



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

CLINICOEPIDEMIOLOGICAL STUDY OF FEMALE PATTERN HAIR LOSS

Dr. Sarda Okram¹, Dr. Basavaraj HB², Dr. Sathyanarayana BD³, Dr. Swaroop MR⁴, Dr. Sudhir Kumar N⁵,
Dr. Manas SN⁶

1. Junior Resident, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.
2. Professor, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.
3. Professor & Head, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.
4. Dr. Swaroop MR, Associate Professor, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.
5. Dr. Sudhir Kumar N, Junior Resident, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.
6. Dr. Manas SN, Junior Resident, Department of Dermatology, Adichunchanagiri Institute of Medical Sciences, BG Nagara, Karnataka 571448, India.

Manuscript Info Abstract

Manuscript History:

Received: 22 November 2014
Final Accepted: 26 December 2014
Published Online: January 2015

Key words:

***Corresponding Author**

Dr. Basavaraj HB

Background: Female pattern hair loss (FPHL) is a broad term for decrease in central scalp hair density that occurs in many females post puberty. It is characterized by a progressive decline in the duration of anagen, an increase in the duration of telogen and miniaturization of the scalp hair follicles.
Objectives: To study epidemiology of various patterns of hair loss in FPHL, to evaluate the association of FPHL with low serum ferritin levels and thyroid levels.

Materials and Methods: A total of 50 patients with FPHL meeting defined inclusion and exclusion criteria were enrolled in this cross-sectional study after taking an informed consent and approval of institutional ethical committee. All patients were subjected to a detailed history based on a questionnaire. A thorough clinical examination was done to study FPHL. Hair pull test was performed on each patient. Trichogram slide was prepared for each patient. Blood samples were collected and complete haemogram, serum ferritin and thyroid levels were determined.

Results: Most of the patients were students (42%). Majority of the cases were clustered in the age group 18-30 years. Mean age of onset was 29.22±13.01. Mean duration of hair loss was 2.00±1.88. 38% of the patients had a positive family history of hair loss. Hair pull test was negative in 74% of the patients. The most common pattern of hair loss was found to be Ludwig pattern (74%), followed by Hamilton-Norwood pattern of female hair loss (18%) and Olsen (8%). The most common grade of hair loss was found to be Ludwig I (66%).

Conclusion: In our study, majority of the patients (68%) were in the age group 18-30 years and most of them were students (42%). 38% of them had a positive family history of baldness and in them the age of onset was quite earlier which confirms that genetic susceptibility predisposes to early onset of FPHL. Commonest pattern was Ludwig pattern (74%). Commonest grade was Ludwig I (66%). Low serum ferritin (<10ng/ml) was associated with Ludwig II, Hamilton-Norwood II and Olsen patterns of hair loss in pre-

menopausal women but it was not statistically significant ($P=0.066$). Only 2 patients (4%) had low thyroid levels.

Copy Right, IJAR, 2015,. All rights reserved

INTRODUCTION

A woman's hair is central to her femininity, beauty and sexuality. Long, strong and shining hair stands for vitality, youth and health for women and thus hair loss in women produce greater psychological distress than in men. Although hair performs no vital function in human beings whose body could be shaved without any physiologic disadvantage, scalp hair has a major psychological importance as it is a social and sexual display feature of the body.

Alopecia refers to lack of hair in areas where hair ordinarily would be found. Androgenetic alopecia (AGA), the common baldness is referred so, as there is androgen-mediated conversion of susceptible terminal hairs into vellus hairs. Female pattern hair loss (FPHL) was originally described as synonymous with androgenetic alopecia. The androgen-dependent nature of AGA in men is well established, but the relationship of androgens to the development of FPHL is more complex. Although women with hyperandrogenism have a high incidence of FPHL (up to 86%), many women with FPHL do not have the elevated blood level of androgen hormones. Women without high circulating androgens may also develop FPHL, which raises the possibility for non-androgen-dependent mechanisms and could explain why some women with FPHL do not respond to androgen inhibition therapy.

FPHL affects more than 50% of women over the age of 50 years and while the hair loss may seem trivial to the observer, it is often emotionally devastating for the affected women. FPHL may occur alone or may be a part of a constellation of androgen-related conditions. The diagnosis of FPHL requires a history, physical examination, laboratory work, and often a scalp biopsy to differentiate it from other causes of hair loss. Few studies have shown association of serum ferritin and thyroid hormones with FPHL but contradictory results were also found in other studies.

