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Original Research Article

Effect of Short Term "Deep Breathing" On MVV in Young Individuals of B.G. Nagara

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Abstract: Breathing is the most vital function for maintenance of life. Studies showed that yogic type of breathing exercises increases MVV. However, the exact effect of deep breathing on MVV is lacking. Hence this study is the, need of the hour to know the effect of deep breathing on MVV**.** This study was conducted to determine the effect of Deep breathing (Db) on MVV in healthy young individuals. The present study was a case-control study consisting of 30 healthy individualsin the age group of 18-24 years. This study was conducted in the Department of Physiology, Adichunchanagiri institute of medical sciences, B.G. Nagara, Nagamangala Taluk, Mandya district, after the institutional ethical clearance and written consent from each participant.MVV was recorded before & after practicing deep breathing exercise daily for three months. The parameters thus recorded was analyzed for statistical significance using Students't' test and $p<0.05$ was considered the level of significance. MVV was significantly increased at ($p < 0.001$**) after practicing deep breathing. The results of this study indicate that a simple maneuver of practicing deep breathing daily as indicated in the method, is suggestive of increasing MVV.
Keywords: MVV- Maximum voluntary ventilation.

INTRODUCTION

"The history of deep breathing can be traced back to the time since human beings evolved on this earth", David Fontana has written in his book "Meditation Bliss: Inspirational Techniques for Finding Calm". Although it is unclear just exactly when the practice of deep breathing began, Akira Hirakawa and Paul Groner wrote in their book "A History of Indian Buddhism" that Buddha taught the importance of practicing deep breathing between 460 and 490 B.C. [1] .

Today many health care professionals such as psychologists, nurses, physical therapists and physicians not only believe in benefits of deep breathing, but promote it as well. Deep breathing is called "diaphragmatic" because it emphasizes the use of the diaphragm, the muscular sheet underlying the rib cage. When the diaphragm contracts, it pushes down on the internal organs of the abdomen, enlarging the space allotted to the thoracic cavity and causing the lungs to expand. The stronger this contraction, the more air you will inhale. Deep breathing strengthens the lungs, makes the heart stronger & improves cellular regeneration. Increased pollution, overcrowding, sedentary life style & smoking habit of the people gradually decrease the ventilator functions of the lungs. Pranayama which improves the lung function parameters therefore needs to be adopted for a healthy living. Deep breathing exercises are commonly taught in yoga classes Slow and deep breathing is economical because it reduces dead space ventilation as well decreases the workload on the heart. It also renews air throughout the lungs in contrast with shallow breathing which renews air only at the base of the lungs [2]. It is also suggested that the practice of deep breathing without breath holding phase, can also strengthen the respiratory muscles and increase the elastic properties of lungs and chest and thereby improve some of the ventilator functions of lungs [3]. Improvement in respiratory parameters such as FVC, MVV and PEFR after practice of pranayama which involves slow and deep breathing is documented [4]. Deep breathing has also been documented to increase the alveolar

ventilation [5]. In COPD patients also deep breathing is shown to significantly improve the tidal volume & MVV [6]. The present study is designed to know if deep breathing for a short duration regularly among apparently healthy young adults, benefits the MVV

MATERIALS & METHODS

Subjects were healthy volunteers in the age group of 18 – 25 years medical students of AIMS B.G NAGAR, With BMI of 19 to 25 kg/m^2. All the subject's were non- smokers and were not on any medications. Those already performing some form of yoga or breathing exercises were excluded from the study. The study was prior reviewed and approved by the Institutional ethical committee. Each subject gave a written consent before participating in the study.

A sample size of 30 subjects was calculated based on the results of a pilot study done on similar subjects. The selected groups of subjects were made to practice the deep breathing daily for 10 minutes between 7am-8am, for a period of three months. Subjects were instructed to sit erect while performing this exercise concentrating on breathing. Subjects were asked to take slow & maximal inspiration lasting for five seconds, followed by maximal expiration which also lasts for five seconds at a rate of 6 breaths per minute during each practice. They were then given an audio CD with the recorded commands, prompting the timed inhalation and exhalation. MVV was recorded using a computerized spirometer – BPL ARPEMIS version 3.1 on both the occasions. Statistical analysis of the data obtained was done using Student-'t' test, and other relevant statistical tools.

