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Case Series

Exploring the effect of peppermint oil massage on pulmonary function in patients with bronchial asthma: insights from a case series

Yogapriya Chidambaram[1], Reeves Justilind Dhas Reginald Prabathas[2], Karthikeyan Palanisamy[3], Sushanthikaa Balasubramaniam[4], Maheshkumar Kuppusamy[5]*

[1]Department of Clinical Research, Sri Ramachandra Institute of Higher Education and Research, Chennai, India
[2]Nandha Naturopathy and Yoga Medical College and Hospital, The Tamil Nadu Dr. MGR Medical University, Erode, India
[3]Department of Anatomy, Nandha Naturopathy and Yoga Medical College and Hospital, The Tamil Nadu Dr. MGR Medical University, Erode, India
[4]Department of Cardiology, All India Institute of Medical Sciences, Rishikesh, India
[5]Department of Physiology, Govt. Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. MGR Medical University, Chennai, India

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***Correspondence:**
Dr. Maheshkumar Kuppusamy,
Email: doctor.mahesh1985@gmail.com

ABSTRACT

Bronchial asthma (BA) is a chronic inflammatory disorder characterized by airway hyperresponsiveness and obstruction, leading to symptoms such as coughing, wheezing, and shortness of breath. Management typically involves inhaled corticosteroids, but their adverse effects necessitate exploring alternative therapies. Aromatherapy massage, particularly using peppermint oil, may offer therapeutic benefits due to its anti-inflammatory and broncho dilatory properties. This study investigates the impact of upper back massage with peppermint oil on pulmonary function in BA patients. Three female patients with a history of poorly controlled BA participated in this case series. Each patient received a 20-minute upper back massage with peppermint oil daily for 10 days. Pulmonary function tests (PFTs) were conducted before and after the intervention, measuring forced vital capacity (FVC), forced expiratory volume in the first second (FEV1), the FEV1/FVC ratio, peak expiratory flow rate (PEFR), and forced expiratory flow (FEF 25-75%). All patients showed improvement in pulmonary function post-intervention. Case 1: FVC increased from 80% to 97%, FEV1 from 67% to 82%, and PEFR from 72% to 93%. Case 2: FVC improved from 69% to 81%, FEV1 from 64% to 76%, and FEF 25-75% from 40% to 50%. Case 3: FVC rose from 74% to 78%, FEV1 from 55% to 60%, and PEFR from 56% to 63%. Upper back massage using peppermint oil appears to enhance pulmonary function in individuals with bronchial asthma.

Keywords: Bronchial asthma, Peppermint oil, Massage therapy, Pulmonary function, Aromatherapy

INTRODUCTION

Bronchial asthma (BA) is a chronic inflammatory disorder of the airways, characterized by recurring airway inflammation, bronchial hyperresponsiveness, bronchoconstriction, vasodilatation, airway edema, and activation of sensory nerve endings.[1] Clinically, asthma presents with symptoms such as coughing, wheezing, shortness of breath, and chest tightness, which are often more pronounced at night or during the early morning hours.[2] The INSEARCH study estimated India's asthma burden at 17.23 million, with a 2.05% prevalence. The global burden of disease study (1990–2019) later estimated this burden at 34.3 million, 13.09% of the global

total. Asthma accounted for 13.2 deaths per thousand and 27.9% of disability-adjusted life years (DALYs) in India.[3,4] Known triggers for asthma symptoms include smoking, exposure to cold air, consumption of cold food, occupational factors, high emotional stress, and indoor allergens. Asthma patients are also at risk for complications such as airway remodelling, bronchiectasis, allergic bronchopulmonary aspergillosis (ABPA), and other related conditions.[5] Glucocorticoids are commonly prescribed for asthma management, with moderate inhaled corticosteroids (ICS) being particularly effective for poorly controlled cases. Combining ICS with long-acting β2 agonists (LABA) has significantly improved asthma control and reduced the risk of exacerbations.[6] The adverse effects of inhaled corticosteroids (ICS), including suppression of the hypothalamic-pituitary-adrenal axis, reduced growth rate in children, osteoporosis, diabetes, and increased susceptibility to respiratory infections, are more likely to manifest in patients with severe asthma and can significantly impair their quality of life.[7] The primary goal of asthma treatment is to maintain normal respiratory function, minimize the risk of future exacerbations, and effectively control symptoms, as there is currently no known cure for the condition.[8]

