# The role of vaginal acidity: The production of glycogen and it's role on determining the gender of the fetus

MOHAMED ATEF ALY[1] AND I.A. ALY[*]

[1] 6th grade, Undergraduate medical student, Medical college, EG 32511
[*] Independent Researcher, Theorist, Natural philosopher, EG 32511
[1] First author: Mohamedatef159@yahoo.com
[*] Corresponding author: Islamatefaly5@gmail.com

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**This paper describes the important role of the vaginal acidity not only in the health of the vagina, but also in determining the gender of the fetus, we have put in mind that where there is vaginal acidity, so we should connect this to the production of oestrogen hormones, putting in mind the cases that lead to high oestrogen level.** 

***OCIS codes:*** (140.3490) Lasers, distributed feedback; (060.2420) Fibers, polarization-maintaining;(060.3735) Fiber Bragg gratings.

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## 1. INTRODUCTION

There are many arguments about the origin of lactic acid in the vaginal tract as there are two possibilities:

- The lactic acid present due to the action of lacto bacillus bacteria
- The lactic acid present due to the production of vaginal epithelial cells to lactic acid, so in case the lactic acid is due to the vaginal epithelial that's mean that the glycogen deposited in the vaginal epithelial during high oestrogen level in case of woman reproductive years or anything else etc, so the glycogen is anaerobically metabolized to lactic acid.

The presence of lactic acid in the vagina protect it from bad bacteria and irritants, so the vaginal acidity due to the presence of lactic acid is important for the maintenance of vaginal health. The healthy vagina is generally found to have a pH of 3.5-4.5, and this rate is shown to be microbicidal for many sexually transmitted disease (STD) pathogens. But does this acidity affect sperm? According to some experiments the sperm is inactivated in PH equal to 4 but the production of semen abolishes vaginal acidity for several hours.

## 2. OVERVIEW

The presence of lactic acid is depend in two cases as we showed above, but by HPLC method, we realized that the lactic acid is due to the presence of good bacteria as human cells can make only L-lactate, while bacteria can produce both D- and L- , thus the D- to L- lactate ratio can indicate the relative contribution of bacterially derived lactic acid, and the result of the method was that D- lactate >50 in vaginal secretion which means that the lactic acid in the vagina is due to vaginal bacteria and this will support my description. [1]

Estrogen hormone has receptors in the vagina, this hormone promote the production of glycogen so the glycogen attract good bacteria, then the bacteria works on the glycogen turns it into lactic acid. The acidity of the vagina ranges from 3.5-4.5 so above that or below indicates some changes in the nature of the vagina and it's secretion.

There are some cases in which the vaginal PH alter:

- Having sex
- Being pregnant
- Menopause
- Douching
- bacterial vaginosis (BV)

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The estrogen hormone is also altered by some changes like the reproductive years and neonatal, and in case of giving birth of a boy the level of estrogen hormone in the woman body is lower than the birth of a girl so when the estrogen is high, the production of glycogen will increase and attract extra good bacteria which will lead to alter glycogen to lactic acid more than if the birth is a boy so the acidity increases a little more than the normal vaginal PH which is 3.5-4.5 so the acidity of the vagina and it's PH measurement depends on the amount of glycogen produced due to the action of estrogen hormone.

### A. Estrogen Hormone

Estrogens are hormones that are important for sexual and reproductive development, mainly in women. They are also referred to as female sex hormones. The term "estrogen" refers to all of the chemically similar hormones in this group, which are estrone, estradiol (primary in women of reproductive age) and estriol.

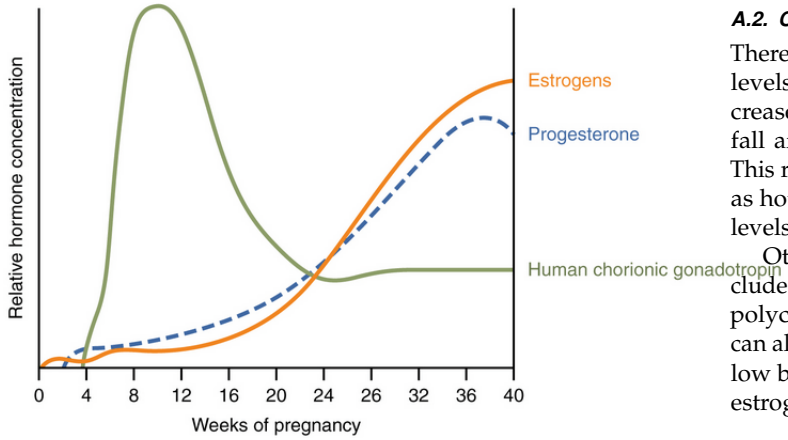


**Fig. 1.** The pregnancy hormones level

#### *A.1. Estrogen's function*

In women, estrogen is produced mainly in the ovaries. Ovaries are grape-sized glands located by the uterus and are part of the endocrine system.

