Polio and its variants

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Manifest Pedagogy

Health as a topic needs to be studies fro two perspectives

1. Science perspective

2. Governance perspective

Every topic in health has these two perspectives. For example even in Polio the science behind it and the Governmental initiatives to tackle it, International collaborations to manage it etc. Questions in mains can be either on Governance aspect or Science aspect. To make it tougher UPSC may mix both. What is needed is a comprehensive consolidation of material on this topic to deliver better answers as there have been many policy initiatives in health in recent times under the new regime.

In news

Contamination of some batches of a polio vaccine threatens to bring back a vaccine strain of polio believed to have destroyed years ago.

In syllabus

Issues relating to development and management of social sector/services related to health

Static dimensions

1. Polio and its variants
2. Diseases eradicated in India

Current dimensions

1. Contamination of polio vaccine
2. Chances of recurrence of polio in India

Content

What is Polio?

Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted by person-to-person spread mainly through the faecal-oral route or, less frequently, by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine, from where it can invade the nervous system and can cause paralysis.

Initial symptoms of polio include fever, fatigue, headache, vomiting, stiffness in the neck, and pain in the limbs. In a small proportion of cases, the disease causes paralysis, which is often permanent. There is no cure for polio, it can only be prevented by immunization.

Key Points

- Polio (poliomyelitis) mainly affects children under 5 years of age.
- 1 in 200 infections leads to irreversible paralysis. Among those paralysed, 5% to 10% die when their breathing muscles become immobilized.
- Cases die to wild poliovirus have decreased by over 99% since 1988, from an estimated 350 000 cases then, to 22 reported cases in 2017. As a result of the global effort to eradicate the disease, more than 16 million people have been saved from paralysis.
- As long as a single child remains infected, children in all countries are at risk of contracting polio. Failure to eradicate polio from these last remaining strongholds

could result in as many as 200000 new cases every year, within 10 years, all over the world.
- In most countries, the global effort has expanded capacities to tackle other infectious diseases by building effective surveillance and immunization systems.

Its Prevalence and Cure

Polio does still exist, although polio cases have decreased by over 99% since 1988, from an estimated more than 350000 cases to 22 reported cases in 2017. This reduction is the result of the global effort to eradicate the disease.

Today, only 3 countries in the world have never stopped transmission of polio (Pakistan, Afghanistan and Nigeria).

Despite the progress achieved since 1988, as long as a single child remains infected with poliovirus, children in all countries are at risk of contracting the disease. The poliovirus can easily be imported into a polio-free country and can spread rapidly amongst unimmunized populations. Failure to eradicate polio could result in as many as 200000 new cases every year, within 10 years, all over the world.

There is no cure for polio, it can only be prevented. Polio vaccine, given multiple times, can protect a child for life.

Vaccines

Oral polio vaccine (OPV) contains an attenuated (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 (and this can offer protection to other children through '**passive' immunization**), before

eventually dying out.

Circulating Vaccine-Derived Poliovirus (cVDPV)

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 – this is what is known as a circulating vaccine-derived poliovirus (cVDPV).

The Global Polio Eradication Initiative (GPEI)

The initiative is a public-private partnership led by national governments with five core partners – the World Health Organization (WHO), Rotary International, the US Centres for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF) and the Bill & Melinda Gates Foundation. Its goal is to eradicate polio worldwide.

Endgame Strategic Plan of GPEI

- Detect and interrupt all poliovirus transmission
- Strengthen immunization systems and withdraw oral polio vaccine
- Contain poliovirus and certify interruption of transmission
- Transition planning for polio's legacy

Polio and India

India's success in eliminating **wild polioviruses (WPVs)** has been acclaimed globally. The World Health Organization formally declared India polio-free after three years with no new cases. It said the milestone means the entire Southeast Asian region, home to a quarter of the world's population, is considered free of the disease.

However, it is still possible polio circulates under these

circumstances, as was the case for Nigeria, where a particular strain of virus resurfaced after five years in 2016.

India's Experience with Polio

Until early 1990s India was hyper-endemic for polio, with an average of 500 to 1000 children getting paralysed daily. In spite of introducing **trivalent oral poliovirus vaccine (tOPV)** in the **Expanded Programme on Immunization (EPI)** in 1979, the burden of polio did not fall below that of the pre-EPI era for a decade.

One of the main reasons was the **low vaccine efficacy (VE) of tOPV** against WPV types 1 and 3. The **VE of tOPV was highest for type 2 and WPV type 2 was eliminated in 1999** itself as the average per-capita vaccine coverage reached 6. **The VE against types 1 and 3 was the lowest in Uttar Pradesh and Bihar**, where the force of transmission of WPVs was maximum on account of the highest infant-population density.

Interruption

Transmission was finally interrupted with sustained and extraordinary efforts.

- During the years since 2004 annual pulse polio vaccination campaigns were conducted 10 times each year, virtually every child was tracked and vaccinated – including in all transit points and transport vehicles
- Monovalent OPV types 1 and 3 were licensed and applied in titrated campaigns according to WPV epidemiology and **bivalent OPV (bOPV, with both types 1 and 3)** was developed and judiciously deployed.

Elimination

Elimination of WPVs with OPV is only phase 1 of polio eradication. India is poised to progress to phase 2, with introduction of **inactivated poliovirus vaccine (IPV)**, switch

from tOPV to bOPV and final elimination of all vaccine-related and vaccine-derived polioviruses. True polio eradication demands zero incidence of poliovirus infection, wild and vaccine.

Test yourself: Mould your thoughts

How did global and national initiatives help India to eradicate the variants of polio? Will it be fatal if polio recurs in India? Critically comment.