

Hormone Imbalance: The Serious Health Hazard for Woman

Dr. P D Gupta*

Former, Director Grade Scientist, (Retired from Centre for Cellular and Molecular Biology), Hyderabad, India.

***Corresponding Author:** Dr. P D Gupta, Former, Director Grade Scientist, (Retired from Centre for Cellular and Molecular Biology), Hyderabad, India.

Abstract

Hormones act through specific receptors present on or in the target cells. More than 200 hormones or hormone-like substances have been discovered in the human body. Most of the activities by the body are regulated by performed the hormones. Imbalance of a particular hormone may hamper majority of the body functions, since they work in cascaded manner. Hormonal imbalances occur when there is too much or too little of a hormone in the bloodstream. All most all body functions such as, metabolism and appetite heart rate sleep cycles reproductive cycles and sexual activity general growth and development mood and stress levels, body temperature, etc. are directly or indirectly regulated by hormones.

INTRODUCTION

Hormones are chemicals messengers travel in very small quantities through the bloodstream to the tissues and organs in the body delivering messages that tell the organs what to do and when to do (1). These chemical messengers play a major role in controlling mental, physical and emotional health. Normally, endocrine glands produce the precise amount of

each hormone needed for various processes (Fig.1). In addition, certain hormones decline with age, and some people experience a more dramatic decrease than others. Endocrine gland products are poured on the circulating blood, but each hormone affects only target organs through specific hormone receptors (2). Hormones are needed in very specific amounts for the body to function optimally (3).

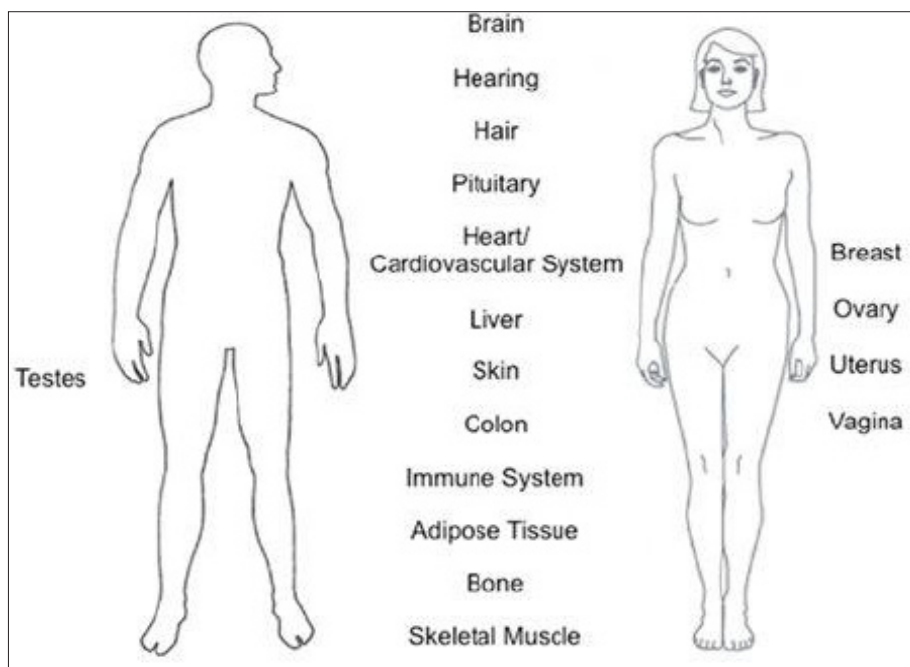


Fig1. Female and male endocrine glands and the target organs

Hormone Imbalance: The Serious Health Hazard for Woman Life

The hormone receptors are special proteins found within and on the surface of target cells throughout the body (2 -4). These receptor proteins are the “eyes” and “ears” of the cells, receiving messages from substances in the bloodstream and then telling the cells what to do. In other words, the receptors act like an on-off switch for a particular activity in the cell. If the right substance comes along that fits into the receptor — like a key fitting into a lock — the switch is turned on and a particular activity in the cell begins. By attaching to hormone receptors, estrogens and/or progesterone contribute to the growth and function of certain cells of the reproductive system (4-11).

