New Vaccines and Drug for Covid

For Prelims: Vaccines and types, Virus Strain and Mutation. Corbevax and Covovax, Molnupiravir, Spike Protein.

For Mains: Mechanism of Vaccine in treating viral infection. Types of Vaccines.

Why in News

Recently, India has approved two **Vaccines** Corbevax **and Covovax**, one pill **Molnupiravir** for treating **Covid-19** patients.

Key Points

- **Corbevax - Protein Subunit Vaccine**:
  - **About:**
    - It is **a protein subunit vaccine,** which means that instead of the whole virus, it uses **fragments of it to trigger an immune response.**
    - In this case, the subunit vaccine contains **a harmless Spike (S) protein.**
      - The S protein is **a highly glycosylated and large type I transmembrane fusion protein that is made up of 1,160 to 1,400 amino acids,** depending upon the type of virus.
      - The S protein plays a crucial role in penetrating host cells and initiating infection.
    - Once the immune system recognises the protein, it **produces antibodies to fight a real infection** when it happens.
  - **Efficacy:**
    - Neutralising antibodies against **Delta strain** indicates a vaccine effectiveness of **more than 80 % for the prevention of symptomatic infections** based on published studies.
    - In the pivotal Phase III study conducted with an endpoint of immunogenic superiority, it demonstrated **superior immune response in comparison with COVISHIELD vaccine** when **assessed for Neutralizing Antibody** (nAb) Geometric Mean Titers (GMT) against the Ancestral-Wuhan strain and the globally dominant Delta variant.
- **Covavax - Recombinant Nanoparticle Vaccine:**
  - **About:**
    - Manufactured by **Serum Institute of India (SII),** is also a protein subunit vaccine, **but uses Recombinant Nanoparticle Technology (RNT).** It has been developed by **US-based Novavax.**
      - Recombinant protein vaccine is another proven approach against Covid-19 virus. This technology teaches the body **how to develop immunity against the virus using spike protein.**
    - **Harmless copies of the spike protein are grown** in insect cells; the protein is then extracted and assembled into virus-like nanoparticles.

        - Novavax has used an immune-boosting compound (adjuvant). The same technology is used in HPV and the Hepatitis B vaccine.
    - **Efficacy:**
        - The vaccine has been evaluated in two Phase 3 trials: a trial in the UK that demonstrated **an efficacy of 96.4% against the original virus strain,** 86.3% against Alpha and 89.7% efficacy overall.
- **Molnupiravir - Oral Antiviral Drug:**
    - **About:**
        - It works **by introducing errors into the virus's genetic code, which prevents** replication.
    - Efficacy:
        - The UK cleared molnupiravir as **"safe and effective".**
        - The US did not authorise it **for use for longer than five consecutive days, or in patients younger than 18** as it may affect bone and cartilage growth.
        - In India, the recommendation is **for treatment of adult Covid patients with oxygen level over 93%,** and who have a high risk of progression of the disease, and that the drug be sold by retail only under prescription.

Types of vaccines

- **Inactivated vaccines:**
    - Inactivated vaccines use the **killed version of the germ** that causes a disease.
    - Vaccines of this type are created by **inactivating a pathogen, typically using heat or chemicals such as formaldehyde or formalin.** This destroys the pathogen's ability to replicate, but keeps it **"intact" so that the immune system can still recognize it.** ("Inactivated" is generally used rather than "killed" to refer to viral vaccines of this type, as viruses are generally not considered to be alive.)
    - They usually don't provide immunity (protection) **that's as strong as live vaccines.** So you may need several doses over time (booster shots) in order to get ongoing immunity against diseases.
        - **They are Used to protect: Hepatitis A**, **Flu** (shot only), **Polio** (shot only), **Rabies.**
- **Live-attenuated Vaccines:**
    - Live vaccines use **a weakened (or attenuated) form of the germ** that causes a disease.
    - Because these vaccines are so similar to the natural infection that they help prevent, they create **a strong and long-lasting immune response.**
    - The limitation of this approach is that **these vaccines usually cannot be given to people with weakened immune systems.**
    - **Live vaccines are used against**: **Measles**, Mumps, Rubella (MMR combined vaccine), Rotavirus, Smallpox among others.
- **Messenger (m) RNA Vaccines:**
    - mRNA vaccines **make proteins in order to trigger an immune response.** mRNA vaccines have several benefits compared to other types of vaccines, **including shorter manufacturing times** and, because they do not contain a live virus, no risk of causing disease in the person getting vaccinated.
    - The vaccines are used to protect against: Covid-19.
- **Subunit, Recombinant, Polysaccharide, and Conjugate Vaccines:**
    - They use **specific pieces of the germ** - like its protein, sugar, or capsid (a casing around the germ). They give a very strong immune response.
    - They can also be used on people with weakened immune systems and long-term health problems.
    - These vaccines are used to protect against: Hib (Haemophilus influenzae type b) disease, **Hepatitis B**, HPV (Human papillomavirus), **Pneumococcal disease** among others.
- **Toxoid Vaccines:**
    - They use a toxin (harmful product) made by the germ that causes a disease. They **create immunity to the parts of the germ that cause a disease instead of the germ itself.** That means the immune response is targeted to the toxin instead of the whole

germ.
    - Toxoid vaccines are used to protect against: **Diphtheria, Tetanus.**
- **Viral Vector Vaccines:**
    - Viral vector vaccines use **a modified version of a different virus as a vector** to deliver protection.
    - Several different viruses have been used as vectors, including **influenza, vesicular stomatitis virus (VSV), measles virus, and adenovirus, which causes the common cold.**
        - Adenovirus is **one of the viral vectors used in some Covid-19 vaccines** being studied in clinical trials.
    - The vaccines are used to protect against:Covid-19

Source:IE