Original Research Article

Clinico-epidemiological study of female pattern hair loss (FPHL) with special reference to obesity and menstrual disorders in a tertiary care centre in North Eastern India

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Abstract

Introduction: Female pattern hair loss (FPHL) is the most common hair loss disorder in women. Initial signs may develop during the age between 21-40 years of age leading to a progressive hair loss with a characteristic pattern distribution. Women diagnosed with FPHL may undergo significant impairment of quality of life. The present study was done to find out the clinical profiles of FPHL and its correlation with obesity and menstrual irregularities in MGM Medical College & LSK Hospital, Kishanganj, Bihar. **Methods:** This was a cross-sectional study where a total of 100 patients in a semi-urban tertiary care hospital that caters both urban and rural population of Bihar and adjacent areas of West Bengal. The study was conducted over the period of one year. Detailed history, physical examination and routine investigations were recorded for all patients. **Results:** Maximum (n=12) patients were in 21-25 years, followed by age group 25- 30 (n=11), and least in 31-40 (n=8) age group, the mean age was being 25.575 years. Maximum number of patients were suffering from disease from <1 years duration. Family history of FPHL either in the paternal or maternal relatives, does not influence it's the age of onset or severity. Obesity and PCOS are some of risk factors which should be addressed in patients with FPHL, for better treatment response and hence compliance. Hypothyroidism is one of the cause of FPHL The mean and SD value of Hb was 10.802 and + 1.139; and the serum ferritin level the values we found were 44.645 and +21.211 respectively. The P value was <0.001 which is statistically significant. The mean and SD value of prolactin was 22.821 and + 10.799. In case of T3 level the values we found were 0.873 and +0.514 respectively. The score of Ludwig scale is -16. 42.5% (17) patients fall in grade II, 15(37.5%) patients fall in grade I and 8 (20%) patient fall in grade III. The result of hair pull test of the study group, Maximum number of patients i.e. 30 (75%) patients showed greater than 10% and 10 (25%) showed less than 10%. Showing Distribution of patients according to Ludwing scale and age group. From the above table we found that majority of patients i.e. 17(42.5%) patients belonged to Ludwing scale-II. Among these 17 patients maximum number of patients (58.3%) belonged to 21-25 years of age group. 16 patients (40%) belonged to Ludwing scale-I, in this group prevalence rate higher among the patients belonged to 26-30 years of age group i.e. 6(54.5%), and 8 patients belonged to Ludwing scale-III, in this group prevalence rate was higher 15-20 years age group 3(33.3%) patients. **Conclusion:** FPHL is a very common, non scarring form of hair loss occurring most commonly in postmenopausal women. Although hormonal factors and genetic predisposition contribute to FPHL, the complete mechanism remains elusive and the most affected women have normal androgen levels. Owing to the high prevalence of FPHL in Indian woman, while dealing with diffuse hair loss in females, we should consider FPHL as one of the aetiology and assess for the risk factors associated with it.

Keywords: Female pattern hair loss (FPHL), obesity, menstrual irregularity, Ludwing scale.

Introduction

Hair loss, also known as alopecia or baldness, refers to a loss of hair from part of the head or body [1]. Typically at least the head is involved [2]. Female pattern hair loss (FPHL) is a distinctive form of hair loss that occurs in women with androgenetic alopecia. Many women are affected by FPHL. In fact, around 40% of women by age 50 show signs of hair loss and less than 45% of women actually reach the age of 80 with a full head of hair [3]. Female pattern hair loss (FPHL) is also a common cause of hair loss in women characterized by diffuse reduction in hair density over the crown and frontal scalp with retention of the frontal hairline. Its prevalence increases with advancing age and is associated with significant psychological morbidity. The pathophysiology of FPHL is still not completely understood and seems to be multifactorial [3]. In FPHL, there is diffuse thinning of hair on the scalp due to increased hair shedding or a reduction in hair volume, or both. It is normal to lose up to 50-100 hairs a day. Another condition called chronic telogen effluvium, also presents with increased hair shedding and is often confused with FPHL. It

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is important to differentiate between these conditions as management for both conditions differ [3].