There are 3 physiological stages in female’s life where sex steroid hormones either boost up or shut down their production; these are namely, start of menarcheal phase, pregnancy and start of menopausal age (5 mothering a cause). However, these “imbalances” are physiological and do not pose any health hazards, but other than these imbalances are generally pathological (1,12,13).

Pineal, the tiny gland, gets its name from its pinecone-like shape from the Latin (pinea, for pinecone) located very deep in the centre of the brain. The 16th-century French philosopher and mathematician René Descartes was fascinated with the pineal gland, considered it “the place in which all our thoughts are formed.” Today we know that it produces a single—but the key—hormone, the melatonin which involved indirectly in reproduction (14). The neurotransmitter serotonin is converted in the hormone melatonin in the pineal gland only in dark through “Dark Reaction”, if more light the brain receives specially during night, the less melatonin is produced, and vice versa (15, 16) . Melatonin inhibits the release of pituitary reproductive hormones, known as gonadotropins, from the pituitary gland , affecting male and female reproductive organs. In this way, melatonin—and therefore the pineal gland—regulate sexual development (17). Estrogen and progesterone are often called “female hormones” because they play an important role in women’s menstrual cycle, sexual development, pregnancy, and childbirth (16 - 18). These two hormones in turn are regulated by another two hormones secreted by pituitary, namely, LH (luteinizing hormone) and FSH (follicular stimulating hormone) by feedback mechanism (1,17).

Hormonal imbalances occur when there is too much or too little of a hormone in the bloodstream (21.). Because of their essential roles and chain reactions,

even small hormonal imbalances can cause side effects throughout the body. All most all body functions such as, metabolism and appetite (22 ,23) heart rate (24), sleep cycles (25), reproductive cycles(26-27) and sexual activity(28), general growth and development(26.,27), mood and stress levels(29), body temperature,(30) *etc.* are directly or indirectly regulated by hormones. More than 200 hormones or hormone-like substances have been discovered in the human body, therefore in this review we will restrict ourselves to the hormones involved in reproductive cycles and sexual function which are commonly termed as “sex hormones”.

Environment and diet regulate menstrual cycle in human females (22). The length of the period between menarche (activation of ovarian hormones) and menopause (inactivation of ovarian hormones) depends on 4 hormones, estrogen, progesterone, follicular stimulating hormone and luteinizing hormone (1). The hormonal imbalance during menopause is found to increase the risk of hormonal dependent cancers (31) The influence of light on age of menarche is also indicated in our study (31,32). Longer exposure to estrogens during the life span of a woman may increase the risk of developing breast cancer (26)

In our epidemiological survey the blind subjects across all age groups (up to 20 years, 20-40 years and 40-60 years) experienced menarche later than sighted subjects in respective age groups. There is a lowering of age at menarche on an average in sighted subjects by about 2, 5 months to 2 years and 10 months to 1 year in the respective age compared to blind subjects. The late menarche in blind is preventing the breast tissue from exposure to estrogen for less number of years than early menarche in sighted subjects. From our studies it can be concluded that blind menopausal women may serve as a model for understanding the regulation of breast cancer in relation to melatonin, estrogens and light (26,27)

Like healthy breast cells, most breast cancer cells—but not all — has hormone receptors and responds to the signals coming from these hormones. Knowing whether or not breast cancer cells have hormone receptors is an important piece of information for making treatment decisions. For hormone-receptor-positive breast cancer cells, hormonal therapy can be used to interrupt the influence of hormones on the cells’ growth and overall functioning. If you take the hormone away or block it, as these medications do, the

Hormone Imbalance: The Serious Health Hazard for Woman Life

cancer cells are less likely to survive. It's also worth noting that some breast cancers that are hormone-receptor-positive can lose their receptors over time. The opposite is also true: hormone-receptor-negative cancers can gain receptors.

