



(REVIEW ARTICLE)



Flutter device for bronchiectasis: Literature Review

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Abstract

Introduction: Bronchiectasis is a chronic respiratory condition characterized by irreversible airway dilation, persistent productive cough, and recurrent exacerbations, primarily resulting from chronic inflammation and impaired mucociliary clearance. The Flutter device, a portable oscillating positive expiratory pressure (OPEP) tool, plays a crucial role in bronchiectasis management by promoting effective airway clearance and preventing airway collapse, enhancing mucus expectoration and improving patient outcomes.

Aim: To evaluate effectiveness of the Flutter device in bronchiectasis patients.

Result: Flutter device outperforms traditional therapies and demonstrates comparable efficacy to ACBT and Autogenic Drainage, making it an effective option for managing bronchiectasis.

Conclusion: Flutter device proves to be an effective intervention for enhancing mucus clearance, pulmonary function, and overall quality of life, providing both convenience and comfort that promote high levels of patient adherence.

Keywords: Bronchiectasis; Flutter; Physiotherapy management; ACTs

1. Introduction

Bronchiectasis is a chronic pulmonary disorder distinguished by irreversible pathological airway dilation, manifesting as a sustained productive cough and recurrent exacerbations [1]. It is a heterogeneous condition, marked by variability in its aetiology, inflammatory profile, patient characteristics, comorbidities, and treatment histories. As a global health issue, this heterogeneity is further compounded by regional disparities in the factors mentioned above [2]. The global prevalence of seems to be rising, making it the third most prevalent airway disease, following chronic obstructive pulmonary disease (COPD) and asthma [3].

The foremost symptoms detrimentally impacting patients' quality of life are persistent cough and sputum production, often distinguished by secretions exhibiting pronounced viscoelasticity [4]. The pathophysiological hallmark is chronic neutrophilic inflammation, intricately linked to airway infection, tissue damage, and impaired mucociliary function [5].

While a routine chest radiograph may occasionally indicate the presence of bronchiectasis, High-Resolution Computed Tomography (HRCT) remains the gold standard for confirming the diagnosis and assessing the extent of the disease [6].

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The management of bronchiectasis encompasses pharmacological interventions and physiotherapy, focusing on enhancing airway clearance and exercise tolerance, reducing exacerbation frequency, and improving health-related quality of life (HRQOL) [7]. The primary objective of most therapeutic interventions is, therefore, to reduce the frequency of exacerbations [8].

National and international guidelines advocate for physiotherapists to prescribe airway clearance techniques (ACTs) for individuals with bronchiectasis, both during periods of exacerbation and in stable disease phases [9]. Mucus expectoration is vital in managing, but many positive expiratory pressure devices are too heavy and expensive for widespread use. The portable Flutter VRPI device offers a more accessible solution [10]. The FLUTTER device uses oscillating positive pressure generated by a stainless-steel ball during exhalation to loosen mucus, aid its movement toward the oral airway, and prevent airway collapse, enhancing mucus clearance [11].

2. Methodology

The Google Scholar database is the primary source for the study conducted between the years 2014-2024, using the keywords “bronchiectasis”, “flutter device”, “physiotherapy management”, “ACTs”.

The inclusion criteria focus on individuals diagnosed with bronchiectasis and include data on the use of the Flutter device, either alone or in combination with other respiratory therapies.

The exclusion criteria consist of eliminating duplicate data, non-clinical studies, and those that lack relevant information regarding the Flutter device.

