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Skin Academy: Hair, skin, hormones and menopause – current status/knowledge on the management of hair disorders in menopausal women

Menopause is defined by 12 months of amenorrhea after the final menstrual period. The reduction in ovarian hormones and increased androgen levels can manifest as hair and skin disorders. Although hirsutism, unwanted facial hair, alopecia, skin atrophy and slackness of facial skin are common issues encountered by post-menopausal women, these problems receive very little attention relative to other menopausal symptoms. The visibility of these disorders has been shown to cause significant anxiety and may impact on patients' self-esteem and quality of life, particularly given the strong association of hair and skin with a woman's femininity and beauty, which is demonstrated by extensive marketing by the cosmetic industry targeting this population and the large expenditure on these products by menopausal women. The proportion of the female population who are in the post-menopausal age group is rising. Therefore, the prevalence of these dermatological symptoms is likely to increase. Current therapies aim to rectify underlying hormonal imbalances and improve cosmetic appearance. However, there is little evidence to support treatment for these disorders specifically in post-menopausal women. This review discusses the assessment and treatment of both the physiological and psychological aspects of hair and skin disorders pertinent to the growing post-menopausal population.

Key words: alopecia, hirsutism, post-menopausal women, quality of life, skin disorders

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The menopause is a natural condition that all women face at the end of their reproductive lives. With about 25 million women passing through the menopause each year and rising, the menopause and its associated symptoms have become key areas of interest [1, 2]. The objective of this review is to raise awareness of the problems of hair and skin disorders in menopausal women, and to discuss assessment and treatment options pertinent to this population group.

Clinical manifestation of the menopause

Menopause is defined by 12 months of amenorrhea after the final menstrual period [3]. During the transition period, the number of anovulatory cycles increases and menstruation becomes more irregular until it finally ceases [4]. The reduction in the number of functional follicles results in increased levels of circulating follicle-stimulating hormone (FSH) and luteinizing hormone (LH) during and after the menopause. This in turn leads to decreased secretion of oestrogen and progesterone [2, 4-6].

The common symptoms of menopause, collectively known as the climacteric syndrome, can be classified as either physical or psychological in nature [6]. Physical symptoms often reported include vasomotor symptoms, urogenital symptoms, palpitations, headaches, bone and joint pain, asthenia, tiredness, disturbed sleep, breast tenderness and skin aging [6]. Psychological symptoms may include depression, memory loss, irritability, poor concentration, tiredness and loss of confidence [6, 7]. Hirsutism and alopecia are two physical symptoms that women experience during menopause, but due to their visibility, can also have a significant impact on the psychological burden of menopause.

The effect of the climacteric syndrome on quality of life (QoL) during the menopause is highly complex and the determinants are not yet well understood [7]. The influence of the menopause alone on mood is variable, as shown by Vesco and colleagues who found that in 5 out of 9 cohort studies which they reviewed there was no association between the menopause and depression or other psychological symptoms [8]. Therefore, other factors need to be considered when assessing patient QoL in relation to the menopause, such as any previous history of

depression [7, 8]. A multitude of factors, including lifestyle and role, body image, interpersonal relationships, and sociocultural status, can influence a woman's attitude towards the menopause and impact on her perception of symptom severity. For example, women who are not satisfied with their appearance have been found to experience more menopausal symptoms [9]. Deeks found that the menopause influenced ratings of fitness and appearance evaluation. Peri-menopausal women and those recently post-menopausal were more likely to negatively rate their fitness levels and appearance compared to pre-menopausal women [7].

Hair and skin in menopause

Hormone dysregulation during the menopause in hair and skin disorders

The menopause is associated with a decline in secretion of the hormones oestrogen and progesterone, due to the depletion of finite ovarian follicles, which can lead to hair and skin disorders [4-6, 10]. For example, the abundance of oestrogen receptors in both the dermis and epidermis and to a lesser extent, progesterone receptors, means that the skin is significantly impacted by changes in hormones during menopause [11, 12]. The association of oestrogen-deprivation with skin problems such as dryness, fine wrinkling and poor healing has been shown in post-menopausal women [11].