FPHL presents quite differently from the more easily recognizable male pattern baldness, which usually begins with a receding frontal hairline that progresses to a bald patch on top of the head. It is very uncommon for women to bald following the male pattern unless there is excessive production of androgens in the body. The mode of inheritance is polygenic, indicating that there are many genes that contribute to FPHL, and these genes could be inherited from either parent, or both. Genetic testing to assess risk of balding is currently not recommended, as it is unreliable [3]. The cause of female pattern hair loss is unclear, the cause of alopecia areata is autoimmune, and the cause of telogen effluvium is typically a physically or psychologically stressful event [2]. Less common causes of hair loss without inflammation or scarring include the pulling out of hair, certain medications including chemotherapy, hypothyroidism, and malnutrition including iron deficiency [2,4]. Causes of hair loss that occurs with scarring or inflammation include fungal infection, lupus erythematosus, radiation therapy, and sarcoidosis [2,4]. Diagnosis of hair loss is partly based on the areas affected [2].

Currently, it is not clear if androgens (male sex hormones) play a role in FPHL, although androgens have a clear role in male pattern baldness [5]. The majority of women with FPHL have normal levels of androgens in their bloodstream. Due to this uncertain relationship, the term FPHL is preferred to 'female androgenetic alopecia'. The role of oestrogen is uncertain. FPHL is more common after the menopause suggesting oestrogens may be stimulatory for hair growth. But laboratory experiments have also suggested oestrogens may suppress hair growth.

The present study was conducted with an aim to find out the demographic profile offemale pattern hairloss (FPHL); assess the obesity factors affecting FPHL, if any, and find out relationship between menstrual irregularities with FPHL, if any.

Materials & Methods

The study was conducted in the Department of Dermatology, M.G.M. Medical College & L.S.K. Hospital, Kishanganj, Bihar with proper approval of institutional ethics committee of the institute. This was a semi-urban tertiary care hospital that caters both urban and rural population of Bihar and adjacent areas of West Bengal.

Sample Design: Female patients with female pattern hair loss were recruited from the Skin OPD of the above mentioned college by the inclusion & exclusion criteria mentioned below & were evaluated. Period of Study: The study was conducted over a duration of 12 months during the period from May 2017 to April 2018.

Inclusion criteria: Female patients with female pattern hair loss pre-treated, untreated and presently treated.

Exclusion criteria: Female patients with alopecia areata, scarring alopecia and alopecia due to collagen vascular disorders and other systemic causes. Patients not willing to execute written informed consent were also excluded.

It was an institution based cross-sectional prospective observational study. The road map of the study details the design. Screenings of all patients attending Dermatology OPD clinically diagnose a case of female pattern hair loss. Written informed consent was taken. Patient details were noted in proforma. Clinical examinations were performed. Pattern of hair loss were evaluated along with history. Obtained data was analyzed. Result and conclusion was recorded. Enlistment were done of all cases attending Dermatology O.P.D with female pattern hair loss following inclusion and exclusion criteria. Total number of Dermatology O.P.D attendees were obtained from the medical records section. The magnitude of the female pattern hair loss were determined by comparing them. Detailed record of demographic and clinical features were noted in the case record proforma after obtaining the written informed consent from the patient/guardian. Digital photography of the patient were taken and preserved. The pattern of hair loss and severity were determined based on the clinical history and presentation. The obesity factors of the patient were assessed and co-related. Detailed menstrual history of all the patients were taken and co-related.

Information was also been collected regarding any precipitating factors, use of cosmetics/hair products, drug intake prior to the onset, and associated cutaneous or systemic diseases. Local examination of the scalp were done and a record was made of the morphology and distribution of lesions, extent and severity of involvement and colour of pigmentation. Diagnosis of the cause were ascertained from the history and clinical examination findings. Results of the dermographic pattern, clinical features and examination were analysed and conclusion was drawn using standard statistical method.

