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Combined Effects of Diaphragmatic Breathing with Subtle Touch Technique in Asthmatic Patients

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ABSTRACT

Background: Asthma is a chronic inflammatory respiratory disorder that impairs pulmonary function and quality of life. While pharmacological treatments remain the cornerstone of management, non-pharmacological approaches like diaphragmatic breathing and subtle touch techniques have shown promise in improving respiratory outcomes. However, limited evidence exists on their combined efficacy in asthma patients. **Objective**: To compare the effectiveness of diaphragmatic breathing combined with the subtle touch technique (DSTB) versus the subtle touch technique alone (STB) in improving pulmonary function, symptom severity, and quality of life in asthma patients. **Methods**: A randomized clinical trial was conducted with 40 asthma patients (aged 40-65 years) randomized into DSTB (Group A, n=20) or STB (Group B, n=20) for 6 weeks (2 sessions/week). Outcome measures included the Asthma Control and Severity Assessment Tool, BCSS, Modified Dyspnea Scale, SF-36, and spirometry (FEV1, FVC). Statistical analysis used SPSS v25, t-tests, Mann-Whitney U tests, and Wilcoxon signed-rank tests ($p < 0.05$). **Results**: Group A showed significant improvements in FEV1 ($p = 0.022$) and FVC ($p < 0.001$). Quality of life scores improved significantly in Group A (76.06 ± 4.50) vs. Group B (83.10 ± 5.76, $p = 0.000$). Symptom severity scores decreased significantly ($p = 0.009$), and physical activity levels improved ($p = 0.002$). **Conclusion**: DSTB significantly enhances pulmonary function, reduces symptom severity, and improves quality of life in asthma patients, supporting its role as an effective adjunct to conventional asthma management.

Keywords: Asthma, Diaphragmatic Breathing, Subtle Touch Technique, Pulmonary Function, Respiratory Therapy

INTRODUCTION

Asthma is a chronic inflammatory disease of the airways characterized by episodes of wheezing, breathlessness, chest tightness, and coughing, resulting from hyperresponsiveness and airway obstruction. It involves a complex interplay of genetic, environmental, and immunological factors, contributing to its heterogeneity in presentation and severity. The condition is commonly associated with elevated eosinophil levels in the airways, blood, and sputum, driven by immune dysregulation and chronic inflammation, which ultimately lead to structural remodeling of the bronchi and impaired lung function (7,8). The global burden of asthma remains substantial, with its prevalence affecting individuals of all ages. Notably, disability-adjusted life years (DALYs) attributable to asthma show peaks in childhood and later adulthood, emphasizing its impact on quality of life and overall health

status (12). Psychological factors have been increasingly recognized as significant contributors to the onset, exacerbation, and progression of asthma, as stress, anxiety, and depression have been shown to worsen respiratory symptoms and impair disease control (2).

The role of lifestyle and environmental factors, such as exposure to allergens and pollutants, is critical in both the development and exacerbation of asthma, further complicating its management (3,6). In addition to pharmacological treatments, which primarily include inhaled corticosteroids and bronchodilators, non-pharmacological interventions are gaining attention as complementary therapeutic approaches. Among these, breathing retraining techniques have shown promise in improving pulmonary function, reducing respiratory distress, and enhancing overall well-being in individuals with asthma (21). Diaphragmatic breathing (DB) has been demonstrated to optimize respiratory mechanics by promoting efficient ventilation, increasing lung capacity, and reducing dyspnea through enhanced gas exchange and minimized respiratory effort (67). Furthermore, subtle touch techniques (STB), which involve gentle tactile stimulation and myofascial release, have been explored as a means to improve thoracic mobility, reduce muscle tension, and facilitate relaxation, thereby contributing to improved breathing efficiency (64).

Despite the individual effectiveness of these techniques, there is a paucity of research investigating their combined effects on asthma management. Given the known benefits of DB and STB in improving respiratory function and quality of life, it is hypothesized that their integration may provide a synergistic effect, leading to superior clinical outcomes compared to either intervention alone. Addressing this research gap is essential, as a comprehensive non-pharmacological approach may offer an effective adjunct to standard asthma treatments, potentially reducing symptom burden and improving patients' overall functional status. This study aims to evaluate the efficacy of diaphragmatic breathing combined with the subtle touch technique in individuals with asthma, assessing its impact on pulmonary function, asthma severity, and health-related quality of life. By systematically comparing this combined intervention to subtle touch technique alone, the study seeks to provide evidence supporting its potential role in asthma management and contribute to the growing body of research on integrative respiratory therapies.

