



# **Epidemiology and Treatment Aspects of Hair Loss in India – A Cross-Sectional, Multicentre, Database Study (HAILO)**

**G. Monil <sup>a\*</sup>, M. Snehal <sup>a</sup>, Krishna C. Veligandla <sup>a</sup>, R. Rahul <sup>a</sup>,  
D. Gauri <sup>a</sup>, K. Bhavesh <sup>a</sup> and S. Snehal <sup>b</sup>**

<sup>a</sup> Department of Medical Affairs, Dr. Reddy's Laboratories Ltd., Hyderabad, Telangana, India.

<sup>b</sup> Department of Clinical Insights, Healthplix Technologies, Bengaluru, India.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors GM, MS, KCV, RR, DG and KB designed the study, wrote the first draft of the manuscript, edited and reviewed the manuscript. Author SS managed the literature searches, data analysis, statistical analysis. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aims:** To evaluate the demography and treatment patterns for Indian patients with hair loss.

**Study Design:** An electronic medical record (EMR)-based, retrospective, multicenter, cross-sectional study.

**Place and Duration of Study:** EMR records between June 2018 and June 2021.

**Methodology:** Data of patients  $\geq 12$  years of age with reported hair loss secondary to any cause was included. Informed consent waiver was obtained from ethics committees as this is a non-experimental, retrospective data analysis study. Demographic and treatment details of patients sub-grouped based on type of hair loss were noted.

**Results:** Data of 24595 patients diagnosed with hair loss were evaluated. Telogen effluvium (TE) was the commonest reason for hair fall (40.70%), followed by female pattern hair loss (FPHL)

\*Corresponding author: E-mail: Monil.yogesh@drreddys.com;

(22.09%), alopecia areata (AA) (12.81%), and male pattern hair loss (MPHL) (7.49%). Majority cases were females (n=10794, 74.8%), with most belonging to 12-39 years' age group (n=11734). Commonest comorbidity noted was acne (10.4%), followed by seborrheic dermatitis (3.0%). Overall, 1658 (12.31%) continued same treatment at follow-up, 956 (7.10%) patients had an add-on of new formulation, and 975 (7.24%) cases had a change of treatment. Overall, nutritional supplements were most adopted by physicians at baseline (n=6843), while pharmacological agents were the therapy of choice at follow-up (17.41%). For MPHL, FPHL and AA groups commonest treatment option at both baseline and follow-up was pharmacological agent; for TE group, commonest treatment option at baseline was nutritional supplements, and pharmacological therapy at follow-up. The most common class of therapy prescribed as a substituted agent at follow-up was nutritional supplements for all hair-loss subgroups.

**Conclusion:** Hair loss was caused by various causes, with TE and FPHL noted to be more common. Young to middle-aged females were noted to be most affected by hair loss. Though pharmacological agents remain the key choice for managing hair loss, substitution or addition of nutritional supplements was noted commonly at follow-up.

*Keywords: Androgenetic alopecia; telogen effluvium; male pattern hair loss; female pattern hair loss; alopecia areata.*

## 1. INTRODUCTION

Hair plays a crucial role in defining a person's appearance and overall health. Hair loss, or alopecia, occurs when there is a decrease in hair beyond the normal amount (50-100 hairs per day) shed naturally. This condition affects people of all ages and genders and can have negative impacts on both their physical and mental well-being [1].

Androgenetic alopecia (AGA) is a common genetic condition caused by over-sensitivity to androgens. It affects up to 50% of both males and females and is influenced by both genetic and environmental factors. In males, it is known as male pattern hair loss and is characterized by hair loss at the vertex and frontotemporal regions. In females, it is known as female pattern hair loss and involves hair loss in the wider anterior part of the hair with the frontal hairline being typically spared [2]. A study in India found a 58% prevalence of AGA in males aged 30-50 [3]. The underlying causes include androgens, interaction between the hair follicles and dermal papillae, and amplified levels of dihydrotestosterone, 5- $\alpha$  reductase, and androgen receptors in the balding scalp [4,5]. The incidence of female pattern hair loss is higher than previously estimated, and it may begin at any age after puberty, increasing after menopause due to a likely hormonal influence [6]. Other factors include the androgen-stimulating effect of prolactin and hypothyroidism [7]. Management options include minoxidil, finasteride, and surgical hair transplantation [8].

Alopecia areata (AA) is another commonly noted cause of hair loss, leading to circumscribed non-scarring alopecia [9]. The poor response of AA to treatment options as well as erratic course are other problems with managing the condition. AA not only leads to cosmetic disfigurement but also causes psychological disturbances like damage to self-esteem and feeling of vulnerability [10]. Just like AGA, AA is also considered multifactorial, with various pathological mechanisms, genetic factors, and environmental influences playing a role. Medical management options for AA include local or systemic corticosteroids, while the non-medical modalities include laser treatment, photo-chemotherapy, and hair transplant [11].

