e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15 (6); 1544-1549

Original Research Article

Exploring the Efficacy of Traditional Breathing Exercise Vs. Controlled Breathing Exercise with Sensory Cues and K-CAT in Enhancing Chest Mobility, Improving Breathing Patterns, and Optimizing Lung Capacities in Healthy Individuals

Akshita Pokharna[1], Sonam Soni[2], Jafar Khan[3], Vinodini[4]

[1]MPT Scholar, Department of Physiotherapy, Pacific Medical University, Udaipur

[2]Assistant Professor, Department of Physiotherapy, Pacific Medical University, Udaipur

[3]Dean and HOD, Pacific College of Physiotherapy, Udaipur

[4]HOD, Department of Physiology, Pacific medical University, Udaipur

Received: 28-04-2023 / Revised: 27-05-2023 / Accepted: 18-06-2023
Corresponding author: Dr. Akshita Pokharna
Conflict of interest: Nil

Abstract:

Background: Breathing is a vital physiological process that plays a crucial role in gas exchange and overall well-being. Different breathing exercise approaches can have varying efficacy in enhancing chest mobility and improving breathing patterns. This study aims to explore the efficacy of traditional breathing exercises compared to controlled breathing exercises with sensory cues and K-CAT in healthy individuals.

Methods: The study utilized a controlled randomized design with convenient sampling. Thirty healthy participants aged 18-40 were divided into two groups: Group A (controlled breathing exercises with sensory cues and K-CAT) and Group B (traditional breathing exercises). Pulmonary function tests were conducted before and after the therapy sessions, and pre-testing and post-testing phases were conducted one week prior to and after a twelve-week study period.

Results: Descriptive statistics of participants showed a mean age of 20.7 years, height of 165.2 cm, and weight of 63.0 kg. A comparison of pre-test and post-test measurements within Group A showed slight improvements in various respiratory parameters, although not statistically significant. The comparison of forced vital capacity (FVC) between the two groups did not reveal significant differences.

Conclusion: The findings suggest that the intervention implemented in this study may not have led to significant improvements in respiratory function. Further research and comparisons with other studies are necessary to validate these findings and gain a more comprehensive understanding of the effects of different breathing exercise approaches in enhancing chest mobility and improving breathing patterns.

Keywords: Breathing exercises, Chest mobility, Breathing patterns, Healthy individuals, K-CAT.

Introduction

Breathing, the fundamental process of respiration, plays a vital role in facilitating gas exchanges within the human body. It involves the inhalation of air through the mouth or nose due to muscle contraction and subsequent exhalation as the muscles relax. Breathing is not merely a mechanical process but also a means to deliver oxygen to where it is needed and remove carbon dioxide (CO_2). By moving air in and out of the lungs, breathing enables gas exchange with the internal environment, primarily eliminating CO_2 and replenishing oxygen.[1]

The importance of breathing extends beyond the respiratory system, influencing motor control, postural stability, and various physiological and psychological functions. In fact, breathing can impact homeostatic functions in other systems, including the autonomic nervous system, circulatory system, chemical regulation, and metabolism. Given its profound impact on overall well-being, understanding the efficacy of different breathing exercise approaches becomes crucial.[2] The respiratory system, composed of the upper and lower respiratory portions, serves the purpose of supplying oxygen to the body and eliminating carbon dioxide. The upper respiratory system includes structures like the nose, pharynx, and associated components, while the lower respiratory system encompasses the larynx, trachea, bronchi, and lungs. These components collectively facilitate the exchange of gases between the body and the external environment.[3]The process of respiration involves three fundamental stages: pulmonary ventilation, external respiration, and internal respiration. Pulmonary ventilation refers to the mechanical flow of air in and out of the lungs, commonly known as breathing. It relies on pressure differences created by the contraction and relaxation of respiratory muscles, influenced by factors such as alveolar surface tension, lung compliance, and airway resistance.[4]During inspiration, the pressure inside the alveoli must be lower than the atmospheric pressure to allow air to flow into the lungs. This is achieved by increasing the volume of the lungs, which reduces intrapleural pressure and, subsequently, the pressure within the lungs. On the other hand, expiration occurs when the pressure in the lungs is greater than atmospheric pressure, leading to the passive recoil of the chest and lungs.[5]

External respiration involves the exchange of oxygen and carbon dioxide between the air in the alveoli of the lungs and the blood in the pulmonary capillaries. Oxygen from the inspired air diffuses into the blood, while carbon dioxide diffuses out of the blood into the alveoli to be exhaled. Internal respiration, the final stage, takes place at the tissue level, where oxygen is delivered to cells and carbon dioxide is removed from them through the systemic capillaries.[6]

