

ACTIVE AIR PURIFIER CUM CONDITIONER FOR ASTHMA PATIENTS

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ABSTRACT

According to the EPA (Environmental Protection Agency), studies have shown that portable HEPA (High Efficiency Particle Arresting) air cleaners can improve asthma and allergy symptoms as well as cardiovascular health. However, the advantages may be modest and not entirely attributable to air purifiers. There are whole-house air filtration systems, but they must be integrated into a building's heating, ventilation, and air conditioning (HVAC) system. Asthma sufferers do not benefit from the summer heat. Environment-related elements, such as humidity and temperature changes, can make this illness worse. Thus, it is important to exert as much control over these aspects as feasible. Contrary to conventional opinion, asthmatics can really benefit from air conditioning. The majority of today's portable air purifiers are made to filter both gases and particulates. However, one filter cannot complete the task. There are so many air cleaners that have various filters, including ones for particles, gases, and additional filters for gases, chemicals, or smells. Using air purifiers to enhance indoor air quality reduced asthmatic symptoms. This paper discusses active air purifiers and conditioners for asthma patients.

Keywords: Air Purifier; Conditioner; Asthma; Patients; Symptoms; Heating; Ventilating; Temperature; Ultraviolet; Light Filters; Pollutants; Allergens; Environmental Protection Agency.

INTRODUCTION

Air purifiers and air conditioners have become crucial tools for reducing discomfort and enhancing those who suffer from these respiratory problems' quality of life. This paper examines how these devices can combat allergies and asthma while fostering a healthier, comfortable indoor environment.

By pulling in the air via a filter that collects and eliminates pollutants and allergens from the air, air purifiers remove impurities from the air. Dust, pollen, pet hair, smoking, and other tiny pollutants are all caught by the filter. HEPA, activated carbon, and ultraviolet (UV) light filters are the three most popular types of filters found in air purifiers. Since HEPA filters can catch particles as fine as 0.3 microns, they are thought to be the most effective at eliminating allergies and contaminants from the air. The cleaned and fresher air is then returned into the space, making it easier to breathe. [1]

UNDERSTANDING ALLERGIES AND ASTHMA

Asthma and allergies are common illnesses that affect individuals all over the world. Inappropriate immune responses to chemicals known as allergens are known as allergies. These triggers include,

among others, mold, pet dander, pollen, and dust mites. Contrarily, asthma is a long-term respiratory disorder marked by inflammation and airway narrowing, which frequently results in breathing problems, wheezing, and coughing. Allergens and environmental irritants, such as cigarette smoke and pollution, are known to exacerbate asthma symptoms, while the precise causes of asthma might differ.

The interior air quality is considerably improved by air purifiers and air conditioners. While air conditioners assist maintain the ideal home temperature and humidity levels, air purifiers function by filtering the air to eliminate pollutants and allergens. [2]

It is possible to better grasp the significance of these devices in establishing healthier living environments for allergy and asthma patients if they understand the nature of allergies and asthma as well as the typical triggers.

Employees with allergies or asthma may find air purifiers to be especially helpful at work because they can assist to lessen their symptoms. Additionally, they can assist in eliminating odors and enhancing the office's general air quality. Workplaces with a lot of dust or other pollutants, such factories or construction sites, might benefit from air purifiers. [3]

HEPA Air Purifiers: HEPA filters, which are widely used in air purifiers, are very good at eliminating airborne contaminants and allergens. They are perfect for use in workplaces where there are people with allergies or asthma.

The most well-known air filter is the high-efficiency particulate air (HEPA) filter. To stop radioactive particles from escaping from labs, HEPA (a type of filter, not a brand name) was created during World War II. The air filter must be able to catch at least 90% of all incoming particles with a diameter of 0.3 microns or bigger in order to be considered a real HEPA filter. These devices' fan noise and high-power costs for running the fan motor are drawbacks. By choosing a large unit made for a bigger area and setting the fan motor at a lower speed, the noise can be decreased. [4]

AIR CONDITIONING FOR COMBATING ASTHMA

People with asthma often turn to air conditioning or an air purifier as a help because of how important environmental variables are to this illness. If the system is utilized and maintained correctly, they clean the air of dangerous particles and the air conditioner also generates a more comfortable temperature. Finally, depending on the triggers for the attacks, it is possible to execute the following actions:

A humidity of between 40% and 60% is considered optimum. Both an atmosphere that is too dry and too humid makes symptoms worse. Be mindful that mites and molds prefer humidity and heat if you have a mold or mite allergy. On the other hand, tightness and wheezing are symptoms of dry air.

Make sure there isn't a big variation in temperature between interior and outdoor spaces—it shouldn't be more than five to eight degrees. Any higher variance might make asthma symptoms worse.