Telogen effluvium (TE) is another important cause of non-scarring, diffuse, hair loss from the scalp which is noted approximately 3 months after an eliciting event and is typically self-limiting. TE usually lasts for 6 months and the associated hair loss is usually less than 50% of the scalp hair [12]. Aetiology of TE necessitates appropriate history taking and laboratory investigations to exclude endocrine, nutritional as well as autoimmune disorders [13]. Since stress plays a key causative role in TE, most crucial part of managing TE is counselling the patient about the natural history of the condition, managing the underlying reason to reverse the disorder and alleviating the stress in patients which may also help in the quicker reversal of the hair loss.

A literature search revealed that the published Indian data related to the epidemiology and

treatment patterns of hair loss is scarce. This study was conducted with the primary objective of determining the demographic profile, clinical presentation, and treatment aspect of hair loss in India. The secondary objectives of the study were to assess the demographic features, clinical presentation, and treatment aspect in various patient subgroups based on type of hair loss; and to understand the change or addition of treatment modalities in patients at follow-up. These characteristics will be evaluated for different types of hair loss after assessing the data obtained from an electronic medical records (EMR) database.

## 2. METHODOLOGY

The present study was an EMR-based, retrospective, multicenter, cross-sectional study. Data on disease characteristics, patient profile and treatment aspects were collected. The data of those patients were included who were  $\geq 12$  years of age, with reported hair loss secondary to any cause. Patients whose relevant data was absent from the EMR database due to any reason were excluded. The investigators involved were dermatologists, who manage a significant number of hair loss cases and have an EMR database at their center.

### 2.1 Data Collection

Ethics committee approval for the study was obtained on 24th March 2022 from Suraksha-Ethics Committee with the protocol number DRL-IND-GGI-009-ALOP/2022. There was no product involved in the study. Since the current study was planned as an observational and database study, no additional tests or interventions were suggested. Informed consent waiver was obtained from ethics committees as this is a non-experimental, retrospective data analysis study. The data was recorded by the dermatologists. The key outcome measures evaluated for the study included:

- Demographic details (viz. age, gender) and other relevant baseline details (anthropometry, comorbidities) of the patients diagnosed with hair loss.
- Type of hair loss (MPHL, FPHL, TE, AA, and hair loss due to any other cause).
- Treatment modalities utilized for patients with hair loss.
- Demographic details of patients sub-grouped based on type of hair loss.
- Treatment aspects in patients with at least 6-month data in EMR (follow-up status,

continuation of treatment, any change in treatment modalities over time).

### 2.2 Statistical Analysis

All the included patients constituted the analysis population and all the available data obtained from the EMR were used for summary/analysis purposes. Quantitative data are presented as mean and median with standard deviation and ranges, respectively. Discrete data are presented by frequency & proportions. Patient characteristics & treatment patterns are described descriptively. Treatment aspects in patients with at least 6-month data in EMR (follow-up status, continuation of treatment, any change in treatment modalities over time) are presented with frequency count (n) and percentage (%).

## 3. RESULTS

The total number of patients in the EMR records between June 2018 to June 2021 was 4592509. Of these, 24595 of these patients (0.56%) were diagnosed with hair loss. 16038 (65.2%) of the patients were treated by dermatologists, 5698 (23.2%) by general physician, and 1382 (5.6%) by consulting physician.

The total number of patients included in the study based on the screening criteria in protocol was 14431 at visit 1 (baseline), and 3056 (21.18%) at visit 2 (defined as follow-up period with at least 6 months of data). TE was the most common reason for hair fall (40.70%), followed by FPHL (22.09%), AA (12.81%), and MPHL (7.49%).

Fig. 1 represents the CONSORT diagram for patient flow and distribution of enrolled cases.

### 3.1 Demographic Details for Complete set of Enrolled Patients

Of the total enrolled patients (N=14431), the majority belonged to the 12-39 years' age group (n=11734). Females were most affected (n=10794, 74.8%). Commonest comorbidity was acne (10.4%), followed by seborrheic dermatitis (3.0%) and tinea infections (1.8%). Of the available data, most of the patients weighed between 50 and 75 kg weight and belonged to class 1 obesity group. The commonest conditions under other causes of hair loss included diffuse hair loss (n=837, 36.5%), followed by hair loss of unknown cause (n=708, 30.8%), diffuse hair loss with acne (n=174,

7.6%), diffuse hair loss with seborrheic dermatitis (n=117, 5.1%) and hair loss of unknown type with acne (n=108, 4.7%).

Table 1 gives the demographic details of all included patients, and the various groups based on different hair loss causes.

### 3.2 Treatment Pattern for Included Patients

Complete patient set: 13471 patients were on treatment at baseline. Nutritional supplements were most adopted by physicians at baseline (n=6843, 50.79%), followed by pharmacological agents (n=6460, 47.95%). At follow-up, data of 3589 (26.64%) patients on treatment were available. Of these 3589 patients, 1658 (46.19%) continued the same treatment at follow-up. 956 (26.63%) patients had an add-on of new formulation, and 975 (27.16%) patients had a substitution or change of treatment. At follow up, pharmacological agents were the most common continued treatment option from baseline (N=1125, 31.34%), and was the commonest treatment option added at follow-up (N=559, 15.57%). Nutritional agents were the most common agent added as a substitution at follow-up (N=605, 16.85%).

