ASPERGILLOSIS

Learning objectives

To know in detail about,

- Diseases caused by *Aspergillus species*
- Morphology and colony characters of *Aspergillus species*
- Pathogenesis of Aspergillosis in cattle
- General approaches used to diagnose Aspergillosis

INTRODUCTION

- It is primarily a disease of the respiratory system characterized by inflammatory, granulomatous, necrotising lesions.
- Haematogenous spread of the organism leads to lesions in eye, skin, meninges and respiratory tract.
- The disease is mainly caused by *A.fumigatus, A.flavus and A.niger*.

Host (s)	Disease (s)
Avian species (Chicken, turkey, ducks, pigeon, quails)	Acute Aspergillosis (Brooder's pneumonia) Chronic Aspergillosis
Bovine	Abortion, pneumonia and mastitis
Ovine	Pneumonia, and abortion
Horse	Abortion and diarrhoea
Dog	Ear and nasal infection
Cat	Fatal pulmonary aspergillosis

- When compared to infection in avian species, the intensity of infection in other species is less.
- Aspergillosis is an economically important disease because of its high mortality and morbidity in brooder chicks.

CULTIVATION

Cultivation of the organism

- The *Aspergillus* grows very well in ordinary Sabouraud's Dextrose Agar with chloramphenicol.
- Cycloheximide should never been incorporated in the media.

Characters	*A.fumigatus*	*A.niger*	*A.flavus*
Macroscopic morphology of the colony	• Velvetty or powdery, at first white then turning to dark bluish green. • Reverse of the colony will be white to tan.	• Wooly. At first white to yellow and then turning to dark brown to black. • Reverse: white to yellow	• Velvetty, yellow to green or brown • Reverse: Red brown
Morphology of conidiospore and sterigmata	Single, usually one on upper half of the vesicle, parellel to axis of stalk.	Double, cover entire vesicle, form radiate head	Single and double, cover entire vesicle, point out in all directions

PATHOGENECITY

- In avian species aspergillosis encountered in two main forms

Acute Aspergillosis

- In which there is high morbidity and mortality in very young chicks.
- This form of the disease is commonly known as brooder pneumonia.
- Typical symptoms are loss of appetite, high temperature, listlessness, foetid diarrhoea, convulsion and affected chicks die with in 24-48hrs of the onset of symptoms.

Chronic Aspergillosis

- It is seen in individual adult birds or few birds in a flock.
- The affected birds may survive for longer periods in a gradually declining state.
- Symptoms are very mild and it is associated with anaemia, yellowing of faeces and the presence of respiratory rattle.

Cattle

- Conditions of high humidity and temperature encourage the growth of molds when hay and straw is stored and this constitutes the source of infection for cattle.
- *Aspergillus fumigatus* is considered as the primary cause of mycotic abortion, however many other *Aspergillus* species, *A.flavus, A.nidulans, A.niger, A.terreus* and *A.versicolor* are also found to be associated with abortion.
- Infections mainly occur by inhalation into lungs or by ingestion, and then carried to the placenta in the blood stream from lesions in the respiratory tract or ulcers, mycotic ruminits or other lesions of the digestive tract.
- This results in a slowly developing fungal placentitis (one to two months) and intefere with the nutrition of the foetus, resulting in foetal death and abortion.
- Chronic form may lead to purulent vaginitis, cervicitis and endometritis, resulting in infertility.
- Abortion most commonly occurs in 6-7 months of gestation.
- The aborted foetus shows discrete, raised ringworm type lesions on the skin of head and neck.
- The placenta is found thickened, haemorrhagic, odematous and necrotic.
- The cotyledons will be grey in color, inter cotyledonary area will be leathery, grey and tan in color.
- On necropsy grayish or yellowish gaseous exudates with mycelia are commonly seen

in the lung and airsac.
- Sometimes the organism colonise the bronchi, forming a compact spherical colony, which is called fungus ball.
- The fungal balls are produced most frequently by *A.niger* than *A.fumigatus*.
- Characteristic nodular lesions are also seen in alimentary canal, kidneys and ovaries.

DIAGNOSIS

- Diagnosis required continuous effort because it is one of the common contaminant of laboratory and it can be cultured routinely from the skin and URT of healthy animals.
- For confirmatory diagnosis, consider the following points:
    - Repeated isolation
    - Absence of any other pathogen
    - Recovery from unexposed tissue and demonstration of hyphae.

Method of diagnosis

- Direct microscopic examination
    - Wet mount prepartion of sputum, nasal discharge, milk, uterine discharge, fetal stomach contents.
- Diagnosis is confirmed by isolation of pathogens from the stomach contents of the aborted foetuses and placenta.
    - Demonstration of fungal hyphae in the foetal tissue (By using 10% KOH or LPCB).
- Demonstration of pattern of condiospore and sterigmata by slide culture method.
- Animal pathogenicity test
- Allergic test.

PREVENTION AND TREATMENT

Prevention

- Aspergillosis can be prevented by
    - Reducing spore exposure to the animals
    - Removal of potential source of spore contamination
    - Maintain stress free environment
    - Prophylactic use of 5-fluorocytosine inhibits inhaled spore germination.

Vaccines

Several types of vaccines are used involving different parts of the fungal elements. i.e. whole cell filterate, spores, mycelial fragments, germinating cells and they areinactivated with the use of heat, phenol, formalin etc. some vaccines of live cell originare also available.

Treatment

- Amphotericin-B, 5-fluorocytosine :- fungistaic, administerd orally, it will inhibit spore germination.
- Ketoconazole effective against cutaneous and gastro intestinal aspergillosis.