Results

Table 1 shows that a total of 40 patients were divided in four age groups 15-20, 21-25, 26-30 & 31-40 years. The 21-25 years age group consisted maximum 12 patients among them. Among 09 patients who belonged to 15-20 years age group, 26-30 years age group consisted 11 patients and 31-40 years of age group consisted 08 patients. The Mean was found 25.575 and SD value + 6.075.So it was statistically highly significant (p Value <0.001).

Table 1: Age Distribution

Age Distribution	No. of Patients	Percentage
15 - 20	09	22.5
20 - 25	12	30.0
25 – 30	11	27.5
30 - 35	08	20.0

Duration of disease of patients in showed in table 2. Maximum number of patients i.e. 72.5% (29) patients were suffering from problem of hair loss<1 year duration, and 27.5% (11) patients were suffering from the problem >1 year duration.

Table 2: Duration of disease

Duration of Disease	No. of Patients	Percentage
<1 year	29	72.5
>1 year	11	27.5

Table 3 shows socioeconomic and demographic status of 40 patients studied in the present study. Most of the patients (70%) hailed from rural background. Most of the patients were from lower income group.

Table 3: Socio-economic & demographical status

Demographic Area	No. of Patients	Percentage
Rural	28	70.0
Urban	12	30.0
Occupational Place		
Indoor	22	55.0
Outdoor	18	45.0
Income Group		
<5000	19	47.5
5000-10000	12	30.0
>10000	09	22.5
Education		
Illiterate	03	7.5
Primary	16	40.0
Secondary	11	27.5
Higher Secondary	04	10.0
Graduate	05	12.5
Post Graduate	01	2.5

Among the 40 patients 15(37.5%) patients were found having mental stress, while the rest 25(62.5%) patients had no mental stress. Among the 40 patients 15(37.5%) patients were found having physical stress, while the rest 25(62.5%) patients had no Physical stress. In table 4 showed any history of past illness. They were suffering from the disease of thyroid- hypothyroidism, hyperthyroidism; iron deficiency, PCOD, malaria, and sudden weight loss. The maximum number of patient (15%) was suffering from hypothyroidism.

Table 4: History of past illness

Past illness	No. of Patients	Percentage
Typhoid	03	7.5
Hyperthyroidism	02	5.0
Hypothyroidism	06	15.0
Iron Deficiency	04	10.0
PCOD	05	12.5
Malaria	02	5.0
Sudden Weight Loss	03	7.5
None	15	37.5

Table 5 shows the family history of FPHL was 32.5% (13) patients and 67.5 % (27) patients had no family history of FPHL.

Table 5: Family history of FPHL

Family history of FPHL	No. of Patients	Percentage
Yes	13	32.5
No	27	67.5

In table 6, we had found 12 (30%) patients were regular menstrual history and 28(70%) patients had irregular menstrual history.

Table 6: Menstrual History

Menstrual History	No. of Patients	Percentage
Regular	12	30.0
Irregular	28	70.0

Table 7.shows the mean and SD value of height, weight, and BMI. The Mean and SD value of height was 157.25+4.011. The mean and SD value of weight was 65.425 and +11.153. In case of BMI the values are 26.537 and 4.972 respectively and the p value (<0.001) we got was statistically significant.

Table 7: Mean & SD value among anthropometric measurement

Anthropometric Measurements	Mean Value	SD Value	p-Value
Height	157.250	±4.011	<0.001
Weight	65.425	±11.153	
BMI	26.425	+4.972	

Table 8 shows the mean and SD value of Hb and serum ferritin level among the patients studied. The mean and SD value of Hb was 10.802 and +1.139. In case of serum ferritin level the values we found were 44.645 and +21.211 respectively. The P value we got <0.001which was statistically significant.

Table 8: Mean & SD value of haemoglobin & ferritin

Investigation	Mean Value	SD Value	p-Value
Haemoglobin	10.802	±1.139	<0.001
Ferritin	44.645	±21.211	

Table 9 shows the mean and SD value of prolactin, T3, T4 & TSH level among the patients studied. The mean and SD value of prolactin was 22.821and +10.799. In case of T3 level the values we found were 0.873and +0.514 respectively. In case of T4level the values we found were 9.200 and +3.058 respectively. And in case of TSH level the values we found were 4.389. + 3.900 respectively. The P value was <0.001, which statistically significant.