Imbalances

Nearly everyone experiences at least one or two periods of hormonal imbalance during their lifetime. Hormonal imbalances have become increasingly common with today's fast-paced modern lifestyle. Hormonal imbalances are more common during puberty, menstruation, and pregnancy. But some people experience continual, irregular hormonal If females are exposed with estrogen for a longer or shorter periods in their lifespan, they may suffer with hormone dependent diseases (21). In our epidemiological survey we found now monarchical age is decreasing, on the other hand menopausal age is increasing (13). The hormonal changes of menopause might make you more likely to gain weight around your abdomen than around your hips and thighs (25). Instead, the weight gain is usually related to aging, as well as lifestyle and genetic factors. For example, muscle mass typically diminishes with age, while fat increases. It is estimated that the average weight gain during menopause is about 10 to 15 pounds. This phenomenon, also known as menopause belly, is a result of shifting hormones (23), an activation of a "menopausal gene" (32) as well as changes in exercise and diet. A decline in estrogen causes fat cells in the abdominal area to store more fat. It may even reduce your body's ability to burn fat (22). Hormonal changes during perimenopause and menopause may cause weight gain more quickly than usual, particularly in the stomach area. Even after menopause, however, women continue to have these hormones in their bodies. Many hormonal imbalances are caused by external factors, such as stress or hormone medications (21). However, hormonal imbalances can also be caused by any medical condition that impacts or involves the endocrine system or glands Men and women alike can be affected by hormone imbalances; nevertheless, there exist sexual dimorphism in terms of sex hormones at least in terms of quantity if not quality. Women experience imbalances in estrogens and progesterone levels, while men are more likely to experience imbalances in testosterone levels. Women are at higher risk of developing different types of hormonal imbalance disorders than men because they

have different endocrine organs and more complex cycles. Women physiologically experience several periods of hormonal imbalance, which is a natural requirement during the different phases of life for example during puberty, menstruation, pregnancy, childbirth, and breast-feeding, peri menopause, menopause, and post menopause; whereas men never undergo such physiological phases. Women are also at risk of developing different types of hormonal imbalance disorders due to certain medical conditions such as polycystic ovary syndrome (Fig.2),

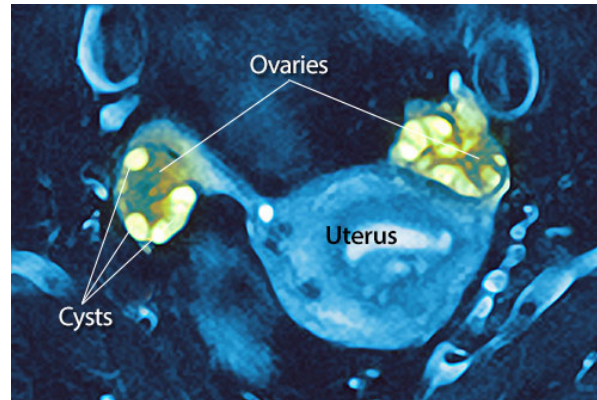


Fig2. *Polycystic ovary syndrome. A disorder involving infrequent, irregular or prolonged menstrual periods, and often excess male hormone levels*

ovarian cancer, hormone replacement or birth control medications, early menopause, primary ovarian insufficiency, early menarche (26)

Estrogens have a wide range of effects on the body and brain. The genetic transcription of estrogens receptors can modulate emotional behaviour, and estrogens can influence emotional processing via neuropsychological factors (29). It enhances the coding of emotion and recognition accuracy for facial expressions. High levels of estrogen can lead to weight gain, particularly around the hips and waist. Excess estrogen can also cause menstrual problems, such as: irregular periods, light spotting and white discharge. (34)

Causes

Everyone will experience natural periods of hormonal imbalance or fluctuations at particular points in their life. But hormonal imbalances can also occur when the endocrine glands are not functioning properly. Several medical conditions are known to impact some, or several, of the endocrine glands. Certain lifestyle habits and environmental factors may also play a role in hormonal imbalances (21).

