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UNLOCKING THE MYSTERY OF HORMONAL BALANCE IN WOMEN: DISCOVER THE PREVALENCE OF RISKS FOR BETTER WELL-BEING AND OPTIMAL HEALTH

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ABSTRACT

Hormones- are chemical messengers that impact the way your cells and organ's function. They conduct the messages through your blood to your organs, skin, muscles and other tissues. Hormones are produced by glands in the endocrine system. Hormones are responsible for regulating a wide range of processes including both physiological processes and behavioral activities such as metabolism, sensory perception, sleep, lactation, stress induction, growth and development, reproduction. The female body operates as a finely tuned symphony of hormones.

Harmonal Imbalance - is a condition that occurs when there is too much or too little of a hormone in the body's bloodstream. Minor hormonal imbalances can cause significant side effects throughout the body. Hormones play a vital role in the health of human females and hormonal

Imbalance can cause several pathological conditions. Improper diet, stressful or depressed lifestyles and use of drugs can cause hormonal imbalance. Hormonal imbalances are more common in women around puberty, menstruation, pregnancy, menopause, and even years after Menopause (Post-menopause) aging. Some women experience continual, irregular hormonal imbalances leading to a variety of health Issues, including mental health disturbances like depression or Anxiety.

Keywords: Chemical messengers, Endocrine system, Physiological processes Behavioral activities, Female health, Pathological conditions

INTRODUCTION -

Women suffer from mood and anxiety disorders up to two times more than men, depending on the specific disorder in question **[1]**. In the health of women hormones play a vital role. Fluctuation in hormone levels, especially estrogen and progesterone, in a female may have negative impact on her mood, sexual desire, ovulation and fertility of a female.

Hormonal imbalance can cause menopause and some other symptoms (like hot flashes and neck or shoulder stiffness] in females **[2]**.

Fluctuating hormone levels are believed to contribute to the issue. In a typical menstrual cycle, the levels of follicle- stimulating hormone (FSH) and luteinizing hormone (LH) experience an initial rise, which prompts the maturation of the ovarian follicle. Additionally, there is a gradual increase in the production of oestradiol (E2), reaching its highest point just prior to ovulation. This surge in oestradiol triggers a notable peak in LH and FSH levels, subsequently leading to the synthesis of progesterone by the corpus luteum. The concentration of progesterone reaches its peak approximately 6–8 days after ovulation **[3]**.

Signs and symptoms of hormonal imbalance include changes in menstruation, acne, fatigue, excessive hair growth, anxiety, allergy, low sexual desire, weight gain, endometriosis, urinary tract infections (UTI's) and premenstrual syndrome (PMS) **[4]**.

Another very well-established risk factor is the individual's sex or gender; Women are at twice the risk for developing anxiety and depression than men are. Symptom profile can also vary with sex, as females with Major Depressive disorder [MDD] are, in general, more likely than males to experience disturbances of sleep, appetite, and energy and to have comorbid anxiety disorder. However, surprisingly, little is still known about factors and mechanisms that underlie sex disparity in these disorders **[5]**.

Hormonal imbalances can come in many forms. There may be an excess of the particular hormone in certain cases, while in others there may be a deficit. The type of hormone that is out of balance will have a significant impact on how the signs and symptoms present themselves and what risks are connected **[6]**.

METHOD

The prevalence of menstrual cycle irregularities among women ranges from 5% to 35.6%, depending on age, country of residence, and occupation. Irregular menstruation can lead to different health consequences and is an indicator of women's health. It has been linked to various illnesses and medical conditions, including metabolic syndrome, coronary heart disease, type 2

diabetes mellitus (DM), and rheumatoid arthritis (RA) **[7]**. Women's hormones play a crucial role in their overall health and well-being. From adolescence to menopause, these chemical messengers regulate various bodily functions and influence emotions, fertility, and overall vitality. Key glands involved in regulating women's hormones include the hypothalamus, pituitary gland, thyroid gland, adrenal glands, and ovaries. Each gland plays a unique role in maintaining hormonal balance and ensuring proper bodily functions **[8]**.