Additionally, the reduction in progesterone is known to increase the impact of androgens on the sebaceous glands and hair follicles [13]. Androgens may change the type of hair present: either lead to miniaturisation of hair follicles or transform vellus to terminal hair follicles. In excessive hair growth or hirsutism, they increase hair follicle size, hair fibre diameter, the duration of the anagen (growth) phase and sebum secretion, and increase the oiliness of the skin and hair [13-16]. A key trigger for excess hair growth is hyperandrogenaemia, with polycystic ovarian syndrome (PCOS) being the main cause of hirsutism [10, 13, 17-20]. The role of androgens in alopecia is not so well-defined, particularly in female androgenetic alopecia (AGA), with some types of alopecia not presenting with elevated androgen levels. Although unproven as yet, genes may also be involved in female pattern hair loss [21]. Limited data on the genetic base of AGA in women indicate a lower incidence of female pattern hair loss (FPHL) in first-degree women relatives over 30 years (21%) compared to first-degree male relatives (54%). Genetically, it is thought that early- and late-onset female AGA may be distinct entities [22].

Post-menopausal hair disorders are often multifactorial with the effects of processes such as ageing, concomitant diseases, environmental factors and medication impacting on the quality of hair follicles [23] as well as an accentuation of any underlying genetic predisposition of female pattern baldness [24]. Recent rapid onset hirsutism or hair loss in post-menopausal women should be investigated, as they may be presenting features of a more serious underlying condition, such as virilising tumours which significantly increase androgen levels [23, 25, 26].

Further research into the mechanism of action of androgens and other hormonal factors is required to develop successful

and satisfying therapies for hair disorders like hirsutism and alopecia which are until now poorly-controlled.

The impact of skin and hair disorders on quality of life

During the menopause and post-menopause, a woman's skin and hair can be affected by changes which may impact on QoL. A woman's appearance is frequently judged, particularly in Westernised societies, by the quality of her skin and hair, both of which are seen to reflect health and well-being [12].

The decline in oestrogen, which occurs during the menopause, affects the biomechanical properties of the skin, particularly on the genitalia, face and lower limbs [11, 27]. Whilst the visible signs of dryness and wrinkled skin, especially on the face, can cause psychological distress to women, changes to the skin of the genitalia can also significantly impact a woman's relationships and play a prominent role in the psychosexual aspects of menopause [12].

There is very little in the literature dealing with the psychological impact of changes in hair distribution specifically in post-menopausal women, these problems receive relatively little attention compared to other menopause symptoms. However, they are genuine concerns for many women. Generally, hair disorders cause greater psychological morbidity in women than men [25]. In contrast to hair loss in men that is generally accepted, society places a greater emphasis on women's hair as an essential part of their femininity, beauty and sexuality [25]. Unwanted facial hair (UFH) may have a detrimental impact on a woman's body image and QoL, as it contradicts cultural and social perceptions of what is physically attractive or acceptable [10, 28]. Loss of hair or growth of unwanted hair, particularly on the face, can cause great psychological and emotional distress and are a source of social embarrassment, impacting on a woman's self-esteem and body image [7, 8, 14, 25, 29-36]. Women spend considerable amounts of time managing UFH and concealing hair loss to enable them to feel more comfortable in social situations. The impact of culture on the psychological effects of UFH was demonstrated with the use of the self-administered Menopause QoL (MENQOL) questionnaire [37] in a study conducted in the United Arab Emirates (UAE). The results showed that although menopausal symptoms, including UFH, had a negative effect on QoL, women living in the UAE reported fewer symptoms and of less severity than women from Western countries, with facial hair being the least reported symptom (15.9%) [38]. Nisar and Sohoo utilised the MENQOL questionnaire to show that menopausal symptoms, including UFH, had a negative effect on the QoL of post-menopausal women in Pakistan [39]. Similarly, the Dermatology Life Quality Index (DLQI) has been used to assess the impact of UFH on QoL and indicated that laser treatment to remove UFH improved the QoL of female patients [40].

Skin changes in the menopause

Chronological ageing and hormonal levels, as well as extrinsic factors such as sunlight exposure and smoking levels, have an impact on skin biology [12]. During the menopause, hormonal changes such as oestrogen depletion affect the biomechanical properties of skin [11, 27]. Skin

conditions that tend to occur more commonly in post-menopausal women include lichen sclerosis, flushing and keratoderma climactericum [27]. In contrast to hair disorders, most of the data to support hormonal effects on the skin and skin function have been collected from the post-menopausal population [11].

