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Influence of Hatha Yoga Techniques on Chronic Pulmonary Disorders among Middle Aged Men Working in Industrial Areas of Visakhapatnam

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Abstract: ***Medical experts point out that COPD cases are no longer just restricted to the elderly but are also being detected in younger age groups and with wide scale of industrials taking place in cities like Visakhapatnam. The aim of this study was to find out the influence of Hatha Yoga Techniques on Chronic Pulmonary Disorders among middle aged men working in Industrial Areas of Visakhapatnam. Randomly selected 40 COPD patients undergoing treatments for pulmonary disorders were divided into two groups of 20 each. Experimental group to undergo 12 weeks Hatha Yoga in addition to their regular medication under the supervision of investigator and two experts in the field. Control group was not provided with Hatha Yoga. Prior to experiment, both the groups were measured of their peripheral capillary oxygen saturation (SpO2) and Pulse Rate (PR). SpO_2% and PR were assessed for every participant using a portable pulse-oximetry device The experimental group were practiced six Hatha Yoga breathing techniques for a period of 12 weeks. Immediately after the experimental period the SpO2% and PR were measured of both the groups. The results proved that Hatha Yoga techniques to the experimental group has recorded improvement on SpO2% and reduction in PR compared to control which does not provided with Hatha Yoga. Thus, it was found that hatha yoga techniques are much helpful for management of pulmonary disorder – COPD among Vishakapatnam Industrial area workers. It was concluded that Hatha Yoga techniques can contribute for management of pulmonary disorders like COPD of Viskhapatnam Industrial Area workers, by beneficially altering SpO2 and PR.***

Keywords: Pulmonary Disorders, Chronic Objective Pulmonary Disorder (COPD), Hatha Yoga – Breathing Exercises, peripheral capillary oxygen saturation (SpO2) and Pulse Rate (PR)

1. Introduction

Health is the very foundation of happy life. Today, more than before in the history of humanity, people are facing stress and strains that are beyond their control. There is an unprecedented rise in psychosomatic and mental illness. The evolution identity of an individual is lost. Happiness, freedom and peace have become empty words. Yoga is a needed as a powerful remedy not only for the day to day problems but also to overcome niggling health problems. The philosophy of yoga is “Caring, Sharing and empowering”. (Govindji (2005)

Haṭha yoga is a branch of yoga. In India, haṭha yoga is associated in popular tradition with the Yogis of the Natha Sampradaya through its traditional founder Matsyendranath, who is celebrated as a saint in both Hindu and Buddhist tantric and haṭha yoga schools. According to the *Dattatreya Yoga Śastra*, there are two forms of haṭha yoga: one practiced by Yajñavalkya consisting of the eight limbs of yoga, and another practiced by Kapila consisting of eight mudras. (*Birch, Jason (2011)* In the 20th century, a development of haṭha yoga, focusing particularly on asanas (the physical postures), became popular throughout the world as a form of physical exercise. This modern form of yoga is now widely known simply as "yoga", which is helpful for healthy life of human and to alleviate diseases particular COPD.

Chronic obstructive pulmonary disease (COPD) is a progressive disease that makes it hard to breathe. Coughing, wheezing, shortness of breath, chest tightness, and heavy mucus production are among the symptoms of COPD. Most COPD patients smoke cigarettes or used to smoke. In COPD, less air flows out of the lungs because air sacs either lose their elasticity or are destroyed. The lungs can also become clogged with mucus and inflamed, leading to breathing difficulties.

Risk factors for COPD include (a) exposure to tobacco smoke; (b) chronic inflammatory airway disease like asthma’ (c) occupation exposure to dusts and chemicals fumes, vapors and dusts in the workplace; (d) exposure to fumes from burning fuel; and (e) uncommon genetic disorder alpha-1-antitrypsin deficiency is the cause of some cases of COPD. (Mayoclinic, 2020)

Visakhapatnam is the largest city of Andhra Pradesh. Visakhapatnam has many heavy industries like Hindustan Petroleum, Visakhapatnam Steel Plant, Hindustan Shipyard, Visakhapatnam Port Trust, National Thermal Power, Bharat Heavy Electricals, BARC, Naval Science and Technological Laboratory, Naval Dockyard, Dredging Corporation of India, Strategic Petroleum Reserve, NMDC, CONCOR, Andhra Pradesh Medtech Zone etc. and Private sector like Coromandel International, Ferro Alloys Corporation, Gangavaram Port, etc., are the factors that made the city into an industrial hub, from a small hamlet. (Venkata Kumar, 2020) There are special economic zones (SEZs) and industrial corridors such as Visakhapatnam Special Economic Zone (VSEZ), APSEZ, APIIC, Aganumpudi Industrial Park, Visakha Dairy, JNPC. Jawaharlal Nehru Pharma City (Ramky Pharma City (India) Limited) is a special purpose entity, setup for the manufacturing of bulk drugs and pharmaceuticals. It is the first industrial township in India, spread over an extent of 2, 400 acres (970 ha) with 102 companies and 8698 employees, presently in operational. (Times of India, 2020) These industrial areas creates long

term exposure to chemical fumes, vapors and dusts in the workplace can irritate and inflame lungs among the Industrial workers of the above establishments, which resulted in developing Chronic Obstructive Pulmonary disease (COPD) in these Industrial areas.

