ORIGINAL ARTICLE

Guidelines for management of androgenetic alopecia based on BASP classification–the Asian consensus committee guideline

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Abstract

Background Androgenetic alopecia (AGA), or pattern hair loss, is a common disorder in both Asian men and women. There are several guidelines for the treatment of AGA which are suitable for Caucasian patients; however, each of these has some limitations. Furthermore, in comparison with Caucasian patients, Asian patients with AGA have different types of hair loss and family histories which may alter the treatment response. There is currently no published AGA guideline for Asian patients.

Objectives The Asian Consensus Committee for Androgenetic Alopecia aimed to develop an algorithmic guideline, based on the basic and specific (BASP) classification, for the treatment of AGA especially in Asian patients.

Methods The committee collaborated extensively on reviewing available literature on AGA treatment in order to formulate an algorithmic guideline on AGA management.

Results Previously published guidelines based on pre-existing classifications of AGA cannot easily classify the patterns of AGA that are more frequently seen in Asians. The BASP classification not only facilitates the development of a unified and simplified algorithm, but also overcomes the disadvantages of previously reported classification systems.

Conclusions The proposed treatment guideline for AGA based on the BASP classification may be useful for dermatologists in their approach to treating Asian patients with AGA in clinical practice. Ideally, clinicians should try to utilize this guideline consistently in their practice to monitor treatment response with the goal of enhancing successful outcomes. This will help boost patients' confidence and self-esteem, thus improving patients compliance with the prescribed treatments.

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Conflict of Interest

None of the committee members has any financial interest in any of the companies whose products are discussed here.

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Introduction

The term 'androgenetic alopecia (AGA)' was coined by Orentreich[1] in 1960, but the same condition in men has been termed male pattern alopecia, common baldness, male pattern baldness and male pattern hair loss (MPHL). Androgen dependence and hereditary factors are less obvious in affected women than in men; therefore, PHL, a broader term than AGA, is preferred for women. AGA is the most common type of alopecia that occurs after puberty in both sexes.

In Caucasians, the prevalence of AGA has been well documented by Hamilton[2] and Norwood.[3] A US study on Caucasian men revealed a predominance of frontal baldness (Type A variant) in 12% and a Type III or worse pattern in 16% of males aged 18–29 years old, which increased progressively to 53% in those aged 40–49 years old.[4] A study of 20- to 50-year-old Norwegian men most commonly reported Type I (31%), followed by Type II (26%) and Type V or worse (20%).[5] Similar results were also shown in Finnish and Australian studies (Table 1).[6,7]

Although the Asian prevalence of AGA is lower than in Caucasians,[8,9] AGA is also a common disorder in Asia. According to epidemiologic data from China,[10,11] India,[12,13] Korea,[14] Taiwan[8] and Thailand,[15] it is estimated that at 41–73% of Asians develop PHL at some point in their lives, and this incidence increases with advancing age. In a recent Japanese study, Japanese men develop AGA approximately one decade later than Europeans, and the prevalence is 1.4-fold lower in each decade of life.[9] In Korean men, the prevalence of AGA (Norwood III or above) at all ages was 14.1% and increased steadily with advancing age, but remained lower than that of Europeans.[14] Similarly, Chinese and Taiwanese men had lower AGA prevalence than Caucasian men.[8,10] In a Singaporean study,[16] the prevalence of AGA in Singapore increased with age, affecting 11% of young adults over 20 years of age, and reaching 61.78% at 70 years of age, which is as high as that of Caucasians. This discrepancy may be attributed to the diverse population residing in the country, or the inclusion of the almost normal Norwood type I in the study.[9] Nonetheless, this high prevalence in older people suggests that this form of hair loss may be considered a normal consequence of ageing. However, particularly in younger men, hair loss can have significant psychosocial manifestations, which has a significant economic impact on the household health expenditure.[17]

Asian men with AGA display different characteristics compared with men of other ethnicities (Table 1). According to Asian data,[8,10–12,14–16] Asian patients with AGA have more prevalence of vertex hair loss and less of anterior hair loss than Caucasians.[9] However, there is a similar increase in prevalence with age among all the Asian groups studied.[8,10–12,14–16] The reason for an increasing rate of the prevalence of AGA in Asia when compared with that of Caucasians remains unknown, but a transition towards a more Western diet and lifestyle may play a role.[14,15] Although Asians with AGA have different types of hair loss[8,10–12,14–16] which may alter the treatment response, there is currently few published AGA guideline for Asian patients. Recently, Japanese guideline for AGA was reported by Tsuboi *et al.*[18] As there is paucity of data comparing treatment responses between races in AGA, it is worthwhile that establishing the treatment guideline of AGA in Asians who have different aspects of prevalence, type, family history and other factors from other races.[8,10–12,14–16]

Various classification methods have been proposed for describing AGA. In 1950, Beek[19] published a classification system, based on 1000 Caucasian males, which used two evolutionary aspects: frontal and fronto-vertex baldness. In the following year, the first systematic classification of AGA was established by Hamilton.[2] Hamilton sub-classified the patterns of baldness based on frontoparietal and frontal recession and vertex thinning, and then evaluated a large group of men and women for the presence of specific patterns of hair loss from the prenatal period through the tenth

Table 1 Clinical differences of androgenetic alopecia between Asian and Caucasian