Although the processes are not yet fully understood, evidence is clear that oestrogen exerts its action through various receptors in the skin, affecting both the epidermal and dermal components; the density of these oestrogen receptors is greatest on the genitalia, face and lower limbs [11, 27]. The decline in oestrogen, which occurs during the menopause, reduces the mitotic activity in the epidermal basal layer as well as modifying epidermal lipid synthesis, causing xerosis. The decline in skin collagen content correlates with menopausal age rather than chronological age [41]. This reduction in collagen synthesis results in thinner skin with less elasticity, producing visible changes in the skin, such as dryness, fine wrinkling and an increased slackness of facial skin [11, 12, 27, 42]. Recurrent flushing and sweating are common symptoms of the menopause; whilst rosacea is more common in post-menopausal women than men of a similar age [27].

Treatment options for post-menopausal skin conditions

General lifestyle changes can be effective in reducing, in the long term, the signs of skin ageing. These include the use of sun protection and over-the-counter moisturisers [43]. In addition, cosmetic interventions such as topical retinoids, facial peels, botulinum neurotoxin (Botox[®]), soft tissue fillers and surgical procedures can be employed to improve the appearance of the skin [43].

In terms of pharmacotherapies, systemic and topical hormone therapy (HT) have produced improvement in skin elasticity and thickness as well as increasing collagen synthesis and improving the appearance of wrinkles in post-menopausal women [27, 41, 44]. However, the effects of HT on the skin remain controversial, with some studies showing positive effects, while others are non-confirmatory [43, 45]. Despite this controversy, the majority do show benefits, with several controlled studies showing beneficial effects on collagen and skin thickness, warranting further research [43, 44, 46, 47]. An epidemiological survey of 3,875 post-menopausal women showed a statistically significant improvement in skin dryness following oestrogen treatment – the most common skin condition in older women [46], HT consists of two components: oestrogen and progestogen. The latter component protects the endometrium in women with an intact uterus [47]. In Europe, the oestrogen component is usually 17 β -estradiol, while in the US, conjugated equine oestrogen (CEE) is preferred [47].

Topical administration has shown improved safety and efficacy over oral administration [44, 48, 49], providing efficient transdermal penetration [44], but avoiding first pass hepatic metabolism which is linked to some of the side effects normally associated with menopausal HT agents [48, 49]. However, this may depend on the type of cream being used, with some conjugated oestrogen creams showing evidence of systemic effects due to penetration that are not seen with estradiol creams [43, 47].

Concerns about the increased risks of serious side effects, including the incidence of cancer and cardiovascular morbidity were initially raised following the Women Health Institute study in 2002 [48, 50]. These concerns have since been reviewed, and data collected indicate that the incidence of the major side effects, such as breast cancer and cardiovascular events, may be influenced by a number of factors including age, starting dose and time from menopause [49-51]. The associated 1% lifetime risk of breast cancer is no different from that linked with drinking wine or being overweight [49].

Alternative treatments to the traditional HT reagents are currently in development and their impact on skin conditions is being investigated. Phytoestrogens are plant-derivatives that structurally resemble endogenous oestrogens; isoflavones being the most widespread [52]. Randomised, placebo-controlled trials have shown moderate effects on menopausal vasomotor symptoms, including improvements in skin dryness and wrinkles [43, 47, 52]. Selective oestrogen receptor modulators (SERMs), which act at the oestrogen receptor level, bind specifically to ER-2 and ER-1 and may therefore minimise the side effects associated with traditional HT agents. Several candidates are in development with limited data on skin effects [44, 47].

Hair changes in menopause

The two major changes in hair distribution seen during menopause are hair loss (alopecia) and hirsutism, in particular UFH; both often occur concomitantly and seem to be associated with the number of years past menopause.

Hair loss in menopause

Ageing, in conjunction with hormonal changes occurring during menopause, can affect hair properties and give the perception of decreased hair coverage in middle-aged women [21]. The reduction of the anagen phase and regression of scalp hair to finer, vellus hair is caused by androgens and can lead to hair loss (alopecia) during the menopause [13, 24, 53]; some women presenting with alopecia do not have elevated androgen levels, indicating that other androgen-independent mechanisms may be involved [25]. The most common form of alopecia in elderly women is Female Pattern Hair Loss (FPHL), which is progressive and often worsens during or after the menopause, particularly if it is pre-existing [4, 23, 25]. FPHL affects hair follicles from the parietal or frontovertical areas causing bitemporal hair thinning but leaving an intact frontal hairline [25, 54-56]. Clinical evaluation of FPHL is by the Ludwig classification system which describes three levels of severity [25] and which has been further developed by Sinclair to facilitate classifying hair loss [54].

