Dermatology Practical & Conceptual

Post-COVID Hair Loss in the Indian Subcontinent: Clinical Patterns and Association with Disease Severity

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ABSTRACT

Introduction: As the pandemic plateaus, post-COVID alopecia is resurfacing in India. COVID-19 remains a pivotal cause of alopecia, and the diagnosis of post-COVID alopecia aids in better treatment outcomes.

Objectives: To estimate the prevalence of post-COVID alopecia and to evaluate the association between alopecia and COVID severity among other factors.

Methods: A retrospective cross-sectional study was conducted among patients admitted to the COVID ward. Patients willing to participate were asked to fill in a pretested semi-structured questionnaire, and the PSS-10 (Perceived Stress Scale) was used to evaluate stress. Data were analyzed using the SPSS version 24.

Results: Prevalence of COVID-19-induced hair loss was 37.8%. Age, sex, COVID severity, and higher stress were the significant factors, with p-value <0.05. Female sex, COVID severity, and high stress

levels came to be significant independent predictors of hair loss. A majority of participants (46.9%) noticed hair loss within three months of contracting the disease.

Conclusion: This study stands to be a pioneer project to investigate the prevalence of COVID-19-induced alopecia in India. The prevalence rate of 37.8% with a significant association with severity of COVID-19 highlights the importance of reviewing patient history to provide proper treatment and reassurance.

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Introduction

The COVID-19 pandemic caused by SARS-CoV-2 has wreaked havoc across the globe, with over 774 million cases reported [1]. Post-acute COVID-19 syndrome, with long-term complications emerging after four weeks, is a growing area of research [2]. Diffuse non-scarring alopecia resembling telogen effluvium has been documented, predominantly within the first month after COVID diagnosis [3-6]. Pandemic-induced stress could potentially aggravate alopecia [5, 7, 8]. Pathological alopecia is indicated by a daily hair loss count of 100 or more, necessitating clinical examination [9]. This underscores the importance of early diagnosis, regular dermatological evaluation, and psychological support. Limited research in India necessitates further studies to determine the prevalence and associated factors, facilitating targeted management and counseling strategies.

Review Of Literature

SARS-CoV-2 has caused a global pandemic, with diverse clinical manifestations including dermatological issues such as alopecia [1, 10]. Post-acute COVID-19 syndrome, characterized by long-term complications emerging beyond four weeks from onset, including telogen effluvium (TE), has been documented in numerous patients [11-19]. Telogen effluvium, an alopecia generally seen three months after a systemic insult such as febrile states, stress, or nutritional insult, is usually self-limited [7, 11, 12, 20-22]. Multicenter studies have documented a rise in diffuse, non-scarring alopecia suggestive of TE after recovery from COVID-19 [2-5, 8, 11, 13-16, 23-26].

Evidence suggests a stronger association between TE and COVID-19 compared to other alopecia forms [27]. Potential mechanisms for post-COVID alopecia include direct endothelial damage by the virus, immune-mediated microthrombi, cytokine-induced follicular inflammation, and drugs used for treatment [5, 6, 28]. ACE2 receptors, which have a 10–20-fold higher affinity for SARS-CoV-2 than for SARS-CoV-1, are present in the basal hair follicle layer [29]. COVID-19 may also exacerbate alopecia through the TMPRSS2 gene affecting androgen pathway [23, 30].

