



Impact of Exclusive Cannabis Use on Lung Function and Asthma Control: A Comparative Retrospective Study

Nahidi M*, Bamha H, El Khattabi W, Fazazi I, Arfaoui H, Msika S, Bougteb N, Jabri H and Afif MH

Department of Respiratory Diseases, 20 August 1953 Hospital, Casablanca, Morocco



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Author : Mohammed Nahidi

Abstract

This retrospective study evaluates the respiratory impact of exclusive cannabis use via traditional pipes in asthmatic patients (n=7) compared to a non-smoking control group (n=54) to assess the clinical and functional consequences of this practice. The results demonstrate increased morbidity among cannabis users, marked by a high prevalence of dry cough (71%) and dyspnea (57%), as well as significant lung function impairment with a mean FEV1 of 65% and a Tiffeneau index of 0.60. The study concludes that inhaled cannabis use seriously complicates asthma control, requiring higher therapeutic steps (GINA Step 4) and promoting persistent bronchial inflammation and accelerated functional decline compared to non-smoking patients.

Introduction

Cannabis is a complex substance derived from the hemp plant, characterized by its concentration of over 60 different cannabinoid compounds. Among these, the most significant are Tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is primarily associated with psychoactive effects, euphoria, and the risk of dependence, yet it also possesses recognized bronchodilatory properties. Conversely, CBD provides analgesic, anti-inflammatory, and relaxing effects without psychoactive impact, while also contributing to bronchodilation.

The epidemiological context of cannabis use is particularly relevant in Morocco, which is identified by the United Nations as the world's leading producer of cannabis. Data from other regions, such as France, indicate a high prevalence of experimentation, with 13.4 million people having tried the drug as of 2012 and an adult prevalence rate of 6% to 7%. While cannabinoids have found applications in modern medicine—such as in the treatment of epilepsy—and are used in dietary supplements and cosmetics, the most common method of consumption remains inhalation.

The primary challenge in clinical practice involves the use of "joints" or pipes, where resin is often mixed with tobacco. This makes it difficult for researchers and clinicians to isolate the specific toxicity of cannabis from that of tobacco or combustion products and to accurately evaluate its implication in various pathologies. Specifically, regarding asthma, there is a critical need to understand how the form and frequency of cannabis use affect respiratory health and disease management.

Patients and Methods

This research was conducted as a retrospective and descriptive study [1]. The study period spanned from January 2021 to March 2024, centered at the Allergy and Asthma Consultation within the Pulmonology Department of the 20 August 1953 Hospital [1].

A total of 61 asthmatic patients were included in the final analysis and were categorized into two distinct cohorts to facilitate a comparative evaluation [1]:

- **Group 1 (n=54):** Asthmatic patients with no reported toxic habits or history of smoking.
- **Group 2 (n=7):** Asthmatic patients who were exclusive consumers of cannabis, specifically utilizing traditional "pipes" (artisanale) for inhalation [1].

The primary objective was to analyze the clinical characteristics and the respiratory functional impact of cannabis within these populations.

Results

Demographic Profile and Clinical Distribution

The study included a total of 61 asthmatic patients. These individuals were divided into two

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*Correspondence:

Mohammed Nahidi, Department of Respiratory Diseases, 20 August 1953 Hospital, Casablanca, Morocco, Tel: 0766730961;

E-mail: nahidisimo@hotmail.com

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Table 1: Prevalence of Respiratory and Clinical Symptoms.

Symptom	Group 1 (Non-smokers, n=54)	Group 2 (Cannabis Users, n=7)
Dry Cough	46.29%	71.42%
Dyspnea	37.03%	57.14%
GERD (Reflux)	35.18%	57.14%
Wheezing	22.22%	42.85%
Expectoration	5.00%	28.57%

Table 2: Asthma Control and GINA Treatment Steps.

Category	Parameter	Group 1 (n=54)	Group 2 (n=7)
Asthma Control	Controlled	66.66%	57.14%
	Poorly Controlled	33.33%	42.85%
Treatment Level	Step 2 (Low-dose ICS)	35.18%	0.00%
	Step 3 (Low-dose ICS + LABA)	41.00%	57.14%
	Step 4 (Med/High-dose ICS + LABA)	24.07%	42.85%

distinct groups: Group 1 (control group), consisting of 54 asthmatic patients with no history of smoking or toxic habits, and Group 2, consisting of 7 patients identified as exclusive cannabis users.

A significant gender disparity was observed between the cohorts. Group 2 was composed entirely of male patients (100%), whereas Group 1 showed a slight female predominance of 56%. The mean age was also higher in the cannabis-using group (40 years) compared to the non-smoking group (33 years).

Patterns of Asthma Onset and Cannabis Exposure

In the cannabis-using cohort (Group 2), the average age of asthma diagnosis was 21 years. These patients reported initiating cannabis use at a mean age of 19 years. Regarding the delivery method, 100% of Group 2 patients used traditional "artisanal pipes." The frequency of consumption was consistent across the group, with an average of 2 pipes per day. In contrast, the non-smoking group (Group 1) had a slightly later mean age of asthma onset, recorded at 24 years.