	Asian	Caucasian
Prevalence	38.5% in men, Thailand (18–90 years)[15]	74.8% in men, Australia(40–69 years)[7]
	40.5% in men and 5.4% in women, Korea[25]	63.0% in men, Norway(20–50 years)[5]
	14.1% in men and 5.6% in women, Korea (25–75 years)[14]	46.0% in men, Finland(25–74 years)[6]
	22.4% in men, Taiwan (40–91 years)[8]	46.3% in men, US(20–94 years)[2]
	21.3% in men and 6% in women, China (> 18 years)[11]	42.0% in men, US(18–49 years)[4]
	19.9% in men and 3.1% in women, China[10]	
	63.0% in men, Singapore (20–80 years)[16]*	
	58.1% in men, India (30–49 years)[12]*	
Most common clinical manifestation	Type III Vertex(H-N) in men and Type I (L) in women, Korea[14]	Type IV (H-N) in men, US[2]
	Type III Vertex (H-N) in men and Type I (L) in women, China[10]	Type A variants (H-N) in men, US[4]
	Type VI (H-N) in men and Type I (L) in women, China[11]	Type IV (H-N) in men, Norway[5]
	Type VI (H-N) in men, Thailand[15]	Frontal only in men, Australia[7]
	Type II (H-N) in men, India[12]*	
	M1V2 (BASP) in men and C0F1 (BASP) in women, Korea[25]	

*This result may be attributed to the diverse populations residing in the country or the inclusion of the almost normal Norwood type I in the study.[9]
H-N, Hamilton–Norwood classification; L, Ludwig classification; BASP, BASP classification; US, United States.

decade of life. In 1975, Norwood[3] refined Hamilton's classification by emphasizing temporo-frontal or vertex only subcategories of hair loss into seven types, with a type A variant and reported the incidence of male pattern baldness at various ages in 1000 Caucasian adult male subjects. An additional pattern was introduced in the 'Norwood-Hamilton classification' in the clinical trial of finasteride in MPHL.[20] Olsen[21,22] proposed assigning separate designations (temporal, frontal, mid and vertex) to the areas of the scalp that bald at different rates in different individuals with MPHL. Olsen[21] also proposed an individualized classification system that assigned a density scale to each of these designated scalp areas in any given patient, which was further refined in a later publication.[22] Ludwig[23] presented a different picture of hair loss in women from that described by Hamilton.[2] He emphasized preservation of the frontal fringe despite progressive centrifugal loss over the top of the scalp and arbitrarily designated three gradations of hair loss. Olsen[24] proposed that frontal accentuation (or the 'Christmas tree' pattern) be considered another pattern of hair loss in women, which helps to distinguish AGA from other potential hair loss mimicries in women. Presently, the Norwood-Hamilton classification[20] for MPHL and the Ludwig classification[23] for female PHL (FPHL) are the most commonly used classification methods for assessing AGA worldwide.

Despite these classification methods for AGA, limitations are evident. The Norwood-Hamilton classification[3] (Fig. 1) is too detailed and is less stepwise in its description, making it difficult to memorize for common use. In addition, this classification does not list some peculiar types of baldness, such as FPHL in men. Additionally, many women with MPHL cannot be classified using the Ludwig classification system (Fig. 2).[21] For most of these classification systems, clinicians must use distinct methodologies for each gender in order to correctly classify the pattern.[22] For these reasons, we use the basic and specific (BASP) classification (Fig. 3),[25] which is a new comprehensive, stepwise, systematic and universal classification system for AGA, regardless of race or sex. The BASP classification may prove particularly useful in communicating the exact amount and distribution of hair loss in those with AGA.

There are several recently published reviews of AGA, including guidelines for diagnosis and treatment.[18,26–32] Many published reviews are focused on the pathophysiology and prevalence of AGA and enumerations of medications. Moreover, previously published guidelines are suitable for Caucasians but, as discussed, they have limitations when applied to Asians.[18,26–29,32] Although Price[29] and Olsen *et al.*[28] suggested practical guidelines, they focused on the enumeration of evaluation and treatment of AGA, and did not indicate an algorithmic guideline. Shapiro *et al.*[32] showed a practical algorithmic guideline of AGA treatment, but it is based on the Norwood–Hamilton classification and Ludwig classification. Blume-Peytavi *et al.*[26] suggested an algorithm for diagnosis, but it is not for treatment and uses the Sinclair scale. In addition, the Japanese guideline[18] is based on the same classification, even if the guideline is difficult to apply to Asians. These classifications are well suited for Caucasians, but FPHL in men cannot be classified using the Norwood–Hamilton classification system, which, as listed examples above, are more frequent in Asians than Caucasians.[2,4–7,9–11,14,25] It is unfortunate that to date, there are no comparative clinical studies of AGA between Asian and Caucasians. Further studies are needed to compare the clinical manifestations between Asian and Caucasian. For these reasons, it is important to establish guidelines for the management of AGA that are also applicable to Asians, and regardless of sex.

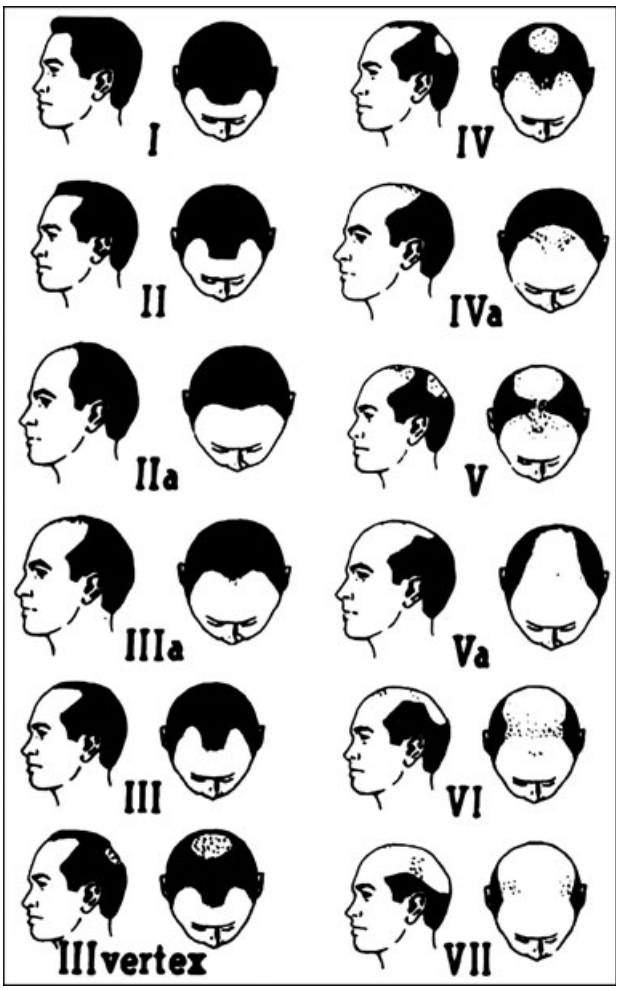

Figure 1 The Hamilton–Norwood classification of male balding defines two major patterns and several less common types.[3] Thinning starts in both temples as well as the crown/vertex and slowly progresses to encompass the entire top of the scalp.

