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EFFECT OF MOUTAIN BREATHING EXERCISE ON LUNG FUNCTION TEST AMONG GERIATRIC POPULATION: A EXPERIMENTAL STUDY

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ABSTRACT

BACKGROUND AND NEED OF STUDY:

The mountain breathing exercise is a slow breathing exercise, used universally. It helps in relieving stress and improves lung volume and capacities. RMS Helio Spiro meter measures lung volume and capacities. It measures the airflow of the upper and lower respiratory tract. Union Ministry of Family and Health Welfare released data in 2021 stating that 60 years elderly population suffers from age-related respiratory changes which decrease their lung volume and capacities leading to exertion. The aim of the study is to see the effect of mountain breathing exercise on lung function tests among the geriatric population.

METHODOLOGY: -

The study was conducted at the Shreeji Hospital. A total of 30 participants were included (15 males, and 15 females). The procedure consisted of 2 sessions of mountain breathing day and night session were done for 3times a week for 3 weeks. Participants were shown the procedures of the mountain breathing exercise. RMS Helios spirometer was used to measure pre- and post-lung volumes and capacities.

RESULT AND DISCUSSION:

The result was analysed in SPSS version 26. Paired t-test was used to analyse the result. The denoted p-value ($p<0.05$) which rejects the null hypothesis and accepts the alternative

hypothesis it states that data is statistically significant, and shows mountain breathing exercise is effective in lung function tests among the geriatric population.

CONCLUSION AND CLINICAL IMPLICATION:

This study concluded that mountain breathing exercise effectively improves lung function tests among the geriatric population.

Keywords: Mountain Breathing, Geriatric, Lung Function Test

INTRODUCTION: -

Mountain breathing is a technique of slow breathing rhythm that is widely used by geriatrics and professional workers. It is also known as box breathing. This technique heightens performance and concentration; it also acts as a powerful stress reliever. It is beneficial to all types of people, especially those suffering from certain lung diseases and smokers **[1]**.

The Mountain Breathing Exercise is a type of deep breathing. Mountain breathing has also been used as a deep breathing exercise to improve their lung volume and capacities, but most of them are administered to preschoolers. So here, this exercise is designated to observe whether mountain-breathing exercise is beneficial to improve lung capacity for breath holding in the geriatric population **[1]**.

There is evidence that this technique can regulate and calm down the ANS (Autonomic Nervous System). It can lower the blood pressure and give an immediate sense of calm; it regulates the body temperature. The slow breathing rhythm allows for the building of CO2 in the blood, which enhances the cardio-inhibitory response of the vagus nerve and stimulates the parasympathetic system when exhaled **[2]**. This method can help with depression, panic disorder, post-traumatic stress disorder (PTSD), generalised anxiety disorder (GAD), and panic attacks by lowering stress and elevating mood. Psychological studies have revealed that mountain breathing can be an effective intervention for emotion enhancement **[3]**. Further evidence from a randomized control trial showed that this breathing exercise reduced depression and anxiety in patients with chronic lower back pain **[4]**. Cardiopulmonary function is an important factor for lung capacity, pulmonary ventilation, and strengthening the respiratory tract by reducing respiratory fatigue **[5]**. Aging-related physical and sarcopenic disabilities are major consequences of reduced cardiopulmonary fitness in older adults **[6]**. Some researchers believe that the relaxation generated by this technique helped to manage attention symptoms among children with ADHD (attention deficit hyperactivity disorder) **[7]**.

Decreased cardiopulmonary function among elderly people can also influence the amount of muscle loss and the extent of physical disabilities **[8]**.