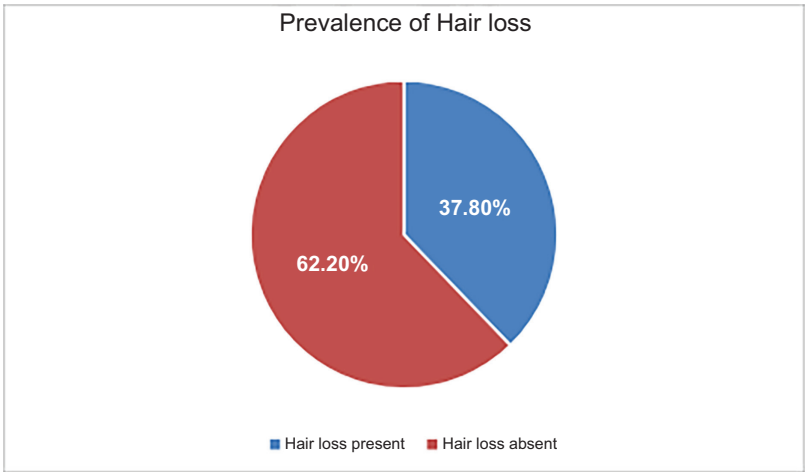

Figure 1. Prevalence of alopecia among post COVID patients. This pie chart illustrates the prevalence of hair loss among study participants, showing the percentages with and without hair loss.

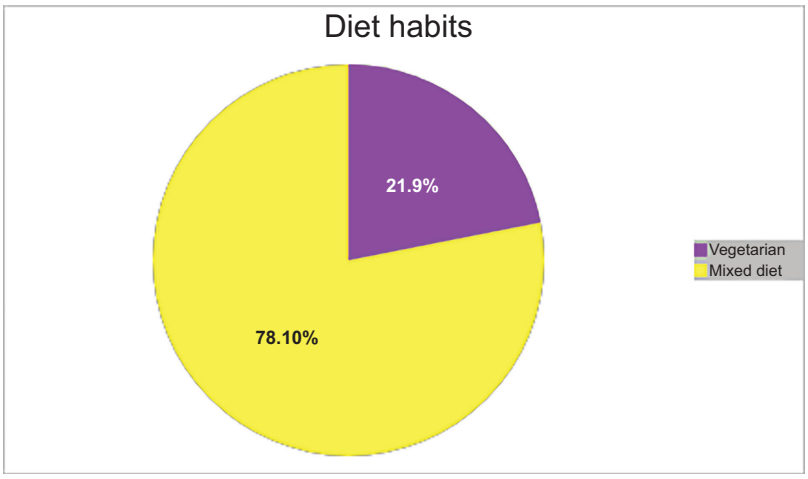

Figure 2. Dietary habits of study participants. This figure illustrates the distribution of dietary habits among participants, comparing mixed and vegetarian diets, presented as percentages.