MPHL group: 996 of 1081 patients were on treatment at baseline. Pharmacological agents

were the most common treatment option at baseline (n=693, 69.57%) followed by nutritional supplements (n=470, 47.18%). At follow-up, 389 (39.05%) of these patients were on treatment. 214 (55.01%) continued same treatment at follow-up, 90 (23.13%) patients had an add-on of new formulation, and 85 (21.85%) cases had a change of treatment modality. Pharmacological agents were the most common continued treatment (N=171, 43.95%) and commonest add-on therapy at follow-up (N=55, 14.13%). The commonest class of therapy which was prescribed by treating doctor as a substitution was nutritional supplements (N=58, 14.91%).

FPHL group: 3131 cases of 3332 patients were on treatment at baseline. 1324 patients (42.28%) were on treatment at the follow-up visit. At follow-up, 609 (45.99%) of these patients continued with the same treatment, 337 (25.45%) patients had an add-on of new formulation, and 378 (28.54%) patients had a change of treatment. The commonest treatment option at baseline (n=2122, 67.77%), the commonest continued treatment (N=468, 35.34%) and add-on therapy (N=220, 16.61%) at follow-up was pharmacological class of therapy. The commonest class of therapy prescribed by the managing doctor as a substituted agent was nutritional supplements (N=258, 19.48%).

