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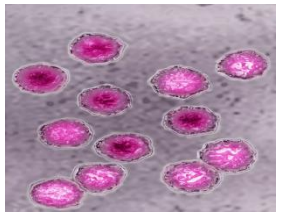
Brucellosis + Leishmaniasis



Prof DR. Waqar Al – Kubaisy

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David Bruce (1855-1931) Australian-born Scottish physican and microbiologist. Identified bacterium causing human undulant fever (Brucella, 1887) and in 1895 in South Afica,

Brucellosis

❑ Brucellosis

- ❖ **is one of the major bacterial zoonosis, and in humans** is also
- ❖ **known as: Undulant fever, Malta fever or Mediterranean fever.**
- ❖ **It is a bacterial disease caused by various Brucella species, which mainly infect cattle, swine, goats, sheep and dogs**
- ❖ It is occasionally **transmitted to man** by **direct or indirect contact with infected animals**.
- ❖ **characterized** by
- ❖ **intermittent or irregular febrile** attacks, with **profuse sweating, arthritis** and an **enlarged spleen.**
- ❖ The disease **may last** for **several days, months, or years**.
- ❖ **Brucellosis is both a severe human disease & a disease of animals**
- ❖ **with serious economic consequences**

Epidemiology

- **Brucellosis is a recognized public health problem**
- **with WW distribution.**
- It affects people of all ages and both sexes

In the general population, most cases are **caused by the consumption of raw milk** or its derivatives such as fresh cheese.

Most of these cases are from sheep and goat products

- **It is endemic** wherever cattle, pigs, goats & sheep are raised in large numbers.
- **Important endemic** areas for brucellosis exist in **Mediterranean z**one,
- ✓ **Eastern Mediterranean countries**, Central Asia, Mexico and South America.
- **in most European countries, North America and Australia it is rare now**
- **The prevalence of human brucellosis is difficult to estimate.**

- **The prevalence of human brucellosis is difficult to estimate.**
  - **Many cases remain undiagnosed**
    - **either because they are unapparent or because**
    - **physicians in many countries are unfamiliar with the disease**

Epidemiological Determinants

Agent:

- The agents are small, **gram-negative** rod shaped, **non-motile**, **non spore** &intracellular **coccobacilli** of the **genus *Brucella***.
- **Four species** infect man **:**

I. B.melitensis **it usually infects goats and occasionally sheep It is the most virulent and invasive species, most prevalent species causing human brucellosis**, owing in part to difficulties in immunizing free-ranging goats and sheep

II. B.abortus is **less virulent** and is primarily a disease **of cattle**.

III. B.suis is of **intermediate** virulence and chiefly infects **pigs.**

1V. B.canis is a disease of **dogs.**

❑ Host Factors

It affects people of all ages and both sexes.

In the general population, most cases are caused by the consumption of raw milk or its derivatives such as fresh cheese.

Most of these cases are from sheep and goat products

- ❖ The disease is also considered an **occupational hazard** for people who work in the livestock الماشيةsector.
- ❖ Human brucellosis is **predominantly** a **disease of adult males??**.
- ❖ **Farmers, shepherds, butchers**, and, veterinarians and **laboratory workers** are particularly at **special risk because of occupational exposure.**

❑ **Immunity follows infection**

❑ Reservoir of Infection :

❖ **Main reservoirs of human infection**;

➢ **cattle, sheep, goats, swine, buffaloes, horses and dogs.**

❑ **In animals** the disease can **cause abortion, premature expulsion** of the foetus or **death.**

❖ **Cross infections can often occur between animal species.**

❑ **The infected animals excrete** Brucella in the **urine, milk, placenta, uterine and vaginal discharges particularly during a birth or abortion**.

❑ contact with blood, placenta, foetuses and uterine secretions have an increased risk of contracting the disease.

❑ This method of transmission primarily **affects farmers, butchers, hunters, veterinarians and laboratory personnel**.

