Brucellosis

Dr R.S. Randhawa & Dr. S.B.Bakshi

Department of Veterinary Public Health & Epidemiology, KCVAS, Amritsar

Synonyms

- In animals: Bang's disease, Contagious abortion, Epizootic abortion
- In humans: Melitococcosis (*Brucella-melitensis*), Malta fever (*Brucella-melitensis*), Mediterranean fever (*Bruce-l lamelitensis*), Undulant fever (*Brucel-laabortus*)

Introduction

- It is an infectious disease in humans, causes acute or chronic brucellosis and is clinically characterized by chills, profuse sweating, weakness, fatigue, insomnia, sexual impotence, headache, arthralgia and generalized malaise, which last for weeks and months; commonly shows remissions (hence also known as undulant fever). It is an acute or chronic contagious disease of domestic animals that causes placentitis and abortion in farm
- animals, especially at last trimester of pregnancy (at about 6th month of pregnancy in cattle).

Brief history

It is an emerging disease since the discoveryof *Brucellamelitensis* by **Bruce** in 1887. 'Brucellosis' is named after its researcher David Bruce. Danish veterinarian **BernardBang** isolated *Brucell aabortus* as the agent and the additional name Bang's disease was assigned in 1897.

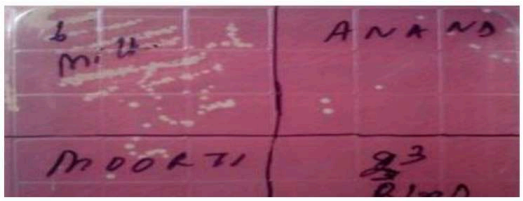
- In 1905, Maltese doctor and archaeologist Sir TemiZammit identified unpasteurized milk as the major source of the pathogen and it has since become known as Malta fever.

Etiology

- The "classic *Brucella*" are *Brucell aabortus* in cattle , *B. melitensis* in goats and *B. suis* in swine. Other zoonotic *Brucella* are *B. canis* in dogs, *B. ovis* in sheep and *B. neotomae* in rats, particularly in desert rat. *B. ovis* and *B. neotomae* are nonzoonotic agents. Recently B. maris has been identified from marine animals.
- Biovars of *Brucella spp.*
  - *Brucellamelitensis* - Biovars 1 to 3
  - *Brucellaabortus* - Biovars 1 to 7

- *Brucellasuis* - Biovars 1 to 5

- *Brucella spp.* Are Gram negative, **facultative intracellular pathogen**, non motile, aerobic and coccobacilli.



Growthof *Brucella* organisms on selective medium

Epidemiology

- Brucellosis is found globally and is a reportable disease in most of the countries. Endemic areas for brucellosis include countries of the Mediterranean basin, Middle East, Central Asia, China, the Indian subcontinent, sub-Saharan Africa, and parts of Mexico and Central and South America.
- In India, the disease is widely prevalent in most of the States.
- It has been eradicated from Finland, Norway, Sweden, Denmark, the Netherlands, Belgium, Switzerland, Germany, Australia, Hungary, the former Czechoslovakia, Rumania and Bulgaria.
- Certain groups of people are at higher risk of getting brucellosis, including people who work in slaughterhouses or the meat-packing industry, veterinarians, laboratory workers, and hunters.

Socio economic impact

- **Biological warfare:** The United States biological warfare program focused on three agents of the Brucella group: Porcine Brucellosis (agent US), Bovine Brucellosis (agent AB) and Caprine Brucellosis (agent AM).
- Permanent sterility in male
- Monetary loss
- Reduced export on international trade
- Loss of man-hours and man-days
- Abortions in both animals and human beings

Transmission

- **In humans**
  - Drinking of infected raw milk/cheese or unpasteurized milk.
  - Ingestion of raw vegetables and water contaminated with excreta of infected animals.
  - Handling of aborted foetus, fluids and foetal membranes.
  - Occupational exposure: Stockyard workers, slaughter house workers and butchers contract infection while handling foetuses, after births or by contact with vaginal secretions, excreta and carcasses of infected animals.
  - Veterinarian gets infection during rectal examination without wearing gloves and while conducting post mortem examination.
  - Through skin abrasions and conjunctiva.