Select a cooling system that has an air filter or a system that can humidify and dehumidify the air.

To ensure the system is operating as efficiently as possible, get the air conditioning checked frequently.

Humidifiers come in a variety of types, including warm mist, cold mist, and ultrasonic humidifiers. Employees who have allergies or asthma may benefit particularly from the cool mist that cool mist humidifiers send into the air. Warm mist humidifiers emit a warm mist into the air, which can be beneficial for workers who are sick with the flu or a cold. Employees who experience dry skin or scratchy throats might benefit from ultrasonic humidifiers, which disperse a thin mist into the air. [5]

Inflammation, reversible airway blockage, and enhanced airway reactivity to diverse stimuli are the hallmarks of asthma. The prevalence and mortality of asthma have been increasing during the past ten years, following a steady drop in the 1970s, despite improvements in our knowledge of the pathophysiology and the development of novel therapies.

Although the causes of greater death rates in black people than in white people are not fully understood, there is evidence of a much higher incidence of asthma among Blacks than Whites. Air pollution, cigarette smoke, wood smoke, and prolonged allergen exposure are risk factors for environmentally caused asthma.

The ambient air contains a huge number of substances that at certain quantities are very harmful. The likelihood of a negative reaction to an inhaled pollution relies on the pollutant's level of exposure and the exposed person's personal traits that influence susceptibility. The preservation of public health and the provision of healthcare both heavily rely on the idea of vulnerability. Numerous variables, such as genetic variations in how an agent is metabolized, variations in an agent's target locations in the lung and airways, and variations in the respiratory system's defensive mechanisms, influence how humans react to environmental chemicals that have an impact on their respiratory systems. Pre-existing conditions, airway reactivity, age, gender, pregnancy, and nutritional status are all crucial. Susceptibility to certain air pollutants may also be influenced by exposures to other substances, such as cigarette smoke, or by mixtures of environmental substances. [6]

Asthma symptoms can only be relieved by air purifiers that eliminate tiny particles. It should, if at all feasible, be HEPA compliant, which implies that it will filter very minute particles. Make sure the air purifier can filter and cleanse the air for optimal effects.

One filter is for gasses, and the other is for particles, in some types of air filters. Together, these filters will provide you the cleanest air possible. Additionally, ensure that purifier is the appropriate size for the space where have to improve the air quality. If anybody wish to purify a big space or more than one room, they should need more than one air purifier.

Ozone is a gas that is produced by several air purifiers. Be cautious to stay away from these items. Human beings' lungs may get inflamed by the ozone, aggravating their asthma. Additionally, this kind of purifier doesn't actually remove particulates from the air; it only sanitizes it.

Be advised that while air purifiers help lessen mold smells and particles, they cannot completely eradicate a mold issue. If anybody's home has mold, take immediate action to clean it up. To avoid having an asthma attack, they might need assistance with this.

Air Conditioners Good for Asthma:

It's good to have air conditioning. They maintain cool, energizing air. They can lessen triggers in the air and humidity. The combination of these factors can enhance asthma management. They may facilitate better breathing. However, if they are not properly cared for, they might potentially cause asthma. [7]

REVIEW OF LITERATURE

Studies have been conducted (Nogrady 1983) to determine the effectiveness of air ionizers in lowering airborne allergens and smoke particles with the goal of easing asthma symptoms. Results of such research are frequently ambiguous, and the efficacy of air ionizers as an asthma therapy is still up for debate. The results of all recognized randomized controlled studies contrasting ionizers with placebo were compiled in this systematic assessment of the available data. [8]

Air purifiers that filter "breathing zone" as anybody sleep, according to the AAAAI, (American Academy of Allergy, Asthma & Immunology) appear to be particularly helpful — especially since allergies and asthma can make it difficult to fall asleep. Additionally, according to the Environmental Protection Agency (EPA), the longer the purifier runs each day, the better it is for the quality of the air within the home. Try to set the air purifier in the bedroom such that there is excellent airflow toward the headboard if anybody use one. Additionally, all might wish to select a quiet model to avoid disturbing the sleep. Most likely, a low or medium setting will provide effective filtration overnight. [9]

In a 2018 research, 50 people with asthma were examined to see how air purifiers affected them. A control group didn't use air purifiers in their beds, but a randomly selected set of individuals did. The findings showed that using air purifiers significantly improved both air quality and respiratory function. This study also urged more investigation into the use of air purifiers in the management of asthma. [10]

Objectives:

- Air purifiers are machines that filter small particles out of the air.
- Air purifiers may be helpful for people with allergies, especially when combined with other strategies to reduce allergens and improve indoor air quality.

- We aimed to find out whether air purifier improve indoor environment and the patients with asthma.
- For best results, look for an air purifier with a true HEPA filter. Air purifier must have clean air delivery rate (CADR) and that matches with the room or area where that should plan to use it.