The elderly population is continuously increasing due to economic growth and advancements in medical techniques **[1]**. Age-related changes are common above 60 years, from which the respiratory system is paramount. As we age, there are structural changes to the thoracic cage that cause a reduction in chest wall compliance, resulting in reduced height of the thoracic vertebrae, stiffening of the thoracic cage (due to calcification and degeneration of bones), kyphosis, and poor posture, which reduce the ability of the thoracic cage to contract and relax during inspiration and expiration. This also reduces the strength of the six inspiratory muscles and the strength of the expiratory muscles, resulting in labored breathing and a poor coughing reflex, which leads to respiratory tract infection **[2]**. There is a mucus and ciliary mechanism to remove foreign particles entering the tract, but due to aging, the frequency of cilia decreases with a decrease in mucus production, which fails to remove particles and can cause infection in the lungs, making them weak **[3]**. For older individuals, breathing exercises are important to be able to perform independent activities of daily living. Breathing exercises for people over 60 years old should consider their structural and functional adaptation and physiological elasticity **[4]**.

Breathing problems can be managed using stable chest exercises, which are aimed at strengthening the respiratory muscle and improving breathing patterns **[5]**. This also reduces the strength of the six inspiratory muscles and the strength of the expiratory muscles, resulting in labored breathing and a poor coughing reflex, which leads to respiratory tract infection **[6]**. There is a mucus and ciliary mechanism to remove foreign particles entering the tract, but due to aging, the frequency of cilia decreases with a decrease in mucus production, which fails to remove particles and can cause infection in the lungs, making them weak **[7]**.

The lung function tests were carried out by an instrument called the RMS Helios spirometer. It measures the airflow with parameters such as FVC, FEV1, FEV1/FVC, PEFR, FIVC. It can also evaluate lung diseases by measuring the amount of air inhale and exhale quickly. There are three phases in this procedure:

1) Maximal inspiration

2) A quick exhalation

3) Continued complete exhalation

The lung function test is simple and quite feasible compared to other pulmonary function tests. The average person can voluntarily hold their breath for 30–60 seconds; this time can increase or decrease

due to various factors, such as underlying medical conditions such as diabetes, blood pressure, and thyroid. Many studies have reported that breathing could help regenerate brain tissue while improving lung capacity. This test has been used as a tool to assess peripheral chemo-reflex sensitivity in patients with chronic heart failure, and it was concluded from their study that this test was a reliable and safe method to include in the assessment. This test is also helpful in assessing conditions such as pulmonary fibrosis, dyspnea, and anxiety **[8, 9, 10]**.

Thus, the need of present study is to see the "Effect of Mountain Breathing Exercise on the Geriatric Population for improving their lung capacity in breath holding

MATERIALS AND METHODS: -

MATERIAL USED:

1. Gujarati Consent Form
2. Mountain breathing printed sheet.
3.Breath ball app.
4.stop watch in cell phone.
5. data collection sheet.

METHODOLOGY:

1. Study Design: Randomized controlled trial
2. Study setting: Saurashtra region geriatric population
3. Sampling Technique: Random sampling
4. Study Duration: 3weeks/ thrice a week.
5. Study Population: 30 subjects

CRITERIA FOR SELECTION:

INCLUSION CRITERIA: -

1. Geriatric Male-Female of Saurashtra region.
2. Subjects age between 60-70 years.
3. Subjects who want to participate voluntarily in study.
4. Subjects with chronic smokers and tobacco chewing.

EXCLUSION CRITERIA:

1. Subjects having medical conditions such as; thyroid.
2. Subjects who are mentally unstable and cannot follow command.
3. Subjects who refuses from participating in study
4. The Person who does meditation and exercise regularly.

PROCEDURE: -

The study participants were recruited from Shreeji hospital. The study was approved by the Institute review board. Before initiating the work, the study was fully explained to the participants, and informed written consent was obtained from each participant.

Phase 1: Gujarati Consent form in MS word was prepared for subjects taking part in study. Each subject read and voluntarily gave consent in hard copy, which was provided by researchers.

Phase 2: Mountain Breathing Exercise, which is a type of deep breathing exercise, was easily available online as in PDF form; from occupational therapy toolbox (www.theottoolbox.com).

Phase 3: After they gave written consent to researchers approached in population, they were selected as per the criteria mentioned in study.

