Co-Relation Between Androgenetic Alopecia and Severity of COVID-19 Disease- A Cross-Sectional Study

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ABSTRACT

Objective: To find the correlation between the degree of androgenetic alopecia and the severity of COVID-19 disease.

Study Design: Cross-sectional study.

Place and Duration of the Study: Dermatology department, PEMH, Rawalpindi Pakistan from Feb to Aug 2021.

Methodology: A total of 227 patients (male and female) of COVID-19 admitted in a Corona ward of Pak Emirates Military Hospital, Rawalpindi, Pakistan were selected randomly. The degree of androgenetic alopecia was assessed with the help of using the Hamilton-Norwood Scale (HNS) for men and the Ludwig Scale (LS) for women, and the severity of COVID-19 was graded based on CT severity score (CTSS).

Results: Out of the total, 161 (71%) were male, and 66 (29%) were female. Out of 161 males, 31 (19.2%) had no alopecia, and 130 (80.7%) had some degree of alopecia. Out of patients with alopecia, 33 had moderate alopecia, and 97 had severe alopecia. Out of 66 females, 32 (48.5%) had no alopecia, while 34 (51.5%) had some degree of alopecia.

Conclusion: High frequency of androgenetic alopecia in severely ill-hospitalized patients of COVID-19 suggests that androgen has a vital role in the disease severity of COVID-19.

Keywords: Androgenetic alopecia, Androgens, COVID-19, 5-Alpha-reductase.

INTRODUCTION

The World Health Organization (WHO) declared the surge of 'severe acute respiratory syndrome coronaviru-2 (SARS-CoV-2)' as a Public Health Emergency of International Concern on 30th January 2020 and a pandemic on 11th March 2020.[1] The last pandemic reported in the world was flu pandemic in 2009.[2] On 31st December 2019, hundreds of pneumonia cases were reported in the city of Wuhan, China which turned out to be of unknown cause.[3] Authorities of Wuhan further investigated these cases, and in January 2020, a new virus was identified. The virus was named SARS-COV2, and the disease caused by it was called covid-19. According to WHO Coronavirus Dashboard, till 28th November 2021, there have been 260,493,573 confirmed cases of COVID-19, including 5,195,354 deaths worldwide.[4] This virus has shown many variants since the start of this global pandemic. All variants have similar viral properties with minute differences; however, some properties are responsible for changes in the transmission of disease, severity of symptoms, vaccine effectiveness, diagnosis and management. The surfacing of new variants of SARS-COV2 has been seen as a threat to global health and a challenge to overcome the pandemic. There is a new surge in COVID-19 cases because of a recently discovered variant of COVID-19 known as omicron. COVID-19 presented a wide variety of symptoms, and menifestations.[5] Males were affected more than females with COVID-19, so the researchers started working to find a relationship between male gender and COVID-19 disease. Many researchers have discovered an association between Androgenetic Alopecia (AGA) and COVID-19 because most men suffering from COVID-19 also had alopecia.[6] Androgenetic Alopecia is defined as the miniaturization of hair follicles caused by increased serum androgen levels, and genetic factors also play an essential role. Prevalence of AGA was found to be 50% and 19% in Caucasian men and women, respectively.[7] South Asia shows more or less a similar picture. A study conducted in India mentioned that 58% of Indian males aged 30 to 50 years showed androgenic alopecia assessed by the Hamilton-Norwood scale (HNS) and the predominant grade of alopecia in them was HNS2.[8]

According to another study, age was an essential factor in the development of AGA in men. Prevalence of AGA is 30% by the age of 30 years, and it rises to 50% by the age of 50 years.[7] And lastly, in a study

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conducted in Turkey, the prevalence of AGA was found to be 23.9% in the general female population.[9] Although testosterone has a vital role in developing male baldness, it is a more potent active metabolite dihydrotestosterone causes a reduction in follicular growth.[10] While the role of androgens in causing male pattern baldness is well known, their role in female pattern baldness is yet to be established. Testosterone is converted into its more potent form, Dihydrotestosterone, with the help of an enzyme 5-alpha reductase.[10] Higher mortality rate in men due to COVID-19 can be explained by Androgen-mediated SARS-CoV-2 susceptibility. In our research, we further aim to demonstrate epidemiologic evidence that androgen sensitivity may have a role in developing severe symptoms leading to hospitalization due to COVID-19.