Medical experts point out that COPD cases are no longer just restricted to the elderly but are also being detected in younger age groups and with wide scale of industrials taking place in cities like Visakhapatnam. Such cases may go up further in the coming days According to Dr. M. Ravindranath, pulmonologist, "Two three years ago, only 20-25% of the total patients suffering from various chest ailments had COPD and it was manly in the elderly population. But nowadays, their number has gone upto 30-35% with even those in their 40s and 50s suffering from COPD mainly due to smoking and increase in air pollution. Nowadays out of 10 patients we see atleast 3-4 suffering from COPD. (Times of India, 2015)

Dr. Sambasiva Rao, Medical superintendent of Government Chest Hospital Visakhapatnam, said that cases of chronic respiratory diseases such as asthma and COPD have gone up due to increase in pollution levels as well as the presence of smog in the winter season. We have been getting more cases of COPD due to the cold weather and pollution. (Times of India, 2015).

Anne E Holland et. al. (2012) determined whether breathing exercises in people with COPD have beneficial effects on dyspnoea, exercise capacity and health-related quality of life compared to no breathing exercises in people with COPD; and to determine whether there are any adverse effects of breathing exercises in people with COPD. And concluded Breathing exercises over four to 15 weeks improve functional exercise capacity in people with COPD compared to no intervention. Outcomes were similar across all the breathing exercises examined. Breathing exercises may be useful to improve exercise tolerance in selected individuals with COPD who are unable to undertake exercise training. David A Kaminsky e. tal. (2017) concluded successfully demonstrated that pranayama was associated with improved exercise tolerance in patients with COPD. Lay personnel were able to adequately teach patients to practice pranayama. These results suggest that pranayama may have significant clinical benefits for symptomatic patients with COPD, a concept that needs to be confirmed in future, larger clinical trials. Holger Cramer et. al. (2019) found robust effects of yoga on exercise capacity and pulmonary function in patients with COPD. Yoga, specifically yoga breathing techniques, can be an effective adjunct intervention for patients with COPD.

Thus, previous researches proved breathing is a key part of yoga practice. Yoga's breathing techniques may help to strengthen the respiratory system. Yoga may also improve the well-being of patients with COPD, who may experience higher stress levels and muscular inactivity. Yoga promotes relaxation and exercise, and may help give COPD patients some control over their breathing. Through breathing exercises, more oxygen is available for muscles in the body to do their job. Researchers from the National Center for Biotechnology Information found that oxygen saturation (the concentration of oxygen in the blood) was improved in COPD patients after just one yoga practice. The investigator was interested to find out the effect of Hatha Yoga techniques in management of pulmonary disorder COPD in the Industrial workers of Visakhapatnam.

2. Methodology

Patients reported for chest ailments at Government Chest Hospital Visakhapatnam were collected demographic data on their age, residence, working place, nature of complaints along with observations of the Doctors. It was found that about 43% of the patients reported for chest ailments were found to be with COPD. Of these COPD patients randomly selected 40 men patients in the age group of 50 to 55 were selected for this study. Due consent were obtained and assured active participation in the investigation. These randomly selected 40 subjects were divided into two groups of 20 each. Group I acted as experimental group to undergo 12 weeks Hatha Yoga in addition to their regular medication under the supervision of investigator and two experts in the field. The control group COPD patients took their regular medication without undergoing any special activities – Hatha Yoga. Prior to experimental treatment subjects of both the groups were measured of their peripheral capillary oxygen saturation (SpO2) and Pulse Rate (PR). SpO_2% and PR were assessed for every participant using a portable pulse-oximetry device Percentage of peripheral capillary SpO_2% was measured after connecting the optical diodes on the patients' fingers by transcutaneous pulse oximetry. The experimental group were practiced six Hatha Yoga breathing techniques for a period of 12 weeks. Immediately after the experimental period the SpO2% and PR were measured of both the groups. The difference between initial scores and the final scores on SpO2% and PR was considered as the effect of Hatha Yoga on the subjects. To test statistical significance two group ANCOVA was employed.

3. Results

Table I shows the results on peripheral capillary oxygen saturation percentage (SpO2%) due to 12 weeks Hatha Yoga in managing Pulmonary disease.

Tab 1: Influence of Hatha Yoga Techniques on SpO2% among Visakhapatnam Industrial area workers

	Hatha Yoga Group	Control	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
Pre Test Mean	92.75 + 1.41	92.80 + 1.32	Between	0.0	1	0.02	0.01
			Within	71.0	38	1.87	
Post Test Mean	94.55 + 1.05	92.85+ 1.09	Between	28.9	1	28.90	25.25*
			Within	43.5	38	1.14	
Adjusted Post Test Mean	94.57	92.83	Between	30.1	1	30.08	117.75*
			Within	9.5	37	0.26	
Mean Diff	1.80	0.05					

Table F-ratio at 0.05 level of confidence for 1 and 38 (df) =4.10, 1 and 37 (df) =4.11.
* Significant at 0.05 level
The pre, post and adjusted mean values of SpO2% presented in Table I is illustrated through bar diagram in Figure I.