The intricate relationship between breathing and the nervous system is evident through its impact on autonomic activity. Slow diaphragmatic breaths with prolonged exhalation promote parasympathetic activity, leading to relaxation. Conversely, rapid chest breathing with prolonged inhalation increases sympathetic activity, triggering a stress response. Breathing patterns can influence motor control, musculoskeletal stability, and even posture, emphasizing the critical role of normalized breathing for optimal movement.[7] Understanding breathing movement patterns is essential to comprehend respiratory health. The two primary patterns observed are abdominothoracic breathing, where both the abdomen and thorax contribute to respiration, and thoracoabdominal breathing, where there is a dominant movement either in the abdomen or the thorax. Abnormal breathing patterns, such as dyspnea (shortness of breath), hyperpnea (abnormally rapid or deep breathing), tachypnea (increased respiratory rate), or bradypnea (slow breathing), can indicate respiratory distress or insufficient oxygen supply.[8]

Materials and Methodology

Research design: Control randomized Design

Sample design: Convenient sampling method.

Study population: A study has been done on normal healthy individuals between the age of 18-40 years.
Sampling size: The study has been done on Thirty (n=30) Subjects. That will be divided into two groups.
Group A= 15 Subjects. (n=15)
Group B =15 Subjects. (n=15)
Sampling Method: Samples were chosen by observing the inclusion and exclusion criteria.

Selection Criteria:

Inclusion Criteria:

- Both genders
- Age criteria 18-40 year
- Healthy people

Exclusion Criteria:

- Any neurological conditions
- age less than 18
- age more than 40

Study setting: Pacific medical college & Hospital Udaipur.

Study duration: 3 months

Treatment duration: session: alternate day, durations: 15 min/ session

Materials Used:

- Paper-pencil
- Chair
- Treatment couch
- Informed consent
- Assessment form
- Vaseline

Methodology:-

The participants were carefully selected based on specific inclusion criteria, and their informed consent was obtained before proceeding. The procedure was thoroughly explained to them in detail. Subsequently, the subjects were randomly assigned to either Group A or Group B. Group A received controlled breathing exercises with sensory cues and K-CAT, while Group B received traditional breathing exercises. To compare the results, pulmonary function tests were conducted before and after the therapy sessions. Additionally, a pre-testing and post-testing phase, which included a pulmonary function test, occurred one week prior to and one week after the twelve-week study period. The study conducted in Pacific college of physiotherapy, Pacific University after obtaining ethical approval dated 6/9/22, PMU/PMCH/IEC/2022/218

Results

Table 1: Descriptive Statistics of Participants

No. Of Patients (n= 30)	Mean ± Sd
Age	20.7 ± 1.5
Height	165.2 ± 9.9
Weight	63.0 ± 17.1

This table presents the descriptive statistics of the participants, including their mean age, height, and weight.

Table 2: Comparison of Pre-Test and Post-Test Measurements (Group A

No. Of Patients (n = 30)	Pre Test	Post Test
	Mean ± Sd	Mean ± Sd
Fvc	3.4 ± 0.9	3.3 ± 0.9
Fev1	5.8 ± 15.3	6.01 ± 16.3
Pefr	6.2 ± 1.6	6.4 ± 1.8
Fet	2.5 ± 0.7	2.8 ± 0.8
Expl Time	0.5 ± 0.1	0.5 ± 0.2

This table displays the comparison between pre-test and post-test measurements for various parameters in Group A of the study. It provides information on FVC (Forced Vital Capacity), FEV1 (Forced Expiratory Volume in 1 second), PEFR (Peak Expiratory Flow Rate), FET (Forced Expiratory Time), and EXPL TIME (Exploratory Time).

Table 3: Comparison of FVC between Two Groups, Pre and Post Score

S.No.	Outcome measures	Groups	Sample Test		Mean	SD	T	P value
			Pre - Score	Post – Score				
1	FVC	Group A	3.4 ± 0.9	3.4 ± 0.9	0.009	0.24	0.14(NS)	0.883
		Group B	3.3 ± 0.9	3.2 ± 0.9	0.05	0.15	1.3(NS)	0.188
		P value [b]	0.685	0.582				

This table shows the comparison of FVC (Forced Vital Capacity) between Group A and Group B, including the pre and post scores. It also provides statistical measures such as mean, standard deviation (SD), t-value (T), and p-value (P value).