❑ **animals may remain infected for life**

❑ Environmental Factors

- Brucellosis is most **prevalent under conditions of advanced domestication of animals in the absence of correspondingly advanced standards of hygiene.**
- **Overcrowding** of herds, **high rainfall**, lack of exposure to sunlight,
- unhygienic practices in milk & meat production,

all favour the spread of brucellosis.

❑ **The** organism **can survive for weeks,** or **months** in favourable conditions **of water, urine, faeces, damp soil and manure**.

❑ **The infection can travel long distances** in **milk and dust**

❑ Mode of transmission

- **Transmission is usually from infected animals to man**.
- There is **no evidence** of transmission from **man to man .**

❑ **The routes of spread are :**

(a) Contact infection :

Most commonly, infection occurs by **direct contact** with infected ***tissues, blood, urine, vaginal discharge, aborted foetuses and especially placenta.***

- **Infection takes place** through **abraded skin**, **mucosa** or **conjunctiva** (muco cutaneous route).
- This type of spread is **largely occupational** and occurs in persons involved in workers. **handling livestock** and **slaughter**house المسلخ

(b) Air-borne infection :

- The environment of **a cowshed may be heavily infected**.
  - people living in such an environment can be infected.
- Brucellae may **be inhaled**

(c) Food-borne infection :

- Infection may take place **indirectly** by the ingestion of
- **raw milk** or dairy products (cheese) **from infected animals.**
- **Fresh raw vegetables** if **grown on soil containing manure from infected farms. can also carry infection**
- **Water contaminated with the excreta of infected animals may also serve as a source of infection**

Pattern of disease

- **Acute phase**

Characterized by a sudden or insidious onset of illness with

(i) swinging pyrexia (up to 40-41 Cº), rigors and sweating.

(ii) arthralgia/arthritis (***usually mono articular***) **involving larger joints such as hip, knee, shoulder and ankle.**

(iii) low back pain. (iv) headache, insomnia.

(v) small firm splenomegaly and hepatomegaly.

(vi) leukopenia with relative lymphocytosi

The acute phase subsides

❑ **The acute phase subsides within 2-3 weeks.**

❖ If the patient is treated **with tetracycline**, the symptoms may disappear quickly,

❖but the infection, being intracellular, **may persist**

❖ **giving rise to subacute or relapsing disease.**

In a few patients (up to 20%), symptoms for prolonged periods.

❑ **Incubation period**

Highly variable. Usually 1-3 weeks, but may be as long as ≥ 6 Mths

in Jordan

A recent study done to estimate the seropositive of animals (in the absence of vaccination). **this study demonstrated a high levels of brucellosis in ruminants** المجترات **of cattle herds** with 18.1% (95% confidence interval [CI]: 11–25.3) and

- 34.3% (95% CI: 28.4–40.4) of the **small ruminant flocks**

Small ruminants were the main source of human infection.

CONT. ..in Jordan

- In 2017, A study detected 441 cases of HB clinical complaints compatible to HB and confirmed by a **Rose Bengal test** (RBT) positive and\or standard tube agglutination test (SAT) were
- reported with **an incidence rate** of 6.6/100000 population.
- The peak incidence was during the months of **March, April, and May.**
- Cases in Mafraq and Alkarak governorates were significantly higher than those in the other governorates.
- Male gender (OR 2.5, **95% CI: 1.4, 4.1**),
- age older than 10 years (OR 1.8, 95% CI: 1.1, 3.9), and
- assisting in raising small ruminants (OR 1.6, 95% CI: 1.1, 2.6) were significantly associated with HB in Jordan

Brucellosis **In Jordan**	
Incidence Rate	4.645/ 100 000

Prevention And Control

Prevention of brucellosis is based on surveillance and the prevention of risk factors. The most effective prevention strategy is the **elimination of infection in animals**.