Post-menopausal frontal fibrosing alopecia (PFFA) is a form of cicatricial alopecia which was first described by Kossard in 1994 [57] and has recently become increasingly recognised as a distinct clinical entity from other types of alopecia [58]. It is a progressive condition which involves the destruction of the upper portion of the hair follicle by an inflammatory lymphocytic infiltrate. This produces a distinctive distribution with symmetrical regression of the frontal and temporal hairline with partial or total loss of the eyebrows [55, 56, 58]. It is not fully understood how the menopausal changes cause this selective targeting of the

frontotemporal scalp and there is no proof of a hormonal basis, but some response has been reported in a few patients following androgen-dependent therapy [21, 25, 55].

The onset of hair loss is difficult to diagnose as patients often present relatively late in the progression of the disease which means that the disease is often stable by the time treatment is initiated, and this impacts on efficacy [24, 56].

Unwanted facial hair (UFH) and hirsutism in the menopause

The amount of body hair in women tends to rise until they reach the menopause, after which body hair begins to decrease. In contrast, facial hair tends to increase even in the elderly [19, 59].

The prevalence of hirsutism and excess hair growth in post-menopausal women has not been well documented. Data from Australia indicate that nearly 1 referral in every 5 to a hirsutism clinic is a woman in the post-menopausal age group, whilst another study in India reported that post-menopausal state hirsutism is the third most common cause of hirsutism [60, 61]. These data suggest that the clinical and social importance of this problem is underestimated. In unpublished work by Freeman *et al*, hair growth patterns were studied in a large population of post-menopausal US women aged 50–79 years who participated in the Women's Health Initiative [59]. Alopecia was present in 38.1% of women aged 50–59 years, rising to 68.4% in those aged 70–79 years. Similarly, over 50% of women aged 50 years and over reported excessive hair growth after menopause.

Causes of hirsutism post-menopause

In general, hirsutism arises either due to increased androgen production or greater sensitivity of the hair follicles to androgens [19, 62]. Androgens are responsible for increasing the hair follicle size, hair fibre diameter, the duration of the anagen phase of terminal hairs and sebum secretion – all factors affecting hirsutism [14]. In more than 95% of cases in women, hirsutism is due to a benign condition; the 2 main causes being Polycystic Ovary Syndrome (PCOS) and idiopathic hirsutism (where circulating androgen levels are within normal range) [10, 13, 17–20]. Although polycystic ovaries and the associated hormone imbalances have been observed after the menopause, the degree of hyperandrogenism has been modest [63, 64]. Despite this, PCOS has been associated with hirsutism post-menopause [65, 66].

More serious, though quite rare, causes of hirsutism include congenital adrenal hyperplasia and Cushing's syndrome, as well as benign and malignant androgen-secreting ovarian and adrenal tumours [13, 61, 67]. Hyperandrogenism caused by adrenal ganglioneuroma [68] and ovarian-related hyperandrogenism associated with hirsutism including those relating to ovarian hyperthecosis [69–72] and ovarian neoplasms [73–80] have been published. Cases of severe virilisation in post-menopausal women with non-malignant aetiology have also been reported, but are rare [81].

Post-menopausal hirsutism has also been associated with androgen therapy including testosterone therapy [82–85] and androgen-oestrogen hormone therapy [86, 87].

Diagnosis of unwanted hair in menopause

Comprehensive guidelines have been published for the evaluation and treatment of hirsutism in pre-menopausal

women [26, 88], although how well these guidelines can be applied to post-menopausal women remains to be determined. According to the classical or modified Ferriman-Gallway (FG) scale, a score of ≥ 8 is considered to represent hirsutism [89, 90]. However, the FG Scale may not be suitable for menopausal women due to changes in both the hair distribution pattern as well as the character of hair [10, 60]. Additionally, the FG scale is semi-quantitative in nature and inter-observer variability can affect the results [17, 19]; the amount of UFH considered unacceptable and distressing to the sufferer is often much less than may be quantified using the FG scale [10, 91].

