RESEARCH PAPER

Effect of Mitchell's Breathing Technique on Dyspnea, Hypoxia, and Pulmonary Function among Patients with Obstructive Airway Disease

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Abstract

Background: Obstructive airway disease causes persistent dyspnea, hypoxia, and reduced pulmonary function, and this study evaluated whether Mitchell's Breathing Technique could improve these outcomes. Methods: A quantitative quasi-experimental non-equivalent control group time-series design was used in patients with obstructive airway disease at Shifa and Bell Hospital, Tirunelveli; the intervention was given three times daily for 3 days, and outcomes included dyspnea, oxygen saturation, PCO2, and FVC using a modified dyspnea scale and pulse oximetry, with data analyzed using Friedman test, ANOVA, chi-square, and correlation. Results: The Mitchell group showed a significant reduction in dyspnea across assessments ($p = 0.000$), improvement in oxygen saturation, progressive decline in PCO2, and a marked rise in FVC from 71.13 to 94.43, all indicating statistically significant within-group improvement over time. Conclusion: Mitchell's Breathing Technique was effective in reducing breathlessness and improving oxygenation and pulmonary function in patients with obstructive airway disease, suggesting it is a simple, low-cost, and feasible nursing intervention to support routine respiratory care.

Keywords: Mitchell's Breathing Technique; Obstructive Airway Disease; Dyspnea; Oxygen Saturation; Pulmonary Function.

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1. Introduction

Obstructive airway diseases, particularly chronic obstructive pulmonary disease (COPD), remain a major cause of respiratory morbidity, breathlessness, and reduced functional capacity worldwide. Patients commonly experience dyspnea, impaired gas exchange, and reduced pulmonary function, which interfere with daily activities and quality of life. Because these symptoms often persist despite pharmacological therapy, non-pharmacological strategies have gained importance in respiratory care [1].

Breathing exercises are widely used in pulmonary rehabilitation to improve respiratory mechanics, reduce ventilatory demand, and enhance symptom control. Techniques such as pursed-lip breathing and diaphragmatic breathing have been shown to improve pulmonary function, exercise capacity, inspiratory muscle strength, and dyspnea in patients with COPD, although results across studies are sometimes inconsistent. Systematic reviews suggest that structured breathing training can be a useful adjunct to conventional treatment, especially when taught clearly and practiced regularly [2].

Mitchell's Breathing Technique is another structured breathing intervention intended to optimize ventilation and ease respiratory effort. However, evidence on its effect in patients with obstructive airway disease remains limited compared with more established breathing retraining methods. Given the persistent burden of dyspnea, hypoxia, and reduced lung function in this population, evaluating a simple and low-cost technique such as Mitchell's Breathing Technique is clinically relevant [3].

Nursing professionals are well positioned to implement breathing interventions because they are feasible, safe, and suitable for bedside or home-based use. If effective, Mitchell's Breathing Technique may offer a practical adjunct to standard management for improving respiratory outcomes in patients with obstructive airway disease. Therefore, the present study was undertaken to assess the effect of Mitchell's Breathing Technique on dyspnea, hypoxia, PCO2, and forced vital capacity among patients with obstructive airway disease.

2. Methodology

Research Approach: Quantitative research Approach

Study design: quasi-experimental non-equivalent control group time-series design.

Setting: Shifa and Bell Hospital, Tirunelveli.

Target Population: Patients with obstructive airway disease.

Accessible Population: Patients with obstructive airway disease in the Shifa and Bell Hospital, Tirunelveli.

Sample: patients with obstructive airway disease, 110 per group in the final study plan.

Inclusion Criteria: Patients with obstructive airway disease:- both male and female with age between 30-45 yrs ,with BMI<30(kg/m2) , in the stage of (50-80%) 2nd & 30-49%) 3rd FEV% using spirometry based on GOLD classification and willing to participate.