Table 9: Mean & SD value among prolactin & Thyroid profile

Prolactin & Thyroid Profile	Mean Value	SD Value	p-Value
Prolactin	22.812	±10.799	<0.001
T3	0.873	±0.514	
T4	9.200	±3.058	
TSH	4.389	±3.900	

Table 10 shows the mean and SD value of glucose (F) & (PP) level among the patients studied. The mean and SD value of glucose (F) was 108.82 and +36.758. In case of Glucose (PP) level the values we found were 162.725 and +70.868 respectively. The P value we got <0.001 which was statistically significant.

Table 10: Mean & SD value among Blood glucose (F) & (PP)

Glucose	Mean Value	SD Value	p-Value
Fasting	108.82	±36.758	<0.001
Postprandial	162.725	±70.868	

The score of Ludwig scale is mentioned in table no 11. 42.5% (17) patients fall in grade II, 15(37.5%) patients fall in grade I and 8 (20%) patient fall in grade III

Table 11: Distribution of Ludwing scale among study group (n=40)

Ludwing Scale	No. of Patients	Percentage
(I)	15	37.5
(II)	17	42.5
(III)	08	20.0

The result of hair pull test of the study group mentioned in table 12. Maximum number of the patients i.e. 30 (75%) patients showed greater than 10% and 10 (25%) showed less than 10%.

Table 12: Distribution of hair pull test

Hair Pull Test	No. of Patients	Percentage
<10%	10	25
>10%	39	75

Table 13 shows distribution of patients according to Ludwing scale and age group. From the above table we found that majority of patients i.e. 17(42.5%) patients belonged to Ludwing scale-II. Among these 17 patient maximum number of patients (58.3%) belonged to 21-25 years of age group. 16 patients(40%) belonged to Ludwing scale-I, in this group prevalence rate higher among the patients belonged to 26-30 years of age group i.e. 6 (54.5%). About 8 patients belonged to Ludwing scale-III, in this group prevalence rate is higher15 –20 years age group 3(33.3%) patients.

Table 13: Distribution of Ludwing scale among age group

Age Group	Ludwig Scale-I n=15		Ludwig Scale-II n=17		Ludwig Scale-III n=8	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
15-20 (n=9)	3	7.5	3	7.5	3	7.5
21-25(n=12)	4	10	7	17.5	1	2.5
26-30 (n=11)	6	15	3	7.5	2	5
30-35 (n=8)	2	5	4	10	2	5

Discussion

The study was conducted in the Department of Dermatology, M.G.M. Medical College & L.S.K. Hospital, Kishanganj, Bihar, which a semi-urban tertiary care hospital that caters both urban and rural population of Bihar and adjacent areas of West Bengal. The study was conducted over the period one year. Initial signs of FPHL may develop during the age between 21-40 years leading to a progressive hair loss with a characteristic pattern distribution. Women diagnosed with FPHL may undergo significant impairment of quality of life. FPHL diagnosis is mostly clinical.

Age group 21-25 years constituted maximum no. (n=12) of patients, followed by 26-30 (n=11), 15-20 years age group and 31-40 years of age group consisted 9 and 8 patients respectively. The Mean was found 25.575 and SD value + 6.075. So it was statistically highly significant (p Value <0.001). The bulk of our patients were in the age group of 18-40 years. A similar trend was seen in a study conducted by Okram S et al [7]. Though the previous studies has concluded that the prevalence of FPHL increases with advancing age, we did not come across the same trend [8-10]. This may be as our study is a hospital based study and greater demand for treatment is among patients aged 25-40 years of age.11. In concordance with the studies by Okram S et al [7] and Zhang X et al 20, the mean age of onset of FPHL was 28.03±8.05 years which is in the reproductive age group.