RESEARCH METHODOLOGY

This study's general structure was exploratory. By eliminating tiny airborne particles, air purifiers may be helpful to reduce allergy symptoms, especially when used in conjunction with other methods. Look for a purifier with a real HEPA filter, a carbon filter, and a sufficient clean air delivery rate (CADR) for the greatest results. Some data suggests that air purifiers can aid in eliminating certain allergies. If anybody uses an air purifier for asthma, be sure it can filter and clean the air as well as capture microscopic particles. Other efficient strategies to lessen asthma triggers include routine cleaning and vacuuming, utilizing an air conditioner, and getting rid of carpets and other materials that might trap allergens. For those sweltering summer days, air conditioners are fantastic. They maintain the air pleasant, cool, and refreshing. There is evidence that they might aid in better asthma management. Here is all you need to know about asthma and air conditioners (A/C) in light of that. [11]

RESULT AND DISCUSSION

Air Purifiers:

Filter Type: The High-Efficiency Particulate Air (HEPA) filter should be included on the air purifier. Numerous common allergens are among the 99.97% of tiny particles that HEPA filters have been shown to collect.

Size and Coverage: Select an air purifier whose capacity is appropriate for the space where it will be used most frequently. Only if it can handle the volume of air in the space will a gadget be effective.

Clean Air Delivery Rate (CADR): These gauge the quantity and speed of particles that an air purifier can filter. Greater CADR values allow the purifier to filter more air in a shorter amount of time.

Noise Level: Noise from air purifiers may be an issue, especially in regions where people sleep because they frequently need to operate constantly to be effective.

Air Purifiers Help in Combating Asthma:**Figure 1: Air purifiers Aid in Asthma Management**

The filtering process is carried out using numerous filter types, each of which is intended to catch certain allergens and contaminants. High-Efficiency Particulate Air (HEPA) filters and activated carbon filters are two of the most used filter kinds.

Air Conditioners:

Size: Purchase a cooling device with the appropriate BTU for your room. An inadequate air conditioner can have trouble reaching a pleasant temperature, while one that is too large might not operate for long enough to dehumidify the air effectively.

Maintenance: Make sure the upkeep of your air conditioner is simple. It must be cleaned and replaced with filters on a regular basis to be effective.

Energy Efficiency: To reduce electricity expenses over time, use a device with a high Energy Efficiency Ratio (EER). It is essential since during the warmer months, air conditioners frequently have to operate nonstop.

Air Quality Features: In order to assist minimize allergies and irritations in the air, look for units with integrated air purifiers or increased filtration.

Air Conditioners Help in Combating Asthma:

Figure 2: Air conditioners Aid in Asthma Management

Air conditioners, which are sometimes just seen as cooling tools, are crucial in fostering an environment that is comfortable for allergy and asthma patients. Aside from regulating the temperature, air conditioners also aid in preserving the correct humidity level inside, which has a significant impact on allergy levels in the home.

But when utilized properly, air purifiers may provide several advantages for the house, such as:

Allergies. Air purifiers can lessen the symptoms of allergies. It is a trusted source for reducing the amount of allergens in the home air.

Asthma. Air purifiers can reduce asthma triggers, symptoms and assaults brought on by pollutants like smoking, pollen, and dust

Dust. Dust particles, which are typically 5 microns or less in size and fall within the purification range of the majority of HEPA air purifiers, may be reduced by your air purifier.

Animal dander. Air purifier assist in lowering the amount of pet dog, cat, or bird dander in the residence.

Particulate matter (PMs). Indoor PM_{2.5} (the smaller particles) concentrations can be decreased by an average of 50% or more with the use of HEPA air cleaners with enough CADR.

Viruses. Some air purifiers can lessen the amount of virus-containing airborne particles. The EPA states that it must be able to eliminate particles as fine as 0.1 micron in order to do this. This is referred to as a particle removal efficiency by the manufacturers, such as "removes 99.9% of particles as small as 0.1 um [or microns]". One of the earliest results on the elimination of severe acute respiratory syndrome coronavirus 2(SARS-CoV-2) airborne concentrations in a hospital setting utilizing combined air filtration and ultraviolet (UV) sterilization.