Therefore, the Asian Consensus Committee for AGA developed an algorithmic guideline for the treatment of AGA in Asian patients. Composed of leading Asian dermatologists, the committee was established based on the significant experience of the members in treating AGA in Asian patients. The committee collaborated extensively on reviewing available literature on AGA treatment to formulate an algorithmic guideline on AGA manage-

Figure 2 Ludwig pattern of hair loss (3-point).[70] There are three main classes each with increasing hair loss.

ment. The regular review, feedback and final consensus of the manuscript was performed and approved by all committee members. This guideline is based on the BASP classification, which not only facilitates the development of a unified and simplified algorithm but also overcomes the disadvantages of previously reported classification systems. It is important that clinicians are involved and trained in the diagnosis and treatment of AGA in Asian patients.

Previously published guidelines based on pre-existing classifications of AGA cannot easily classify the patterns of AGA that are more frequently seen in Asians. As a matter of course, this new guideline is not exclusive to Asian patients, but may also be applied to other races regardless of age or sex. This guideline will not only aid clinicians in managing and selecting the appropriate

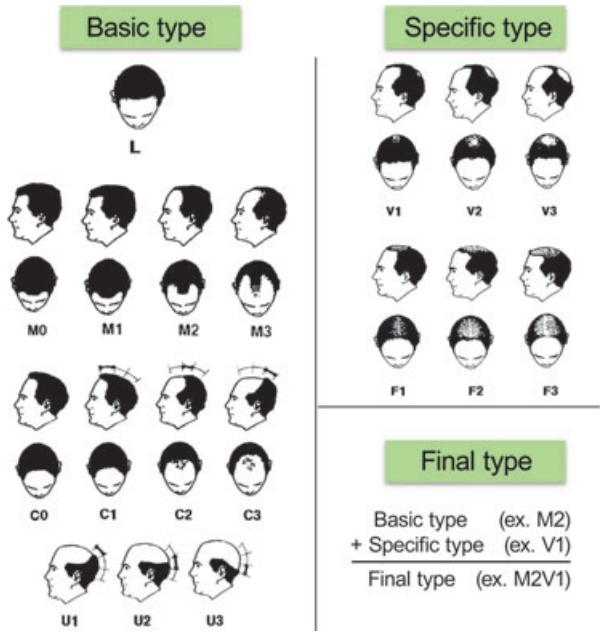

Figure 3 The basic and specific classification system includes four basic types (L, M, C and U) and two specific types (V and F).[25] The basic types represent the shape of the anterior hairline, and the specific types represent the density of hair on specific areas (frontal and vertex). The final type is decided by a combination of the basic and specific type.

treatments for AGA patients but it will also educate the public regarding the misinformation and myths surrounding AGA.

Management

There has been paucity of data comparing treatment responses between races in AGA. Further studies are needed in near future. In this review, we introduce the general aspects of management and treatment of AGA.

General considerations

Patients should avoid hair-care products likely to damage the scalp and/or hair. Patients should also maintain an adequate diet, especially one with adequate protein.[28] The National Institutes of Health recommended daily allowance for protein is 0.8 gm/kg.[27] Topical medications work only where the medication is applied; therefore, the entire area at risk of hair loss (e.g. the top of the scalp) should be treated with a given topical agent. If possible, any drugs that could negatively affect hair growth should be stopped and alternative substitutes made.[9] Although certain drugs are more commonly associated with hair loss than others, any drug can potentially cause telogen effluvium. Medications for which hair loss is a common potential side-effect include retinoids, cytotoxic agents, anticoagulants, β-blockers, captopril, cholesterol lowering drugs, colchicine, lithium, penicillamine and valproate.[28,29] Any underlying scalp disorder, such as seborrhoeic dermatitis or scalp psoriasis, should be treated as these conditions can affect the ability to use topical treatments for hair loss without irritation.[28]

Education and counselling

Androgenetic alopecia is often associated with a poor self-image and low self-respect. The problem must be viewed in perspective, and an empathic approach is important as different people are affected in various ways when they lose hair. The typical man with MPHL who seeks treatment likely has significant concerns about the condition and has already engaged in considerable efforts to obtain information and at times even resorted to self-medication. Individualized consideration of attitudes, concerns, self-treating efforts and expectations is crucial for effective management of men seeking medical treatment for MPHL.[33] In a Japanese study, although the treatment of AGA improved the quality of life of patients, it did not alleviate the patients' anxiety of AGA.[34] In addition, research has shown that most men and women who have unwanted hair loss have a distressing experience that diminishes their body image regardless of race.[35] Nevertheless, the distressing experience of hair loss may be more serious in Asians, due to its lower prevalence in this population.[8,9] For instance, Asian patients with AGA may be more likely to experience stressful situations, such as feelings of insecurities or unattractiveness, which may have significant effects in their social and professional lives.[36,37]

As of the psychological impact of hair loss, patients may seek inappropriate and unproven therapies. Patients must know that

safe and effective treatment is available, if they require it. However, they must also appreciate the real 'goals' and true 'limitations' of each form of therapy. Knowledge and understanding of the genetic and physiological basis of AGA may help allay misconceptions and anxiety about its occurrence, and indirectly influence a patient's willingness to seek treatment for this condition.[29]

It is important that misconceptions are also corrected. Some patients mistakenly think they have too many hormones. Others erroneously place too many restrictions on their hair and grooming (e.g. hair styling, teasing, hair spray, washing frequency and hair colour or permanents).[38]

Clinicians should follow the progress of their patients periodically to identify problems, utilizing a photographic record of the treatment results. More importantly, these reviews also help to boost patients' compliance to treatment. This is one of the key backbones for successful AGA treatment, as it may take time to see good results.

