

Vertex Accentuation in Female Pattern Hair Loss in Asians

Chavalit Suprisunjai, M.D., Rattapon Thuangtong, M.D.

Department of Dermatology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

ABSTRACT

Background: The most common cause of hair loss seen in women is female pattern hair loss (FPHL), also known as female androgenetic alopecia. It affects the central part of the scalp, but spares the frontal hairline. Frontal accentuation was also described by Olsen. In Asian women, vertex thinning patterns are frequently developed, but there has been no report about vertex thinning pattern in female pattern hair loss.

Objective: To find prevalence of vertex accentuation in female pattern hair loss (FPHL) in Asian women.

Methods: Scalp hair counting (n/cm^2) were measured at 3 different areas; vertex, mid scalp and frontal area respectively by digital dermoscope (Dino digital AM-413T). Visual counting and photography were performed. Outcomes were evaluated by gross appearance of vertex thinning and/or hair density $<120/cm^2$ in any of 3 areas.

Results: 143 patients were evaluated. Mean age was 45.54 years. Of the hair loss type, 36.4% were mid-scalp, 33.6% were vertex accentuation and 30.1% were frontal accentuation, respectively. Age was not significantly different among the 3 types of hair loss (P-value 0.859).

Conclusion: Although the most common female pattern hair loss type is diffuse type (Ludwig type), vertex accentuation pattern is the second most common pattern in this study. This study is the first to mention “Vertex accentuation” to be another pattern for FPHL.

Keywords: Female pattern hair loss, vertex accentuation

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INTRODUCTION

Female pattern hair loss (FPHL) is a common type of hair loss. It is characterised by the diffuse declination in hair density over the central scalp and frontal scalp with retention of the frontal hair line¹. The onset starts after puberty with difference in progression, rapidity and final degree of hair loss. However, the pathogenesis of FPHL remains less well understood than male pattern hair loss, possibly due to indistinct patterns

of hair loss in women and presence of other confounding factors such as telogen effluvium². This condition is likely a multifactorial, genetic predisposition, and it is plausible that both androgen-dependent and independent mechanisms play some parts in the clinical manifestation³. The classification of FPHL also varies. In 1977, Ludwig described retention of the frontal fringe, but progressive hair loss over the top of the scalp and classified three grades of hair loss.⁴ Later in 1999, Olsen proposed that frontal accentuation (or the “Christmas tree” pattern) which is progressive decline in hair density from the front to the vertex of the scalp could be considered another pattern of hair loss in women, which helps to distinguish pattern hair loss from other potential hair-loss

Correspondence to: Rattapon Thuangtong

E-mail: rattaponthuangsung@yahoo.com

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mimic conditions in women such as telogen effluvium⁵. In 2007, Lee WS et al devised a new classification system, named Basic and Specific Pattern (BASP) classification, which is a new systematic, and universal classification system for FPHL, regardless of sex⁶. Until recently, various classification methods have been proposed for describing patterns of hair loss.

In these authors' experience, it has been noticed that quite a few Asian women developed vertex thinning with preservation of frontal fringe. Although several classification methods of patterns of hair loss have been suggested, none of these existing classifications mentioned this kind of hair loss apart from Lee WS et al. The authors therefore described a new pattern of hair loss named vertex accentuation. This study was to find the prevalence of vertex accentuation in female pattern hair loss in Asian women.

MATERIALS AND METHODS

Patients

In all, 143 female patients were studied. Participants were all outpatients aged over 15 years old at outpatient Department, Siriraj Hospital Mahidol University Thailand between January 2012 - December 2012 and were given a diagnosis of female pattern hair loss (FPHL) by clinical appearance or if necessary in doubtful case by histological confirmation which showed miniaturization of terminal hairs into vellus-like hairs and/or the ratio of terminal to vellus hair decreased to 2:1⁷. We excluded persons with other hair diseases or treatment for hair growth within 6 months before enrollment and those with systemic conditions influencing hair growth, for example, thyroid disease and anemia or sign and symptoms of hyperandrogenism. The study was approved by Siriraj Institutional Review Board (Si 103/2011).