I. In The Animals

- The most rational approach **for preventing human brucellosis** is
- **control and eradication of the infection from animal reservoirs which** is **based on the combination of the following measures :**

(a)Test and slaughter :

- ❖ **Case finding is done by mass surveys.**
- ✓ **Skin tests are available.**
- ✓ **The complement fixation test is also** recommended.
- ✓ **Infected animals** are **slaughtered,** with **full compensation paid to farmers.**
- ❖ ***This is the only satisfactory solution aimed at eradication of the disease.***

Vaccination:

(b) Vaccination:

- **Vaccine of *B. abortus* strain 19 *is commonly used for young animals***
- A **compulsory vaccination** programme **for all heifers** لعجول **in** a given community
- on **a yearly basis** can considerably **reduce the rate** of infection.
- **Systematic vaccination for a period of 7 to 10 years may eliminate the disease.**

❖ **Control of the infection caused by *B. melitensis* in goats and sheep has to be based mainly on vaccination**

(c) Hygienic measures:

Provision of a clean sanitary environment for animals,

- **Sanitary disposal of urine and faeces,**
- **Veterinary care of animals and**
- **Health education of all those who are occupationally involved**

II- In The Humans

(a)Early diagnosis and treatment:

- **doxycycline** 100 mg twice a day for 45 days, plus **streptomycin 1 g** daily for 15 days
- The main alternative therapy is doxycycline at 100 mg, twice a day for 45 days, plus rifampicin at 15mg/kg/day (600-900mg) for 45 days.

In countries where eradication in animals through vaccination or elimination of infected animals is not feasible, prevention of human infection is primarily based on **raising awareness**, **food-safety** measures, occupational hygiene and laboratory safety.

(b) Pasteurization or Boiling *of milk :*

Render milk and milk products safe for consumption. **is an important step to preventing transmission** from animals to humans ***Boiling*** *of milk is effective when* ***pasteurization*** *is not possibl*

Education campaigns about **avoiding unpasteurized milk products can be effective, as well as policies on its sale.**

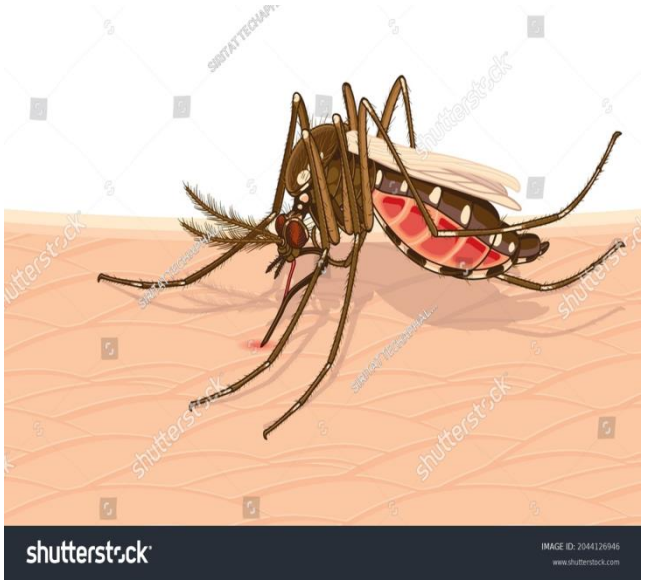
(c) Protective measures :

- ❖ **prevent direct contact** with **infected animals** among persons at risk *such as farmers, shepherds, milkmen, abattoir المسلخ workers* .
- ❖ **Care in handling and disposal of placenta, discharges** and **foetuses from an aborted animal**.
- ✓ **Protective clothing should be wear when handling carcasses**
- ➢ **Exposed areas of the skin should be washed** and soiled **clothing renewed**.

❑ *(d) Vaccination :*

Human **live vaccine** of *B. abortus strain* 19-BA is available,

- ❑ **Brucellosis would disappear if it were eradicated from animals.**



Leishmaniasis

Leishmaniasis

Leishmaniasis are a group of protozoa! diseases caused by parasites of the genus Leishmania, and transmitted to man by the bite of female phlebotomine sand-fly.

