Al-Azhar International Medical Journal

Volume 4 | Issue 4 Article 27

2023

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Hamed Mohamed Abdo
Dermatology, Venereology and Andrology department, Faculty of Medicine, Al-Azhar University, Egypt

Ahmed Mohammed Said Kadah
Dermatology, Venereology and Andrology department, Al Hussein Hospital- Al-Azhar University, Egypt

Hamza Mohamad Saqaan
Dnipropetrovsk State Medical Academy -Ukraine, hamza.sakaan50@gmail.com

How to Cite This Article

Abdo, Hamed Mohamed; Kadah, Ahmed Mohammed Said; and Saqaan, Hamza Mohamad (2023) "Prevalence of Telogen Effluvium in Egyptian Women with Post-Covid 19 Viral Infection," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 4, Article 27.
DOI: https://doi.org/10.58675/2682-339X.1744

ORIGINAL ARTICLE

Prevalence of Telogen Effluvium in Egyptian Women with Post-COVID-19 Viral Infection

Hamed Mohamed Abdo [a], Ahmed Mohammed said Kadah [b], Hamza Mohamed Saqaan [c,*]

[a] Dermatology, Venereology and Andrology Department, Faculty of Medicine, Al-Azhar University, Egypt
[b] Dermatology, Venereology and Andrology Department, Al Hussein Hospital- Al-Azhar University, Egypt
[c] Dnipropetrovsk State Medical Academy, Ukraine

Abstract

Background: **COVID-19 is a worldwide pandemic of concern. Frequent symptoms include fever and respiratory problems. Recent investigations have also identified dermatological manifestations as extrapulmonary symptoms. This includes telogen effluvium, which is associated with post-COVID-19 comorbidities.**

Aim and objectives: **To draw attention to the common occurrence of telogen effluvium in Egyptian women who have viral infections after COVID-19.**

Subjects and methods: **Five hundred female patients with COVID-19 virus infections from a few weeks to months prior were the subject of this investigation. The following procedures were applied to all patients: full general examination, complete history taking, clinical scalp and hair examination, including the hair pull test and part width test, and trichoscopic inspection.**

Result: **Hospitalized for COVID19 and telogen effluvium differed statistically significantly ($P = 0.001$).**

Conclusion: **Lower hair density, empty hair follicles, and/or short regrowing hair were early symptoms of after-COVID-19-caused acute TE. The results do not establish that COVID-19 is the only cause of acute TE; nevertheless, they do highlight the need to consider the COVID-19 pandemic when assessing patients who present with hair loss and a history of COVID-19 infection. Although acute TE doesn't often last long, it can have a significant influence on a person's mental health if they have previously been incapacitated by the COVID-19 sickness.**

Keywords: COVID-19, Hair lose, Telogen effluvium

1. Introduction

An ectodermal structure with significant aesthetic value is hair. It supports a person's ability to preserve their sense of self and engage in positive, productive social connections.[1] Many women's identities depend heavily on their hair. Women's hair is symbolically associated with femininity, sexuality, beauty, and personality, whereas men's hair is not. Compared to males, women are more likely to have reduced quality of life and less social interactions as a result of hair loss. Regardless of age or gender, losing one's hair is a problem for everyone.[2]

Every hair on the scalp is replaced every three to five years according to the normal hair cycle.[3] The most frequent reason for diffuse hair loss is telogen effluvium (TE). Diffuse alopecia areata has additional causes, such as female pattern hair loss, chronic TE, anagen effluvium (AE), loose anagen hair syndrome, congenital atrichia, congenital hypotrichosis, and anomalies of the hair shaft (hair breakage, unruly hair).[4]

TE is a non-scarring, diffuse hair loss from the scalp that starts around three months after a trigger event and typically lasts for approximately six months until it self-limits. Typically, less than 50% of the scalp hair is lost with TE.[5]

Accepted 23 October 2022.
Available online 30 December 2023

* Corresponding author. Postal/zip code: 58675.
E-mail address: hamza.sakaan50@gmail.com (H.M. Saqaan).

