

# Headcover and Male-Pattern Hair Loss: A Cross-Sectional Study

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## Abstract

**Background:** Androgenetic alopecia (AGA) is the most common form of alopecia. The interaction of genetics and environmental factors likely plays a role in its pathogenesis. Several environmental factors have been studied in relation to the severity of AGA; however, the effect of headcover has not been properly assessed. **Objectives:** The objective of this study is to assess the severity of male-pattern hair loss (MPHL) in relation to headcover. **Methods:** Adult males with varying degrees of MPHL were recruited during the period from May 2016 to August 2017. Data included demographics and type of headcover. The total duration of headcover was calculated for every participant in years. Assessment of MPHL was performed using the Norwood–Hamilton classification. **Results:** A total of 865 participants with MPHL were enrolled. No statistically significant difference in the severity of MPHL was found between participants who covered their head frequently as compared to those who did not ( $P = 0.952$ ). Multivariate logistic regression analysis showed that age was the only factor associated with increased severity of MPHL. **Conclusions:** Males who cover their head do not appear to have increased overall severity of MPHL.

**Keywords:** Baldness, headcover, male-pattern hair loss, shemagh

## INTRODUCTION

Androgenic alopecia (AGA) or patterned hair loss is the most common type of alopecia. It is characterized by hair loss affecting the superior part of the scalp while sparing the lateral and posterior aspects. The prevalence of AGA increases with age, and up to 50% of males will have some degree of AGA by the age of 50 years.<sup>[1]</sup>

Hair loss in AGA occurs due to progressive miniaturization of hair follicles. The exact cause of these changes is still poorly understood. AGA develops in genetically predisposed individuals. Males with a paternal history of male-pattern hair loss (MPHL) are significantly more likely to have MPHL than those with negative paternal family history.<sup>[2]</sup> Furthermore, positive family history is associated with more severe AGA.<sup>[3,4]</sup> Genetic abnormalities in AGA are a most likely part of a multifactorial process that requires environmental factors in order for the disease to manifest.

Studies on the relationship between environmental factors and AGA are limited. Androgens play a major role in the

pathogenesis of AGA.<sup>[1]</sup> Smoking and drinking alcohol are associated with more severe AGA.<sup>[4]</sup> Other factors related to lifestyle such as poor sleep, frequent consumption of soybean drink, and high body mass index (BMI) are observed more frequently in patients with more severe AGA.<sup>[5,6]</sup>

One lifestyle that is common in our community is to cover the head (for example, with a hat). Interestingly, we have noticed that many people in the community, especially males, ask physicians if covering the head worsens AGA. This question was only addressed partially by one previous study on female twins.<sup>[7]</sup> Pressure created by the upper scalp weight of the skin on hair follicles might hypothetically contribute to the development of AGA.<sup>[8,9]</sup> Covering the head might further increase the pressure on hair follicles and theoretically worsens

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AGA. Therefore, we hypothesized that a higher frequency of headcover use might be associated with more severe MPHL. The aim of this study was to assess the severity of MPHL in relation to headcover.

## METHODS

The study has been performed according to the Declaration of Helsinki principles and was approved by the Institutional Ethics Committee at King Abdullah International Medical Research Center (IRBC/328/16).

This cross-sectional study was conducted at public places (mainly shopping malls and coffee shops) during the period from May 2016 to August 2017. Informed consent was obtained from all enrolled participants. Adult Saudi males with any degree of patterned hair loss were interviewed. Exclusion criteria included the presence of the following within the past six months: any treatment for baldness, high fever ( $>38^{\circ}\text{C}$ ), severe emotional distress, or anticancer treatment. The following data were collected: demographics, BMI, family history of AGA, perception of factors that might cause and/or worsen MPHL, and type of headcover. Types of headcover included shemagh, sun cap, military hat, and helmet. Shemagh is the national headcover for males. It is usually worn over a white hat that is firmly attached to the scalp. The duration of headcover was calculated for each type of headcover using the following formula:

$$\text{Duration of head cover (hours)} = \text{hours per day} \times \text{days per week} \times 52 \times \text{years of head cover use}$$

The total duration of headcover (in hours) for each participant was obtained by summing the duration of using each type of headcover. Finally, the total duration in hours was converted to years. Participants were categorized based on their BMI into normal ( $\text{BMI} < 25$ ), overweight ( $\text{BMI} 25\text{--}29.9$ ), and obese ( $\text{BMI} \geq 30$ ). Assessment of MPHL was performed using the Norwood–Hamilton classification.<sup>[10]</sup> The severity of MPHL was further categorized into mild (I–II), moderate (III–IV), and severe (V–VII).

The sample size was calculated based on the proportion of headcover across the three levels of severity of MPHL. To achieve a power of 80% in detecting at least 10% difference in proportion of headcover between the levels of severity of MPHL and with a 5% level of significance, the required sample size was 808. Calculation was done using PiFace (<https://homepage.stat.uiowa.edu/~rlenth/Power/>). To accommodate for no responses, 10% extra was added to the sample size to become 890. Convenient sampling was performed with stratification based on the frequency of headcover.

