LUGANSK STATE MEDICAL UNIVERSITY

Department of Infectious disease

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POLIOMYELITIS

Introduction

Synonyms

Infantile paralysis

Definition

Acute viral infectious disease

Caused by enterovirus

Route – feco – oral

Greek

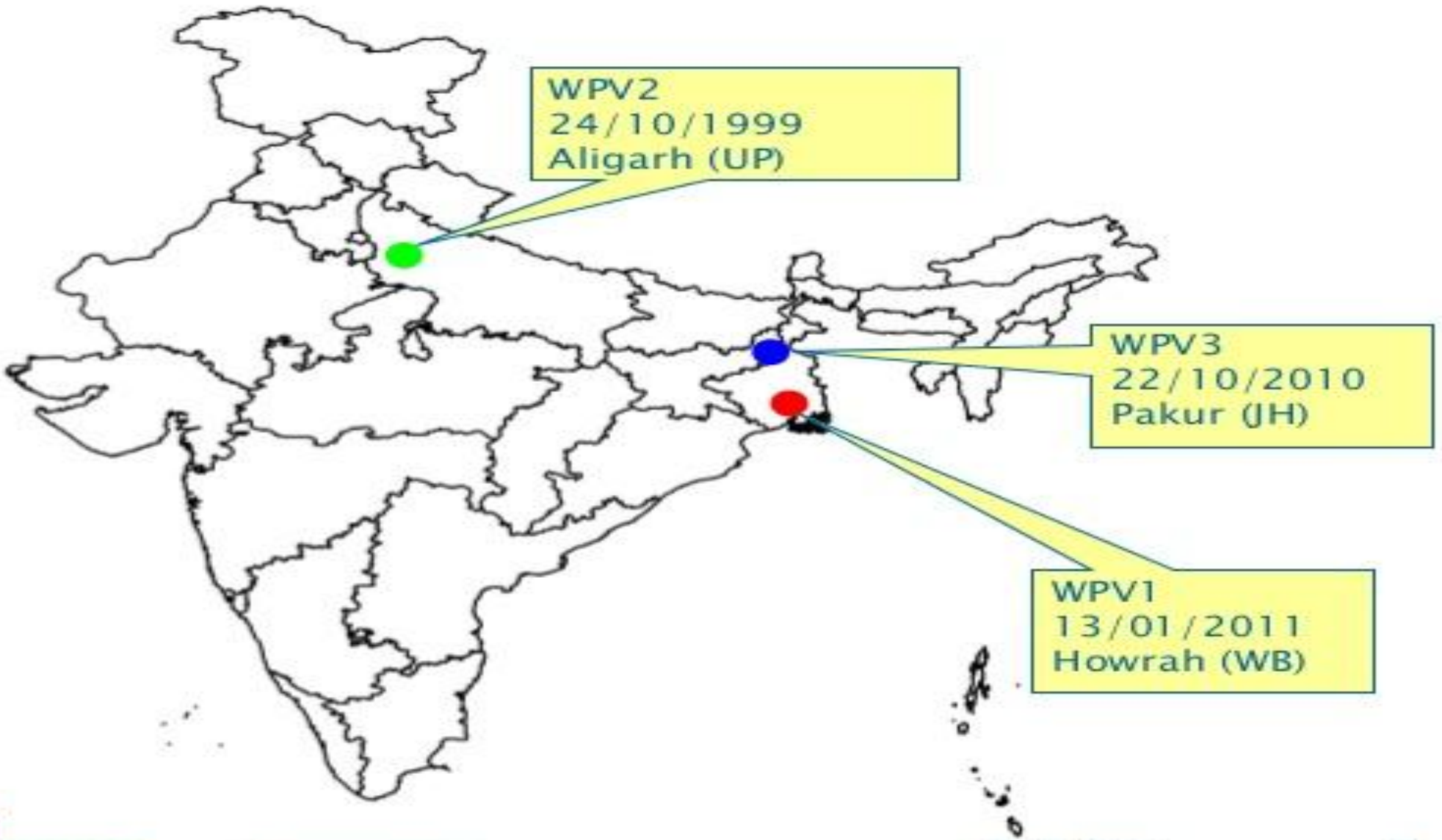
poliós - "grey"

myelós - "spinal cord"

