Oral Polio Vaccine and VDPV

Why in news?

The U.S., the U.K., and Israel, among others, recently reported polio cases in unvaccinated people after having been polio-free for more than a decade.

What is polio?

- *Poliomyelitis* (commonly called polio) is a highly infectious *viral disease* that can leave patients disabled, and in some cases, even prove fatal.
- The virus enters the nervous system and can cause total paralysis in just a few hours.
- **Types of Polio virus -** Wild poliovirus (WPV) has three known strains – types 1, 2, and 3 – each with a slight difference in structure.
- Immunity to one type does not guarantee immunity to others.
    - **Type 1 WPV** - remains in circulation and endemic to Pakistan and Afghanistan.
    - **Type 2 WPV** - declared eradicated in September 2015.
    - **Type 3 WPV** - declared eradicated in October 2019.
- **Spread -** The polio virus is most commonly spread through the *faecal-oral route* and through *contaminated water or food.*
- The virus multiplies in the host's intestine.
- **Treatment -** There is *no known cure* for polio. It can only be prevented by way of vaccination.
- **Vaccine -** There are two types of vaccines – oral poliovirus vaccine (OPV) and inactivated poliovirus vaccine (IPV).
- Click here to know more about **Polio virus resurgence.**

India was declared polio free in 2014 by WHO.

What is OPV and IPV?

- **Oral Polio Vaccine** (OPV) is a live attenuated vaccine for Polio.
- It contains weakened polioviruses (all three types – 1, 2, and 3) to induce an immune response in a human body without causing disease.
- **Inactivated Polio Vaccine** (IPV) contains inactivated polioviruses (all three types).
- IPV is administered by injection.
- It induces a strong systemic immune response, thus protecting against paralytic poliomyelitis, without any risk of causing VAPP or VDPV.

What are the pros and cons of OPV?

What is the inactivated polio vaccine?

- **Global switch -** Poliovirus Type-2 cause 90% of VAPP and VDPV cases.
- Type 2 virus was eradicated worldwide in 1999 and it was decided that OPV type-2 be discontinued.
- Since April 2016, the OPV has had attenuated versions of types 1 and 3 of the virus.
- This is accompanied by the introduction of the IPV in countries that still depended on the OPV in their national immunisation programmes.
- **VDPV after switch -** But the number of VDPV cases on contrary to expectation *increased* after April 2016.
- The previously existing type-2 VDPV began to circulate.
- In 2020, the VDPV Type-2 cases were at 1,081 from 26 countries, many of which were previously polio-free.
- **Reasons**
    - Limited supply/availability of the IPV
    - Cost and logistics of the IPV
    - Sudden increase in the demand for IPV after the switch.
    - The population immunity against type-2 virus dropped in OPV.

What are the alternatives in development?

- Experts are trying to develop better polio vaccines to tackle the disadvantages of both the OPV and the IPV.
- **Novel OPV (nOPV)** – It has been recently in use in African countries.
- It is manufactured using attenuated polioviruses in which certain mutations have been introduced using genetic engineering.
- nOPV makes it 5 times harder for the virus to regain its neurovirulence.
- All clinical trials shows that novel OPV is safer and effective than monovalent oral polio vaccine type 2 (mOPV2).
- Even after administering the nOPV, a few VDPV cases have been reported.
- **Sabin IPV -** Researchers are trying to use attenuated viruses instead of wild viruses to make the IPV-manufacturing safer.
- Sabin IPV is currently undergoing clinical trials in Japan and China.
- **Adjuvant -** Experts are also testing specific adjuvants (substances that enhances the body's immune response to an antigen) to be added to the IPV to induce a mucosal immune response.

References

1. The Hindu - OPV in the world’s quest for eradication
2. The Hindu - Unethical to continue using polio-causing OPV

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