Rasheed H *et al*² and Kantor J *et al*³ found that serum ferritin levels in FPHL candidates were significantly lower than in controls and that the levels decreased with increased disease activity. They concluded that iron supplements would be beneficial in the treatment of the disease. Olsen EA *et al*⁴ found out when ferritin $\leq 15\mu\text{g/L}$ was used as the definition, iron deficiency occurred in 12.4%, 12.1% and 29.8% of premenopausal women with FPHL (n=170), chronic telogen effluvium (CTE) (n=58) and control subjects (n=47) respectively. They concluded that iron deficiency was common in women but not increased in patients with FPHL or CTE. Freinkelet al⁵ and Schmidt J.B *et al*⁶ found that deficiency of thyroid hormone was associated with an increase in the percentage of telogen hairs. On the other hand Zhang X *et al*⁷ found no association between the severity of FPHL and laboratory values including anemic and gonadal profiles.

There is paucity of medical literature on clinico-epidemiological aspects of FPHL in India. In this study we aim to assess epidemiology and patterns seen in FPHL in a rural set up like our teaching hospital and also to assess the association of serum ferritin and thyroid hormones with FPHL if there is any.

Materials and methods

This study is being conducted in Department of Dermatology, Venereology and Leprosy, Sri Adichunchanagiri Hospital and Research Centre, B.G. Nagara, with 50 cases and Patient willing for the study, Females aged above 18 years, hair loss over the frontal and vertical area, frontotemporal recession of hair line were included and Pregnant and lactating females, Patients with patchy hair loss in frontovertical area or frontotemporal hairline, hair loss patches with absence of follicular opening, wrinkled shiny skin, have underwent hair transplantation, chemotherapy or those taken it less than 1 year back were excluded. Informed consent and ethical

committee approval were taken. A detailed history of all the patients based on standard questionnaire was taken with emphasis on history of hairfall, onset, duration, point of breakage of hair (either root or breaking in between), any associated symptoms (itching, pain in scalp, scaling of the scalp) and history of exacerbating factors if any. Detailed hair care history was taken that included frequency of washing hairs, products used to wash the hair (shampoo, soap nut, soap), history of conditioner use, history of any parlor activities (hair straightening, curling, streaking, coloring, head massage) and history of hair care procedures done at home (ironing, coloring, mehendi). Personal history of diabetes, hypertension, hypothyroidism, hyperthyroidism, anemia and polycystic ovarian disease was noted. History of taking any oral contraceptive medication was taken. Family history of hairloss in father, mother, brother and sister was taken. Personal history of diet (vegetarian, mixed, crash diet) was noted. Menstrual history, history of any spontaneous abortions and history of infertility were also noted. All were documented in a structured proforma.

A thorough clinical examination was done. Presence of pallor, icterus, cyanosis, clubbing, edema, lymphadenopathy, seborrheic dermatitis, pityriasis versicolor, pityrosporum folliculitis, striae, acne, acanthosis nigricans, hirsutism and virilisation were noted. Pattern of hair loss was noted based on the three major scales of hairloss (Ludwig scale, Olsen scale and Hamilton-Norwood scale). Hair quality was noted (smooth/rough, presence of split ends, presence of brownish pigmentation of the hair). Hair pull test was done on each patient followed by trichogram

Blood samples were collected from all enrolled patients and the following investigations were performed. Hb%, Total leucocyte count, Differential count (Neutrophil/lymphocyte/eosinophil/monocyte), Erythrocyte sedimentation rate, PCV, MCHC, MCH, Platelet count, Peripheral smear, Serum ferritin, T3, T4, TSH, FSH, LH, Prolactin, serum free testosterone (in women with irregular menstruation, abrupt hair loss less than 1 month duration, hirsutism or nodulocystic acne)

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Results

Out of 50 patients 68% of the patients were in the age group 18-30 years, 14% were in the age group 31-40 years, 10% were in the age group >50 years and 8% were in the age group 41-50 years. So, maximum number of patients were clustered between 18-30 years of age. Majority of the patients (94%) had insidious onset of hair loss, 28% of the patients had 6 months to 1 year duration of hair loss and 90% of the patients complained of hair falling from the roots. Mean duration of hair loss was found to be 2.00 ± 1.88 . Most common distribution of hair loss was in the top portion of the scalp (TPS) constituting 74%. Majority of patients (52%) had no associated features like itching and scaling. 38% of the patients had positive family history of hair loss. The most common site of hair loss from the scalp was in the frontal region (74%), followed by frontotemporal region (18%) and central parting (8%).