https://doi.org/10.58675/2682-339X.1744

A reason cannot be inferred from the observation of increased telogen hair loss. To determine the cause of TE, it is necessary to get a pertinent medical history and do suitable laboratory tests to rule out autoimmune, endocrine, and nutritional diseases.[6] The pathogenesis of TE has been linked to a wide range of possible causes.[7] The following physiological reasons, febrile conditions, stress, medications, endocrine, and other factors have been suggested as TE causes.[4]

Each follicle goes through a series of development and resting stages known as the hair cycle, which comprises the anagen (active hair growth), catagen (involution), and telogen phases (resting). The anagen phase might span between two and eight years, the catagen phase between four and six weeks, and the telogen phase between two and three months. The discharge of telogen hair signals the beginning of the exogen phase of the hair follicle.[5] Premature TE occurs when a significant number of anagen hairs are induced to enter the catagen phase, and then the telogen phase. After the initial shock wears off—usually after two to three months—there is a significant amount of hair loss.[7]

A pneumonia epidemic that hit Wuhan, the capital of Hubei province, in early January 2020 was traced to the Middle East respiratory syndrome coronavirus (MERS-CoV) and the novel RNA coronavirus known as Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV)-2. From Wuhan, the pneumonia epidemic quickly spread throughout China. The virus spread to Italy and other European nations after infecting and killing tens of thousands of people in China.[8] and the USA, and there are presently more verified new cases being reported every day.[9] Due to its extensive infectivity and high rate of transmission, the disease was given the term (COVID-19) and later proclaimed a pandemic by the WHO. Most commonly, gastrointestinal and respiratory diseases are brought on by human coronaviruses.[10] Similar to other corona viruses, the SARS-CoV-2 infection mostly exhibits flu-like symptoms like fever, coughing, and asthenia.[11]

Clinical symptoms must persist for at least four weeks following the onset of acute symptoms in order to be diagnosed with post-acute COVID-19. Medical symptoms that persist for more than 4 weeks after COVID-19 infection are classified as "post-Covid conditions" by the Centers for Disease Control and Prevention. The following are some examples: The COVID-19's multiorgan effects, the COVID-19's treatment/hospitalisation effects, the COVID-19's long covid (which encompasses a wide spectrum of symptoms that could last weeks to months), and the COVID-19's persistent postcovid syndrome (PPCs). The common clinical symptoms of 'long covid' are lethargy, shortness of breath, difficulty concentrating, a headache, a loss of taste or smell that doesn't go away, a persistent cough, apathy, sadness, a low-grade temperature, palpitations, disorientation, muscle soreness, and joint discomfort.[12]

While the duration of COVID-19's multiorgan effects is uncertain, the virus causes clinical symptoms in the cardiovascular, pulmonary, renal, and neuropsychiatric systems. The "effects of COVID-19 treatment or hospitalisation" are there, just like they are for other serious disorders. Some examples are postintensive care weakening syndrome and post-traumatic stress disorder.[12]

The study's objective was to draw attention to how common TE is in Egyptian women who had post-Covid 19 viral infection.

2. Patients and methods

Five hundred female patients who had COVID-19 virus infections in the previous several weeks to months were included in this investigation. All research participants provided their written consent before beginning.

Inclusion criteria: Egyptian girls who have had a chest X-ray, CT scan, or PCR to confirm their Covid-19 virus infection must be at least 18 years old and have recovered from the virus (2 weeks, 6 months).

Exclusion criteria: Patients with other TE-related conditions, such as those causing hair loss diffusely, such as chronic TE, female pattern hair loss, loose anagen hair syndrome, AE, and alopecia areata, diffuse form, as well as patients with chronic illnesses and women who are pregnant or nursing.

All patients were subjected to the following: The following investigations will be performed in situations where TE has been clinically diagnosed after collecting a complete history, doing a comprehensive general examination, and performing clinical scalp and hair examinations, including part width and hair pull tests (CBC, TSH, and Serum Ferritin).

Statistical analysis of the data: IBM SPSS version 20.0 software was used to enter data into the computer for analysis. IBM Corp., Armonk, New York Number and percentage were used to describe qualitative data. The normality of the distribution was examined using the Kolmogorov-Smirnov test. The range (minimum and maximum), mean, standard deviation, median, and interquartile range were used to characterise quantitative data. At the 5% level, significance of the results was determined.

