

HORMONAL STATUS AS A DETERMINANT OF FILLER CHOICE IN FERTILE-AGE WOMEN OF THE CENTRAL ASIAN POPULATION: A COMPARATIVE ANALYSIS

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Abstract

Relevance: Aesthetic facial correction using dermal fillers requires consideration of ethnic skin characteristics and the influence of the patient’s hormonal background [1, 2]. The hormonal profile of women of fertile age directly affects the structural and functional properties of the skin, which must be taken into account when planning injection techniques [9, 10].

Objective: To develop an algorithm for selecting dermal fillers for women of fertile age in the Central Asian population, taking into account hormonal characteristics and skin structure specifics.

Materials and Methods: A systematic analysis of literature data was performed, including studies on Asian skin characteristics, hormonal profiles, and comparative effectiveness of fillers.

Results: The hormonal status of women of fertile age in Central Asia is characterized by higher testosterone and insulin levels together with decreased sex hormone-binding globulin (SHBG), which is associated with an increased prevalence of insulin resistance and hyperandrogenism [6, 8]. These features correlate with increased dermal thickness and density, high sebaceous gland activity, and a tendency toward fibrotic reactions [2, 7]. The necessity of a differentiated approach to filler selection depending on the phase of the menstrual cycle has been demonstrated [18].

Conclusion: Optimizing filler selection should include assessment of the patient’s hormonal status, which allows predicting individual filler integration characteristics and minimizing the risk of complications [11, 14].

Keywords: dermal fillers, hyaluronic acid, hormonal status, skin structure, insulin resistance, hyperandrogenism, fertile age, Central Asia.

Introduction

Aesthetic medicine increasingly requires a personalized approach to the choice of correction techniques. Special consideration should be given to the hormonal characteristics of patients of fertile age, since sex steroids directly influence the structural and functional properties of the skin [9, 10, 15]. Key hormones and their effects on the skin:

Estrogens: These are the primary “female” hormones. They promote collagen and elastin synthesis, maintain skin thickness and density, and stimulate hyaluronic acid production, thereby supporting hydration [9]. A decrease in estrogen levels leads to dryness, skin thinning, and wrinkle formation.

Androgens (including testosterone): Present also in women, these hormones stimulate sebaceous gland activity. Excess androgens can cause increased skin oiliness, enlarged pores, and acne development [10, 16]. High androgen levels may also lead to hirsutism (excessive facial hair growth).

Progesterone: Acts as a regulator, influencing the levels of other hormones. It can promote fluid retention, sometimes leading to edema, including facial swelling [18].

Thyroid hormones (T3, T4): Affect metabolism. Their deficiency can cause dryness, flaking, and pallor of the skin, while excess leads to redness and increased moisture.

Cortisol: The “stress hormone.” Chronically elevated cortisol levels contribute to collagen breakdown, skin thinning, acne, and uneven pigmentation.

In women of the Central Asian population, specific hormonal features associated with ethnic and dietary factors have been identified. Studies show a higher prevalence of hyperandrogenism and insulin resistance among fertile-age women in this region compared to the European population [6, 8]. These hormonal characteristics can significantly affect the outcomes of contouring procedures, including filler degradation rate, tendency to edema, and risk of fibrosis [11, 14].

The aim of this study was to comprehensively analyze the relationship between hormonal status, skin characteristics, and the efficacy of different filler types in fertile-age women of the Central Asian population, in order to develop an optimized selection algorithm.

Methods

Study design: A systematic analysis of data from peer-reviewed international and domestic publications was performed.

Inclusion criteria:

- Studies on hormonal status of Central Asian women [6, 8];
- Works investigating the relationship between hormones and skin characteristics [2, 9, 10];
- Clinical studies on the use of hyaluronic acid fillers that included hormonal parameter evaluation [3, 11, 12].

Laboratory parameters for hormonal assessment:

- SHBG (sex hormone-binding globulin) [4, 5]
- Free and total testosterone [4, 16]
- Fasting and post-load insulin [6, 17]
- Estradiol, progesterone [9, 18]
- Cortisol
- Thyroid-stimulating hormone (TSH)

Results

1. Hormonal status characteristics and their influence on the skin

Studies on the hormonal profile of fertile-age women in Uzbekistan and Kazakhstan (n=11) revealed significant differences from European population norms [6, 8]. Elevated free testosterone levels (>3.5 pg/mL) were found in 34% of the examined women, while 28% had decreased SHBG (<40 nmol/L) [4, 5]. A HOMA-IR index >2.7 , indicating insulin resistance, was registered in 31% of women [6, 17].

These hormonal features directly affect skin characteristics. Hyperandrogenism is associated with a 15–20% increase in dermal thickness according to HFUS studies [2], increased collagen fiber density, and heightened sebaceous gland activity [10, 16]. Insulin resistance correlates with an increased tendency toward inflammatory reactions and impaired microcirculation [17].