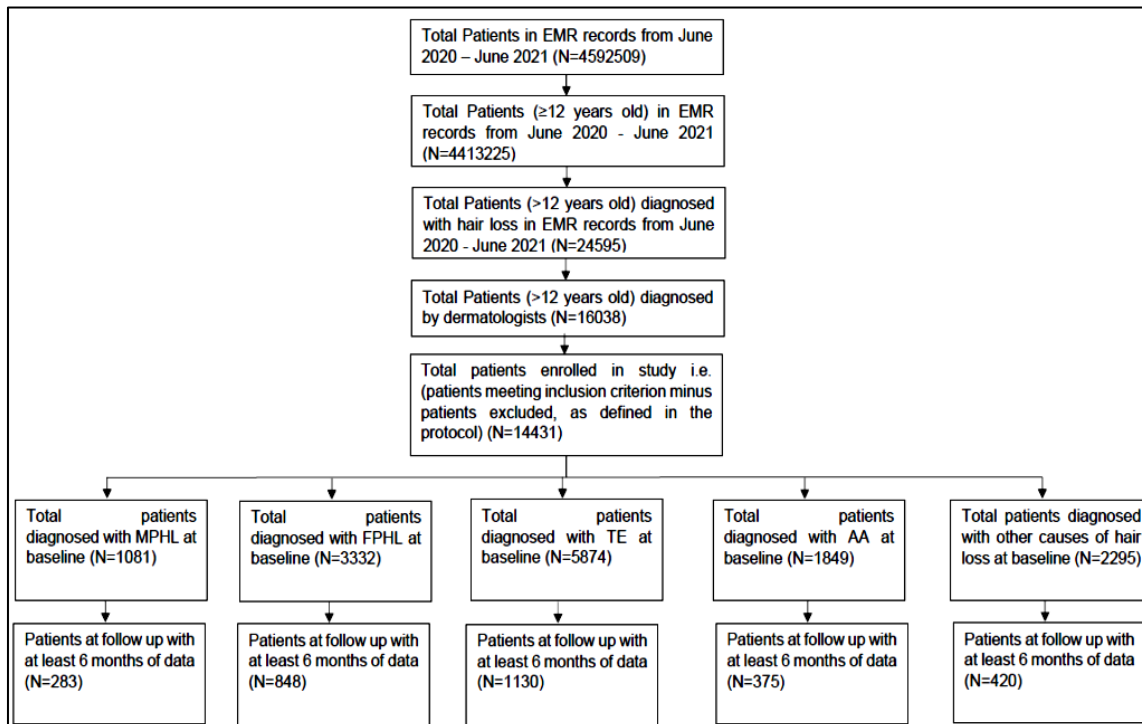


Fig. 1. CONSORT Diagram for the study

**Table 1 . Demographic details of patients included in study**

<b>Causes of Hair loss</b>	<b>Total enrolled cases</b>	<b>MPHL</b>	<b>FPHL</b>	<b>TE</b>	<b>AA</b>	<b>Other causes</b>
<b>Characteristic</b>	<b>(N=14431)</b>	<b>(N=1081)</b>	<b>(N=3332)</b>	<b>(N=5874)</b>	<b>(N=1849)</b>	
<b>Age Groups</b>						
12-39 years	11734	995	2502	4778	1571	1888
40-64 years	2582	84	803	1037	269	389
>=65 years	115	2	27	59	9	18
<b>Gender Distribution</b>						
Male	3637 (25.2)	1081 (100)		849 (14.5)	1230 (66.5)	477 (20.8)
Female	10794 (74.8)		3332 (100)	5025 (85.5)	619 (33.5)	1818 (79.2)
<b>Comorbidity</b>						
Acne	1500 (10.4)	47 (4.3)	312 (9.4)	783 (13.3)	-	358 (15.6)
Diabetes Mellitus Type 2	93 (0.6)	7 (0.6)	37 (1.1)	44 (0.7)	-	5 (0.2)
Hypertension	132 (0.9)	7 (0.6)	42 (1.3)	69 (1.2)	-	14 (0.6)
Polycystic ovary syndrome	126 (0.9)		75 (2.3)	29 (0.5)	-	22 (1.0)
Psoriasis	142 (1.0)	7 (0.6)	27 (0.8)	79 (1.3)	-	29 (1.3)
Seborrheic dermatitis	428 (3.0)	58 (5.4)	74 (2.2)	219 (3.7)	-	77 (3.4)
Thyroid	241 (1.7)	3 (0.3)	91 (2.7)	123 (2.1)	-	24 (1.0)
Tinea infections	264 (1.8)	27 (2.5)	36 (1.1)	131 (2.2)	-	70 (3.1)
Urticaria	134 (0.9)	6 (0.6)	27 (0.8)	62 (1.1)	-	39 (1.7)
<b>Weight (kg)</b>						
<50 kg	278	2	48	109	30	89
50-75 kg	908	79	178	295	105	251
75-100 kg	216	32	43	58	25	58
>100 kg	11	4	2	1	3	1
<b>Obesity</b>						
Class 1 (BMI 30-34.9)	15	-	6	8	-	1
Class 2 (BMI 35-39.9)	3	-	1	2	-	-
Class 3 (BMI ≥ 40)	3	-	1	2	-	-

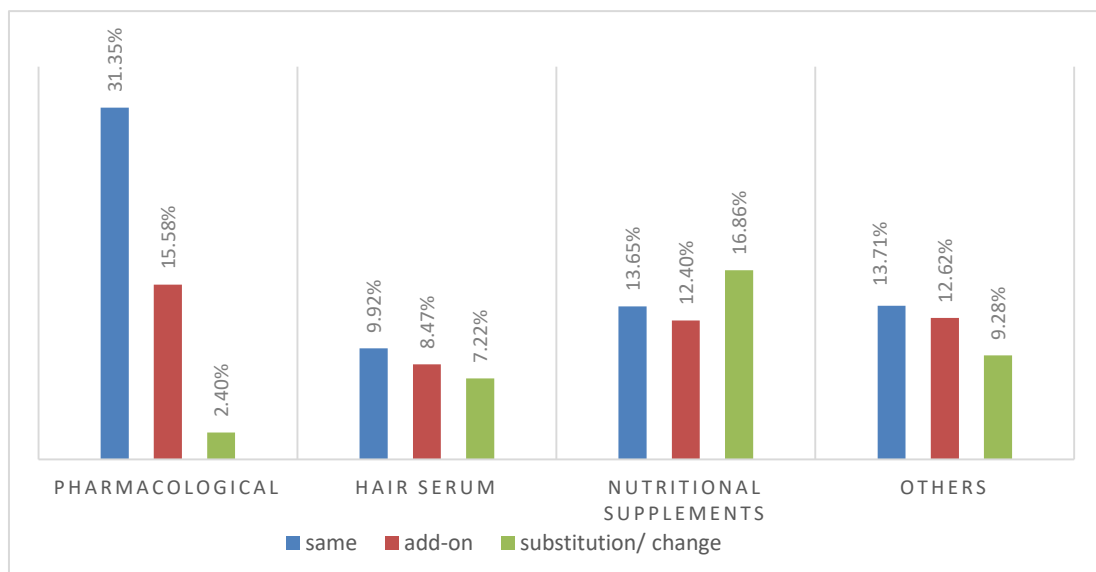
TE group: 5481 of 5874 patients were on treatment at baseline. 1421 of the 5481 patients (25.92%) were on treatment at follow-up. 626 (44.05%) of the patients continued same treatment at follow-up, 396 (27.86%) patients had an add-on of new formulation, and 399 (28.07%) patients had a substitution of treatment. The commonest treatment option at baseline was nutritional supplements (n=3170, 57.83%), while the commonest continued treatment at follow-up (N=381, 26.81%) and commonest add-on therapy was pharmacological class of agents (N=230, 16.18%). The commonest class of therapy which was prescribed as a substituted agent was nutritional supplements (N=214, 15.05%).

AA group: At baseline, 1747 of 1849 patients were on treatment. 575 of the 1747 patients (32.91%) were on treatment at follow-up. Of these, 305 (53.04%) continued same treatment at follow-up, 160 (27.82%) cases had an add-on of new formulation, and 110 (19.13%) cases had a substitution or change of treatment. The commonest treatment option at baseline (n=715, 40.92%) and commonest continued treatment option at follow-up (N=113, 19.65%) was pharmacological agent. The commonest add-on of new formulation to previous therapy was also a pharmacological agent (N=92, 16%). The commonest class of therapy which was a substituted agent prescribed was nutritional supplements (N=42, 7.30%).