They are responsible for various syndromes in humans :

1. kala-azar or visceral leishmaniasis (VL), (L. infantum and L. donovani),
2. cutaneous leishmaniasis (CL), (L. major and L.tropica),
3. muco-cutaneous leishmaniasis (MCL),
4. anthroponotic cutaneous leishmaniasis (ACL),
5. zoonotic cutaneous leishmaniasis (ZCL),

post-kala-azar dermal leishmaniasis (PKDL),

Cutaneous leishmaniasis is the **most common form** of **leishmaniasis** affecting humans. It is a skin infection caused by a single-celled parasite that is transmitted by the bite of a phlebotomine sand-fly

Most species of Leishmania are capable of infecting humans and causing cutaneous leishmaniasis

There are about thirty species of Leishmania that may cause Cutaneous leishmaniasis

The majority of the leishmaniasis are zoonoses involving **wild** or **domestic** mammals (rodents, canines. with the exception of Leishmania tropica — which is often an anthroponotic disease (an infectious disease that is naturally transmissible from humans to vertebrate animals

Leishmaniasis **is endemic in many** countries in **tropical** and **subtropical regions,** including Africa, Central and South Americas, Asia and the Mediterranean region.

- **More than 90%of all cases** of cutaneous leishmaniasis occur in Afghanistan, Algeria, Brazil, Colombia, Iran, Peru, Saudi Arabia and Syrian
- In the **Eastern Mediterranean** Region

an average of 100 000 cases in the last 11 years and more than 120 000 cases I in the last 3 years have been reported

Situation in countries affected by crisis

- **in Syria** : Both *L. tropica* and *L. major* are **endemic** and transmission will continue. **In the context of the Syrian crisis**
- the **cutaneous leishmaniasis** form caused by ***L. tropica*** **is the most important in terms of** risk of being introduced **in neighboring** countries.
  - It also presents **more treatment failures**
  - up to 20% of cases may **become chronic**.

- Egypt: *L. major* in North Sinai. 864 cases in 2011 and 1260 in 2012.
- Iraq: *L. major*. 2978 cases reported in 2011 and 2486 in 2012.
- **Jordan: Zoonotic forms are endemic. There is low risk of *L.tropica* causing outbreaks.** In 2011, **136 c**ases caused by ***L. major*** were reported and in 2012, **103 cases**.

Lebanon: 5 cases cases caused by *L. infantum* In 2011, , 2 cases in 2012. very low risk of *L. tropica* being introduced.

Turkey: *L. tropica* is endemic in southern Turkey

The disruption of water and sanitation systems in Syria, where cutaneous leishmaniasis is endemic has created the perfect conditions for the phlebotomine sandfly to thrive and transfer the disease.

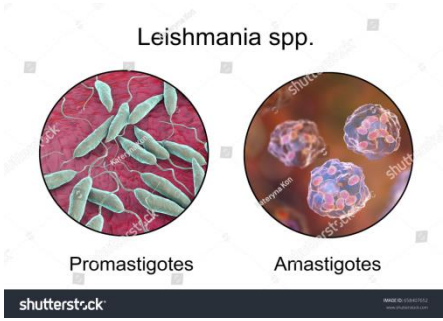
Since 2012, a progressive increase in number of reported cases has been observed, largely due to the inflow of refugees from Syria resulted in an increased number of cases cutaneous leishmaniasis Refugee camps, such as Al-Zaatari, in Jordan are **reporting cases of cutaneous leishmaniasis almost on a weekly basis.**

Cutaneous leishmaniasis is a growing public health problem in the Jordan . It disfigures people who are infected; thus often resulting in social stigmatization and exclusion, particularly for women.

- every year from Jordan **overall, 200-300 cases** of cutaneous leishmaniasis are reported
- WHO has chosen year 2014 vector-borne diseases as a topic of focus.