Naturopathy is a unique system of traditional and complementary medicine (T&CM) recognized by the WHO. Naturopathic clinical education focuses on non-pharmacological treatments, including lifestyle-based self-care, dietary nutrition, herbal medicine, physical activity, stress management, and preventive behaviours, as well as clinical nutrition, herbal medicine, mud therapy, hydrotherapy, and hands-on manual therapies.[9] Massage therapy is complementary to enhance the pulmonary index and overall respiratory function in children with asthma.[10] Aromatherapy massage facilitates the transdermal absorption of aromatic herbal oils and volatile compounds. Once absorbed, these herbal constituents can exert various therapeutic effects, including analgesic, antipyretic, sedative, anti-inflammatory, and antispasmodic properties.[11] Previous studies indicate that peppermint oil may reduce pain intensity, alleviate nervous disorders and mental fatigue, manage symptoms of irritable bowel syndrome, and mitigate nausea.

Additionally, it has been reported to help reduce hot flashes in women and has antiseptic properties.[12] Although no prior studies have specifically evaluated the effectiveness of massage with peppermint oil in bronchial asthma, this study aims to investigate the impact of aromatherapy massage on lung function in patients with bronchial asthma.

CASE SERIES

Case 1

A 23-year-old female student, with a three-year history of BA, presented with frequent episodes of wheezing, shortness of breath, and chest tightness, particularly during exercise and exposure to cold weather. She had been prescribed a combination inhaler containing a corticosteroid and a long-acting beta-agonist, which she used regularly to manage her symptoms. Despite adherence to her medication regimen, she reported experiencing nocturnal symptoms at least twice a week, which affected her sleep and overall quality of life. Her medical history revealed no significant comorbidities, and she had no known allergies. On inspection, there was no pallor, icterus, or cyanosis. On percussion, no hyperresonance or dullness was observed. On auscultation, an expiratory wheeze was present along with hoarseness of voice. On physical examination, her vitals were stable pulse rate of 74 beats per minute, temperature 98.2 Fahrenheit, respiratory rate of 14 cycles/min, and blood pressure of 109/71 mmHg. Her weight was 52 kg, her height was 157 cm and her body mass index (BMI) was 20.8 kg/m^2.

Case 2

A 19-year-old female student with a history of BA diagnosed at the age of 15 reported increasing difficulty in managing her symptoms over the past year. Her asthma was predominantly triggered by exposure to pollen and dust, which was exacerbated during the spring and fall seasons. She was using a daily maintenance inhaler containing a low-dose inhaled corticosteroid, along with an as-needed short-acting bronchodilator for acute symptom relief. Despite these measures, she experienced episodes of wheezing and shortness of breath at least three times a week, particularly during periods of high stress, such as during exams. The patient had a family history of asthma, with both her mother and younger sister also being affected by the condition. On inspection, there was no pallor, icterus, or cyanosis. On auscultation, normal vesicular breath sound was heard, and no added sounds, and on percussion, dullness, and hyper-resonance were absent. Her blood pressure was 113/69 mmHg, respiratory rate was 19 cycles/min, height was 154 cm, weight 59 was kg, and her BMI was 24.5 kg/m^2.

Case 3

A 20-year-old female with a long-standing history of BA, diagnosed in childhood, presented with poorly controlled symptoms despite the use of a high-dose combination inhaler. She reported daily episodes of wheezing, coughing, and chest tightness, often requiring the use of a rescue inhaler multiple times a day. Her asthma was significantly impacted by environmental triggers such as pollution and strong odours, which she frequently encountered in her urban living environment. On inspection, no pallor, icterus, or cyanosis was present. On auscultation, an expiratory wheeze was present. On percussion, no hyper-resonance or dullness was present. On physical examination, her vitals were stable with a pulse rate of 78 beats per minute, temperature of 98.4 Fahrenheit, respiratory rate of 16 cycles/min, and blood

pressure of 119/72 mmHg. Her weight was 67 kg, her height was 159 cm and her BMI was 26.8 kg/m^2.

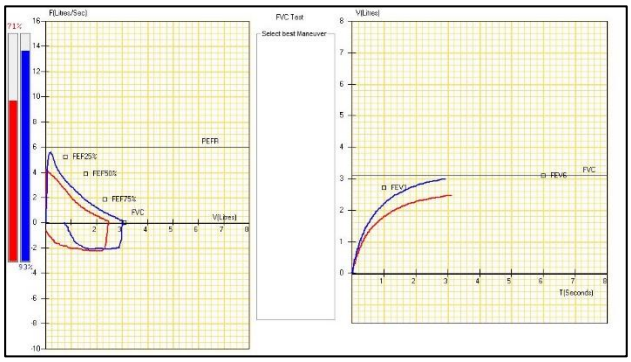

Figure 1: Effect of fomentation on pulmonary function test in case 1. Red, pre-test; blue, post-test.

