

NORMAL BACTERIAL FLORA OF VAGINA

Pages with reference to book, From 1 To 3

Nasreen Kirmani (PMRC Research Centre, Jinnah Postgraduate Medical Centre, Karachi.)

The skin and mucous membranes harbour a variety of micro-organisms. These can be arranged into two groups.

1. The resident flora consisting of relatively fixed types of microorganisms regularly found in a given area at a given age which, if disturbed promptly re-establish themselves. Microorganisms constantly present on body surface are commensals. Their luxuriant growth in a given area depends upon physiologic factors like temperature, moisture and the presence of certain nutrients and inhibitory substances. Resident flora of certain areas play a definite role in maintaining health and normal functions. On the other hand, members of the normal flora may themselves produce disease under certain circumstances if introduced into foreign locations in large numbers, and if predisposing factors are present' -

2. The transient flora consisting of non-pathogenic or potentially pathogenic microorganisms that inhabit the skin and mucous membrane for hours, days or week. They are derived from the environment, do not produce disease nor establish themselves permanently on the surface. Members of transient flora are generally of little significance as long as the normal resident flora remain intact. However, if the resident flora are disturbed, transient microorganisms may colonize, proliferate and produce disease.¹ The bacterial flora of the female reproductive tract is a focal point for the study of infectious disease in obstetrics and gynaecology, as it is recognized that many pelvic infections involve bacteria resident on the cervical-vaginal epithelium. The vaginal flora contains a large variety of bacterial species, including aerobic and anaerobic organisms.² The pattern of development of the biota of the vagina is associated with maturation, the deposition of glycogen in the vaginal epithelium and the presence of group of activity acidogenic and acidouric microorganisms³. The microbial flora of the vagina present as extensive and diversified spectrum of pathogenic and non-pathogenic organisms as any other human tissue.⁴ An important distinction must be drawn between the flora of vulva and vestibulum on the one hand and that of the vagina proper on the other except that immediately after parturition and during the first few days of puerperium, the vaginal flora is quite distinct from that of the vulval flora.⁵ The vulva of the newborn child is sterile but after the first 24 hours of life it gradually acquires from the skin, vagina and intestine a rich varied flora of non-pathogenic organisms⁶ like:

1. Obligatory aerobes and aerobic bacteria, of which the chief types are pseudo diphtheria bacilli and *M. tetragenus*.
2. Coliform bacilli.
3. Facultative anaerobes, usually more or less susceptible to acid.
4. Bacilli derived from the vagina including yeasts.
5. Obligatory anaerobes.

On aerobic plates the commonest organisms to form colonies are staphylococci, diphtheroids, enterococci, sarcinae and coliform bacilli. Beside these organisms, yeasts *oidum* and *sacchrômyces* are very common. Under anaerobic conditions of cultivation, numerous colonies appear consisting of organisms many of which have so far been only imperfectly studied. Pathogenic bacteria are uncommon. The vaginal flora contains a large variety of bacterial species, including aerobic and anaerobic organisms as revealed by modern microbiologic methods.² The type of flora found in the vagina dependent upon glycogen content of vaginal epithelium, which in its turn is dependent on ovarian activity, i.e., the type of flora found in the vagina is dependent upon the pH of its secretions and