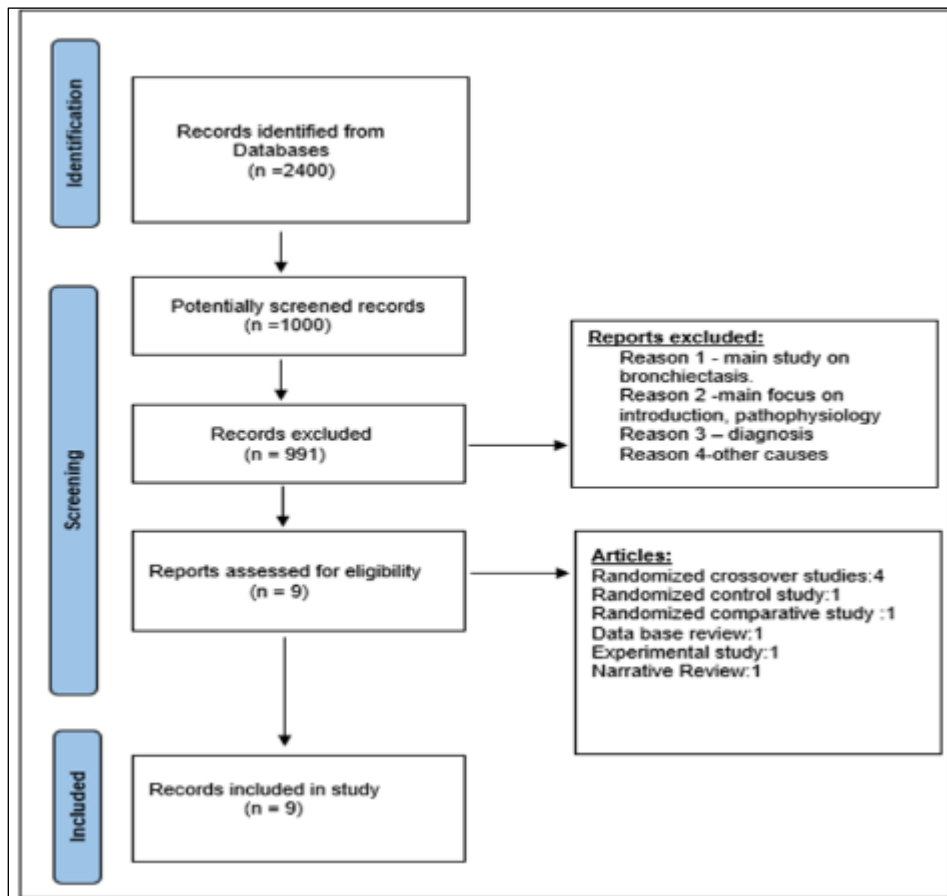


Figure 1 flow diagram of literature search results

3. Results

After reviewing several articles from Google Scholar, I identified nine significant studies that met the inclusion criteria for further analysis.

Table 1 Summary of review literature

Author name and year	Type of study	Sample size	Study duration	outcome measures	intervention	conclusion
J Tambasico 2014 [12]	Randomized crossover study	17	4 weeks	Mucociliary transport, Contact angle, Simulated cough Machine, cell cytology percentage of neutrophil and eosinophil macrophages	Flutter vrp1	Flutter® VRP1 improves cough transport in bronchiectasis but doesn't affect inflammatory cells or Colony Forming Units (CFU) in secretions.
Marina Eleni klonil 2014[13]	Database reviews	96	-	Sputum clearance/ pulmonary function	Flutter	Flutter® improved sputum clearance and pulmonary function.
Ahmed ali naglah 2015[14]	Randomized crossover study	30	3months	Pulmonary function	Flutter	Flutter is more effective in patient than traditional therapy
Yasmin R silva 2017[15]	Randomized crossover study	40	1 week	Sputum weight wet /dry sputum weight	Lung flute and lung flutter	Both devices aided secretion clearance, but most preferred the Flutter for its speed and ease of use.
Bilge uzmezoglu 2018[16]	Randomized comparative study	40	4weeks	Quality of life/ pulmonary functions /sputum production	Flutter and ACBT	Flutter and ACBT are effective physiotherapy methods, with Flutter showing greater impact on sputum production.
Siddhi ghodge 2020[17]	Randomized crossover study	46	1 day	Sputum levels >30ml Before and after24 hours	Lung flute and flutter	The Lung Flute and Flutter devices are equally effective but patients prefer the Flutter device for its comfort and ease of use.
Vrushali k athawale 2020[18]	Experimental study	40	20 minutes with three sets of repetitions	Dyspnea	ACBT and flutter	Both are effective in improving in bronchiectasis
Sara annonil 2020[19]	Narrative review	-	-	Forced expiratory volume (FEV1)	Flutter. Active cycle breathing technique, postural	Showed improvement in both FEV1, increased sputum

					drainage	weight and volume. 44% patients found that flutter device is effective
Dokka mani chandrika 2021[20]	Random control study	35	4weeks	Quality of life/ saturation/ pulse rate	Autogenic drainage /flutter	Both showed significant result in spo2 but flutter showed more improvement

4. Discussion

Bronchiectasis is a chronic respiratory disorder characterized by irreversible airway dilation, resulting from repeated cycles of infection and inflammation further leads to impaired mucociliary clearance, causing dyspnoea, productive cough and recurrent exacerbations

Management focuses on improving mucus clearance through Airway Clearance Techniques (ACTs), which includes the Flutter® device, an Oscillatory Positive Expiratory Pressure (OPEP) tool, has emerged as an effective intervention for enhancing airway clearance and reducing mucus viscosity by generating oscillations and positive pressure during exhalation.

