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Review

The impact of the presence of hirsutism and hypertrichosis on the psychological state of women suffering from polycystic ovary syndrome and hyperandrogenism

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Abstract: This review article focuses on analyzing the impact of excessive hairiness, in the form of hirsutism and hypertrichosis, on the psychological state of women affected by polycystic ovary syndrome (PCOS) and hyperandrogenism. PCOS is one of the most common endocrine disorders in women, characterized by hyperandrogenism, insulin resistance and menstrual disorders, among others. Studies suggest that excessive body hair can have a significant impact on the quality of life and psychological state of PCOS patients, leading to lowered self-esteem, depression, anxiety and body dysmorphophobia. Despite numerous clinical observations, however, a complete understanding of the mechanisms underlying this association is lacking. The article underscores the need for further research to identify the biological and psychological mechanisms affecting the psychological state of women with excessive body hair in the context of PCOS and hyperandrogenism. As progress is made in this area, it will be possible to develop more effective management strategies and therapeutic interventions that can help improve the quality of life for these patients.

Keywords: hirsutism; hypertrichosis; polycystic ovary syndrome; hyperandrogenism; mental status

1. Introduction

The location of body hair is one of the important differences between men and women. For women, the presence of hair in areas typical of men can be troublesome, due to prevailing beauty standards (Farkas et al., 2013). Excessive hair growth in undesirable areas, is often caused by various diseases or disorders.

Polycystic ovary syndrome is a common female metabolic and endocrine disorder. It affects approximately 10%–15% of women of reproductive age (Rodriguez-Paris et al., 2019; Scaruffi et al., 2018; Tłuszcz, 2020). PCOS is associated with a number of clinical complaints and complications, including reproductive (e.g., hyperandrogenism, hirsutism, infertility), metabolic (e.g., overweight, obesity, insulin resistance, impaired glucose tolerance) and psychological (e.g., depression, reduced quality of life) (Otlewska et al., 2018; Tłuszcz, 2020).

Hyperandrogenism, is a deviation from the physiological norm, and can occur as an independent endocrine disorder or accompany medical conditions, i.e. polycystic ovary syndrome. Hyperandrogenism refers to excessive concentrations of male hormones in women, and manifests itself in such ways as: acne lesions, androgenic alopecia or hirsutism (Marszalec, 2021).

Both conditions are linked by the possibility of excessive hair growth in women in androgen-dependent regions, i.e. the jaw, neck or chest area (Kłosowski et al., 2017;

Marszalec, 2021). Increased hair growth occurring in women in areas characteristic of the opposite sex can negatively affect the psychological state of patients and significantly reduce the quality of life (Otlewska et al., 2018).

The purpose of this study was to review the available literature to assess the impact of hirsutism and hypertrichosis on the psychological state of women struggling with polycystic ovary syndrome or hyperandrogenism.

2. Methodology

Scientific databases such as Google Scholar, PubMed, Central and Eastern European Online Library were analyzed. The following keywords were used to search for papers: PCOS, polycystic ovary syndrome, mental health, hirsutism, hypertrichosis, paradoxical hypertrichosis. The scientific articles discussed are from 2005–2024. It should be noted that most of the analyzed publications are reports from 2018–2024. A total of 32 papers (review, review and research) were analyzed.

3. Polycystic ovary syndrome

Polycystic ovary syndrome is a common endocrinopathy affecting women of reproductive age (Tłuszcz, 2020). The disorder can affect about 5%–10% of all women (Alijanpour, 2016; Bumbuliene and Alisauskas, 2009). The pathogenesis of PCOS is not yet understood. Current knowledge suggests that it is a hereditary disorder, and its development is influenced by a number of risk factors, including (Błaszczyk, 2018; Rodriguez-Paris et al., 2019; Wertheim et al., 2007):

- Increased synthesis of progesterone and androgens,
- elevated levels of insulin, which stimulates the tecal cells of Graff's follicles to overproduce androgens,
- Disturbed balance and frequency of lutropin (LH) pulses,
- Changes in folliculotropin (FSH) activity.

Ovarian polycystic ovaries mainly manifest as menstrual cycle disorders (including irregular periods, prolonged bleeding intervals or secondary amenorrhea), fertility disorders, overweight or obesity, insulin resistance, lipid disorders. Increased androgen production leads to symptoms such as acne in androgen-dependent areas (including upper lip, chin), androgenic or alopecia areata, decreased tone of voice, and hirsutism (Kłosowski et al., 2017; Kruk, 2021; Zdonek, 2013).

