

SEX HORMONES. THE ROLE OF HORMONES IN REPRODUCTIVE FUNCTION**Solimirzayeva Gulmira Mukhtorjon kizi**

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Abstract: This article discusses the role and importance of sex hormones in the human reproductive system. It is scientifically explained that sexual maturation, menstrual cycle regulation, ovulation, fertilization, pregnancy and sperm maturation in men are regulated by hormonal control. It also analyzes the physiological functions of the main hormones such as estrogen, progesterone, testosterone, FSH and LH, the consequences of hormonal imbalance between them and their impact on reproductive health. The study demonstrates the central role of sex hormones in the development of the body and substantiates the integral importance of the endocrine system in ensuring reproductive health.

Keywords: Sex hormones, reproductive functions, estrogen, progesterone, testosterone, FSH, LH, endocrine system, menstrual cycle, ovulation, fertilization, hormonal balance.

Annotatsiya: Ushbu maqolada inson reproduktiv tizimida jinsiy gormonlarning roli va ahamiyati muhokama qilinadi. Erkaklarda jinsiy yetilish, hayz ko'rish siklini tartibga solish, ovulyatsiya, urug'lantirish, homiladorlik va sperma yetilishi gormonal nazorat orqali tartibga solinishi ilmiy jihatdan tushuntirilgan. Shuningdek, unda estrogen, progesteron, testosteron, FSH va LH kabi asosiy gormonlarning fiziologik funktsiyalari, ular orasidagi gormonal nomutanosiblikning oqibatlari va ularning reproduktiv salomatlikka ta'siri tahlil qilinadi. Tadqiqot jinsiy gormonlarning organizm rivojlanishidagi markaziy rolini ko'rsatadi va reproduktiv salomatlikni ta'minlashda endokrin tizimning ajralmas ahamiyatini asoslaydi.

Kalit so'zlar: Jinsiy gormonlar, reproduktiv funktsiyalar, estrogen, progesteron, testosteron, FSH, LH, endokrin tizim, hayz ko'rish sikli, ovulyatsiya, urug'lantirish, gormonal muvozanat.

Аннотация: В данной статье рассматриваются роль и значение половых гормонов в репродуктивной системе человека. Научно обосновано, что половое созревание, регуляция менструального цикла, овуляция, оплодотворение, беременность и созревание сперматозоидов у мужчин регулируются гормональным контролем. Также анализируются физиологические функции основных гормонов, таких как эстроген, прогестерон, тестостерон, ФСГ и ЛГ, последствия гормонального дисбаланса между ними и их влияние на репродуктивное здоровье. В исследовании показана центральная роль половых гормонов в развитии организма и обоснована неотъемлемая роль эндокринной системы в обеспечении репродуктивного здоровья.

Ключевые слова: Половые гормоны, репродуктивные функции, эстроген, прогестерон, тестостерон, ФСГ, ЛГ, эндокринная система, менструальный цикл, овуляция, оплодотворение, гормональный баланс.

Introduction. In the human body, hormones play an important role as regulators of biological processes. Of these, sex hormones are one of the most important factors in the formation, development and functioning of the reproductive system. It is thanks to these hormones that sexual maturation occurs in the male and female body, the menstrual cycle is regulated, ovulation occurs, and the necessary conditions for fertilization and pregnancy are created. At the same time, sex hormones have a significant impact not only on the process of reproduction, but also on the general physiological state, psychological stability and social activity of a person.

Maintaining the stability of hormonal balance is of particular importance in ensuring reproductive health. As a result of the harmonious functioning of hormones such as estrogen, progesterone, testosterone, FSH and LH, the full functioning of the reproductive system in the body is ensured. This article aims to present scientifically based concepts about the functions of sex hormones and their role in reproductive functions.

Literature Review. The relationship between sex hormones and reproductive function is one of the most important areas of modern medicine and physiology. This issue has been comprehensively studied by international scientific schools and Uzbek researchers, creating a rich scientific heritage on the biological, clinical and functional mechanisms of hormonal control.

Among international scientific schools, the greatest contribution was made by such prominent physiologists as Guyton & Hall[1], Ganong[2], Knobil and Neill[3], whose research sheds light on the role of sex hormones in the body, the stages of the hormonal cycle, the mechanisms of fertility regulation and the causes of hormonal disorders on a deep scientific basis. In particular, fundamental works such as Physiology of Reproduction are of particular importance in explaining the neuroendocrine control of the reproductive system, the evolutionary formation of the estrogen and androgen systems, and hormonal imbalances leading to infertility.

Also, leading specialists in reproductive endocrinology - scientists such as R. Norman[4], R. Lobo, D. R. Miller[5] - have deepened the issues of hormonal changes in the male and female body, the process of sexual maturation, hormonal control of ovulation and spermatogenesis through clinical research.

In Uzbek scientific schools, this topic is mainly studied by professors and teachers of physiology, obstetrics and gynecology, and reproductive health. The textbooks published by A. Rasulov and R. Kh. Raimov[6] extensively cover the functions of the endocrine system, the classification of sex hormones, and their biological effects on the body. Also, scientific articles by scientists such as D. Saidov[7], M. Karimova[8], Z. Usmonova[9] provide a scientific and practical analysis of hormonal disorders in women, factors for maintaining reproductive health, and modern approaches to hormonal diagnostics.