Hormone Imbalance: The Serious Health Hazard for Woman Life

Causes of Hormonal Imbalances Include

- Poor diet and nutrition
- being overweight
- hormonal replacement or birth control medications
- abuse of anabolic steroid medications
- pituitary tumours
- benign tumours and cysts (fluid-filled sacks) that affect the endocrine glands
- endocrine gland injury
- severe allergic reactions or infections
- cancers that involve endocrine glands
- chemotherapy and radiation therapy
- Turner syndrome (females with only one functioning X chromosome)
- phytoestrogens, naturally-occurring plant estrogens found in soy products
- exposure to toxins, pollutants, and endocrine disrupting chemicals, including pesticides and herbicides.

Hormonal Imbalances in Woman

Women are also at risk of developing different types of hormonal imbalance disorders than men because they have different endocrine organs and cycles.

Medical conditions causing irregular hormonal imbalances in women include:

polycystic ovary syndrome (PCOS)(34,35), hormone replacement or birth control medications, early menopause, primary ovarian insufficiency (POI) ovarian cancer,

- Symptoms of hormonal imbalances in women include:
- heavy, irregular, or painful periods
- osteoporosis (weak, brittle bones)
- hot flashes and night sweats
- vaginal dryness
- breast tenderness
- indigestion
- constipation and diarrhea
- acne during or just before menstruation
- uterine bleeding not associated with menstruation

- increased hair growth on the face, neck, chest, or back
- infertility
- weight gain
- thinning hair or hair loss
- skin tags or abnormal growths
- deepening of the voice
- clitoral enlargement

Common Symptoms of Low Estrogens Include (33)

- Painful sex due to a lack of vaginal lubrication.
- an increase in urinary tract infections (UTIs) due to a thinning of the urethra.
- irregular or absent periods.
- mood swings.
- hot flashes.
- breast tenderness.
- headaches or accentuation of pre-existing migraines.
- depression.

Estrogens, progesterone, and testosterone are hormones that affect a woman's sexual desire and functioning (28). When it comes to sexual desire, the most influential hormone is testosterone (36). Child sexual abuse, for instance, sometimes manifests later in life as hypersexuality or compulsive sexual behaviour. A high libido is also sometimes caused by life changes. Other women report an increased sex drive during menopause, when the ovaries stop producing estrogens, and testosterone becomes more dominant (36).

The researchers surveyed a group of women between ages 40 and 100, with a median age of 67. Half of the responders said they were sexually active, and most of those women said they were able to become aroused, maintain lubrication and achieve orgasm during sex, even after the age of 80.

An increase in age led to a decrease in sexual activity. Forty-six percent of 65- to 70-year-olds reported being sexually active, compared to 39 percent of 71- to 75-year-olds and 25 percent of 76- to 80-year-olds. Men were more likely to be sexually active than women: 51 percent versus 31 percent. At age 55, men can expect another 15 years of sexual activity, but women that age should expect less than 11 years, according to a study by University

Hormone Imbalance: The Serious Health Hazard for Woman Life

of Chicago researchers published early online March 10 by the British Medical Journal. Men in good or excellent health at 55 can add 5 to 7 years to that number (37).

When a woman is sexually excited, blood flow increases to the genitals so that the vulva and clitoris swell and the vagina lubricates itself, which is called "getting wet." The feeling of a tight vagina during sexual penetration could be due to the woman not being fully aroused. A woman's vagina experiences many changes throughout her life (38).

For light touch, the neck, forearm, and vaginal margin are the most sensitive areas, and the areola is the least sensitive. When it comes to pressure, the clitoris and nipple are the most sensitive, and the side boob and abdomen are the least. The G-spot, also called the Gräfenberg spot (for German gynecologist Ernst Gräfenberg), is characterized as an erogenous area of the vagina that, when stimulated, may lead to strong sexual arousal, powerful orgasms and potential female ejaculation (39).

