Arthropod Born Infections

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Arthropod borne- viral Haemorrhagic Fevers

- Acute febrile diseases with extensive external and internal haemorrhage, may be associated with shock
- Liver damage and high case fatality
- The most important of these fevers are yellow fever, dengue, rift valley and west Nile fever
- All are zoonotic diseases except dengue fever

Yellow Fever

- Arthropod borne viral haemorrhagic acute disease of short duration and varying severity
- Notifiable disease to the WHO
- **Geographic distribution:**
- It is endemic in Africa and south America in the latitudes between 15^{o} north and 10^{o} south of the equator (yellow fever belt)
- Yellow fever exists in nature in two transmission cycles:
- A jungle cycle that involves forest mosquitoes and monkeys, and urban cycle involving aedes aegypti mosquitos and humans

Yellow Fever

- **Causative agent:**
- **Yellow fever virus**
- **Reservoir and vector of yellow fever:**
- **In urban yellow fever, the reservoir is man and aedes aegypti mosquito is the vector**
- **It is a daytime feeding, peri-domiciliary (around houses) mosquito that may breed in any container of fresh water**
- **African monkeys not susceptible to fatal yellow fever virus infection**

Yellow Fever

- **African monkeys do not provide early signal of human outbreaks**
- **In jungle yellow fever, main reservoir in the forest is monkeys and forest mosquitos are the vector (haemagogus species)**
- **Exit:**
- **Blood of infected individuals and monkeys through the bites of the mosquitos**

Yellow Fever

- **Mode of transmission:**
- **Urban yellow fever: bite of infective female aedes aegypti mosquitos (man mosquito-man)**
- **Jungle yellow fever: bite of several species of genus haemagogus (monkey-mosquito-man)**
- **Susceptibility and resistance:**
- **Age and sex: all ages and both sexes are susceptible**
- **Immunity: infection with yellow fever is followed by absolute immunity**
- **Incubation period:**
- **3-10 days (6 days in international health regulation)**

Yellow Fever

- **Clinical picture:**
- **Disease may occur in mild form, the typical attack is characterized by sudden onset, fever, chills, headache, muscle pain, prostration, nausea and vomiting**
- **After brief remission of hours to a day, some cases progress to the severe form of haemorrhagic symptoms:**
- **Epistaxis, gingival bleeding, hematemesis, melena, liver and renal failure**
- **Fatality rate of jaundiced cases may reach 20-50%**

Yellow Fever

- **Period of communicability:**
- **No man-to-man transmission**
- **Blood of man is infective to the mosquito during late incubation period and first 3-5 days of disease**
- **Diagnosis:**
- **Demonstration of viral antigen in blood by ELISA**
- **Demonstration of viral genome in blood and liver tissue by PCR**
- **Serologic diagnosis by demonstration of specific IgM in early phase, rise in titter of specific antibodies**

Yellow Fever

- **Prevention:**
- **General:**
- **Environmental sanitation: eradication of mosquitos, breeding places and use of pesticides**
- **Health education:**
- **Protective clothing, bed nets, repellents**
- **Specific:**
- **Active immunization:**
- **17 D vaccine, live attenuated vaccine, given as a single dose of 0.5 ml by SC injection**

Yellow Fever

- **Antibodies appear 7-10 days after immunization and persist for life**
- **Vaccine internationally effective after 10 days for 10 years then reimmunization**
- **All travellers over 9 months should have it coming or going to endemic areas**
- **Contraindicated for immunocompromised and pregnant**
- **In areas like Egypt, notification to WHO within 24 hours**
- **Certificate of vaccination should present**
- **If travellers has no certificate, isolation to the end of incubation period, or presence of certificate**
- **Disinfection of aircrafts in endemic areas**
- **Quarantine of imported monkeys at receptive areas**

Yellow Fever

- **How is Egypt protected:**
- **Cross immunity due to infection by other flavi viruses, dengue, west Nile**
- **They provide ecological barrier that prevents the occurrence of yellow fever in these areas**

West Nile Fever

A form of ST. Louis group of encephalitis in Egypt caused by west Nile virus.