Methods

To evaluate the presence of vertex accentuation hair loss pattern in out-patient clinic, a descriptive cross sectional study was done of all women with a clinical diagnosis of female pattern alopecia case seen by the authors in the out-patient

clinic or Hair Disorders Clinic at Siriraj Hospital, Thailand from January 2012 - December 2012. The diagnosis of female pattern alopecia was made by the authors and supported by a personal history (including past history and family history), scalp examination, and hair pulling test. For all those patients whose hair loss first began at age of 50 or older, who had multiple episodes of diffuse hair loss, or who had a history of alopecia areata or trichotillomania, female with male pattern hair loss, or history of chemotherapy, were excluded from this evaluation. Any sign of follicular degeneration, moderate to severe scalp inflammation, or patched area of hair loss were also excluded. A hair pulling test was undertaken from multiple areas of the scalp, and patients with a positive hair pulling test (>2 to 3 hairs per pulling) of telogen hairs from multiple areas of the scalp were excluded due to having a confounding condition of telogen effluvium. Hair loss compatible with female pattern alopecia was required to be more prominent on the top, the sides and back of the scalp but this was not necessarily limited to the top of the scalp. Biopsies of the scalp were done only in those cases in which the diagnosis was questionable after consideration of all of the above, for example, chronic telogen effluvium in which clinical presentation can be confusing with female pattern hair loss. Pathologic findings suggestive of androgenetic alopecia included the presence of miniaturisation of the hair follicle, a terminal-to-vellus hair ratio of less than or equal to 2:1, the absence of a peribulbar inflammatory infiltrate, preservation of normal follicular density, and a lack of significant fibrosis.

Photographs were taken in this clinic at the first visit by the authors. The top view of the scalp was taken of all patients. The authors classified each hair loss patient as to have a Ludwig pattern of hair loss (I to III). The assessment of the photograph and the diagnosis was made by the same author. The presence or absence of the thinning pattern at the vertex of hair loss on the top of the scalp was also determined from the midline part photographs. Those patients who had no photographs were excluded from the study. The procedure was explained to the patients and the informed consents were obtained. Scalp

hair counting (n/cm^2) were measured at 3 different areas; vertex, mid scalp and frontal areas respectively. The vertex was defined as the crown of scalp where the hair forms a whorl. Frontal area was regarded as the frontal hair line and the mid scalp was the area measured between vertex and frontal area. The hairs were trimmed short in order for easy measurement after asking for patient permission. The plastic grid sized $1 \times 1 \text{ cm}^2$ was applied to area of measurement before photographing by digital dermoscope (Dino digital AM-413T) (Fig 1). Visual counts were performed. Outcomes were evaluated by gross appearance of hair thinning and/or hair density $< 120/\text{cm}^2$ in any of 3 areas⁶. The types of hair loss were categorised according to the thinnest area out of 3 areas.

All characteristics were compared and statistical analysis was done with descriptive study (mean, SD), One way ANOVA (Analysis of variance) and Fisher's exact test using software (SPSS, 17.0 SPSS Inc, Chicago, IL). p values of less than 0.05 were considered statistically significant.

RESULTS

Given these parameters, 143 women with androgenic alopecia were evaluated. The mean

age was 45.54 years (range, 15 to 78 years). Of the age groups, the vast majority of the patients were in 35-54-year-old age group ($n=58$, 40.55%) followed by 55-74-year-old age group ($n=44$, 30.76%) and 15-34-year-old age group ($n=40$, 20.97%) respectively. Only one patient in our study was over 75 years old. Of the hair loss type, 36.4% were mid-scalp, 33.6% were vertex thinning and 30.1% were frontal thinning patterns (Table 1). There was no significant age difference among the type of hair loss ($p=0.859$). 115 women had Ludwig pattern I hair loss (80.4%), 23 had Ludwig pattern II hair loss (16.1%) and 5 had Ludwig pattern III hair loss (3.5%). Of these, 48 (33.6%) had evidence of the "Vertex accentuation" pattern of hair loss on the top of the scalp (Table 2). There was no correlation of degree of hair loss according to Ludwig classification with the presence of this sign ($p=0.411$). It was seen in up to 85.4% of those with very early loss (Ludwig I), but far less in those with pattern II (14.6%) where the hair loss was obvious, but not severe, on the top of the scalp. "Vertex accentuation" pattern of loss was not seen in those with pattern III, which was probably because of scant remaining hair in the affected area. Of those women with pattern II (obvious, but not severe) hair loss who did not demonstrate the "Vertex accentuation" sign, many had diffuse hair loss although with persistent accentuation on the crown of the head. No scalp biopsy was done in the patients.



Fig 1. Patient with vertex accentuation (A), Target area hair count (TAHC) (B), Digital dermoscope (Dino digital AM-413T) (C) and plastic grid sized $1 \times 1 \text{ cm}^2$ (D).



Fig 2. A female patient with female pattern hair loss demonstrated mid-scalp thinning of hair.