Medical treatments

Generally, with medical treatment, a reduction in hair loss is seen after 3–6 months and visible hair regrowth is observed after 6–12 months. Continuous treatment is needed to ensure sustained benefits. Unfortunately, available medical treatments are not definitely curative. Ensuring that patients understand the limitations of these treatments is an important aspect of AGA management. Patients should be counselled that AGA treatment will not restore hair growth to its prepubertal density and that the main aim is to prevent further progression of hair loss.

Males Currently there are two agents, topical minoxidil and oral finasteride, approved by the US Food and Drug Administration (FDA) for the treatment of AGA.

(1) Topical minoxidil solution: Topical minoxidil solution is administered at a dosage of 1 mL twice daily. Its mechanism of action remains unknown; however, the main benefit appears to be the prolongation of the anagen phase and hair shaft diameter, irrespective of the underlying cause. The efficacy of minoxidil solution varies in different studies. It is well established that 5% minoxidil is more effective than the 2% or 3% solution. In a study of men aged 18–49 years old, hair counts were 45% higher in those receiving 5% minoxidil than those receiving 2% minoxidil.[39] Patients should be warned that in the initial 2–8 weeks, a temporary telogen effluvium may occur in some, which is self-limiting and subsides when subsequent anagen regrowth begins, and it should not be a cause for treatment cessation.[40] A Japanese study[41] also confirmed the superiority of 5% topical minoxidil to 1% topical minoxidil in treating Japanese men. The safety and efficacy of 5% minoxidil solution was also confirmed in a phase 4, open-label and multi-centre clinical trial involving Korean men with AGA.[42] A recent advancement in the use of minoxidil as a hair loss treatment is the development of a 5% topical foam. Placebo-controlled double-blind trials have demonstrated that the hydroalcoholic foam is efficacious, safe and well accepted cosmetically by patients.[19]

(2) Oral finasteride: Oral finasteride is a potent type II 5α-reductase inhibitor that should be administered at a daily dosage of 1 mg. In clinical trials over a 2-year period in men aged 18–41 years, the following results were obtained: at 1 year, 48% regrew hair (slight in 30%, moderate in 16%, great in 2%), 51% had hair loss stabilized and 1% had progressive hair loss. At 2 years, 66% regrew hair, 33% had stabilized hair loss and 1% lost hair. The number of responding hairs was established after 1 year and continued treatment increased the length, diameter and pigmentation of these hairs so that the coverage of the scalp increased over time. On stopping finasteride, the regrown hair persisted, but the balding process resumed. An extension of the above study to 5 years showed that finasteride 1 mg/day was well tolerated, and led to durable improvements in scalp hair growth.[43]

Finasteride is generally well tolerated, side-effects are typically mild and generally do not require discontinuation of therapy. Rare side-effects may include some loss of libido and erectile function. At present, there is no proven benefit for finasteride in women. A placebo-controlled study in post-menopausal women with AGA given finasteride 1 mg/day over 1 year showed no significant benefit in Western study.[43] However, the study of 5 mg/day finasteride treatment for Asian women revealed that the treatment may be an effective and safe treatment for normoandrogenic women with FPHL. Further studies are needed to clarify the efficacy of finasteride in women.[44]

Finasteride is also effective in Asian AGA patients. In Taiwanese men with AGA, finasteride 1 mg/day for 1 year slowed the progression of hair loss and increased hair growth.[45] In a clinical study by Kawashima *et al.*[46] 58%, 54% and 6% of Japanese men with AGA receiving finasteride 1 mg, finasteride 0.2 mg and placebo, respectively, had improved conditions based on assessments of global photographs. All efficacy endpoints were numerically superior for the 1 mg dose over the 0.2 mg dose. They suggested that finasteride 1 mg/day slows hair loss and improves hair growth in Japanese men with MPHL. In addition, in a recently published Japanese study of 3177 patient with AGA, long-term use of oral finasteride maintained progressive hair regrowth without recognized side-effects.[47]

However, to date, there is no published comparative study on finasteride treatment between Asian and Caucasian patients. Interestingly, although oral finasteride improved the quality of life of Japanese AGA patients, oral finasteride did not alleviate the patients' anxiety of AGA.[34]

Females (1) Topical minoxidil solution: As with men, topical minoxidil solution is administered at a dosage of 1 mL twice daily in females. Data for women, however, are less conclusive. In a randomized, placebo-controlled trial on Japanese women with AGA, Tsuboi *et al.*[48] reported that 29.2% of the patients had moderate or better improvement in the 1% topical minoxidil group com-

pared with 11.8% in the placebo group. Meanwhile, the 5% solution was compared with the 2% solution in two studies involving 493 women. On the basis of hair-count data, the 5% solution was not significantly more effective than the 2% solution.[43] A recent comparative study between 5% foam and 2% solutions in Caucasians showed similar results.[49] However, as mentioned previously, patients should be warned of the possibility of an initial but temporary telogen effluvium, which should not be a cause for treatment cessation.[40] Side-effects include hypertrichosis which occurs in 6% of women using 2% minoxidil, and 14% among those using the 5% solution. It may occur on the face but resolves within 1–6 months after drug discontinuation. Moreover, hypertrichosis diminishes or disappears after about 1 year, even with continued use of minoxidil in Caucasian study.[40]

(2) Oral anti-androgens: Cyproterone acetate, spironolactone and flutamide can be used as an alternative to minoxidil solution, but most of the anti-androgen therapies have not been rigorously studied in FPHL.[50] In general, better results are seen in women with hyperandrogenism.[28] Side-effects are generally greater with cyproterone acetate and spironolactone.[28] The efficacy of anti-androgens for AGA has been investigated in some small studies,[51] but this approach is not usually considered.[30,52]

