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Stress and its Relation to Hair Loss among Medical Students in a Tertiary Care Hospital of Kathmandu

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Abstract

Background: Students of the medical profession exhibit elevated levels of stress due to the modality of their academics. Due to stress, resources are diverted for flight & fight response and causes the release of cortisol. Both of these factors can lead to hair loss. Thus, it emphasizes the need for focused research in this group. This study aims to determine the prevalence of hair loss and its relation to stress among medical students.

Materials and Methods: A cross-sectional study was conducted among undergraduate medical students of Kathmandu Medical College Teaching Hospital from December 2021 to March 2022. Ethical approval was obtained from the Institutional Review Committee. 216 students were selected using a non-probability convenience sampling method. Perceived stress scale was used to assess the level of stress and hair pull test was used to assess the degree of hair loss.

Results: A total of 216 students including 91 females and 125 males participated in the study. Mean age was 21.7 ± 1.6 years. 15.75% of students (12 females; 22 males) had low stress, 58.33% of students (45 females; 81 males) had moderate stress and 25.93% of students (34 females; 22 males) had severe stress. A total of 30 (13.88%) students had excessive hair loss. Among them 11 were males and 19 were females. Hair loss was more prevalent in females (20.87%) as compared to males (8.8%). Multivariate logistic regression adjusting for stress levels showed that male students had significantly higher odds of hair loss compared to females (AOR = 2.746, 95% CI: 1.210–6.231, p = 0.016). There was no statistically significant association between stress and hair loss among medical students (χ^2 = 0.969, df = 2, p = 0.616). This finding was confirmed by multivariate logistic regression adjusting for gender (Wald χ^2 = 0.698, df = 2, p = 0.705)

Conclusions: Hair fall is not common among medical students of Kathmandu Medical College Teaching Hospital and no significant association was found between stress and hair fall.

Key words: hair loss; perceived stress scale; hair pull test

Introduction

Stress is any physical or psychological stimulus that disturbs the adaptive state and provokes a coping response.[1] Students of medical profession exhibit elevated levels of stress due to the modality of their academics, long study hours, academic performance pressure and concerns over future employment which results in degradation of quality of life.[2,3] These stressors can differ from those experienced by non-medical students.[4,5] Thus, it emphasizes the need for focused research in this group.[2] This study aims to

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fill the knowledge gap in this particular group. Stress activates the survival mode of humans due to which the resources are diverted away from good skin blood flow, growth and sleep to be used instead for fight or flight response. Cortisol is released in response to stress and can cause significant harm to the hair follicles leading to hair loss.[6] Hair is one of the fastest growing tissue in the human body.[7] About 50-100 hair falling daily is considered to be normal; if it crosses this limit, it is known as alopecia.[8]

Many studies have shown that stress felt by medical students is more than non-medical students. Several stressors such as academic performance, finance, environment, etc, have an important role in this.[9] Furthermore, hair loss itself can cause stress in many people because it carries a significant mental burden, thus resulting in a vicious cause-and-effect cycle.[10] Understanding this bi-directional relationship is vital in devising an effective stress management and hair health improvement. Though hair loss due to stress is well-established in many clinical trials, the research evaluating relationship between perceived stress and hair loss among medical students is limited in South Asian population.[11] Furthermore, most research articles have used indirect methods for assessing hair loss, such as self-reported questionnaires which may be prone to bias. This study introduces a combined approach of using the Perceived Stress Scale (PSS)[12] to measure stress levels and the Hair Pull Test (HPT)[13] to clinically assess hair loss. In light of these considerations, our study seeks to fill a population gap by focusing on medical students in a South Asian context, and a methodological gap by integrating both subjective and clinical measures of stress and hair loss.

This study aims to determine the prevalence of hair loss and its relation to stress among medical students.