The most common pattern of hair loss seen in the study group was Ludwig [Ludwig I (66%) and Ludwig II (4%)], followed by Hamilton-Norwood II (18%) and Olsen (4%). Hair pull test was positive in only 26% of the patients and negative on 74% of the patients.

Out of 50 patients 30% of the patients had <12 gm% of haemoglobin, 2% of the patients had <4000 cells/cumm of total leukocyte count, 76% of the patients had <40% of packed cell volume, 50% of the patients had <32 gm% of mean corpuscular haemoglobin concentration and 38% of the patients had <27g of mean corpuscular haemoglobin. 6% of the patients had >4 lakh cells/cumm of platelet and 10% of the patients had >20 mm/1hr of erythrocyte sedimentation rate. 29.3% of the patients had a low serum ferritin level of <10ng/ml whereas 70.7% of the patients had normal serum ferritin level of >10ng/ml. Ludwig II, Olsen and Hamilton-Norwood II are associated with low serum ferritin levels (<10ng/ml) in pre-menopausal women. (P=0.066).

Discussion

Female pattern hair loss (FPHL) is characterized by a progressive decline in the duration of anagen, an increase in the duration of telogen and miniaturization of scalp hair follicles. Ludwig scale, Olsen scale and

Hamilton – Norwood scale are the three main patterns described in literature for Female pattern hair loss. There have been conflicting reports on the association of FPHL and levels of serum ferritin and thyroid.

In the present study, majority of patients were in the age group of 18 – 30 years. The mean age, mean age of onset and mean duration of onset in our study were 29.22 ± 13.01 , 27.37 ± 12.35 and 2.00 ± 1.88 respectively. However, in a study done by Zhang X *et al*⁷, the values were 34.4 ± 10.6 , 29.8 ± 9.47 and 4.49 ± 3.76 respectively and in another study done by Sillani C *et al*⁸, the values were 34.9 ± 11.1 , 29.8 ± 9.9 and 4.9 ± 3.9 respectively. These values were slightly higher when compared to observations in our study. Majority of patients were students by occupation (21 patients).

19 patients had a family history of hair loss. The mean age of onset of hair loss in these patients was 23.49 ± 10.16 . Patients with family history had an earlier onset of hair loss (23.49 ± 10.16) as compared to patients without hair loss (29.75 ± 13.10). Our observations were in concordance with a study done by Zhang X *et al*⁷ which confirms that genetic susceptibility predisposes to early onset of hair loss (23.5 ± 6.50 versus 35.3 ± 8.08).

Ludwig was the most common pattern and Ludwig I (66%) was the most common grade observed which was in concordance with the studies done by CaullooS *et al*⁹, Zhang X *et al*⁷ and AktanS *et al*¹⁰. Hamilton-Norwood pattern of female pattern hair loss was the second most common pattern (18%), followed by Ludwig II (8%) and Olsen (8%). Our observations were compared with similar studies and are shown in the table 1 below.

Majority of the patients (70%) had normal Hb levels ($>12\text{gm}\%$), 2% of the patients had a low leukocyte count of <4000 cells/cumm, 10% of the patients had ESR $>20\text{mm}/1$ hr, 6% of the patients had platelet count >4 lakh cells/cumm.

In our study, $10\text{ng}/\text{ml}$ was set as the lower limit of normal serum ferritin in pre-menopausal women and $30\text{ng}/\text{ml}$ was set as the lower limit for post-menopausal women. The mean serum ferritin was 31.17 ± 23.28 which was lower compared to similar studies done by Kantor J *et al*¹¹ ($37.3\text{ng}/\text{ml}$), Park SY¹² ($49.27\text{ng}/\text{ml}$) and Zhang X *et al*⁷ ($58.5\text{ng}/\text{ml}$).

The mean serum ferritin of pre-menopausal women was found to be 25.06 ± 18.31 and mean serum ferritin of post-menopausal women was found to be 58.99 ± 24.10 which was lower when compared to a study done by Park SY *et al*¹². Out of 41 pre-menopausal women, 12 women had a low serum ferritin level of $<10\text{ng}/\text{ml}$. Low serum ferritin levels ($<10\text{ng}/\text{ml}$) was associated with the patterns Ludwig II, Olsen and Hamilton-Norwood II in pre-menopausal women but was not statistically significant ($P=0.066$). All the 9 post-menopausal women had normal serum ferritin levels ($>30\text{ng}/\text{ml}$).