METHODOLOGY

We conducted a cross-sectional study in an indoor facility of Pak Emirates Military Hospital (PEMH), Rawalpindi Pakistan, for six months from February 21 to Auugust 21. Ethical approval was obtained from the Ethical Committee of PEMH, Rawalpindi (Ethical Committee Certificate No A/28/EC/229/2020). Data of 227 patients of COVID-19 admitted in COVID wards was taken randomly. The researchers used to visit one hall of the COVID wards daily in alphabetical order and take data of all patients fulfilling inclusion criteria, i.e., starting from 1st floor, hall A, B, C, D, E, F and then on next floor. Consent was obtained in written form from each subject before starting the study. Non-probability consecutive sampling technique was used.

Inclusion Criteria: Patients of each gender with an age of more than 18 years were admitted to any of the COVID wards in PEMH were included in the study.

Exclusion Criteria: Patients visiting the outdoor department and children and adolescents (<18 years old) were not included in this study.

Demographic variables were asked, while the degree of alopecia and disease severity were assessed. The degree of alopecia was assessed using the Hamilton-Norwood Scale (HNS) for men,[11,12] and the Ludwig Scale (LS) for women.[13]

The outcomes were grouped into: ''no alopecia'' for HNS=1 or LS=0; ''moderate AGA'' for HNS=2 or LS=1; and ''severe AGA'' for HNS>2 or LS >1. The severity of COVID-19 was cate-gorized into mild, moderate, and severe according to CT scan severity score (CTSS score) as follows; (CTSS <10=mild, CTSS 11-20=moderate, CTSS 21-40= severe).[14,15] A survey form was used by the dermatologist to document the patient's particulars, vital signs, O2 saturation, inflammatory markers, presence of any comorbidity, CTSS score and HNS/LS.

The data was collected and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.00. Frequency and percentage were calculated for categorical variables. Chi-Square test was used to see the associations. The p-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 227 patients were included in the study. Out of the 161 (71%) were male, 66 (29%) were female. Out of 161 males, 31 (19.2%) were with no alopecia, and 130 (80.7%) were with some degree of alopecia (moderate and severe). Out of 130 patients with alopecia, 33 (25.3%) had moderate alopecia, and 97 (74.6%) had severe alopecia.

In patients with no alopecia, 19 (61.3%) were admitted with mild COVID, 12 (38.7%) with moderate/severe COVID (25.8% moderate, 12.9% severe). In patients with moderate alopecia, 9 (27.2%) were with mild COVID, 24 (72.7%) with moderate/severe COVID (48.5% moderate, 24.2% severe). Out of 97 patients with severe alopecia only 20 (20.6%) had mild COVID and 77 (79.3%) had moderate/severe COVID (28.8% moderate, 50.5% severe).

Out of 66 females, 32 (48.5%) were with no alopecia, while 34 (51.5%) had some degree of alopecia. In female patients with no alopecia, 9 (28.1%) had mild COVID, 23 (71.8%) had moderate/severe COVID (34.3% moderate, 37.5% severe). In 27 (79.4%) patients of moderate alopecia, only 5 (18.5%) were with mild COVID, 22 (81.5%) with moderate/severe COVID (37% moderate, 44.4% severe). In severe alopecia patients all 7 (20.6%) had either moderate or severe COVID (57% moderate, 43% severe) as shown in Table.

Different frequencies of the degree of alopecia about the severity of the disease (p-value <0.05) were shown in Table. As observed in males, there was a strong correlation between the degree of alopecia and the intensity of the COVID-19 disease, as shown in the Figure.