Data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 21 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics including frequencies and percentages were used to describe categorical variables. Mean and standard deviation were generated for numerical data. Univariate and multivariate logistic regression analyses

were used to test the relationship between headcover status and MPHL severity. A test with  $P \leq 0.05$  was considered statistically significant.

## RESULTS

A total of 865 participants were enrolled [Tables 1 and 2]. The mean age was  $36 \pm 10.8$  years. Family history of AGA was positive in approximately 80% of participants. Approximately 20% of participants thought that covering the head causes and/or worsens MPHL. The majority used shemagh as a headcover [Figure 1].

Univariate analysis showed that the severity of MPHL did not differ with regard to headcover status ( $P = 0.952$ ) [Table 3]. A statistically significant difference in the severity of MPHL was found in relation to age, duration of baldness, marital status, and job ( $P < 0.001$  for all variables). Age and duration of baldness were found to be highly correlated ( $r = 0.68$ ,  $P < 0.001$ ). Therefore, the duration of baldness was not included in the multivariate regression analysis in order to avoid collinearity. Multivariate regression analysis showed that age was the only factor associated with MPHL severity [Table 4].

## DISCUSSION

The exact cause of AGA is unknown. Knowledge of environmental factors associated with exacerbation of AGA is important; however, studies in this regard are limited. Ustuner theorized that pressure on hair follicles against the skull by the skin leads to AGA.<sup>[8,9]</sup> This is expected to be more at the

**Table 1: Participant characteristics (n=865)**

Variable	Categories	n (%)
Age (years)	<30	241 (27.9)
	30-39	405 (46.8)
	40-49	110 (12.7)
	$\geq 50$	109 (12.6)
Marital status	Married	625 (72.3)
	Single	240 (27.7)
BMI	Normal	247 (28.6)
	Overweight	346 (40.0)
	Obese	272 (31.4)
Job	Office worker	266 (30.8)
	Military personnel	111 (12.8)
	Health-care worker	42 (4.9)
	Government employee	165 (19.1)
	Student	102 (11.8)
	Independent worker	50 (5.8)
	Engineer	40 (4.6)
	Retired	58 (6.7)
Duration of baldness (years)	Unemployed	31 (3.6)
	0-4	244 (28.2)
	5-9	263 (30.4)
	10-14	157 (18.2)
	$\geq 15$	201 (23.2)

BMI: Body mass index

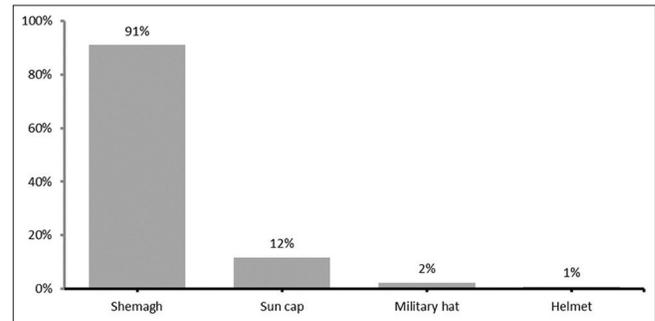
top of the scalp due to the gravity effect. With increasing age and elevation of testosterone levels at puberty, subcutaneous fat thickness decreases and hair follicles undergo more

pressure.<sup>[8]</sup> We hypothesized that frequently covering the head would be associated with more pressure on hair follicles and subsequently more severe AGA.

Surprisingly, our study showed that the frequent use of headcover is not associated with more severe MPHL. Interestingly, headcover was found to be associated with less hair loss in a study of AGA in female twins.<sup>[7]</sup> However, this

**Table 2: Male-pattern hair loss severity based on the Norwood-Hamilton classification (n=865)**

Categories	n (%)
I	192 (22.2)
II	159 (18.4)
IIa	23 (2.7)
III	42 (4.9)
IIIa	29 (3.4)
III vertex	99 (11.4)
IV	48 (5.5)
IVa	19 (2.2)
V	59 (6.8)
Va	43 (5)
VI	82 (9.5)
VII	70 (8.1)



