“The History of Polio: From Outbreaks to Eradication”

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1. Definition and Significance of Polio

Polio is a disease that is caused by poliovirus. Though most people affected by polio have no symptoms or mild ones, it can cause paralysis in others. With polio type 2 and type 3 being almost eradicated, type 1 still exists and has no cure except poliovirus. There are three variations of poliovirus, called wild poliovirus type 1, 2 and 3 (WPV1, WPV2, and WPV3).

Poliovirus or poliomyelitis enters the body via your nose or mouth and multiples in the throat or the gut. In some cases, it can invade your spinal cord and the brain and cause paralysis of arms, legs, and other muscles.

In most countries, polio is considered eliminated — it's no longer spread in that area. But when people stop getting vaccinated, polio can start to spread again. The best way to completely get rid of, or eradicate, an illness is through vaccination. When enough people are vaccinated, the virus has no one left to infect, and it will disappear.

2. Overview of the Impact of Polio on Global Health

Whereas polio has existed since prehistoric times, German physician Jakob Heine formally recognized it as a condition in 1840. In the late 19th and 20th centuries, the disease spread and became one of the most significant and feared diseases.

Major outbreaks in 1916 and 1952 in the US, killing over 5000 people, were of major concern. By the late 20th century, the virus spread throughout the world. People who used to survive suffered life-long consequences like deformed limbs. With these major outbreaks and epidemics, the need for a vaccine began.

3. Early History of Polio: Ancient Records and Evidence

Polio is not some phenomenon of the new age, it has been there since ancient times. Paintings from ancient Egypt show adults with deformed limbs and children walking with canes and support. Theory says that Roman Emperor Claudius was stricken with polio causing him to walk with a limp for the rest of his life but the earliest recorded case came in 1773 when Sir Walter Scott developed severe fever resulting in the paralysis of his right leg. However, polio wasn't known at that time but later a strong diagnosis was produced based on the detailed account he made during the illness.

The symptoms of poliomyelitis have been described by many names. In the early nineteenth century the disease was known variously as: Dental Paralysis, Infantile Spinal Paralysis, Creeping Paralysis, Essential Paralysis of Children, Regressive Paralysis, Myelitis of the Anterior Horns, Tephromyelitis (from the Greek tephros, meaning "ash-gray") and Paralysis of the Morning.

4. The 1916 Outbreak in the UnitedStates

In 1916 a polio epidemic began in New York, infecting thousands and killing around 2000 people. The epidemic was officially announced in June 1916, and a special field force was assembled under the authority of Dr. Simon R. Blatteis of the New York City Health Department's Bureau of Preventable Diseases.

At that time, polio was not known as a disease and it had no vaccine so the primary method that was adopted to prevent the spread was quarantine and disinfecting areas where the disease had already spread. Polio clinics were established at several locations and all kinds of public places were closed. On Saturday, June 17, 1916, an official announcement of the existence of an epidemic polio infection was made in Brooklyn, New York. Over the course of that year, there were over 27,000 cases and more than 6,000 deaths due to polio in the United States, with over 2,000 deaths in New York City alone.

Out on the streets, people blamed Italian immigrants who were ostracised, vilified and beaten up. And even though their infection rates were low, they remained the villains of the piece until the 1950s. Ultimately, the epidemic subsided in the winter months, with the cause remaining a mystery to investigators and the public. Polio was known to be caused by a virus, but its nature and mode of transmission and attack were a mystery.

5. The Quest for a Polio Vaccine

5.1. The Role of Jonas Salk

A breakthrough occurred in 1949, when poliovirus was successfully cultivated in human tissue by John Enders, Thomas Weller and Frederick Robbins at Boston Children's Hospital. Their pioneering work was recognized with the 1954 Nobel Prize. Not long afterwards, in the early 1950s, the first successful vaccine was created by US physician Jonas Salk. Salk tested his experimental killed-virus vaccine on himself and his family in 1953, and a year later on 1.6 million children in Canada, Finland and the USA.

On 12th April 1955, Salk's inactivated polio vaccine got licensed and by 1957 annual cases dropped from 58000 to 5600.

5.2. Albert Sabin and the Oral Polio Vaccine (OPV)

A second type of polio vaccine, the oral polio vaccine (OPV) was developed by physician and microbiologist Albert Sabin. Like Salk, Sabin tested his experimental vaccine on himself and his family; but he had to go further afield for larger-scale trials.

Then Sabin traveled to Leningrad and Moscow and struck up a longstanding collaboration with Mikhail P Chumakov, who was also responsible for tests of the Salk vaccine in the Soviet Union. Trials carried out in the Soviet Union, on 20,000 children in 1958 and 10 million children in 1959, and in Czechoslovakia, on over 110,000 children from 1958 to 1959, proved the vaccine was safe and effective.