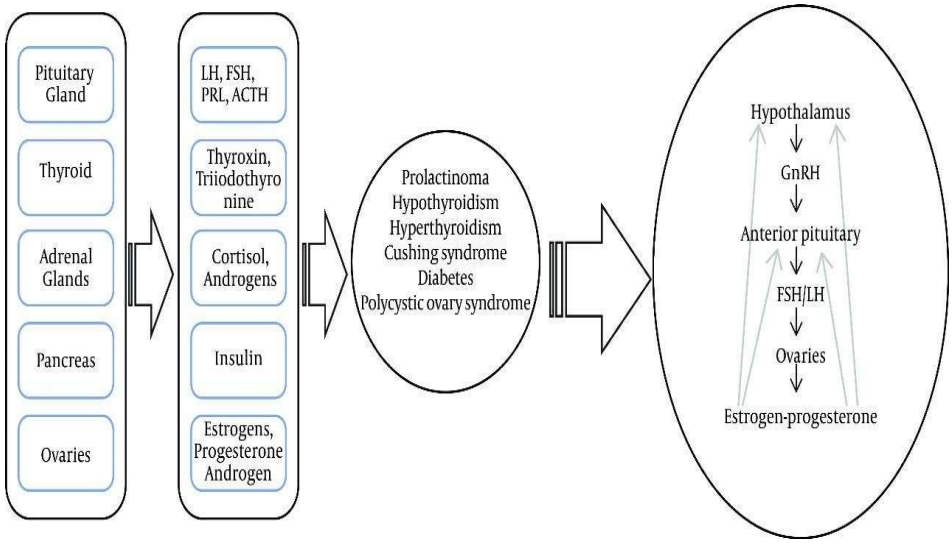

Figure 1: Endocrine disorders and the hypothalamic-pituitary-gonadal axis [9]

HORMONES IN HORMONY AND CHAOS - REGULATION AND IMBALANCE

The pituitary gland, which is located in the bony sella turcica, is attached to the base of the brain and has a unique connection with the hypothalamus. It consists of anatomically different regions called anterior lobe (adenohypophysis) and the posterior lobe (neurohypophysis) **[10]**. The hypothalamic hormones are released into blood vessels that connect the hypothalamus and the pituitary gland. It includes Corticotropin-releasing hormone (CRH) regulating carbohydrate, protein, and fat metabolism as well as sodium and water balance in the body. Gonadotropin-releasing hormone (GnRH) controls sexual and reproductive functions, including pregnancy and lactation. Thyrotropin-releasing hormone (TRH) directs the metabolic processes of all cells. Growth hormone-releasing hormone (GHRH) governs the organism's growth **[11]**.

The adenohypophysis constitutes 80% of the pituitary gland growth hormone (GH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH),

luteinizing hormone (LH), prolactin and adrenocorticotropic hormone (ACTH). In contrast to the adenohypophysis, the neurohypophysis is directly connected to the hypothalamus by axonal projections and stores oxytocin and antidiuretic hormone (vasopressin) **[12]**.

ADENOHYPOPHYSIS HORMONES

- Thyroid-stimulating hormone (TSH) affects the thyroid gland.
- Adrenocorticotropic hormone (ACTH): stimulates the adrenal glands.
- Follicle-stimulating hormone (FSH) and luteinizing hormone (LH) affect the ovaries and testicles.

NEUROHYPOPHYSIS HORMONES

- Oxytocin: affects the womb and mammary glands, and causes contractions in childbirth, for instance.
- Antidiuretic hormone (ADH): regulates water uptake in the kidneys and makes the blood vessels narrower. This can increase blood pressure **[13]**.
- Gonadotropin-releasing hormone (GnRH) is a crucial substance in the hypothalamic-pituitary-gonadal (HPG) axis in humans. This hormone regulates puberty onset, sexual
- development, and ovulatory cycles in females **[14]**.
- In male patients with gonadotrophin deficiency the features are those of delayed puberty, characterized by, small testes, and eunuchoid proportions and loss of secondary sexual characteristics, such as loss of facial and body hair. Other effects include gynecomastia, erectile dysfunction.
- Azoospermia is found in all cases of hypogonadotropic hypogonadism. In females, the deficiency results in primary amenorrhea and absent breast development. In the adult woman, amenorrhea or oligomenorrhea, infertility, breast atrophy, vaginal dryness, and dyspareunia occur **[15]**.
- **Diagnosis of gonadotrophin releasing hormone deficiency includes-**
- In adolescents presenting with absent or partial puberty using biochemical testing that reveals low serum testosterone or oestradiol (hypogonadism) that results from complete or
- partial absence of GnRH-mediated release of LH and FSH (hypogonadotropic hypogonadism [HH]) **[16]**.
- The **thyroid gland,** a small butterfly-shaped organ located in the neck,

produces hormones that regulate metabolism, energy levels, and body temperature. Two key hormones, thyroxine (T4) and triiodothyronine (T3) are released by the thyroid and play a crucial role in ensuring the proper functioning of cells and organs.