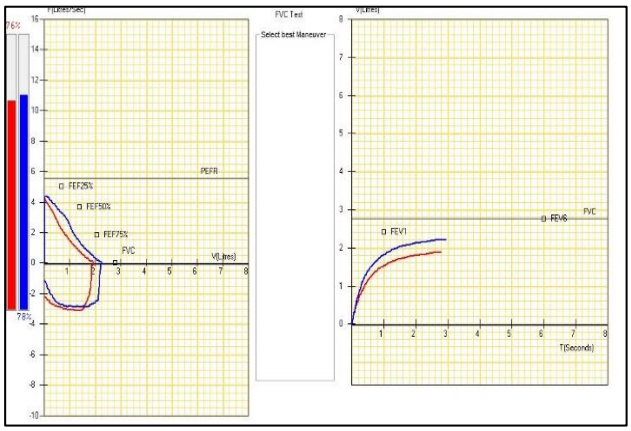

Figure 2: Effect of fomentation on pulmonary function test in case 2. Red, pre-test; blue, post-test.

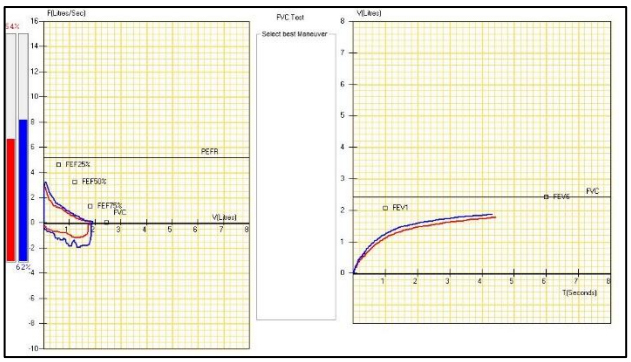

Figure 3: Effect of fomentation on pulmonary function test in case 3. Red, pre-test; blue, post-test.

Following the initial consultation, participants received a detailed introductory briefing on the intervention, including a thorough explanation of the assessment procedures and a demonstration. In all three cases, written and verbal informed consent was obtained. The participants received a 20-minute upper back massage daily for 10 consecutive days. The massage utilized a blend of peppermint oil and sesame oil, prepared by mixing 8 drops of peppermint oil with 1 tablespoon of sesame oil. The massage was performed in a comfortable, prone lying position, ensuring the participant was relaxed. The procedure involved gentle but firm strokes, focusing on the upper back region, specifically targeting the muscles around the shoulder blades and upper thoracic spine. The oil was applied directly to the skin and massaged using circular and long sweeping motions. Care was taken to maintain consistent pressure and ensure even oil distribution. No adverse events were reported either during or after the intervention.

Table 1: Pulmonary function test parameters before and after fomentation in case 1.

Parameter	Predicted level	Before pre	% PRED	After post	% PRED	IMP
FVC	3.10	2.48	80	3.02	97	+22
FEV1	2.71	1.81	67	2.22	82	+23
FEV1/FVC%	87.42	72.98	83	73.51	84	+01
FEF 25-75	3.53	1.37	39	1.69	48	+23
PEFR	6.0	4.33	72	5.57	93	+29

PRED, predicted value; IMP, improvement; FVC, forced vital capacity; FEV1, forced expired volume in the first second; FEV1/FVC, forced expiratory volume in the first second and forced vital capacity ratio; FEF, forced expiratory flow; PEFR, peak expiratory flow rate.

Table 2: Pulmonary function test parameters before and after fomentation in case 2.

Parameter	Predicted level	Before pre	% PRED	After post	% PRED	IMP
FVC	2.77	1.91	69	2.24	81	+17
FEV1	2.42	1.55	64	1.85	76	+19
FEV1/FVC%	87.36	81.15	93	82.59	95	+02
FEF 25-75	3.53	1.42	40	1.77	50	+25
PEFR	5.58	4.40	79	4.36	78	-01

PRED, predicted value; IMP, improvement; FVC, forced vital capacity; FEV1, forced expired volume in the first second; FEV1/FVC, forced expiratory volume in the first second and forced vital capacity ratio; FEF, forced expiratory flow; PEFR, peak expiratory flow rate.