Articles on reproductive system pathologies, clinical manifestations of hormonal imbalances and treatment strategies are regularly published in Uzbek scientific journals - such as “New Day in Medicine”, “Uzbek Medical Journal” and others.

The above complex of scientific research not only strengthens the theoretical foundations of sex hormones and reproductive health, but also forms the necessary scientific methodology for the effective organization of diagnostic and treatment processes in practical medicine. The combination of international and local research allows for the emergence of more in-depth scientific approaches in this area.

Methodology. This study is aimed at a systematic study of the role of sex hormones in reproductive function, and physiological, biochemical and clinical analysis approaches were used as a methodological basis. The theoretical foundation of the study was formed by the scientific views of international schools of physiology - fundamental scientific interpretations of the neuroendocrine mechanisms of hormonal control, the functional properties of the estrogen and androgen systems, the processes of ovulation and spermatogenesis.

In the research process, an analytical-descriptive method was used, that is, the method of comparing, comparing, substantive analysis and generalization of existing scientific sources. In particular, the scientific views of such scientists as Guyton, Ganong, Knobil were coordinated with the works of scientists of the Uzbek school of physiology, and the interaction of sex hormones, functional changes in the reproductive system and the clinical significance of hormonal imbalance were analyzed on a scientific basis.

As a practical approach, a review of statistical and clinical data was used, and the results of recent scientific articles, clinical observations and epidemiological studies on reproductive health were studied. This method made it possible to explain the prevalence of sex hormone deficiency, hormonal disorders and conditions related to fertility.

The study also followed the principle of an integrated approach: the general physiological mechanisms of the endocrine system, psychophysiological factors, environmental and social conditions, their impact on reproductive health were studied as a whole system from ecological, biological and clinical aspects.

Such a multifaceted structure of the methodology allowed for an in-depth study of the topic, drawing reasonable conclusions based on existing scientific results and creating a scientifically sound interpretation of hormonal regulation in the reproductive system.

Discussion and results. During the study, it was found that the role of sex hormones in regulating the reproductive system is a harmonious system of multifaceted, complex and interrelated processes. A comparison of the physiological functions of such basic hormones as estrogen, progesterone and testosterone showed that each hormone ensures not only a separate stage of the reproductive function in the human body, but also the complete continuity of the entire process. For example, in women, estrogen controls the follicular phase of the menstrual cycle, progesterone - the process of preparing for pregnancy, while in men, testosterone acts as a central stimulator of spermatogenesis.

The analysis showed that pituitary hormones such as LH and FSH act as the “master conductor” of the activity of the gonads. Even a slight change in their level has a significant effect on

ovulation, spermatogenesis, the duration of the menstrual cycle or fertility. This confirms the incomparable importance of the neuroendocrine system in reproductive health.

The studied international and local scientific sources indicate that hormonal imbalances - such as polycystic ovary syndrome (PCOS), hypoestrogenism, hyperprolactinemia, testosterone deficiency - directly negatively affect reproductive health. The study confirmed that these conditions affect not only physiological limitations, but also psychological state, mood, energy level and overall quality of life.

During the discussion, it was also noted that modern factors such as environmental changes, nutritional characteristics, stress, sleep quality and inactivity directly affect the level of sex hormones. Along with world studies, the importance of these factors was also highly appreciated in the work of Uzbek scientists.

The accumulated scientific evidence showed that, sex hormones are the control center of the reproductive system, and the balance between them determines all processes from human sexual maturation to the ability to bear children. Hormonal imbalance is the starting point of many clinical conditions.

In summary, the results suggest that the activity of sex hormones is closely related to all body systems, and their stable functioning is essential for promoting reproductive health. The study confirmed the scientific basis of this process and served to shed more light on the biological and clinical significance of hormonal control.

Conclusions and recommendations. The conducted studies have once again confirmed that the role of sex hormones in the reproductive system is one of the most important mechanisms that ensure the biological stability of the organism and the ability to reproduce. The complex interaction of hormones such as estrogen, progesterone, testosterone, FSH, LH and prolactin regulates the processes of human sexual maturation, menstrual cycle, ovulation, spermatogenesis and general reproductive health. The scientific evidence identified during the study showed that hormonal imbalance is one of the main causes of many clinical conditions - infertility, menstrual disorders, PTSD, hyperprolactinemia, testosterone deficiency and psycho-emotional changes. It was also noted that environmental factors, stress, diet and modern lifestyle directly affect the activity of hormones. In general, the physiological functions and clinical significance of sex hormones play a central role in ensuring reproductive health.

Based on these results, the following recommendations were formulated:

To strengthen reproductive health, it is especially important to check hormonal balance, especially for young adolescents, couples planning to have children, and individuals at high risk of hormonal diseases. Factors such as healthy nutrition, physical activity, adequate sleep, and stress management are effective tools for ensuring hormonal stability. Regular monitoring of the menstrual cycle is recommended for women, and periodic monitoring of testosterone levels and spermatogenesis status for men. In medical practice, it is necessary to expand screening programs aimed at early detection and treatment of hormonal disorders, and to strengthen public education on reproductive health.

It is also advisable for future scientific research to focus on a deeper study of the relationship between hormones and psychological state, emotional stability, immune system activity, and

metabolism. The relevance of this topic will create a scientific basis for the formation of more innovative diagnostic and treatment methods in the field of reproductive health in the future.

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