

EFFECTS OF EXPOSURE TIME TO SUN ON HAIR FALL DURING LOCKDOWN IN COVID PANDEMIC

Samia Khalid Khokhar¹, Aisha Qamar², Yasmeen Mahar³

Correspondence

¹Samia Khalid Khokhar, Assistant Professor, Bahria University Health Sciences Campus Karachi

☎: +92-334-2367634

✉: dr.samia_khalid@hotmail.com

²Professor, Anatomy Department, Bahria University Health Sciences Campus, Karachi

³Senior Associate Professor, Anatomy Department, Bahria University Health Sciences Campus, Karachi

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ABSTRACT **OBJECTIVES**

The study aimed to assess the effects of quarantine on non-scarring hair fall and to determine the relationship between sun exposure and hair fall.

METHODOLOGY

This cross-sectional study was conducted in Karachi from January to June 2022. Ethical approval was taken from the institutional ethical review committee. Participants were recruited by non-probability convenience sampling technique after obtaining informed consent. Those with dermatologic diseases of the scalp (cicatricial alopecia, alopecia areata, seborrheic dermatitis, infections), high-stress levels, post-pregnancy, thyroid disorders, hormonal disorders and COVID-19 were excluded from the study. Hair loss was assessed using a self-filled questionnaire regarding the history of comorbidities, demographics, education, institute status during quarantine, hair fall experience and personal habits.

RESULTS

The study consisted of 137 participants after exclusion criteria were applied. Among these, 95.6% complained of increased hair fall during quarantine. Most participants were women (63.4%) compared to men (36.6%). The average age of the hair fall group was 20 years. Only 15.3% of participants spent more than 1-2 hours in the sun, and the majority had their hair covered when going out during quarantine.

CONCLUSION

Hair fall is high during quarantine, particularly among women of young age group. Personal habits and exposure to the sun for a short time at noon can affect hair fall in quarantine, although no direct correlation was found. Hair fall during lockdown is inversely related to certain comorbidities.

KEYWORDS: Hair follicle, Personality, Quarantine, Sunlight

INTRODUCTION

Hair loss is a very frequent problem these days.¹ Loss of hair is distressful and can have a fundamental effect on the person's quality of life.² Some causes of hair loss are due to diseases and need consultation and treatment by a dermatologist, whereas other reasons may be temporary and self-limiting. Telogen Effluvium is a non-inflammatory type of hair loss, comparatively abrupt in onset and related to physiological or emotional stress. Once the causative factor is removed, the hair will most likely regrow.⁴ Telogen effluvium can be acute, lasting for less than six months or chronic when the condition persists for more than six months. Chronic cases usually occur in middle-aged women. The hair loss takes place two to three months after the event, which has triggered this response. In one-third of patients, the cause cannot be identified. However, around 95% of acute cases usually undergo remission. Examination of such cases reveals short regrowing hair in the frontal region of the scalp.⁵ There are three

phases in the life cycle of hair. A growth phase (anagen) is the first, followed by an involution phase (catagen) and lastly, a resting phase (telogen). The first phase can last up to 2-5 years, and about 90% of scalp hair exists in this anagen phase. The second phase, which is catagen, is shorter, extending from three to six weeks, and leads to apoptosis of hair follicles. The third and final phase, telogen, lasts three to five months. About 10% of scalp hair is in this phase. The hair shaft matures to form a club hair, eventually falling from the follicle. Thus, if the ratio of scalp follicles in the telogen phase increases, there is a proportional increase in hair shedding from the scalp.⁶ Most people have about 100,000 scalp hair, of which 10-15% are in the telogen phase. Shedding of 100-150 telogen hair is regarded as normal. However, hair loss in the growth phase (anagen) is considered abnormal. Diffuse hair loss is stimulated by conditions like emotional stress, physiological stress, and exposure to sunlight, which may lead to vitamin D deficiency, intestinal diseases, malabsorption syndrome, or dietary deficiencies. Lack

of vitamin D has been correlated with hair fall.⁷ Vitamin D modulates calcium uptake and bone formation through the receptor (vitamin D receptor) in the body. The receptor acts on target genes to regulate their transcription.⁸ The action of vitamin D on hair is mediated by its receptor (VDR), which is expressed in addition to keratinocytes, also in dendritic cells, B and T lymphocytes, macrophages and epidermal keratinocytes and mesodermal dermal papilla cells. VDR is essential for the integrity of hair follicles. Its expression is needed for the normal hair follicle growth cycle, so its deficiency leads to the inhibition of differentiation of keratinocytes and disturbs the normal hair follicle cycle leading to excessive hair fall.⁹ Due to the COVID-19 pandemic, many countries have imposed lockdowns on their citizens to contain the disease.¹⁰ Pakistan was one of these countries. However, the impact of lockdown affected the mental health of individuals such as anxiety and depression, but it also caused changes in the physical health.^{11,21} Most of the population affected by the lockdown were young individuals who lost their normal routine of attending college and university. Hair fall has been linked to many overlapping factors. However, its link with sun exposure in quarantine remains to be seen. This study was planned to observe the incidence of hair fall during quarantine during COVID-19 among young adults in Karachi. Data from this research can be used to formulate treatment modalities specific to the age group, gender and location.

