Source : www.thehindu.com Date : 2020-04-26

CORONAVIRUS SPARES NO MAJOR ORGAN IN THE BODY

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

As the number of confirmed cases of coronavirus (COVID-19) crosses 2.7 million and that of deaths is fast approaching 192,000, physicians are beginning to realise that lungs are just the ground zero for the virus while the virus spreads its lethal tentacles to multiple organs — heart and blood vessels, kidneys, gut, and brain — not necessarily in one patient.

Coronavirus India lockdown Day 32 updates

While about 80% of people infected with the virus either don't display any symptoms or only mild symptoms, the remaining need hospitalisation and about 5% need ICU care. Who would need hospitalisation and even ICU care depends on how decisively the body strikes down the virus soon after infection. If not beaten back in the initial stage of infection, the virus invades the lower respiratory tract and enters the lungs, which very soon turns into a battle ground.

A feature published in the journal *Science* explains how the virus tears apart the body and attacks different organs with so far unseen ferocity. The virus enters the cells by binding to receptors found on certain cells called angiotensin-converting enzyme 2 (ACE2). The lining of the nose is rich in cells with this receptor and hence is the site of entry into the body. The receptors are found in cells found in many other organs, thus leaving them too vulnerable.

The tiny air sacs in the lungs called the alveoli, where oxygen exchange between the lungs and blood vessels take place, are rich in ACE2 receptors. Once the virus enters these cells, the immune system mounts an all out battle against the virus, disrupting the oxygen transfer and leaving the air sacs with fluid and dead cells, which makes breathing shallow and difficult and accompanied with coughing.

State-wise tracker for COVID-19 cases, deaths and testing, and a map of confirmed cases in India

While some patients survive without further complications once provided with external oxygen support, some others deteriorate further, developing a condition called acute respiratory distress syndrome.

Oxygen levels drop sharply and breathing becomes harder. The lungs are by now riddled with fluid white blood cells, mucus, and the detritus of destroyed lung cells instead of air. Many patients end up on ventilators, and while some survive the rest either die or their condition worsens further.

Patients experiencing worsening conditions typically have their immune system overreacting and bringing on a "cytokine storm", where the level of cytokines far exceed the levels needed resulting in healthy tissues being attacked. "Blood vessels leak, blood pressure drops, clots form, and catastrophic organ failure can ensue," the *Science* feature says.

Heart is one of the organs that gets affected after lungs. The disruption seems to extend to the blood itself, causing blood clots, which when breaks can restrict the blood supply to the brain causing stroke or artery supplying blood to the lungs causing pulmonary embolism.

Infection may also lead to blood vessel constriction, causing reduced blood supply to organs. “Some patients have extremely low blood-oxygen levels and yet are not gasping for breath. The oxygen uptake is impeded by constricted blood vessels rather than by clogged alveoli,” the report says. The virus attacking the blood vessels could be one reason why patients with blood pressure, diabetes are at higher risk.

Surprisingly, asthmatics or patients with other respiratory diseases are not at great risk unlike those with vascular problems — diabetes, obesity, age, hypertension. Scientists are yet to understand exactly what causes damage to the heart and blood vessels.

Kidneys too are very vulnerable and experience in China shows that a sizeable fraction of patients may suffer from kidney failure. It could be due to direct infection by the virus, cytokine storms reducing blood supply to the kidneys, or pre-existing diabetes causing fatal damage to kidneys.

A small subset (5%-10%) of patients suffer from neurological problems — seizure-like symptoms, strokes, loss of sense of smell and taste, and at times even depression of brain stem reflex, which is responsible for sensing oxygen starvation. In rare cases, the virus finds its way into the cerebrospinal fluid causing meningitis and encephalitis.

“No one knows when or how the virus might penetrate the brain. But one scientist speculates about a possible invasion route: through the nose, then upward and through the olfactory bulb — explaining reports of a loss of smell — which connects to the brain,” the report says.

As many as 284 districts have at least one COVID-19 case

END