RESULTS

The parameters thus recorded were analyzed for statistical significance using Students 't' test and $p<0.05$ was considered the level of significance. GSR was significantly increased at ($p < 0.001$**) after practicing deep breathing.

Table-1: Distribution of Height (cms) of subjects studied

Height (cm)	Number of subjects	%
<150	1	3.3
150-160	10	33.4
160-170	13	43.2
>170	6	19.9
Total	30	100.0

Table-2: Distribution of Weight (kg) of subjects studied

Weight (kg)	Number of patients	%
40-50	11	36.5
51-60	14	46.6
61-70	5	16.6
Total	30	100.0

Table-3: Effect of deep breathing on MVV

Parameter	Before practicing deep breathing	After practicing deep breathing for three months	Significance
MVV (L / min)	71.32 ± 19.2	85.71 ± 19.76	< 0.001**

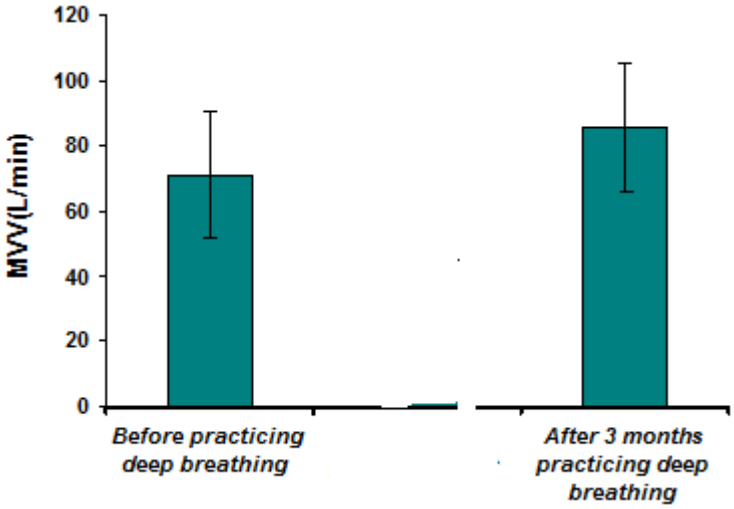

Fig-3: Effect of deep breathing on MVV

DISCUSSION

MVV was significantly increased in the subjects after practicing deep breathing for 3 months. The result of the present study was consistent with study done by L N Joshi *et al* [3] done on 71 subjects where in MVV was significantly increased in the subjects after practicing deep breathing for 1 hour daily for six weeks. The result of the study was also consistent with study done by Rana Budhi Bal *et al* on 30 healthy individuals in the age range 15 - 30 years, where in MVV was significantly increased in the yoga group ,the yoga group practicing deep breathing exercises 15 minutes daily, six days a week for one month [7]. This increase in MVV was probably because, strengthening of the respiratory muscles due to regular practice of deep breathing and increase in the elasticity of the lungs due to increase in surfactant secretion due to regular practice of deep breathing. Surfactant which is secreted by the type II pneumocytes is increased after deep breathing and this surfactant increases the compliance of the lung as shown in the increased compliance during the deflation phase of the pressure volume curve of a lung. This phenomenon has been well studied in isolated animal lungs, in-situ lungs and also in the cultured pulmonary epithelial cells with the possible mechanism of exocytosis [8-10]. In addition increased development of respiratory musculature and endurance due to regular practice of deep breathing delays the onset of fatigue[11].

CONCLUSION

By this we can conclude that practicing deep breathing even for short duration daily can improve our lung functions by increasing respiratory muscle strength, the elastic properties of lungs and chest, thereby improves the ventilatory functions of the lungs.

Limitations of the study-The limitations of the present study were less number of the subjects.

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