REPRODUCTIVE MICROBIOLOGY

An Essay

Submitted in Partial Fulfillment for the Master Degree in Obstetrics & Gynaecology

By

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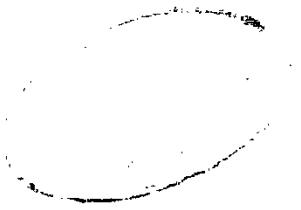

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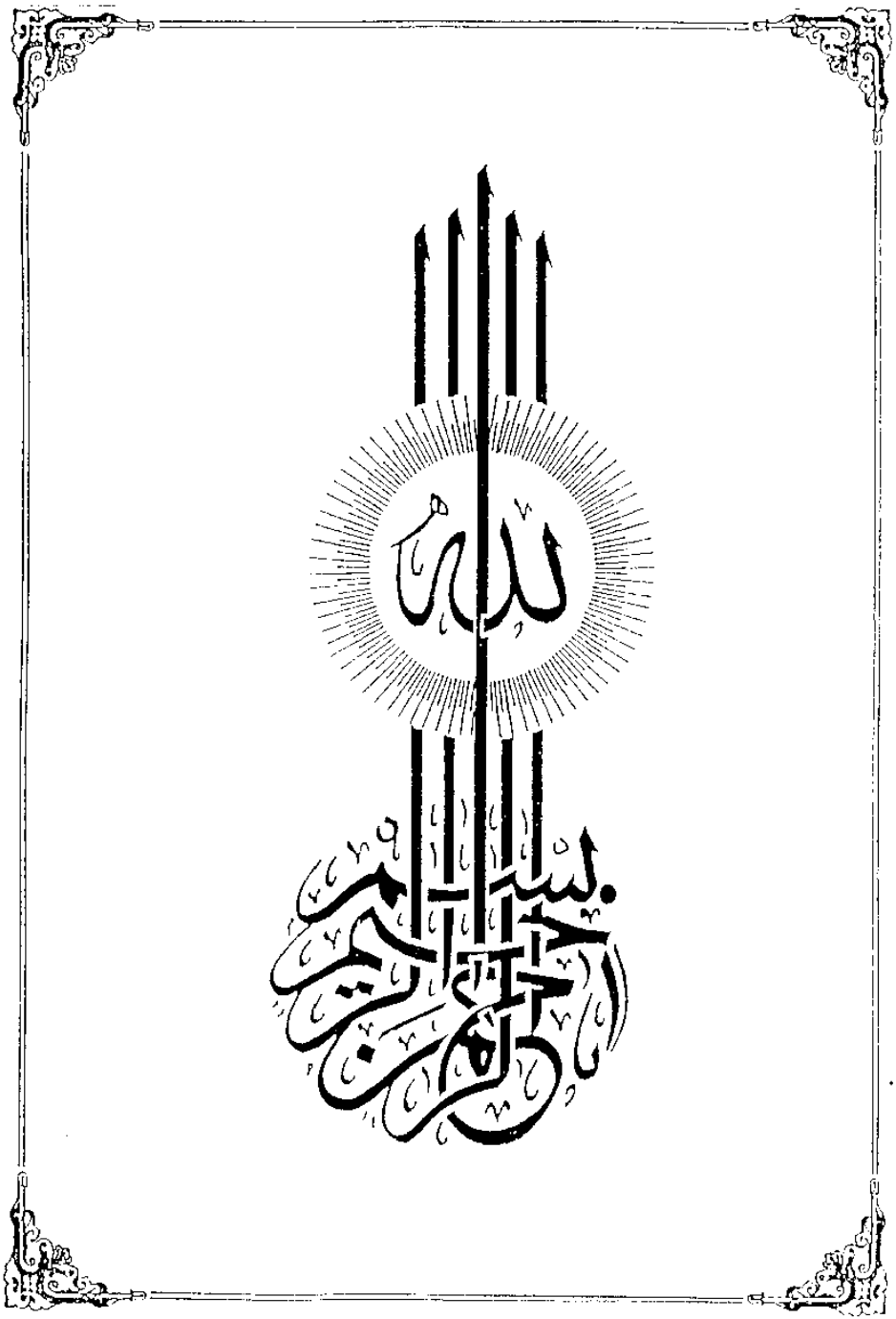

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MICROBIAL FLORA

THE MICROBIAL FLORA

The normal flora can be defined as microorganisms which inhabit and replicate in an area and do not harm and may even serve a benificial role. The microorganisms which colonize an area are sometimes referred to as the endogenous microbiota, and they are dependent on the physiological conditions which are present in the particular area. Every day, we are exposed to literally thousand of different strains of bacteria, which are capable of becoming part of out endogenous flora. However, only a very small number of organisms with genetic and biochemical properties that can best utilize the environmental conditions will replicate and survive and thus become part of the normal microbial flora.

