

## Original Article

# A Cross Sectional Clinical Study to Evaluate the Pattern of Acute Hair Loss in Patients after SARS-CoV-2 Infection

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**Background :** Dermatologists have largely studied the cutaneous involvement of Coronavirus Disease 2019 (COVID-19), It is still debated whether the skin manifestations are a direct consequence of COVID-19 pathogenicity or a consequence of thrombogenic and immune deregulatory responses triggered by SARS-CoV-2 infection. Multiple studies are available focusing on the cutaneous manifestation of COVID-19 but only few reports are available regarding the Telogen Effluvium as a sequelae of COVID infection.

**Materials and Method :** The cross-sectional study included 130 patients who presented with the complaint of hairfall and had a history of getting infected with COVID during the second wave (confirmed cases of SARS-CoV-2). We divided the average per day shedding into mild (200-400 hairs/ day), moderate (400-600/day) and severe (>600 hairs/day).

**Results :** A Chi-square test of independence was performed to examine the relation between severity of COVID infection and severity of hairfall. The relation between these variables was not significant,  $X^2(4, N=130)=2.244$ ,  $p=0.691$ . So we can conclude that the severity of covid infection is independent of the severity of hairfall.

**Conclusion :** Inflammatory process in mild COVID disease may not be causing severe acute condition during active infection but is affecting the immediate anagen release leading to increased hair loss after 2-3 months of infection. More research is needed to identify the inflammatory process underlying COVID infection which may even be affecting other systems of the body and may appear as a late sequelae.

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**Key words :** SARS-CoV-2 Infection, Telogen Effluvium, Pandemic.

The current pandemic of COVID-19 due to Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) which has rapidly spread across the globe infecting around 63 crore people and 64 lakh deaths Worldwide till date. Various studies have been published citing the various cutaneous manifestations of COVID infection including chilblain-like, maculopapular and vesicular lesions, urticaria, livedoid/necrotic lesions, are few which are frequently reported. Multiple studies are available focusing on the cutaneous manifestation of COVID-19 but only few reports are available regarding the Telogen Effluvium as a sequelae of COVID infection. The skin manifestations are still being questioned as to whether they are a direct result of COVID-19 pathogenicity or a result of thrombogenic and immunological deregulatory responses triggered by SARS-CoV-2 infection<sup>1</sup>. Psychological stress and drug therapy

### Editor's Comment :

■ The article underscores a paradigm shift in understanding SARS-CoV-2 as primarily an auto-inflammatory rather than infectious condition, emphasizing the significant impact of the body's immune response compared to the virus itself. Addressing conditions like Acute Telogen Effluvium (ATE), characterized by non-scarring hair loss post-infection, requires a multifaceted approach including counseling, reassurance, and interventions like multivitamin supplements, topical peptides, antioxidants, and microneedling with PRP therapy. Vigilant follow-up is crucial for early detection of potential post-COVID sequelae, highlighting the necessity for comprehensive screening even in cases of mild disease.

associated with the COVID-19 can even be attributed as a causative etiology for post COVID Telogen Effluvium.

Telogen Effluvium (TE), first described by Kligman in 1961, is a diffuse, non-scarring shedding of hairs, resulting from the early immediate release of hair from anagen phase and entry of the hair into the telogen phase. Acute Telogen Effluvium present as acute onset of hair loss (increased loss of hair on brushing/combing or during shampoo) post triggering event like high fever, surgical trauma, psychological stress, sudden loss of weight, hemorrhages or sometimes (around 1/3<sup>rd</sup> of cases) no trigger factor identified.

Telogen Effluvium is mainly a clinical diagnosis assisted by history, clinical routine test, trichoscopy

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and sometimes a trichogram. A diffuse loss of hair volume with patients complaining of thinning of pony tail, positive hair pull test and nonspecific findings on trichoscopy like single hair projecting from follicular units with no loss of follicular units are generally adequate to make a diagnosis of Telogen Effluvium.

The primary objective of the study was to study the pattern of hair fall as a sequelae of COVID-19 infection.

Secondary objective was to check whether there was a association between the severity of COVID-19 symptoms with the severity of hairfall the patients suffered.

### MATERIALS AND METHOD

An observational cross-sectional study was carried out in the Department of Dermatology at tertiary care hospital after taking approval from the Ethics committee. The study included 130 patients who presented with the complaint of hairfall and had a history of getting infected with COVID during the second wave (confirmed cases of SARS-CoV-2). Patients with a previous history of hair disorder or any debilitating conditions, chronic illness, crash diet causing acute weight loss were excluded to rule out any possible bias. A complete detailed history was elicited assisted by trichoscopy and a final clinical diagnosis was made. Patients were grouped into Mild, Moderate and Severe disease according to definition given by AIIMS/ICMR COVID-19 National task force/Joint monitoring group. Also the severity of hairfall was assessed using a visual analogue scoring tool which had hair of short, medium and long lengths by dividing a bundle of hair of each length into nine piles of increasing hair amount that were then photographed and arranged in order of size. The tool was developed and validated by Martínez-Velasco, María Abril, *et al*. All Patients were asked to select the photographed hair bundle that best correlated with the amount of hair they shed on an average day. The tool didn't classify the amount of average shed as mild, moderate or severe but for the statistical analysis we divided the average per day shedding into mild (200-400 hairs/ day), moderate (400-600/day) and severe (>600hairs/day). Patients were treated with multivitamin supplements and microneedling with PRP therapy and mostly all patients responded within 1-2 months.

