Original Article

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A Study on Effect of Laughter on Pulmonary Functions among Elderly People

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Abstract

Background: Laughter Yoga has become a very popular form of exercise and is primarily practiced in groups. Laughter is initially forced as a physical exercise by maintaining eye contact with other members in the group and promoting childlike playfulness. This soon leads to real, spontaneous laughter. Laughter Yoga is the one only technique that allows adults to achieve sustained hearty laughter without involving cognition. The objective is to study the effect of laughter on pulmonary functions in elderly people. **Subjects and Methods**: This study was done under ICMR STS research Programmed for Undergraduate students at Dr D Y Patil Medical College, Pune from June 2016 to October 2016. A total of 60 study subjects aged more than 60 years of age were selected for the purpose of the study. The Pulmonary functions were tested by using instrument 'Spirotech before and after the laughter therapy for 4 weeks. **Results:** Immediately after a good bout of laughter FVC and PEFR were increased but not statically significant FEV1 was statically significant immediately after good laughter. All three pulmonary functions FVC, FEV1 and PEFR were statically highly significant after regular laughter therapy practice for 4 weeks. **Conclusion:** Laughter is beneficial for pulmonary functions when practiced regularly in our study laughter therapy for 4 weeks proved beneficial ruling out all age sex and ethnic differences.

Keywords: Pulmonary Function, Laughter Therapy, Yoga, Spirometry, Old Age

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Introduction

Old age is a pleasant time; our children have grown, we get retirement from work, and ample time to pursue interests. As we mature, in mind and body, our wisdom expands but our bodily strength disappears. Feebleness sets in, our abilities are limited and we become susceptible to a spectrum of age related diseases and syndromes.[1] With nuclear families becoming more preferable and grandchildren steering away from grandparents, the aged are put in old age homes or are left to themselves. Life tends to turn into a vicious cycle of boredom, loneliness, depression, anxiety and stress which can culminate in much more debilitating conditions.

As Victor Hugo put it, 'Laughter is the sun that drives winter from the human face', laughing certainly has many medically beneficial effects on the body.[1,2]

The benefits of laughter include:

- Boosting immunity
- Reduction of stress hormones
- Pain reduction
- Cardiac exercise
- Muscular relaxation
- Improving respiration

A hearty guffaw or even a light chortle elevates mood, enhances resilience, and adds joy and zest to life. So Laughter Therapy or Laughter Yoga is a reliable and sustainable approach to using laughter to keep seniors in good health and good cheer.[3]

We inhale oxygen and exhale carbon dioxide and oxygen is a primary catalyst for ATP (adenosine triphosphate) generation in our body. The respiratory system works in tandem with the circulatory system to provide body cells with oxygen. In order to keep the lungs healthy and the body working efficiently, one should take deep breaths and flush out the 'old' air from from the lungs. During normal shallow respiration an inhalation fills about 25% (tidal volume) of the total lung capacity.

The remaining 75% which is the residual volume held in lower $2/3^{rd}$ of the lungs is stale air. When we breathe shallowly, the heart has to put in more work because the gas exchange takes place in lower part of the lungs and heart has to beat more in order to achieve the same input of oxygen for similar output of carbon dioxide. An easy and pleasurable way to sustain deep breaths is to laugh. A hearty laugh helps to provide a longer exhalation and since, while laughing the amount of air inhaled is less than the amount of air exhaled, the lungs are able to get rid of the residual air.[4–6]

Laughter Yoga has become a very popular form of exercise and is primarily practiced in groups. Laughter is initially forced as a physical exercise by maintaining eye contact with other members in the group and promoting childlike playfulness. This soon leads to real, spontaneous laughter. Laughter Yoga is the one only technique that allows adults to achieve sustained hearty laughter without involving cognition. It bypasses intellectual systems that normally act as a brake on involuntary, natural laughter.