EPIDEMIOLOGY

- **Agent**: poliovirus
- **Type** : three sero types(type-1,type-2,type-3)
- **Reservoir**: man
- **Infectious material**: faeces, oro-pharyngeal secretions
- **Incubation period:** 7 to 14 days(3- 35 days)
- **Period of communicability:** 7 to 10 days
- **Host age** : 6 months to 3 years
- **Environment** : rainy season (June to September)
- **Mode of transmission:** faeco – oral route, droplet infection

Last wild poliovirus cases by type, India



* data as on 10 January 2014

Agent

Poliovirus

Structure:

- Group- group IV ((+)ssRNA)
- Genus- **Enterovirus**
- Family- Picornaviridae
- 3 serotypes- **type 1, type2, type 3**
- Composed of an RNA genome and a protein capsid.

Resistance:

- In feces – for months at 4^0 C & years at -20^0 C
- Inactivated by heat and chlorination

Host

Age

- Most vulnerable- 6 months to three years

Sex

- M: F ratio 3:1

Immunity

- First 6 months maternal antibody
- Acquired through infection with the wild virus
- Immunization

Environment

Seasonal

- More during rainy season

Environmental sources of infection

- Contaminated water and food
- Flies
- Overcrowding and poor sanitation

Pathogenesis and pathology.

- Enter through Mouth,
- Multiplies in Oropharynx tonsils and Intestines,
- Excreted in Stool.
- Enters the CNS from Blood.
- Spread along the Axons of peripheral nerves to CNS.
- Progress along the fibers of the lower motor neurons spinal cord or brain.

Pathology and Pathogenesis.

- Destroy the Anterior horn cells of the Spinal Cord
- Do not Multiply in Muscles only muscles manifest with weakness and flaccid paralysis result is secondary.
- Occasionally produce
  Myocarditis,
  Lymphatic hyperplasia.

Clinical Features

- Infection
  - Inapparent (90-95%)
  - Apparent (5-10%)
    - Abortive polio
    - Non- paralytic aseptic meningitis
    - Paralytic poliomyelitis
    - Polio encephalitis

Abortive polio

- **4 – 8%** of infections
- **Minor illness**
- **Symptoms**
  - low grade fever
  - sore throat
  - vomiting
  - abdominal pain
  - Loss of appetite
  - malaise
- **Recovery** – complete, no paralysis