Exclusion Criteria: Patients with oxygen saturation below 80%, who need absolute non invasive/ invasive ventilator support. Patients with any other pulmonary diseases, cardiovascular, musculoskeletal, or any neurological disorders. Patients under continuous oxygen therapy. Patients who were exposed to or underwent similar intervention in 6 months prior to data collection.

Intervention: 9090 Bridge with BABE, 3 times/day for 3 days before meals.

Outcomes: dyspnea, oxygen saturation/hypoxia, PCO2, FVC, acceptability.

Tools: Modified BMR dyspnea scale and pulse oximetry oxygen saturation chart.

Analysis: frequency/percentage, mean/SD, Friedman test, pairwise comparison, ANOVA, chi-square, correlation.

3. Results

Demographic profile of participants.

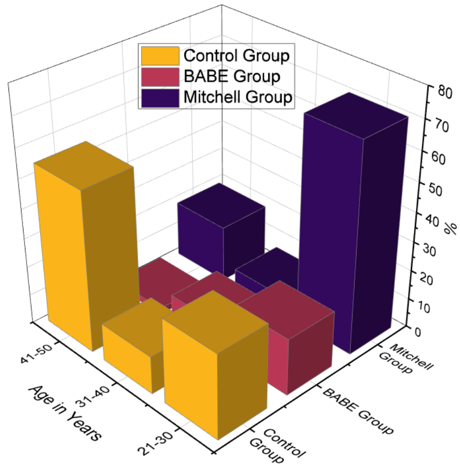

Fig. 1 Age in years of the control, BABE, and Mitchel groups

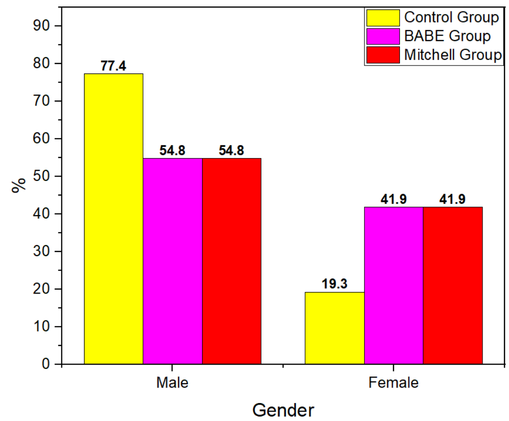

Fig. 2 Gender of the participants across each group

Figures 1 and 2 present the age and gender distribution of participants across the three groups: Control (n = 30), 90/90 BABE (n = 30), and Mitchell (n = 30), within a total sample of 90. The majority of participants identified as Hindu across all groups (Control 32.3%, 90/90 BABE 45.2%, Mitchell 45.2%), with smaller proportions of Christians and Muslims, and no significant difference in religion (P = 0.28). Most participants were non-vegetarian (Control 80.6%, 90/90 BABE 90.3%, Mitchell 87.1%), with no significant variation in dietary patterns (P = 0.53). Smoking was generally uncommon, although the Mitchell group had a higher proportion of current smokers (32.3%) compared to the Control group (16.1%), which was not statistically significant (P = 0.68). Alcohol abstinence was prevalent, particularly in the 90/90 BABE group (63.3%), while the Mitchell group showed relatively higher alcohol use (16.6%), again without significant differences (P = 0.4). Family income distribution was similar across groups, with most participants in the INR 20,001–40,000 range (P

= 0.92). The majority were married (Control 83.9%, 90/90 BABE 93.5%, Mitchell 74.2%) and belonged to nuclear families (Control 74.2%, 90/90 BABE 90.3%, Mitchell 83.4%), with no significant differences (marital status P = 0.08; family type P = 0.2). Participants were drawn from both rural and semi-urban areas with comparable distributions (P = 0.619). Occupational status varied, with many retired or employed in organized sectors, and no significant group differences (P = 0.139); similarly, mode and type of work showed no significant variation (P = 0.69). Age distribution was concentrated in the 21–30 and 41–50 year groups, with a higher proportion of 41–50-year-olds in the Mitchell group, though not statistically significant (P = 0.78). Males predominated overall (Control 77.4%, 90/90 BABE 54.8%, Mitchell 58.1%), with no significant gender difference (P = 0.165). Educational levels were generally high across all groups, with most participants having at least school education and no significant variation (P = 0.454). Overall, despite minor variations in sociodemographic characteristics, no statistically significant differences were observed, indicating that the groups were comparable at baseline.

