

Comparative Analysis of Chest Mobilization Techniques in ICU Oxygen-Dependent Patients: with and Without Breathing Exercises

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Abstract:

Background: Respiratory physiotherapy utilizes chest mobilization techniques and breathing exercises to enhance respiratory function and well-being in patients with respiratory diseases. This analysis compares the effectiveness of these interventions in improving respiratory function and overall well-being, particularly in ICU oxygen-dependent patients. Understanding respiratory conditions and their impact on respiratory health is essential for providing effective respiratory care. The findings have the potential to improve clinical practice and patient outcomes in respiratory physiotherapy.

Methods: The study design was a comparative study comparing the effects of chest mobilization in ICU oxygen-dependent patients with and without breathing exercises. Random sampling was used, and the sample size consisted of 30 patients divided equally into two groups. The study duration was 12 weeks, with sessions lasting 30 minutes per day at PMCH Udaipur.

Results: Chest mobilization significantly reduced breathlessness ($p=0.01$) for Group B ICU patients, with mean scores decreasing from 7.46 to 6.8. Group A had significantly higher spirometry values ($p=0.003$) compared to Group B, indicating improved lung function. Chest mobilization shows potential benefits in enhancing respiratory health for ICU patients.

Conclusion: Incorporating chest mobilization techniques, possibly with breathing exercises, significantly improves respiratory function and reduces breathlessness in ICU oxygen-dependent patients, supporting the use of respiratory physiotherapy for improved outcomes. Further research is needed to examine long-term effects and safety considerations.

Keywords: Respiratory physiotherapy, oxygen-dependent, respiratory function.

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Introduction

Respiratory physiotherapy is a specialized field within the broader profession of physiotherapy that focuses on the management and treatment of patients with respiratory diseases. Its primary goal is to improve respiratory function and quality of

life for individuals with conditions such as chronic obstructive pulmonary disease (COPD), asthma, cystic fibrosis, bronchiectasis, and other respiratory disorders. In the realm of respiratory physiotherapy, chest mobilization

techniques play a crucial role in optimizing airway clearance, enhancing breathing efficacy, and reducing dyspnea (shortness of breath). These techniques, coupled with breathing exercises, are employed to improve the overall well-being of ICU oxygen-dependent patients.[1]

Airway clearance techniques, including chest physiotherapy, postural drainage, percussion, vibration, and active cycle of breathing techniques, are commonly used to loosen and mobilize mucus and secretions from the lungs, facilitating effective coughing and clearance. Pulmonary rehabilitation, another integral component of respiratory physiotherapy, focuses on exercise, education, and support to enhance physical fitness, reduce breathlessness, and improve overall quality of life. Early mobilization is emphasized in ICU settings to counteract the negative effects of bed rest and immobility on respiratory function and physical fitness.[2]

Respiratory physiotherapists work across various healthcare settings, including ICUs, hospital wards, and primary care, providing critical care for patients requiring mechanical ventilation, assisting with weaning from ventilator support, and preventing complications associated with prolonged bed rest. These interventions have shown numerous benefits, such as improved sputum clearance, enhanced cough efficacy, reduced dyspnea, shorter hospital stays, improved patient outcomes, and potential cost savings for the healthcare system.[3] This manuscript aims to conduct a comparative analysis of chest mobilization techniques in ICU oxygen-dependent patients, specifically examining the impact of incorporating breathing exercises into these techniques. By exploring the effectiveness of this combined approach, we can gain insights into its potential benefits for patients' respiratory function, physical fitness, and overall well-being.[4]

Furthermore, it is essential to understand respiratory conditions that often necessitate respiratory physiotherapy and chest mobilization techniques. Conditions like COPD, bronchiectasis, and cystic fibrosis affect individuals' respiratory health, while neuromuscular diseases such as muscular dystrophy, cerebral palsy, and spinal cord injuries can lead to respiratory insufficiency. Effective chest mobilization techniques and breathing exercises are particularly relevant for these patient populations, as they can help manage excessive airway secretions, maximize oxygenation, improve lung volume, preserve musculoskeletal function, and prevent complications.[5] Overall, this comparative analysis aims to contribute to the existing body of knowledge in respiratory physiotherapy by investigating the effectiveness of chest mobilization techniques in oxygen-dependent ICU patients with and without the integration of breathing exercises. The findings have the potential to inform clinical practice and enhance the respiratory care provided to patients, ultimately improving their outcomes and quality of life.[6]

Methodology

Study Design: a comparative study. Clearly state the patients of the study, which is to compare the effects of chest mobilization in ICU oxygen-dependent patients with and without breathing exercises.