WHO **focus on cutaneous leishmaniasis**, given the spread of this disease following the Syrian crisis

Epidemiological determinants



a) Agents :

The leishmania are intracellular parasites.

They infect and divide within macrophages.

The life cycle is completed in two different hosts – a vertebrate and an insect;

in the former, it occurs in an amastigote (called "leishmania bodies") and in the latter as a flagellated promastigote

(b) **Reservoirs of Infection** :

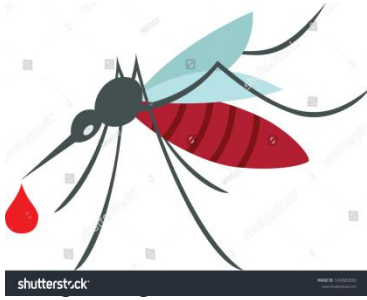
There is a variety of animal reservoirs, e.g., dogs, jackals, foxes, rodents and other mammals

The main reservoirs of *Leishmania major* are rodents, gerbils,

Humans are the main reservoir for *L. tropica*

(c) Vectors :

Cutaneous leishmaniasis is transmitted by P. papatasi and P. sergenti. Sandflies breed in cracks and crevices **in the soil and buildings, tree holes, caves etc**. **Overcrowding**, ill-ventilation and accumulation of organic matter in the environment **facilitate transmission**. **Their habits are primarily nocturnal. Only the females bite. Those who develop the disease usually present lifelong immunity after lesions due** to *L. major* or *L. tropica* heal. The disease is self-curing in 2-8 months for ***L. major*** lesions and 1 year or much longer for ***L tropica*.**



- After an infective blood meal, the sandfly becomes infective in **6 to 9 days** (extrinsic incubation period). This is the time required for the development of the parasite in the insect vector

In Cutaneous leishmaniasis The agent is restricted to skin. The disease is characterized by painful ulcers in the parts of the body **exposed to sandfly bites** (e.g., legs, arms or face) reducing the victim's ability to work.

3**. Muco-cutaneous leishmaniasis**

Ulcers similar to the oriental sore (CL) appear around the margins of mouth and nose. It can mutilate the face so badly that victims may become social outcasts

- **Risk factors**

1. Lack of immunity against the parasite (*Leishmania*). Very high risk especially in areas lacking of herd immunity
2. High exposure to infective sand-fly bites
3. Conducive environment to high contact human-infective vector-reservoir

❑ Mode of transmission

Mainly, as a vector-borne disease through bite of infective female p. (sandflies).

L. major is transmitted by *P. papatasi* from the animal reservoir to humans.

L. tropica is transmitted by *P. sergenti* from person to person.

Very rarely, *L. tropica* through transfusion.

❑ Communicability period

Not directly transmitted from reservoir to person, but infectious to sandflies as long as parasites remain in lesions in untreated cases, usually a few months to 2 years.

Transmission is seasonal through adult sandflies. *P. sergenti* in Aleppo appears generally between May and October, with a usual peak in June and another in September.

P. papatasi appears generally mainly in September–October.

❑ Incubation period

L. major: At least one week. Usually less than 4 months.

L. tropica: At least one week. Usually 2–8 months.

❑ Epidemiology

WHO definition

Alert threshold;

If the area is endemic, so the vector is present, data of the previous 5 to 10 years should be compared to the data of the similar duration (month), to assess if there is a sustained **increase about to reach doubling of the cases** above the previous years.

Epidemic threshold;

If the area is endemic, data of the previous 5 to 10 years should be compared to the data of the similar duration (month), to assess if there is a sustained increase **reaching at least doubling of the cases** above the previous years

Suspected case:

A person **showing clinical signs** (skin lesions). A papule appears, which may enlarge to become an indolent ulcerated nodule or plaque. The sore remains in this stage for a variable time before self healing and typically leaves a depressed scar.

Other atypical forms may occur.

Confirmed case:

A person **showing clinical signs** (skin lesions) with parasitological confirmation of the diagnosis (**positive smear or** culture from the skin lesion).