The presence of PCOS is confirmed when the patient has a minimum of 2 of the 3 criteria listed (Otlewska et al., 2018):

1) Menstrual disorders (complete absence or irregular and infrequent periods),
2) Excess androgens confirmed by laboratory,
3) Image of polycystic ovaries seen on ultrasound (above average number of Graff follicles);

Polycystic ovary syndrome causes many clinical complications, including infertility, cardiovascular disease, obesity, endometrial cancer, and mental health problems due to changes in external appearance (Tłuszcz, 2020; Zdonek, 2013).

4. Hyperandrogenism

Hyperandrogenemia is an endocrine disorder, and can occur alone or accompany disease entities such as PCOS, congenital adrenal hyperplasia, cushing's syndrome, hyperprolactinemia, or ovarian or adrenal tumors. It is a condition of excessive production of male sex hormones (Mrozińska et al., 2015; Sowińska-Przepiera et al., 2018). Androgens are synthesized by the adrenal glands and ovaries and have many important functions, including being responsible for regulating bone metabolism, affecting body weight or skin condition. Several fractions of androgens have been distinguished (Kłosowski et al., 2017):

- dehydroepiandrosterone sulfate (DHEAS)
- dehydroproepiandrosterone (DHEA)
- androstendione (A)
- testosterone (T)
- dihydrotestosterone (DHT)

Dehydroepiandrosterone sulfate is produced only by the adrenal glands, while the other fractions are synthesized by the ovaries and adrenal glands (Otlewska et al., 2018). The most active androgen fraction is dihydrotestosterone, which is formed from testosterone through the enzyme 5α-reductase (Imko-Walczuk et al., 2012).

Excessive androgens are associated with a number of ailments, and can lead to the development of menstrual, fertility and libido disorders, lowered tone of voice, clitoral hypertrophy, seborrhea, acne in the jaw area, and hirsutism, which is the most common symptom of hyperandrogenemia (Kłosowski et al., 2017; Marszalec, 2021; Otlewska et al., 2018).

5. Hirsutism

Hirsutism is the occurrence of excessive male-type hair located in androgen-sensitive regions in women (Stuła et al., 2019). A hallmark of hirsutism is the appearance of pigmented, coarse terminal hairs (Kłosowski et al., 2017; Saleh et al., 2024).

Factors such as the concentration of androgens in the body, sensitivity of the hair follicle to androgens, polymorphism of the gene encoding the androgen receptor or local 5α-reductase activity play a key role in the pathogenesis of hirsutism (Otlewska et al., 2018). Androgens contribute to prolonging the anagen phase of hair covering the body skin, while shortening it on the scalp; additionally, they act on the hair follicle receptor to stimulate hair growth (Stuła et al., 2019).

SAHA (seborrhoea-acne-hirsutism androgenetic alopecia syndrome), idiopathic hirsutism or hirsutism associated with endocrine diseases (e.g., PCOS) and endocrine disorders (hyperandrogenism) may also develop (Stuła et al., 2019; Vedak, 2022).

In addition, hirsutism can be a side effect of the use of many anabolic drugs, glucocorticosteroids, acetylcorticotropic hormone, and oral contraceptives (especially single-ingredient ones containing progesterone) (Prędota, 2021).

The Ferriman Gallwey four-point scale is used to ascertain and assess the severity of hirsutism. It assesses the presence of hirsutism in androgen-dependent regions: upper lip, chin, shoulders, chest, upper and lower abdomen and back, and thighs (Andrzejczak, 2020; Rosenfield, 2005).

Treatment of hirsutism is based on cosmetic, temporary removal of excessive hair (e.g., laser or light hair removal) and the use of contraceptive drugs and anti-androgens (Andrzejczak 2020; Vedak, 2022).

Hirsutism is a significant health and aesthetic problem. It contributes to lowered self-esteem and the development of psychological disorders (including depression), so it is important to treat it effectively (Stuła et al., 2019).

