Human Salmonellosis

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Introduction

- "***Salmonellosis***" covers a complex group of food borne infections ***affecting both man and animals***.
- Causes ***illness and even death*** in humans as well as ***economic losses*** in animal and food industries.

Magnitude of Problem

- Global problem
- Represents ***60-80% of all reported cases of foodborne diseases.***
- *Tens of millions of human cases* occurring every year.
- ***Animal feeds containing antimicrobial ?*** drugs that favour drug resistant salmonellae
- Occur sporadically or in small outbreaks
- Extent of the problem is not clear in developing countries where ***diarroheal diseases are widespread***.

Epidemiological determinants

Agent:

- Group of bacteria: comprise more than 25,000 serotypes.
  - Usually small number (about *10) are endemic at any one time*.
- Survive in many kinds of food.
  - ***Resistant to*** drying, salting, smoking and freezing ***even for years***.
- Sensitive to heat
  - not survive >70 degree Celsius

- Three main groups:

1. Infect ***only man***
   - e.g. *S. typhi, S. paratyphi A* and *C*

2. Host-adapted for ***particular species of animals***
   - e.g. *S. cholera-suis* in swine, *S. Dublin* in cattle, *S. abortus equi* in horses.

3. ***No particular host preference*** and can infect both man and animals
   - e.g. *S. typhimurium, S. enteritidids*.

Reservoir:

- Main reservoir is the intestinal tract of man and animals.

Sources of infection:

i. Foods
ii. Animals
iii. Environment

(i) Food:

- Meat and poultry:
  - *Primary source of salmonellosis*
  - *During slaughter, through shell cracks*

- Produced or processed in contaminated environment (***chocolates, spices*** etc.)

- ***Cross-contamination*** of cooked foods from raw ingredients, kitchen utensils or surfaces

(ii) Animals:

- Hosts and principal vectors
- Bacilli in their tissues (meat), eggs or excreta
- ***Carriers*** occur among both man and animals

(iii) Environment:

- Widely distributed
- In ***dust, water, manure, sewage, sludge, vegetables, birds, fish, rodents and other animals***
- *Survive in soil for months*

Mode of transmission

- Ingestion of contaminated food or drink
- ***Direct contact with domestic animals*** e.g. dogs, pigeons, rats
- Man to man transmission through *faecal–oral route*
- ***Facilitated by***:
  - Food handling methods
  - Local customs
  - Cooking and food habits
  - Food processing, storage and distribution
  - Sanitary conditions

Incubation period

- 06 to 72 hours usually.

Clinical features

- May be manifest by one of three syndromes:

i. Gastroenteritis or salmonella enterocolitis:
   - Most common manifestation
   - Nausea, vomiting, diarrohea, fever, dehydration (in sever cases)
   - Resolves in 2-3 days
   - Stool culture are positive but Blood culture are negative
   - Death is rare and occur in neonates, infants and elderly.

ii. Enteric fever.

iii. Septicemia with focal lesions:
   - PUO, osteomyelitis, pyelonephritis, meningitis, endocarditis, cholecystitis.

Prevention and Control

- ***Immunization of farm animals*** against salmonella
- Use of ***hygienic animal feed***
- Ensuring ***sanitary environment*** for the animals
- ***Hygienic slaughtering and milking***
- ***Pasteurization***
- Disposal of solid and liquid wastes
- Cold storage facilities
- Health education and training.

Recommendations for the public and travellers

- Ensure food is ***properly cooked and still hot*** when served.
- Drink only ***pasteurized or boiled milk***.
- ***Avoid ice*** unless it is made from safe water.
- When the ***safety of drinking water is questionable***, boil it or if this is not possible, disinfect it with *a reliable, slow-release disinfectant agent* (usually available at pharmacies).
- Wash hands thoroughly and frequently using soap, in particular ***after contact with pets or farm animals***, or after having been to the toilet.
- ***Wash fruits and vegetables carefully***, particularly if they are eaten raw. If possible, ***vegetables and fruits should be peeled.***

Recommendations for food handlers

- Both *professional and domestic food handlers should be vigilant* while preparing food and should observe hygienic rules of food preparation.
- *Professional food handlers* who suffer from fever, diarrhoea, vomiting or visible infected skin lesions *should report* to their employer immediately.
- The *WHO Five Keys to Safer Food* serve as the basis for educational programmes to train food handlers and educate consumers. They are especially important in preventing food poisoning. The Five Keys are:
  - *Keep clean.*
  - *Separate raw and cooked.*
  - *Cook thoroughly.*
  - *Keep food at safe temperatures.*
  - *Use safe water and raw materials*.

Recommendations for producers of fruits and vegetables

- **The WHO "Five keys to growing safer fruits and vegetables"** is an educational manual for rural workers, including small farmers who grow fresh fruits and vegetables for themselves, their families and for sale in local market.
- It provides them with ***key practices to prevent microbial contamination of fresh produces*** during planting, growing, harvesting and storing.
- ***The five keys practices are:***
- Practice good ***personal hygiene***.
- ***Protect fields*** from animal faecal contamination.
- ***Use treated faecal waste***.
- ***Evaluate and manage*** risks from irrigation water.
- Keep harvest and storage ***equipment clean and dry***.