Though majority complained of reduced size of plait, a period of active telogen effluvium prior to the onset of the hair thinning was noted in a small percentage of our patients. This was also reported by Siah TH et al [11]. Similar to the observation by the former author we noted Hamilton-Norwood type in 12% of the patients [10]. Sinclair scale was used to grade hair loss in order to identify early perceptible hair loss. Identical to the finding by Sinclair RD and Gan DCC, we noted a higher grade of hair loss with advancing age, as it is influenced by the duration of the disease [12].

Maximum number of patients i.e. 72.5 % (29) patients were suffering from disease from <1 years long. 27.5% (11) patients were suffering from the disease from >1 year. In history of past illness, they were suffering from the disease of thyroid, hypothyroidism, hyperthyroidism, iron deficiency, PCOD, Malaria, and sudden weight loss. The maximum number of patient (15%) was suffering from hypothyroidism.

Studies have shown an association of FPHL with PCOS in a range of 22 to 67%, while in our study it was 23%. The occurrence of the Hamilton Norwood type (male pattern) of hair loss (bi-temporal recession) in women with PCOS in the present study, supports the role of androgens in the pathogenesis of FPHL. Futterweit et al found that, of 109 patients with hair loss studied, only 38.5% had a clinical or biochemical evidence of hyperandrogenism [13]. This may be as apart from androgens, other androgen independent mechanisms are involved in the development of FPHL [14]. Among the 40 patients 15 (37.5%) patients were found having mental & physical stress, while the rest 25 (62.5%) patients had no mental & physical stress.. This study shows that 32.5% (13) patients had Family history of FPHL while 27(67.5%) patients had no family

history of FPHL. We are in agreement with the observation made by Saih et al [11] and Zhang et al regarding positive family history either paternal or maternal or both relatives of patients with FPHL. As against the observation of an early age of onset and advanced grade of hair loss in patients with positive family history in the studies by Zhang et al [6] and Okram S et al [7], we did not notice any such difference. Hence this high prevalence of family history, with varying degrees of intensity of hair loss and the onset at different ages, suggest a polygenic pattern of inheritance with incomplete penetrance. Further besides genetics, external factors may also be important for the development of FPHL [15].

We noted that 65% of our patients were either overweight or obese with the mean BMI of our patients comparable with the case control study by Zaki MS [16] and Ahmed IZ. In their study, it was found that patients with FPHL had 5.95 times greater probability of metabolic syndrome compared to those without FPHL with 75.8% of patients having a waist circumference of ≥ 88cm indicating abdominal obesity. The mean and SD value of Hb was 10.802 and ± 1.139. In case of serum ferritin level the values we found were 44.645 and ±21.211 respectively. The P value we got <0.001 which was statistically significant. Ferritin levels may be measured, especially in telogen effluvium. The association between FPHL and low ferritin levels was suggested in two different studies [17,18] which reported significantly lower ferritin levels in women suffering from FPHL compared with controls. More recent studies have not shown sufficient evidence of the relationship between low ferritin level and FPHL and do not recommend iron supplementation in the absence of deficiency anemia [19]. In 2008, Bregy and Trüeb even suggest no association between iron deficiency and hair loss in women [20].

The mean and SD value of prolactin was 22.821 and ± 10.799. In case of T3 level the values we found were 0.873 and ±0.514 respectively. In case of T4 level the values we found were 9.200 and ±3.058 respectively. TSH level the values were 4.389. ± 3.900 respectively. The P value we got <0.001 which was statistically significant. As seen in study by Siah et al, we also noted preexisting hypothyroidism in 15% of the patients. The lack of optimal thyroid hormone levels may be responsible for the outbreaks of telogen effluvium in women with androgenic alopecia, [21] as we noted a positive diffuse hair pull test in 24% of patient The result of hair pull test of the study group mentioned in table 17. Maximum number of patients' i.e. 30 (75%) patients showed greater than 10% and 10 (25%) showed less than 10%.