Once a flora of microorganisms is established, it is not a static population for the remainder of life, but is dynamic situation. As the physiological conditions are altered (part of which may be due to the microorganisms themselves), the population of microorganisms may change. Thus, if another microorganism is introduced into the area and it is better suited to utilize the conditions for its replication; it will have the selective pressure in its favour and the newly introduced strain will become part of

the normal flora or may even become the predominant organisms (El-Hanbaly, 1982).

Organisms are not uniformly distributed throughout the female genital tract. Some areas support growth of predominantly anaerobic flora, whereas others support the growth of aerobes (Ross and Holbrook, 1984).

Because the normal flora may be a source of the organism causing diseases or may interact antagonistically or synergistically with exogenous pathogens, it is necessary to define the normal flora of the female genital tract as well as the characteristics of the cervico-vaginal microenvironment that determine patterns of colonization (Larsen and Galask, 1982).

Normal Vaginal Microbial Flora

The vaginal flora is a dynamic and closely interrelated system, which is influenced by several factors such as glycogen content of epithelial cells, glucose, pH, hormonal support, pregnancy and delivery, trauma, coitus, birth control method and others. It comprises a large variety of bacterial species, including aerobic and anaerobic organisms (Paavonen, 1983).

Among the aerobic organisms, the gram positive bacilli, i.e lactobacilli dominate the facultative genital tract flora as indicated by their presence in most women. These organisms correspond to the Doderlein's bacilli first described by Doderlein in 1892. They comprise a heterogenous group of acidophilic gram positive bacilli that consists of several species. These organisms are considered to be of low virulence, and since the early report of Doderlein they have been considered to play a protective role in the female genital tract preventing colonization by more virulent species. Despite its broad acceptance, clear evidence for this role is lacking (Larsen and Galask 1980 and 1982).

Increased vaginal glycogen, which occurs with diabetes mellitus, enhances colonization with lactobacilli and yeast (Gardner, 1987), there are some unresolved issues regarding the coexistence of lactobacilli and yeast, since some data suggest an antagonistic relationship (Mardh et al., 1983), lactobacilli contribute additional acidity to the vaginal environment by the production of lactic acid. This latter point has been controversial, since many investigators have proposed that the lactobacilli are primary responsible for creating the vaginal environment by their production of lactic acid.

The Diphtheroid bacilli, members of the genus Corynebacterium, comprise most of the remaining gram positive bacilli in female genital tract. As lactobacilli; These organisms are of extremly low virulence (Larsen and Galask, 1980 and 1982).

The facultative gram positive cocci are represented by staphylococci and streptococci. Staphylococcus epidermidis is the most commonly isolated staphylococcus. It is of lower virulence than staphylococcus aureus which is much less common and consistently found in a small percentage of women. The beta haemlytic streptococci of the female genital tract belong predominantly to lancefield s group B; those belonging to group A are found infrequently. The alpha haemolytic and non haemolytic streptococci are commonly found in cultures of the female genital tract. The group D streptococci, including the enterococci, are frequently found in the female genital tract; they vary in their hemolytic reaction. (Larsen and Galask, 1980 and 1982).

The occurrence of facultative gram negative bacilli in the vaginal flora is of special clinical interest because of their frequent involvement in post-operative infections and because they present a greater challeng from the stand point

of antimicrobial therapy than do the gram positive organisms. Generally E.coli is the predominant gram-negative facultative bacillus in cultures of the female genital tract. This organism is commonly encountered in pelvic infections; however the majority of investigators found the organism in vaginal cultures of less than one third of healthy patients and quantitative studies have indicated that when present E.coli is usually found in low numbers. Barlett et al., 1977; Lindner et al., 1978, Larsen and Galask 1980 and 1982).