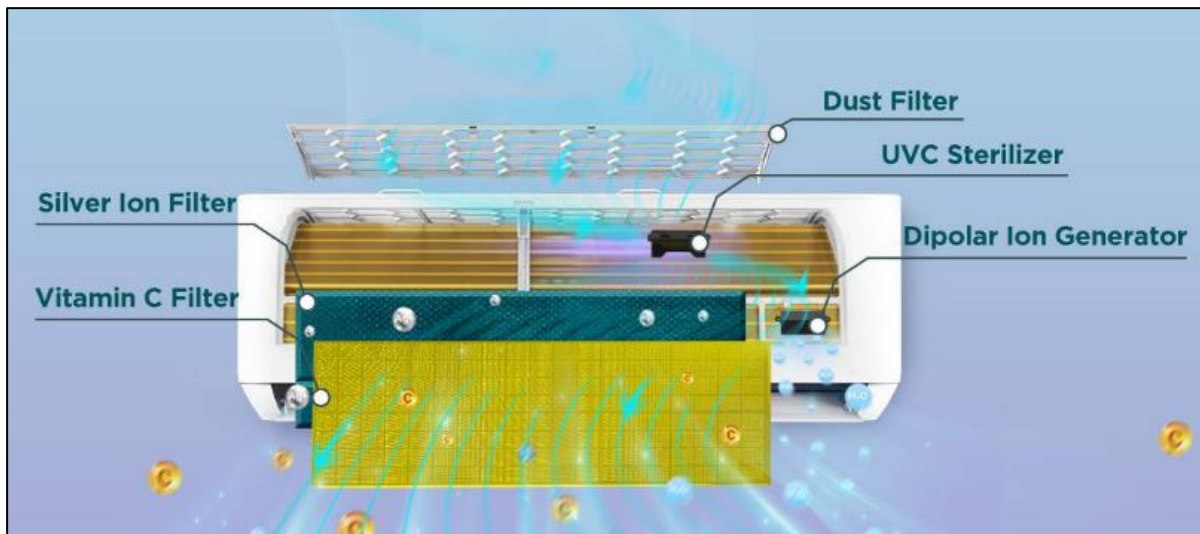


Figure 3: Air conditioners with step air purification technology also serve as air purifiers

UV-C Sterilization for Maximum Protection:

Clean, healthful air is now essential due to the growing threat of pollution and the worsening air quality. The T-Pro series of air conditioners are developed with UV-C sterilization in response to market demand. The users may inhale clean, virus-free air thanks to this.

Silver Ion Filter for Eliminating Bacteria:

According to reports, silver has excellent anti-microbial qualities that are comparable to those of activated carbon and can help to create an atmosphere free from allergies and asthma. The silver ion filter is used by air conditioners to clean and purify the air. Additionally, the greatest inverter ACs have silver ion filters that stop the development of spores, viruses, and fungus.

Vitamin C Filter for Ultimate Care:

The top inverter air conditioner's vitamin C filter protects the skin. It is regarded as treatment in addition to being only a filter. A powerful antioxidant, vitamin C-filled air neutralizes free radicals in the skin, which are the main factor in skin aging. The vitamin C-rich air refreshes the skin, slows the signs of aging, and improves the texture and quality of the skin. The inverter AC filter incorporates Vitamin C into the airflow to provide a moisturizing impact on the skin.

Dipolar Ion Generator for Killing Germs:

Few people appreciate how beneficial it is to have the best air conditioners with 5-step air purification technology because most of us take air conditioning for granted. The TCL T-Pro air conditioners can provide cold air while sanitizing and purifying the interior environment.

Air purifiers work by forcing air through specialized filters to filter out microscopic particles from the air.

These filters can capture a variety of substances that cause allergies, such as:

- Dust
- Pollen
- Pet dander
- Mold
- Smoke
- Chemicals
- Odors
- Air pollution

One of the major reasons to buy an air purifier is to get rid of dust mites from the air. According to the American Lung Association, which suggests HEPA filters for dust collection, dust mites can cause allergic responses and asthma attacks in those who have allergies or asthma. It's a good thing that the Coway Airmega 400S Air Purifier has many dust-trapping filters, including a pre-filter for big dust particles and a HEPA filter for tiny dust particles. In order to eliminate smells from food, dogs, and cigarettes, it also features a carbon filter.

CONCLUSION

Asthma and the environment interact in a complicated way. Along with pollutants produced by various activities, one must also take into account the ecology of aeroallergens. Air purifiers can benefit people with asthma by filtering particles like dust or smoke and recirculating clean air into the space, which can help lessen indoor asthma triggers.

People can use an air purifier in their homes to help get rid of allergies or indoor pollution. While some evidence suggests that air purifiers may help those who have asthma, the best course of action may be to reduce or get rid of the trigger cause. There is some data that shows utilizing air purifiers may help lessen asthma symptoms, but further study is required. For those who have asthma, it's crucial to reduce environmental triggers in the house by maintaining a clean atmosphere and getting rid of any bugs or mold. The HEPA filter-using air purifier should be suitable for the size of the space in issue, according to experts. Ionizing air purifiers should not be used by those who have asthma since they can create ozone and irritate the respiratory system.

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