### Statistical Analysis :

The Chi-square test of independence was used for statistical analysis. The p-value <0.05 was considered statistically significant.

### RESULTS

In this study, 130 patients were included, consisting of 124(95.40%) Female and 6(4.60%) Male. The mean age of the study population was  $37.74 \pm 11.84$  years with the age range from 20-75 years. The average duration of onset of hair fall post COVID infection was  $3.08 \pm 1.05$  months and median onset of hairfall was 3 months after infection with a range from 1-4 months. The median period of presenting to OPD for consultation since onset of hairfall was 30 days.

Table 1 shows Distribution of Patients according to Severity of COVID disease and Hairfall with Chi-square analysis.

A Chi-square test of independence was performed to examine the relation between severity of COVID infection and severity of hairfall. The relation between these variables was not significant,  $X^2 (4, N=130)=2.244$ ,  $p=0.691$ . The analysis suggests that the severity of COVID infection is independent of the severity of hairfall.

Around 77(59.20%) patients gave positive history about pre COVID hairfall but with median hairfall of  $\leq 100$  average hair shed per day and all 77(100%) patients had aggravation of hair fall with median of 700 hair sheds /day (moderate hair fall) with mean onset of aggravation at  $3.09 \pm 1.10$  months.

### DISCUSSION

The present study was conducted in the Department of Dermatology at GMERS Medical College and Hospital, Ahmedabad in the month of August, 2021.

In this cross sectional observational study 130 patients were enrolled fulfilling the inclusion and exclusion criteria.

A detailed history with thorough clinical examination assisted by trichoscopy, coupled with recent recovery from COVID infection and ruling out the other causes of hairloss a diagnosis of Acute Telogen Effluvium as a post COVID infection sequelae was made in all 130 patients.

Study consisted of 124(95.40%) Female and 6(4.60%) Male. This discrepancy may be because female patients are more aware and concerned regarding the hair fall than the male patients.

COVID-19 disease severity according to ICMR Guidelines	Severity of Hairfall			
	Mild	Moderate	Severe	Grand Total
Mild	27(20.77%)	50(38.46%)	37(28.46%)	114(87.70%)
Moderate	1(0.77%)	6(4.61%)	6(4.61%)	13(10.00%)
Severe	1(0.77%)	1(0.77%)	1(0.77%)	3(2.30%)
Grand Total	29(22.30%)	57(43.85%)	44(33.85%)	130(100.00%)

Chi square : 2.244; Degree of freedom : 4 ; P-value : 0.691

The Mean (SD) duration of onset of hairfall was 3.08(1.05) with a range of 1-4 months. Majority of patients presented had onset of hairfall after 2-3 months from recovery of COVID infection but 10 patients (7.7%) presented with onset within 1 month. A case series of 14 patients<sup>3</sup> is available with median onset of hairfall 2 months post COVID while our study had median onset 3 months post COVID.

Most frequently noted trichoscopic findings were single hair emerging from the follicular unit, terminal regrowing hair and empty hair follicles.

114(87.7%) patients suffered from asymptomatic/mild symptoms of COVID-19, 13 (10%) patients had moderate disease and 3 (2.3%) patients had severe disease. 29 (22.30%), 57 (43.85%) and 44 (33.85%) patients had mild, moderate and severe hairfall respectively. A Chi square test of independence gave a statistically non-significant p-value (0.691) stating severity of hair fall was independent of the severity of COVID disease which supported the hypothesis of study that Telogen Effluvium associated with SARS-CoV-2 infection was independent of the severity of the COVID infection.

In multiple studies, it has been reported that those with more severe COVID-19 infections are associated with higher levels of proinflammatory cytokines<sup>4,5</sup>. Overproduction of proinflammatory cytokines and oxidative stress-inducing cytokine storms lead to Acute Respiratory Distress Syndrome and multiorgan dysfunction associated with higher mortality.

Telogen effluvium is associated with infections like typhoid fever, malaria, chikungunya, tuberculosis with severe febrile conditions (which is a sign of a higher level of cytokine production), acute psychological stressors, or with significant surgeries (higher cortisol levels), or crash diets (leading to nutritional deficiency) and vaccines causing immune stimulation. During fever, the cytokines initiate apoptosis of hair follicle keratinocytes starting with catagen then followed by telogen<sup>6</sup>. Proinflammatory state and cytokine storms can explain the TE associated with moderate to severe COVID disease but in mild COVID disease, the majority of patients, though asymptomatic or having a low-grade fever for a day or two, loss of taste and smell sensations and having an average level of inflammatory marker panel, a large percentage of patients suffered from Telogen Effluvium as a sequela. This could be due to the production of some inflammatory cytokines, which may not be causing acute systemic abnormality but may be causing immediate anagen release. This is important as it may even have affected some other system in the body and may show a late post-infection sequelae.

