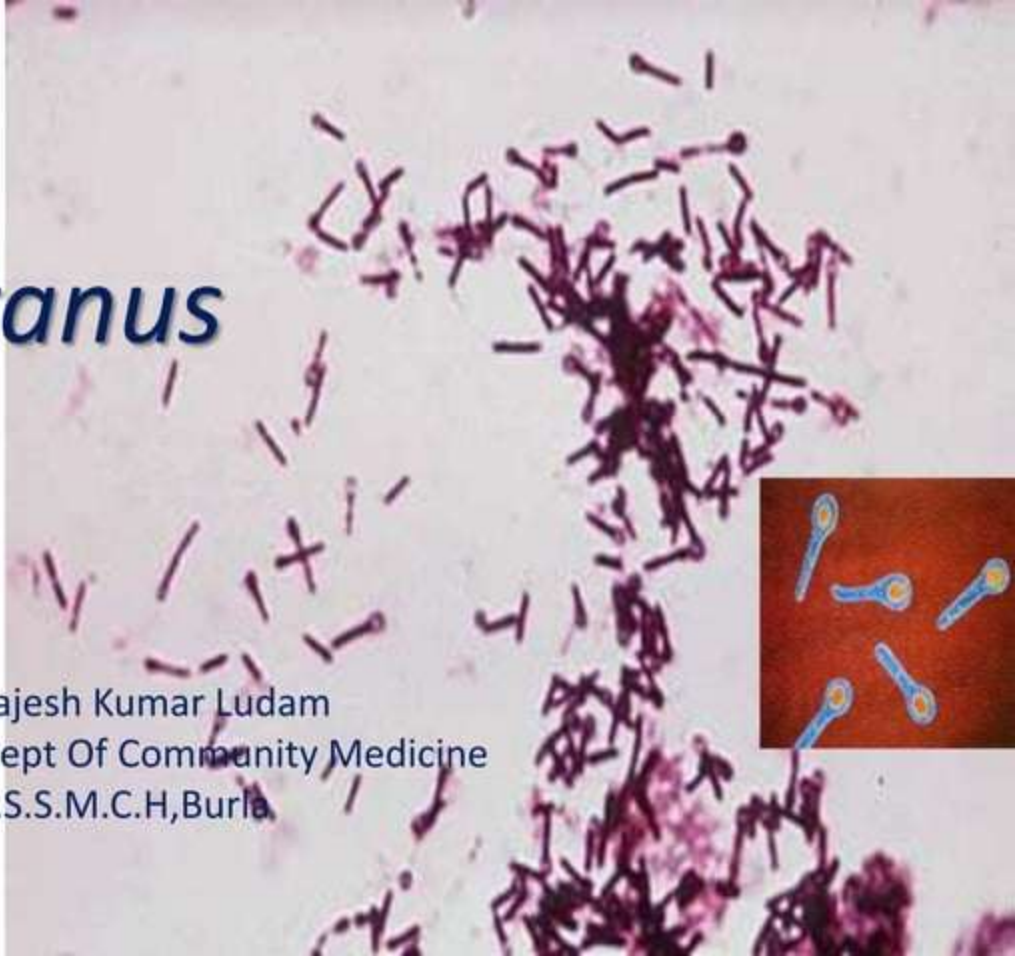




Tetanus



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TETANUS

- ❖ INTRODUCTION
- ❖ CAUSATIVE AGENT
- ❖ EPIDEMIOLOGY
- ❖ TRANSMISSION, HOST FACTORS,
ROUTE OF ENTRY
- ❖ TYPES OF TETANUS
- ❖ PREVENTION – ACTIVE & PASSIVE
IMMUNIZATION

Introduction

- Tetanos – a Greek word – **to stretch**
- First described by Hippocrates & Susruta
- Tetanus an neurological disease characterized by an acute onset of hypertonia, painful muscular contractions (usually of the muscles of the jaw and neck), and generalized muscle spasms without other apparent medical causes.
- Only vaccine preventable disease that is infectious but not contagious

CAUSATIVE AGENT

- Caused by **CLOSTRIDIUM TETANI**
- Anaerobic
- Motile
- Gram positive bacilli
- Oval, colorless, terminal spores – **tennis racket or drumstick shape.**
- It is found worldwide in soil, in inanimate environment, in animal faeces & occasionally human faeces.

***Clostridium tetani* Gram Stain**



NOTE: Round terminal spores give cells a "drumstick" or "tennis racket" appearance.