Estrogen is also produced by fat cells and the adrenal gland. At the onset of puberty, estrogen plays a role in the development of so-called female secondary sex characteristics, such as breasts, wider hips, pubic hair and armpit hair.[2]

Estrogen also helps regulate the menstrual cycle, controlling the growth of the uterine lining during the first part of the cycle. If the woman's egg is not fertilized, estrogen levels decrease sharply and menstruation begins. If the egg is fertilized, estrogen works with progesterone, another hormone, to stop ovulation during pregnancy.

During pregnancy, the placenta produces estrogen, specifically the hormone estriol. Estrogen controls lactation and other changes in the breasts, including at adolescence and during pregnancy.

Estrogen is instrumental in bone formation, working with vitamin D, calcium and other hormones to effectively break down and rebuild bones according to the body's natural processes. As estrogen levels start to decline in middle age, the process of rebuilding bones slows, with postmenopausal women eventually breaking down more bone than they produce. This is why postmenopausal women are four times more likely to suffer from osteoporosis than men.

Estrogen also plays a role in blood clotting, maintaining the strength and thickness of the vaginal wall and the urethral lining, vaginal lubrication and a host of other bodily functions.[3]

It even affects skin, hair, mucous membranes and the pelvic muscles, according to Johns Hopkins Medicine. For example, estrogen can make the skin darker. Some researchers hope to use this information to create safe fake tanning lotions by activating the skin darkening reaction in estrogen, without triggering other changes in the body due to the hormone.

The hormone also affects the brain, and studies also show that chronically low estrogen levels are linked with a reduced mood (the National Library of Medicine).

Men produce estrogen as well, but at lower levels than women. Estrogen in males is secreted by the adrenal glands and by the testes. In men, estrogen is thought to affect sperm count. Overweight men are more commonly affected by low sperm count due to estrogen because there is more adipose tissue in the obese, which can set off the creation of excess estrogen.

#### *A.2. Changes in estrogen levels*

There are many times throughout a person's life when estrogen levels may change. For example, estrogen levels naturally increase during puberty and during pregnancy. Estrogen levels fall after menopause, or when a woman stops menstruating. This reduction in estrogen production can cause symptoms such as hot flashes, vaginal dryness and loss of sex drive. Estrogen levels also decrease after childbirth.

Other conditions that can cause estrogen levels to drop include hypogonadism (or diminished function of the ovaries) and polycystic ovarian syndrome. Extreme exercise and anorexia can also cause a decrease in estrogen levels because women with low body fat may not be able to produce adequate amounts of estrogen.

### B. Changes in pregnancy hormones

Estrogen and progesterone are the chief pregnancy hormones. A woman will produce more estrogen during one pregnancy than throughout her entire life when not pregnant. The increase in estrogen during pregnancy enables the uterus and placenta to improve vascularization, transfer nutrients, and support the developing baby. In addition, estrogen is thought to play an important role in helping the fetus develop and mature. Estrogen levels increase steadily during pregnancy and reach their peak in the third trimester. The rapid increase in estrogen levels during the first trimester may cause some of the nausea associated with pregnancy and, during the second trimester, plays a major role in the milk duct development that enlarges the breasts.

Progesterone levels also are extraordinarily high during pregnancy. The changes in progesterone cause a laxity or loosening of ligaments and joints throughout the body. In addition, high levels of progesterone cause internal structures to increase in size, such as the ureters (which connect the kidneys with the maternal bladder). Progesterone also is important for transforming the uterus from the size of a small pear in its non-pregnant state to a uterus that can accommodate a full-term baby.[4]

### C. bacteria in the vagina change during pregnancy

Just to clarify, bacteria do not actually live in the womb (if they get inside there that can go very badly wrong) but they do set up camp along the vagina and basically any areas of the reproductive system (and indeed the body) that can be reached safely from the outside. As well as protecting against fungal and other pathogenic infections simply by colonising the available space, the vaginal bacteria also actively help to decrease the pH inside the vagina, making it harder for other infections to set up. Killing off these bacteria (as anyone who has ever taken antibiotics to deal with cystitis will be aware) can lead to the fungal infection thrush, as without the bacteria in place the fungus can take over.

Overall, pregnant women showed much less diversity in bacterial species and fewer colonies present, particularly in areas up near the uterus which were very sparse indeed. In both pregnant and non-pregnant women, colonies varied throughout the vaginal area, and the dominant species were Lactobacillus spp. Some particular bacterial species were found to be more prevalent in pregnancy, although the overall diversity was reduced. This snapshot of the vaginal bacteria flora as a changing landscape; affected by internal pH and decimated by oncoming pregnancy.

## LIST OF FIGURES

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