Taeniasis

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Introduction

- Cestode infections

- Parasites of importance:
  - ***Taenia saginata***
  - ***Taenia solium***

- Cyclo-zoonoses:
  - require ***more than one vertebrate host*** (but no invertebrate host) to complete developmental cycles.

Magnitude of problem

- ***T. saginata:***
  - ***Highly endemic*** (30 to 80%) in African countries, eastern Mediterranean countries, part of USSR
  - ***Moderate prevalence*** in Europe, Indian subcontinent, Southern Asia, Japan.
  - ***Low endemic*** (below 0.1%) in Australia, Canada and USA.

- ***T. solium:***
  - Latin America, Africa, Asia including India.

Hosts of infection

- Life cycles in two hosts:
- Adult parasite lives in human small intestine.
- Larval stage occurs in:
  - ***cattle (T. saginata, C. bovis)*** and
  - pig (***T. solium, C. cellulosae***)

- Mixed infestion of both parasites can occur.

Mode of transmission

i. ***Hetero-infection:***

- Ingestion of infective cysticerci in ***undercooked beef*** (*T. saginata*) ***or pork*** (*T. solium*).
- Ingestion food, water or vegetables ***contaminated with eggs***

ii. ***Auto-infection***:

- Reinfection by the transport of eggs from the ***bowel to the stomach by retro-peristalsis (rare)***

Incubation period

- 08 to 14 weeks.

Clinical features

- Vast majority of cases do ***not lead to clinical manifestations***
- Occasional abdominal discomfort, chronic indigestion, anorexia
- Cysticercosis:
  - Most serious risk:
  - ***Neurocysticercosis:*** Epilepsy, intracranial hypertension syndromes, hydrocephalus, psychiatric diseases, death

Prevention & Control

- *Treatment of infected person*
- *Meat inspection*
- *Health education* regarding hand washing and open field defecation.
- *Adequate sewage treatment and disposal*, especially used for farming.

- **Treatment of infected person:**

  - ***Praziquantel*** (10 mg/kg stat dose) and ***Niclosamide*** (2 grams stat)
  - ***Surgical removal of cyst***
  - Purgatives 2-3 hours after the drug in case of T. solium

  - ***Albendazole (10 mg/kg/day BD X 28 days***) and ***Steroid for cysticercosis.***

Trachoma

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Introduction

- Trachoma - leading ***infectious cause of blindness*** in the world.
- *Chlamydia trachomatis,* ***an obligate intracellular bacterium*** .
- The infection-transmitted through contact with *eye and nose discharge of infected people,* particularly ***young children*** who are the ***principal reservoir*** of infection.
- Also ***spread by flies*** which have been in contact with the eyes and noses of infected people

Agent factors

- *Chlamydia trachomatis,* an obligate intracellular bacterium
- ***Reservoir***:
  - Children with active disease,
  - chronically infected cases
- ***Source of infection***:
  - Ocular & Nasal discharge, fomites.

Host factors

- **Age:**
  - 02-05 years age group
- ***Gender*** :
  - equal in younger age group but females > males in older age group.
- ***Pre-disposing factors*** :
  - ***dust, smoke, kajal*** application

- ***Environmental risk factors*** influencing the transmission of the disease include:
- *Poor hygiene*
- *Crowded households*
- *Water shortage*
- *Inadequate latrines and Sanitation facilities*
- *Higher temperature and rainfall*

Clinical characteristics

- *Trachomatous follicular inflammation –(TFI)*
- *Trachomatous trichiasis (TT)*
- *Corneal opacity (CO).*
- *Trachomatous intense inflammation –(TII)*
- *Trachomatous conjunctival scarring (TCS)*

- The prevalence of TFI in children aged 01-09 years is the ***key index*** for determining whether ***an area needs intervention with the A, F and E components of SAFE***.

- The prevalence of TT determines the ***probable need for surgical services***.

- The prevalence of CO is a (rough) measure of the ***burden of blindness and visual impairment due to trachoma***.

Distribution

- Responsible for the ***visual impairment of about 1.8 million people, of whom 0.5 million are irreversibly blind.***
  - This represents about 1.4% of the global total of blind individuals.

- Overall, Africa remains ***the most affected continent and the one with the most intensive control efforts.***

Prevention and Control

- ***Assessment*** of the problem
- ***Chemothearpy:***
  - Mass treatment vs. Selective treatment
  - Tetracyclines, erythromycin
- SAFE
- ***Surveillance***
- Health education

Prevention & Control

- ***WHO-recommended SAFE strategy***:
  - Surgery to treat the blinding stage of the disease (trachomatous trichiasis),
  - ***Antibiotics to treat infection*** (tetracycline eye ointment or Azithromycin single oral dose),
  - **Facial cleanliness**, and
  - ***Environmental improvement***, particularly ***improving access to water and sanitation.***

Thanx