Epidemiology

- Tetanus is an international health problem, as spores are ubiquitous. The disease occurs almost exclusively in persons who are unvaccinated or inadequately immunized.
- Entirely preventable disease by immunization
- Tetanus occurs worldwide but is more common in hot, damp climates with soil rich in organic matter.
- More common in developing and under developing countries.
- More prevalent in industrial establishment, where agricultural workers are employed.
- **Tetanus neonatorum** is common due to lack of MCH care.

India-:

- Tetanus is important endemic infection in India.
- Causative factors
 - Hand washing
 - Delivery practices
 - Traditional birth customs
 - Interest in immunization
- Since 1983 Nationwide EPI recommended 2 doses of TT for pregnant women during each pregnancy (or one booster if <3 yrs have passed since the prev. pregnancy)
- Prior to the national immunization programme estimated 3.5 lakh children were dying annually. 70,000 cases continue to occur largely in the states – Orissa, Bihar, MP, Assam, Rajasthan, UP, where TT immunization coverage is less than national coverage(70%) .
- In addition to Immunization clean delivery centers at hospitals and a cadre of trained ANMs and other trained birth attendants have contributed to reducing the burden of NT in INDIA.

- Depending on NT incidence rates, immunization coverage levels, proportion of clean deliveries by trained personals, Districts are divided into-:

NT High risk – Rate $> 1/1000$ live births or
TT2 coverage $< 70\%$ or attended deliveries $< 50\%$

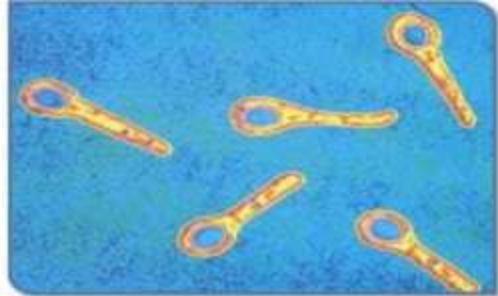
NT Control – Rate $< 1/1000$ live births or
TT2 coverage $> 70\%$ or attended deliveries $> 50\%$

NT Elimination – Rate $< 0.1/1000$ live births or
TT2 coverage $> 90\%$ or attended deliveries $> 75\%$

Agent Factor-:

1.Agent-: Cl. Tetani

- Oval, colorless, terminal spores – tennis racket or drumstick shape.
- Spores are highly resistant to a number of injurious agents, including boiling, phenol and autoclaving for 15 min at 120°C.



2.Reservoir of infection-: Natural Habitat-:Soil & Dust

- Also found in intestine of- Cattle,horses,goats,sheeps and excreted in faeces
- Can survive for years in nature without causing ill effects
- Are blown about in dust and occur in wide variety of situations

Sporulated



Vegetative



3.Toxins-:

- When the oxygen levels in the surrounding tissue is sufficiently low, the implanted *C. tetani* spore then germinates into a new, active vegetative cell that grows and multiplies and most importantly produces tetanus toxin -

Tetanospasmin and *Tetanolysin*.

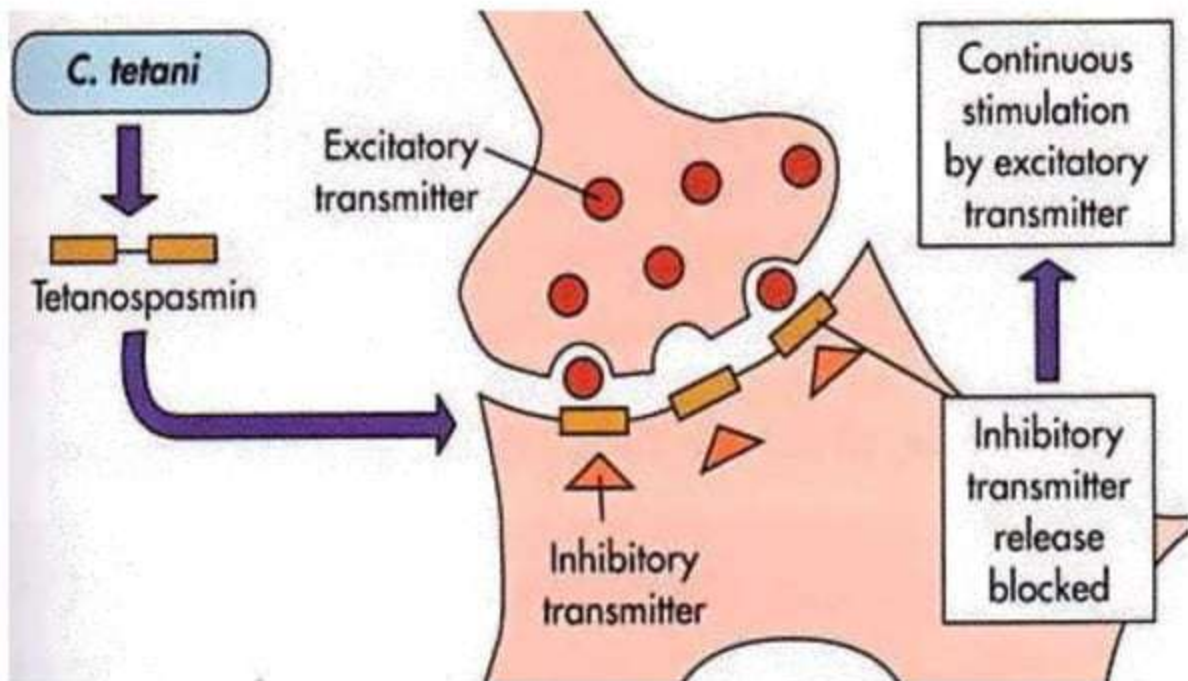
- **Tetanolysin** is not believed to be of any significance in the clinical course of tetanus.