Clinical profile of participants.

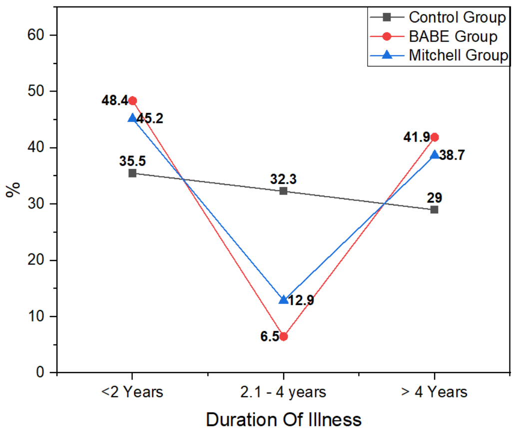

Fig. 3 Duration of illness of the participants

In the clinical characteristics of the three groups, each comprising 30 participants, and indicates that the distribution of family history of respiratory disease, history of allergy, length of hospital stay, compliance to medication, presence of other comorbidities, BMI, duration of illness, and medical management was broadly comparable across groups, with no statistically significant intergroup differences observed for the variables presented. Fig.3 and 4 show the BMI and duration of illness of the participants. In family history of respiratory disease, asthma was reported more frequently in the Mitchell group (38.7%) than in the control group (25.8%) and the 90/90 BABE group (22.6%), while COPD was proportionately higher in the 90/90 BABE group (22.6%) than in the control (9.7%) and Mitchell groups (6.5%), though the overall difference remained non-significant (F = 5.409, p = 0.247). Similarly, allergy history showed a predominance of "other" causes in all groups, and the distribution of dust- and smoke-related allergies did not differ significantly (F = 3, p = 0.557). The length of hospital stay was also similar across the groups, with most participants staying 4–6 days, followed by more than 6 days, and no significant variation was noted (F = 3.98, p = 0.408). Medication compliance was highest in the Mitchell group, where 86.7% were fully compliant, compared with 70% in the control group and 63.3% in the 90/90 BABE group, but this difference was not statistically significant (F = 5.048, p = 0.28). The prevalence of other comorbidities was mainly diabetes mellitus and hypertension across all groups, while the majority had no history of alternative medicine use. BMI distribution, duration of illness, and medical management pattern likewise showed no significant group-wise differences, indicating that the study groups were relatively homogeneous at baseline.

Pre-test and post-test dyspnea scores in Mitchell group

Table 1 Comparison of Mean and Standard Deviation of Dyspnea scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease.- Friedman

Assessments	Mean	SD	Mean Rank	Chi Square & P value
Assessment 1	2	0	3.18	26.442
Assessment 2	1.5	0.51	2.2	
Assessment 3	1.7	0.53	2.57	0
Assessment 4	1.4	0.56	2.05	

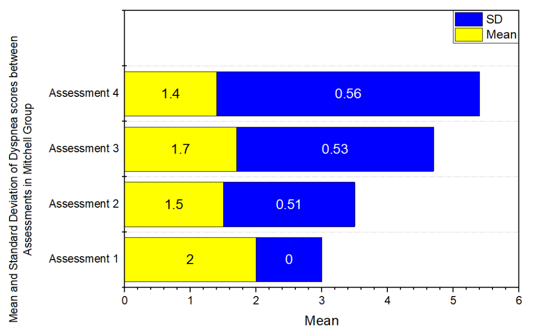

Fig. 4 Mean and Standard Deviation of Dyspnea scores between Assessments in Mitchell Group