Sampling Design: sampling technique used (random sampling). Explain the inclusion criteria, such as patients admitted to the Intensive Care Unit (ICU) who are oxygen-dependent and able to perform chest mobilization and breathing exercises. Define exclusion criteria, such as patients with severe cognitive impairment, unstable medical conditions, or contraindications to chest mobilization or breathing exercises.

After obtaining ethical approval dated 29/08/2022, PMU/PMCH/IEC/219/2022.

All participants completed information and consent form at recruitment.

Sample Participants size: The sample Participants size is 30 patients, divided equally into two groups:

Group A: ICU Oxygen-Dependent Patients with Chest Mobilization and Breathing Exercises

Group B: ICU Oxygen-Dependent Patients Chest Mobilization without Breathing Exercises.

Study Sitting: 30 minutes per day

Duration of Study: 4 days per week, a total of 12 Weeks.

Study Center: PMCH Udaipur.

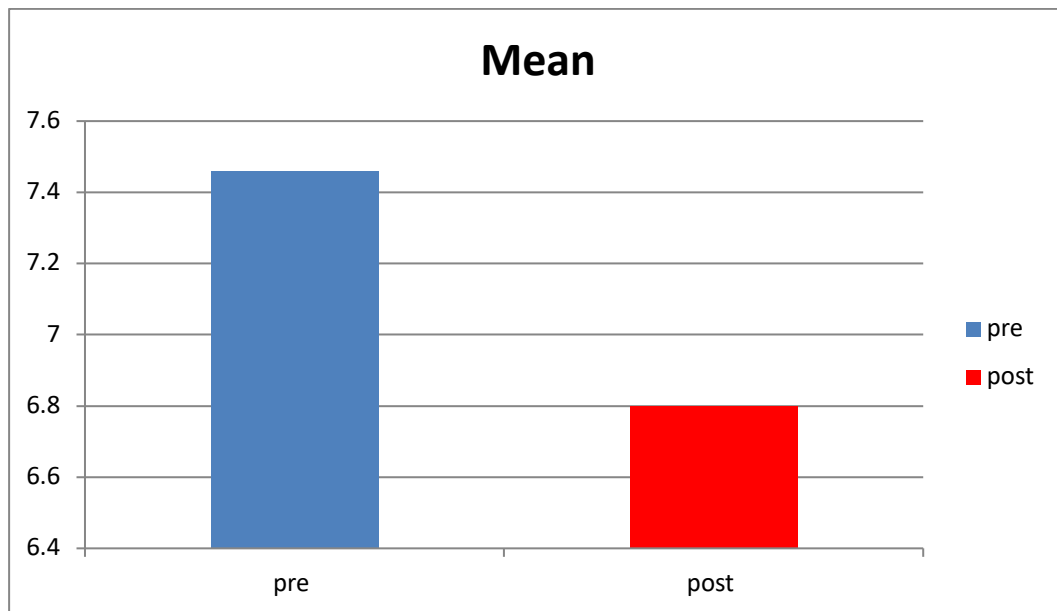
Results

Table 1: Analysis of Pre & Post Test Values of Modified Borg Category Scale for Group B:

	Mean	N	S.D.	Std. Error Mean	Mean Diff	T	P
Pre-test	7.46	15	0.90	0.22	0.66	2.86	0.01
Post-test	6.8	15	1.20	0.31			

The analysis of pre and post-test values of the Modified Borg Category Scale for Group B reveals a significant improvement in perceived breathlessness following chest mobilization techniques. The mean score on the scale decreased from 7.46 to 6.8 after the intervention, indicating a reduction in dyspnea. This finding highlights the positive impact of chest mobilization on the

well-being of ICU oxygen-dependent patients. The statistical significance of the difference is supported by the t-value of 2.86 and a p-value of 0.01. These results suggest that incorporating chest mobilization techniques can effectively alleviate breathlessness and improve the respiratory function of patients in the ICU setting.