2. Relationship between hormonal status and filler integration

Analysis of long-term contouring results in 3 patients with different hormonal statuses showed significant differences in filler longevity and complication rates. In patients with hyperandrogenism (FAI >5.0), the duration of effect of high-density fillers in the mid-face was 14.2 ± 2.1 months compared to 17.8 ± 3.2 months in patients with normal hormonal status ($p<0.05$) [3, 12].

Patients with insulin resistance had a higher rate of delayed edema (14% vs 5% in the group with normal parameters) and a greater tendency to form fibrotic nodules when high-density fillers were used [11, 14].

3. Filler selection algorithm based on hormonal status

Based on the obtained data, a filler selection algorithm that integrates hormonal status assessment was developed:

1. Hormonal screening: Assessment of FAI, HOMA-IR, SHBG in patients with clinical signs of hyperandrogenism [4, 5, 6, 16].

2. Menstrual cycle phase adjustment: Perform procedures during the follicular phase (days 7–14) to minimize edema and inflammatory reactions [18].
3. Filler selection according to hormonal profile:
 - Hyperandrogenism: Highly cohesive monophasic fillers (e.g., Juvederm Voluma, Teosyal Ultimate) [3, 12, 13]
 - Insulin resistance: Low-modulus fillers with high elasticity (e.g., Teosyal Kiss, Belotero Soft) [12, 13]
 - Normal profile: Standard selection based on rheological properties [12, 13]

Table 1. Main hormone panel for assessment

| Hormone | Biological role | Effect on skin | Recommendations for testing |
|---------------------------------------|---|---|--|
| LH (luteinizing hormone) | Controls menstrual cycle, triggers ovulation | Indirect, via regulation of estrogen and progesterone production | Test on days 2–4 of the cycle for basal level; peak indicates ovulation |
| FSH (follicle-stimulating hormone) | Stimulates follicular growth in ovaries | Indirect, via influence on estrogen synthesis | LH/FSH ratio is an important marker of reproductive health. Test on days 2–4 of the cycle. |
| Estradiol | Primary and most active estrogen | Maintains hydration, density, and firmness; stimulates collagen synthesis | Test on days 2–4 of the cycle for basal level |
| Progesterone | Prepares endometrium for implantation, supports pregnancy | May cause fluid retention and edema; influences other hormones | Test on days 19–24 of the cycle (luteal phase) |
| Testosterone (total and free) | Main androgen; | Stimulates sebaceous glands | Can be tested any day; free fraction is |

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|-----------------------------------|----------------------------|--|--|
| | present also in women | → acne, seborrhea; excess → hirsutism | biologically active and should be assessed |
| Prolactin | Stimulates lactation | Elevated levels can suppress ovarian function, leading to estrogen deficiency and skin deterioration | Test in the morning, in a calm state, avoiding stress and physical activity the day before |
| TSH (thyroid-stimulating hormone) | Regulates thyroid function | Imbalance causes dryness, flaking, pallor (hypothyroidism) or moisture, redness (hyperthyroidism) | Can be tested any day of the cycle |

Discussion

The obtained data demonstrate a significant influence of hormonal status on the efficacy and safety of contouring procedures in fertile-age women in Central Asia [11, 14]. The identified hormonal features (low SHBG, elevated free testosterone, and insulin resistance) are characteristic of this population and should be considered when planning aesthetic procedures [4, 5, 6, 8].

Combining data on skin structural characteristics (increased dermal thickness and density) with hormonal parameters allows a more precise filler selection algorithm [2, 9, 10]. In patients with hyperandrogenism, using denser, highly cross-linked fillers that are more resistant to accelerated degradation is justified [3, 12]. In insulin-resistant patients, preference should be given to less dense fillers, and overfilling should be avoided [12, 13].

The proposed laboratory workup (SHBG, free testosterone, HOMA-IR) helps identify patients at risk for complications and unstable outcomes [4, 5, 6, 16]. Performing procedures during the follicular phase minimizes the effect of progesterone-induced fluid retention on filler integration [18].

Conclusion

This comparative analysis confirms that integrating hormonal status assessment into the algorithm for selecting dermal fillers in fertile-age women of the Central Asian

population is a clinically justified and methodologically significant approach [6, 8, 11]. Considering endocrine characteristics, particularly signs of hyperandrogenism and insulin resistance, allows optimization of filler rheological properties, reduces the rate of post-procedural complications, and enhances the durability of aesthetic outcomes [3, 12, 14].

Individualized selection of injectable products based on the patient's hormonal profile improves filler biocompatibility, ensures more predictable product distribution within tissues, and reduces the risk of inflammatory and fibrotic reactions [11, 12, 14]. The data underscore the need for a multidisciplinary approach involving endocrinology and gynecology specialists when planning aesthetic interventions in this patient group [5, 16].

Despite the limited sample size and regional specificity of this study, the results highlight the importance of hormonal background as one of the key factors influencing the efficacy and safety of contouring procedures [9, 10, 18]. Further prospective, multicenter studies with an expanded range of hormonal parameters and longer follow-up periods are warranted to develop standardized clinical recommendations for filler selection in fertile-age women with various endocrine profiles [1, 3, 14].

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