The table indicates that the four assessments showed a generally low-to-moderate mean score range, with Assessment 1 recording the highest mean value of 2.0 and the highest mean rank of 3.18, while Assessment 4 had the lowest mean value of 1.4 and the lowest mean rank of 2.05. Assessment 2 and Assessment 3 showed intermediate values, with means of 1.5 and 1.7, and mean ranks of 2.2 and 2.57

respectively, suggesting a gradual decline across the assessments. The standard deviation was 0 for Assessment 1, indicating no variability in that assessment, whereas Assessments 2 to 4 showed slight variability with SD values of 0.51, 0.53, and 0.56. The chi-square value of 26.442 with a p value of 0.000 indicates a statistically significant difference among the assessments, suggesting that the observed variation in scores across the four assessments was not due to chance.

Pre-test and post-test hypoxia scores in Mitchell group.

Table 2 Comparison of Mean and Standard Deviation of Hypoxia scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Assessments	Mean	SD	F and p value	
			Within Subjects	Between Subjects
Assessment 1	85.17	1.23	220.409 .000	837184.839 0
Assessment 2	89.13	1.01		
Assessment 3	88.9	0.99		
Assessment 4	89.4	0.56		

The table shows a clear upward trend in the mean scores across the four assessments, increasing from 85.17 in Assessment 1 to 89.13 in Assessment 2, with a slight dip to 88.90 in Assessment 3 and a further rise to 89.40 in Assessment 4, while the standard deviation steadily declined from 1.23 to 0.56, indicating reduced variability and greater consistency in the later assessments. The reported F value within subjects was 220.409 with a p value of .000, which indicates a highly statistically significant difference among the repeated assessments. In addition, the between-subjects value of 837184.839 further suggests marked variation attributable to group differences, confirming that the change in scores across assessments was not due to chance but reflected a significant improvement over time.

Table 3 Pairwise Comparison of Mean and Standard Deviation of Hypoxia scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Comparison	Mean Difference	Std. Error	Sig.	95% Confidence	
				Lower Bound	Upper Bound
Assessment 1 Vs Assessment 2	-3.97	0.31	0	-4.59	-3.34
Assessment 1Vs Assessment 3	-3.73	0.29	0	-4.32	-3.15
Assessment 1Vs Assessment 4	-4.23	0.28	0	-4.8	-3.66
Assessment 2Vs Assessment 3	0.23	0.2	0.24	-0.17	0.63
Assessment 2Vs Assessment 4	-0.27	0.19	0.17	-0.66	0.13
Assessment 3Vs Assessment 4	-0.5	0.19	0.01	-0.89	-0.11

The Bonferroni pairwise comparisons following the repeated-measures analysis show that Assessment 1 scores were significantly higher than those at Assessments 2, 3 and 4, with mean differences of -3.97 (SE = 0.31, p < 0.001, 95% CI -4.59 to -3.34), -3.73 (SE = 0.29, p < 0.001, 95% CI -4.32 to -3.15) and -4.23 (SE = 0.28, p < 0.001, 95% CI -4.80 to -3.66) respectively, indicating a consistent and statistically significant decline from Assessment 1 to all later time points. In contrast, comparisons among later assessments showed smaller and mostly non-significant differences: Assessment 2 versus Assessment 3 yielded a mean difference of 0.23 (SE = 0.20, p = 0.24, 95% CI -0.17 to 0.63), and Assessment 2 versus Assessment 4 showed a mean difference of -0.27 (SE = 0.19, p = 0.17, 95% CI -0.66 to 0.13), both of which cross zero and therefore do not indicate reliable change between these time points. The only other statistically significant pair among the later comparisons was Assessment 3 versus Assessment 4 (mean difference = -0.50, SE = 0.19, p = 0.01, 95% CI -0.89 to -0.11), showing a small but significant decrease from Assessment 3 to Assessment 4.