The used tests were: Chi-square test: To contrast several groupings using categorical variables. Monte Carlo correction: The chi-square test has to be adjusted when more than 20% of the cells have a predicted value of less than 5.

Table 1. Descriptive analysis of the studied cases according to age in total sample (n = 500).

	Min. – Max.	Mean ± SD.	Median (IQR)
Age (years)	18.0–70.0	34.94 ± 12.97	33.0 (24.0–45.0)

IQR, Inter quartile range; SD, Standard deviation.

Table 2. Distribution of the studied cases according to diagnosis and onset of Covid-19 in total sample (n = 500).

	No. (%)
Diagnosis	
Chest X-ray	217 (43.4)
CT scan	72 (14.4)
PCR	167 (33.4)
Chest X-ray and PCR	8 (1.6)
PCR and CT-scan	24 (4.8)
Chest X-ray, PCR and CT scan	12 (2.4)
Chest X-ray	237 (47.4)
CT scan	108 (21.6)
PCR	211 (42.2)
Onset of Covid-19 (months)	
Min. – Max.	1.0–9.0
Mean ± SD.	3.58 ± 1.80
Median (IQR)	3.0 (2.0–5.0)
Hospitalisation for Covid –19	
No	464 (92.8)
Yes	36 (7.2)

IQR, Inter quartile range; SD, Standard deviation.

3. Results

Table 1 shows that the age of patients ranged from 18.0 to 70.0 yrs with an age mean of 34.94 (±12.97 SD) Table 2.

According to diagnosis of covid-19, there were 43.4% of cases who had positive findings on chest X-ray, 14.4% had CT scan, 33.4% had PCR, 1.6% had chest X-ray and PCR, 4.8% had PCR and CT scan and 2.4% had chest X-ray, PCR, and CT scan findings. The duration of onset of covid-19 ranged from 1.0 to 9.0 months (mean ± SD, 3.58 ± 1.80). Out of the 500 patients, 36 (7.2%) were hospitalized for covid-19 Fig. 1.

According to the treatment of covid-19 in the total sample, 69.6% were treated with azithromycin, 85.6% used paracetamol, 89.6% used Vit C, 88.8% used zinc, 14.2% used steroids, 14.2% used ivermectin, 14.2% used antihistamine, 0.8% used broad spectrum antibiotic and 0.8% used hydroxychloroquine (Fig. 1), Table 3.

(1) The Hb was ranged from 11.90 to 14.60 g/dl (mean ± SD, 12.96 ± 0.73).

(2) The serum ferritin was ranged from 41.0 to 101.0 µg/l (mean ± SD, 65.78 ± 17.75).

(3) The mean TSH was 1.89 mIU/l (SD ± 0.89) with range from 0.0 to 3.90.

(1) 72.2% of the studied cases had negative hair pulling test and 27.8% had positive hair pulling test.

(2) 68.2% had normal trichoscopic findings and 31.8% had abnormal trichoscopic findings in the form of diffuse hair thinning (77.9%), multiple short regrowing hairs (35.2%), peripilar sign (10.1%), multiple empty follicles (7.5%), yellow dots (5%), with most of follicular units have single hair (27.6%)

(3) 88.0% had no associated other hair loss disease, 0.8% had alopecia areata, 0.8% had frontal traction alopecia and 10.4% had female pattern androgenetic alopecia (Tables 4 and 5).

There was a statistically significant difference between telogen effluvium and associated other hair loss diseases ($P < 0.001$), as well as hospitalisation for Covid –19 ($P = 0.001$).