6. Hipertrychosis

Hypertrichosis is excessive growth of vellus hair (vellus hair) that is not dependent on androgen levels (Kłosowski et al., 2017). Hypertrichosis is characterized by hair growth that exceeds the norm for a given age, gender, race and body area (Vedak, 2022). The cause of the aforementioned excessive hair growth depends on the type of hypertrichosis (Nowicki et al., 2019; Saleh et al., 2024):

- Congenital hypertrichosis—a genetic cause and the use of certain drugs by pregnant women, such as minoxidil,
- Hypertrichosis occurring during puberty-elevated levels of total and free testosterone in the blood,
- Acquired, generalized hypertrichosis-malnutrition, acromegaly, juvenile hypothyroidism and dermatomyositis, post-traumatic brain injury, HIV infection (Human Immunodeficiency Virus, pl. Human Immunodeficiency Virus), antibiotic therapy, taking anti-inflammatory drugs, anticonvulsants, vasodilators, immunosuppressants, diuretics, antiseptics, penicillin or alpha interferons.

Histopathological examination reveals an above-average presence of mesquite or terminal hairs, depending on the etiology of the condition (Saleh et al., 2024).

The main difference between hypertrichosis and hirsutism, is the cause of the growth and the type of hair that grows (**Table 1**).

Table 1. Differences between hirsutism and hypertrichosis.

Hirsutism	**Hypertrichosis**
The cause is genetics, hyperandrogenism, endocrine diseases.	The causes are genetic errors, pharmacotherapy, excess testosterone.
Grows out thick, hard, pigmented hair, has a core	They grow mesquite hairs that are thin, short, lack a core and are not intensely pigmented.

Source: own compilation based on: 7, 18, 19, 23.

Treatment of the disorder in question involves regular use of depilatory creams and treatments such as laser depilation, light depilation and electrolysis (Andrzejczak, 2020; Prędota, 2012). Laser depilation works on the basis of the principle of selective thermolysis, that is, selective action on a specific chromophore (Inoue et al., 2024).

Laser depilation and IPL (Intense Pulsed Light) are performed routinely and have been found to be safe for human use (Andrzejczak, 2020; Saleh et al., 2024). Side effects of the aforementioned treatments are rare and are usually scarring, caused by damage to the skin and subcutaneous tissue. In some cases, the laser does not remove hair, but stimulates hair growth. The anomaly described has been called paradoxical hypertrichosis (Inoue et al., 2024; Snast et al., 2021). It mainly occurs after treatment with intense pulsed light, alexandrite or diode lasers (Inoue et al., 2024). The likely cause of this phenomenon is subtherapeutic heat damage to the hair follicle system. If

the heat generated by the laser is lower than the temperature required for hair follicle thermolysis, an inflammatory response can develop within the follicular papilla, resulting in increased blood flow and growth factors delivered to the hair follicle, resulting in the transformation of mesquite hair into terminal hair (Inoue et al., 2024; Snast et al., 2021).

The exact cause of the development of paradoxical hypertrichosis remains unknown, while risk factors include features such as (Inoue et al., 2024; Snast et al., 2021):

- Dark and thick hair—contains more melanin than light hair and more chromophore than fine hair.
- Skin phototype III to V,
- Supplementation and hormone treatment,
- Undiagnosed endocrinopathies (i.e., PCOS)
- Anatomical structure—areas frequently exposed to sunlight, areas of keloid tissue and areas that are covered by thin and light hair or mesquite hair, such as. cheeks, jaw, shoulders, neck, upper back, are exposed.

The development of hypertrichosis can also be linked to improperly performed hair removal procedures or professional errors by the laser or light head operator (Mallat et al., 2023).

Treatment of any type of hypertrichosis, including paradoxical, is based on the reapplication of cosmetic methods of excessive hair removal, namely laser or light hair removal, electrolysis or effective hair removal creams containing calcium thioglycolate and barium sulfate (Saleh et al., 2024).

The direct impact of hypertrichosis on women's psychology has not been thoroughly studied. Women struggling with PCOS or hyperandrogenemia may be at risk of developing it, due to currently practiced treatments (Andrzejczak, 2020; Vedak, 2022).

7. Psychological impact

There is a lack of current research carried out in a group of people diagnosed with hypertrichosis, but, due to the similar nature of hirsutism and hypertrichosis, it can be tentatively assumed that the abnormal amount of hair in both cases affects women's mental health in a similar way (Kłosowski et al., 2017). Both conditions are characterized by the occurrence of hairiness, which in the medical context is considered a deviation from the physiological norm, and the common treatment method for the conditions in question, may be laser or light hair removal, which can lead to complications (including paradoxical hypertrichosis). Excessive hair covering the body of women, especially in areas characteristic of the opposite sex, can contribute to a decrease in the quality of life previously led, if only by negatively affecting social relations (Prędota, 2012).