- **Tetanospasmin** is a neurotoxin and causes the clinical manifestations of tetanus.

- Astounding lethal toxicity, exceeded only by Botulinum Toxin.
- Lethal Dose-: 0.1mg for a 70 kg-man
- The toxin acts on 4 areas of nervous system-:
 - Motor End Plates in Skeletal System
 - Spinal Cord
 - Brain
 - Sympathetic System
- Principal Action is to block inhibition of spinal reflexes.

4. Period of Communicability-: None

Mechanism of Action of Tetanus Toxin



- Spores are extremely stable, although immersion in boiling water for 15 minutes kills most spores. Exposure to saturated steam under 15 lbs. of pressure for 15-20 minutes at 121°C is highly effective against spores .
- Sterilization by dry heat is slower than by moist heat (1 -3 hrs at 160 °C),but it is also effective against spores.
- Ethylene oxide sterilization is also sporocidal.
- Autoclaving at 121°C for 15min kills the spores readily.
- Iodine(1% aqueous soon) and H₂O₂ (10 volume) kills spores within few hours.

Host Factors

- Age : It is the disease of active age (5-40 years), New born baby, female during delivery or abortion
- Sex : Higher incidence in males than females
- Occupation : Agricultural workers are at higher risk
- Rural –Urban difference: Incidence of tetanus in urban areas is much lower than in rural areas
- Immunity : Herd immunity does not protect the individual

Environmental & Social Factors-:

- Tetanus is a positive environmental hazard.
- Depends upon man's physical and ecological surroundings.
- Factors Contributing-:
 - Unhygienic custom habits
 - Unhygienic delivery practices
 - Ignorance of infection &
 - Lack of primary health care services.

Routes Of Infections/Mode of Transmission-

- Trivial pin prick, Skin Abrasion
- Puncture wounds,Burns,Human Bites
- Animal bites and stings
- Unsterile Surgery,IUD
- Bowel Surgery & Dental Extraction
- Injections, Unsterile division of Umbilical Cord
- Compound Fractures,Otitis Media
- Chronic skin ulcers, Eye Infection
- Gangrenous Limb

Thus tetanus is an wound infection “ **NO WOUND,
NO TETANUS**”

Incubation Period-:

- Usually incubation period ranges from 3-21 days but can range from the day of injury to several months.
- Average incubation period is 10 days.
- Depends on character, location, and extent of wound.

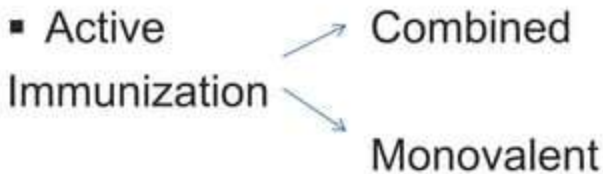
Types of tetanus

- Traumatic
- Puerperal
- Otogenic
- Idiopathic
- Tetanus neonatorum
- Cephalic



Prevention

- Tetanus is completely preventable by active tetanus immunization.
- Immunization is thought to provide protection for 10 years.