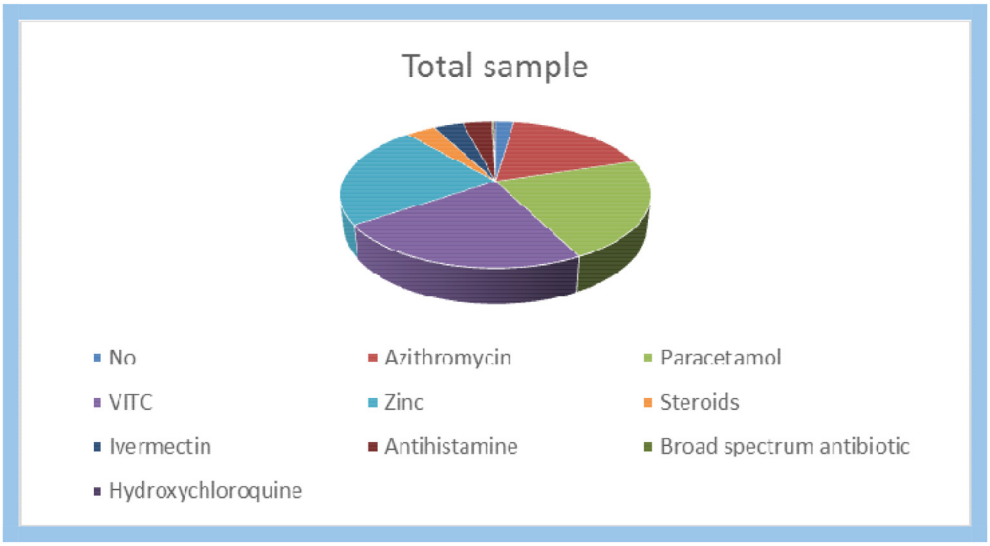


Fig. 1. Distribution of the studied cases according to the treatment of Covid-19 in total sample.

Table 3. Descriptive analysis of the studied cases according to laboratory investigation in total sample (n = 159).

Laboratory investigation	Min. – Max.	Mean ± SD.	Median (IQR)
Hb (g/dl)	11.90–14.60	12.96 ± 0.73	13.0 (12.45–13.13)
Serum ferritin (μg/l)	41.0–101.0	65.78 ± 17.75	62.0 (52.0–79.0)
TSH (mIU/l)	0.0–3.90	1.89 ± 0.89	1.90 (1.60–2.50)

IQR, Inter quartile range; SD, Standard deviation.

Table 4. Distribution of the studied cases according to hair pulling test, trichoscopic findings and associated other hair loss disease in the total sample (n = 500).

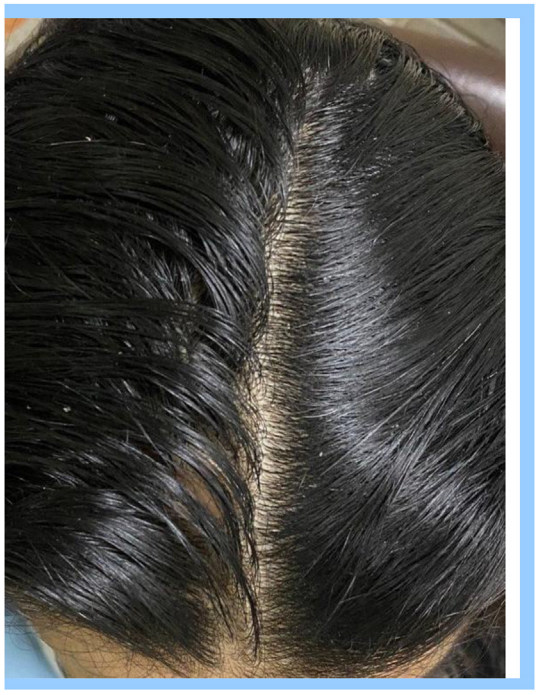
	No. (%)
Hair pulling test	
Negative	361 (72.2)
Positive	139 (27.8)
Trichoscopic findings	
Normal	341 (68.2)
Abnormal	159 (31.8)
Diffuse hair thinning,	124 (77.9%)
Multiple short regrowing hairs,	56 (35.2%)
Peripilar sign,	16 (10.1%)
Multiple empty follicles,	12 (7.5%)
Yellow dots,	8 (5%)
Most of follicular units have single hair	24 (27.6%)
Associated other hair loss disease	
No	440 (88.0)
Alopecia areata	4 (0.8)
Frontal traction alopecia	4 (0.8)
Androgenetic alopecia female pattern	52 (10.4)