Birds are the reservoir and Culex pipiens is the vector

Most of cases pass with no symptoms

Group of antibodies is formed and protect from yellow fever

West Nile virus could be transmitted by blood transfusion, trans-placental and percutaneous routes

Rare cases could have febrile myalgia syndrome-lymphadenopathy and maculopapular rash

Plague

- **Communicable arthropod borne zoonotic disease**
- **One of the epidemic diseases subject to regulations and notification to WHO**
- **Rodents are the reservoir of infection and fleas are the vectors which transfer infection to various animals and man**
- **Forms of spread:**
- **Endemic in Asia and south America**
- **Causative agent:**
- **Bacteria:**
- **Pasteurella pestis, a gram- negative bacillus characterized by bipolar staining**

Plague

- **Mode of transmission:**
- **Vector borne**
- **Infected rat flea is vector of rat to rat, then rat to man infection**
- **Handling tissues of infected animals**
- **Airborne droplets**
- **From human patients or careless manipulation of laboratory cultures in pneumonic plague**

Plague

- **Susceptibility and resistance:**
- **Age and sex are general susceptibility,**
- **Immunity after recovery may not protect against a large inoculums**
- **Living environment:**
- **Rural areas, slums insanitary waste disposal Favors breading of rats and increases the risk of exposure**
- **Occupation, like hunting, laboratory work may increase risk of exposure**
- **Incubation period:2-10 days- international is 6 days**

Plague

- **clinical picture:**
- **Primary (bubonic), secondary (septicaemic and pneumonic):**
- **Bubonic plague:**
- **80-90% of cases, they are enlarged, tender and soft lymph nodes draining the site of flea bites, usually inguinal, where the bacilli cause lymphadenitis**
- **Fever and other systemic manifestations, outcome could be,**
- **Buboes resolve and case recover**
- **Secondary infection**
- **Bacilli invade blood and causing septicaemia**

Plague

- **Septicaemic plague:**
- **Organism exist in sputum, exposing contacts to droplet infection and pneumonia**
- **Diagnosis:**
- **Clinical examination, soft tender buboes**
- **Confirmatory lab investigation by finding bacilli in biopsies**
- **After several labs confirmed only clinical examination is enough later**
- **Prevention:**
- **General:**
- **Environmental sanitation:**
- **Control of fleas should be done before rat control**

Plague

- **Use insecticides, repellents, dogs and cats should be protected by insecticides**
- **Control of rats:**
- **Rat proofing of buildings**
- **Preventing access to food**
- **Use appropriate types of rodenticides**
- **Control of rats on ships by rat fumigation**
- **Survey rats periodically to evaluate the potential for epizootic plague**

Plague

- **Maintain surveillance of natural plague foci:**
- Bacteriological testing of sick or dead rodents and fleas, dogs and cats
- Chemoprophylaxis:
- Tetracycline or trimethoprime sulfametoxazole to be give to at risk individuals

- **Epidemic measures:**
- Investigate all suspected plague deaths
- Case finding
- Health education of the public
- Control of fleas and rodents

Filariasis

- **An arthropod borne disease caused by nematode wuchereria bancrofti**
- **Endemic in Egypt**
- **Bancrofti is a long thread like worm, adults reside in lymphatics of infected people**
- **Female worms produce microfilaria; they reach blood stream 6-12 after infection**
- **Microfilaria appears in large numbers at night, with maximum density in blood between 10 pm and 2 am (nocturnal periodicity)**
- **Reservoir and vector:**
- **Man is definitive host with the microfilaria of w. bancroftian in blood is the reservoir**
- **Vector is the mosquito, is the intermediate host**

Filariasis

- **Mosquito infected during sucking blood of infected individuals with microflaria present in the peripheral blood, infective after 2 weeks**
- **Mode of transmission:**
- **The bite of infective female culex pipeins mosquito in Egypt**
- **The larvae enter the punctured skin following the bite and passes into lymphatics and become an adult**
- **Susceptibility and resistance:**
- **Filariasis appears only in small percent of infected persons**
- **Immunity:**
- **Resistance may develop after many years of exposure to infection**

Filariasis

- **Insanitary and inadequate disposal services facilitates breeding of culex mosquito**
- **Clinical picture:**
- **Acute form with fever, lymphangitis and lymphadenitis**
- **Chronic obstructive form due to fibrosis and obstruction of lymphatic vessels after repeated attacks**
- **Ten years later, obstructed lymphatic vessels, lead to elephantiasis of limbs, breast and genitalia, nocturnal asthma and severe eosinophilia**

Filariasis

- **Prevention:**
- **General prevention:**
- **Environmental sanitation and health education**
- **Specific prevention:**
- **Mass drug administration:**
- **Single annual dose of combination of diethyalbendazole for 4-6 years l carbamazine citrate**
- **Or diethyalbendazole mediated cooking salt for 1-2 years**
- **Mass administration prevent future cases and control infection among cases**

Filariasis

- **Control:**
- **Notification**
- **Protection from mosquitos**
- **Treatment to suppress microfilaria in blood, but may not destroy adult worm**
- **Low level of microfilaria may reappear after treatment, so yearly treatment is needed**
- **Elimination of lymphatic filariasis:**
- **Means reduction of disease incidence close to zero:**
- **Community education programs**
- **Interruption of transmission and care for diseased**