METHODOLOGY

Three hundred thirty-five subjects aged 18-25 were enrolled in this cross-sectional retrospective study. The study was conducted in Karachi over six months. Ethical approval was obtained from the institutional ethical review committee. The sample size was calculated using OpenEpi version 3.0 with a 5% margin of error and a confidence interval of 95%. Non-probability convenience sampling was used to collect the data. Residents of Karachi meeting the inclusion criteria were recruited for the study. All participants were distributed a self-perceived stress test along with the study questionnaire. The stress score was categorized into low (0-13), moderate (14-26) and high level (27-40). Participants with a perceived stress score of 14 and above were excluded from the study. Those with cicatricial alopecia, alopecia areata, seborrheic dermatitis of the scalp, scalp infections, pregnancy-related hair fall, COVID-19 infection and any other disease associated with hair fall (Thyroid dysfunction, polycystic ovaries, androgenic hair loss) were also excluded. Participants were distributed a written English questionnaire on Google Forms composed of

20 questions about demographics, the participant's current situation during quarantine, hair health, hair care, sun exposure and frequency of hair fall. The data was analyzed using SPSS 24 software. The significance of the association was determined using the Chi-Square test.

RESULTS

A total of 335 subjects were enrolled in the study. Self-assessment stress form revealed anxiety and high level of stress in 70 participants. 56 and 72 participants reported a history of COVID-19 infection and gave a history of scalp-related problems. After exclusion, data from 137 participants was analyzed. Our study determined a significant increase in hair fall since the beginning of quarantine (Figure-1). The participants with no change in hair fall during the quarantine were labelled Group B, while those with increased hair fall during the quarantine were named Group A. The average age of the participants who presented with an increase in hair fall was 20.21 years, and the majority (63.4%) were females (Table-1). This is probably attributed to a higher number of female participants in the study. Among group A, 45% reported a high frequency of hair products than group B. However, the difference between the groups was not significant (Table-2). Infrequent use of hair dye and hair straightener was reported by Group A in comparison with Group B. The difference between those using hair straightener among Group A and Group B with or without the straightener use was significant ($p=0.05$) (Table-2). The use of hair protective products may have influenced this result. High frequency of hair brushing showed less increase in hair fall, whereas it was the opposite with less frequent hair brushing habits. The difference between the groups was insignificant. Both groups reported using moderate-temperature water for hair washing. The water temperature used for hair washing also showed no significant difference between the groups (Table 2). This indicates the influence of physical factors on hair fall depending on the hair cycle. An increase in hair fall was also reported in those who used hair cover during the quarantine. However, the difference between the groups was not significant (Table-3). This could be due to reduced exposure of hair to sunlight, increased oil secretions on the scalp or individual habits. Participants of both categories reported sun exposure time of 16-30 minutes and 1-15 minutes during the quarantine period. Both groups also reported sun exposure at noon time of the day. Comparisons revealed no significant differences (Table-3). Comorbidities were absent in the majority, with an increase in hair fall. The difference between the groups was highly statistically significant ($p\leq 0.001$)

(Table-4). Comorbid conditions influence the diet and nutritional status, causing hair fall to increase in such cases.

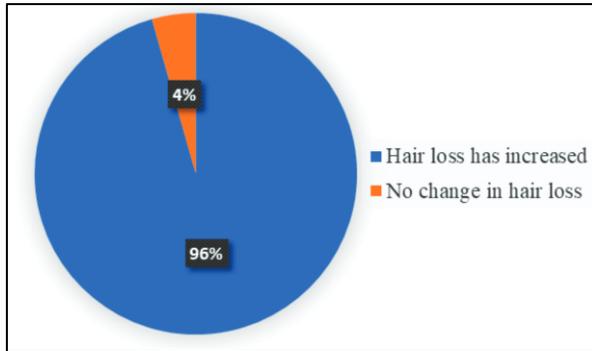


Figure 1: Frequency of Hair Fall during Lockdown

Table 1: Age and Gender Distribution of Participants with Frequency of Hair Loss during Covid-19 Quarantine

Since the quarantine has started, how has your hair loss been?	Frequency (n=137)	%age
	Mean Age	
Hair loss has increased	20.21±1.259	
No change in hair loss	21.33 ±1.366	
Gender	A	B
Female	83(63.4%)	04(66.7%)
Male	48(36.6%)	02(33.3%)