Non paralytic aseptic meningitis

- **1- 2 %** of infections

- **Symptoms**

  headache

  nausea

  vomiting

  pain and stiffness of back and legs

Paralytic poliomyelitis

- **0.5 – 1%** of infections

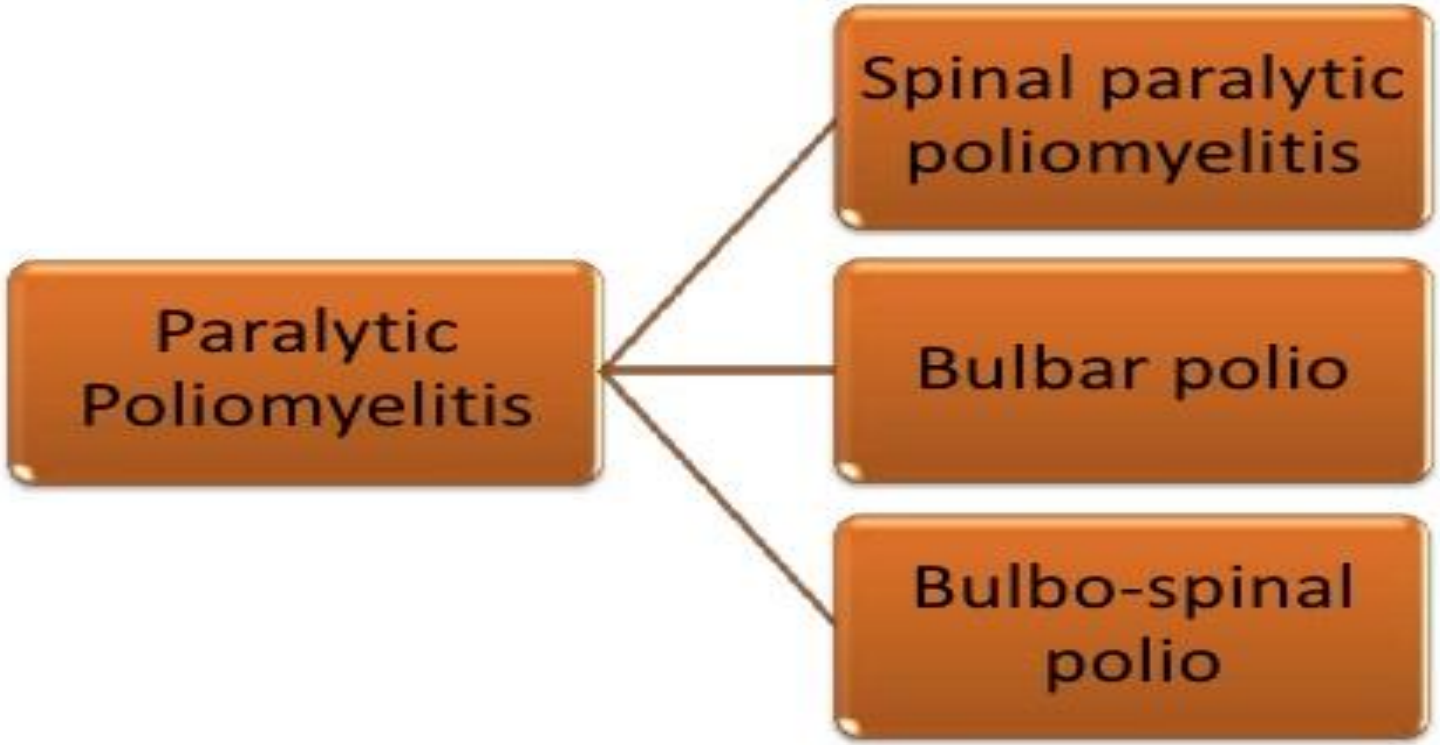
- **2 PHASES** - **Minor**
  Major

Minor- same as abortive polio

Major- muscle pain ,spasm and return of fever

Followed by rapid onset flaccid paralysis
complete within 72hrs

Paralytic poliomyelitis



Spinal paralytic poliomyelitis

- **Most common**
- **80%** of cases
- Results from **lower motor neuron lesion** of anterior horn cells of spinal cord
- Affects muscles of **legs, arms and/or trunk**
- Severe cases – **quadriplegia , paralysis of trunk abdominal and thoracic muscles**

Spinal paralytic poliomyelitis

- Paralysis – **asymmetrical** (legs > arms), **descending** paralysis
- Muscles – **floppy**
- **Reflexes diminished**
- Sensation **normal**
- Residual paralysis after **60 days**

MUSCLES COMMONLY WEAKENED BY POLIO

Bulbar polio

- **2%** of cases
- **Life threatening**
- Cranial nerve lesion - **vagus**

Symptoms

- Nasal twang and hoarseness of voice
- Nasal regurgitation
- Dyspnea
- Dysphagia
- Child refuses to feed
- Secretions accumulate in pharynx - aspiration

Polio Encephalitis

Occurs in rare cases

Symptoms

- Irritability
- Delirium
- Disorientation
- Tremors
- Convulsions
- Paralysis is of upper motor neuron type

Diagnosis

- History
- Clinical examination
- Stool examination
- CSF examination
- Serological tests