REFERENCES

- [1] Gupta, P.D. and Pushkala, K. (2005) Hormones. In: Concepts of Biochemistry for Medical students (Ed.) L.M. Shrivastva. CBS Publishers & Distributors, New Delhi (India). Pages-479-514.
- [2] KK Sen, PD Gupta, GP Talwar (1975) Intracellular localization of estrogens in chick liver: Increase of the binding sites for the hormone on repeated treatment of the birds with the hormone. *J steroid biochem* 6 (8), 1223-1227
- [3] Singh, S Shaul, PW and Gupta PD (2002) Conventional estrogen receptors are found in the plasma membrane of vaginal epithelial cells of the rat. *Steroids* 67 (9), 757-764
- [4] Moutsatsou P. and Sekeris C.E. (2003). Steroid receptors in the uterus: implications in endometriosis. *Ann. NY Acad Sci.* 997, 209-222.
- [5] Gupta, PD Khar, A and Vijayasaradhi S (1986) Localization of estradiol receptors in rat vaginal epithelial cells in vitro. *Indian journal of experimental biology* 24 (11), 679-682
- [6] Cheng J.G., Rodriguez C.I. and Stewart C.L. (2002). Control of uterine receptivity and embryo implantation by steroid hormone regulation of LIF production and LIF receptor activity: towards a molecular understanding of "the window of implantation". *Rev. Endocr. Metab. Disord.* 3, 119-126.
- [7] Childs G.V., Unabia G. and Komak S. (2001). Differential expression of estradiol receptors alpha and beta by gonadotropes during the estrous cycle. *J. Histochem. Cytochem.* 49, 665-666.
- [8] Franco H.L., Jeong J.W., Tsai S.Y., Lydon J.P. and DeMayo F.J. (2008). In vivo analysis of progesterone receptor action in the uterus during embryo implantation. *Semin. Cell Dev. Biol.* 19, 178-186.
- [9] Moutsatsou P. and Sekeris C.E. (2003). Steroid receptors in the uterus: implications in endometriosis. *Ann. NY Acad Sci.* 997, 209-222.
- [10] Gupta, PD Johar Sr K, Nagpal K and Vasavada AR (2005) Sex hormone receptors in the human eye. *Survey of ophthalmology* 50 (3), 274-284
- [11] Gupta PD (1999) Molecular Biology of steroid and nuclear hormone receptors. *Indian J Exptl Biol* 37, 622-622
- [12] Pushkala, K. and Gupta, P.D. (2009) Prevalence of breast cancer in menopausal blind Women. *Int. J. Med. and Med. Sciences* 1: 425-431.
- [13] Pushkala K, Gupta PD, Geetha R (2018) Differential drift in menarcheal age in blind and sighted girls. *Gynecol Perinatol* 2: 333-339
- [14] Gupta, P.D. and Pushkala, K. Extra visual Functions of the Eye (2020) *Clinical J Ophthal, Eye Care* (in press).
- [15] Gupta, P.D., Usha, N. and Pushkala, K. (2010). Dark side of the night light: Implication in breast cancer. *J. Cell Tissue Res.* 10, pp. 2173-84
- [16] Pushkala, K and Gupta P D (2011) Dark side of the Night Light, A monograph, Lambert, Academic Publishing, GmbH & Co. Germany
- [17] Gupta PD and Iino A (2002) Mothering a cause Oxford and IBH Publication, New-Delhi
- [18] Singh, S and Gupta PD (1997) Induction of phosphoinositide-mediated signal transduction pathway by 17 beta-oestradiol in rat vaginal epithelial cells. *J Mol Endocrinol* 19 (3), 249-57
- [19] Laven J.S. and Fauser B.C. (2006). What role of estrogens in ovarian stimulation. *Maturitas* 54, 356-362.