Table 2: Comparison of Hair Loss with Personal Habits

Since the quarantine has started, how has your hair loss been?				
Question		A (n=131)	B (n=6)	P-Value
How often do you use Shampoo, conditioner, or any other hair product?	3 to 4 times a week	23(17.6%)	0(0.0%)	0.186
	Daily	32(24.4%)	0(0.0%)	
	Once a week	17(13.0%)	02(33.3%)	
	Twice a week	59(45.0%)	04(66.7%)	
How often do you dye your hair?	Never	121(92.4%)	06(100.0%)	0.781
	Rarely	08(6.1%)	0(0.0%)	
	Sometimes	02(1.5%)	0(0.0%)	
How frequently do you use a straightener?	Never	64(48.9%)	06(100.0%)	0.05*
	Rarely	53(40.5%)	0(0.0%)	
How many times a day do you brush your hair?	Sometimes	14(10.7%)	0(0.0%)	0.784
	1-2	100(76.3%)	04(66.7%)	
	3-5	24(18.3%)	02(33.3%)	
	6-8	05(3.8%)	0(0.0%)	
What is the temperature of the water you bathe with?	more than ten times	02(1.5%)	0(0.0%)	0.567
	Cold	11(8.4%)	0(0.0%)	
	Hot	10(7.6%)	0(0.0%)	
	Moderate	110(84.0%)	06(100.0%)	

Table 3: Comparison of Hair Loss and Sun Exposure during Quarantine

Since the quarantine has started, how has your hair loss been?				
Question		A(n=131)	B (n=6)	P-Value
Do you wear a hat or cover your head when you go out in the sun?	Always	43(32.8%)	04(66.7%)	0.149
	Never	41(31.3%)	0(0.0%)	
	Sometimes	47(35.9%)	02(33.3%)	
Approximately for how long you are exposed to the sun in this Quarantine period?	1-15 minutes	38(29.0%)	02(33.3%)	0.782
	1-2 hours	26(19.8%)	02(33.3%)	
	16-30 minutes	41(31.3%)	02(33.3%)	
	More than 1 to 2 hours	20(15.3%)	0(0.0%)	
	Not at all	06(4.6%)	0(0.0%)	
At what time of the day you are exposed to the sun?	Early morning	25(19.1%)	0(0.0%)	0.381
	Evening	16(12.2%)	0(0.0%)	
	None	04(3.1%)	0(0.0%)	
	Noon	86(65.6%)	06(100.0%)	

P<0.05: significant difference*

Table 4: Association of Hair Loss and Comorbidities during Quarantine

Since the quarantine has started, how has your hair loss been?			
Question	A (n=131)	B (n=6)	P-Value
Asthma	02(1.5%)	02(33.3%)	0.000**
Migraines	02(1.5%)	0(0.0%)	
No	125(95.4%)	04(66.7%)	
Thalassemia minor	02(1.5%)	0(0.0%)	

P<0.05: significant difference*; P<0.001: Highly significant difference**

DISCUSSION

In addition to the effects of COVID-19 on the various systems of the human body, the quarantine period during this pandemic itself had many adverse effects on the mental and physical health of the population worldwide.¹³ Much work has been done on mental health and different aspects of physical health during the COVID-19 quarantine, but hair loss during this challenging period has not been explored so far. Hair loss is a distressing condition. Although not life-threatening, it affects the quality of life of the patient remarkably.³ To the best of our knowledge, this is the first study exploring the effects of quarantine on hair fall. Because of this, many of the parameters have not been studied so far, so similar or different studies are not available. The subjects included in our study were 137. Out of these, 95.6% complained of increased hair loss during quarantine. The mean age of the hair loss group was 20.21 years compared to 21.33 years of those who did not complain of hair fall. This finding was by Bakry et al., who also found the mean age of the

subjects suffering from alopecia areata as 20.7 years compared to controls (23.71).¹⁴ Poonia et al. also reported hair fall in a similar age group (21-40 years).¹⁵ The data of Varman et al. and Ramteke et al. differed from our study as the mean age of participants, comprising men with hair fall, was 36-50 years. This difference was most likely because we had enrolled young participants ranging from 18-28 years of age.^{16,17} The present study comprised 83 females (63.4%) and 48 males. Our results were similar to Gualano et al., who had 65.6% females out of 1515 participants.¹³ Alomaish et al. also found an increased frequency of females reporting hair loss in a cross-sectional study comprising 729 participants in Saudi Arabia.¹⁷ Contrary to our study Madubuko et al. observed more hair loss in males (61.3%) than females (38.7%) in Southern Nigeria.¹⁹ The present study found no significant association between hair fall and head cover. Similar results were reported by Sajid et al. Their study, however, reported more hair fall with a sedentary lifestyle in the male group of participants, which contrasts with our findings.²⁰

LIMITATIONS

There are certain limitations of the current study that should be noted. This pilot study with a small sample size limited the analysis of smaller subsets.

CONCLUSIONS

The incidence of hair fall is high during quarantine, particularly among women of young age group. Hair fall increases with frequent use of hair products, infrequent hair brushing and exposure to the sun at noon. Using hair dye and straightener has no effect on hair fall during quarantine. Our study found no correlation between sun exposure time and duration of COVID-19 lockdown with hair fall. An inverse relationship between hair fall during quarantine and comorbidities (migraine, thalassemia minor and asthma) was observed.

CONFLICT OF INTEREST: None

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CONTRIBUTORS

- Samia Khalid Khokhar** - Concept & Design; Drafting Manuscript
- Aisha Qamar** - Critical Revision; Supervision
- Yasmeen Mahar** - Final Approval