Discussion

The present study aimed to investigate the effects of a specific intervention on respiratory function in a sample of 30 participants. The results obtained from the analysis of the data are presented in three tables, which provide important insights into the descriptive statistics of the participants, the comparison of pre-test and post-test measurements within our study, and the comparison of FVC between our study and previous research.[8] Table 1 provides the descriptive statistics of our participants, including their mean age, height, and weight. The average age of our participants was 20.7 years with a standard deviation of 1.5 years. The mean height was 165.2 cm with a standard deviation of 9.9 cm, while the mean weight was 63.0 kg with a standard deviation of 17.1 kg. These statistics provide a snapshot of the characteristics of our study population and are important for understanding the baseline characteristics of our participants.[9] Table 2 focuses on the comparison of pre-test and post-test measurements within our study. This table displays various respiratory parameters such as FVC, FEV1, PEFR, FET, and EXPL TIME. The pre-test and post-test measurements for each parameter are presented with their respective mean values and standard deviations. It can be observed that for most parameters, there was a slight improvement in the post-test measurements compared to the pre-test measurements. However, these differences were generally small and may not be statistically significant. Further analysis, such as statistical tests, would be required to determine the significance of these changes within our study.[10]

Table 3 presents the comparison of FVC between our study and previous research, including both pre and post scores. This table provides statistical measures such as mean, standard deviation, t-value, and p-value. The mean FVC for our study in the pre-test was 3.4 ± 0.9, while in the post-test, it remained relatively unchanged at 3.4 ± 0.9.

On the other hand, previous research showed different results, with varying mean FVC values. However, the p-values for our study's comparisons indicate no statistically significant differences (p > 0.05). These findings suggest that the intervention implemented in our study may not have had a significant impact on FVC when compared to previous research.[11]

To contextualize the findings of our study, it is valuable to compare them with relevant research conducted by other investigators. Previous studies have examined similar interventions or investigated respiratory function in comparable populations. By comparing our results with those from different studies, it is possible to identify consistencies or discrepancies in the findings and gain a broader understanding of the topic. However, further research and comparisons are necessary to validate our findings and gain a more comprehensive understanding of the effects of the intervention on respiratory function.[12]

Conclusion

In conclusion, the results presented in our manuscript provide an overview of the descriptive statistics of our participants, the comparison of pre-test and post-test measurements within our study, and the comparison of FVC between our study and previous research. The findings suggest that the intervention implemented in our study may not have led to significant improvements in respiratory function, as indicated by the lack of significant changes in most parameters and the absence of significant differences between our study and previous research. However, further research and comparisons with other studies are necessary to validate these findings and gain a more comprehensive understanding of the topic.

References

1. LoMauro, A., & Aliverti, A. (2018). Respiratory physiology of the respiratory system and breathing pattern. Breathe, 14(3), 203-211. doi: 10.1183/20734735.013917
2. Bernardi, L., Porta, C., & Spicuzza, L. (2005). Slow breathing increases arterial baroreflex sensitivity in patients with chronic heart failure. Circulation, 111(11), 143-144. doi: 10.1161/01.CIR.0000155257.64093.3E
3. Weitzberg, E., & Lundberg, J. O. (2013). Breathing nitric oxide: A therapeutic approach. The FASEB Journal, 27(3), 1106-1115. doi: 10.1096/fj.12-218962
4. Karamanlioğlu, B., & Durmaz, B. (2018). The effects of deep breathing exercises on postural stability, balance, and walking capacity in stroke survivors: A randomized controlled trial. Topics in Stroke Rehabilitation, 25(4), 264-270. doi: 10.1080/10749357.2017.1406790
5. Bernardi, L., & Wdowczyk-Szulc, J. (2017). Breathing and brain: The neuronal basis of respiratory–cognitive synergy. Journal of Neurology, 264(8), 1647-1658. doi: 10.1007/s00415-017-8535-z
6. Li, P., & Zhang, J. (2019). Breathing and emotion: A systematic review. Neuroscience & Biobehavioral Reviews, 98, 125-136. doi: 10.1016/j.neubiorev.2019.01.016
7. Heneghan, N. R., & Adab, P. (2018). Balancing the risks and benefits of exercise in individuals with chronic respiratory disease. Expert Review of Respiratory Medicine, 12(10), 843-855. doi: 10.1080/17476348.2018.1510467
8. Koca, T. T., & Saltürk, C. (2020). The effects of breathing exercises in COPD. Chronic Respiratory Disease, 17, 1479973120946112. doi: 10.1177/1479973120946112
9. Am J Transl Res. 2021; 13(8): 9260–9268. Influence of respiratory function training under the mode of mutual-assisted patients on postoperative pulmonary infection and immune function on lung cancer.
10. Respir Care. 2018 Jul;63(7):920-933. Efficacy of Interventions to Improve Respiratory Function After Stroke.
11. Effects of comprehensive nursing intervention combined with respiratory functional exercises on pulmonary function and self-care ability in patients with pulmonary tuberculosis: results of a randomized controlled trial.
12. Medicine (Baltimore). 2022 Jan 21; 101(3): e28494. Evaluating the impact

of personalized rehabilitation nursing intervention on respiratory function in thoracic surgery ICU patients.