At baseline, 1438 (82.31%) of the enrolled cases with AA diagnosis were noted to be only on steroids. Out of these, the common formulations received by AA patients were betamethasone (218 cases, 12.7%), mometasone furoate (104 cases, 6.1%), beclomethasone (100 cases, 5.8%), betamethasone + halobetasol propionate (96 cases, 5.6%), clobetasol propionate (88 cases, 5.1%), triamcinolone (79 cases, 4.6%) and halobetasol propionate (73 cases, 4.3%).

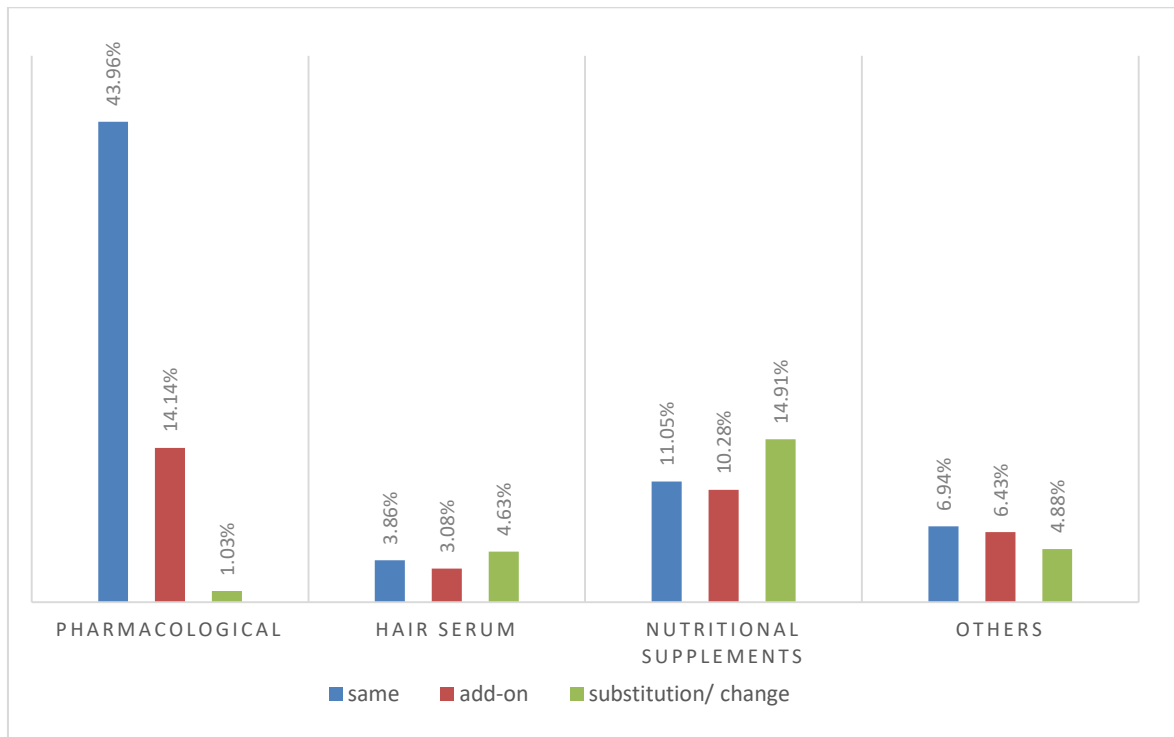
For other causes of hair loss, 2014 of 2295 patients were on treatment at baseline. Of these 2014 cases, 455 patients (22.59%) were on treatment at follow-up. 209 (45.93%) continued same treatment at follow-up, 133 (29.23%) had an add-on of new formulation, and 113 (24.83%) patients had a substitution of treatment. The commonest treatment option at baseline was nutritional supplements (n=1285, 63.80%). Commonest continued treatment at follow-up (N=105, 23.07%) was a pharmacological agent. The commonest class of therapy which was prescribed as a substituted agent was nutritional supplements (N=75, 16.48%).

Figs. 2-7 show the complete details of treatment pattern for whole patient subset as well as for the various groups of patients based on cause of hair loss.