Surgical management

Despite advances in medical therapy, hair transplantation remains the only means of permanent hair restoration in severe AGA. It is contraindicated in patients with systemic diseases, such as hypertension, cardiac disease and diabetes mellitus, all of which must be controlled before hair transplantation. Local diseases, such as cutaneous lupus erythematosus, morphea, alopecia areata and scalp folliculitis, have to be quiescent for at least 6 months before hair transplantation. Complications of hair transplantation include ingrown hairs and foreign body reactions, infection, cobblestoning, graft depression, epidermal cysts, bleeding, headaches, scarring (keloid and hypertrophic scars), poor hair growth, arteriovenous fistula, osteomyelitis, wound dehiscence, telogen effluvium, accelerated hair loss, delayed temporary marked thinning, curly, lustreless hair, chronic mild folliculitis and patient dissatisfaction.[50,53]

It is impossible to accurately predict how many hairs will appear in any given graft. The average number is between 10 and 18 hairs per standard round graft, 3–6 per minigraft, and 1 or 2 per micrograft. After 4–6 months, the skin surface of the grafts has usually blended in perfectly with the surrounding scalp. In some patients, the grafts may be a shade lighter in colour until they are 'aged' by sun exposure.[50,53–55]

Medical therapy only available in specific regions

Oral dutasteride Dutasteride is dual type I and type II 5α-reductase inhibitor. In clinical trials, dutasteride showed significantly higher efficacy than placebo according to phototrichometric hair count, subject self-assessment and investigator and panel photographic assessment.[56] Dutasteride is generally well tolerated, with rare side-effects that may include some loss of libido and erectile function. Dutasteride is only approved by the Korean FDA for AGA treatment.

Topical 0.025% alfatradiol Under the influence of 17-α-estradiol (alfatradiol), an increased conversion of testosterone to 17-β-estradiol and androstendione to estrone improves hair growth.[57,58] Topical alfatradiol may be an alternative, although reports of its efficacy have variable results in Caucasian studies.[59,60] In a recent Asian study in Korea, 17α-estradiol solution showed significant improvements in hair counts and diameter from baseline to 4 and 8 months after treatment.[61] Topical alfatradiol is available in Europe, South America and Korea.

Evolving therapy not approved for AGA treatment

Bimatoprost and latanoprost Prostaglandin (PG) F2α analogues, bimatoprost and latanoprost, demonstrate a stimulatory effect on eyebrow and eyelash hair growth and pigmentation in many patients.[62] The expression of PG receptors was examined in mouse skin hair follicles, and mRNA was identified in the dermal papilla and outer root sheath follicular structures during the anagen phase. In addition, other studies have demonstrated the ability of PG to stimulate movement from the telogen to the anagen phase in mice.[63] In a recent study, latanoprost significantly increased hair density at 24 weeks compared with baseline and the placebo-treated area.[64]

Ketoconazole The mechanism of ketaconazole remains unknown but may involve anti-inflammatory or anti-androgenic properties.[65] There is some evidence, both in humans and in rodents, that this agent may stimulate hair growth.[17,66]

Other devices

Devices can be used as alternative tools for the treatment of AGA. However, the following treatments cannot be substituted for the medical and surgical approaches previously mentioned.

Low-level laser therapy A total of seven patients were exposed to low-level laser therapy (LLLT) twice weekly for 20 min at a time over a period of 3–6 months. On average, Caucasian patients had a decrease in the number of vellus hairs, a non-significant increase in the number of terminal hairs and an increase in shaft diameter.[67] Further studies are needed to verify the accuracy, validity and the efficacy of the laser hair comb.[67]

Fractional photothermolysis laser In a pre-clinical study, the hair stimulation effects of fractional photothermolysis laser therapy were dependent upon the energy level, density and irradiation interval. In a human pilot study, incremental improvements in hair density and growth rate were observed both Asian and Cauca-

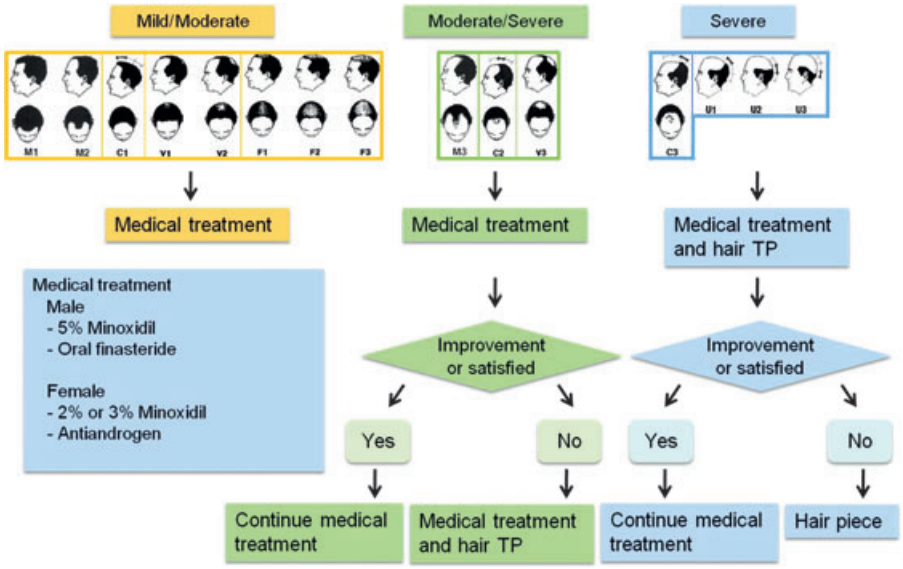

Figure 4 Algorithmic guideline for the management of androgenetic alopecia (AGA). Mild/moderate AGA = BASP type M1-2, C1, F1-3 or V1-2; moderate/severe AGA = BASP type M3, C2-3, U1-3 or V3; severe AGA = BASP type C3 or U1-3.

sian.[68,69] Further studies are needed to clarify the efficacy of this laser treatment.