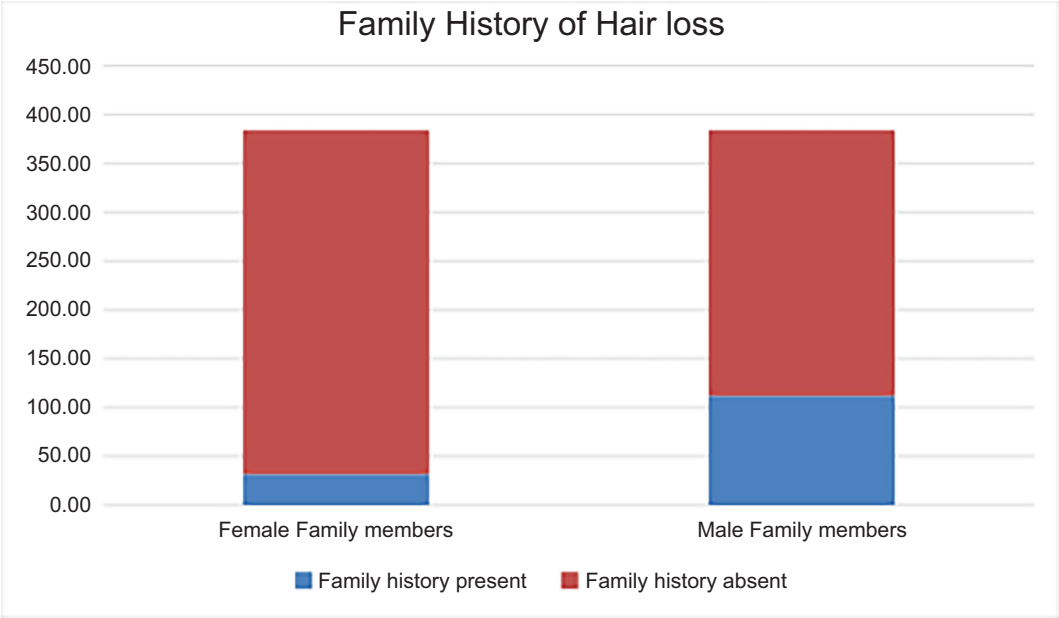

Figure 3. Family history of hair loss. The figure shows the prevalence of hair loss in male and female family members, with data presented as the percentage of participants reporting a family history of hair loss in each group.

Table 1. Distribution of COVID Severity among Study Participants

COVID severity	Frequency (N)	Percentage
Mild	168	43.8 %
Moderate	175	45.6 %
Severe	41	10.7%
Total	384	100%

N: number of participants

Abdulwahab R A et al. found the prevalence of post-COVID hair loss to be 48.5%, predominantly affecting females within 2–3 months post-infection [4]. Other studies focusing on the variables associated with post-COVID alopecia have found female sex, longer hospital stays, or disease severity to be significant [14, 19, 25, 26, 31]. However, Monari P et al. reported no association between TE and COVID-19 features [25].

Table 2. Hair Loss Noticed for the First Time by Study Participants.

When was hair loss first noticed?	Frequency (N)	Percentage
Within 3 months	68	46.9%
4–6 months	19	13.1%
Not sure	45	31%
Longer	13	9%
Total	145	100%

N: number of participants

Table 3. Duration of Hair Loss among Study Participants.

Duration of hair loss noticed	Frequency (N)	Percentage
Within 3 months	20	13.8%
3–6 months	20	13.8%
Not sure	44	30.3%
Longer	61	42.1%
Total	145	100%

N: number of participants

Table 4. Type of Hair Loss expressed as by Study Participants.

Type of hair loss	Frequency (N)	Percentage
Patterned hair loss	7	4.8%
Generalised hair loss	138	95.2%
Total	145	100%

N: number of participants

Table 5. Perceived Stress Scale among Study Participants.

PSS	Frequency (N)	Percentage
Low stress	89	23.2%
Moderate stress	268	69.8%
High stress	27	7%
Total	384	100%

N: number of participants

Stress from the pandemic and hair loss itself likely exacerbate alopecia via the brain-hair follicle axis and by a shift to the telogen phase [7, 17, 20, 28, 31-33]. Studies have revealed that post-COVID patients generally suffer from moderate-to-high stress, which may be related to alopecia [2, 34-38]. Post-COVID TE generally resolves spontaneously but can impact mental well-being due to the importance given to cosmesis. The limited research in India underscores the need for studies to elucidate the associated factors, allowing for effective management and patient counseling.

Objectives

The primary objective was to estimate the prevalence of alopecia among post-COVID patients who were admitted to a tertiary care center in Telangana. The secondary objectives were to investigate the association between alopecia and disease severity of COVID-19 and to investigate factors associated with alopecia among post-COVID-19 patients.

Materials and Methods

A cross-sectional study was conducted among patients admitted to the COVID ward in a tertiary care center in Telangana from January 2021 to December 2021. There were 1120 patients admitted in this period. On obtaining approval from the institute's ethics committee, the medical records department was approached to access the patient records. Medical records were retrieved, and information on patients' COVID severity and investigations were collected. COVID-19 severity was graded according to ICMR guidelines [39].

The patients were contacted, and those willing to participate after being informed regarding the purpose of research were included. A meeting was arranged for data collection at the hospital at the patient's convenience.

The inclusion criteria were as follows: i) patients who had tested positive for COVID-19 by RTPCR and who were admitted to the tertiary care center in Telangana between January 2021 and December 2021; ii) patients with no previous history of alopecia or scalp disorders; iii) patients who gave their consent for the study.