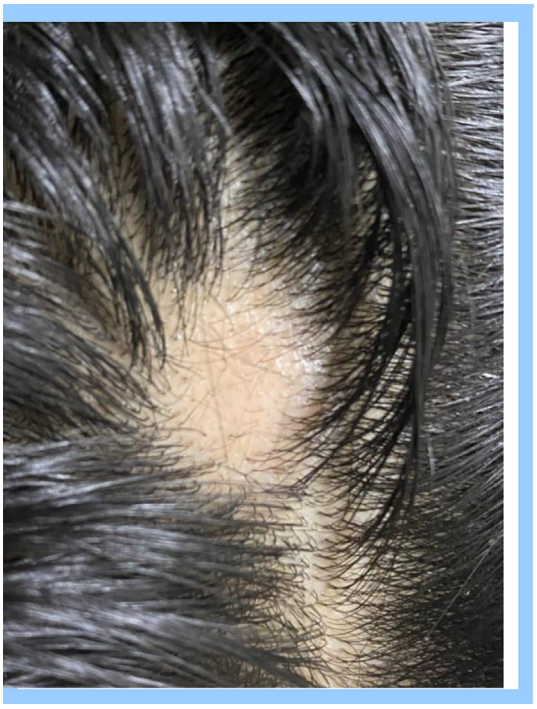
3.1. Cases

Case 1. (a) hospitalized patient with telogen effluvium (positive hair pull test) and androgenetic alopecia. (b) dermoscopic findings; diffuse hair thinning, >20 different hair diameters, solitary hair-bearing follicles, a peripilar sign, and yellow dots.

Case 2. (a) nonhospitalized patient with telogen effluvium (positive hair pull test) and alopecia areata. (b) dermoscopic findings; high follicular unites with one hair and uniform pattern of hair follicles. (c) dermoscopic findings of alopecia areata; tapering hairs, yellow dots, black dots, multiple upright regrowing hair it.

Case 3. (a) nonhospitalized patient with telogen effluvium (positive hair pull test). (b) dermoscopic findings; diffuse hair thinning, multiple normal





short regrowing hairs >0.3 mm and peripilar sign (telogen effluvium diagnosed by exclusion).

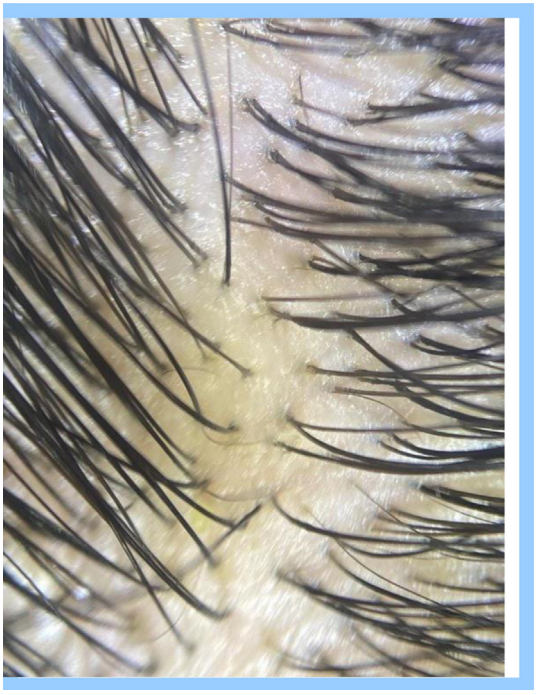
4. Discussion

From minor symptoms to potentially septic shock, fatal respiratory failure and finally organ failure led to death, COVID-19's clinical presentation is highly diverse. The clinical signs of COVID-19 infection that are most often observed include anosmia, drying cough, fever, headache vomiting, weariness, sore throat, dyspnea, diarrhea, and ageusia (Shome et al., 2022).

Despite being previously dismissed as of little consequence, COVID-19's dermatological symptoms have shown to be complex and variable. Lesions on the skin can happen anywhere from 0.6% to 20.4% of the time in COVID-19, according to published research. Following recovery from COVID-19, hair loss is a typical occurrence (Hussain et al., 2022).

