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Infectious diseases

Presented By;-

Mr. Samarpan Mishra (Assistant Professor)

Specialization:- Pharmaceutical Chemistry

Infectious Diseases

1. Meningitis
2. Typhoid
3. Leprosy
4. Tuberculosis

- Infectious Diseases Are Illnesses Caused By Pathogenic Microorganisms, Such As **Bacteria, Viruses, Fungi, And Parasites**, That Invade The Body And Multiply.
- These Diseases Can Be Spread In Various Ways And Range From Mild To Life-threatening Conditions.

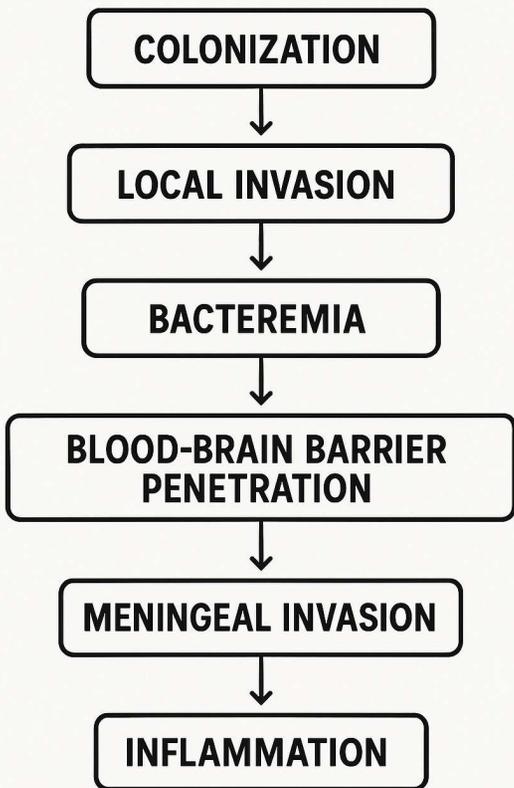
1. Meningitis

S.No	Heading	Details
1	Definition	Inflammation of the meninges (protective membranes covering brain & spinal cord).
2	Types	Bacterial, Viral, Fungal, Parasitic, Tuberculous (TB), Aseptic.
3	Severity	Bacterial = medical emergency; Viral = usually mild.
4	Transmission	Respiratory droplets, close contact, bloodstream spread.
5	Clinical Features	Fever, headache, stiff neck, photophobia, vomiting, altered mental status.

I. Etiology of Meningitis

S.No	Type	Common Causative Agents
1	Bacterial	Neisseria meningitidis, Streptococcus pneumoniae, Haemophilus influenzae, Listeria monocytogenes, Group B Streptococci.
2	Viral	Enteroviruses, Herpes simplex virus, Varicella, Mumps, HIV.
3	Tuberculous (TB)	Mycobacterium tuberculosis.
4	Fungal	Cryptococcus neoformans, Histoplasma, Candida.
5	Parasitic	Naegleria fowleri, Toxoplasma gondii.
6	Non-infectious / Aseptic	Drugs (NSAIDs, antibiotics), cancer, autoimmune disorders.

PATHOGENESIS OF MENINGITIS



II. Pathogenesis of Meningitis

III. Diagnostic Tests for Meningitis

S.No	Diagnostic Test	Purpose / Findings
1	Lumbar Puncture (CSF Analysis)	Gold standard—checks WBC, glucose, protein, culture.
2	CSF Culture / Gram Stain	Identifies bacteria.
3	CSF PCR	Detects viral, TB, fungal pathogens.
4	Blood Culture	Identifies systemic infection source.
5	CBC	Elevated WBC count.
6	C-reactive Protein (CRP)	Elevated in bacterial meningitis.
7	CT/MRI Brain	Rule out abscess, increased intracranial pressure.

IV. Treatment of Meningitis

S.No	Type of Meningitis	Treatment
1	Bacterial	Immediate IV antibiotics: Ceftriaxone/Cefotaxime + Vancomycin; add Ampicillin for Listeria. Dexamethasone to reduce inflammation.
2	Viral	Supportive care; IV Acyclovir for HSV meningitis.
3	TB Meningitis	Anti-TB drugs: HRZE (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol) + corticosteroids.
4	Fungal	Amphotericin B + Flucytosine; Fluconazole for maintenance.
5	Parasitic	Amphotericin B (for Naegleria), antiparasitic drugs.
6	Supportive Treatment	IV fluids, analgesics, antipyretics, anticonvulsants, oxygen therapy.
7	Prevention	Vaccines: Hib, Meningococcal, Pneumococcal vaccines.