DISCUSSION

The female-pattern hair loss is characterised by progressive miniaturisation of hair follicles, mediated most probably by dihydrotestosterone within the follicle, which may affect women with normal levels of circulating androgens.⁸ The frequency and severity of female pattern hair loss (FPHL) increases with age.¹ From the study, many women also first complained of hair loss in the 35-54- year-old- age group. It was not clear whether this was truly late onset of FPHL or an exacerbation of long standing FPHL which



Fig 3. A female patient with female pattern hair loss showed thinning of hair from front to vertex of the scalp.

had not previously been diagnosed. The role of androgens in all cases is less obvious than in male pattern hair loss.⁹ There are several physical findings that should be sought in women who are suspected of having androgenetic alopecia. In general, the diagnosis is usually based on clinical findings, such as age of onset and pattern of hair loss. However, in early disease, and in patients in whom other causes of hair loss also present, the diagnosis may be quite challenging. According to the other studies the pattern tends to be one of the two patterns in most women which are diffuse central thinning¹¹ or frontal accentuation.^{5,9} Male pattern hair loss is characterised by frontal and temporal recession and vertex thinning is a third, but uncommon pattern which was excluded from this study. Unexpectedly, in these authors' study it was found that vertex accentuation pattern was the second most common pattern (33.6%), whereas the most common type was still diffuse central thinning (36.4%). Age does not appear to relate with the type of hair loss ($p = 0.89$).

In the study, the authors tried to validate vertex accentuation pattern as another pattern of hair loss for describing FPHL. FPHL undoubtedly can occur in women with hyperandrogenism. In contrast to the patients, these women with high level of circulating androgen may show a male

TABLE 1. Prevalence of each type of hair loss and mean age of the study population.

Type	Number (%)	Mean age (year)
Vertex	48 (33.6%)	45.27
Mid-scalp	52 (36.4%)	46.42
Frontal	43 (30.1%)	44.77
Total	143 (100%)	45.54

*Difference of the mean age of each group was not statistically significant ($p = 0.859$, One way ANOVA)

TABLE 2. Vertex accentuation pattern and Ludwig pattern of hair loss in women with androgenetic alopecia.

Type	Ludwig type (number)			Total
	1	2	3	
Vertex	41 (85.4%)	7 (14.6%)	0 (0%)	48 (100%)
Mid scalp	42 (80.8%)	7 (13.5%)	3 (5.8%)	52 (100%)
Frontal	32 (74.4%)	9 (20.9%)	2 (4.7%)	43 (100%)
Total	115(80.4%)	23(16.1%)	5 (3.5%)	143 (100%)

*The relationship between of Ludwig type and area of hair loss was not statistically significant ($p = 0.411$, Fisher's exact test)

pattern hair loss. The authors excluded male pattern hair loss in females with vertex thinning from the study. The lack of underlying scalp abnormalities, follicular disappearance, or diffuse or patched loss are important negatives characteristics of androgenetic alopecia. A hair pulling test may be positive for telogen hairs in early cases of androgenetic alopecia or during active loss, but the falling hair are fewer than in telogen effluvium or alopecia areata and are generally limited to the area involved, that is, the top of the scalp. The “vertex accentuation” pattern of hair loss (increasing hair loss towards the vertex of the scalp), may be another useful clinical clue to diagnosing androgenetic alopecia in women, because it is common in androgenetic alopecia characterised by minimal loss. Its absence does not rule out androgenetic alopecia. However this could provide some clinical evidence of the diagnosis in the early stage of hair loss.

Although neither Ludwig nor Olsen mentioned the progressive vertex hair loss with undisturbed frontal hair line seen in so many women with androgenetic alopecia, this does not limit their usefulness. Hopefully, the proposed combination of the Ludwig classification with frontal accentuation and vertex accentuation to describe subtypes of hair loss in women with androgenetic alopecia should make communication among physicians and determination of efficacy within clinical trials much easier. Unfortunately, the relationship between androgen and vertex accentuation pattern remains unclear and needs further study to elucidate this condition.

CONCLUSION

Although the most common female pattern hair loss type is diffuse type (Ludwig type), vertex accentuation pattern was the second most common pattern in this study. To the authors’ knowledge,

this study is the first to describe vertex accentuation as a new pattern for describing female pattern hair loss. It might have minor errors of hair numbers in each area because some patients refused hair trimming which could make hair counting more difficult. The authors believe that this hair loss pattern should shed some light on the pathogenesis of female pattern hair loss in the future.

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