Multiple studies have been done to show diurnal variations in pulmonary functions in various age groups.[3–9]

The concept of Laughter Yoga or Hasya yoga is very recent. Basically, it is a practice involving prolonged, self induced laughter. Laughter Yoga was made popular as a routine exercise by Indian Physician Madan Kataria. It is based on the credence that voluntary laughter provides the same physiological and psychological benefits as impulsive laughter. Laughter similar to deep breathing may have some beneficial effects on pulmonary functions. .In stressful life, people engage to relieve tension by various methods like laughter therapy. The purpose of this study is to assess the effects of laughter (through practice of Laughter Yoga) specifically on the efficiency of the respiratory system in elderly people.[10–13]

Enormous work has been done in various respiratory disorders to improve respiratory functions.Since the geriatric age group is prone to have decreased respiratory functions and laughter is the most cost effective solution to improve multiple respiratory parameters, this study was chosen to find out the effect of laughter in aged people and to signify the benefits if any.[11]

Objective of the study

To study the effect of laughter on pulmonary functions in elderly people.

Subjects and Methods

A Cross Sectional Study was conducted at Dr D Y Patil Medical College, pune from June 2016 to October 2016. A total of 60 study subjects aged more than 60 years of age were selected for the purpose of the study. They were made to practice Laughter Yoga and the short term effects on the pulmonary function were assessed. The parameters studied were:

1. Forced Vital Capacity (FVC)
2. Forced expiatory Volumes (FEV1)
3. Peak expiatory Flow Rate (PEFR)

The hypothesis was that 'Laughter yoga will improve the efficiency of the respiratory system of the aged subjects and will also have a positive impact on their overall health.'

Inclusion Criteria

- Age: 60 years and above people
- Minimum number of subjects 25, both males and females.
- From Beheri Old Age Home, Pune.
- Apparently Healthy with normal range of Physiological and Psychological activities.

Exclusion Criteria

- Having known autonomic disorder.
- Suffering from major illness – E.g. Neuromuscular and Connective tissue disorder, Arrhythmias, any cardiovascular disorders and respiratory disorders, Diabetes, any Systemic disease(s) or factor(s) that may affect their autonomic reflexes.
- Female subjects while being studied should be in post-menopausal phase.
- Subject under study must not be chronic smoker or chronic alcoholic and also should avoid Smoking tobacco, Alcoholic beverages, Tea, Caffeine for at least three hours prior to study.
- Extreme obese and extreme underweight subjects would be avoided.
- Acute or chronic respiratory system illness should not be present.

Equipment's required

- "Spirotech" (A self-calibrating computerized spirometer)
- Stethoscope
- Nose clip
- Modified mercurial sphygmomanometer
- Weighing machine
- Height measuring stand
- Flat comfortable cot
- Laptop with Spirotech software.

Experimental procedure and steps

A written informed consent was taken after explaining the intentions of the study to every individual who Agreed to be a subject. Before participation all subjects were screened and their health history and present physiological and

psychological conditions was recorded in a standard preform. The subjects were familiarized with the instrument and the procedure. Detailed instructions and demonstration was given for our satisfaction and to avoid confusion among the subjects. The subjects were asked to assemble in the hall at the old age home in the form morning 8 am to 9 am and were asked to perform gentle warm up exercises like stretching, clapping or chanting to break down inhibitions and initiate laughter. The laughter session was for 10 to 20 minutes and used to end with 'laughter meditation' which is a session of unstructured laughter in during which subjects allow natural laughter to flow from within.

The Pulmonary functions were tested by using instrument 'Spirotech' (A self-calibrating computerized Spirometer that fulfills the criteria of standardized lung function test) which was available with the Department of Physiology, Dr. D Y Patil Medical College Pune. The pulmonary functions were tested at the start of the course, immediately after laughter session in the subjects from Beheri Old Age Home, Pune to assess the short term effects. To check lung function, the subjects were made to breathe out forcefully followed by deep inspiration into the mouth piece attached to the Spirotech and the records were saved. This was done before and after one session of therapy and then after 4 weeks of therapy and pulmonary functions were recorded was ensured that the subjects practiced laughter every day for a minimum of 10 minutes every day for 4weeks.

Results

A total of 60 study subjects aged more than 60 years were enrolled in the study and further analyzed.

Table 1: Average values of pulmonary functions before laughter therapy.