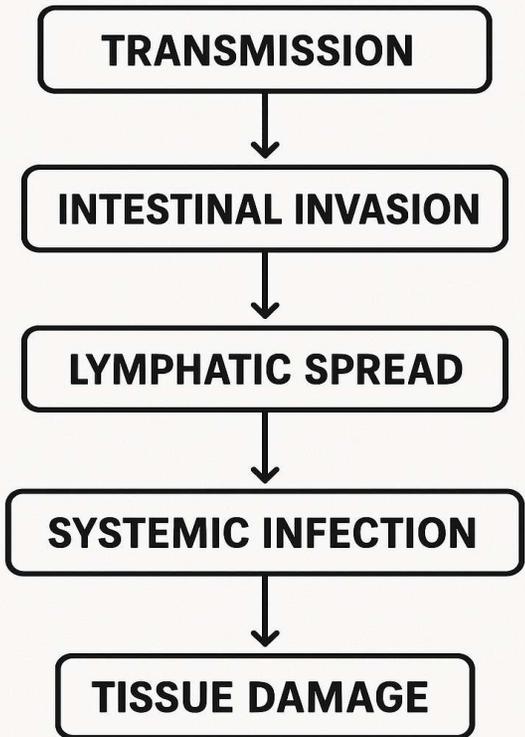
2. Typhoid

S.No	Heading	Details
1	Definition	Typhoid fever is a systemic infectious disease caused by Salmonella typhi, characterized by prolonged fever, abdominal pain, and intestinal involvement.
2	Transmission	Feco-oral route through contaminated food/water.
3	Incubation Period	7–14 days.
4	Affected System	Gastrointestinal tract → bloodstream → multiple organs.
5	Key Symptoms	Step-ladder fever, abdominal pain, rose spots, diarrhea/constipation, hepatosplenomegaly.

I. Etiology of Typhoid

S.No	Category	Details
1	Causative Agent	Salmonella enterica serotype Typhi (most common).
2	Related Organisms	Salmonella Paratyphi A, B, C (cause paratyphoid fever – milder).
3	Source	Infected humans (carriers/hospital cases).
4	Mode of Spread	Contaminated water, food, poor sanitation, poor hygiene.
5	Risk Factors	Overcrowding, unsafe drinking water, poor hand hygiene, travel to endemic areas.

PATHOGENESIS OF TYPHOID



II. Pathogenesis of Typhoid

III. Diagnostic Tests for Typhoid

S.No	Diagnostic Test	Purpose / Findings
1	Blood Culture	Gold standard; positive in 1st week.
2	Widal Test	Detects antibodies (TO, TH); used after 1st week, but low specificity.
3	TyphiDot / Rapid Tests	Detect IgM/IgG antibodies quickly.
4	Stool Culture	Positive in 2nd–3rd week.
5	Urine Culture	May detect organism in later stages.
6	CBC	Leukopenia, anemia, relative lymphocytosis.
7	Bone Marrow Culture	Most sensitive; positive even after antibiotics.

IV. Treatment of Typhoid

S.No	Category	Drugs / Management
1	First-line Antibiotics	Ceftriaxone, Cefotaxime, Ciprofloxacin (where sensitive).
2	Drug-resistant Typhoid	Azithromycin, Cefixime; for XDR strains: Meropenem.
3	Supportive Treatment	ORS/IV fluids, antipyretics (paracetamol), nutrition.
4	Severe Case Management	Hospitalization, IV antibiotics, monitoring for complications.
5	Prevention	Typhoid vaccines (Vi polysaccharide, Typhoid conjugate vaccine TCV), safe water, hygiene.

