Original Article

Telogen effluvium after COVID-19 vaccination among public in Saudi Arabia

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Abstract

Background: Number of reports linked Telogen effluvium to coronavirus disease 2019 (COVID-19) infection. However, data about Telogen effluvium after COVID-19 vaccination are limited. **Objectives:** To estimate prevalence of Telogen effluvium among those who received COVID-19 vaccination. **Methods:** A cross-sectional study was performed during July 2021. Adults who received one of recognized COVID-19 vaccine irrespective of previous COVID-19 infection were asked to fill a questionnaire. **Results:** The majority of participants were females (90.3%). The most common age group was between 21 and 30 years (51.9%). Out of 991 participants who were included in the current analysis, 670 (67.6%) reported post-vaccination hair fall. The probable causes of post-vaccination hair fall were vaccine-related in 185 (27.6%) participants, other causes in 326 (48.7%) participants, and unclear in 326 (48.7%) participants. Post-vaccination hair fall was significantly higher among females compared with males (68.5% versus 57.9%, $P = 0.036$), those who did not suffer compared with those who suffered from hair fall before vaccination (72.1% versus 63.4%, $P = 0.003$), and those who did not report compared with those who reported preexisting conditions that might be related to hair fall (74.5% versus 57.3%, $P < 0.001$). **Conclusion:** We are reporting a high prevalence of post-vaccination hair fall, which affected approximately two-thirds of participants who received COVID-19 vaccines. Only 28% of these participants were apparently vaccine related. The role of COVID-19 infection and stress caused by infection and vaccine cannot be excluded. Primary care physician and dermatologist need to consider the possibility of COVID-19 vaccine as a potential cause of hair loss.

Keywords: COVID-19 vaccine, hair fall, Saudi Arabia, Telogen effluvium

Introduction

Telogen effluvium is one of the most common forms of hair fall, characterized by excessive diffuse hair shedding.[1,2] As most of the cases are subclinical, the true burden of the disease is not accurately estimated.[1] It can be acute or chronic based on the duration of hair fall.[2] It is usually a complain of women rather than men.[3] Approximately 90% of the normal scalp hair should be in the anagen or growth phase of hair cycle while 10% in the telogen or resting phase.[1] In telogen effluvium, a lot of hair follicle prematurely enter the telogen phase. Telogen effluvium can be triggered by several conditions, such as severe stress, febrile diseases, several medications, hormonal changes from pregnancy or menopause, dietary deficiency, other underlying health conditions like organ failure, metal toxicity, and surgery.[2,3]

Although the pulmonary manifestations of coronavirus disease 2019 (COVID-19) were the main focus of early COVID-19 research, cutaneous manifestations were reported in the first half of 2020.[4-6] In these reports, up to 50% of the patients had one or more lesions in the skin or nails. Late in 2020, case series linking Telogen effluvium to COVID-19 started to emerge.[7-15] More recent research confirmed the association of COVID-19 with Telogen effluvium and other types of hair loss.[14,15] Researchers in New York reported four-fold increase in the incidence of Telogen effluvium at dermatology clinics.[10] The condition was

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observed in approximately two-thirds of COVID-19 patients.[11] The onset was within two to three months after infection[9,12,14] and largely resolve within six months.[7,8,14] The onset is thought to be related the clinical severity of COVID-19 infection.[9,11,14] Trichodynia, a painful sensation at the scalp, was reported in up to a third of the patients with Telogen effluvium.[9,11]

Hair loss is a common complaint in dermatology and primary care clinics, seen in patients of all ages and in females more than males.[16,17] Although it is usually self-limiting problem, it could be a source of significant psychological impact.[16,17] Hair fall has been reported as one of the rare side effects of COVID-19 vaccines.[18,19] Reports characterizing the association between Telogen effluvium and COVID-19 vaccines are very scarce. Recent case reports linked different types of COVID-19 vaccines to alopecia areata.[20-22] By the end of July 2020, close to 50% of Saudi population have already received one or two doses of COVID-19 vaccines.[23] The objective of the current study was to estimate prevalence of Telogen effluvium among those who received COVID-19 vaccination.

Methods

Study design: A cross-sectional study was performed during 2021. The ethical approval was obtain from regional ethical approval in the Riyadh.

Population: A total 1012 participants filled the questionnaire of the study after expressing their agreement to join the study. Adult males and females who received one of recognized COVID-19 vaccine were included, irrespective of the status of previous COVID-19 infection. Those who were aged less than 18 years or above 60 years were excluded. Out of the 1012 participants who completed the questionnaire, 21 participants were later excluded leaving 991 participants for data analysis. The reasons for exclusion including lack of COVID-19 vaccination (N = 2) or lack of answers to hair fall questions (N = 19).

Data collection: Data were collected using a questionnaire covering the following characteristics; age, gender, hair fall before and after COVID-19 vaccines, type of vaccine, previous history of COVID-19 infection, and preexisting conditions that might be related to hair fall. The questionnaire was developed after reviewing similar studies and was reviewed by a consultant dermatologist. A pilot study was conducted on 10 volunteers to ensure clarity and convenience of the questions and to estimate the time needed to fill the questionnaire. No identifier or sensitive data were collected.

