Lec 6 : The Normal Flora of Humans

Normal flora: is the mixture of microorganisms (bacteria and fungi) that are regularly found at any anatomical site of human body like:

- Skin
- Eyes (i.e. Conjunctiva)
- Nose (i.e. Respiratory tract)
- Mouth (i.e. Human Oral Cavity)
- Ears
- Urogenital tract
- Elementary tract

Advantages of The Normal Flora

1. They constitute a protective host defense mechanism by occupying ecological niches.

2. They produce vitamin B and vitamin K in intestine.

3. The oral flora contribute to immunity by inducing low levels of circulating and secretary antibodies that may cross react with pathogens.

4. The oral bacteria flora exert microbial antagonism against nonindigenous species by production of inhibitory fatty acids, peroxides, bacteriocins, etc.

5. The normal flora may antagonize other bacteria through the production of substances which inhibit or kill nonindigenous species.

Disadvantages of The Normal Flora

1. They can cause disease in the following:

   a) When individuals become immunocompromised or debilitated.

   b) When they change their usual anatomic location.

2. The oral flora of humans may harm their host since some of these bacteria are pathogens or opportunistic pathogens.

Estimation of the Normal flora

It has been calculated that the normal flora human body about 1012 bacteria on the skin, 1010 in the mouth, and 1014 in the gastrointestinal tract

Normal Flora of the Skin

- The most important sites are:

1. Axilla
2. Groin
3. Areas between the toes

- The majority of skin microorganisms are found in the most superficial layers of the epidermis and the upper parts of the hair follicles.
- Important bacteria:

1. *Staphylococcus epidermidis*
2. *Micrococcus* sp.
3. *Corynebacteria* sp.
4. *Mycobacterium smegmatis*

Normal Flora of the Conjunctiva

1. *Staphylococcus epidermidis*
2. *Corynebacterium sp.*
3. *Propoinibacteriumacnes*
4. *Staphylococcus aureus*
5. Viridans streptococci
6. *Neisseria* sp.

7. *Haemophilus influenzae*

Normal Flora of the Respiratory Tract

A) The nares (nostrils)

1. *Staphylococcus epidermidis*
2. Corynebacteria
3. *Staphylococcus aureus*
4. *Neisseria sp.*
5. *Haemophilus sp*
6. *Streptococcus pneumoniae*

B) The upper respiratory tract (nasopharynx).

1. Non-hemolytic streptococci
2. Alpha-hemolytic streptococci
3. *Neisseria* sp.
4. *Streptococcus pneumoniae*
5. *Streptococcus pyogenes*
6. *Haemophilus influenzae*
7. *Neisseria meningitidis*

C)The lower respiratory tract (trachea, bronchi, and pulmonary tissues):

- Usually sterile.
- The individual may become susceptible to infection by pathogens descending from the nasopharynx e.g.
- *H. influenzae*
- *S. pneumoniae*.

Normal Flora of the Human Oral Cavity

- Oral bacteria include:

1. Viridans streptococci
2. Lactobacilli
3. Staphylococci (*S. aureus* and *S. epidermidis*)
4. *Corynebacterium* sp.
5. *Bacteroides* sp.
6. *Streptococcus sanguis* (dental plaque)
7. *Streptococcus mutans* (dental plaque)
8. *Actinomyces* sp.

The Normal Flora of The Ears (i.e. external ear)

- The external ears contains avariety of microorganisms. These include:

1. *Staphylococcus epidermidis*
2. *Staphylococcus aureus*
3. *Corynebacterium sp*

Normal flora of the Urogenital Tract

A) The anterior urethra

1. *Staphylococcus epidermidis*
2. *Enterococcus faecalis*
3. alpha-hemolytic streptococci.
4. Some enteric bacteria (e.g. *E. coli*, Proteus sp.)
5. Corynebacteria sp.
6. *Acinetobacter sp.*

7. *Mycoplasma sp.*
8. *Candida sp.*
9. *Mycobacterium smegmatis*

B) The vagina

1. *Corynebacterium* sp.
2. Staphylococci
3. Nonpyogenic streptococci
4. *Escherichia coli*
5. *Lactobacillus acidophilus*
6. *Flavobacterium sp.*
7. *Clostridium sp.*
8. *Viridans streptococci*
9. Other *Enterobacteria*

Normal Flora of the Gastrointestinal Tract (GIT)

- In humans, the GIT flora are influenced by:

1. Age
2. Diet
3. Cultural conditions
4. The use of antibiotics

- **At birth**
- The entire intestinal tract is sterile, but bacteria enter with the first feed. The initial colonizing bacteria vary with the food source of the infant.

- **In breast-fed**

1. Bifidobacteria account for more than 90% of the total intestinal bacteria.
2. Enterobacteriaceae
3. Enterococci
4. Bacteroides
5. Staphylococci
6. Lactobacilli
7. Clostridia

- **In bottle-fed infants**
- Bifidobacteria are not predominant. When breast-fed infants are switched to a diet of cow's milk or solid food, bifidobacteria are progressively joined by:

1. Enterics
2. Bacteroides
3. Enterococci
4. Lactobacilli
5. Clostridia

In the upper GIT of adult humans

- mainly acid-tolerant lactobacilli

e.g. Helicobacter pylori

- **The proximal small intestine**

1. Lactobacilli
2. *Enterococcus faecalis*
3. Coliforms

4. Bacteroides

- **The large intestine (colon**)

1. Enterococci
2. Clostridia
3. lactobacilli
4. Bacteroides
5. Bifidobacterium (*Bifidobacterium bifidum*)
6. *Escherichia coli*
7. Methanogenic bacteria
8. *Viridans streptococci*
9. *Staphylococcus sp.*
10. *Proteus sp.*
11. *Candida albicans* (Yeast)
12. *Mycoplama sp.*