitations of time and space, a state which transcends matter and energy and which cannot be qualified by any attribute. This reality of pure Consciousness has been recognized by all thinkers, spiritualists or materialists, as the fundamental axiom of life from which intelligence, volition, love and thought emanate. (Yogacharya Janakiraman and Carolina Rosso Cicogna, 1989) [2].

Breathing is life. The ancient yogis in India knew the intimate connection between breath and mind. For example, when your mind is angry, watch your breathing. It will be disturbed. And similarly, if you hold your breath for long, your mind will get agitated. The yogis were trying to get some degree of control over the mind. By controlling the breath, they were indirectly able to influence the mind.

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Breathing is an automatic process controlled by the autonomic nervous system. We do not have any conscious control over it. The science of bio-energy including the breathing movements is the practical yoga par excellence. In the Bhagavad Gita, Lord Krishna explains to Arjuna that one should practice Yoga to purify him. (Swami Vishnu Devanada, 2000).

The science of breath is called in Sanskrit pranayama. The word pranayama is a compound word which consists of prana and yama. Prana means life-force, or the vital energy, or that force by which we have our life. Ayama means control, i.e. control of the breath. That is the literal meaning. The first expression of life-force or prana is in the motion of the lungs. If a child does not breathe after its birth for some time, we give up the hope of that child. The first expression of life would be the breath, and motion of the lungs produces the breath. It is the primary function, and all other functions of the heart, digestive organs, and others are secondary. (Swami Abhedananda, 1999) [3].

Tidal volume: Is the lung volume representing the normal volume of air displaced between normal inhalation and exhalation when extra effort is not applied. In a healthy, young adult, tidal volume is approximately 500 ml per inspiration or 7 ml/kg of body weight.

Inspiratory reserve volume: The maximal volume that can be inhaled from the end-inspiratory level.

Vital capacity: Is the maximum amount of air a person can expel from the lungs after a maximum inhalation. It is equal to the sum of inspiratory reserve volume, tidal volume, and expiratory reserve volume.

Methods

In this study, the effect of pranayama practice on selected respiratory parameters such as tidal volume, inspiratory reserve volume and vital capacity have been examined. Thirty male subjects studying in various departments, except from

the Department of Physical Education and Faculty of Fine Arts, Maharshi Dayanand University were randomly selected and divided into two equal groups of fifteen subjects each, out of which group- I (n=15) remained a control group and group-II (n=15) underwent varied types of pranayama practices.

For the purpose of collection of data on tidal volume, inspiratory reserve volume and vital capacity, the wet spirometer was used. Before applying the experiment all the subjects of the control group and pranayama practice group attended the pre-test, which was conducted a day prior to the commencement of the training and the data were collected on tidal volume, inspiratory reserve volume and vital capacity. After six weeks of training the post-test was conducted one day after the training period to find out any changes in the criterion variables.

Selection of Pranayama

The experimental factor selected the pranayama; the scholar consulted with experts in the field of yoga and pranayama, and then selected the following pranayama for the experimental group:

The different types of Pranayama are the Bhastrika Pranayam, Anuloma / Viloma, Kapalbhathi, Bhramri, Ujjayi and Vedhene Bandh.

Training Schedule

The subjects were divided into two groups, namely control group and pranayama practice (experimental) group. The control group was not given any specific training. The experimental group practiced pranayama weekly five days i.e. Monday to Friday, between 6.00 A.M. to 8.00 A.M., for a period of six weeks.

Analysis of the Data: The data collected prior to and after the experimental period on tidal volume, inspiratory reserve volume and vital capacity on control group and pranayama practice group were analysed and presented in the following table -1.

Table 1: Shows Variable Name Group Name Control Group Pranayama Group F' Ratio

Variable Name	Group Name	Control Group	Pranayama Group	'F' Ratio
Tidal Volume	Pre-Test Mean±S.D.	0.447±0.021	0.439±0.027	0.49
	Post-Test Mean±S.D.	0.442±0.017	0.474±0.037	8.315*
	Adj. Post Test Mean±S.D.	0.439	0.476	24.63*
Inspiratory Reserve Volume	Pre-Test Mean±S.D.	2.67 ± 0.103	2.73 ± 0.09	1.141
	Post-Test Mean±S.D.	2.67 ± 0.105	2.77 ± 0.074	10.42*
	Adj. Post Test Mean±S.D.	2.68	2.76	55.68*
Vital Capacity	Pre-Test Mean±S.D.	3.71 ± 0.075	3.72 ± 0.072	0.104
	Post-Test Mean±S.D.	3.69 ± 0.076	3.82 ± 0.075	22.51*
	Adj. Post Test Mean±S.D.	3.7	3.82	55.02*

*Significant at 0.05 level of confidence.

(The Table value required for significance at 0.05 level of confidence with df 1 and 28 and 1 and 27 were 4.20 and 4.21 respectively).

Results

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, 0.05 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 between control group and pranayama practice on tidal volume, inspiratory reserve volume and vital capacity after six weeks of training. All the criterion variables have

significantly improved after the training period for pranayama practice group when compared with the control group.

Discussion

The results of the study reveal that there was a significant change after the pranayama training in inspiratory reserve volume (L.N. Joshi and V.D. Joshi, 1998). The results of the study reveal that there was a significant change after the pranayama training in vital capacity (K Upadhyay Dhungel *et al*, 2008, D. A. Birkel and L. Edgren, 2000). The inspiratory volume also increased after the pranyama practices. This

result is in line with the findings of D.V. de Godov *et al*, 2006. The findings of this study showed that the respiratory parameters such as tidal volume, inspiratory reserve volume and vital capacity has significantly increased due to the pranayama practices. The pranayama also had a deep impact on the sleep behaviour where the control group observed deep sleep and less restlessness when compared with the other group.

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