Study outcomes: Prevalence and probable cause of hair fall, which was defined as self-reported hair fall after receiving one of recognized COVID-19 vaccines. The hair fall was considered "vaccine-related" if the participant declined pre-vaccine hair fall and preexisting conditions that might be related to hair fall. The hair fall was considered "related to other causes" if the participant was complaining of hair fall before receiving COVID-19 vaccines. The cause of hair fall was considered "unclear" if the participant had no pre-vaccine hair fall but did not exclude preexisting conditions that might be related to hair fall.

Statistical Analysis: Data were presented as frequencies and percentages. Demographic and other characteristics were compared between those who had and those did not have hair fall after receiving COVID-19 vaccines. Chi-square or Fisher exact tests, as appropriate, was used to detect significant differences. All *P* values were two-tailed. *P* value <0.05 was considered as significant. SPSS software (release 25.0, Armonk, NY: IBM Corp) was used for all statistical analyzes.

Results

Out of 991 participants who were included in the current analysis, 670 (67.6%) reported post-vaccination hair fall [Figure 1]. The probable causes of post-vaccination hair fall were vaccine-related in 185 (27.6%) participants, other causes in 326 (48.7%) participants, and unclear in 326 (48.7%) participants [Figure 1]. Among the 321 participants who did not notice any change in their hair fall after the vaccination, 188 (58.6%) had history of hair fall before vaccination.

Table 1 shows demographic and clinical characteristics by post-vaccination hair fall. The majority of participants were females (90.3%). The most common age group was those between 21 and 30 years (51.9%), followed by those aged 31 to 40 years (33.4%), above 40 years (8.4%), and 20 years or less (6.3%). The most common type of vaccine received was Pfizer (82.2%), followed by AstraZeneca (13.7%), and a mix of Pfizer and AstraZeneca (2.5%). Only 15.8% of the participants

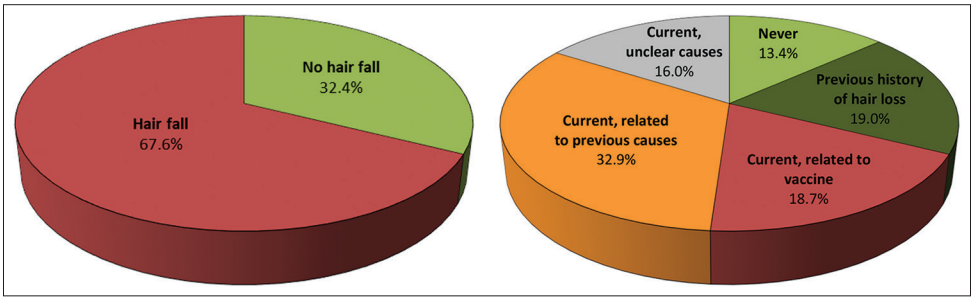

Figure 1: Prevalence (above) and causes (below) of hair fall among participants who received COVID-19 vaccine

Table 1: Demographic and clinical characteristics by the status of post-vaccination hair fall among participants who received COVID-19 vaccine

	Total* *n*=991	No hair fall** *n*=321	Hair fall** *n*=670	*P*
Gender				
Males	95 (9.7%)	40 (42.1%)	55 (57.9%)	0.036
Females	883 (90.3%)	278 (31.5%)	605 (68.5%)	
Age				
≤20	62 (6.3%)	18 (29.0%)	44 (71.0%)	0.940
21-30	512 (51.9%)	169 (33.0%)	343 (67.0%)	
31-40	330 (33.4%)	107 (32.4%)	223 (67.6%)	
>40	83 (8.4%)	27 (32.5%)	56 (67.5%)	
Vaccine type				
Pfizer	811 (82.2%)	265 (32.7%)	546 (67.3%)	0.308
AstraZeneca	135 (13.7%)	43 (31.9%)	92 (68.1%)	
Both	25 (2.5%)	10 (40.0%)	15 (60.0%)	
Others	16 (1.6%)	2 (12.5%)	14 (87.5%)	
COVID-19 infection before vaccine				
No	833 (84.2%)	268 (32.2%)	565 (67.8%)	0.899
Yes	156 (15.8%)	51 (32.7%)	105 (67.3%)	
Hair fall before vaccine				
No	477 (48.1%)	133 (27.9%)	344 (72.1%)	0.003
Yes	514 (51.9%)	188 (36.6%)	326 (63.4%)	
Preexisting conditions that might be related to hair fall				
No	377 (38.0%)	96 (25.5%)	281 (74.5%)	<0.001
Yes	274 (27.6%)	117 (42.7%)	157 (57.3%)	
Don't know	340 (34.3%)	108 (31.8%)	232 (68.2%)	

*Column percentages were calculated ** row percentages were calculated

reported having COVID-19 infection before vaccination. Approximately half (51.9%) of the participants reported suffering from hair fall before vaccination. Approximately 27.6% of the participants reported having preexisting conditions that might be related to hair fall, such as hormonal imbalances, vitamin D deficiency, and low ferritin level. The rest of the participants were either sure (38.0%) or not sure (34.3%) about lack of such preexisting conditions.