**Figure 1: Types of headcover**

**Table 3: Univariate analysis of factors associated with increased severity of male-pattern hair loss**

	Norwood-Hamilton classification, n (%)			P
	Mild (I-II)	Moderate (III-IV)	Severe (V-VII)	
Headcover				
No	76 (42.2)	50 (27.8)	54 (30.0)	0.952
Yes	298 (43.5)	187 (27.3)	200 (29.2)	
Duration of baldness (years)				
0-4	147 (60.2)	60 (24.6)	37 (15.2)	<0.001
5-9	119 (45.2)	83 (31.6)	61 (23.2)	
10-14	46 (29.3)	45 (28.7)	66 (42.0)	
≥15	62 (30.8)	49 (24.4)	90 (44.8)	
Age (years)				
<25	83 (75.5)	20 (18.2)	7 (6.4)	<0.001
26-29	70 (53.4)	33 (25.2)	28 (21.4)	
30-39	160 (39.5)	118 (29.1)	127 (31.4)	
40-49	30 (27.3)	42 (38.2)	38 (34.5)	
≥50	31 (28.4)	24 (22.0)	54 (49.5)	
Marital status				
Married	222 (35.5)	185 (29.6)	218 (34.9)	<0.001
Single	152 (63.3)	52 (21.7)	36 (15.0)	
BMI				
Normal	119 (48.2)	69 (27.9)	59 (23.9)	0.137
Overweight	142 (41.0)	100 (28.9)	104 (30.1)	
Obese	113 (41.5)	68 (25.0)	91 (33.5)	
Job				
Office worker	109 (41.0)	81 (30.5)	76 (28.6)	<0.001
Military personnel	43 (38.7)	28 (25.2)	40 (36.0)	
Health-care worker	22 (52.4)	11 (26.2)	9 (21.4)	
Government employee	71 (43.0)	47 (28.5)	47 (28.5)	
Student	76 (74.5)	20 (19.6)	6 (5.9)	
Independent worker	12 (24.0)	16 (32.0)	22 (44.0)	
Engineer	15 (37.5)	12 (30.0)	13 (32.5)	
Retired	15 (25.9)	11 (19.0)	32 (55.2)	
Unemployed	11 (35.5)	11 (35.5)	9 (29.0)	

BMI: Body mass index

**Table 4: Multivariate logistic regression analysis of factors associated with increased severity of male-pattern hair loss**

	OR	95% CI	P
Headcover			
No	1.04	0.91-1.19	0.578
Yes*	1		
Age (years)**			
<25	0.56	0.40-0.80	0.001
26-29	0.72	0.55-0.94	0.017
30-39	0.84	0.68-1.03	0.099
40-49	0.94	0.74-1.19	0.600
≥50*	1		
Marital status			
Married	1.16	0.98-1.38	0.090
Single*	1		
BMI			
Normal	0.95	0.83-1.10	0.501
Overweight	1.01	0.89-1.15	0.879
Obese*	1		
Job			
Office worker	0.82	0.60-1.10	0.183
Military personnel	0.90	0.66-1.25	0.536
Health-care worker	0.72	0.50-1.04	0.078
Government employee	0.78	0.57-1.06	0.112
Student	0.74	0.51-1.06	0.100
Independent worker	1.07	0.75-1.54	0.714
Engineer	0.88	0.61-1.29	0.520
Retired	1.01	0.68-1.49	0.971
Unemployed*	1		

\*Reference group. \*\*Duration of baldness was not included in the multivariate regression analysis in order to avoid collinearity as it was found to highly correlate with age. BMI: Body mass index, CI: Confidence interval, OR: Odds ratio

was only assessed in 18 participants, and details on headcover were not mentioned. Subcutaneous blood flow is reduced in MPHL.<sup>[11]</sup> Frequently covering the head might increase the local temperature and subsequently increases blood flow to the scalp. This might oppose the pressure effect by the headcover.

Exposure to ultraviolet light might be associated with aggravation of AGA. Keratinocytes release inflammatory mediators and reactive oxygen species after exposure to ultraviolet radiation. This potentially results in microscopic follicular inflammation that could negatively affect hair growth.<sup>[12]</sup> The prevalence of MPHL was found to be two times higher in Asian policemen as compared to the general population.<sup>[13]</sup> This was attributed to possibly more stress and exposure to sunlight in policemen. Furthermore, there was a higher risk of developing AGA in policemen who practiced less sun protection and got exposed to sunlight for longer durations. Prolonged exposure to ultraviolet radiation has been shown to be a significant risk factor in Asian females with AGA.<sup>[14]</sup> Given that ultraviolet radiation is a potential aggravating factor for AGA, headcover could decrease the progression of AGA by photoprotection. Scalp

photoprotection might neutralize the pressure effect secondary to covering the head.

Age was the only factor that was independently associated with more severe MPHL. This is in agreement with previous studies.<sup>[14,15]</sup> BMI was not found to be associated with MPHL in our study. This is consistent with results of some previous studies.<sup>[16-18]</sup> However, other studies showed a strong association BMI and severity of MPHL.<sup>[6,15]</sup>

There are some limitations to our study. One limitation is the cross-sectional design. Furthermore, recall bias could have possibly affected the accuracy of the duration of headcover use. Those limitations would be potentially minimized with a prospective cohort study design.

## CONCLUSIONS

Our study showed that the overall MPHL severity did not differ with headcover use. Additional studies are required to provide better counseling to patients with MPHL regarding headcover.

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## Conflicts of interest

There are no conflicts of interest.

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