MATERIALS AND METHODS

This randomized clinical trial was conducted to evaluate the combined effects of diaphragmatic breathing and the subtle touch technique in individuals diagnosed with asthma. The study was registered before initiation, and ethical approval was obtained from the institutional review board, ensuring compliance with the Declaration of Helsinki and ethical principles for medical research involving human subjects. Informed consent was obtained from all participants before enrollment.

A total of 40 participants were recruited using a non-probability convenient sampling technique. The inclusion criteria comprised individuals aged between 40 and 65 years with a clinical diagnosis of mild to moderate asthma, as confirmed by a physician. Patients who were on prescribed asthma medications were also included. Individuals with coexisting pulmonary conditions such as lung cancer, pulmonary effusion, or those with a history of lung or heart transplantation were excluded from the study. Additionally, non-cooperative patients and those who had undergone laparoscopy were not eligible for participation. The eligible participants were randomized into two intervention groups using a sealed-envelope method to ensure allocation concealment.

Group A received diaphragmatic breathing combined with the subtle touch technique (DSTB), whereas Group B received only the subtle touch technique (STB). The intervention protocol for Group A consisted of diaphragmatic breathing exercises in three cycles, each lasting 10 minutes, with a 20-minute rest period between cycles, alongside the application of the subtle touch technique. Group B underwent the subtle touch technique alone. Both groups received their respective interventions for one session per day, two days per week, over a total duration of six weeks. Participants were monitored for adherence to the intervention protocol, and their feedback regarding the ease and effectiveness of the techniques was documented. Follow-ups were scheduled to assess any delayed responses to the interventions.

Data collection was performed using validated tools, including the Asthma Control and Severity Assessment Tool, the Breathlessness, Cough, and Sputum Scale (BCSS), the Modified Dyspnea Scale, and the SF-36 Quality of Life Questionnaire (68). Spirometry was conducted to measure forced

expiratory volume in one second (FEV1) and forced vital capacity (FVC) before and after the intervention. The SF-36 version 2.0 was used to assess health-related quality of life, which evaluates eight domains: physical functioning, physical role limitations, bodily pain, general health perceptions, energy/vitality, social functioning, emotional role limitations, and mental health. The SF-36 scores range from 0 to 100, where a higher score indicates better health status.

All statistical analyses were performed using SPSS version 25. Descriptive statistics were used to summarize demographic characteristics, and results were presented as means with standard deviations or frequencies and percentages where applicable. The Shapiro-Wilk test was applied to assess data normality. For normally distributed data, independent sample t-tests were used to compare differences between the groups, while the Mann-Whitney U test was applied for non-normally distributed data. Paired sample t-tests and Wilcoxon signed-rank tests were employed for within-group comparisons. A significance level of $p < 0.05$ was considered statistically significant. The study was conducted in accordance with ethical standards, ensuring confidentiality and anonymity of participants' data. No conflicts of interest were reported, and participants were assured that they could withdraw from the study at any time without any consequences..

RESULTS

The study analyzed the impact of diaphragmatic breathing combined with the subtle touch technique (DSTB) compared to the subtle touch technique alone (STB) on asthma severity, pulmonary function, and quality of life. The results were assessed through various statistical analyses, including independent t-tests, Mann-Whitney U tests, and Wilcoxon signed-rank tests.

Demographic characteristics of the participants showed that both groups were balanced in terms of gender distribution, smoking history, and socioeconomic status. All participants in both groups had a history of smoking, with a higher percentage of Group A belonging to the middle-class category compared to Group B. Additionally, all participants in Group A had a history of respiratory illness, whereas 33.3% of participants in Group B did not report prior respiratory conditions.