The involvement of psychological stress associated with COVID infection cannot be ruled out as a cause of Telogen Effluvium. The production of various neurotransmitters, neuropeptides and hormones in response to psychological stressors, in particular, may produce significant alterations in the hair growth cycle by driving the transition of anagen hair to the telogen phase. However, fear, stress and anxiety is more prevalent among the hospitalized patients and with a severe disease rather than those suffering from mild infection.

Study by Sharquie KE<sup>7</sup> consisted thirty-nine patients; their ages ranged from 22 to 67 years with a mean and SD of 41.3±11.6 years with 36 (92.3%) females and 3 (7.69%) males which was consistent with our study. 15 (38.46%) patients reported mild COVID symptoms, 24 (61.53%) patients presented with moderate disease and no patient required hospitalization.

In a large-scale study<sup>8</sup> (538 cases) in Wuhan, China, investigating clinical sequelae of COVID-19, the prevalence of alopecia as a sequela was detected in 28.6% of patients.

In a multicentric study by Moreno-Arrones OM, *et al*<sup>9</sup> 214 patients with a diagnosis of ATE were enrolled and 89.7% (191 patients) had a confirmed diagnosis of prior SARS-CoV-2 infection.

To the best of knowledge, this is the first study in India that highlights the relation between severity of COVID-19 and acute Telogen Effluvium and investigated the etiopathogenesis of hair shedding during the pandemic of this virus infection.

#### CONCLUSION

SARS-CoV-2 is more of an auto-inflammatory condition rather than an infectious condition. Damage caused by your own immune system to the body is far more than the damage caused by COVID virus to the body. ATE is a non-scarring diffuse hair loss, usually occurs 3 months after the event that causes hair loss, and may last up to 6 months. Majority of cases require only proper counseling and reassurance. Multivitamin supplements, topical peptides mimicking hair growth factors, antioxidants, microneedling with PRP therapy may improve the hair quality and may shorten the period of hair shedding with quicker normalizing the hair to the baseline. Exact mechanism is still unknown related to the COVID associated Telogen Effluvium but is mainly attributed to the immune stimulation and cytokine storm in response to the virus. Stringent screening through regular follow up is required for early identification and diagnosis of other serious post

COVID sequelae still unknown to us even in mild disease.

**Limitations :** There are limitations to our study. The study had a smaller sample size and the population not representative of the general population. In addition, our data did not include all patients affected by COVID-19 but only those patients who visited the clinic with complaints of hairfall. Nevertheless the aim of the study was not to study the prevalence of the Telogen Effluvium among the patients of COVID-19 infected patients but to study the occurrence of TE against the severity of COVID-19.

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**Conflicts of interest :** There are no conflicts of interest.

#### REFERENCES

- 1 Starace M, Iorizzo M, Sechi A, Alessandrini AM, Carpanese M, Bruni F, *et al* — Trichodynia and telogen effluvium in COVID-19 patients: Results of an international expert opinion survey on diagnosis and management. *JAAD Int* 2021; **5**: 11-8.
- 2 Martínez-Velasco MA, Vázquez-Herrera NE, Maddy AJ, Asz-Sigall D, Tosti A — The Hair Shedding Visual Scale: A Quick Tool to Assess Hair Loss in Women. *Dermatol Ther (Heidelb)* 2017; **7(1)**: 155-65.
- 3 Rossi A, Magri F, Sernicola A, Michelini S, Caro G, Muscianese M, *et al* — Telogen Effluvium after SARS-CoV-2 Infection: A Series of Cases and Possible Pathogenetic Mechanisms. *Skin Appendage Disord* 2021; **7**: 377-81.
- 4 Tufan A, Avanođlu Güler A, Matucci Cerinic M — COVID-19, immune system response, hyperinflammation and repurposing antirheumatic drugs. *Turk J Med Sci* 2020; **50(SI 1)**: 620-32. 10.3906/sag-2004-168.
- 5 Jose RJ, Manuel A — COVID-19 cytokine storm: the interplay between inflammation and coagulation. *Lancet Respir Med* 2020; **8(6)**: e46 e47. 10.1016/S2213-2600(20)30216-2.
- 6 Trueb RM — *Hair growth and disorders*. 1st edn. Berlin: Springer; 2008. Diffuse hair loss. In: Blume-Peytavi U, Tosti A, Whiting DA, Trueb R, editors; pp 259-72.
- 7 Sharquie KE, Jabbar RI — COVID-19 infection is a major cause of acute telogen effluvium. *Ir J Med Sci* 2021; **31**: 1-5.
- 8 Clinical sequelae of COVID-19 survivors in Wuhan, China: a single-centre longitudinal study. *Xiong Q, Xu M, Li J, Liu Y, Zhang J, Xu Y, Dong W Clin Microbiol Infect* 2021; **27(1)**: 89-95.
- 9 Moreno-Arrones, OM — SARS-CoV-2-induced telogen effluvium: a multicentric study. *Journal of the European Academy of Dermatology and Venereology : JEADV* 2021; **35,3**: e181-e183. doi:10.1111/jdv.17045.

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