❑ Laboratory diagnosis of cutaneous leishmaniasis

diagnosis is mainly done on clinical and epidemiological basis.

The role of the laboratory is the confirmation of the causative agent by stained smear or culture from the skin lesion, especially in patients presenting atypical lesions or needing systemic treatment.

There is no rapid diagnostic test that could assist in reaching the diagnosis

CONTROL MEASURES

- **Medicines to treat cutaneous leishmaniasis are expensive.**
- WHO **and ministries of health have initiated a**
- **number of measures to prevent, detect and treat cutaneous leishmaniasis.** These include
- **water and sanitation** measures including **waste collection**, **indoor residual spraying**, protection measures such as the use of **impregnated bed nets** الناموسيات المشربة, and improved **access to necessary health care.**
- **WHO supports national cutaneous leishmaniasis control programs, and is developing evidence-based policy guidelines, strategies and standards for prevention and control.**
- WHO **promotes research** on effective cutaneous leishmaniasis control, including in the areas of safe, effective and affordable medicines, diagnostic tools and vaccines.

CONTROL MEASURES

In the absence of an effective vaccine,

the control measures comprise the following

Sand-fly control

The application of **residual insecticides** has proved effective in the control of sandflies. Dichloro-diphenyl-trichloroethane **(DDT) is** the first choice since the vector is susceptible to DDT.

Insecticide spraying should be undertaken in human dwellings , animal shelters and all other resting places up to **a**

- **height of 6 feet (2 meters) from** floor **level.**
- **DDT (two rounds per year)** at the rate of 1-2 g/ M^2 is considered sufficient to control transmission.
- Spraying should be **preceded and followed** by an **assessment of susceptibility**.
- Any sign of resistance in vector should lead to an immediate change in insecticide

BHC

BHC benzene hexachloride (BHC), **should be kept as a second line of defense Spraying should be repeated at regular intervals to keep down the density of sandflies**.

- **For long-lasting results, insecticidal spraying should be combined with sanitation measures**, viz elimination of breeding places (e.g., **cracks in mud or stone walls, rodent burrows, removal of firewood, bricks or rubbish around houses**),
- **location of cattle** sheds and poultry at a fair distance from human dwellings, and improvement of housing and general sanitation.

2. Personal prophylaxis

The risk of infection can be reduced **through health education** and **individual protective measures** such as **avoiding sleeping on floor, using fine-mesh nets around the bed**. **Insect repellents** (in the form of lotions, creams, or sticks) for temporary protection and keeping the **environment clean**.

There are no drugs for personal prophylaxis

Case management

The type of treatment is based on five clinical aspects :

- **Size of the largest lesion**
- **Number of lesions**
- **Location of lesions**
- **Causative agent** (type of *Leishmania* species)
- **Immunologic status.**

In all patients lesions should be washed with **clean water** **and soap**, then the lesion will be covered by a **dressing (gauze and tape**) to be **changed three or four times per week**, which facilitates healing and prevents the creation of a sticky crust.

Prevention and control measures

Avoid patients becoming a source of parasites to sandflies by covering the lesions (wash/dressing) and **using insecticide-treated bed nets**

Avoid healthy people acquiring the disease by **using insecticide-treated bed nets**

- **Avoid healthy people acquiring the disease by using insecticide-treated bed nets**
- **Ensure active case finding** to allow early diagnosis and prompt treatment, especially for cases due to *L. tropica.*
- Physically modify sandfly breeding and resting sites, in specific contexts, mainly for *P. papatasi*, **by destroying the burrows of the gerbil or the specific plants eaten by certain rodents**.
- Eliminate sandfly breeding sites such rubble, rubbish heaps or wall cracks, especially in urban areas.
- **Strengthen or establish the surveillance** system to assess disease trends.
- Create a multisectoral coordination mechanism, especially in *L. major* endemic areas.

❑ **No vaccine is currently available.**

References

Thank You

Qs ???

QS ???