Phase 4: Lung Function Test test was conducted before and after the intervention of Mountain breathing exercise. This was followed up for three consecutive weeks and thrice times a day every day. The data were recorded in data collection sheets with following information: -

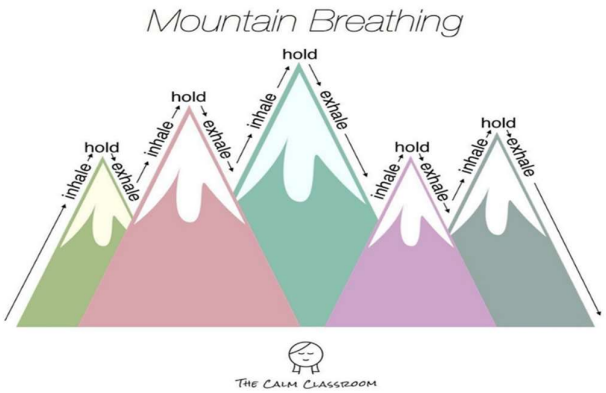
1. Sr. No
2. Name
3. Gender
4. Age
5. FVC
6. FEV1
7. FEV1/FVC
8. PEFR
9. PRE-Data.
10. POST Data.

Phase 5: A final total of 30 participants were included in this study (15 males, 15 females), gender balance was also taken into consideration. The lung function test was taken with an instrument called the 'RMS Helios spirometer'.

Phase 6: Subjects were in comfortable position with well-ventilated room. Instruction was to take deep breath till the mountain arrow goes up and fill lungs how much they can and hold it for how long they can hold comfortably and if they no longer can hold breath, exhale. PRE- breath holding seconds were noted in data collection sheets with mentioned other details of subjects. Mountain breathing exercise was then taught to them by the breath ball app after knowing their breath holding capacity.

Phase 7: Coloured sheet of Mountain breathing was secluded. Researchers explained and demonstrated whole procedure on them, which was followed by them. They were instructed take deep breath seeing the mountain finger on the breath ball app hold the breath and exhale the breath till end, pause at the end of mountain and see the next mountain and breath out. Continue several times. This exercise was followed for three consecutive weeks and thrice a day. Follow-up of exercise was kept every day at same hour.

Phase 8: At the end of third day, lung function test was conducted as same mentioned above. POST- Breath hold seconds were recorded in data collection sheets. Increment was observable in all subjects after intervention of exercise. And their lung capacity was improved.



STATISTICAL ANALYSIS: -

	PRE	SD	POST	SD	PVALUE
FVC	2.30	0.69	2.48	0.71	<.001
FEV1	1.98	0.75	2.16	0.71	<.001
FEV1/FVC	82.4	21.92	86,9	30.3	.01
PEFR	1.89	0.82	2.07	0.86	.011

INTERPRETATION:

The Data was then analysed for Result in SPSS software Version 26.

Paired sample t test was used for comparing PRE -POST data of breath holding capacity after three consecutive weeks.

The error was set at 5%. The p value for PRE/POST data of breath holding capacity in 30 subjects, which is statistically significant and rejects null hypothesis as per denoted p-value should be less than 0.05(p-value<0.05)

DISCUSSION: -

By the end of the third week, following the mountain breathing exercise, FVC, FEV1/FVC, and PEFR were all significantly increased.

Numerous studies in health physiology and clinical treatment have demonstrated that mountain breathing technique is an effective technique among geriatric population.

Azza Slim et al. conducted a study in 2018 on “Lung Function Test: An Assessment Technique in Chronic Obstructive Disease.". It was considered a simple and reliable tool compared to other pulmonary function tests. This test was used in 30 patients with chronic obstructive pulmonary disease. The statistical analysis of the study showed that the data is statistically significant. The significant p value was 0.001, which is less than the denoted p value (p-value<0.05). Thus, it was concluded that the breath-holding test is statistically significant and effective in assessing patients with chronic obstructive disease **[11]**.

CONCLUSION:

The Mountain Breathing Exercise was administered to the geriatric population to

improve their lung capacity. Mountain breathing showed an increment in breath holding seconds from PRE to POST, and its statistical analysis showed significance, thus stating the effectiveness of exercise in the population. Thus, we can conclude that Mountain Breathing Exercise was useful in improving lung capacity in geriatric population.