Tetanus prone wound

- A wound sustained more than 6 hr before surgical treatment.
- compound fractures
- deep penetrating wounds
- wounds containing foreign bodies (especially wood splinters)
- wounds complicated by pyogenic infections
- wounds with extensive tissue damage (e.g. contusions or burns)
- any wound obviously contaminated with soil, dust
- Re-implantation of an avulsed tooth is also a tetanus-prone event

1.Active-:

A. Combined



- Offered routinely in combination with diphtheria vaccine and killed B. pertussis organisms as DPT vaccine.

| | |
|-------------------------------|---|
| 1st dose | - 6th week (DPT) |
| 2nd dose | - 10th week (DPT) |
| 3rd dose | - 14th week (DPT) |
| 1st booster | - 18th month (DPT) |
| 2nd booster | - 5th completed year (DT) |
| 3rd booster | - 10th year (TT) |
| 4th booster | - 16th years (TT) |

B. Monovalent vaccines

- Purified tetanus Toxoid (adsorbed) supplanted the plain Toxoid – higher & long lasting immunity response
- Primary course of immunization – 3 doses
- Each 0.5 ml , injected into arm given at intervals of 0,2,12 months
- The longer the interval b/w two doses, better is the immune response
- Booster doses : After 5 yr f/b Every 10 yrs
- Stored between +2 to +8°c and must not be allowed to freeze at any time.

2.Passive immunization

- Temporary protection – human tetanus immunoglobulin /ATS
- **Human Tetanus Hyper-immunoglobulin :**
- 250-500 IU
- Produces protective antibody level for at-least 4-6 weeks.
- Does not cause serum sickness
- Longer passive protection compared to horse ATS(30 days / 7 -10 days)
- Produced at Serum institute Pune.

- **ATS (EQUINE) :**

- If Human ATS not available
- 1500 IU s/c after sensitivity testing
- Protection-: 7 – 10 days
- High risk of serum sickness
- It stimulates formation of antibodies to it , hence a person who has once received ATS tends to rapidly eliminate subsequent doses.

Active & Passive Immunization

- In non immunized persons
- 1500 IU of ATS / 250-500 units of Human Ig in one arm & 0.5 ml of adsorbed Tetanus Toxoid (PTAP or APT) into other arm /gluteal region
- Followed 8 wks later by , 0.5 ml of Tetanus Toxoid
- 1 yr later , 0.5 ml of Tetanus Toxoid 3rd dose
- Again at 5 yr and 10 yrs.....

Purpose-: Immediate Temporary Protection + Long Lasting Protection

Antibiotics

- Theoretically, antibiotics may prevent multiplication of *C tetani*, thus halting production of toxin. Benzathine Penicillin is the drug of choice.
- **Penicillin: (1.2 MU IV in 2-4 divided doses-FOR 3-4 WEEKS)**
- **Erythromycin is alternative for penicillin allergic patients 500mg 6hrly for 7 days.**
- Started as soon as possible after Injury.(around 6 hrs)
- Alone it is ineffective in prevention of tetanus as it is not a substitute to Immunization.

Prevention of neonatal tetanus

- Clean delivery practices alone is effective.(about 90%)
- 3 cleans : clean hands, clean delivery surface, clean cord care
- Tetanus toxoid protects both mother & child
- Unimmunized pregnant women : 2 doses tetanus toxoid (16th-36th week)
- 1st dose as early as possible during pregnancy
- 2nd dose – at least a month later / 3 wks before delivery
- Immunized pregnant women : a booster is sufficient
- No need of booster in every consecutive pregnancy.
- To newborn of unimmunized mother, 750 IU (HTIG) within 6 hours of birth.

IMMUNITY CATEGORY

- A - has had a complete course of Toxoid or booster dose within the past 5 years
- B - has had a complete course of Toxoid or booster dose more than 5 years ago & less than 10 years ago
- C - has had a complete course of Toxoid or a booster dose more than 10 years ago
- D - has not had a complete course of Toxoid or immunity status unknown

Post-exposure prophylaxis:

- All wound receive surgical toilet

Wounds less than 6 hours
Old, clean, non-penetrating,
& with negligible tissue damage

**immunity
category**

A

nothing more required

B

Toxoid 1 dose

C

Toxoid 1 dose

D

Toxoid complete course

other wounds

**immunity
category**

A

nothing more
required

B

Toxoid 1 dose

C

Toxoid 1 dose +

human tetanus Ig.

D

Toxoid complete course +
human tetanus Ig

