**Normal Flora**

The mixture of microorganisms found risiding at any anatomical sites of human body without causing diseases is referred to as the normal microbiota, the microflora, or the normal flora.Microorganisms is introduced as soon as the new born passes through the birth canal followed by breathing, feeding and contact with other individual.within two to three days most common miroorganisms harbour the human body.These human microbiota remains through out the life, under going changes in response to the internal and external environment of the individual. Some microorganism established permanent relationship with the body such are known as resident organism well other present for the limited time period termed as transient organisms.The relationship of microbial population and the body is the example of symbiosis or living together.In some cases, the symbiosis is beneficial to both the body and the microorganisms such relationship is called mutualisms.In other cases, the symbiosis is beneficial only to the microorganisms in such case the sysbiosis is called commensalisms.

In a healthy human the internal tissues (e.g., brain, blood, cerebrospinal fluid, muscles) are normally free of microorganisms. Conversely, the surface tissues (e.g., skin and mucous membranes) are constantly in contact with environmental microorganisms and become readily colonized by certain microbial species. The range of organisms that make up a person’s normal flora is dependent on a number of factors including age, gender, hormonal activity, race, environment, diet and nutrition.

Examples of the normal flora risiding at various body parts of the human is define below:-

**Eye**

At birth and throughout human life, a small number of bacterial commensals are found on the conjunctiva of the eye.

The predominant bacterium are *Staphylococcus epidermidis,S. aureus,* aerobic corynebacteria (diphtheroids), and *Streptococcus pneumoniae.*

**External Ear**

The normal microbiota of the external ear resemble those of the skin predominatly *Staphylococci spp* and *Corynebacterium* *spp* are found. Less frequently *Bacillus spp, Micrococcus spp,* and *Neisseria spp* Gram-negative rods such as *Proteus spp, Escherichia spp* and *Pseudomonas spp* are occasionally seen.

Mycological studies also showed the presence of fungi as normalflora: *Aspergillu spp, Penicillium spp, Candida spp* and *Saccharomyces spp.*

**Mouth**

The normal microbiota of the mouth or oral cavity contains organisms able to resist mechanical removal or flushing by the oral cavity contents and adhere to the surfaces of gums and teeth. Those that cannot attach are flushed into the stomach where they are destroyed by hydrochloric acid. Those microorganisms able to colonize the mouth find a very comfortable environment due to the availability of water, nutrients, the suitability of pH and temperature, and the presence of many other growth factors. The oral cavity is colonized by

*Streptococcus* *parasanguis, Lactobacillus spp,*

*Streptococcus mutans*  (attach to oralsurfaces and the presence of these bacteria contributes to the formation of dental plaque, caries, gingivitis, and periodontal disease.)

**Skin:**

Commensal microorganisms living on or in the skin can be either resident (normal) or transient microbiota.The skin surface or epidermis is not a favorable environment for microbial colonization. Several factors are responsible for this hostile microenvironment- periodic drying, acidic pH, high NaCl content, inhibitory substances such as lysozyme, lipids etc. However many bacteria are found on the superficial cells, colonizing dead cells, or closely associated with the oil and sweat glands. They get water, amino acids, urea, electrolytes, and specific fatty acids that serve as nutrients.

Common bacteria in the skin: *Staphylococcus epidermidis* and aerobic corynebacteria, *Propionibacterium acnes.*

**Respiratory Tract:**

Divided into Upper respiratory tract and lower respiratory tract

Upper respiratory tract : consist of Nasal cavity, Pharynx and larynx

**Nasal cavity**

The normal microbiota of the nose is found just inside the nostrils. *Staphylococcus aureus* and *S. epidermidis* are the predominant bacteria present.

The nasopharynx, may contain small numbers of potentially pathogenic bacteria such as *Streptococcus pneumoniae, Neisseria meningitidis,*and *Haemophilus influenzae.* Diphtheroids are commonly found in both the nose and nasopharynx.

**Oropharynx**

Like the nose, large numbers of *Staphylococcus aureus* and *S. epidermidis* inhabit oropharynx region. The most important bacteria found in th oropharynx are the various species of streptococci like *S.* *oralis, S. milleri,* large numbers of diphtheroids; *Branhamella catarrhalis;*

**Lower Respiratory Tract**

The lower respiratory tracts (trachea, bronchi, bronchioles and alveoli)do not have a normal flora.This is because microorganisms are removed by the continuous stream of mucus generated by the ciliated epithelial cells, the phagocytic action of the alveolar macrophages and bactericidal effect is exerted by the enzyme lysozyme, present in nasal mucus.

**Intestinal Tract**

**Stomach**

Many microorganisms are washed from the mouth into the stomach. In the stomach due to acidic pH values (2 to 3) of the gastric contents, most microorganisms are killed hence scanty microorganisms are found.Some examples are *Sarcina spp, Streptococcu spp Staphylococcus spp, Lactobacillus spp* and yeasts such as *Candida* spp.

**Small Intestine**

The small intestine is divided into three anatomical areas: the duodenum, jejunum, and ileum. The duodenum contains few microorganisms because of the combined influence of the stomach’s acidic juices and the inhibitory action of bile and pancreatic secretions.Bacteria present are *Staphylococcus* spp*, Streptococcus spp*. Jejunum consists of *Enterococcus faecalis,* lactobacilli, diphtheroids, and the yeast *Candida albicans*. In the distal portion of the small intestine (ileum) comparatively more number of normal flora are found anaerobic gram-negative bacteria like *Clostridium spp,Bacillus fragilis*

**Large Intestine (Colon)**

The large intestine or colon has the largest microbial community in the body. About 400 species of bacteria are isolated.10 -30%of the fecal mass constitutes bacterial mass.

Bacteria such as *E coli, Clostridium spp, Lactobacillus spp* are found in colon. Besides the many bacteria in the large intestine, the yeast *Candida albicans* and certain protozoa (*Trichomonas hominis, Entamoeba hartmanni),* may also occur as harmless commensals.

**Genitourinary Tract**

The upper genitourinary tract (kidneys, ureters, and urinary bladder) is usually free of microorganisms. In both the male and female, a few bacteria (*Staphylococcus epidermidis, Enterococcus* *faecalis,* and *Corynebacterium* spp.) usually are present in the distal portion of the urethra. *Neisseria* and some members of the *Enterobacteriaceae* are occasionally found. In contrast, the adult female genital tract, because of its large surface area and mucous secretions, has a complex microbiota that constantly changes with the female’s menstrual cycle. The major microorganisms are the acid-tolerant lactobacilli, primarily *Lactobacillus acidophilus*. They ferment the glycogen produced by the vaginal epithelium, forming lactic acid. As a result the pH of the vagina and cervix is acidic as a result prevent infection from other pathogens.

Benificial activities of normal flora.

* They constitute a protective host defense mechanism by occupying ecological niches. Eg: *S aureus* in skin controls other microorganisma from invading the body ie for food and space.
* They are important in the synthesis of vitamin B and vitamin K, conversions of bile pigments and bile acids in intestine.
* *Lactobacillus acidophilus* is important in controlling the amount of yeast and infection from other pathogens.
* They bear antagonism property against the pathogenic microorganisms
* They helps for breaking down and digestion of food particles.

Harmful effects of normal flora

* They can cause disease in the following situation

a) When individuals become immunocompromised or debilitated.

b) When they change their usual anatomic location.

* Insufficient amount of normal flora can cause issues such as a UTI's, yeast infections and diarrhoea.