

Pandemic potential new influenza virus isolated in pigs

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When the whole world is reeling under COVID-19, new influenza viruses are found. Alongwith COVID-19 other viruses, their spread and pandemic potential become very important for both UPSC Prelims and Mains. It is advisable to the aspirants to keep notes of all new strains of viruses and revise them.

In news Scientists have identified a new 're-assorted' influenza virus from pigs in China

Placing it in syllabus Science and Technology- Developments and their applications and effects in everyday life.

Static dimensions

1. Strain of H1N1 virus – Eurasian-avian (EA) swine influenza virus
2. Reassortment and new genotype (G4) of EA-H1N1

Current dimensions

1. EA-H1N1 transmission
2. Preparedness to contain EA-H1N1

Content

- Scientists have identified a new re-assorted influenza virus from pigs in China that has pandemic potential.
- The virus has shown increased human infectivity in swine industry workers.
- According to a US journal, the study was based on extensive surveillance done among pig populations in 10 provinces of China from 2011-2018.
- The serological exercise showed that the new gene of the H1N1 virus has efficient infectivity and

transmissibility in ferret models (animal models for pathogenesis).

What is Reassortment?

- Reassortment of viruses is a mechanism through which new strains of virus are generated. These strains have new properties and can cause pandemics.
- The swine influenza viruses have many lineages.
- Eurasian-avian (EA) is the most dominant one among them.
- The 2009 pandemic virus went back to pig herds after the outbreak.
- Reassortants between the swine EA H1N1 virus and human pandemic/09 H1N1 virus have been sporadically detected in pigs in China and other countries, some of which have caused human infections in China.

The new genotype (G4)

- The new genotype (G4) of this EA strain of H1N1 virus produced due to reassortment was found to have acquired increased human infectivity.
- The current infectivity of all the new emergent EA reassortants in human populations was unknown.
- G4 reassortant has all the essential hallmarks of a candidate pandemic virus similar to the 2009 pandemic virus.
- Human-to-Human transmission is possible for this reassortant.
- G4 virus could efficiently infect human airway epithelial cells found in the respiratory system.
- Replicability in normal human bronchial epithelial cells and alveolar epithelial cells is also found in the respiratory system. Both are incidentally major targets of influenza virus infection.
- The replicability level of the G4 gene was similar to the 2009 pandemic virus at each point in time and

produced virus progeny after 36-60 hours of seeding of infection.

- The post-mortem further revealed that the G4 virus caused much more damage to the lungs as compared to the 2009 pandemic virus.

The transmissibility potential of any virus

- The transmissibility potential of any virus is dependent on the fact as to how effective human-to-human transmission would be.
- The researchers performed transmission experiments on ferrets through direct contact and through respiratory droplets.
- The 2009 pandemic virus was found to be efficiently transmitting between ferrets through both the mediums.
- As far as the G4 type was concerned, all the four variants of this gene showed effective transmission through direct contact.
- Three of four variants of the G4 showed effective transmission through respiratory droplets too.
- The researchers also confirmed aerosol transmission in G4 (Aerosols are liquid particles having viruses and tend to sustain in the air for some time).
- It has the capability of binding to human-type receptors like the SARS-CoV-2. Incidentally, aerosol transmission has not been confirmed for the novel coronavirus SARS-CoV-2.

Will pre-existing immunity against influenza viruses protect against G4?

- Whether pre-existing immunity against one form of a virus will work as a shield against new types depends on the fact as to how much the 'drift' or change is in the antigenic properties in the latter.
- G4 types are antigenically distinct from the existing influenza strains.

- Therefore, the existing seasonal influenza vaccines will provide no immunity against the new gene.
- So far, there are five human cases of EA strain in China, of which, two belonged to the G4 type.

Preparedness to the influenza virus:

Centers for Disease Control and Prevention (CDC) and its public health partners around the world will continue to monitor this situation closely. It is taking a number of actions to monitor and prepare against this emerging public health threat, including:

- Coordinating with public health partners in China, including requesting a virus sample
- Assessing the risk of the virus causing a pandemic using CDC's Influenza Risk Assessment Tool (IRAT)
- Evaluating whether an existing candidate vaccine virus (CVV) against a closely related flu virus (called "G5") would protect against this virus,
- If needed, creating a new CVV specific to G4 viruses, and
- Studying whether existing flu antiviral drugs offer protection against this group of viruses.

Mould your thought What is Eurasian-avian (EA) strain of influenza virus? How does it transmit? Explain how the world is prepared against it?