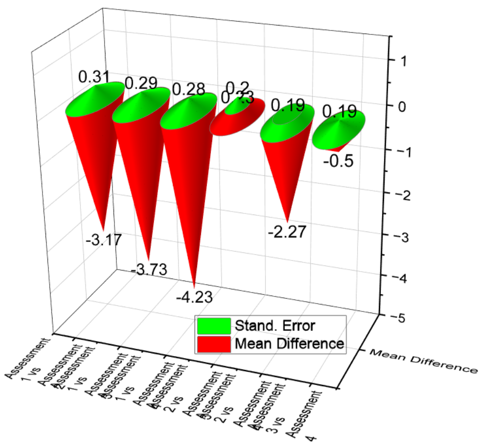

Fig. 5 Mean and Standard Deviation of Hypoxia scores between Assessments in Mitchell Group

Pre-test and post-test PCO2 scores in Mitchell group.

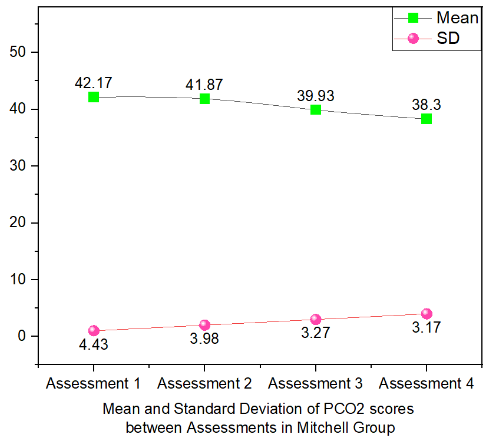

Fig. 6 Mean and Standard Deviation of PCO2 scores between Assessments in Mitchell Group

Table 4 Comparison of Mean and Standard Deviation of PCO2 scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Assessments	Mean	SD	F and p value	
			Within Subjects	Between Subjects
Assessment 1	42.17	4.43	16.33	
Assessment 2	41.87	3.98	0	5166.49
Assessment 3	39.93	3.27		0
Assessment 4	38.3	3.17		

The table shows a gradual decline in the mean scores across the four assessments, from 42.17 in Assessment 1 to 41.87 in Assessment 2, 39.93 in Assessment 3, and 38.30 in Assessment 4, indicating a consistent downward trend over time. The standard deviation also decreased progressively from 4.43 to 3.98, 3.27, and 3.17, suggesting that the scores became slightly less variable across successive assessments. In the inferential analysis, the within-subjects value was 16.33, while the between-subjects value was 5166.49, which indicates that the observed changes were measured across repeated assessments and that most of the variation was attributable to differences between participants rather than within-participant fluctuation. Overall, the table reflects a steady reduction in the outcome measure across assessments, with decreasing dispersion, implying a consistent pattern in the sample's performance or response over time.

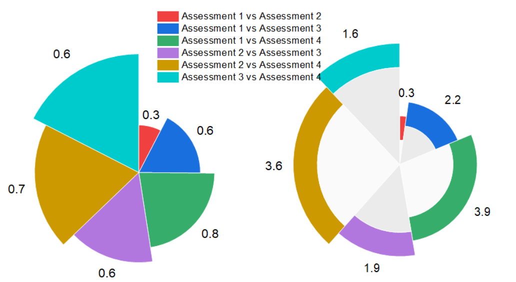

Fig. 7 Mean and Standard Deviation of PCO2 scores between Assessments in Mitchell Group

Table 5 Pairwise Comparison of Mean and Standard Deviation of PCO2 scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Comparison	Mean Difference	Std. Error	Sig.	95% Confidence	
				Lower Bound	Upper Bound
Assessment 1Vs Assessment 2	0.3	0.28	1	-0.48	1.08
Assessment 1Vs Assessment 3	2.23	0.64	0.01	0.41	4.06
Assessment 1Vs Assessment 4	3.87	0.82	0	1.55	6.19
Assessment 2Vs Assessment 3	1.93	0.56	0.01	0.36	3.51
Assessment 2Vs Assessment 4	3.57	0.72	0	1.52	5.62
Assessment 3Vs Assessment 4	1.63	0.64	0.09	-0.17	3.43