- **Hypothyroidism**
- In hypothyroidism, the thyroid gland does not produce enough hormones to meet the body's needs. This condition can result in a myriad of symptoms, including fatigue, weight gain, cold intolerance, and irregular menstrual cycles.
- **Hyperthyroidism**
- Conversely, hyperthyroidism occurs when the thyroid gland produces an excess of hormones. This can lead to symptoms such as weight loss, increased heart rate, anxiety, and irregular menstrual cycles. The elevated levels of thyroid hormones can interfere with the regular secretion of reproductive hormones, impacting menstrual regularity and fertility **[17]**.

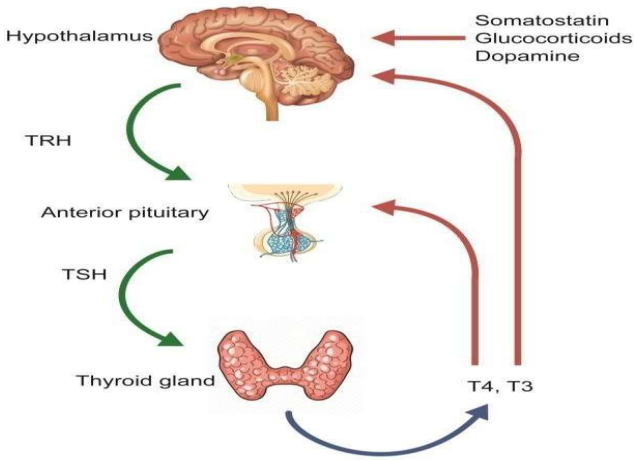

Figure 2: Biosynthesis of T3 and T4 [18]

Cushing's syndrome: While it's not as common of a symptom, Cushing's syndrome (excess cortisol) can cause anxiety, as well as depression and irritability **[19]**.

RISK OF DISEASES DUE TO HORMONAL IMBALANCE

Polycystic ovary syndrome (PCOS) is a heterogeneous condition that is reported to affect between 8% to 20% of women. PCOS has a number of significant comorbidities associated with it, including type 2 diabetes (T2DM), cardiovascular disease, insulin resistance, obesity, infertility **[20]**.

PCOS presents as a phenotype reflecting a self-perpetuating vicious cycle involving neuroendocrine, metabolic, and ovarian dysfunction.

PCOS is characterized by excessive ovarian

and/or adrenal androgen secretion. Ovarian stroma from women with PCOS tends to be more rigid. The developing oocyte and its surrounding scaffolding rely on endocrine, paracrine, and autocrine signalling mechanisms to maintain cell-to-cell communication and assure synchronized developmental progression. Aberrant development during these earliest stages of follicular growth likely contributes to the ovarian aspects of PCOS **[21]**. Symptoms include menstruation abnormalities, infertility, hair loss, and metabolic issues **[22]**.

Rheumatoid arthritis (RA) is the most common inflammatory rheumatic disease and has a female predominance of around 3:1. Rheumatoid arthritis (RA) is a chronic multisystem inflammatory disease which causes a destructive symmetrical polyarthritis. Common to many autoimmune disorders, there is a female predominance, with a female: male distribution of around 3:1 **[23]**. A recent study showed that menopause prior to age 45 (early menopause) was associated with milder RA **[24]**.

Breast cancer is considered a health problem at a worldwide level. In Brazil, the South and Southeast regions have the highest mortality rates **[25]**. Symptoms include, Breast changes size or shape Lump in a breast or armpit, Sunken dip (dimple) on the nipple or elsewhere on the breast Red or scaly skin on a breast that doesn't go away, A clear or bloody fluid comes out of a nipple **[26]**.

SCREENING -DIAGNOSIS

Diagnosing breast cancer is based on a triple test com-prising clinical examination, imaging (usually mammography and/or ultrasonography) and needle biopsy. Collectively, mammography (low- dose X-ray imaging of the breasts) randomized con-trolled trials have provided high- level evidence that population screening significantly reduces mortality from breast cancer by a relative risk of 20% for those invited to screening **[27]**.