The exclusion criteria were: i) pregnant patients and patients below 18 years of age; ii) patients suffering from comorbidities such as hypertension, diabetes mellitus, thyroid disorders, anemia, and any endocrine and metabolic disorders.

Sample size calculation: The prevalence of alopecia among COVID-19 patients was reported to be 48% [4]. At a 95% confidence interval(CI), considering absolute precision of 5%, the calculated sample size was 384.

Study tool: A pre-tested semi-structured questionnaire was used to collect information on alopecia, its duration,

and information of co-existing comorbidities at the time of admission. Perceived Stress Scale (PSS)-10 was used to assess the stress level of post-COVID patients to find any association with alopecia. A score of 0–13 was considered low stress, 14–26 was moderate stress, and 27–40 was considered high stress [40].

Statistical Analysis

Data were entered in an excel spreadsheet and analyzed using SPSS version 24. The prevalence of alopecia is expressed as frequency and percentages. All the quantitative variables, like age and duration of illness, are expressed as mean +/- standard deviations. Qualitative variables like severity of illness are expressed as proportions. Factors associated with alopecia in COVID patients were found using the Chi-squared test. Multivariate analysis was done using multiple logistic regressions and is expressed as adjusted odds ratio (OR) with 95% CI. A p-value of <0.05 was considered as statistically significant.

Results

The sociodemographic details of the study participants were as follows: the mean age of the participants was 41.2 years (SD=15.1 years), ranging from 18 to 83 years; 50% of the participants were ≥40 years. Most of the participants (N=205, 53.4%) were female.

Regarding the severity of COVID-19 among our study participants, the ICMR Guidelines were used for severity categorization; it was noted that the majority had moderate illness, i.e., 175 (45.6%) (Table 1).

Regarding the prevalence and characteristics of alopecia expressed by the study participants, the prevalence of alopecia among the patients of this study was 37.8% as depicted in Figure 1, with the majority (N=68, 46.9%) of the study participants reporting alopecia starting within three months of suffering from COVID-19 as shown in Table 2. The duration and type of hair loss are detailed in Tables 3 and 4, respectively.

Most (N=98, 68.1%) of the participants did not take any action after suffering from alopecia, while 16.7% reported having approached a dermatologist; 5.7% reported having had hair styling / chemical procedures done during pandemic.

When asked regarding the frequency of hair washing, 49.7% reported washing on alternate days, 39.8% washed once weekly, and 10.4% washed daily. Figure 2 presents an overview of the participants' dietary habits.

As for information regarding menstrual cycle among female study participants, 47 (23.3%) of the 205 females included in this study had attained menopause, and 74 (36.3%) reported irregular cycles. Unwanted or excessive hair growth on face and body was reported by 40 (19.5%) females. Figure 3 presents the family history of hair loss

Regarding stress among COVID patients per the Perceived Stress Scale (PSS), 268 (69.8%) of the study participants had a moderate level of stress, and 7% had high stress. (Table 5).

Concerning associated factors of alopecia among COVID patients, a bivariate analysis was done using chi-squared test to find the associated factors of alopecia among post-COVID patients, the results of which are depicted in Table 6.

Age, sex, COVID severity, stress, hair styling or chemical treatments, menstrual irregularities, and attaining menopause were significant, with p-value <0.05.

Among the sociodemographic factors, age and sex were found to be statistically significant. The age group <40 years was found to have a higher prevalence of alopecia (N=84, 43.8%) compared to the age group >40 years (N=61, 31.8%), with a p-value of 0.015. Females were found to have a higher prevalence of alopecia (N=107, 52.2%) compared to males (N=38, 21.2%), p-value <0.001.

Participants with moderate-to-severe COVID were found to have a higher prevalence of alopecia (92,42.6%) when compared to those with mild disease (N=53, 31.5%), p-value 0.027. Study participants who experienced moderate-to-high stress per the Perceived Stress Scale reported a higher prevalence of alopecia (N=122, 41.4%) compared to those who experienced low stress (N=23, 25.8%), p-value 0.008.