TE is a type of hair loss that happens after following a stressful event, like a fever, taking medicine, or giving birth, and lasts for about two to three months. The triggering incident caused hair loss by ending the anagen phase too soon and moving the hair into the catagen and telogen phases. When the body is infected with COVID-19, a proinflammatory condition is created that damages tissue and has related effects. By disrupting the anticoagulation process and producing proinflammatory cytokines, TE in hair follicles may result from a systemic inflammatory reaction (Alijanpour et al., 2022).

It was discovered that alternations in specific follicular cycle stages are the basis for the development of five different functional kinds of TE. Since the majority of TE cases are subclinical, the exact incidence is unknown. TE is an exclusionary



diagnosis on trichoscopy. The absence of characteristics common to other diseases is the most telling dermoscopic clue of TE; The presence of empty hair follicles, a prevalence of follicular units with just one hair, perifollicular discolouration (the peripilar sign), upright regrowing hairs (mainly acute forms), and increasing uniform hair loss are further non-specific observations (chronic forms) (Sharquie et al., 2021).

The purpose of this study was to demonstrate the prevalence of TE in Egyptian women who had viral infections after COVID-19. The age of the patients in the current research varied from 18.0 to 70.0 years, with a mean age of 34.94 (±12.97 SD).

±Babaei et al. (2022) published findings that are similar to ours in that subjects ranged in age from 8 to 62 years old, with a mean age of 30.97 ± 9.592 years, and that hair loss began on average 7.65 ± 1.739 weeks following COVID-19 improvement. Female patients made up 77.9% of the population; they often appeared sooner and had worse COVID-19 grades than did men. According to the authors, women see doctors more frequently because they are more sensitive to beauty and have long hair, which makes hair loss more visible. On the other hand, females are more likely to experience the early onset of hair loss due to TE due to the high incidence of various illnesses, including mental stress, thyroid abnormalities, and anaemia.

Patients who reported with TE following COVID-19 had a mean age of 47.4 years, according to Moreno-Arrones et al. (2021). All age groups, especially the elderly, are afflicted by the COVID-19 worldwide epidemic, however, the disease may be more common in specific age groups in each location. The mean patient age appears to be lower in the examined region than in other regions since it appears

Table 5. Relation between telogen effluvium with associated other hair loss disease and hospitalisation for Covid-19.

	Telogen effluvium		χ^2	P
	No ($n = 341$) No. (%)	Yes ($n = 159$) No. (%)		
Associated other hair loss disease				
No	341 (100.0)	99 (62.3)		
Alopecia areata	0 (0.0)	4 (2.5)		
Frontal traction alopecia	0 (0.0)	4 (2.5)	148.299[a]	$^{MC}P < 0.001$[a]
Androgenetic alopecia female pattern	0 (0.0)	52 (32.7)		
Hospitalisation for Covid −19				
No	325 (95.3)	139 (87.4)	10.094[a]	0.001[a]
Yes	16 (4.7)	20 (12.6)		

χ^2, Chi square test; MC, Monte Carlo.
[a] Statistically significant at $P \leq 0.05$.

that COVID-19 patients there are younger and more susceptible to hair loss.

Ten instances of post-COVID-19 TE were reported by Olds et al. in 2021. The majority of patients were female, and most had serious illnesses that need hospitalisation and systemic drugs, which is typical of our patients. According to Monari et al. (2022), there was no appreciable variation in the mean age of their patients, who were 59.0 years old (54.5–65.0) on average and predominately male ($n = 62$, 64.6%; females, $n = 34$, 35.4%).

In the current study, we discovered that 43.4% of patients had positive chest X-ray findings, 14.4% had CT scans, 33.4% had PCR tests, 1.6% had chest X-ray and PCR results, 4.8% had PCR and CT scan results, and 2.4% had chest X-ray, PCR, and CT scan results. The time from when covid-19 first appeared varied from 1.0 to 9.0 months (mean ± SD, 3.58 ± 1.80). 36 (7.2%) of the 500 patients were admitted to the hospital for covid-19. According to Monari et al. (2022), patients stayed in hospitals for an average of 13 days (9.0–16.5). The average time that COV-2-positive persisted was 31.0 days [26.0–37.0], whereas the average time that fever persisted was 11.0 days (9.0–13.0).