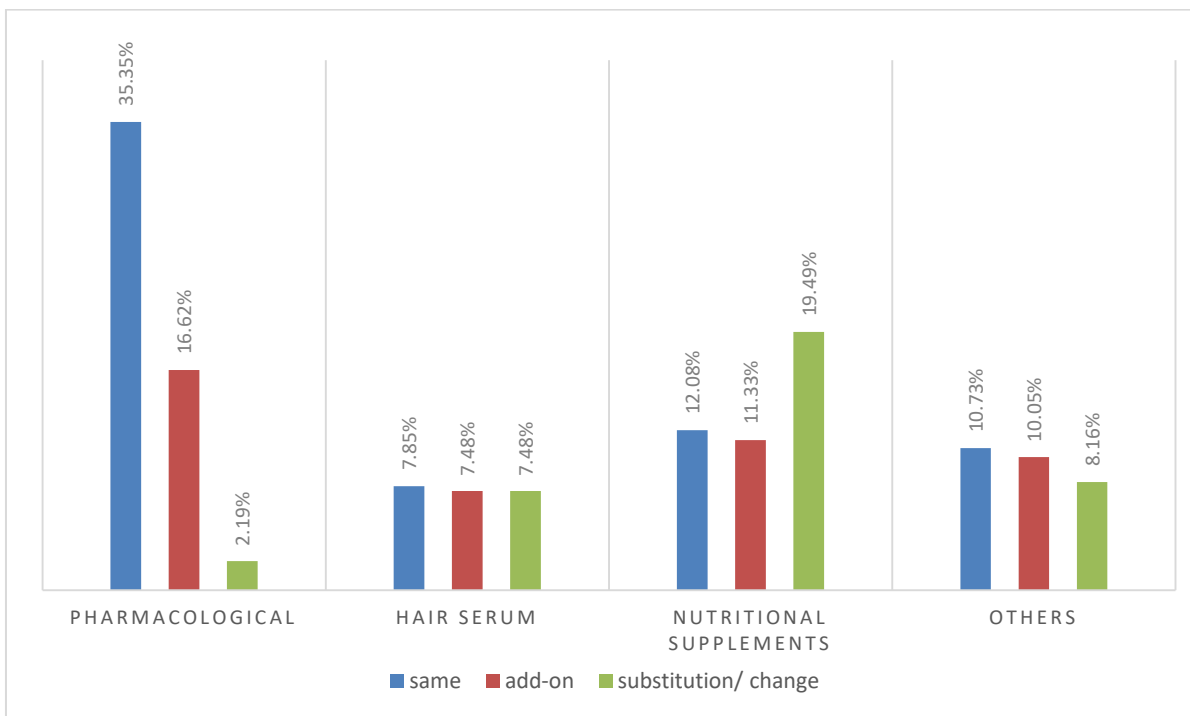
**Fig. 2. Treatment details of total patients with hair loss at follow-up\***

\* Percentage at follow-up calculated using number of patients at follow-up (N=3589) on treatment



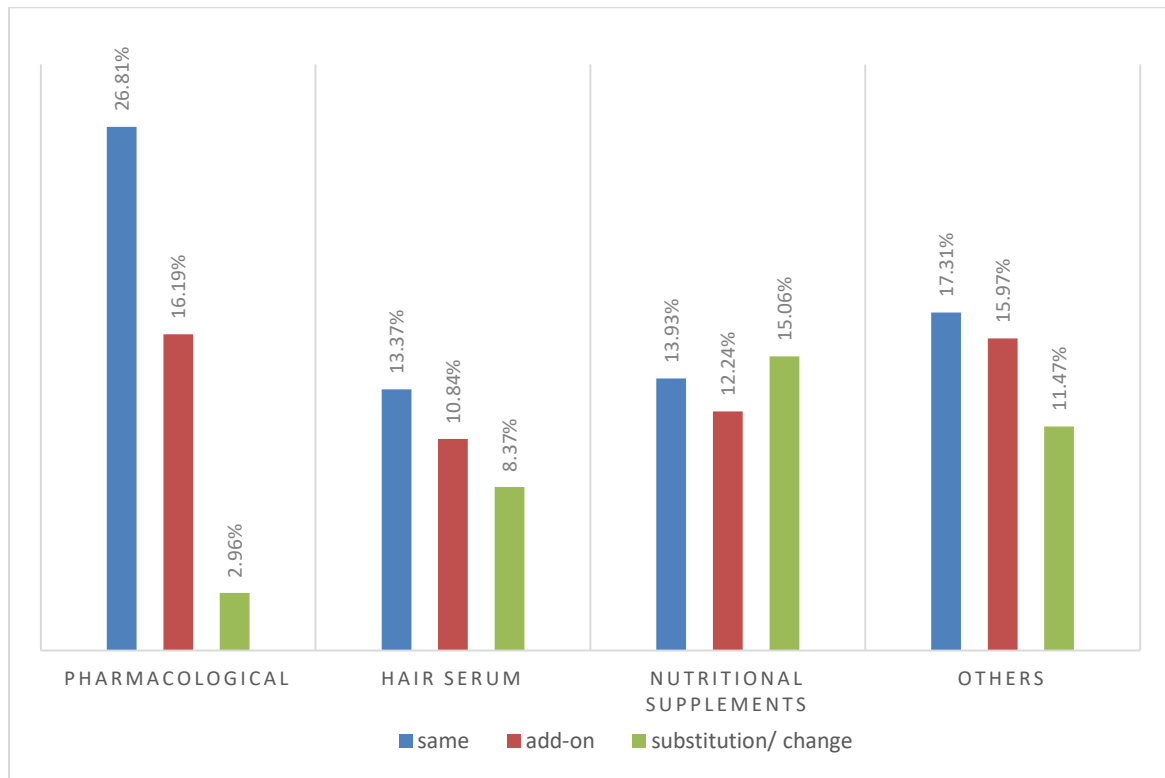
**Fig. 3. Treatment details of patients with MPHL at follow-up\***

\* Percentage at follow-up calculated using number of patients at follow-up (N=389) on treatment



