Concerns in polio eradication

What is the issue?

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Though the world is inching towards eradicating polio, vaccination in itself has become the main source of polio paralysis in the world.

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What is a Vaccine-derived polio virus?

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- Inactivated polio vaccine (**IPV**) consists of killed poliovirus strains of all three poliovirus types and it produces antibodies in the blood to all three types of poliovirus.
- In the event of infection, these antibodies prevent the spread of the virus to the central nervous system and protect against paralysis.
- On the other hand, Oral polio vaccine (**OPV**) contains a weakened vaccine-virus, activating an immune response in the body.
- When a child is immunized with OPV, the weakened vaccine-virus replicates in the intestine for a limited period, thereby developing immunity by building up antibodies.
- During this time, the vaccine-virus is also excreted.
- In areas of inadequate sanitation, this excreted vaccine-virus can spread in the immediate community, before eventually dying out.
- On rare occasions, if a population is seriously under-immunized, an excreted vaccine-virus can continue to circulate for an extended period of time.
- The longer it is allowed to survive, the more genetic changes it undergoes.
- In very rare instances, the vaccine-virus can genetically change into a form that can paralyse, which is known as a circulating vaccine-derived poliovirus

(cVDPV).
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What is the threat posed by VDPV?

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- The world is inching towards eradicating polio, with wild polio virus strains reduced by 99.9% since 1988.
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- But more children today are affected by the live, weakened virus contained in the oral polio vaccine (OPV) that is meant to protect them.
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- While the wild-type virus has caused 22 and 25 polio cases in 2017 and 2018 respectively, in just two countries, VDPV was responsible for 96 and 75 polio cases in more countries during the same periods.
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- According to The Lancet, vaccination (using OPV) has become the main source of polio paralysis in the world.
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What is the case with India?

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- While circulating VDPV strains are tracked, and outbreaks and cases are recorded and shared, little is known about vaccine-associated paralytic poliomyelitis (VAPP) cases in India.
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- VAPP occurs when the virus turns virulent within the body of a recently vaccinated child and causes polio.
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- The frequency of VAPP cases varies across countries.
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- With high-income countries switching to the inactivated polio vaccine (IPV) that uses dead virus to immunise children, the VAPP burden is concentrated in low-income countries like India which continue to use the OPV.
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- In spite of the WHO asking all countries using the OPV to include a continuous and effective system of surveillance to monitor the frequency of VAPP in 1982, India did not comply.
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- WHO said the number of VAPP cases in India in 1999, 2000 and 2001 were 181, 129 and 109, respectively.
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- The WHO had suggested a rate of 1 case of VAPP per million births and had estimated the annual global burden of VAPP to be approximately 120 cases in 2002.
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- But the observed number of cases in India itself was 181 in 1999.
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- This indicates that the actual risk is seven times the expected number and it is reasonable to assume that there would be 400-800 annual cases of VAPP globally.
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- However, India justified that VAPP cases can be ignored as they are sporadic and pose little or no threat to others.
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- This stand that VAPP cases are epidemiologically irrelevant is ethically problematic.
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- Many member countries started to choose IPV over the OPV, mainly to avoid any risk of VAPP.
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- Thus, the VAPP cases can be avoided once the government stops using the OPV to immunise children in India.
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What are the concerns on both IPV and OPV?

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- **On IPV** – The IPV produces humoral immunity (involving antibodies in body fluids) so the immunised child does not get paralysis, but it can't stop the circulation of wild polio viruses.
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- India licensed the IPV only in 2006 but did not introduce it in routine immunisation.
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- The reason for not switching over to the IPV is because global production was too low to meet India's demand.
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- India is the largest cohort and it needs 48 million doses per year to immunise all children.
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- The decision to manufacture the IPV in India was taken in 1988 and a company was eventually set up with technology transfer from France.
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- However, the plan was shelved and the IPV production didn't meet India's demands.
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- **On OPV** – India's goal was to eradicate polio, and the OPV was crucial for that.
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- However, the primary objective of polio vaccination is to prevent the disease, which the OPV failed to achieve fully.
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- The OPV was used for eradicating purposes but without fully protecting the children.
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- Also, parents were obliged to accept the OPV and face the consequences of VAPP as well as VDVP.
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- Despite giving several doses, the OPV doesn't fully protect the child.
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- When a vaccine is provided, it must be ensured that the child doesn't get polio and only the IPV can do that.
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- Hence, demands are being raised to **use both** the IPV and the OPV.
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What should be done?

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- It is easier to administer the OPV than the IPV and the cost per dose of OPV is also lower than that of the IPV.
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- However, the OPV fared poorly on two important counts, namely safety and efficacy.
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- Administering the OPV was easier than the IPV but no cost-benefit analysis was done before choosing the OPV.
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- While high-income countries preferred the IPV, India and other low-income countries continued to rely on the OPV.
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- The IPV is essential for post wild-type polio virus eradication, to get rid of

VDPV and VAPP.
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- The globally synchronised switch from trivalent to bivalent OPV in mid-2016 was accompanied by administering a single dose of the IPV prior to administering the OPV.
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- A single dose of the IPV primes the immune system and the antibodies against the polio virus, seen in more than 90% of immunised infants.
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- Thus India needs to monitor if the use of a single dose of IPV followed by immunisation using bivalent OPV has led to a reduction in the number of VAPP cases in the future.
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Source: The Hindu

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