Stool examination

Collection of sample

- Two samples 24 hr apart
- Within 14 days of onset of paralysis
- 8-10 grams or thumb size
- Collected in a clean wide mouth bottle – plastic or glass with screw cap
- Sample stored below 8°C
- No dessication or leakage till received at WHO Accredited Lab
- If paralysis detected after 2 wks sample taken upto 60 days from onset

CSF examination

Characteristics	Observations
Appearance	Clear / slightly turbid
Cells	Leucocytosis (mainly lymphocytes)
Proteins	Normal / slightly raised
glucose	Normal

Serological tests

- **3 types of antibodies**
  - Neutralizing antibodies (IgG)
  - Antibodies to C antigen (IgM)
  - Anti-D antibodies

- **Complement fixation test** – detects IgM and Anti-D antibodies
- Identifies exposure to poliovirus not for type- specific diagnosis
- Less often employed

Differential diagnosis

- **Most common**
  - GB syndrome
  - Transverse myelitis
- **Others**
  - Traumatic neuritis
  - Meningitis
  - Encephalitis
  - Toxin – diphtheria and botulism

Treatment

Symptomatic and supportive

- Rest in bed
- Relief of pain and spasm of muscles
- Neutral positioning of the limbs
- Physiotherapy
- Good nursing

Bed Rest

- Essential during acute phase

  Physical activity & trauma increases risk of paralytic polio

- Posture to be changed every 2-3 hrs.

- Child to be placed on stomach for short periods each day, to prevent pneumonia

Physiotherapy

❖ **Method**

- Joints & paralysed muscles – moved passively through full range
- For 10 min , 2-3 times/day

❖ **Benefits**

- Prevents deformities and contracture
- Promote development of muscle power in non-paralysed muscles

Physiotherapy

Good nursing

- Team approach is essential
- Nursing staff is an imp part

- **Diet**
- Nutritious , balanced & wholesome

In non paralytic polio- normal diet

In paralytic

Fed by Ryles tube

Calories/kg body wt.

Rehabilitation

- Physical
- Emotional and Psychological
- Social

PREVENTION

Immunisation

- History
- Sabin's Live Polio Vaccine
  I. Preparation
  II. Storage and transport
  III. Administration
  IV. Dosage
  V. Development of Immunity
  VI. Advantages and Disadvantages
  VII. Complications and Contraindications
- Salk's Killed Polio Vaccine
  I. Preparation
  II. Dosage
- Sabin Vs Salk
- Pulse Polio Immunization

Sabin's Live Polio Vaccine

- OPV in India, trivalent, contains

a. Type 1- 1 lakh TC ID 50
b. Type 2- 2 lakh TC ID 50
c. Type 3- 3 lakh TC ID 50

} per 0.5 ml (2 drops in India)

- Administration- 2 drops
- Use the dropper supplied
  a. Tilt the child's back
  b. Gently squeeze the cheeks/ pinch the nose → make the mouth open
  c. Let the drops fall from the dropper onto the tongue.

Salk's Killed Polio Vaccine

- Injectable Polio Vaccine (IPV)

a. 1st dose → given at 6 weeks.

b. Immunity sustained by booster doses every 3-5 years thereafter

c. Vaccination of choice among HIV, other immunocompromised states, pregnant mothers.

- **Enhanced potency IPV**

a. Produced in human diploid cells

b. Two s.c. Does, 4-8 weeks apart, third may be 6-12 months later.

c. Better seroconversion

Development of Immunity

Infects intestinal epithelial cells

Replicates → transported to Peyer's patches

Secondary multiplication ć subsequent viremia

Spreads to other parts of body

Production of circulating antibodies

Prevents dissemination of virus to nervous system

Prevents paralytic polio

(SYSTEMIC IMMUNITY)

Stimulates production of IgA antibodies

(LOCAL IMMUNITY)

Prevents infection of GIT with wild strains

Vaccine progeny excreted in feces

Non-immunized persons immunized

HERD IMMUNITY

Thank You!!!

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