Non-medical aesthetic aids

Non-medical approaches can provide cosmetic relief to both men and women with thinning hair, if medical treatments are not indicated, ineffective or not desired by the patient. They can also be used as adjuvant tools to medical or surgical treatments.[28]

Wigs, hair pieces and hair extensions In patients with extensive hair loss or those who want non-medical treatment, these methods can be used to cover a thinning scalp. Hair pieces can be custom-made and fitted to match the extent of hair loss or can be obtained as a readymade piece. Small interwoven wigs (weaved in with existing terminal hair) may be satisfactory in some men and women. Advances in the technology of these prostheses have made their use more acceptable. However, continued hair growth tends to lift up the interwoven wigs and frequent readjustments are necessary and may be expensive.

Topical powder makeup In patients with AGA and mild-to-moderate vertex hair loss, topical hair powder may be satisfactory. As static electricity allows a transient attachment between the hair and the powder, it can provide a cosmetic covering of the scalp in areas of scalp hair thinning and can be a useful in camouflage.

Algorithmic guideline for the management of AGA

A suggested algorithm for therapeutic management of AGA is shown in Fig. 4, and several treatment options for AGA are listed in Table 2. In individuals with mild-to-moderate AGA (BASP type M1-2, C1, V1-2 or F1-3), monotherapy with 5% minoxidil or

Table 2 Management options for androgenetic alopecia (AGA)

Medical treatments*
Males
Topical minoxidil (A)
Oral finasteride (A)
Females
Topical minoxidil (A)
Oral anti-androgens (C)
Surgical treatment
Hair transplantation (B)
Miscellaneous medical therapy†
Oral dutasteride (B)
Topical 0.025% alfatradiol (C)
Evolving therapy‡
Bimatoprost and latanoprost
Ketoconazole
Non-medical aesthetic aids
Wigs, hair pieces and hair extensions
Topical powder makeup

*Currently, only topical minoxidil and oral finasteride are approved by the FDA for treatment of AGA.
†Only available in specific regions.
‡Not approved for AGA treatment.
(A) Strongly recommended on the basis of at least one evidence of one or more systematic review, meta-analysis or randomized controlled trials corroborating the efficacy of the treatment; (B) Recommended on the basis of at least one evidence of randomized controlled trials with low quality, evidence of controlled study without randomization with good quality; (C) May be considered for use, but not enough evidences.

finasteride in men and with 2% or 3% minoxidil or anti-androgen in women is recommended for 6–12 months, with initial follow-up visits at 6 and 12 months. A pre-treatment photograph should be taken to help track patient outcomes. In moderate-to-severe AGA patients (BASP type M3, C2 or V3), medical treatment is recommended for at least 1 year, with initial follow-up visits at 6 and 12 months and annually thereafter in treatment responders. In those individuals with no perceptible improvement or stabilization after 1 year of treatment, a combination of medical treatment with hair transplantation is recommended. In severe AGA patients (BASP type C3 or U1-3), a combination of medical treatment with hair transplantation is recommended for at least 1 year, with initial follow-up visits at 6 and 12 months and annually thereafter in treatment responders. A hair piece or cosmetic aids can be considered in patients with severe AGA and no perceptible improvement or stabilization after 1 year of treatment. This algorithmic guideline may also be used for Caucasians, although it was created by the committee specifically for Asians, because the BASP classification used in the guideline appropriately classifies the patterns of AGA that are more frequently seen in Asians.

Conclusion

Although the clinical aspects of AGA are well recognized in both men and women, much remains to be determined regarding the most appropriate treatment based on the genetics and pathophysiology of these common conditions. In addition, dermatologists should take into account the psychological well being of patients with AGA, which can lead to inappropriate treatments. There are effective treatments, medical or surgical, currently available for some men and women with AGA. Compared with other ethnicities, Asian patients with AGA have different types of hair loss and family histories which may alter the treatment response. The proposed treatment guideline for AGA in Asians may thus be useful for dermatologists in the region. Clinicians should try to utilize this guideline consistently in their practice to monitor treatment response with the goal of enhancing successful outcomes. This will help boost patients' confidence and self-esteem, thus improving patients' compliance with the prescribed treatments.

It is worthwhile to establish an AGA treatment guideline based on the BASP classification for Asians who may have different AGA presentations compared with other races. Nevertheless, this new guideline is not exclusive to Asian patients, and may be universally applicable to any person regardless of race or sex.