Androgen-dependent hairiness is problematic for the patients themselves and entails psychosocial consequences, in the form of anxiety disorders, depressive disorders and social withdrawal (Otlewska et al., 2018; Prędota, 2012). A survey of bio-psycho-social problems conducted in a group of women suffering from polycystic ovaries indicates that the vast majority of respondents do not accept their own external

appearance. A response suggesting a confident degree of satisfaction with one's own appeal was given by only 2% of women. The same study attempted to determine patients' life satisfaction, with the majority of women not feeling fully satisfied (Kurek and Babiarczyk, 2017). The results obtained are influenced by the entirety of polycystic ovary syndrome, as it is a disease that changes the physical appearance of the sufferer. Despite the negative impact of hirsutism on women's quality of life, most doctors continue to treat the said symptom as a cosmetic problem (Kurek and Babiarczyk, 2017; Katulski and Meczekalski, 2011; Trzęsowska-Greszta et al., 2017).

PCOS has been linked to reproductive dysfunction, which, combined with excessive male-type body hair, can also negatively affect women's sexuality. The disturbed perception of the altered body, combined with fertility disorders, has a detrimental effect on the mental health of female patients (Tłuszcz, 2020; Rodriguez-Paris et al., 2019). A study devoted to the topic of body image and the level of quality of life in a group of patients with polycystic ovary syndrome has proven that for the aforementioned patients there is a strong relationship between physical appearance and quality of life (Ziółkowska and Wróbel, 2020).

The prevailing beauty canons regarding hair growth, can negatively affect the psychological state of many women. This is a particular threat to the psychological well-being of female patients facing hirsutism or hypertrichosis, since the occurrence of excessive hair growth is beyond their control. A survey of British female patients conducted by Keegan et al. found that women struggling with abnormal body hair perceived their bodies as "disgusting" (Keegan et al., 2003). Participants in a similar study confessed to feeling like "slaves to their own bodies" due to hirsutism and used the word "prison" to describe their own bodies (Farkas et al., 2013).

For many women, the presence of excessive hair is a cause for concern. It is a problem that also affects adolescent girls. A study of female patients between the ages of 11 and 18 proved that the physical symptoms of hyperandrogenism are associated with reduced self-confidence and impaired relationships with peers (Besenek and Gurlek, 2020). It is also widely believed that excessive body hair, combined with acne, alopecia or excessive body weight, can contribute to the development of increased psychological distress and reduced quality of life. For some female patients, the phenomena described can result in depression, anxiety and even aggression (Elsenbruch et al., 2006). Additionally, an epidemiological cohort study by Morgan et al. (2008) found that eating disorders, i.e. bulimia or anorexia, are more common in the population of women with hirsutism compared to the general population. The factors leading to the use of compensatory methods are usually dissatisfaction with one's own body and weight (Ekbäck et al., 2009; Morgan et al., 2008). Excessive body hair may also be related to elevated levels of psychological stress. Symptoms, i.e., elevated androgen levels or atypical hairiness, lead to the experience of higher levels of psychological stress, especially among young, pubescent women (Franks, 2008; Himelein and Thatcher, 2006; Sadeeqa et al., 2018; Trent et al., 2005).

8. Conclusions

Hypertrichosis, defined as hypertrichosis or hirsutism, is a condition characterized by increased hairiness, often in areas typically considered male, such as

the face, chest and abdomen in women. Although excessive body hair is not usually a serious physical health concern, it can have a significant impact on patients' psychological state and quality of life. Multiple studies suggest that people affected by excessive body hair experience lowered self-esteem, anxiety, depression and body dysmorphophobia, which can lead to a significant decrease in quality of life.

There is also evidence to suggest that hypertrichosis may be related to the development of mental illnesses such as depression, anxiety and eating disorders. People affected by hypertrichosis often experience stress related to social and cultural pressures, which can lead to the development of the aforementioned mental problems.

However, despite numerous clinical observations and epidemiological analyses, a complete understanding of the direct impact of excessive hairiness on women's psychological status is still lacking. There is a need for further research to identify the biological and psychological mechanisms underlying this relationship and to develop more effective management strategies and therapeutic interventions for patients with excessive hair. As progress is made in this area, physicians and mental health professionals will be able to more effectively support patients in dealing with the psychological consequences of excessive body hair.

Conflicts of interest: The authors declare no conflicts of interest.

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