Source : www.thehindu.com Date : 2022-02-16

HOW TO FIGHT COVID-19 WITH VENTILATION AND AIR PURIFIERS

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

An illustration of masked people at a meeting in a ventilated room. | Photo Credit: Getty Images/ iStock photo

COVID-19 is an airborne disease, and the latest Omicron variant of SARS-CoV-2 is the most transmissible thus far. While vaccination is effective in reducing the risk of hospitalisation and death, awareness of risky situations and taking precautions like wearing masks and ensuring ventilation or air purification can reduce your risk of catching the virus. In our previous article published in *The Hindu* on January 10, we discussed the best masks and mask-wearing practices. Here, we expand on ventilation and air filtration.

Over the past two years, we have learned that the virus is more likely to spread in situations where virus-carrying particles exhaled by an infected person can accumulate in the air (like cigarette smoke) and other people breathe in these particles. Outdoor, airy conditions where you are not close to anyone are generally safe. On the other hand, if you are in a crowded outdoor space with no wind for a prolonged period of time, you will be at relatively higher risk. An indoor space that is not well ventilated and in which an infected person is present is perhaps the riskiest situation for most people. Think, for instance, of a COVID-19-positive patient being isolated in a room and not wearing a mask. The first step to reduce your risk of catching COVID-19 is to wear a well-fitting, high-filtration mask. The second step is to reduce the time you spend in such risky situations. The next steps are ventilation and/or air purification.

Ventilation is the act of replacing stale room air with fresh outdoor air. As more people gather or live in an apartment or office, our activities warm up the space and our exhaled carbon dioxide (CO_2) can build up, leading to undesirable effects like drowsiness and impaired cognitive function. Fresh outside air can have significantly lower CO_2 and could be cooler than indoor room air, and so letting in fresh air lowers indoor CO_2 levels and cools the indoor space.

If someone in an indoor space is contagious, they emit virus-carrying particles when they breathe or talk or shout or sing. Uninfected people in the same space can then breathe in these viral particles and get infected. So, the simplest solution - natural ventilation - is to open a window (or keep a shop door open) to the outdoors, exchanging the virus-laden indoor air for fresh outdoor air.

Natural ventilation may not always be enough, as it can depend on wind conditions, the positioning and size of the window, and other factors. Ventilation can be increased using box or pedestal fans that bring outside air in from one window or doorway, with indoor air being naturally pushed out of another open window. However, in hotter weather, we may not want hot outdoor air entering cooled indoor residences and workplaces. Further, with increasing air pollution in most Indian cities, unfiltered ventilation brings in construction dust and traffic pollution, which are also bad for our health. In such situations, air purifiers can help.

Air purifiers can remove airborne particles (whether dust or smoke or exhaled virus-carrying particles or other bacteria) and thus limit indoor transmission of COVID-19. Other respiratory illnesses like the flu, colds, and diseases like tuberculosis are also transmitted by respiratory particles and droplets. Further, air pollution from outdoor (construction, traffic) and indoor (natural gas cooking, incense/camphor burning) sources can cause respiratory illnesses

including asthma attacks. Thus, air purifiers in indoor spaces can be beneficial to our health at all times.

Many such air purifiers are available in India, whether in stores or with reputable online retailers, and priced from 4,000 to over 50,000. So, how do we choose? We recommend air purifiers with a high-efficiency particulate air (HEPA) filter. Some units come with activated carbon filters that reduce odours (for example, volatile organic compounds or VOCs), which may also be helpful. However, electronic air purifiers using ionizers and similar non-HEPA technology are not recommended. These electronic/ionizer units often perform well below advertised specifications in your apartment. Further, electronic/ionizer units can produce harmful byproducts including indoor ozone, ultrafine particles, and additional VOCs. Just stick to “simple” HEPA filters.

So, now we have a choice of HEPA (with or without activated carbon) air purifiers. How do we decide? Look at the Clean Air Delivery Rate (CADR), usually reported in m^3/h. Higher is generally better, as the rated CADR is only achieved at the maximum fan speed which can be noisy; we may want to run the unit quietly (i.e. at lower fan speed) in some situations while ensuring satisfactory air filtration. To size the air purifier for an indoor space, calculate the ‘air changes per hour’ (ACH) as ‘ACH = CADR / room volume’ where the room volume is simply length x width x height (all in meters if CADR is in m^3/h). If there is a hall and/or a balcony that opens to the room with large open air paths (for example, always open doors or no doors), these should be included in the ‘room volume’ as well. An ACH above five is good; the higher, the better.

We should also note that it is not necessary to purchase a commercial air purifier. The last two years have seen do-it-yourself solutions like the Corsi-Rosenthal box, which has a box fan on one side and air filters on four other sides. The organisation Prana Pan-India, in partnership with Active Buildings, makes 'Bubble' air cleaners based on the Corsi-Rosenthal box, priced at the low end of commercial air purifiers.

While one can never guarantee zero-risk conditions, we can significantly reduce the risk of indoor transmission of COVID-19 (and other respiratory diseases) using ventilation, air purifiers, and high-quality masks in addition to vaccination.

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