The basic approach to the differential diagnosis should be:

- documentation of the degree of excess androgen,
- and exclusion of androgen-secreting tumours and other serious but rare causes of hirsutism [13].

The diagnosis of hirsutism should include the milestones of the consensus but also include an assessment of the psychological impact [26] as the cornerstone, using patient reported outcomes.

Managing hair disorders in the menopause

The aim of any treatment is to rectify underlying hormonal imbalances if present and to improve the cosmetic appearance of hair loss or unwanted hair growth [16]. The similarities between alopecia and hirsutism mean there is overlap in the recommended treatments. The two approaches available are the application of topical preparations and the administration of systemic medication [92]. For both systemic and topical treatments there is some delay before patients begin to see an improvement. For hair loss, systemic therapies require a minimum of 12 months while topical therapies need at least 6 months to accurately assess efficacy.

The current available options are described in more detail in the following sections.

Hair loss treatment options

There are limited data available which focus on the treatment of hair loss specifically in pre- and post-menopausal women. Treatments are often combined with a variety of cosmetic methods to improve aesthetics, including hair styling techniques, use of camouflaging products and replacement hair pieces to cover exposed areas of scalp and provide the illusion of more volume, and even laser hair combs [92]. Hair transplantation may be considered for cases of advanced FPHL which have not responded to medical treatment [54]. In addition, alternative methods for addressing hair loss in women have been reported and these, along with the more conventional therapies, are covered in more detail below.

Systemic treatments

Systemic anti-androgens, androgen antagonists or enzyme inhibitors, which inhibit the synthesis of potent androgens, are used for the treatment of hair loss in women with hormonal dysregulation. Insufficient published scientific data

exist to support the use of systemic anti-androgens for the treatment of FPHL where there are no menstrual disturbances [92].

Cyproterone acetate (CPA) and chlormadinone acetate (CMA). They are orally active progestens which suppress gonadotrophin secretion, therefore reducing the production of ovarian and adrenal androgens [90], although their use is tempered by their side effects. Each is available as a combined oral contraceptive pill containing ethinyl oestradiol [90]. The anti-androgenic potential of CMA is deemed lower than that of CPA [90]. Some studies suggest a greater role for CPA in women presenting with evidence of hyperandrogenism and it has been used to treat FPHL [25, 93]. Indeed, data suggest that there is no benefit with CPA when used to treat AGA in women who have no hormone dysregulation and therefore are without signs of hyperandrogenism [94]. In this population, the combined use of CPA with the topical treatment Minoxidil was found to be most effective [94]. CPA, at doses of 50 mg, has shown some effect in treating post-menopausal women presenting with FPHL, in the absence of hormone dysregulation [95]. However, in Europe, the benefit : risk ratio of this high dose in women is unacceptable in the absence of hormone dysregulation.

Finasteride. Finasteride is a 5- α reductase inhibitor which hinders the synthesis of the potent dihydrotestosterone. It is licensed in men for treatment of prostate hyperplasia (5 mg) or for male pattern balding (1 mg). Some individual case studies or series have investigated the effect of finasteride at a dose of 2.5 mg/day in post-menopausal women [55, 96] or with 5 mg/day, showing some effect in women with hyperandrogenism [97]. There are no randomised, double-blind, placebo-controlled clinical trials for post-menopausal hair loss, only for use of finasteride in hirsutism.

Dutasteride. Dutasteride is even more potent than finasteride, inhibiting both type I and type II of the enzyme 5- α reductase, although it is only licensed for prostate hyperplasia. This therapy is currently in clinical development and has demonstrated efficacy in the treatment of post-menopausal frontal fibrosing alopecia in a randomised clinical trial [98]. However, it is uncertain whether the apparent responses observed are due to the therapy alone, or partly due to the natural course of disease progression [98].

Spironolactone. Spironolactone is an anti-androgen that is widely used to treat FPHL, mainly in the United States, and which also inhibits ovarian androgen production [99]. Limited data are available from published studies to support the efficacy of spironolactone [25]. In an open intervention study, data showed no significant differences between spironolactone and CPA in the treatment of women presenting with FPHL [95].

Flutamide. Flutamide is a potent anti-androgen which has been discussed as an interesting candidate for the treatment of alopecia. So far, limited data are available with regards to treatment of FPHL [25]. In one randomised clinical trial, flutamide gave a modest 21% reduction to Ludwig scores for hair thinning; this was after 1 year and in women presenting with hyperandrogenism. In the same study, finasteride and CPA induced no significant improvements [100].