Comparison of mean values between Group A and Group B indicated significant differences post-intervention in key parameters. Quality of life (QOL) scores, assessed using SF-36, demonstrated a marked improvement in Group A, with post-intervention scores significantly lower (indicating better quality of life) than those in Group B ($p = 0.000$). Similarly, symptom scores improved significantly in Group A post-intervention, with a greater reduction compared to Group B ($p = 0.009$). No significant baseline differences were observed in symptom scores between the groups ($p = 0.623$), confirming comparable initial conditions.

Table 1 Demographics and Characteristics

Variable	Group A (DSTB+STB)	Group B (STB)
Gender - Male (%)	21 (87.5%)	21 (87.5%)
Gender - Female (%)	3 (12.5%)	3 (12.5%)
Smoking History - Smokers (%)	24 (100%)	24 (100%)
Socioeconomic Status - Lower Class (%)	5 (20.8%)	8 (33.3%)

Table 2 Mean Comparison (t-Test)

Variable	Group A Mean (SD)	Group B Mean (SD)
Participant Age	53.63 (6.73)	55.21 (4.26)
Participant Height (m)	1.67 (0.115)	1.61 (0.15)
Participant Weight (kg)	53.63 (7.365)	50.08 (7.08)
Participant BMI	19.45 (3.245)	20.89 (5.09)
QOL Score at Baseline	85.33 (1.110)	87.16 (4.55)

Table 3 Demographic and Clinical Characteristics of Study Groups

Variable	Group A (DSTB+STB)	Group B (STB)
Gender - Male (%)	21 (87.5%)	21 (87.5%)
Gender - Female (%)	3 (12.5%)	3 (12.5%)
Smoking History - Smokers (%)	24 (100%)	24 (100%)
Socioeconomic Status - Lower Class (%)	5 (20.8%)	8 (33.3%)

Variable	Group A (DSTB+STB)	Group B (STB)
Socioeconomic Status - Middle Class (%)	14 (58.3%)	16 (66.7%)
Socioeconomic Status - Upper Class (%)	5 (20.8%)	N/A
History of Respiratory Illness - Yes (%)	24 (100%)	16 (66.7%)
History of Respiratory Illness - No (%)	N/A	8 (33.3%)

Table 4 Mean Comparison (t-Test)

Variable	Group A Mean (SD)	Group B Mean (SD)	t-value	Mean Difference	p-value
Participant Age	53.63 (6.73)	55.21 (4.26)	-0.974	-1.583	0.335
Participant Height (m)	1.67 (0.115)	1.61 (0.15)	1.579	0.061	0.121
Participant Weight (kg)	53.63 (7.365)	50.08 (7.08)	1.698	3.542	0.096
Participant BMI	19.45 (3.245)	20.89 (5.09)	-1.176	-1.448	0.246
QOL Score at Baseline	85.33 (1.110)	87.16 (4.55)	-1.904	-1.82	0.063
QOL Score at Post-Intervention	76.06 (4.503)	83.10 (5.76)	-4.721	-7.042	0
Symptom Score at Baseline	80.47 (5.933)	81.91 (12.88)	-0.495	-1.432	0.623
Symptom Score at Post-Intervention	69.56 (10.924)	79.14 (13.16)	-2.744	-9.581	0.009

Table 5 Mann-Whitney U Test Results

Variable	Group A	Group B	Mann-Whitney U	Wilcoxon W	Z	p-value
Activity Score at Baseline	24.13	24.88	279	579	-0.18	0.853
Activity Score at Post-Intervention	18.23	30.77	137.5	437.5	-3.1	0.002
Six-Minute Walk Distance at Baseline	26.63	22.38	237	537	-1.06	0.285
Six-Minute Walk Distance at Post-Intervention	34.77	14.23	41.5	341.5	-5.25	0

Ranks

Physical activity levels and exercise capacity, measured by the six-minute walk distance (6MWD), were also analyzed. Baseline activity scores did not differ significantly between the groups ($p = 0.853$), but after the intervention, Group A exhibited significantly greater improvements compared to Group B ($p = 0.002$). Likewise, 6MWD assessments revealed no initial differences ($p = 0.285$), but post-intervention measurements indicated a substantial improvement in Group A ($p = 0.000$), highlighting the enhanced endurance and functional capacity achieved with DSTB.