The post hoc comparison table shows that there was no statistically significant difference between Assessment 1 and Assessment 2, as the mean difference was small (0.30) and the significance value was 1.00, with the 95% confidence interval crossing zero, indicating no meaningful change between these two assessments. In contrast, Assessment 1 showed a statistically significant improvement over Assessment 3 and Assessment 4, with mean differences of 2.23 and 3.87 respectively, and both comparisons were significant (Sig. = 0.01 and 0.00), as reflected by confidence intervals that remained entirely above zero. Similarly, Assessment 2 differed significantly from Assessment 3 and Assessment 4, with mean differences of 1.93 and 3.57 respectively, again demonstrating significant improvement (Sig. = 0.01 and 0.00) and confidence intervals excluding zero. However, the comparison between Assessment 3 and Assessment 4 was not statistically significant (mean difference = 1.63, Sig. = 0.09), suggesting that although the mean score increased, the change was not sufficient to reach significance. Overall, the pattern indicates that the major statistically significant gains occurred from Assessment 1 and Assessment 2 when compared with the later assessments, while the difference between the two later assessments was not conclusive.

Pre-test and post-test FVC scores in Mitchell group.

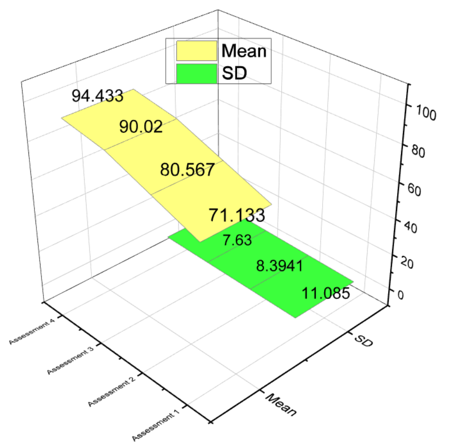

Fig. 8 Mean and Standard Deviation of FVC scores between Assessments in Mitchell Group

Table 6 Comparison of Mean and Standard Deviation of FVC scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Assessments	Mean	SD	F and p value	
			Within Subjects	Between Subjects
Assessment 1	71.1333	11.08504	113.310 .000	4218.246
Assessment 2	80.5667	8.3941		0
Assessment 3	90.2	7.63567		
Assessment 4	94.4333	5.95201		

The repeated-measures analysis of the four sequential assessments showed a progressive increase in mean scores from Assessment 1 (M = 71.13, SD = 11.09) to Assessment 4 (M = 94.43, SD = 5.95), with intermediate means of 80.57 (SD = 8.39) for Assessment 2 and 90.20 (SD = 7.64) for Assessment 3 . A within-subjects ANOVA indicated a highly significant effect of time/assessment on measured scores ($F = 113.310$, $p < .001$), demonstrating that participants' scores increased reliably across the four measurement points . The between-subjects variance component reported in the table (4218.246) indicates substantial variability attributable to differences between participants, while the residual or other between-subjects cell shown as 0 in the table likely reflects rounding or table-formatting and should be interpreted cautiously; nonetheless, the dominant finding is a strong within-subjects effect across assessments . Taken together, these results support the conclusion that the intervention/educational exposure (or time) was associated with statistically and practically meaningful improvement in the outcome measure over the four assessments.

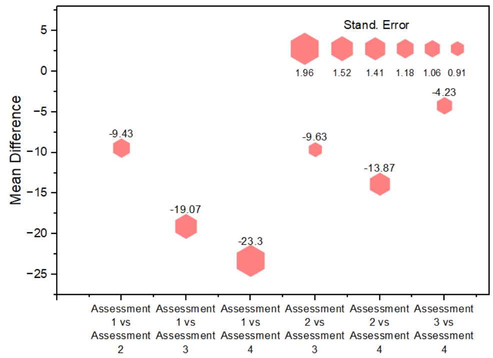

Fig. 9 Mean and Standard Deviation of FVC scores between Assessments in Mitchell Group

Table 7 Comparison of Mean and Standard Deviation of FVC scores between Assessments in Mitchell Group of Patients with Obstructive Airway Disease