TREATMENT-

Breast cancer treatment is nuanced and based on various factors, such as-Disease stage, pathology, patient preference, and available resources. In general, breast cancer management approaches are divided into - early breast cancer, locally advanced breast cancer, and metastatic breast cancer treatment.

EARLY BREAST CANCER TREATEMNT INCLUDES

Treatment involves surgery, chemotherapy, radiation, and hormonal therapy, depending on the stage and molecular profile **[28]**.

CAUSES/ETIOLOGY OF HORMONAL IMABALANCE

Unhealthy diet Excessive stress High % of fat Pituitary tumor's. Type1 and type2 diabetes. Hereditary pancreatitis Injury to

endocrine gland **[29]**.

SIGNS AND SYMPTOMS OF HORMONAL IMBALANCE-

1. **Menstrual and Reproductive Symptoms**

Irregular Periods: Skipped, delayed, or very heavy periods. Infertility: Difficulty conceiving due to ovulation issues. Vaginal Dryness: Often due to low oestrogen, causing discomfort during intercourse.

2. **Physical Symptoms**

Weight Changes: Unexplained weight gain or loss. Hair Changes: Hair thinning or loss (alopecia). Excess hair growth (hirsutism), especially on the face, chest, or back. Acne: Persistent or cystic acne often linked to high androgens. Fatigue: Chronic tiredness despite adequate rest. Hot Flashes and Night Sweats: Common in menopause or hormonal shifts.

3. **Emotional and Mental Health Symptoms**

Mood Swings: Sudden and extreme changes in mood. Anxiety or Depression: Feelings of sadness or worry not linked to specific life events. Irritability: Increased sensitivity to stress or irritability. Brain Fog: Difficulty concentrating, memory issues, or confusion.

4. **Skin and Nails**

Dry Skin: Flaky, dry, or irritated skin. Darkening of Skin: Especially in body folds (e.g., neck or armpits). Brittle Nails: Fragile or easily broken nails.

5. **Sleep Disturbances**

Insomnia: Difficulty falling or staying asleep. Restlessness: Feeling tired despite sleeping **[30]**.

TESTS TO DIAGNOSE THE CAUSE OF HORMONAL IMBALANCE-

Hormone blood tests may include:

Oestrogen test: To help diagnose infertility, menstrual problems.

Progesterone test: To help diagnose infertility, abnormal bleeding, and adrenal gland disorders.

FSH test: To help diagnose infertility, problems with the ovaries or testicles, and low sperm count

TSH test: To see how well your thyroid is working

DHEA sulphate test: To check adrenal gland function, disorders of the testicles or ovaries, and excess body hair in women.

Lifestyle changes that may help reduce the symptoms of hormonal imbalances include:

- ✓ Maintaining a moderate body weight
- ✓ Eating a nutritious and balanced diet
- ✓ Exercising regularly
- ✓ Practicing good personal hygiene,
- ✓ Avoiding triggers that cause hot flashes
- ✓ Reducing and managing stress
- ✓ Practicing yoga, meditation, or guided visualization
- ✓ Limiting sugary foods and refined carbohydrates
- ✓ Avoiding packaged foods.

CONCLUSION

The present study reveals that some factors like oral contraceptive pills PCOD and passes smoking women and further more symptoms have been reported in patients with hormonal imbalance. Additional symptoms reported in patients with hormonal imbalances include sleep disorders and amenorrhea. We conclude that the prevalence of hormonal imbalance is higher among married and physically inactive women, often correlating with complications such as kidney diseases. Additional risk factors should be counted for hormonal disorders includes Age group of 46- to 60-year-old, poor diet, heavy BMI, and large waist circumference. Our data suggest that hormone levels should be regularly monitored in all reproductive and childbearing women to mitigate risks associated with hormonal imbalances **[31]**.

The patients with hormonal imbalance, has been reported comorbid condition include hypertension, kidney diseases, anaemia, respiratory disease, CVDs, and arthritis.

History of surgical operation among women was predominant, so hormonal imbalance could be caused by such factor. It is crucial to raise awareness about these risks and promote research and interventions aimed at restoring hormonal balance. This will not only improve women's health outcomes but also their quality of life. Understanding the prevalence and impact of these disorders is crucial for developing effective prevention and treatment strategies **[32]**.

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