CONSENT AND ETHICAL APPROVAL

The study participants were recruited from Shreeji Hospital. The study was ethical approved by the Institute review board. Before initiating the work, the study was fully explained to the participants, and informed written consent was obtained from each participant.

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REFERENCES

[1] Alaparthi, G. K., Augustine, A. J., Anand, R., & Mahale, A. (2016). Comparison of diaphragmatic breathing exercise, volume andflow incentive spirometry, on diaphragm excursion and pul-monary function in patients undergoing laparoscopic surgery:A randomized controlled trial. Minimally Invasive Surgery,2016, Article ID 1967532. https://doi.org/10.1155/2016/1967532.

[2] Aliasgharpour, M., & Hadiyan, Z. (2011). Assessment of a designedexercise program on physical capacity using six-minute walk-ing test (6MWT) in hemodialysis patients. Journal of Hayat, 17(3), 59–68.

[3] Hsieh, C. W., Lee, C. T., Chen, C. C., Hsu, L. P., Hu, H. H., & Wu, J. C. (2016). Pulmonary hypertension in patients on chronic hemo-dialysis and with heart failure. Hemodialysis International, 20(2), 208–217. https://doi.org/10.1111/hdi.12380.

[4] Liu, C.-J., Tsai, W.-C., Chu, C.-C., Muo, C.-H., & Chung, W.-S.(2019). Is incentive spirometry beneficial for patients with lung can-cer receiving video-assisted thoracic surgery? BMC PulmonaryMedicine, 19(1), Article No. 121. https://doi.org/10.1186/s12890-019-0885-8.

[5] Martin, T. J., Patel, S. A., Tran, M., Eltorai, A. S., Daniels, A. H., & Eltorai,A. E. M. (2018). Patient factors associated with successful incen-tive spirometry. Rhode Island Medical Journal, 101(9), 14–18.

[6] Narayanan, A. L., Hamid, S. R., & Supriyanto, E. (2016). Evidenceregarding patient compliance with incentive spirometry inter-ventions after cardiac, thoracic and abdominal surgeries: Asystematic literature review. CJRT: Canadian Journal of Respi-ratory Therapy, 52(1), 17–26.

[7] Palamidas, A. F., Gennimata, S. A., Karakontaki, F., Kaltsakas, G.,Papantoniou, I., Koutsoukou, A., Milic-Emili, J., Vlahakos, D.V., & Koulouris, N. G. (2014). Impact of hemodialysis on dys-pnea and lung function in end stage kidney disease patients.BioMed Research International, 2014, Article ID 212751.https://doi.org/10.1155/2014/212751

[8] Restrepo, R. D., Wettstein, R., Wittnebel, L., & Tracy, M. (2011). In-centive spirometry: 2011. Respiratory Care, 56(10), 1600–1604.https://doi.org/10.4187/respcare.01471

[9] Watanabe, F. T., Koch, V. H., Juliani, R. C., & Cunha, M. T. (2016).Six-minute walk test in children and adolescents with renaldiseases: Tolerance, reproducibility and comparison withhealthy subjects. Clinics (Sao Paulo), 71(1), 22–27. https://doi.org/10.6061/clinics/2016(01)05.

[10] Yılmaz, S., Yildirim, Y., Yilmaz, Z., Kara, A. V., Taylan, M., Demir, M., Coskunsel, M., Kadiroglu, A. K., & Yilmaz, M. E. (2016). Pul-monary function in patients with end-stage renal disease: Ef-fects of hemodialysis and fluid overload. Medical ScienceMonitor, 22, 2779–2784.

[11] Azza Slim, Abir Hedhli, Sana Cheikh Rouhou, Nourelhouda Mbarek, Amir Taboubi, Safa Benkhaled, Yassine Ouahchi, Jouda Cherif, Meriem Mjid, Sonia Toujani, Samira Merai European Respiratory Journal 2018 52: PA4053; DOI: 10.1183/13993003.congress-2018.PA4053.