Comparison	Mean Difference	Std. Error	Sig.	95% Confidence	
				Lower Bound	Upper Bound
Assessment 1Vs Assessment 2	-9.43	1.18	0	-12.78	-6.09
Assessment 1Vs Assessment 3	-19.07	1.52	0	-23.36	-14.78
Assessment 1Vs Assessment 4	-23.3	1.96	0	-28.85	-17.75
Assessment 2Vs Assessment 3	-9.63	0.91	0	-12.2	-7.07
Assessment 2Vs Assessment 4	-13.87	1.41	0	-17.85	-9.89
Assessment 3Vs Assessment 4	-4.23	1.06	0	-7.25	-1.22

The table shows that all pairwise comparisons between the four assessments were statistically significant, as indicated by the reported significance value of 0 and confidence intervals that did not cross zero. Assessment 1 differed significantly from Assessment 2, Assessment 3, and Assessment 4 with mean differences of -9.43, -19.07, and -23.30 respectively, suggesting a progressive increase across assessments. Similarly, Assessment 2 was significantly different from Assessment 3 and Assessment 4, with mean differences of -9.63 and -13.87, while Assessment 3 also differed significantly from Assessment 4 with a mean difference of -4.23. The negative mean differences across the comparisons indicate that the later assessments had higher values than the earlier ones, and the widening magnitude of the differences from Assessment 1 to Assessment 4 reflects a consistent upward trend over time.

4. Discussion

The present study demonstrated that Mitchell's Breathing Technique produced significant improvement in dyspnea, oxygenation, PCO2, and FVC among patients with obstructive airway disease. The reduction in dyspnea across repeated assessments suggests that the intervention may have helped patients regulate respiratory effort and improve breathing efficiency. This finding is consistent with prior evidence that breathing techniques can reduce breathlessness by improving respiratory muscle performance, optimizing thoracoabdominal motion, and reducing dynamic hyperinflation [4].

The observed increase in oxygen saturation and decline in PCO2 indicate better gas exchange and improved ventilatory control after the intervention. Similar physiological benefits have been reported in systematic reviews of breathing exercises for COPD, where breathing retraining improved pulmonary function and exercise capacity, particularly when techniques were practiced regularly and correctly. The progressive rise in FVC in the present study also supports earlier findings that structured breathing exercises can enhance lung function in individuals with chronic obstructive pulmonary disease [5].

Although some reviews have reported inconsistent effects on dyspnea depending on the technique used, the present findings suggest that Mitchell's Breathing Technique may be clinically meaningful when applied in a structured and repeated manner. The improvement may be attributed to better airway clearance, reduced expiratory resistance, and enhanced patient control over respiration. The acceptability of the intervention further suggests that it is feasible for nursing-led implementation in routine care [4].

Overall, the findings reinforce the role of breathing techniques as low-cost, non-invasive adjuncts in the management of obstructive airway disease. Future studies with larger samples and longer follow-up are needed to confirm durability of benefit and compare Mitchell's technique directly with other established breathing interventions.

5. Conclusion

Mitchell's Breathing Technique was effective in reducing dyspnea and improving oxygenation and pulmonary function among patients with obstructive airway disease. The progressive improvement in hypoxia, PCO2, and forced vital capacity suggests that this simple breathing intervention may support better ventilatory efficiency and symptom control when used alongside routine treatment. Because the technique is non-invasive, low-cost, and easy to teach, it has practical value for nursing and respiratory care settings. These findings support the inclusion of structured breathing exercises as a complementary approach in the management of obstructive airway disease. Further multicenter studies with larger samples and longer follow-up are needed to confirm these benefits and establish the sustained clinical impact of Mitchell's Breathing Technique.

Ethical considerations:

Ethical approval was obtained from the Institutional Ethics Committee, Apollo College of Nursing, Chennai. Setting permission was obtained from the concerned authorities. Informed consent was obtained from the study participants. Confidentiality was maintained throughout the study.

Conflict of Interest: The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.

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