In another, randomised controlled study, flutamide reduced hair loss more significantly than spironolactone [25]. Unfortunately, flutamide has a rare but serious side effect of hepatotoxicity so the risk : benefit ratio needs to be assessed for individual patients before prescribing [25].

Topical therapies

There is a broad spectrum of diverse, topical, mainly cosmetic agents, such as aminexil, fluridil, anastim, saw palmetto, and synthetic and natural oestrogen-containing solutions [101]. However, the clinical evidence level is poor and double-blind placebo-controlled trials are lacking or have proven no efficacy. Minoxidil is the only currently approved topical treatment for FPHL which is supported by clinical evidence in terms of efficacy for hair loss [92]. Minoxidil is suitable for treating post-menopausal women with or without hyperandrogenism because it works via an androgen-independent mechanism [54].

Alternative Therapies

Naturally occurring 5 α -reductase inhibitors have been shown to have some effect on hair loss, with a pilot study reporting a 60% response rate [102]. Wuttke and co-workers explored the effects of herbal remedies, although the availability of data from controlled trials is rare. In one randomised, double-blind, placebo-controlled trial, they reported that black cohosh provides some benefit with weak oestrogen-like effects in post-menopausal women [103]. They also showed that chaste tree fruit extracts alleviated pre-menstrual symptoms in another randomised, double-blind, placebo-controlled trial [104]. Little is known about the nutritional factors and hair loss. Serum ferritin concentration may be a factor in hair loss but studies looking at the link between iron deficiency and female hair loss have provided conflicting results [105, 106].

Hirsutism treatment options

Very little evidence exists for the specific treatment of hirsutism in post-menopausal women. A holistic approach is required for the treatment of excessive hair growth [28] with the main objectives being to modify any causal hormonal imbalance, to reduce the visible appearance of excess hair and to therefore improve the quality of life for the patient. The choice of hirsutism treatment depends on the severity of the condition and the underlying cause [16]. Four classes of drugs are available for the treatment of hirsutism and several direct methods of hair removal can be combined with the pharmacological treatment regimens to achieve the optimum effect for the patient. These are summarised in *table 1* [90].

Systemic Treatments

Anti-androgens. Several of the anti-androgen therapies available for the treatment of hirsutism are the same as those used for treating alopecia. CPA, CMA, spironolactone, flutamide and finasteride have all been shown to be effective in treating hirsutism [17, 90, 107]. Spironolactone has a relatively low cost with a good safety profile and has shown greater efficacy in the treatment of hirsutism than finasteride; the latter lowering hirsutism scores by 30-60% across more than 25 studies [17]. Spironolactone has also shown efficacy in treating severe hirsutism when combined

Table 1. Medical Treatment and Adjuvant Therapies for Hirsutism [90]

Mechanism of Action	Medical Treatment
Anti-androgens	Cyproterone acetate (CPA) Chlormadinone acetate (CMA) Denogest Drospirenone Spironolactone Flutamide and bicalutamide
Enzyme Inhibitors	Finasteride Eflornithine
Insulin-sensitising agents	Metformin
Gonadotropic-releasing hormone analogues	Leuprolide Nafarelin
Adjuvant therapies	
Epilation methods	Physical and chemical epilation (tweezing, shaving, waxing, sugaring, threading) Electrolysis or electroepilation Laser or photoepilation

with an OCP, with few side effects [19, 90]. Bicalutamide is a new potent pure anti-androgen and has been shown to be effective at a dose of 25 mg/day in women with PCOS and idiopathic hirsutism [90, 108, 109].

Enzyme inhibitors. The efficacy of finasteride in the treatment of hirsutism is supported by the data from several randomised and observational clinical studies. Results have shown that finasteride can reduce hirsutism scores by 30-60% [90].

Insulin-sensitising agents. Women with insulin-resistance, such as those with PCOS, are often prescribed insulin-sensitizing agents such as metformin which reduces circulating insulin levels as well as the free androgen concentration; these have limited sole use for hirsutism [17, 107]. Rosiglitazone is not licensed for treating hirsutism in women and it has recently been withdrawn by the EMA because of cardiovascular concerns [90].