Leishmaniasis

- Caused by protozoa parasitic from over 20 leishmania species worldwide
- Transmitted to humans by the bite of infected female Phlebotomus papatasii (sandfly)
- Three forms of the disease:
- Visceral: (kala-azar, the most serious form of the disease
- Cutaneous (most common)
- Mucocutaneous

Leishmaniasis

- **Cutaneous Leishmaniasis exists countrywide in rural and peri urban areas, including Cairo**
- **Risk areas include delta, Suez canal zone, and Sinai peninsula, northeast Sinai**
- **Visceral Leishmaniasis occurs near Alexandria**
- **Humans and dogs, foxes and rodents, are found as natural reservoirs of leishmania parasite**
- **Disease associated with malnutrition, poor housing, population displacement, weak immune system and lack of resources**

Leishmaniasis

- **Leishmaniasis is linked to environmental changes such as deforestation, building of dams, irrigation schemes and urbanization**
- **1.3 million new cases and 20000 to 30000 deaths occur annually**
- **Leishmania HIV co infected people can develop the disease and has a high relapse and mortality rates**
- **Diagnosis made by combining clinical signs and parasitological or serological tests**
- **Rapid diagnostic test and others**

Leishmaniasis

- **Prevention and control:**
- **Early diagnosis, effective case management, vector control by controlling sandflies, effective disease surveillance and community development**

Malaria

- **Communicable arthropod borne parasite disease, have four types:**
- **Vivax, ovale, malariae and falciparum, that causes the ill health in many tropical and subtropical areas**
- **Malaria is highly prevalent in hot humid season with rain fall, suitable environment for mosquito breeding**
- **Causative agent:**
- **Plasmodium parasites of genius plasmodium of the four types**
- **Mixed infections are frequent in endemic areas**

Malaria

- **Reservoir and vector of malaria:**
- **Humans are the only reservoir of human malaria**
- **Infective stage is gametocytes, which must be mature, both sexes, sufficient density and viable**
- **Vector includes many species of female Anopheles mosquito**
- **Sporozoites are the infective stage to man**
- **Mosquito is the definite host, and man is the intermediate host**

Malaria

- **Modes of transmission:**
- **Direct transmission from one individual to another through contaminated blood or blood products, injection equipment, or organ transplant**
- **Congenital transmission or in utero from mother to foetus**
- **Susceptibility and resistance:**
- **All ages are affected, tolerance to disease is high in endemic areas among adults**
- **Males are more exposed , pregnant women are at high risk to severe forms of infection**
- **Immunity:**
- **Infection induces species specific immunity**

Malaria

- **In highly endemic areas, exposure is early in childhood and after many subsequent infections the severity of the disease becomes less**
- **Populations of Africa show a natural resistance to infection with P. vivax**
- **Sociocultural and environmental factors**
- **Incubation period:**
- **9-40 days between time of infective bite and clinical symptoms, according to type of malaria, with or without infection through blood transfusion and number of parasites infused**

Malaria

- **Clinical picture:**
- **Disease begins with slowly rising fever, chills, malaise, headache, nausea, lassitude, muscle and joint pain**
- **Rigor sensation and rapidly rising temperature ending by profuse sweating**
- **Cycle of fever, chills, sweating is repeated either daily or every other day or every third day or irregular according to type of malaria**
- **Relapses may occur without parasitaemia at irregular intervals up to 5 years**

Malaria

- **Period of communicability:**
- **In untreated cases it may reach up to 3 years, but with anti malarial drugs the period is greatly shortened**
- **Stored blood can remain infective for at least one month**
- **Complications:**
- **Anaemia**
- **Splenomegaly**
- **Abortion and foetal infection**
- **Respiratory distress, jaundice, liver failure, encephalopathy, pulmonary oedema**

In falciparum malaria

Malaria

- **Diagnosis:**
- **Malaria parasite in thick blood film**
- **Repeated microscopic examination every 12-24 h may be necessary to cover all parasite species**
- **Rapid diagnostic test for plasmodial antigens in blood**
- **Parasitic genetic material by PCR is sensitive**
- **Serologic tests for antibodies in first week of infection**

Malaria

- **Prevention:**
- **Environmental sanitation**
- **Human protection**
- **Health education**
- **Specific measures:**
- **Chloroquine phosphate 500mg, the drug must be continued for 4-6 weeks after leaving endemic areas**
- **Mefloquine in areas with chloroquine resistant 5mg/kg/week, 1-2 weeks before travel, during stay and 4 weeks after leaving endemic areas**

Malaria

- **Control:**
- **Cases, early case finding**
- **Notification**
- **Isolation**
- **Disinfection**
- **Treatment**
- **Contacts:**
- **Enlist**
- **Investigation for early case finding**

THANK YOU