In this study, Covid-19 was treated with azithromycin in 69.6% of cases, paracetamol in 85%, vitamin C in 89.6%, zinc in 88.8%, steroids in 14.2%, ivermectin in 14.2%, antihistamine in 14.2%, broad-spectrum antibiotic in 0.8%, and hydroxychloroquine in 0.8%. According to Monari et al., 2022, 73 (76%) of the patients needed oxygen treatment, 83 (86.5%) of the patients were given hydroxychloroquine, 24 (25%) of the patients were given steroids, 59 (61%) of the patients were given azithromycin, 31 (32.3%) of the patients were given anticoagulants or antiplatelet agents to prevent pulmonary embolisms, and ritonavir (94 patients, 97.9%) was None of our patients have been treated with antiviral drugs.

The Hb varied in the current research from 11.90 to 14.60 g/dl (mean ± SD, 12.96 ± 0.73). (Mean ± SD, 65.78 ± 17.75) The serum ferritin varied from 41.0 to 101.0 g/l. The range for the mean TSH was 0.0–3.90, with an SD of 0.89 mIU/l. According to Monari et al. (2022), there was no correlation between the results of the laboratory tests performed on the patients with TE and the group control. In particular, there was insignificant statistically difference of zinc ($P = 0.371$), iron ($P = 0.371$), ferritin ($P = 0.194$), transferrin ($P = 0.890$), or iron between individuals with and without TE.

The most prevalent findings in Babaei et al. (2022) research were that 24.3% of participants had vitamin D insufficiency and 21% had hypothyroidism. Since the two aforementioned conditions are the primary contributors to both hair loss and TE, they can both aggravate or prolong hair loss in those who also have COVID-19 infection. After the COVID-19 infection was treated, hypothyroidism caused an early beginning of hair loss. As a result, hypothyroidism is a crucial component that may hasten the transition of hair follicles from the anagen to the telogen phase.

In the current study, we discovered that 27.8% of the investigated patients had positive hair-pulling tests, whereas the remaining 72.2% had negative tests. 68.2% of the skin samples revealed normal dermoscopic results, whereas 31.8% had aberrant ones. 10.4% had female pattern androgenetic alopecia, 0.8% had alopecia areata, 0.8% had frontal traction alopecia, and 88.0% had no additional hair loss diseases connected with it.

According to Monari et al. (2022), of the 96 patients, 30 (31.3%) had alopecia evaluated, with 8 (26.7%) being male and 22 (73.3%) being female, a substantial gender disparity. There was a difference between males (72.36) and females (72.36) in the average number of days between the beginning of the first symptom (fever) and the onset of alopecia (54.00). Trichodynia was the earliest TE symptom in 8 cases (26.6%).

These findings were consistent with those of Hussain et al. (2022), who showed that a physical

examination of the scalp showed that 79% of patients had a positive telogen hair-pulling test. The idea behind the telogen hair pull test is to tug 'gently' on your hair to cause telogen hair loss. It helps in figuring out how much and where hair is falling out. The most common trichoscopic findings were decreased hair density, empty follicles, and short hair regrowth.

According to this study, 341 patients (68.2%) had TE while 159 individuals (34.8%) did not. Five prevalent post-COVID-19 recovery symptoms were identified by Lopez-Leon et al. (2021) in a recent meta-analysis. These symptoms were tiredness (58%), headache (44%), attention disturbance (27%), hair loss (25%), and dyspnea (24%). According to Roda et al. (2021), individuals with acute post-COVID-19 TE had a female prevalence (67.5%). This can be explained by the harsher psychological impacts of hair loss in women, The greater sensitivity of women hair follicles, the simpler identification of loss of hair in women because of longer hair, and the underreporting of hair loss in men. It has been suggested that stress experienced while infected with COVID19 may be a factor in hair loss.

There was a statistically significant difference between TE and the other hair loss illnesses that were related with it in the current study ($P < 0.001$), as well as hospitalisation for Covid −19 (P 0.001). This was in line with research by Hussain et al. (2022), results revealed that during the COVID-19 infection phase, more over one-fourth (39 percent) of patients suffering from acute post-COVID-19 TE were hospitalized to hospitals. According to Olds et al. (2021), hospitalisation for COVID-19 infection was necessary for 70% of their patients.