Gonadotropic releasing hormone analogues (GnRH). Leuprolide and nafarelin are GnRH analogues, an expensive class of pharmacotherapy that only has weak evidence to support its efficacy for hirsutism [88, 90]. If GnRH treatment is not combined with oestrogen then severe oestrogen-deficiency can occur, causing menopausal symptoms such as hot flashes and osteoporosis and this therapy is not generally recommended for post-menopausal women [88, 90].

Topical treatments

Eflornithine is approved as a topical treatment for unwanted facial hair. The cream inhibits L-ornithine decarboxylase, a critical enzyme in hair growth, resulting in reduced hair density making the hair less noticeable [107]. It has been shown to promote rapid hair removal if combined with laser treatment [17]. Although it does not remove hair, it reduces the rate of hair growth. More long-term data are required [90].

Adjuvant Therapy

To optimise treatment, pharmacotherapies are often combined with mechanical hair-removal methods, including shaving, bleaching, depilation and electrolysis [17, 90] and topical agents like eflornithine.

Treatment recommendations and exclusions

Skin disorders

HT has been shown to alleviate skin problems which arise as post-menopausal symptoms. However, HT would not be recommended solely for this purpose. It should be viewed that HT is used to treat other menopausal symptoms with the added bonus that it may also improve skin-related conditions [43, 47]. The risk : benefit ratio should be assessed on an individual basis and HT should not be ruled out [6, 40, 46, 51]. General life-style changes and cosmetic interventions can also help to reduce the signs of skin-ageing.

Hair disorders

There are limited data available providing sufficient clinical evidence of efficacy with regards to the pharmacotherapies available for the treatment of hair disorders, particularly in post-menopausal women [92]. This may be due to the lack of clarity with regards to the diagnosis of hair disorders, chronic conditions treated with long-lasting therapies, as well as patient uncertainty. A more structured approach to collecting patient history combined with the use of standardised methodology for clinical diagnosis, for example the use of classification and score systems, have resulted in improvements [92]. A holistic approach is recommended for the treatment of hair disorders in order to encompass the psychological and lifestyle aspects of these conditions as well as the pharmacotherapeutic interventions and cosmetic adjuncts [28].

Hair loss

The present study data are lacking in terms of providing clinical evidence of efficacy for the systemic and topical therapies currently available for the management of post-menopausal hair loss. Assessment of efficacy is made more difficult due to the apparent stabilisation in hair loss which seems to occur over time regardless of treatment [56, 98]. Providing psychological support with reassurance to lessen patients' anxiety about hair loss is important [110].

Although the use of complementary and alternative medicine among menopausal women has increased over recent years [111], very little has been published about treatments specifically for hair loss.

In conclusion, there are currently no recommendations and insufficient knowledge of hair loss treatment in post-menopausal women and further scientific research, particularly in this age group, is required.

Hirsutism

The Endocrine Society's Clinical Guidelines for the treatment of hirsutism recommends the use of pharmacological therapy or direct hair removal methods for women suffering with hirsutism [85], as follows:

- oral contraceptives are the mainstay of hirsutism treatment for pre- and post-menopausal women,
- anti-androgens are recommended for women of none child-bearing potential or who choose not to conceive or who have a safe contraception,
- anti-androgens can be prescribed for women as an adjunct therapy to oral contraceptives if the hirsutism persists after 6 months of monotherapy,
- flutamide and the use of topical anti-androgen therapies are not recommended for hirsutism whilst GnRH agonists should only be administered to women with severe hyperandrogenemia or who have not responded to OCPs and anti-androgens,
- laser treatment or photoepilation are recommended as direct long term hair removal methods.

In all cases, the character and anatomy of the hair should be taken into account when considering treatment.

Conclusions

Changes in the appearance of the skin and in hair distribution in post-menopausal women can have a significant and detrimental effect on their quality of life. Treatment of these conditions should be specific to this patient population and should take patient preference into account. In particular, the impact of UFH and hirsutism in post-menopausal women is still underestimated and requires further research. Female alopecia remains a challenging condition to treat with limited data available for treatment specifically in the post-menopausal female population.

The causes of skin changes, hirsutism and hair loss and the management of these conditions are different for post-menopausal women compared with women of reproductive age. It is felt that post-menopausal women deserve special care and attention as they enter a new phase in their lives, a phase that is associated with complex physiological and psychological changes. ■

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