Hair styling was found to be significant, with a p-value of <0.001. Hair washing patterns were not found to be associated with alopecia (p-value 0.813).

Among the females, regular menstrual cycles (P=0.038) and not attaining menopause (P=0.039) were found to be significantly associated with alopecia. Dietary habits and special diets did not have a significant association with alopecia, with p-value 0.403 and 0.111, respectively.

Multivariate logistic regression was used to find predictors of post-COVID alopecia, considering confounding factors. All the variables which had a p-value of <0.25, i.e., age, sex, COVID severity, stress, hairstyling, and special diets followed, were included in the model. Forward stepwise method was used to run the logistic regression command.

Four out of the six variables included, i.e., female sex, COVID severity, high stress, and hairstyling, came to be significant independent predictors of alopecia (P<0.05) as shown in Table 7. Females were found to have 4.084 times higher odds of having post-COVID alopecia. Patients affected with moderate-to-severe COVID had higher odds of experiencing alopecia compared to those with mild illness, with an OR of 1.763. Patients with moderate-to-high stress were found to have 2.519

Table 6. Associated Factors of Alopecia among Post-COVID Patients.

Variables		Alopecia		Chi-square	Degree of freedom	p-value	OR (95% CI)
		Absent	Present				
Age	<40years	108(56.3%)	84 (43.8%)	5.86	1	**0.015**	**1.669 (1.101-2.531)**
	≥40 years	131 (68.2%)	61 (31.8%)				
Sex	Male	141 (78.8%)	38 (21.2%)	39.0	1	**<0.001**	**4.048 (2.577-6.802)**
	Female	98 (47.8%)	107 (52.2%)				
COVID severity	Mild	115 (68.5%)	53 (31.5%)	4.91	1	**0.027**	**1.61 (1.05-2.46)**
	Moderate-to-severe	124 (57.4%)	92 (42.6%)				
Stress	Low	66 (74.2%)	23(25.8%)	7.00	1	**0.008**	**2.02 (1.19-3.43)**
	Moderate-to-high	173(58.6%)	122(41.4%)				
Hair styling/ chemical procedures	Not done	233(64.4%)	129(35.6%)	12.1	1	**<0.001**	**4.82 (1.84-12.6)**
	Done	6(27.3%)	16(72.7%)				
Menstrual cycle	Irregular	43(57.3%)	32(42.7%)	4.30	1	**0.038**	**1.83 (1.03-3.26)**
	Regular	55(42.3%)	75(57.7%)				
Menopause	Not Attained	69(44.5%)	86(55.5%)	4.26	1	**0.039**	**2.008 (1.029-3.921)**
	Attained	29(61.7%)	18(38.3%)				
Family History of Hair loss	Absent	166(63.8%)	94(36.2%)	0.884	1	**0.347**	**1.23 (0.796-1.91)**
	Present	73(58.9%)	51(41.1%)				

Table 7. Independent Predictors of Post-COVID Alopecia.

Variables	Reference Category	Adjusted OR (CI)	P-value
Age	>40 years	1.446 (0.907-2.305)	0.121
Sex	Male	4.084 (2.531-6.590)	<0.001
COVID severity	Mild	1.763 (1.102-2.819)	0.018
Stress	Low	2.519 (1.409-4.505)	0.002
Hair styling/chemical procedures	No	4.103 (1.484-11.343)	0.006
Special diet	No	1.524(0.528-4.397)	0.436

times higher odds of getting alopecia. Patients who had hairstyling/chemical treatments done were found to have 4.103 times higher odds of developing alopecia.

Discussion

The present study investigated post-COVID-19 alopecia prevalence and its related variables in India. Wadhwa D et al. have previously focused on associated factors such as female sex, age, duration of illness, and stress in patients with post-COVID hair loss [10].