their enzyme contents. ⁶ Biologic characteristic of the normal human vagina during the sexually mature period of life are governed by the ovarian hormones. Estrogen are the primary factor responsible for the proliferation of the vaginal epithelium and it is the estrogen which mediates the deposition of glycogen in the vaginal epithelial cells and, during this sexually matured period of life, the vaginal mucosa is very rich in glycogen. ⁷ The vagina of the newborn child is sterile but in the first 24 hours it is invaded by staphylococci, enterococci and diphtheroids. After two to three days, the estrin from the maternal circulation induces the deposition of glycogen in the vaginal epithelium, and glycogen facilitates the growth of large gram positive bacillus, Doderlein's bacilli or lactobacilli. These organisms produce lactic acid from glycogen and make the vaginal secretion acidic and the bacterial flora is for a few weeks, similar to that of the adult. ⁶ In this way lactobacilli contribute to the maintenance of acid pH. When passively transferred estrin is excreted in the urine, glycogen is no longer demonstrable in the epithelium, Doderlein's bacilli disappears and the vaginal secretion reverts towards alkalinity⁶ and there after until puberty, the vaginal secretion remains alkaline with varied flora consisting of micrococci, alpha and nonhemolytic streptococci, coliform and diphtheroid bacilli. At puberty glycogen reappears in the vaginal walls and the vaginal secretions become acid as a result of the metabolic activity of Doderlein's bacilli, E. coli and yeast⁵, and Doderlein's bacilli established itself as the predominant aerobic organism⁵ - This however, still remains mixed and Doderlein's bacilli is accompanied by streptococci, diphtheroids, fungi and yeast⁴. This appears to be an important mechanism in preventing the establishment of other possibly harmful microorganisms⁷ and constitutes a defence mechanism in the vagina. Hence, lactobacilli are part of the normal flora of the vagina. In a recent study it has been found that the number of colonies of Lactobacilli are inversely proportional to the number of colonies of candida species⁸. In a study of the normal flora of one hundred individuals, Carter and Jones found diphtheroids in 74%, staphylococcus pyogenes var albus in 50%, anaerobic cocci and bacilli in 48%, non-hemolytic streptococci in 38%, Doderlein's bacilli in 30%, yeast in 15%, alpha streptococci in 90% and E. coli in 8%. During pregnancy, there is an increase in white staphylococci, Doderlein's bacilli and yeast. After menopause the flora resembles that found before puberty. ⁶ Normal vaginal flora often include group B hemolytic streptococci, anaerobic streptococci (Peptostreptococci), aerogenes group Staphylococci, yeast, Bacteroids species, Veillonella, Mycobacterium smegmatis clostridia, Gardnerella (Haemophilus vaginalis) Urea-plasma, urealyticum and sometimes, Listeria¹. - Vaginal organisms, for example, group B streptococci,¹ present at delivery, may infect the newborn. The streptococci are very varied; those belonging to Lancefield group D are common, group B, F & G are much less frequent⁵. Both strept. viridans (alpha haemolytic) and strept. faecalis rarely occur in the vagina or cervix and are harmless commensals⁸. - Some anaerobic streptococci are normally found in the genital tract. When growing in purulent exudates, they produce a foul or fetid odour⁸, Postpartum streptococcal infection of the uterus (puerperal sepsis) is caused by strept. Pyogenes group B encountered as commensal in human vagina. It is rarely pathogenic to the human subject, but has been recorded in a few cases of puerperal infection, Staph. albus is a common inhabitant of the vagina and is considered as an ubiquitous commensal. It has however been recently recognized as potential pathogen in situation of altered resistance to infection. Veillonella, member of Neisseria group, occur as commensals in natural cavities of man, particularly the mouth and genital mucosa⁸. Of the coliform Aerobacter, aerogenes is sometimes found as harmless commensal in the vagina. E. coli, however, is incriminated as a pathogen; it occurs on the skin of the perineum and genitalia and frequently infects wounds that become contaminated with urine or faeces⁸, Candida albicans is a member of normal flora of vagina⁹. Mycobacterium smegmatis is a commensal found in smegma and sometime on the skin^{6,8} - The vaginal secretion has pronounced bactericidal action on many species of bacteria. Ps aeruginosa, staphylococcus and Streptococcus, introduced experimentally into the vagina, could not be recovered

after 21—26 hours, A change in mucous membrane may be responsible for the curative action of oestrin in gonorrhoeal vaginitis in prepubertal children, At puberty or after oestrin, there is an increase in mucosal glycogen, superficial keratinization of the mucosa and a shift of vaginal pH from 7 to 4.5-6 due to lactic acid production from the glycogen by Doderlein's bacilli (Lactobacilli). The result is an antigenococcal environment. A well known association of Doderlein's vaginal bacilli with ovarian activity and glycogen deposition represents definite host parasite relationship in the genital tract⁴. At menopause, when ovarian activity ceases, the condition reverts that of pre-pubertyt After parturition and during the first few days of puerperium, the vaginal flora resembles that of the vulva. At the time of parturition, organisms ascend from the vulva to the uterus, where they may be demonstrated for several days.⁵

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