Other gram negative aerobic bacilli such as klebsiella, proteus and enterobacter species are sometimes isolated from cultures of the female genital tract (Larsen and Galask 1982).

For completeness, it should be noted that gram negative aerobic cocci such as non gonococcal Neisseria are occasionally cultured from healthy women, but these organisms are absent from most reports on vaginal flora and when they do occur they are found only in a small number of patients (Larsen and Galask, 1980).

The literature on the anaerobic bacteria of the female genital tract is more restricted than that on the aerobic

flora. However, it has been reported that a very large number of anaerobic isolates may be found in bacterial cultures of the female genital tract. Moreover, quantitative studies have suggested that the anaerobes outnumber aerobic organisms by a factor of 10 (Bartlett et al., 1977).

Some common representatives of anaerobic isolates are the peptococcus species and peptostreptococcus species that are present in most healthy persons, in fact the majority of women are colonized by one or more species of an aerobic cocci. Various species of bacteroides are quite common, with bacteroides bivius and bacteroides disiens being reported often. Bacteroides fragilis and bacteroides melaninogenicus seen to be relatively uncommon but they attracted much attention as they are frequently associated with deep infections of the female pelvis (Larsen and Galask 1980 and 1982).

The anaerobic lactobacilli are frequently cultured. Bifidobacterium, Eubacterium, Veillonella and clostridium species are isolated from few patients (Larsen and Galask, 1982).

Fungi and Mycoplasma were found to be members of the normal flora of the female genital tract. The commonest fungus isolated is candid a albicans.

Mycoplasma commonly encountered are ureaplasma urealyticum (Formerly called T strain Mycoplasma and Mycoplasma hominis, the former being more frequently isolated (Tashjian et al., 1976).

Bacteriology of common members of vaginal flora

Lactobacilli:

These are gram-positive non-motile non-sporulating bacilli of varying length. Some are long and slender, and others very short, showing pleomorphism. Most species are facultatively anaerobic and prefer a medium more acidic for growth, (pH 4-5). Some species are strict anaerobes. Sautter and Brown, 1980, reported a direct correlation between decrase in pH and increase in lactobacilli. They are present in the vaginae of most women, being found in 17% to 96% of female patients (Larsen and Galask, 1980).

Diphtheroides

Gram-positive non-motile and non spore forming bacilli arranged in characteristic palisade manner. They are non pathogenic and found as normal flora of the vagina being isolated in 61% of women (Corbishley, 1977).

Staphylococci:

Gram-positive spherical cells arranged in irregular clusters. They are aerobic, non motile and non spore forming organisms. Staphylococcus albus is non pathogenic, it does not produce coagulase and does not ferment mannitol. It is

frequently seen as a normal flora in the vagina, being found in 12% to 92% of women (Larsson and Galask, 1980). On the other hand, the more virulent staphylococcus aureus tends to produce coagulase, be hemolytic and ferment mannital. It occurs much less common in the vaginal flora, being found in fewer than 5% of healthy women of reproductive age (Larsen and Galask; 1981).

Streptococci

Gram-positive spherical microorganisms, characteristically arranged in chains. Most streptococci are facultative anaerobes. According to their actions on the red blood cells, streptococci were grouped into hemolytic partially hemolytic and non-hemolytic streptococci serological groups within the genus have been described subsequently the serological scheme and the physiological characteristics have been used to establish the various species.

Two serological groups are frequently found in the vagina, namly group B and D. They are more resistant to acid conditions than are other streptococci.

Baker and Barrett, 1973, reported a colonization rate of 22-30% for the group B streptococci in the vagina of

gravid and non gravid women; however, Watt et al., 1987 isolated group B streptococci from 2.9 of the vaginal of normal young women.

The group D makes up the other large proportion of streptococci found in the vagina. It contains several species, some of which are enterococci. The organisms are frequent colonizers of the vagina (Brown, 1978). Ohm and Galsk, 1976, reported an isolation rate of 36% for group D streptococci.

Coliform-organisms:

The coliform bacteria are a large and heterogenous group of facultative anaerobic short gram-negative bacilli. All the genera of this group can be found in the intestinal tact, several genera are part of the normal flora of the vagina being found in approximately 16% of women (Watt et al., 1981). E.coli is the commonest coliform to be isolated, other members of the family are less frequently isolated. Coliforms may at times enter the vagina as the result of focal contamination of the lower genital tract from the perineal area.