5.3. Global use and impact

The ease of administering the oral vaccine made it the ideal candidate for mass vaccination campaigns. Hungary began to use it in December 1959 and Czechoslovakia in early 1960, becoming the first country in the world to eliminate polio.

In 1962, Cuba began to administer the OPV in nationwide immunization programs. OPV had an added benefit that paved the road to eradication. While IPV protected the vaccinated child, it did not stop the poliovirus from spreading between children. OPV, on the other hand, interrupted the chain of transmission, meaning that this was a powerful vaccine to stop polio outbreaks in their tracks.

With WHO's assistance, vaccine production was also expanded globally, with significant capacity developed in countries including India and Indonesia. In 1995, mass vaccination campaigns took place in China and India. National Immunization Days were coordinated in 19 European and Mediterranean countries in 1995, and in 23 African countries in 2004. By 1994, polio had been eliminated from the Americas, and by 2000 the Western Pacific was polio free.

By 2003, polio remained endemic in only 6 countries – and by 2006, that number had dropped to 4. WHO's South-East Asia region was certified polio-free in 2014, the African region in 2020, and the Eastern Mediterranean region has restricted the virus's reach to just a handful of districts.

6. Global Polio Eradication Initiatives

In 1988, the World Health Assembly passed a resolution to eradicate polio – to achieve its permanent reduction to zero, with no risk of reintroduction – and in the same year, the Global Polio Eradication Initiative (GPEI) was launched.

The goal of the Global Polio Eradication Initiative is to ensure that no child anywhere will ever again be paralysed by any form of poliovirus.

Launched in **1988** after the World Health Assembly passed a resolution to eradicate polio, the Global Polio Eradication Initiative, along with its partners, has helped countries to make huge progress in protecting the global population from this debilitating disease. As a result, global incidence of polio has decreased by **99.9%** since GPEI's foundation. An estimated 16 million people today are walking who would otherwise have been paralysed by the disease, and more than **1.5 million** people are alive, whose lives would otherwise have been lost. Now the task remains to tackle polio in its last few strongholds and get rid of the fina**l 0.1%** of polio cases.

7. Challenges in Polio Eradication in Pakistan

The major barriers to eradicating polio in Pakistan are persistently missed children during vaccination drives, a high percentage of environmental water samples testing positive for polio virus, vaccine refusal, misconceptions about the polio vaccine, killing of polio workers, and low performing districts.

The major challenge in polio eradication in Pakistan is the children who are missed during polio drives. These are children who are not at home, either at school or in some other area. These children can be vaccinated on their return home but even after re-visits and attempts to vaccinate all of the children, still children are missed due to some reason. In 2017, the number of missed children even after all the efforts was 858,000. This poses a major challenge in polio eradication as the risk of being infected rises.

Despite the record low number of wild-type polio cases in 2017, the environmental surveillance system indicates that the virus remains a serious threat to children, with 18% of environmental water (sewerage or other waste water) samples testing positive for wild type polio virus in May 2017. The positive environmental samples were detected from Islamabad, Punjab, Sindh, KP, and Baluchistan.

Another issue is parental refusal to vaccinate their children due to security concerns, fear, etc. In early 2017, there were 3000 parental refusals.

8. Recent Advances and Ongoing Efforts

This year, one WPV1 case was reported in Sindh in Pakistan making it the fourth case this year. The number of 2023 cases remain six.

13 WPV1-positive environmental samples were reported; 10 in Sindh and one each in Balochistan, Khyber Pakhtunkhwa, and Punjab.

Ongoing efforts for polio eradication are a testament to global collaboration and innovation. The Global Polio Eradication Initiative (GPEI) spearheads these efforts, employing advanced vaccination strategies, cutting-edge surveillance technologies, and comprehensive public health campaigns. Despite challenges such as vaccine hesitancy, conflict zones, and epidemiological hurdles, significant progress has been made, reducing polio cases by over 99% since 1988. Continued dedication and international cooperation are crucial to overcoming the final barriers and achieving a polio-free world.

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9. About Quwat e Yardim:

At our core, we are dedicated to overcoming the barriers to polio eradication in Pakistan.Through relentless research and education, we aim to build community trust and engagement, ensuring that every child receives the life-saving polio vaccinations they need. Our mission is to foster a healthier, polio-free future for all Pakistanis, bringing hope and well-being to every community we touch.

> As we delve deeper into the complexities of polio eradication, our upcoming research paper uncovers the underlying challenges and explores innovative solutions.
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> We investigate why polio persists in Pakistan despite global progress. Our findings reveal the critical gaps between policy and practice, the impact of misinformation, and the essential role of community engagement in overcoming this public health crisis.
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> Stay tuned for our comprehensive research paper, where we will present in-depth analyses, actionable recommendations, and inspiring success stories. Together, we can bridge the divide and ensure a polio-free future for Pakistan. Don't miss the opportunity to gain valuable insights and join us in this vital mission to protect every child from the crippling effects of polio.

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