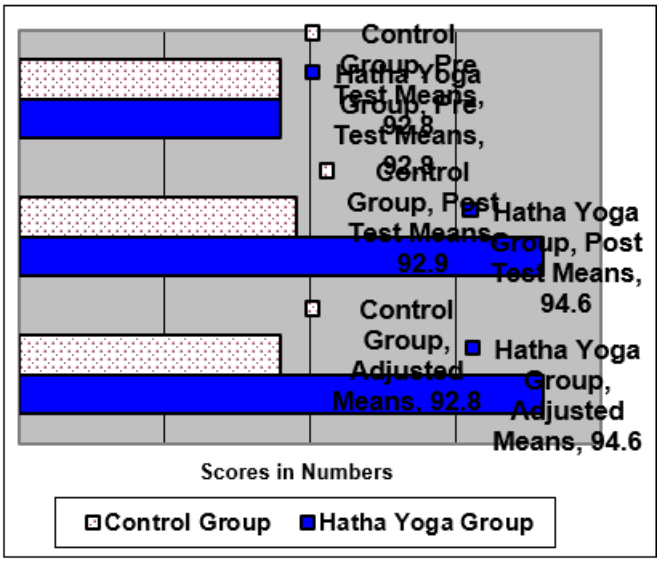

Figure 1: Pre, Post and Adjusted Means on oxygen saturation percentage due to Hatha Yoga Techniques

Table II shows the results on pulse rate of the Visakhapatnam Industrial workers due to 12 weeks Hatha Yoga in managing Pulmonary disease.

Table II: Influence of Hatha Yoga Techniques on SpO2% among Visakhapatnam Industrial area workers

	Hatha Yoga Group	Control	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
Pre Test Mean	104.10 + 6.4	104.20 + 4.2	Between	0.1	1	0.10	0.003
			Within	1117.0	38	29.39	
Post Test Mean	102.80 + 6.0	104.70 +5.8	Between	36.1	1	36.10	1.03
			Within	1331.4	38	35.04	
Adjusted Post Test Mean	102.85	104.65	Between	32.3	1	32.33	7.00
			Within	170.8	37	4.62	
Mean Diff	- 1.30	0.05					

Table F-ratio at 0.05 level of confidence for 1 and 38 (df) =4.10, 1 and 37 (df) =4.11.
* Significant at 0.05 level
The pre, post and adjusted mean values of pulse rate (PR) presented in Table II is illustrated through bar diagram in Figure II.

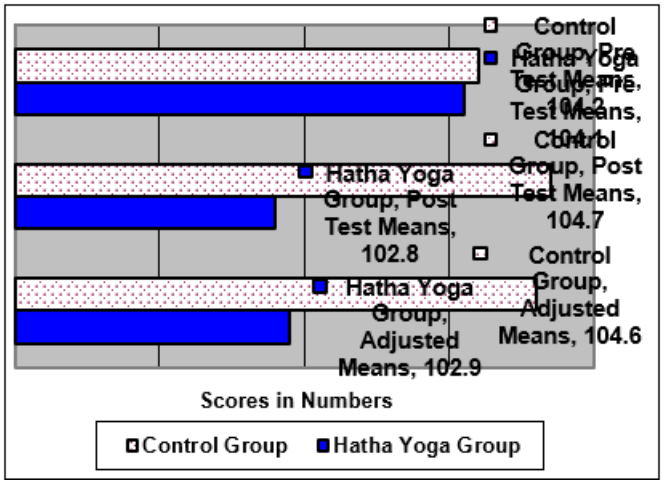

Figure II: Pre, Post and Adjusted Means on Pulse Rate (PR) due to Hatha Yoga Techniques

4. Discussions

Among pulmonary disorders Chronic Obstructive Pulmonary (COPD) found to be dominant, especially among labourers who has to faced dust and smoke due to their working place of Industrial areas. This study aims at managing COPD through Hatha Yoga techniques. The results presented in Tables I and II proved that there was no significant difference between treatment group and control group on SpO2% and PR at the initial stages. After the intervention of Hatha Yoga techniques to the experimental group has recorded improvement on SpO2% and reduction in PR compared to control which does not provided with Hatha Yoga. has recorded improvement. The alterations were noted as significant as the obtained F values on Adjusted Means of SpO2% and PR stood at 117.75 and 7.00. Thus, it was found that hatha yoga techniques are much helpful for management of pulmonary disorder – COPD among Vishakhapatnam Industrial area workers. The findings of this study were in agreement with the findings of Rajashree Ranjita et. al. (2016) and David A Kaminsky e. tal. (2017) yoga is beneficial to manage COPD.

5. Conclusions

It was concluded that Hatha Yoga techniques can contribute for management of pulmonary disorders like COPD of Visakhapatnam Industrial Area workers, by beneficially altering SpO2 and PR.

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