



Impact of Airstacking and Digital Pressure Feedback on Pulmonary Function in RLD

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INTRODUCTION

Airstacking is a technique to improve lung compliance and maximum insufflation capacity (MIC) in patients with neuromuscular disorders by sequentially inflating the lungs using a manual resuscitation bag. Traditional methods lack standardization and rely on subjective feedback. A pilot study established optimal pressure ranges using a digital manometer, suggesting its potential to standardize airstacking. This study evaluates the longitudinal effects of airstacking with and without digital pressure feedback on pulmonary function

METHODS

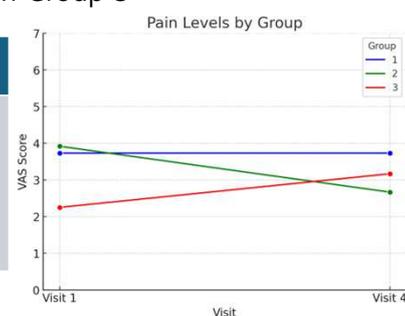
A stratified randomized controlled trial was conducted with 40 patients allocated into three groups: those performing airstacking appropriately (Group 1), those previously performing airstacking inappropriately but using digital pressure feedback during the study (Group 2), and those previously performing airstacking inappropriately without feedback (Group 3). Pulmonary function parameters, including forced vital capacity expressed as a percentage of the predicted normal value (FVC%), MIC, and assisted peak cough flow (aPCF), were measured at baseline, 3, 6, and 12 months. Caregiver outcomes, musculoskeletal pain, and satisfaction were assessed.

RESULTS

Digital pressure feedback did not significantly alter pulmonary function. Changes in FVC% ($p = 0.164$), MIC ($p = 0.218$) and aPCF ($p = 0.787$) were not statistically significant. However, Group 2 caregivers showed significant reductions in musculoskeletal pain than Group 3 ($p = 0.036$) and higher satisfaction (mean: 8.92/10). The proportion of caregivers achieving optimal pressure increased by 25% in Group 2 compared to 16.67% in Group 3

Group	Visit 1	Visit 2	Visit 3	Visit 4	p-Value
1	1461.82 ± 399.55	1360.91 ± 469.24	1384.55 ± 418.22	1451.82 ± 393.26	0.218
2	1790.00 ± 333.52	1818.33 ± 356.11	1768.33 ± 340.80	1840.83 ± 375.99	
3	1679.17 ± 640.99	1647.50 ± 630.77	1556.67 ± 704.03	1487.50 ± 587.17	

Table. Changes in maximum insufflation capacity across visits in each group



CONCLUSIONS

While digital pressure feedback did not significantly alter pulmonary function, it contributed to improved caregiver adherence and reduced musculoskeletal pain. These findings suggest that integrating objective pressure feedback into airstacking training may enhance technique standardization and caregiver experience, though its impact on pulmonary function remains uncertain.