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Factors Associated with Acute Telogen Effluvium and COVID-19 Infection

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ABSTRACT

Telogen effluvium, a common type of hair loss, has emerged as a concerning side effect for many individuals recovering from COVID-19. **Methodology:** A descriptive cross-sectional study was conducted at Dermatology Outpatient department of Sohail Trust Hospital, Karachi to determine frequency and factors associated with Acute telogen effluvium and COVID-19 infection. We enrolled 100 Covid 19 PCR positive patients between January to July 2022 after taking informed consent. This study employed a semi-structured self-administered questionnaire for data collection. Statistical analyses were conducted using SPSS version 25. The Chi-square test was utilized to assess the association between Telogen Effluvium and COVID-19 infection. Multivariable logistic regression analyses were performed to identify factors associated with the development of Telogen Effluvium. **Results:** Our findings revealed that 64% of female participants experienced Telogen Effluvium following COVID-19 infection. Diabetes emerged as the most prevalent co-morbidity among these patients. The temporal region was the most frequently affected scalp area (32%), followed by complete hair loss observed in 31% of cases. Participants who did not supplement their diets were significantly more likely to experience severe hair loss. Notably, 34.6% of individuals with hair loss reported that other family members also developed hair loss post-COVID-19. Within our study population, only 7% sought professional treatment for their hair loss. **Conclusion:** This study demonstrates a high prevalence of Telogen Effluvium among female COVID-19 survivors, with diabetes as a significant risk factor, highlighting the need for increased awareness and accessible treatment options for this undertreated condition.

INTRODUCTION

Coronavirus disease 2019 (COVID-19), a global pandemic triggered by the severe respiratory infections disorder coronavirus type 2 (SARS-CoV-2), was first reported in Wuhan, China, in December 2019. (1) World Health Organization (WHO) declared Corona virus outbreak as a global pandemic in March 2020. (2) The pandemic has profoundly impacted the well-being of individuals and society across all facets of life. Survivors of COVID-19 may encounter in-hospital complications that could have both short and long-term health consequences, as the virus affects several organ systems. (3)

While initially considered minor, the dermatological manifestations of COVID-19 have proven to be multifaceted and complex. Published research reports a variable prevalence of cutaneous lesions in COVID-19, ranging from 0.6% to 20.4%. (3) Following COVID-19 recovery, hair loss has emerged as a prominent cutaneous symptom, with acute Telogen effluvium (TE) being a frequent observation. (4)

Telogen effluvium, also known as TE, is among the most prevalent types of hair loss. This kind of hair loss is characterized by a diffused baldness and has numerous known causes, including traumatic situations, medicines, endocrine disorders, multiple surgeries, febrile infections, and nutrient deficiencies. (5) Acute telogen effluvium (ATE) is a non-scarring hair loss that typically takes place three months following the event that causes hair loss and can last for up to six months. Chronic telogen effluvium (CTE) lasts longer than 6 months. ATE is a self-limiting condition that is defined by abnormal hair loss (more than 100+ lost hairs each day) as a result of a sudden change of the hair shaft from the maturation stage to an ovarian cycle. (6) There are 3 phases that make up the hair growth period: the anagen, catagen, and telogen stages. The stage of the telogen

phase that corresponds to growth is called the anagen stage. At any given time, 85 percent of a person's hair will be in the maturation stage, which can last anywhere from two to six years. The catagen stage is the major transition that happens when an anagenic follicle gets a signal that tells it to cease the stage of growth. This causes the anagenic follicle to enter the catagen process. Between one and two weeks pass during the catagen period. The final section of the hair growth cycle is known as the telogen phase. This stage, that is also known as the resting period, is the time wherein the hair does not grow. This phase can persist anywhere from three to five weeks before finally giving way to the anagen. (7, 8) Rapid telogen effluvium (TE) seems to represent the most frequent trichology condition in people with COVID-19, though androgenetic alopecia have also been linked to the virus. (9, 10)