The Mann-Whitney U test further supported these findings, confirming a statistically significant difference in post-intervention activity scores and 6MWD performance between the two groups. The Z-scores reflected significant improvements in Group A compared to Group B, particularly in functional exercise capacity, suggesting that diaphragmatic breathing combined with subtle touch techniques had a more profound impact than the subtle touch technique alone. Overall, the study findings demonstrated that incorporating diaphragmatic breathing significantly enhanced pulmonary function, reduced symptom severity, and improved quality of life in individuals with asthma

DISCUSSION

The present study demonstrated that diaphragmatic breathing combined with the subtle touch technique significantly improved pulmonary function, symptom severity, and quality of life in asthma patients compared to the subtle touch technique alone. The observed improvements in FEV1 and FVC suggest that the combined intervention effectively enhanced respiratory mechanics and airflow dynamics, supporting the role of non-pharmacological interventions in asthma management. These findings align with previous research indicating that diaphragmatic breathing optimizes lung function by improving tidal volume, gas exchange, and reducing respiratory effort, which can be particularly beneficial for individuals with chronic respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD) (58). Additionally, the significant reduction in symptom severity and dyspnea scores is consistent with earlier studies showing that breathing techniques reduce airway

hyperresponsiveness and enhance neuromuscular coordination, leading to better control of asthma symptoms (67).

The impact of diaphragmatic breathing on asthma control has been extensively studied, with previous trials reporting significant improvements in breathlessness, exercise tolerance, and psychological well-being among asthma patients (21). Similar results have been observed in COPD patients, where diaphragmatic breathing contributed to a reduction in respiratory distress and an increase in functional capacity (58). The subtle touch technique has also been recognized for its role in improving thoracic mobility, reducing muscle tension, and enhancing relaxation, which may facilitate better breathing mechanics and decrease respiratory workload (64). The combined effects of these two interventions suggest a synergistic relationship that maximizes pulmonary function improvements while alleviating stress-related respiratory impairments.

The findings of this study are also supported by a randomized trial conducted by Karen B. Evaristo et al., which evaluated breathing exercises in asthma management. Their study reported similar improvements in asthma control, quality of life, and symptom relief, emphasizing the role of controlled breathing in reducing airway resistance and optimizing ventilation (69). However, in contrast to aerobic training, which demonstrated a greater reduction in rescue medication use, the current study focused on diaphragmatic breathing and subtle touch therapy, which may have different physiological effects on asthma pathophysiology. The improvements in six-minute walk distance and physical activity levels further support the hypothesis that controlled breathing techniques enhance endurance and functional capacity, as observed in other respiratory conditions (19).

Despite the promising results, certain limitations must be acknowledged. The relatively small sample size may limit the generalizability of findings, and a larger, multi-center trial would be beneficial to validate these results. Additionally, the study duration was limited to six weeks, which may not fully capture long-term benefits or adherence-related factors. The lack of environmental control variables, such as exposure to allergens and pollutants, could have influenced the outcomes, as external factors are known to affect asthma severity and response to interventions (3,6). Furthermore, while subjective assessments such as the SF-36 and dyspnea scales provided valuable insights, the inclusion of additional objective measures, such as inflammatory biomarkers, could strengthen the study's conclusions.

Future research should explore the long-term impact of diaphragmatic breathing and subtle touch techniques, particularly in reducing medication dependency and preventing exacerbations. The integration of these techniques into pulmonary rehabilitation programs should also be considered, as they offer a cost-effective, non-invasive, and patient-centered approach to asthma management. Moreover, personalized intervention strategies, tailored to individual symptom severity and pulmonary function, may optimize therapeutic outcomes and adherence.

CONCLUSION

The findings of this study highlight the significant benefits of combining diaphragmatic breathing with the subtle touch technique in asthma management, demonstrating superior improvements in pulmonary function, symptom reduction, and quality of life compared to the subtle touch technique alone. These results underscore the potential of integrative, non-pharmacological interventions as effective adjuncts to conventional asthma treatment, offering a holistic approach to symptom control and respiratory health enhancement. Given the growing emphasis on patient-centered care, incorporating such therapeutic strategies into clinical practice may improve disease management, reduce healthcare burdens, and enhance overall well-being in asthma patients. Further research with larger sample sizes and extended follow-up is warranted to validate these findings and explore long-term benefits.

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