- Possibly airborne.

- **In Animals**

- Ingestion of feed and water that are contaminated with aborted materials.
- Mechanical transmission through flies, ticks, rats
- Artificial insemination with frozen semen from infected bulls and dogs.

Clinical signs and symptoms In Animals

- The incubation period is ranged from 1 to 3 weeks, but some rare instances may take several months.
- Abortions (at third trimester of pregnancy) are followed by immunity.
- Carrier state persists especially with secretions from the udder.
- Infertility, testicular abnormalities and poor semen quality.
- Mastitis.
- Inapparent infection may be common, as indicated by seropositivity.

Aborted foetus by *Brucellaabortus*

Disease in man

- The incubation period ranges from 1 to 3 weeks.
- It is a septicemic disease with sudden or insidious onset and is accompanied by continued intermittent or irregular fever.
- It can be of acute or chronic form.
- In acute brucellosis
- Chills and profuse sweating (peculiar odour at night)
- Weakness and fatigue
- Normal temperature in the morning and rise at after noon.
- Insomnia, nausea, headache, anorexia, arthralgia, muscular and body pain, weight loss, sexual impotence and orchitis in males.
- Lymphadenopathy.
- Neurological symptoms: Irritation, nervousness and depression.
- In chronic brucellosis
  - Symptoms are undulant nature, with periods of normal temperature between acute attacks; symptoms may persist for years, either continuously or intermittently.
  - Symptoms are associated with hypersensitivity and it is very difficult to diagnose.

Treatment

- The use of more than one antibiotic is needed for several weeks, due to the fact that the bacteria incubate within cells.
- Combination regimens of two or three drugs are more effective.

- Either (1) doxycycline plus rifampicin or streptomycin (or both); (2) trimethoprim-sulfamethoxazole plus rifampicin or streptomycin (or both) are effective in doses for 21 days.
- Longer courses of therapy may be required to cure relapses, osteomyelitis or meningitis.

- The gold standard treatment for adults is daily intramuscular injections of streptomycin 1 g for 14 days and oral doxycycline 100 mg twice daily for 45 days (concurrently). Gentamicin 5 mg/kg by intramuscular injection once daily for 7 days is an acceptable substitute when streptomycin is not available or difficult to obtain. **Prevention and control**
- The main way of preventing brucellosis is by using fastidious hygiene in producing raw milk products or by pasteurization of milk that is to be ingested by human beings, either in its pure form or as a derivate, such as cheese.
- Hygienic disposal and handling of aborted uterine discharges, foetus and foetal membranes. For this purpose, use Protective gloves, gown and eyewear.
- Human brucellosis can be prevented by controlling and eradicating animal brucellosis.
- Quarantine and testing of the newly
- Quarantine and testing of the newly introduced animals. Screening the herds and removing the reactors.
- Test and slaughter method will be the most rational approach, but it is not done in india due to religious issues.
- Vaccination of all female calves between 4 and 10 months of age with approved vaccines (Dose is 2 ml by s/c route).

Vaccination

Strain 19 vaccine: Live-attenuated vaccine strain. It is not given to male calves as it may get localize in testes.

- **Strain 19 vaccine:** Live-attenuated vaccine strain. It is not given to male calves as it may get localize in testes.
- **RB51 vaccine:** Newer live-attenuated vaccine strain that is used at present.
- **"Calfhood vaccination":** Vaccination should be done during calfhood (4 to 8 months for S19; 4 to 10 months for RB51) so as to minimize the induction of antibodies that might be interpreted as evidence of actual infection.
- Vaccination should not be conducted in pregnant animals because of the risk of vaccine-induced abortion.
- S19 vaccine will induce brucellosis in humans who are inadvertently stuck. If this happens, person should receive doxycycline for 3 weeks and rifampicin antibiotics prophylactically. The potential for human disease due to RB51 remains unclear, but prophylaxis with doxycycline is prudent.