Despite the significant impact of the COVID-19 pandemic globally, a notable gap exists in the Pakistani context regarding the specific association of TE with the virus. While studies have explored hair fall and alopecia in general, none have specifically focused on TE. This knowledge gap is significant given the high prevalence of hair loss reported in the Pakistani population during the pandemic. For instance, one study found that 95.6% of individuals experienced increased hair fall during quarantine, and another study observed a higher frequency and severity of alopecia in male COVID-19 patients compared to females. (10, 11) Conducting this study in Karachi will contribute valuable data to address this critical knowledge gap and provide crucial insights into the impact of COVID-19 on hair health within the Pakistani population.

METHODOLOGY

A descriptive cross-sectional research design was employed and it was conducted between January to July 2022. This study was conducted within the Dermatology Outpatient Departments of Jinnah Medical Center Hospital (JMCH) and Medicare Hospital, Karachi, Pakistan. Due to the lack of available data on the prevalence of post-COVID-19 Telogen Effluvium (TE) in the Pakistani population, a formal sample size calculation was not feasible. Hence, a non-probability purposive sampling technique was employed to select participants. Inclusion criteria encompassed individuals aged 18 years and above with a confirmed history of COVID-19 infection within the preceding six months, as evidenced by a positive PCR test. Exclusion criteria included individuals with a pre-existing history of hair loss, chronic illnesses, autoimmune diseases, and a family history of alopecia.

The study received approval from Ethical Review Committee of Sohail University with Protocol #.00021812. Participants were enrolled after taking written and informed consent. A semi structured questionnaire was developed by the Principal Investigator in collaboration with the research team. This instrument comprised of two distinct sections. The first section had socio-demographic characteristics of participants, including age, gender, and any past medical history. The second section focused on specific information related to hair loss experiences and the participants' history of COVID-19 infection.

Statistical analysis was conducted using SPSS version 25. The frequency and percentage were calculated for categorical variables. Mean and SD were estimated for continuous variable. The Chi square test was performed to determine the association between hair loss and Covid-19. Logistics regression analysis was performed to determine the association between Covid 19 and Telogen effluvium and other socio-demographic factors.

RESULTS

A total of 100 participants, presented with COVID-19 infection were enrolled. Among them 42% were males while 58% were females. Female participants exhibited a higher prevalence of hair loss (64.1%) compared to males (35.9%). The majority of affected individuals (83%) were within the age group of 20-40 years. More than half of the patients (86%) diagnosed with Telogen Effluvium, reported no co-morbid conditions. Diabetes emerged as the most prevalent co-morbidity, observed in 4% of cases, followed by hypertension at 3%. [Table 1]

Table 1

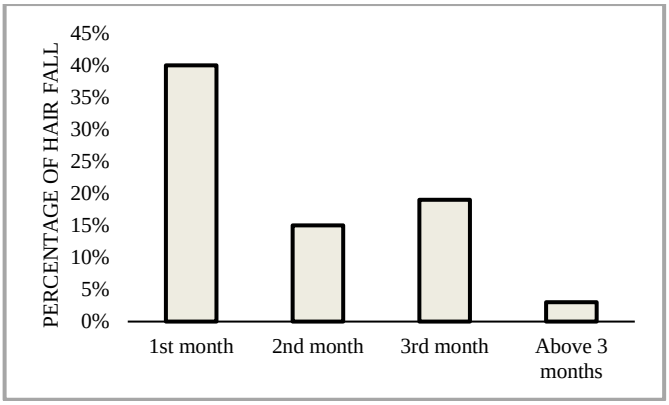
Sociodemographic Characteristics of Study Participants (N = 100)

Factors	Frequency	Percentages
Age of the patient		
0- 20 years	10	10%
20- 40 years	81	81%
40 -60 years	9	9%
Gender		
Male	48	48%
Female	52	52%
Presence of Co- morbid		
Yes	14	14
No	86	86