Di Landro et al. (2021) published similar findings, noting that 16 of the 39 patients who presented with patients with COVID-19-related acute TE also had an extreme COVID-19 infection that required hospitalisation and treatment with continuous positive airway pressure. This is explained by the notion that individuals with severe COVID-19 infection have greater amounts of proinflammatory cytokines, increasing their chance of developing future acute TE. This does not, however, indicate that people with subclinical COVID-19 infection do not have acute TE.

In a multicenter study of 214 cases of acute TE associated with COVID-19, Moreno-Arrones et al. (2021) reported that One in ten patients had a COVID-19 infection that was not yet showing symptoms. So, no matter how bad the acute TE is, it is important for doctors to think about a history of COVID-19 infection as a possible alternative diagnosis. It is not clear what the link is between the severity of a COVID-19 infection and the severity of an acute TE. Rossi et al. (2021) say that acute TE went away in all four patients who had to be hospitalized because of a COVID-19 infection 3–5 months after the hair loss started. This shows that there is no link between how bad the first acute TE was and how bad the next ones are.

Monari et al. (2022) reported that, in contrast to our findings, there was no correlation between TE and COVID-19-related parameters (days of hospitalisation, days of SARS-CoV-2 positive, days with fever). There was no correlation between the condition and any COVID-directed therapies.

According to Wambier et al. (2020), the majority of hospitalized patients or COVID-19 patients exhibited androgenetic alopecia (AGA). The majority of the patients' concomitant alopecias were of the AGA kind. The likelihood of a significant improvement in hair density is limited, which makes the coexistence of TE and AGA important. However, the frequent cohabitation of TE and AGA is linked to higher levels of emotional stress, which may worsen hair loss.

According to our data, Shome et al. (2022) reported 20 women with TE who began presenting more than six months after recovering from COVID-19 infection. All of their patients (29), according to Sharquie et al. (2021), experienced severe hair loss within 2–3 months of infection.

Data on 128 patients were supplied by Strace et al. (2020). 66.3% of patients had TE, while 58.4% had trichodynia. In 42.4% of instances, trichodynia was linked to TE, and anosmia and eosinophilia were connected in 66.1% and 44.1% of cases, respectively. The majority of patients (62.5%) experienced hair-related signs and symptoms within the first month after receiving a COVID-19 diagnosis, and 47.8% of patients did so 12 weeks or later.

When empty hair follicles, yellow spots, and short, black, regrowing hairs of normal thickness are observed during trichoscopy and there are no other scalp problems present, the diagnosis of TE may be suggested (Micali et al., 2003). The absence of symptoms common to other illnesses is the most telling trichoscopic clue of TE; empty hair follicles, an excess of follicular units containing a single hair, perifollicular discolouration (the peripilar sign), upright regrowing hairs (mainly acute forms), and increasing uniform thinning of hair (chronic forms) are other common but non-specific observations (Sharquie et al., 2021). We discovered that 31.8% of our patients showed aberrant trichoscopic results, including widespread hair thinning (77.9%), many short regrowing hairs (35.2%), peripilar sign (10.1%), several empty follicles (7.5%), yellow spots (5%), and the majority of follicular units having a single hair (27.6%).

Hussain et al. (2022) used the majority of their cases to show how trichoscopy results often included hair shedding and follicles drying out, leading to a loss of density and regrowth of short, thin hair. A case of 58-year-old lady with atypical acute TE following recovering from COVID-19 was described by Vastarella et al. in 2021. Trichoscopy showed an increase in follicular units with a single terminal hair, a few yellow spots, few upright regrowing hairs, and perifollicular discolouration.

4.1. Conclusion

Reduced hair density, short hair regrowth and/or empty hair follicles were early symptoms of after-COVID-19-caused acute TE. Our results don't prove that COVID-19 is the only reason for acute TE, but they do show that the COVID-19 pandemic should be taken into account when evaluating patients with hair loss and a history of COVID-19 infections.

Conflict of interest

Authors declare that there is no conflict of interest, no financial issues to be declared.

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