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References

1 Orentreich N. Pathogenesis of alopecia. *J Soc Cosmet Chemists* 1960; **11**: 479–499.
2 Hamilton J. Patterned loss of hair in men: type and incidence. *Ann N Y Acad Sci* 1951; **53**: 708–728.
3 Norwood OT. Male pattern baldness: classification and incidence. *South Med J* 1975; **68**: 1359–1365.
4 Rhodes T, Girman CJ, Savin RC *et al.* Prevalence of male pattern hair loss in 18-49 year old men. *Dermatol Surg* 1998; **24**: 1330–1332.
5 DeMuro-Mercon C, Rhodes T, Girman CJ, Vatten L. Male-pattern hair loss in Norwegian men: a community-based study. *Dermatology* 2000; **200**: 219–222.
6 Hirsso P, Rajala U, Hiltunen L *et al.* Prevalence of alopecia and its association with cardiovascular disease in the Finnish male population age 25-74 years; results from the Finrisk 2002 study. *Eur J Dermatol* 2007; **17**: 93–94.
7 Severi G, Sinclair R, Hopper JL *et al.* Androgenetic alopecia in men aged 40-69 years: prevalence and risk factors. *Br J Dermatol* 2003; **149**: 1207–1213.
8 Su LH, Chen TH. Association of androgenetic alopecia with smoking and its prevalence among Asian men: a community-based survey. *Arch Dermatol* 2007; **143**: 1401–1406.
9 Lee WS, Lee HJ. Characteristics of androgenetic alopecia in Asian. *Ann Dermatol* 2012; **24**: 243–252.
10 Xu F, Sheng YY, Mu ZL *et al.* Prevalence and types of androgenetic alopecia in Shanghai, China: a community-based study. *Br J Dermatol* 2009; **160**: 629–632.
11 Wang TL, Zhou C, Shen YW *et al.* Prevalence of androgenetic alopecia in China: a community-based study in six cities. *Br J Dermatol* 2010; **162**: 843–847.
12 Krupa Shankar D, Chakravarthi M, Shilpakar R. Male androgenetic alopecia: population-based study in 1,005 subjects. *Int J Trichology* 2009; **1**: 131–133.
13 Grover S. A study of patterns of androgenetic alopecia in men: an Indian perspective. *Br J Dermatol* 2005; **152**: 572–574.
14 Paik JH, Yoon JB, Sim WY *et al.* The prevalence and types of androgenetic alopecia in Korean men and women. *Br J Dermatol* 2001; **145**: 95–99.
15 Pathomvanich D, Pongratananukul S, Thienthaworn P *et al.* A random study of Asian male androgenetic alopecia in Bangkok, Thailand. *Dermatol Surg* 2002; **28**: 804–807.
16 Tang PH, Chia HP, Cheong LL *et al.* A community study of male androgenetic alopecia in Bishan, Singapore. *Singapore Med J* 2000; **41**: 202–205.
17 Ellis JA, Sinclair RD. Male pattern baldness: current treatments, future prospects. *Drug Discov Today* 2008; **13**: 791–797.
18 Tsuboi R, Itami S, Inui S *et al.* Guidelines for the management of androgenetic alopecia (2010). *J Dermatol* 2012; **39**: 113–120.
19 Beek CH. A study on extension and distribution of the human body-hair. *Dermatologica* 1950; **101**: 317–331.
20 Kaufman KD, Olsen EA, Whiting D *et al.* Finasteride in the treatment of men with androgenetic alopecia. Finasteride Male Pattern Hair Loss Study Group. *J Am Acad Dermatol* 1998; **39**: 578–589.
21 Olsen EA. Female pattern hair loss. *J Am Acad Dermatol* 2001; **45**: S70–S80.
22 Olsen EA. Current and novel methods for assessing efficacy of hair growth promoters in pattern hair loss. *J Am Acad Dermatol* 2003; **48**: 253–262.
23 Ludwig E. Classification of the types of androgenetic alopecia (common baldness) occurring in the female sex. *Br J Dermatol* 1977; **97**: 247–254.
24 Olsen EA. The midline part: an important physical clue to the clinical diagnosis of androgenetic alopecia in women. *J Am Acad Dermatol* 1999; **40**: 106–109.
25 Lee WS, Ro BI, Hong SP *et al.* A new classification of pattern hair loss that is universal for men and women: basic and specific (BASP) classification. *J Am Acad Dermatol* 2007; **57**: 37–46.
26 Blume-Peytavi U, Blumeyer A, Tosti A *et al.* S1 guideline for diagnostic evaluation in androgenetic alopecia in men, women and adolescents. *Br J Dermatol* 2011; **164**: 5–15.