This discussion consolidates findings from multiple studies, underscoring their individual and combined roles in improving patient outcomes

Siddhi Godghe's randomized crossover study provided critical insights into the comparative efficacy of devices like the Flutter® and Lung Flute. Both devices were effective in augmenting airway clearance, yet patient comfort and preferences heavily influenced device selection. The tactile feedback offered by the Flutter® device was particularly appreciated, providing a psychological sense of effectiveness. This highlights the importance of incorporating patient preferences and ease of use into long-term airway management strategies.

A complementary perspective was offered by Marina eleni klonil database study, which analysed the comparative efficacy of various airway clearance techniques, including the Flutter®, postural drainage, and manual chest physiotherapy. While the Flutter® consistently demonstrated improved sputum clearance and pulmonary function compared to conventional methods, the study emphasized the variability in outcomes across studies. These discrepancies underscore the need for robust, randomized crossover trials to provide more definitive comparisons in terms of sputum volume, pulmonary function, and quality-of-life metrics.

Further advancing this understanding, Yasmin R. Silva et al. compared the Flutter® and Lung Flute devices in individuals with stable bronchiectasis. The Flutter®, operating through oscillatory positive expiratory pressure at 11.3 Hz, achieved quicker and more efficient sputum clearance. Patients favoured its speed and simplicity over the Lung Flute, which, despite being effective, required reed replacements and entailed higher costs. These findings reinforced the Flutter®'s suitability for patients prioritizing efficiency in their daily routines.

Research by Vrushali et al. highlighted the enhanced effectiveness of combining ACBT with the Flutter® device. While both ACBT and the combined approach improved oxygen saturation and reduced dyspnoea, the integration of the Flutter® device amplified these benefits. By promoting faster and more efficient airway clearance, this combination aligns with prior studies advocating for multimodal approaches to optimize bronchiectasis management.

Mani Chandrika Dokka et al. provided further insights through a comparison of Autogenic Drainage (AD) and the Flutter® device. Both interventions demonstrated significant improvements in oxygen saturation, pulse rate, and quality of life. However, the Flutter® device exhibited superior outcomes, likely due to its ability to deliver airway vibrations and intermittent positive expiratory pressure, facilitating mucus clearance and reducing airway obstruction. These mechanisms make the Flutter® a practical and effective tool for enhancing respiratory function and overall quality of life in bronchiectasis patients.

Ahmed ali naglah et al. examined the broader efficacy of the Flutter® device in improving pulmonary function and patient satisfaction. The findings corroborated its role in enhancing lung function parameters such as FVC, FEV1, and MEF. The Flutter®'s oscillatory pressure mechanism significantly improved sputum clearance and was preferred for its

comfort and ease of use. However, rare adverse effects like pneumothorax, as reported in the literature, highlight the importance of individualized patient assessment to ensure safety.

Bilge uzmezoglu et al. focused on home-based physiotherapy using the Flutter® and ACBT. Both methods effectively alleviated symptoms and improved quality of life over a four-week period, with the Flutter® demonstrating slightly better outcomes in dyspnoea relief and patient adherence.

J. Tambascio study shows, Using the Flutter® VRP1 for 30 minutes daily over a minimum of four weeks is sufficient to alter physical properties and enhance mucus clearance via the coughing mechanism.

Four randomized crossover studies have demonstrated that the Flutter® device is equally effective as other oscillatory devices, such as the Lung Flute, and proves to be more effective than traditional therapies. Furthermore, experimental studies indicate that the Flutter® device and the Active Cycle of Breathing Technique (ACBT) show similar efficacy when compared to Autogenic Drainage

5. Conclusion

The Flutter® device has proven to be an effective and practical tool for airway clearance in patients with bronchiectasis. It facilitates the mobilization of mucus, leading to improved sputum clearance, enhanced pulmonary function, reducing dyspnoea, improving quality of life. It increases patient adherence due to its portability, simplicity, and user comfort.

Limitations

Heterogeneity in study designs across the reviewed literature, including variations in sample sizes, intervention durations, and outcome measures, makes it challenging to draw definitive conclusions or establish standardized protocols

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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