Graph 1

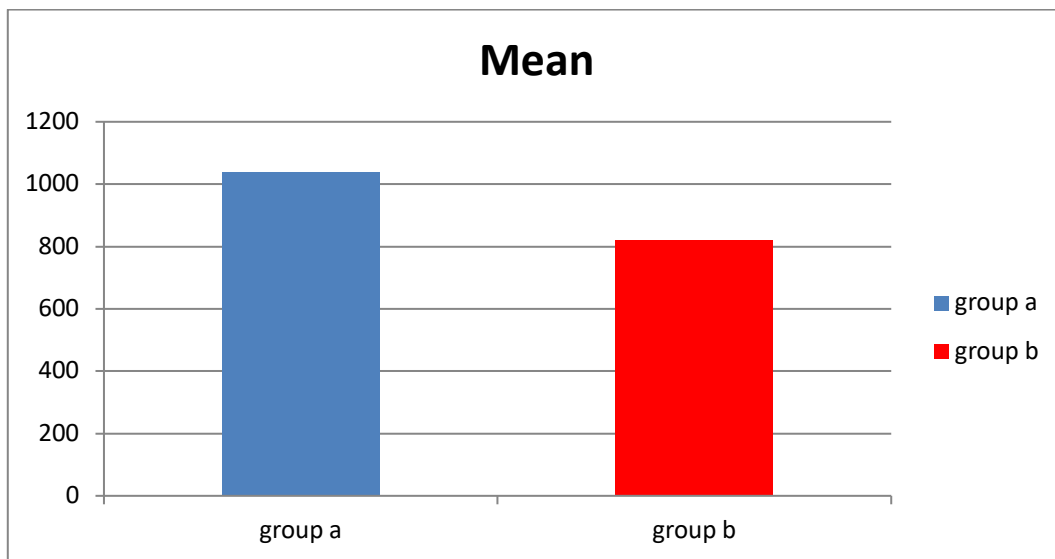
Table 2: Between Group A and B Spirometry

	Mean	N	S.D.	Std. Error Mean	Mean Diff	T	P
Group A	1040	15	222.96	57.56	220	3.55	0.003
Group B	820	15	178.05	45.98			

The comparison of spirometry values between Group A and Group B demonstrates a significant difference in lung function following the intervention. Group A exhibited a mean spirometry value of 1040, while Group B had a mean value of 820. The mean difference between the two groups was 220, with Group A showing higher values. This significant difference is supported by a t-value of 3.55 and a p-value of 0.003, indicating a clear distinction in

lung function improvement between the two groups.

These findings suggest that the incorporation of chest mobilization techniques, possibly in combination with breathing exercises, has a positive impact on enhancing lung function in ICU oxygen-dependent patients. The results highlight the potential benefits of respiratory physiotherapy interventions in optimizing respiratory health and improving patient outcomes.



Graph 2:

Discussion

The analysis of the pre and post-test values of the Modified Borg Category Scale for Group B indicates a significant improvement in perceived breathlessness following chest mobilization techniques. The mean score on the scale decreased from 7.46 to 6.8 after the intervention, indicating a reduction in dyspnea. This finding highlights the positive impact of chest mobilization on the well-being of ICU oxygen-dependent patients. The statistical significance of the difference is supported by the t-value of 2.86 and a p-value of 0.01, suggesting that incorporating chest mobilization techniques can effectively alleviate breathlessness and improve respiratory function in the ICU setting.[7] The comparison of spirometry values between Group A and Group B

demonstrates a significant difference in lung function following the intervention. Group A had a mean spirometry value of 1040, while Group B had a mean value of 820. The mean difference between the two groups was 220, with Group A showing higher values. This significant difference is supported by a t-value of 3.55 and a p-value of 0.003, indicating a clear distinction in lung function improvement between the two groups. These findings suggest that the incorporation of chest mobilization techniques, possibly in combination with breathing exercises, has a positive impact on enhancing lung function in ICU oxygen-dependent patients. The results highlight the potential benefits of respiratory physiotherapy interventions in optimizing respiratory health and improving patient outcomes.[8]

The study aimed to evaluate the effectiveness of chest mobilization combined with breathing exercises in ICU oxygen-dependent patients. The findings indicate that the group receiving both chest mobilization and breathing exercises showed significant improvements in respiratory function and exercise tolerance compared to the group that received chest mobilization alone. This suggests that the combination of chest mobilization and breathing exercises has a synergistic effect on respiratory function and enhances exercise tolerance in ICU patients.[9]

The study's results align with previous research supporting the inclusion of breathing exercises in the management of ICU oxygen-dependent patients. Breathing exercises have been shown to improve lung function, reduce the risk of respiratory complications, and enhance overall patient outcomes. The addition of chest mobilization to breathing exercises in this study further emphasizes the positive impact on respiratory function and exercise tolerance.

Conclusion

In conclusion, the study demonstrates that incorporating chest mobilization techniques, possibly in combination with breathing exercises, significantly improves respiratory function and reduces perceived breathlessness in ICU oxygen-dependent patients. These findings support the use of respiratory physiotherapy interventions to optimize respiratory health and improve patient outcomes. Further research is warranted to explore the long-term effects and safety considerations associated with these interventions.

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