27 Drake LA, Dinehart SM, Farmer ER *et al.* Guidelines of care for androgenetic alopecia. American Academy of Dermatology. *J Am Acad Dermatol* 1996; **35**: 465–469.
28 Olsen EA, Messenger AG, Shapiro J *et al.* Evaluation and treatment of male and female pattern hair loss. *J Am Acad Dermatol* 2005; **52**: 301–311.
29 Price VH. Treatment of hair loss. *N Engl J Med* 1999; **341**: 964–973.
30 McElwee KJ, Shapiro JS. Promising therapies for treating and/or preventing androgenic alopecia. *Skin Therapy Lett* 2012; **17**: 1–4.
31 van Zuuren EJ, Fedorowicz Z, Carter B *et al.* Interventions for female pattern hair loss. *Cochrane Database Syst Rev* 2012; **5**: CD007628.
32 Shapiro J, Wiseman M, Lui H. Practical management of hair loss. *Can Fam Physician* 2000; **46**: 1469–1477.
33 Cash TF. Attitudes, behaviors, and expectations of men seeking medical treatment for male pattern hair loss: results of a multinational survey. *Curr Med Res Opin* 2009; **25**: 1811–1820.
34 Yamazaki M, Miyakura T, Uchiyama M *et al.* Oral finasteride improved the quality of life of androgenetic alopecia patients. *J Dermatol* 2011; **38**: 773–777.
35 Cash TF. The psychosocial consequences of androgenetic alopecia: a review of the research literature. *Br J Dermatol* 1999; **141**: 398–405.
36 Han SH, Byun JW, Lee WS *et al.* Quality of life assessment in male patients with androgenetic alopecia: result of a prospective, multicenter study. *Ann Dermatol* 2012; **24**: 311–318.
37 Kim HJ, Sim WY, Song JY. Assessment of the characteristics of illness behavior and quality of life in patients with androgenetic alopecia. *Korean J Dermatol* 2001; **39**: 1094–1099.
38 Sawaya ME, Shapiro J. Androgenetic alopecia. New approved and unapproved treatments. *Dermatol Clin* 2000; **18**: 47–61, viii.
39 Olsen EA, Dunlap FE, Funicella T *et al.* A randomized clinical trial of 5% topical minoxidil versus 2% topical minoxidil and placebo in the treatment of androgenetic alopecia in men. *J Am Acad Dermatol* 2002; **47**: 377–385.
40 Dinh QQ, Sinclair R. Female pattern hair loss: current treatment concepts. *Clin Interv Aging* 2007; **2**: 189–199.
41 Tsuboi R, Arano O, Nishikawa T *et al.* Randomized clinical trial comparing 5% and 1% topical minoxidil for the treatment of androgenetic alopecia in Japanese men. *J Dermatol* 2009; **36**: 437–446.
42 Park HY, Lee WS, Park JK *et al.* An open label, multi-center clinical trial of topical 5% minoxidil solution for the treatment of male androgenetic alopecia (a phase 4 study). *Korean J Dermatol* 2009; **47**: 295–302.
43 Finasteride Male Pattern Hair Loss Study Group. Long-term (5-year) multinational experience with finasteride 1 mg in the treatment of men with androgenetic alopecia. *Eur J Dermatol* 2002; **12**: 38–49.
44 Yeon JH, Jung JY, Choi JW *et al.* 5 mg/day finasteride treatment for normoandrogenic Asian women with female pattern hair loss. *J Eur Acad Dermatol Venereol* 2011; **25**: 211–214.
45 Lin JH, Chen WC. Finasteride in the treatment of Taiwanese men with androgenetic alopecia: a 12-month open-label study. *Kaohsiung J Med Sci* 2002; **18**: 379–385.
46 Kawashima M, Hayashi N, Igarashi A *et al.* Finasteride in the treatment of Japanese men with male pattern hair loss. *Eur J Dermatol* 2004; **14**: 247–254.
47 Sato A, Takeda A. Evaluation of efficacy and safety of finasteride 1 mg in 3177 Japanese men with androgenetic alopecia. *J Dermatol* 2012; **39**: 27–32.
48 Tsuboi R, Tanaka T, Nishikawa T *et al.* A randomized, placebo-controlled trial of 1% topical minoxidil solution in the treatment of androgenetic alopecia in Japanese women. *Eur J Dermatol* 2007; **17**: 37–44.
49 Blume-Peytavi U, Hillmann K, Dietz E *et al.* A randomized, single-blind trial of 5% minoxidil foam once daily versus 2% minoxidil solution twice daily in the treatment of androgenetic alopecia in women. *J Am Acad Dermatol* 2011; **65**: 1126–1134 e2.
50 Ross EK, Shapiro J. Management of hair loss. *Dermatol Clin* 2005; **23**: 227–243.
51 Camacho-Martinez FM. Hair loss in women. *Semin Cutan Med Surg* 2009; **28**: 19–32.
52 Blumeyer A, Tosti A, Messenger A *et al.* Evidence-based (S3) guideline for the treatment of androgenetic alopecia in women and in men. *J Dtsch Dermatol Ges* 2011; **9**(Suppl 6): S1–57.
53 Pathomvanich D. Donor harvesting: a new approach to minimize transection of hair follicles. *Dermatol Surg* 2000; **26**: 345–348.
54 Avram MR. Hair transplantation for men and women. *Semin Cutan Med Surg* 2006; **25**: 60–64.
55 Avram MR. Laser-assisted hair transplantation - a status report in the 21st century. *J Cosmet Dermatol* 2005; **4**: 135–139.
56 Eun HC, Kwon OS, Yeon JH *et al.* Efficacy, safety, and tolerability of dutasteride 0.5 mg once daily in male patients with male pattern hair loss: a randomized, double-blind, placebo-controlled, phase III study. *J Am Acad Dermatol* 2010; **63**: 252–258.
57 Hoffmann R, Niiyama S, Huth A *et al.* 17alpha-estradiol induces aromatase activity in intact human anagen hair follicles *ex vivo*. *Exp Dermatol* 2002; **11**: 376–380.
58 Arai A, von Hintzenstern J, Kiesewetter F *et al.* In vitro effects of testosterone, dihydrotestosterone and estradiol on cell growth of human hair bulb papilla cells and hair root sheath fibroblasts. *Acta Derm Venereol* 1990; **70**: 338–341.
59 Orfanos CE, Vogels L. Local therapy of androgenetic alopecia with 17 alpha-estradiol. A controlled, randomized double-blind study (author's transl). *Dermatologica* 1980; **161**: 124–132.
60 Blume-Peytavi U, Kunte C, Krisp A *et al.* Comparison of the efficacy and safety of topical minoxidil and topical alfatradiol in the treatment of androgenetic alopecia in women. *J Dtsch Dermatol Ges* 2007; **5**: 391–395.
61 Kim JH, Lee SY, Lee HJ *et al.* The Efficacy and Safety of 17alpha-Estradiol (Ell-Cranell(R) alpha 0.025%) Solution on Female Pattern Hair Loss: Single Center, Open-Label, Non-Comparative, Phase IV Study. *Ann Dermatol* 2012; **24**: 295–305.
62 Banaszek A. Company profits from side effects of glaucoma treatment. *CMAJ* 2011; **183**: E1058.
63 Sasaki S, Hozumi Y, Kondo S. Influence of prostaglandin F2alpha and its analogues on hair regrowth and follicular melanogenesis in a murine model. *Exp Dermatol* 2005; **14**: 323–328.
64 Blume-Peytavi U, Lonnfors S, Hillmann K *et al.* A randomized double-blind placebo-controlled pilot study to assess the efficacy of a 24-week topical treatment by latanoprost 0.1% on hair growth and pigmentation in healthy volunteers with androgenetic alopecia. *J Am Acad Dermatol* 2012; **66**: 794–800.
65 Trueb RM. New and established methods in therapy of hair diseases. *Hautarzt* 2003; **54**: 732–740.
66 Hugo Perez BS. Ketocazole as an adjunct to finasteride in the treatment of androgenetic alopecia in men. *Med Hypotheses* 2004; **62**: 112–115.
67 Avram MR, Rogers NE. The use of low-level light for hair growth: part I. *J Cosmet Laser Ther* 2009; **11**: 110–117.
68 Kim WS, Lee HI, Lee JW *et al.* Fractional photothermolysis laser treatment of male pattern hair loss. *Dermatol Surg* 2011; **37**: 41–51.
69 Schweiger ES, Boychenko O, Bernstein RM. Update on the pathogenesis, genetics and medical treatment of patterned hair loss. *J Drugs Dermatol* 2010; **9**: 1412–1419.
70 Ludwig E. Classification of the types of androgenetic alopecia (common baldness) occurring in the female sex. *Br J Dermatol* 1977; **97**: 247–254.