	FVC	FEV1	PEFR
Mean	1.1912	0.7908	1.1012
SD	0.524933	0.327438	0.552741

Among the study subjects before the beginning of Laughter Therapy the mean FVC was 1.19 + 0.524, FEV1 was found to be 0.790 + 0.327 and PEFR was found to be 1.101+ 0.55.

Table 2: Average values of pulmonary functions immediately after one session of laughter therapy.

	FVC	FEV1	PEFR
Mean	1.3428	1.0028	1.342
SD	0.444725	0.376059	0.553079
P Value	0.276	0.038	0.130

[Table 2] shows average values of FVC, FEV1 and PEFR in elderly people immediately after one session of laughter therapy and was statistically analyzed with the baseline variables.

The FVC when compared with before laughter therapy P value = 0.276 with DF 48. This is statistically not significant. The FEV1 compared with before laughter therapy P value = 0.038 with DF 48. So P value is P< 0.05 which is statistically significant. The PEFR compared with before laughter therapy P value = 0.130 with DF 48 which is statistically not significant.

Table 3: Average values of pulmonary functions after 4 weeks of laughter therapy.

	FVC	FEV1	PEFR
Mean	2.2056	1.5968	2.3616
SD	0.502689	0.484617	1.103394
P value	0.001	0.001	0.001

It was further found that after 4 weeks of laughter therapy the FVC, FEV1 and PEFR was found to be gradually increased among the study who were on Laughter therapy.

The FVC when compared with before laughter therapy and after 4 weeks P <0.001 with DF 48. So this is statistically highly significant. FEV1 compared with before laughter therapy P <0.001 with DF 48 which is statistically highly significant. PEFR compared with before laughter therapy P <0.001 with DF 48 which is statistically highly significant.

Discussion

The [Table 1] consists of average of pulmonary functions before laughter therapy in elderly people. Mean FVC was 1.1912 L, mean FEV1 was 0.7908 sec and mean PEFR was 1.101 L/min. These values were less than the predicted values maybe because of morning respiratory dip phenomenon. The [Table 2] consists of average values of pulmonary functions immediately after laughter therapy. Mean FVC was 1.3428 L, mean FEV1 was 1.0028 and mean PEFR was 1.342 when compared with the values before laughter therapy FVC – increased but statically not significant. FEV1 was statistically significant P<0.05. PEFR was also increased but statically not significant.

This could be because a hearty laugh is just like deep breathing which causes increased amount exhalation compared to inhalation which in turn causes extra amount of residual air to leave the lungs which then causes increase in various pulmonary functions.

The [Table 3] consists of average values of pulmonary functions after 4 weeks' laughter therapy. Mean FVC was

2.2056 L, mean FEV1 was 1.5968 and mean PEFR was 2.3616 when compared with the values before laughter therapy FVC was found to be statically highly significant p<0.001 FEV1 was statistically highly significant P<0.001 PEFR was statistically highly significant P<0.001. This signifies the positive effects of long term laughter therapy practiced regularly by elderly people.

Laughter is a type of breathing in which one breathes out forcefully and rapidly which causes exercise of inspiratory as well as expiratory muscles. In a forceful laugh pulmonary pressure continues to increase resulting in an adequate driving force to propel the blood of the upper most part of lung where oxygen is more. This Results in more perfusion of lungs from top to bottom and improves the pulmonary function. Laughter as a humor also contributes in relieving tension and releasing feel good factors.[12,13]

One of the important factors of lung inflation near to total lung capacity is also major physiological stimulus for release of prostaglandins which decrease bronchial smooth muscle tone and improve pulmonary functions. Laughter catalyzing happiness helps reduce and release the emotional stress thereby withdrawing the bronchial constriction effect.

Conclusions

Laughter is beneficial for pulmonary functions when practiced regularly. Immediately after a good bout of laughter FVC and PEFR were increased but not statically significant FEV1 was statically significant immediately after good laughter. All three pulmonary functions FVC, FEV1 and PEFR were statically highly significant after regular laughter therapy practice for 4 weeks. In our study laughter therapy for 4 weeks proved beneficial ruling out all age sex and ethnic differences.

Further studies are recommended in larger group and considering various factors affecting pulmonary functions such as diet obesity and diurnal variations. This study is being considered as a pilot study from our side and further study is anticipated on a larger scale.

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