In females admitted with COVID-19, androgenic alopecia was present, but only a weak correlation could be established between the degree of alopecia and severity of COVID-19.
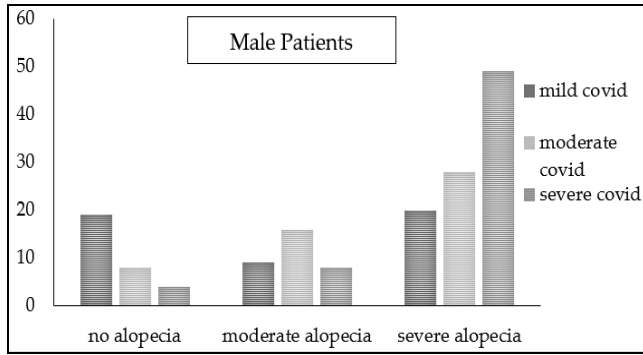
Figure: Degree of AGA in male patients of COVID-19 disease.

and the results conformed with this theory. From our study population, most men (80.7%) admitted with COVID-19 had AGA. Moreover, among those subjects, less than 1/4th had mild disease and more than 3/4th had moderate/severe disease.

On the other hand, 51.5% of female patients were found to have AGA. Only 1/6th had mild disease, and 5/6th had moderate/severe disease. However, a strong correlation could not be established between the degree of alopecia and the severity of disease in female subjects, probably due to the small sample size of

Table: Association of severity of disease with degree of alopecia.

Gender of the Participants			Degree of Alopecia			p-value
			No, (n=63)	Moderate, (n=60)	Severe, (n=104)	
Male (71%)	Severity of Disease	Mild	19 (61.3%)	9 (27.2%)	20 (20.6%)	0.001
		Moderate	8 (25.8%)	16 (48.5%)	28 (28.8%)	
		Severe	4 (12.9%)	8 (24.2%)	49 (50.5%)	
Female (29%)	Severity of Disease	Mild	9 (28.1%)	5 (18.5%)	-	0.438
		Moderate	11 (34.3%)	10 (37%)	4 (57%)	
		Severe	12 (37.5%)	12 (44.4%)	3 (43%)	

DISCUSSION

It has been observed that men have presented with more severe symptoms of COVID-19 disease than women, regardless of age. Many proposed reasons can explain this theory, including the history of smoking in men, more alcohol consumption, psychosocial factors and other comorbidities in the male gender.[15,16] Male patients of COVID-19 are also more prone to admission to ICU, and they have a higher mortality rate. However, if a severe disease occurs, the risk of dying is similar in both genders.[17] The reason could be better immune responses to the causative agents in females than males.[18] Many authors have previously proposed that androgens have a role in the intensity of the COVID-19 disease, and many patients hospitalized with COVID-19 also had androgenetic alopecia.[19] In our study among 227 patients, the outcome suggests that COVID-19 was more severe in patients with androgenetic alopecia, especially in the case of male patients.[20] In dermatology, androgenetic alopecia (AGA) is correlated with high levels of androgens in the body, which may be related to COVID-19 disease severity.[21]

In a previously conducted study, out of 175 patients, 67% of men suffering from COVID-19 had androgenetic alopecia, and 42% of female COVID-19 patients had some degree of alopecia.[22] Furthermore, a recent review of the data has suggested a strong possible link between AGA and COVID-19 disease.[23] Keeping this theory in mind, we conducted our study,

females. A study with an equal male and female sample size may show fruitful results in both genders.

LIMITATIONS OF STUDY

The lack of a control group was a limitation of this study. In addition, observer bias was possible because dermatologists actively graded AGA. Finally, a small sample of female subjects may be the reason for insignificant results in females.

RECOMMENDATIONS

The precise AGA rate in COVID-19 patients visiting OPDs is a recommended idea for new researchers to extract additional evidence. In addition, trials with antiandrogen agents in COVID-19 patients are recommended for further research since no specific and successful treatment has been established for the COVID-19 disease yet.

CONCLUSION

The high prevalence of androgenetic alopecia in severely ill hospitalized patients of COVID-19 suggests that androgen has a vital role in the disease severity of COV-19.

Conflictof Interest: None.

Author's Contribution

MWS: Concept, design, acquisition, data collection, NI: Concept, acquisition, review (for approval), MI: Drafting, data analysis, intellectual content, NAM: Final approval, review,

MA: Data collection, data interpretation, BA: Data interpretation, critical review.

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