Table 3: Pulmonary function test parameters before and after fomentation in case 3.

Parameter	Predicted level	Before pre	% PRED	After post	% PRED	IMP
FVC	2.43	1.79	74	1.90	78	+06
FEV1	2.07	1.13	55	1.25	60	+11
FEV1/FVC%	85.19	63.13	74	65.79	77	+04
FEF 25-75	2.73	0.70	26	0.81	30	+16
PEFR	5.21	2.92	56	3.27	63	+12

PRED, predicted value; IMP, improvement; FVC, forced vital capacity; FEV1, forced expired volume in the first second; FEV1/FVC, forced expiratory volume in the first second and forced vital capacity ratio; FEF, forced expiratory flow; PEFR, peak expiratory flow rate.

Pulmonary Function Testing (PFT) was conducted using the RMS Helios 401 device. Calibration was performed before the assessment, which was done in a seated position. A minimum of three trials were conducted, and the best of these readings was used for analysis. Spirometry was used to assess forced vital capacity (FVC), forced expiratory volume in the first second (FEV1), the ratio of FEV1 to FVC (FEV1/FVC), peak expiratory flow rate (PEFR), and mean forced expiratory flow during the middle half of FVC (FEF 25–75%). Baseline measurements were taken on day 1 before the intervention, and post-assessment measurements were recorded on day 10.

Upper back massage using peppermint oil for 20 minutes for 10 days improved pulmonary function in patients with bronchial asthma. Case 1: FVC (L/min) from 80% to 97%, FEV1 (l/min) from 67% to 82%, FEV1/FVC ratio from 83% to 84%, FEF (25–75%) (l/min) from 39% to 48%, and PEFR (l/Sec) 72% to 93%. (Table 1, Figure 1). Case 2: FVC (L/min) from 69% to 81%, FEV1 (l/min) from 64% to 76%, FEV1/FVC ratio from 93% to 95%, FEF (25–75%) (l/min) from 40% to 50%, and PEFR (l/Sec) from 79% to 78%. (Table 2, Figure 2). Case 3: FVC (l/min) from 74% to 78%, FEV1 (l/min) from 55% to 60%, FEV1/FVC ratio from 74% to 77%, FEF (25–75%) (l/min) from 26% to 30%, and PEFR (l/Sec) from 56% to 63%. (Table 3, Figure 3).

DISCUSSION

This study is the first to explore the effects of upper back massage with peppermint oil on improving pulmonary lung in individuals with BA. The findings suggest that this type of massage has a positive impact on enhancing lung function in those with bronchial asthma. These results could be achieved through the following mechanism of action. Upper back massage may enhance pulmonary function through several physiological mechanisms. The massage may stimulate the parasympathetic nervous system, promoting relaxation and reducing respiratory rate, which can lead to improved lung capacity and function.[13] Additionally, the mechanical action of massage on the muscles surrounding the thoracic region can help relieve muscle tension and improve thoracic mobility, thereby facilitating better lung expansion and airflow. The increased blood circulation induced by massage could also enhance the delivery of oxygen and nutrients to the lung tissues, further supporting respiratory efficiency.[14]

Peppermint oil's primary constituents include luteolin-7-O-rutinoside and menthol.[15] Luteolin-7-O-rutinoside exerts anti-inflammatory effects by inhibiting histamine release, thereby reducing inflammation.[16] Menthol attenuates the production of key inflammatory mediators, including leukotriene B4, prostaglandin E2, and interleukin-β2, which contributes to decreased airway wall thickness, reduced mucus production, and alleviation of bronchoconstriction. Additionally, menthol has antispasmodic properties through its action on calcium channels, where it inhibits the influx of extracellular calcium ions via voltage-dependent channels.[15,17] Moreover, the application of peppermint oil during massage may have broncho dilatory effects due to its menthol content, which can relax the smooth muscles of the respiratory tract, potentially leading to improved airway function.[18] These combined effects may contribute to an overall enhancement in pulmonary function, as observed in individuals with conditions like bronchial asthma.

This is the first-ever study evaluating the effect of upper back massage with peppermint oil on improving pulmonary lung in individuals with BA. No adverse effects were reported during and after the intervention. The limitations of the study are a smaller sample size and lack of post-intervention follow-up. Future experimental studies are needed to further elucidate the intervention's effects and its time-dependent impact on pulmonary function.

CONCLUSION

This case series offers preliminary evidence suggesting that peppermint oil back massage could be a promising and effective complementary treatment for improving pulmonary function in individuals with BA.

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