The interpretation of our study results could not be directly correlated with other studies for the simple reason being that the lower cut-off value for normal serum ferritin levels in different studies were different. In studies done by Deloche C *et al*⁸, Park SY *et al*¹² and Kantor J *et al*¹¹, decreased serum ferritin was associated with female pattern hair loss. In contrary, studies done by Olsen EA *et al*⁴ and Bregy A *et al*¹³ concluded that there was no positive correlation between low serum ferritin levels and female pattern hair loss.

Only 2 patients had hypothyroidism. Whereas in a study done by Vincent M *et al*¹⁴ thyroid dysfunction was associated with all types of alopecia as age advanced.

In conclusion, majority of the patients (68%) were in the age group 18-30 years and most of them were students (42%) which could probably be due to the fact that they are more cosmetically aware and concerned about hair loss. Commonest pattern was Ludwig pattern (74%).and the commonest grade was Ludwig I (66%). 12 out of 50 patients (24%) had low ferritin levels and only 2 patients (4%) had hypothyroidism. These findings were not statistically significant.

Table 1: Different Patterns with grading of hair loss

Pattern and grading	Caulloos <i>et al</i> ⁹	Zhang X <i>et al</i> ⁷	Fatemi F <i>et al</i> ¹¹	AktanS <i>et al</i> ¹⁰	Present study
Ludwig I	34%	40%	41.7%	69.2%	66%
Ludwig II	28%	23.3%	48.7%	28.2%	8%
Ludwig III	26%	26.7%	4.9%	2.5%	0%
Olsen	-	-	37.2% (all of them fell under one of the 3 Ludwig pattern)	-	8%
Hamilton-Norwood	6%	10%	14.2%	-	18%

References:

- Messenger AG, de Burker DAR, Sinclair RD. Disorders of hair. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rooks Textbook of Dermatology, 8th ed. UK: Wiley-Blackwell; 2010. p. 66.16-66
- Rasheed H, Mahqoub D, Hegazy R, El-Komy M, Abdel Hay R, Hamid MA *et al*. Serum ferritin and Vitamin D in Female Hair Loss : Do They Play a Role? *Skin PharmacolPhysiol* 2013;26:101-07
- Kantor J, Kessler LJ, Brooks DG, Cotsarelis G. Decreased serum Ferritin is Associated with Alopecia in Women. *J Invest Dermatol* 2003;121:985-88
- Olsen EA, Reed KB, Cacchio PB, Caudill L. Iron deficiency in female pattern hair loss, chronic telogen effluvium, and control groups. *J Am Acad Dermatol* 2010;63:991-9
- Freinkel RK, Freinkel N. Hair Growth and Alopecia in Hypothyroidism. *Arch Dermatol* 1972;106:349-52
- Schmidt JB. Hormonal Basis of Male and Female Androgenetic Alopecia: Clinical Relevance. *Skin Pharmacol* 1994;7:61-66
- Zhang X, Caulloos S, Zhao Y, Zhang B, Cai Z, Yang J *et al*. Female Pattern hair loss: clinico-laboratory findings and trichoscopy depending on disease severity. *Int J Trichology* 2012;4:23-8
- Deloche C, Bastien P, Chadoutaud S, Galan P, Bertrais S, Herberg S *et al*. Low iron stores: a risk factor for excessive hair loss in non-menopausal women. *Eur J Dermatol* 2007;17:507-12
- Caulloos S, YE Yan T, Zhao Y, Zhang B, Cai Z, Gong Y *et al*. A Clinical Study of 50 Cases of Female Pattern Hair Loss. *Journal of Diagnosis and Therapy on Dermato-venere* 2011;18:363-68
- Aktan S, Akarsu S, Ilknur T, Demirtasoglu M, Ozkan S. Quantification of female pattern hair loss: a study in a Turkish population. *Eur J Dermatol* 2007;17:321-4
- Fatemi F, Rahmaniyan N, Vatankhah M, Hashemi F. Prevalence of androgenetic alopecia in women of 20-70 years in Isfahan during 2008-2009. *Journal of Pakistan Association of Dermatologists* 2010;20:75-78
- Park SY, Na SE, Kim JH, Cho S, Lee JH. Iron Plays a Certain Role in Patterned Hair Loss. *J Korean Med Sci* 2013;28:934-38
- Bregy A, Trueb RM. No Association between Serum Ferritin Levels >10µg/l and Hair Loss Activity in Women. *Dermatology* 2008;217:1-6
- Vincent M, Yogiraj K. A Descriptive Study of Alopecia Patterns and their Relation to Thyroid Dysfunction. *Int J Trichology* 2013;5:57-60