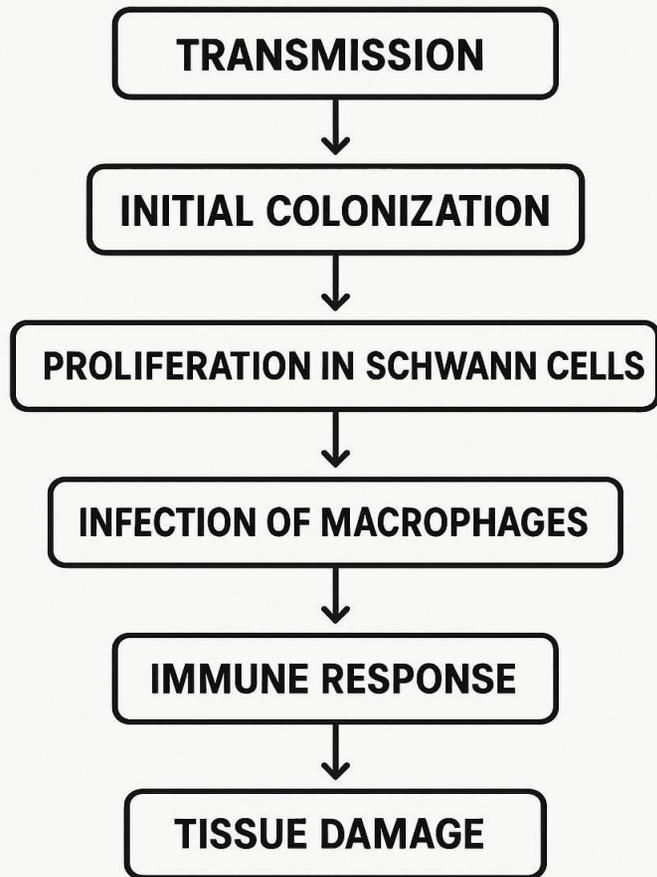
3. Leprosy

S.No	Heading	Details
1	Definition	Leprosy (Hansen's disease) is a chronic infectious disease caused by Mycobacterium leprae, affecting skin, peripheral nerves, eyes, and mucosa.
2	Nature	Slowly progressive; leads to sensory loss and deformities if untreated.
3	Transmission	Prolonged close contact; respiratory droplets from untreated cases.
4	Incubation Period	Long (2–10 years).
5	Systems Affected	Skin, nerves, eyes, upper respiratory tract.

I. Etiology of Leprosy

S.No	Category	Details
1	Causative Agent	Mycobacterium leprae (acid-fast bacillus).
2	Mode of Transmission	Inhalation of droplets, long-term contact with infected individuals.
3	Reservoir	Humans (primary), armadillos (in some countries).
4	Risk Factors	Poor immunity, malnutrition, overcrowding, genetic susceptibility (HLA-linked), close household contact.
5	Types (Cause-Based)	- Paucibacillary (PB): Low bacterial load - Multibacillary (MB): High bacterial load

PATHOGENESIS OF LEPROSY



II. Pathogenesis of Leprosy

III. Diagnostic Tests for Leprosy

S.No	Diagnostic Test	Purpose / Findings
1	Clinical Examination	Skin lesions with sensory loss, nerve thickening.
2	Skin Smear (AFB Test)	Detects acid-fast bacilli; positive in MB leprosy.
3	Skin Biopsy	Histopathology (granulomas, AFB presence).
4	Lepromin Test	Measures immune response; positive in tuberculoid type.
5	PCR Test	Detects M. leprae DNA (high sensitivity).
6	Nerve Conduction Studies	Assess peripheral nerve damage.

III. Treatment of Leprosy

S.No	Category	Treatment / Drugs
1	WHO Multi-Drug Therapy (MDT)	PB Leprosy: Rifampicin + Dapsone (6 months) MB Leprosy: Rifampicin + Clofazimine + Dapsone (12 months)
2	Anti-inflammatory	Prednisolone for nerve pain, lepra reactions.
3	Clofazimine	Anti-inflammatory and anti-mycobacterial.
4	Supportive Therapy	Physiotherapy, skincare, ulcer prevention.
5	Surgery	For deformities (reconstructive surgery).
6	Prevention	Early detection, MDT, contact tracing; BCG offers partial protection.