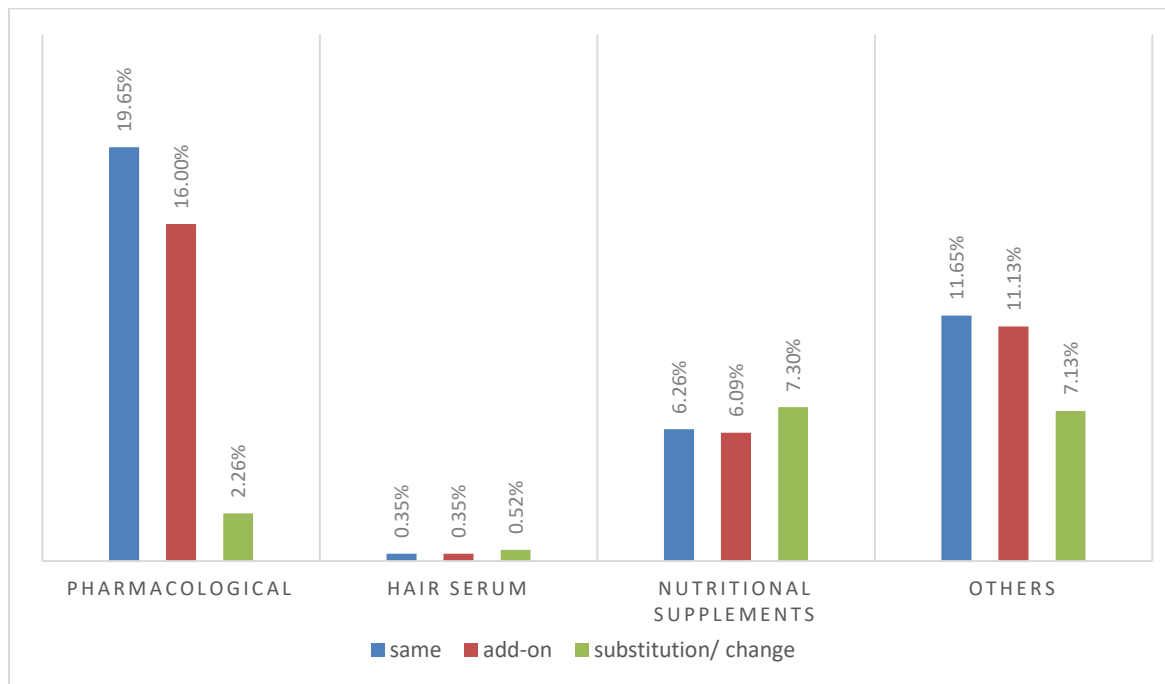
**Fig. 4. Treatment details of patients with FPHL at follow up\***

\* Percentage at follow-up calculated using number of patients at follow-up (N=1324) on treatment



**Fig. 5. Treatment details of patients with TE at follow up\***

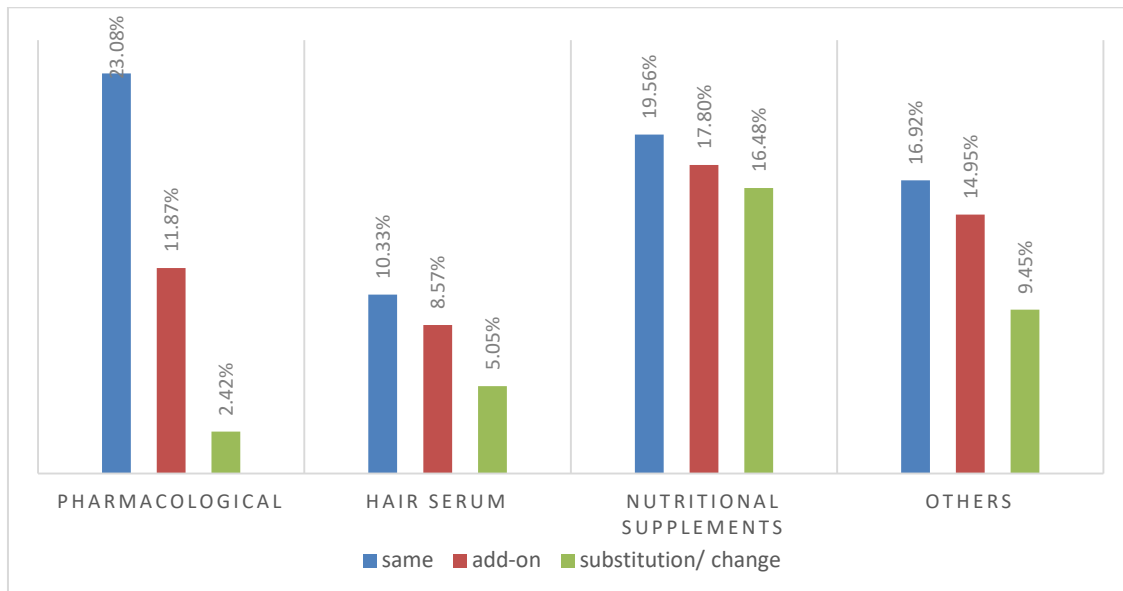
\* Percentage at follow-up calculated using number of patients at follow-up (N=1421) on treatment