Almost all of the participants exhibited hair loss following Covid-19 infection. The most noticeable hair shedding (40%) was observed within the first month post-infection. Subsequently, the severity of hair loss exhibited a gradual decline, with a reduction observed in the following months. Specifically, the proportion of participants experiencing severe hair loss decreased to 15% in the second month, 19% in the third month, and ultimately to 3% in subsequent months. [Figure 1]

Figure 1

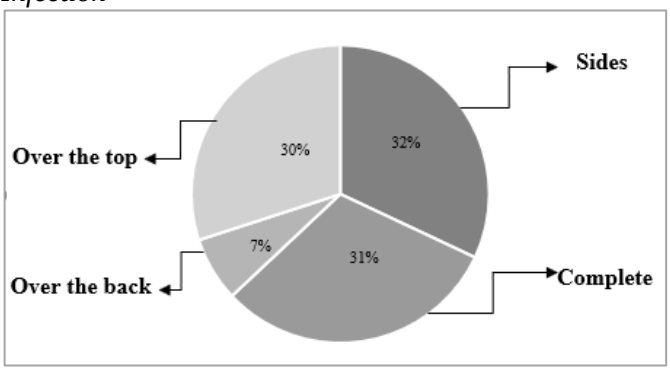
Percentage of Hair Loss Onset by Month Following COVID-19 Infection



Regarding the distribution of hair loss, the temporal region was the most frequently affected area, reported in 32% of participants. Complete hair loss was observed in 31% of cases. The onset of hair loss following COVID-19 infection was most common within one month, occurring in 52% of patients, followed by an onset within three months in 25%. A statistically significant association between allergies and hair loss could not be determined due to insufficient disclosure of allergy history by the participants. [Figure 2]

Figure 2

Distribution of Hair Loss Patterns Observed in Patients Experiencing Telogen Effluvium Following COVID-19 Infection



The multivariable analysis was performed to assess the association of TE with Covid-19 viral infection and the final model revealed that female gender, history of chronic illness and severity of corona virus infection are significantly associated with Telogen Effluvium. Among females the odds of TE was 3.7 times more compared to males (95% CI 1.47, 2.13) while history of chronic illness had higher odds of 4.2 times compared to those who had no chronic illness history (95% CI 2.64, 7.58). Similarly, Covid-19 severity had an odd of 2.8 compared with participants who had non-severe corona infection (95% CI 1.25, 2.24). After adjusting for these factors, taking nutritional supplements, previous and family history of hair fall had no significant association with TE. [Table 2]

Table 2

Univariate and Multivariable Analysis of Factors Associated with Telogen Effluvium in Patients with COVID-19

Factors	Unadjusted OR	Adjusted OR	95% CI	P-value
Age in years				
> 30 years	0.49		0.11-2.58	0.35
< 30 years (ref)	-		-	
Gender				
Female		3.75	1.47-2.13	0.013
Male (ref)		-	-	-
Any chronic illness				
Yes		4.2	2.64-7.58	0.03
No (ref)		-	-	
Severity of Covid-19 symptoms				
Severe		2.8	1.25-2.24	0.04
Not severe (ref)		-	-	
Take nutritional supplement				
No	1.09		0.48-2.19	0.58
Yes (ref)	-		-	-
Previous history of hair loss				
Yes	0.87		0.25-1.98	0.25
No	-		-	-
Family History of hair loss				
Yes	0.57		0.47-3.56	0.98
No	-		-	-

DISCUSSION

The present study examined the frequency and associated factors of acute Telogen Effluvium (TE) in individuals who had suffered from COVID-19. Our findings indicated that a significant proportion of female participants experienced pronounced hair shedding within the first month following COVID-19 infection, with the temporal region being the most commonly affected site.