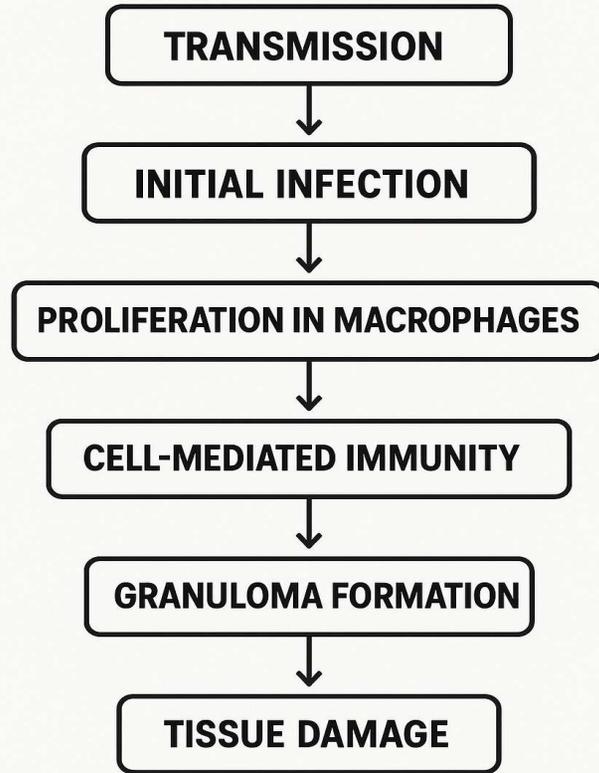
4. Tuberculosis

S.No	Heading	Details
1	Definition	Tuberculosis is a chronic infectious disease caused by Mycobacterium tuberculosis, primarily affecting the lungs (pulmonary TB), but can involve any organ (extra-pulmonary TB).
2	Mode of Transmission	Airborne droplets via coughing, sneezing, talking.
3	Affected Organs	Lungs (most common), lymph nodes, bones, kidneys, CNS, GI tract.
4	Pathology	Formation of granulomas and caseous necrosis in infected tissues.
5	Key Feature	Slow-progressing infection due to intracellular survival of bacteria.

II. Etiology of Tuberculosis

S.No	Type	Causative Agent / Risk Factor
1	Causative Agent	Mycobacterium tuberculosis (main), M. bovis, M. africanum.
2	Mode of Spread	Inhalation of infected aerosols, rarely ingestion of infected milk (M. bovis).
3	Risk Factors	HIV/AIDS, malnutrition, diabetes, smoking, alcoholism, overcrowding, poverty, immunosuppression, chronic diseases.
4	Predisposing Conditions	Silicosis, renal failure, malignancy, long-term steroid therapy.

PATHOGENESIS OF TUBERCULOSIS



II. Pathogenesis of Tuberculosis

III. Diagnostic Tests for Tuberculosis

S.No	Test / Method	Purpose / Findings
1	Tuberculin Skin Test (Mantoux)	Detects delayed hypersensitivity to TB antigen.
2	Chest X-ray	Shows consolidation, cavitation, nodules, lymphadenopathy.
3	Sputum AFB (Acid Fast Bacilli)	Direct smear to detect mycobacteria.
4	CBNAAT / GeneXpert	Rapid molecular test for TB and rifampicin resistance.
5	Culture (Löwenstein–Jensen)	Gold standard; confirms TB and drug sensitivity.
6	IGRA (Interferon Gamma Release Assay)	Used in latent TB; unaffected by BCG vaccine.
7	CT / MRI	Helpful in extra-pulmonary TB like CNS or bone involvement.

IV. Treatment of Tuberculosis

S.No	Type of TB	Treatment
1	Drug-Sensitive TB (DOTS Regimen)	2 months Intensive Phase (HRZE): Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Ethambutol (E) → 4 months Continuation Phase (HR).
2	MDR-TB (Multi-Drug Resistant)	Second-line drugs: Fluoroquinolones (Levofloxacin), Amikacin, Linezolid, Clofazimine, Cycloserine.
3	XDR-TB	Advanced regimen: Bedaquiline, Delamanid, Linezolid.
4	Latent TB	Isoniazid for 6–9 months OR Rifampicin-based therapy.
5	Supportive Treatment	Nutrition, hydration, management of symptoms, oxygen if needed.
6	Prevention	BCG vaccination, mask use, good ventilation, early detection.

Thank you