Post-vaccination hair fall was significantly higher among females compared with males (68.5% versus 57.9%, $P = 0.036$), those who did not suffer compared with those who suffered from hair fall before vaccination (72.1% versus 63.4%, $P = 0.003$), and those who did not report compared with those who reported preexisting conditions that might be related to hair fall (74.5% versus 57.3%, $P < 0.001$). On the other hand, post-vaccination hair fall was not significantly different by age groups, type of COVID-19 vaccine, or history of COVID-19 infection before vaccination.

Discussion

The current study showed high prevalence of post-vaccination hair fall, which affected approximately two-thirds of participants who received COVID-19 vaccines. Interestingly, half of these participants had hair fall before vaccination, excluding the direct impact of COVID-19 vaccines. Another quarter had preexisting conditions that might be related to hair fall, adding doubts to direct impact of COVID-19 vaccines. Several points need to be highlighted to better interpret the current data. Despite the lack of difference in COVID-19 infection among those who reported and those did not report post-vaccination hair fall, the role of pre-vaccination COVID-19 infection in causing hair fall in these participants cannot be excluded. COVID-19 infection could be under-reported by the current participants. It has been estimated that documented and symptomatic COVID-19 infection range between 20% and 45% of the true COVID-19 infection.[24,25] Additionally, the COVID-19 infection rate in the study population is probably lower than reported in concurrent seroprevalence reports in Saudi Arabia (15.9% versus 19.3%).[26]

The association between COVID-19 and Telogen effluvium has been documented in several reports.[7-15] It was observed in approximately 66% of COVID-19 patients.[11] Hair fall has been listed as one of the post-COVID syndrome that may continue for six months.[27] This may be explained by several mechanisms associated with COVID-19. Inflammatory cytokines and impairment of coagulation cascade due to COVID-19 infection may provoke Telogen effluvium through systemic inflammatory process and microthrombi in the hair follicles.[13,28] Additionally, stress, anxiety, and emotional exhaustion associated with COVID-19 infection and its sequencies like quarantine can play a major role in hair fall.[29] Moreover, hair fall could be an adverse reaction to the medications used in COVID-19 management.[30]

Approximately 28% of the participants who reported post-vaccination hair fall declined pre-vaccine hair fall and preexisting conditions that might be related to hair fall.

Post-vaccination hair fall has been reported as side effect of COVID-19 vaccines in 1.0 to 1.5% of vaccine recipients.[18,19] Few recent case reports described alopecia areata and to less extent alopecia universalis after administering COVID-19 vaccines.[20-22] It has been attributed to an autoimmune reaction to the vaccine components or its adjuvants.[20-22] The currently observed high percentage of post-vaccination hair fall may be related to vaccine-related stress and fear rather than vaccine itself. COVID-19 vaccination in Saudi Arabia was associated with a considerable degree of hesitancy, misconception, and fear.[31,32] Public opinion about safety and efficacy of COVID-19 vaccination has been shaped by the social media since the beginning of this pandemic.[33] Despite its importance in raising awareness, it played a major role in spreading misinformation about COVID-19 vaccines.[33] It should be mentioned also that the vaccination policy in Saudi Arabia is largely obligatory, which set specific dates for not allowing non-vaccinated individuals to engage in important daily activities such as work, education, shopping, religious gathering, and air travel.[32] This policy may have created a high level of anxiety and stress among some recipients, especially those who were not pro-vaccine.

The current study findings may be helpful for primary care physician evaluating hair loss. The study highlights the possibility of COVID-19 vaccine as a potential cause of hair loss. Although it is generally a self-limiting disease, patient assurance is important to reduce the associated psychological problems which may initiate a viscous cycle of hair loss.[15,16]

To our knowledge, the current study is considered the first study to report post-vaccination hair fall among the public in Saudi Arabia, and probably the region. Additionally, previous reports were mainly case reports with no ability to calculate prevalence. This was done among a relatively large sample size. Nevertheless, a number of limitations should be acknowledged. The cross-sectional study design cannot confirm causal relationship between vaccine and hair fall. The self-reported hair fall may have overestimated the true burden of the problem, especially in females. Additionally, the convenience sampling used in recruitment may limit the generalization of findings. However, we believe that the current findings are important in justifying future prospective multi-center studies that better confirm the diagnosis of both Telogen effluvium and COVID-19 infection.

In conclusion, we are reporting a high prevalence of post-vaccination hair fall, which affected approximately two-thirds of participants who received COVID-19 vaccines. Only 28% of these participants were apparently vaccine related. The role of COVID-19 infection and stress caused by infection and vaccine cannot be excluded. Primary care physician and dermatologist need to consider the possibility of COVID-19 vaccine as a potential cause of hair loss. The current findings need to be confirmed in future multi-center studies with prospective design.

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Conflicts of interest

There are no conflicts of interest.

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