

NOVEL CORONAVIRUS INFECTION MIGHT TRIGGER TYPE-1 DIABETES

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

Growing evidence: The novel coronavirus might actually be triggering diabetes in some people who have so far remained free of it. | Photo Credit: [celsopupo](#)

Diabetes poses one of the key risk factors for developing severe COVID-19, and chances of dying are elevated in people with diabetes. Now, there is growing evidence that novel coronavirus might actually be triggering diabetes in some people who have so far remained free of it. These patients typically develop type-1 diabetes. The virus seems to be causing diabetes spontaneously in people.

These patients typically develop type-1 diabetes, which is caused when the body's immune system plays rogue and begins to attack and destroy the beta cells, which produce the hormone insulin in the pancreas. With the destruction of beta cells, the amount of insulin produced is reduced, and hence, the ability of the body to control blood sugar is compromised leading to type-1 diabetes.

The 2002 SARS coronavirus, too, caused acute-onset diabetes in patients. Like the 2002 SARS coronavirus, the SARS-CoV-2 virus, too, binds to ACE2 receptors that are found on many organs involved in controlling blood sugar, including the liver and pancreatic beta cells, and subsequently infects the cells in the organs.

In a letter published in *The New England Journal of Medicine*, the researchers write: "There is a bidirectional relationship between COVID-19 and diabetes. On the one hand, diabetes is associated with an increased risk of severe COVID-19. On the other hand, new-onset diabetes and severe metabolic complications of preexisting diabetes... have been observed in patients with COVID-19."

However, more evidence is needed to conclusively prove that COVID-19 indeed causes type-1 diabetes. It is also not clear if the acute-onset diabetes in COVID-19 patients will be permanent or transient. There is no clarity whether people who are borderline type-2 develop the disease.

The COVID-19 patients who develop diabetes have extremely high levels of blood sugar and ketones. When there is insufficient insulin produced, breaking down the sugar present in the blood is compromised leading to high levels of sugar. At the same time, the body begins to turn to alternative sources of fuel, which in this case are ketones. A study found 42 of 658 patients presented with ketosis on admission. Patients with ketosis were younger (median age 47). Ketosis increased the length of hospital stay and mortality, the researchers found.

Using human pluripotent stem cells, researchers grew miniature liver and pancreas and found that both the organs were permissive to SARS-CoV-2 infection. In particular, they found the pancreatic beta cells were infected by coronavirus. ACE2 is expressed in human adult alpha and beta cells. While the beta cells produce insulin which reduces the sugar level in the blood, the alpha cells produce glucagon, which increases the blood sugar. A fine balance between the two helps maintain the blood sugar level.

The researchers transplanted the miniature pancreatic endocrine cells produced using human stem cells into mice. Two months later, they examined the xenografted pancreas and found

ACE2 receptors on beta and alpha cells. When the mice were infected with coronavirus, they found the beta cells were infected by the virus. Thus the virus is capable of damaging the cells that control blood sugar thus triggering acute-onset of type-1 diabetes.

According to *Nature News*, a global database to collect information on people with COVID-19 and high blood-sugar levels who previously do not have a history of elevated blood sugar levels has been initiated. "The researchers hope to use the cases to understand whether SARS-CoV-2 can induce type 1 diabetes or a new form of the disease," *Nature News* says. Researchers want to use the database to understand if the acute-onset diabetes is permanent and people who are borderline type-2 develop the disease.

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