In the present study we found that majority of patients i.e. 17 (42.5%) patients belonged to Ludwing scale-II. Among these17 patients maximum number of patients (58.3%) belonged to 21-25 years of age group. About 16 patients (40%) belonged to Ludwing scale-I, in this group prevalence rate higher among the patients belonged to 26-30 years of age group i.e. 6 (54.5%). About 8 patients belonged to Ludwing scale-III, in this group prevalence rate is higher 15-20 years age group 3(33.3%) patients. Sinclair grade was most common type of FPHL, of which majority was were in Sinclair grade III, which clinically correspond to Ludwig grade II. This trend was also noted by Fatemi et al and Okram S et al [7, 10].

Conclusion

With this study, we infer that FPHL is not an uncommon cause of the diffuse hair loss in women. Though the prevalence and the severity of the disease increases with advancing age, there is a substantial proportion women who present in third decade of life. Maximum (n=12) patients are in 21-25 years age group, followed by age group 25-30 (n=11), and least in 31 - 40 (n=8) age group. The Mean age was found 25.575 and SD value ± 6.075.So it was statistically highly significant (p value <0.001). Maximum numbers of FPHL patients were presented with the problem less than 1 year duration. Family history of FPHL either in the paternal or maternal relatives, does not influence it's the age of onset or severity. Obesity, PCOS are some of risk factors which should be addressed in patients with FPHL, for better treatment response and hence compliance. Hypothyroidism is one of the cause of FPHL The mean and SD value of Hb was 10.802 and ± 1.139. In case of serum ferritin level the values we found were 44.645 and ±21.211 respectively. The P value we got <0.001 which was statistically significant. The mean and SD value of prolactin was 22.821 and ± 10.799. In case of T3 level the values we found were 0.873 and +0.514 respectively. The score of Ludwig scale is -16. About 42.5% (17) patients fall in grade II, 15(37.5%) patients fall in grade I and 8 (20%) patient fall in grade III The result of hair pull test of the study group, Maximum number of patients i.e. 30 (75%) patients showed greater than 10% and 10 (25%) showed less than 10%. Showing Distribution of patients according to Ludwing scale and age group. From the above table we found that majority of patients i.e. 17(42.5%) patients belonged to Ludwing scale-II. Among these 17 patient maximum numbers of patients (58.3%) belonged to 21-25 years of age group. 16 patients(40%) belonged to Ludwing scale-I, in this group prevalence rate higher among the patients belonged to 26-30 years of age group i.e. 6(54.5%). About 8 patients belonged to Ludwing scale-III, in this group prevalence rate is higher 15 - 20 years age group 3(33.3%) patients [Fig .1-3].

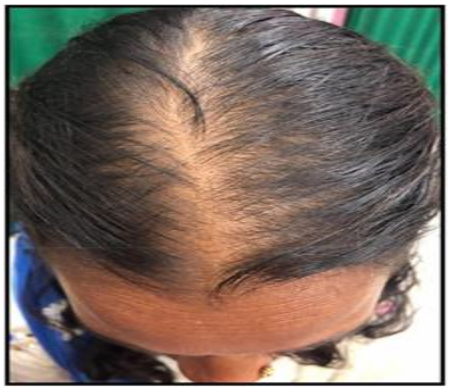

Fig. 1: Ludwig Scale-III

Fig. 2: Ludwig Scale-I

Fig. 3: Ludwig Scale-II

FPHL is a common, non scarring form of hair loss that can occur in all ages but most commonly in postmenopausal women. Although hormonal factors and genetic predisposition are believed to contribute to FPHL, the complete mechanism remains elusive and the most affected women have normal androgen levels. FPHL does not cause physical discomfort but the hair loss can contribute to significant psychological distress. Generally, the condition is diagnosed clinically, suggested by the reduction in hair density with a characteristic distribution. Depending on patient history and clinical evaluation, In conclusion, owing to the high prevalence of FPHL in Indian woman, while dealing with diffuse hair loss in females, we should also consider FPHL as one of the aetiology and assess for the risk factors associated with it. Early diagnosis and counseling helps in prompt treatment and compliance among the patients.

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