

Research Diary

Inhale The Herbs and Contain COVID-19

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We have seen the emergence of various deadly infections including swine flu, Asian flu, AIDS in the last few decades and now the COVID-19 or SARS-Cov-19. It is worth thinking about how an entity which is not living by itself but gets activated only when inside an organism can bring lives, economy to a standstill - the virus. The recent emergence of COVID-19 has made virus a known contagion in every household. While various sanitisation practices have gained importance, containment of such viral infection demands vaccines and antivirals.

Adjuvant therapies are going to play a vital role in the treatment of COVID-19 infected patients until a specific drug is discovered or a vaccine is invented to prevent the infection. COVID-19 has been identified as one of the severe acute respiratory syndromes (caused by SARS CoV-2) and has emerged as a global public health crisis. The most common signs and symptoms of patients are fever and cough. In the early stages, the patients show the acute respiratory infection symptoms, with some that quickly develop an acute respiratory failure, and at later stages results in multiple organ dysfunctions ultimately leading to death. As the SARS-COV-2 majorly invades respiratory system and causes pneumonia, the virus mainly resides and replicates within the alveoli of lungs. Hence, pulmonary targeting of antiviral drugs would be most beneficial. The pulmonary route provides a large surface area for rapid absorption provided by terminal bronchioles and alveoli, a thin (0.1–0.2 mm of alveolar epithelium) physical barrier, thus promoting rapid uptake into the bloodstream, and minimal extracellular enzyme levels for metabolic breakdown compared with the gastrointestinal tract.

Indian people have long relied on consuming Indian traditional medicinal herb extracts and Indian spices to boost the immune system.

Various herbal agents/extracts are well studied and known for antimicrobial activity against various bacteria, fungus and anti-viral activity against viruses such as Corona, Herpes, HIV Dengue, Hepatitis. The main proteins in this virus and those previously identified in SARS-CoV or MERS-CoV exhibit a high similarity.

Due to this similarity, the herbal compounds found to be effective on SARS-CoV and MERS-CoV viruses, provide a promising opportunity to create anti-SARS-COV-2 formulations. Thus, our group is working on making formulations from 4 plant extracts, namely, Carvacrol, Thymol, Eugenol, 6-gingerol, extracted from oregano, thyme, clove, basil, and ginger.

Pulmonary drug administration is in the form of an aerosol and is based on one of the three platforms: nebulizers, a pressurized metered-dose inhaler (pMDI), and dry powder inhalers (DPIs). Amongst various formulations (nanosuspensions, solid lipid nanoparticles, liposomes, microspheres and microcapsules), microcapsules and microspheres are of interest as they offer better loading efficiency and possess good control over release kinetics. Our previous work has shown microencapsulation of the synergistic combination of three essential oils – eugenol, carvacrol, and thymol with high efficiency (Figure 1). Similar formulations can be made from other plant extracts of interest here. Thus, we aim to formulate the selected phyto-pharmacological agents as microcapsules/microspheres, test their anti-viral activity and examine drug release in respiratory fluid and ultimately prepare an adjuvant therapy of lyophilized powders for pulmonary delivery for relief for COVID-19 infected people.

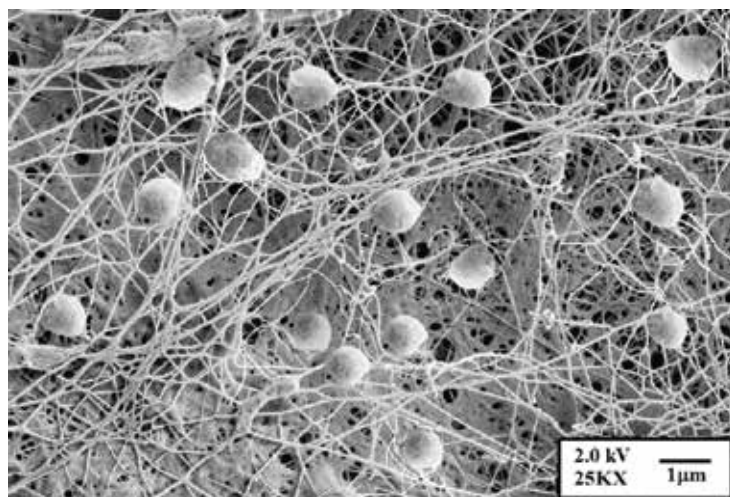


Figure 1: Microcapsules of eugenol carvacrol thymol embedded in a nanofibrous matrix



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