Comparative Analysis of Respiratory Symptoms

Clinical evaluation revealed a higher prevalence of respiratory and systemic symptoms among cannabis users compared to the control group. Dry cough was the most prevalent symptom in both groups but was significantly more frequent in Group 2.

Asthma Control and Maintenance Treatment

The level of asthma control was assessed via the Asthma Control Test (ACT), and the intensity of the required background therapy was categorized according to GINA steps.

Asthma Control Status: In Group 1, 66.66% of patients achieved "Controlled" status, while 33.33% were "Poorly Controlled." In Group 2, the proportion of "Poorly Controlled" asthma was notably higher at 42.85%.

Comparative Analysis of Respiratory Function (Spirometry)

Spirometric measurements showed a clear decline in lung function parameters for the cannabis-using group. Both the volume (FEV1) and the flow-volume ratio (FEV1/FVC) were lower in the smoking cohort.

Table 3: Mean Respiratory Functional Values.

Spirometric Metric	Group 1 (Non-smokers)	Group 2 (Cannabis Users)
Mean FEV1 (% of predicted value)	71%	65%
Mean FEV1/FVC Ratio (Tiffeneau)	0.65	0.60

Discussion

The clinical implications of cannabis smoke on the respiratory system are complex and multifaceted. Our study highlights a clear association between cannabis use and the worsening of asthma markers, a finding that aligns with several major international cohorts [1, 2].

Prevalence of Respiratory Symptoms

One of the most striking results of our study is the significant increase in respiratory symptoms among cannabis users (Group 2), particularly dry cough (71.42%) and dyspnea (57.14%). These findings are consistent with the work of Adlington et al. (2007), who demonstrated that cannabis smokers have an increased prevalence of cough and wheezing, with an odds ratio (OR) of 1.7 for developing asthma-related symptoms after the age of 30 [1]. Furthermore, Hancox et al. (2015) established that frequent cannabis use (>52 times/year) is strongly associated with increased sputum production (OR 2.31) and wheezing (OR 1.55) [2]. This increased morbidity is likely due to the higher combustion temperature and the specific inhalation technique—characterized by deep inspiration and prolonged breath-holding—which increases the deposition of particulates in the lower airways compared to tobacco smoke [3].

Impact on Lung Function (FEV1 and FEV1/FVC)

Our results show a lower mean FEV1 (65%) and a reduced Tiffeneau Index (0.60) in cannabis users compared to non-smokers. While some studies in the literature remain discordant, our data supports the systematic review by Nadine Aoun et al. (2021), which indicates that while a decline in FEV1 is not always statistically significant in light users, a significant decline in the FEV1/FVC ratio is observed in heavy smokers (OR 2.1), particularly those exceeding 20 pack-years [4]. It is noteworthy that our study specifically focused on the "artisanal pipe," a method lacking the filtration found in modern devices, which may explain the more pronounced obstructive pattern (Tiffeneau 0.60) observed in our cohort.

The Bronchodilation Paradox vs. Chronic Inflammation

A unique aspect of cannabis is the acute bronchodilatory effect of Δ^9 -THC, documented in early physiological studies [5]. However, this transient benefit is heavily outweighed by chronic inflammatory changes. Biopsies of the bronchial mucosa in regular cannabis smokers have revealed extensive abnormalities, including basal cell hyperplasia, loss of ciliated cells, and increased mucus-secreting goblet cells [6]. This histological remodeling explains why, despite potential immediate relief, asthmatic patients who consume cannabis exhibit poorer long-term control (42.85% poorly controlled) and require higher GINA treatment steps (42.85% in Step 4) [4].

Therapeutic Adherence and Fungal Risks

Beyond the direct toxic effects of smoke, cannabis use in asthmatics poses indirect clinical risks. Literature suggests that cannabis users often show lower adherence to inhaled corticosteroid (ICS) therapy [4, 7]. Moreover, the artisanal nature of cannabis production in certain regions, including Morocco, carries a risk of contamination

by molds such as *Aspergillus*. Inhaling fungal spores along with the smoke can lead to Allergic Bronchopulmonary Aspergillosis (ABPA) or increased airway sensitization, further complicating asthma management [7].

Study Limitations

The primary limitation of this study is the small sample size of Group 2 (n=7), reflecting the clinical difficulty of isolating exclusive cannabis users who do not co-consume tobacco. Nonetheless, the consistency of the functional decline and symptomatic burden with larger international studies suggests that our findings represent a significant clinical trend that warrants larger-scale prospective investigations.

Conclusion

Inhaled cannabis is a major contributor to various respiratory pathologies, including asthma exacerbations, pneumothorax, and COPD. Our study confirms that its consumption via inhalation leads to a higher symptomatic burden and a more rapid decline in respiratory function in asthmatic patients. Cessation of cannabis use is primordial to prevent long-term deterioration.

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