Our findings demonstrate a higher prevalence of Telogen Effluvium (TE) among female participants, aligning with the literature that has documented a greater susceptibility to hair disorders in women. A previous study observed generalized hair loss, consistent with TE, in patients with a history of SARS-CoV-2 infection, particularly among middle-aged females. This gender disparity may be influenced by hormonal factors, as estrogen and progesterone play roles in hair follicle health and immune modulation. (12) Another research has identified female gender, prolonged hospitalization, a high burden of comorbidities such as hypertension, diabetes, and respiratory diseases, and the severity of COVID-19 infection as significant risk factors for the development of TE. (13)

Our study observed a proportion of comorbidities, particularly diabetes (4%) and hypertension (3%), among COVID-19 patients experiencing hair loss. This finding is consistent with the existing literature that

identifies diabetes as a significant risk factor for post-COVID-19 TE. (14) While a case study has also identified hypertension as a potential contributing factor. (15) There's a strong association between chronic conditions and COVID-19 but further investigation to needed to understand the underlying mechanisms linking specific medical conditions to the development of TE following COVID-19 infection. (16)

Another significant association our study observed was between the severity of COVID-19 infection and the development of Telogen Effluvium (TE). Our observations are in line with previous reports suggesting that severe COVID-19 infections are characterized by inducing cytokine storm, producing elevated levels of IL-6, TNF-α, IL-1β, and IFN-γ. These inflammatory markers play a crucial role in the immune response to the virus and their excessive production can disrupt the normal hair growth cycle. (17) Specifically, studies have shown that these inflammatory mediators can induce the catagen phase, leading to premature hair follicle regression and subsequent hair shedding, which are hallmark features of Telogen Effluvium. (18)

Furthermore, existing literature suggests that middle-aged individuals, particularly those older than 30 years, may exhibit increased susceptibility to post-COVID-19 Telogen Effluvium (TE). This heightened vulnerability may be attributed to age-related physiological changes that can impair the body's capacity for recovery from infection. However, our study did not reveal a statistically significant association between age and the development of post-COVID-19 TE. (13)

Another noteworthy finding of this study pertains to the impact of nutritional supplementation on Telogen Effluvium (TE) development. Previous research has established a strong association between anosmia/ageusia, commonly reported symptoms of COVID-19, and decreased appetite, potentially leading to nutritional deficiencies that can exacerbate or even induce hair loss. In support of this, a previous study reported that approximately 25% of COVID-19 patients develop TE, and while no single therapeutic intervention guarantees complete hair regrowth, patient education and the judicious use of nutritional supplements, particularly in individuals with identified deficiencies, are crucial for optimal management (19). Our study also observed a trend towards increased severity of hair loss in individuals who did not supplement their diets, although this association did not reach statistical significance.

Additionally, our study revealed that 34.6% of patients with hair loss had other family members experiencing similar post-covid symptoms. This can be potential influence of shared environmental factors, genetic predisposition, or shared lifestyle experiences on the development of this complication. Additionally, only 7% of the individuals who experienced hair loss sought treatment, indicating a potential lack of awareness or access to appropriate interventions. This is in accordance with the literature which suggest that prior to the pandemic, the rate of dermatological referrals for similar complaints ranged from 15% to 28%. However, a significant decrease in referral rates was observed during the pandemic, with rates falling to between 2.5% and 12.5% (20)

Limitations

This study has some limitations. Firstly, the sample size may not be fully representative of the general population, and the reliance on self-reported data may introduce potential biases. Future research with larger, more diverse cohorts and objective assessment methods are necessary to validate and expand upon these findings.
Despite these limitations, our research provides valuable insights into the frequency and factors associated with acute Telogen Effluvium (TE) following COVID-19 infection.

CONCLUSION

Key findings include a higher prevalence of TE among young adult females and a potential protective effect of nutritional supplementation in preventing the severity of hair loss. Furthermore, the study highlights the importance of factors such as gender, comorbidities (such as diabetes and hypertension), age, disease severity, and family history in the assessment and management of post-COVID-19 TE. These findings contribute to a growing body of evidence suggesting that COVID-19 infection can significantly impact hair health and emphasize the need for further research to identify the underlying mechanisms and develop effective management strategies for this complication.

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