This study revealed a 37.8% prevalence of alopecia in the study population, with females being significantly more affected (N=107, 52.2%) than males (N=38, 21.2%). Similar studies worldwide have reported prevalences ranging from 20% [41] to 52.70%, [31] with females often being the majority affected. A Saudi Arabian study of 343 participants showed a 48.5% prevalence, of which 60.2% were females [4]. A Chinese study reported a 28.6% prevalence of alopecia, of which 48.5% were females [16].

Societal pressures on appearance and longer hair in many females may influence the higher rate of hair loss reported compared to males.

Age was found to be a significant factor, with those younger than 40 years reporting more alopecia, consistent with Alkeraye et al.'s observations of greater hair loss in

individuals under 46 years of age [31]. Younger individuals may notice hair changes sooner due to greater appearance concerns, explaining this age-related trend. Average ages in multiple papers ranged from 30 to 61 years, with many in their 40s, similar to our study [4, 5, 11, 14, 19, 25, 34, 42].

Analysis revealed that moderate-to-severe COVID-19 significantly increased alopecia risk, and the majority had moderate disease; 42.6% (N=92) of moderate-to-severe disease cases experienced alopecia. In another study, 60% of those with alopecia required ward level care [4]. Similar patterns were observed in other studies, with most alopecia occurring in moderate-to-severe cases [11, 19]. Starace et al. found that 66.7% of their 128 patients with alopecia had grade 1 COVID, contrary to this study's findings, which may be attributed to the discrepancy in sample size [5].

In this study, 46.9% of patients noticed alopecia within three months, consistent with other research, where 52.2% noticed it within three months of COVID-19 [5]. In two other studies, the mean time to notice hair loss was 57 days [34] and 45 days [18]. A Saudi Arabian study reported that 28% had onset within one week of COVID [31].

Our study found that 42.1% experienced alopecia for over six months, mirroring a similar study, where about 33% experienced it for over six months [31]. Pandemic-related stress, inadequate nutrition, disease severity, and comorbidities may have contributed to these findings.

Ninety-five point two percent experienced generalized hair loss, consistent with stress-induced TE [7, 20, 28]; 68.1% of participants took no action, reflecting a lack of perceived seriousness or influence of financial and familial factors. Similarly, 86% of patients did not seek consultation in another study [31].

Hair washing and dietary habits were insignificant on analysis. Regular menstrual cycles correlated with higher risk of alopecia. Hair styling increased the risk fourfold, although this warrants further study. Family history of hair loss was not significant.

Participants with moderate-to-high stress on the PSS reported a higher prevalence of alopecia (41.4%). Several studies report that stress can induce hair loss, which could be linked to the brain-hair follicle axis [7, 17, 28, 31, 32]. The study's limitations include potential recall bias due to delayed data collection, single-center scope, and lack of representation of home-treated patients.

Conclusions

The COVID-19 pandemic disrupted global operations, necessitating extensive efforts to develop treatment protocols and vaccines. Initially presenting with respiratory symptoms, the pandemic later revealed other manifestations amidst heightened stress and financial insecurities. There is increasing concern about the prevalence of COVID-19-related alopecia in the Indian population given the recent increase in reports documenting this phenomenon across the world. While this often resolves without intervention, it necessitates reassurance.

Our study found a 37.8% prevalence of post-COVID alopecia, influenced by factors such as COVID severity, age, sex, stress levels, hairstyling practices, and menstrual status. Younger individuals (<40 years), females, and those engaging in hairstyling routines faced elevated risks. Moderate-to-severe COVID significantly increased the risk of alopecia, and a similar risk was seen in those with moderate-to-high stress. Alopecia typically occurred within three months for 46.9% of participants and persisted beyond six months for 42.1%. Addressing the underlying causes of alopecia is crucial, given the anxiety it provokes. Future research could validate the prevalence across broader populations and explore interconnected factors such as comorbidities for comprehensive understanding and management of this condition.

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