**Fig. 6. Treatment details of patients with AA at follow up\***

\* Percentage at follow-up calculated using number of patients at follow-up (N=575) on treatment





**Fig. 7. Treatment details of patients with other causes of hair loss at follow up\***

\* Percentage at follow-up calculated using number of patients at follow-up (N=455) on treatment

#### 4. DISCUSSION

The evaluation of subtypes of hair loss found that most of the cases were TE cases followed by FPHL and AA. Most cases of TE are subclinical; therefore, its true incidence is not clearly known [14]. Published literature on commonest form of hair loss worldwide is limited, though some reviews have highlighted that MPHL can be the commonest cause for patterned hair loss, and TE can be commonest cause for diffuse hair loss [15].

Majority of the cases were females, belonging to 12-39 years' age group. It has been noted in published literature that women take hair shedding problem more seriously than men and are likely over-represented in seeking medical treatment [16]. In the Indian context, a population-based study of 1005 subjects showed a 58% prevalence of MPHL in males aged 30-50 years [3]. Patients often have their first hair loss episode before the age of 40, but AA can occur at any age and has a lifetime risk of nearly 2% worldwide [13,17]. In another Indian study, majority of patients (712, 88%) were below 40 years of age [18].

For TE, majority of cases in present study were females (85.5%), while AA was predominantly noted in males (66.5%). The recent review by Asghar et al. clearly noted that females are more commonly affected than males by TE [19]. In the Indian study by Sharma et al., 66% of AA

cases were males, which was very similar to our study [18].

Most of the included patients in either of the subgroups started with treatment but most of them experienced an addition or a complete change in therapy on follow-up. In addition, though the majority continued pharmacological agents for hair loss management, many of them underwent a change to nutritional supplement on follow-up.

Minoxidil is one of the commonest prescribed pharmacological drugs for hair loss. Minoxidil is converted to minoxidil sulphate, the active form of the drug which opens ATP-sensitive potassium channels in cell membranes, leading to a vasodilatory effect [20].

The enzyme 5-alpha-reductase converts testosterone to its active form DHT and inherited sensitivity of the hair follicles to DHT is one of the etiological factors in AGA. Drug inhibiting the 5-alpha-reductase used in AGA are finasteride which is a type II 5-alpha-reductase-inhibitor. It is not United States Food and Drugs administration (USFDA) approved for use in women and contraindicated in pregnant women and during lactation due to the risk of feminization of the male fetus. Studies in both humans and animals have shown that the combination of minoxidil and finasteride is superior to finasteride or minoxidil monotherapies [21,22]. This is one of the reasons why many patients in study received a combination of the two pharmacological agents.

Nutritional supplementation has also gained acceptance as treatment options for alopecia. Nutritional agents were the most common agent added as substitution at follow-up for all types of hair loss in study. This indicates that dermatologists probably consider nutritional supplements as a last resort option at follow-up if other lines of treatment do not work. The role of oral supplementation with amino acids, biotin, zinc, and other micronutrients in hair loss of any origin is controversial. Iron acts as a metabolic cofactor for ribonucleotide reductase, which is the rate-limiting enzyme for DNA synthesis of hair growth stems. Recent studies have shown that vitamin D receptor activation plays an important role in anagen initiation and vitamin D receptors regulate the expression of genes that are required for hair follicle cycling [23]. Neither vitamin E or biotin supplementation are supported by the literature for treating AGA or TE. Studies show that excess of vitamin A can lead to hair loss, as can too much selenium, although more studies are needed to establish this relationship [24].

Topical and oral steroids were given to most patients diagnosed with AA throughout follow-up in the present study. Pharmacological agents were the most common continued and add-on treatment option at follow-up. Topical steroids may not be beneficial in the long term and are less effective in treating more severe types of alopecia [13]. Oral steroids have demonstrated efficacy in stimulating hair regrowth in AA cases [25]. In addition, immunosuppressive and immunotherapy drugs have been found to be effective in treating alopecia [26].

The study had a few limitations. The outcome of patients with various types of hair loss was not evaluated in the study. Since this is a retrospective EMR database study, limitations common to retrospective medical records database analyses, including possible missing data and incorrect data may be a constraint.

## 5. CONCLUSION

TE and FPHL are noted to be more common causes of hair loss as compared to AA and MPHL. Most of the patients visited dermatologist, but many patients visited a general physician and consulting physician as well. An equal proportion of patients continued the same treatment post-baseline at follow-up or had an addition/substitution of new treatment agent for hair loss at follow-up. Young to middle-aged

female individuals were noted to be most affected by hair loss. Though pharmacological agents remain the key choice for managing hair loss, substitution or addition of nutritional supplements, hair serums or other treatment options were noted at follow-up for the patients with hair loss. As there is a high degree of substitution or addition of treatment modality at follow-up, it is recommended that treating physicians should communicate about the importance of medication adherence when prescribing new treatment agents.

## CONSENT

Informed consent waiver was obtained from ethics committees as this is a non-experimental, retrospective data analysis study.

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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