Hormone Imbalance: The Serious Health Hazard for Woman Life

- [20] Critchley H.O. and Saunders P.T. (2009). Hormone receptor dynamics in a receptive human endometrium. *Reprod. Sci.* 16, 191-199
- [21] www.avogel.co.uk > health > periods > understanding. Understanding your period and hormone imbalance
- [22] Gupta, P.D. and Pushkala, K. (2012) Prevention and Treatment of Breast Cancer by Light and Food in: Natural Products and their Active Compounds on Disease Prevention. Editors: Essa, M.M., Manickavasagan, A., and E. Sukumar, E. Nova Science Publishers. C.G.C Press USA.
- [23] Davis SR, Castelo-Branco C, Chedraui P, Lumsden MA, Nappi RE, Shah D, Villaseca P (2012) Understanding weight gain at menopause. *Climacteric*.15(5):419-29.
- [24] Yang SG, Mlček M, Kittnar O (2013) Estrogen can modulate menopausal women's heart rate variability. *Physiol Res.* ;62 Suppl 1:S165-71.
- [25] Kagan, Risa Constantine, Ginger 2; Kaunitz, Andrew
- [26] M. ; Bernick, Brian ; Mirkin, Sebastian (2019). Improvement in sleep outcomes with a 17 β -estradiol-progesterone oral capsule (TX-001HR) for postmenopausal women *Menopause*: 26(6) 622-628
- [27] Gupta PD and Pushkala K (2018) Impact of Lowering Menarchial Age on Human Embryogenesis. *Human Genet. Embryol.* 8: 148.
- [28] Gupta PD and Pushkala K (2018) Menarche: The Essential Event for Motherhood *J Ageing Restorative Med*, 2(2): 84
- [29] Maurand Cappelletti and Kim Wallen (2016) Increasing women's sexual desire: The comparative effectiveness of estrogens and androgens *Horm Behav* 78: 178-193.
- [30] Whitney Wharton, Carey E. Gleason, Sandra R. M. S. Olson, Cynthia M. Carlsson, and Sanjay Asthana (2012) Neurobiological Underpinnings of the Estrogen - Mood Relationship *Curr Psychiatry Rev.* 8(3): 247-256.
- [31] Charkoudian N, Stachenfeld NS. (2014) Reproductive hormone influences on thermoregulation in women. *Compr Physiol.* 4(2):793-804.
- [32] PD Gupta, K Pushkala 2006 Age dependent changes in steroid hormones level modulate progression and regression of breast cancer *J Cell Tissue Res* 6 (2), 825
- [33] Helen S. Kok, Kristel M. van Asselt, Yvonne T. van der Schouw, Petra H.M. Peeters, Cisca Wijmenga (2005) Genetic studies to identify genes underlying menopausal age *Human Reproduction Update*, 11, 5, 483-493,
- [34] Lara, L. A.; Useche, B; Ferriani, R. A.; Reis, R. M.; De Sá, M. F.; De Freitas, M. M.; Rosa e Silva, J. C. and Rosa e Silva, A. C. (2009). The effects of hypoestrogenism on the vaginal wall: Interference with the normal sexual response. *J Sexual Med.* 6 (1): 30-39.
- [35] De Leo V, Musacchio MC, Cappelli V, Massaro MG, Morgante G, Petraglia F (2016). "Genetic, hormonal and metabolic aspects of PCOS: an update". *Reprod Biol Endocrin (Review)*. 14 (1): 38.
- [36] Bacallao K, Leon L, Gabler F, Soto E., Romero C., Valladares L. and Vega M. (2008). *In situ* estrogen metabolism in proliferative endometria from untreated women with polycystic ovarian syndrome with and without endometrial hyperplasia. *J. Steroid Biochem. Mol. Biol.* 110, 163-169
- [37] Athol K (2009) Testosterone and Sexual Desire *Rev Obstet Gynecol.* 2(1): 65-66.
- [38] Sex, health, and years of sexually active life gained due to good health: evidence from two US population based cross sectional surveys of ageing : *BMJ* 2010;340:c810
- [39] www.insider.com > how-your-vagina-changes-2018-11.
- [40] YK Maratos, R Gombergh, E Cornier, JP Minart, N Amoretti and A Mpotsaris, (2016). The G-spot: an observational MRI pilot study, *BJOG: International J Obstetrics & Gynaecology*, 123, 9, (1542-1549).

Citation: P D Gupta. *Hormone Imbalance: The Serious Health Hazard for Woman Life. Open Access Journal of Gynecology and Obstetrics.* 2020; 3(1): 03-08.

Copyright: © 2020 P D Gupta. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.