Materials and Methods

We conducted a cross-sectional study among undergraduate medical students of Kathmandu Medical College and Teaching Hospital from December 2021 – March 2022 irrespective of age and gender. Ethical approval was obtained from the Institutional Review Committee of Kathmandu Medical College with reference no. 1110202108. A total of 216 students participated in the study from first year to final year. Interns and post-graduate students as well as medical students who refused to participate in the study were excluded. Students willing to participate in the study and formally consenting after an explanation about the study were included. Convenience sampling was used because the study targeted medical students who were readily accessible during the academic and clinical schedule, allowing timely data collection within the study period. This method was practical given constraints in reaching all students across different years and schedules. The sample size was calculated using the formula given below;

$n = z^2\ pq/e^2$

$=1.96^2*0.15*0.85/0.05^2$

$= \sim 196$

Where n = sample size, z(z-score) =1.96, p(prevalence) =15.8%[14], q=1-p=84.2%, allowable error(e)=5%

The sample size was estimated to be 196 at a 95% confidence level. Adding 10% of the non-response rate, the total sample size is 216.

The stress level of all participants was assessed using the Perceived Stress Scale (PSS)[12] and they were asked not to shampoo for the next 24 hours. On the following day, the degree of hair loss of those participants was assessed through the 'Hair Pull Test'[13], performed at multiple scalp sites including frontal, vertex, and occipital regions. The test was conducted by trained examiners who were blinded to participant's stress levels to avoid bias. Inter-observer reliability was ensured by periodic cross-checking among examiners.

The PSS is a stress assessment measure which is used to assess the degree to which the participant has perceived situations in his/her life in the last month as stressful.[12] It consists of 10 questions rated on a 5-point Likert Scale (0=never; 1=infrequently; 2=sometimes; 3=frequently; 4=always). Scores ranging from 0-13 were considered as mild stress; 14-26 as moderate and 27-40 were considered as severe stress.

Hair Pull Test (HPT) is a simple way to assess hair loss. The thumb, index, and middle fingers are used to grasp approximately 50-60 hairs and are pulled gently with firm traction. The test is positive if 3 or more hairs are extracted and negative if 2 or less hairs are extracted.[13]

Potential confounding factors that could influence hair loss were addressed through careful history taking. Participants with a history of chronic illness, relevant medication use, genetic predisposition to hair loss or androgenetic alopecia, and hormonal disorders were excluded from the study. Gender was included as a covariate in the multivariate logistic regression analysis to adjust for its effect. Data were entered in MS Excel version 2016 and analyzed using IBM SPSS version 24. Subjects with ≥ 3 hairs on HPT were considered to have excessive hair loss. Statistical significance between the two was studied using the Chi-square test. To further evaluate the relationship while controlling for potential confounding, multivariate binary logistic regression analysis was conducted with hair loss as the dependent variable and stress level and gender as independent variables. Adjusted odds ratios (AOR) with 95% confidence intervals were calculated. A p-value of <0.05 was considered statistically significant.

Results

A total of 216 students including 91 females and 125 males participated in the study. The mean ± SD age was 21.7 ± 1.6 years

Table 1: Gender-wise Distribution of Stress Levels among Medical students

		Gender		Total
		Female	Male	
Level of Stress	Mild Stress	12	22	34
	Moderate Stress	45	81	126
	Severe Stress	34	22	56
Total		**91**	**125**	**216**

Among 216 students, 15.75% of students (12 females; 22 males) had low stress, 58.33% of students (45 females; 81 males) had moderate stress and 25.93% of students (34 females; 22 males) had severe stress as shown in Table 1.

Table 2: Gender-wise Prevalence of Hair Loss in Among Medical Students

		Gender		Total
		Female	Male	
Hair pull test	Negative	72	114	186
	Positive	19	11	30
Total		**91**	**125**	**216**

A total of 30 (13.88%) students had excessive hair loss. Among them 11 were males and 19 were females as shown in Table 2. Hair loss was more prevalent in females (20.87%) as compared to males (8.8%).

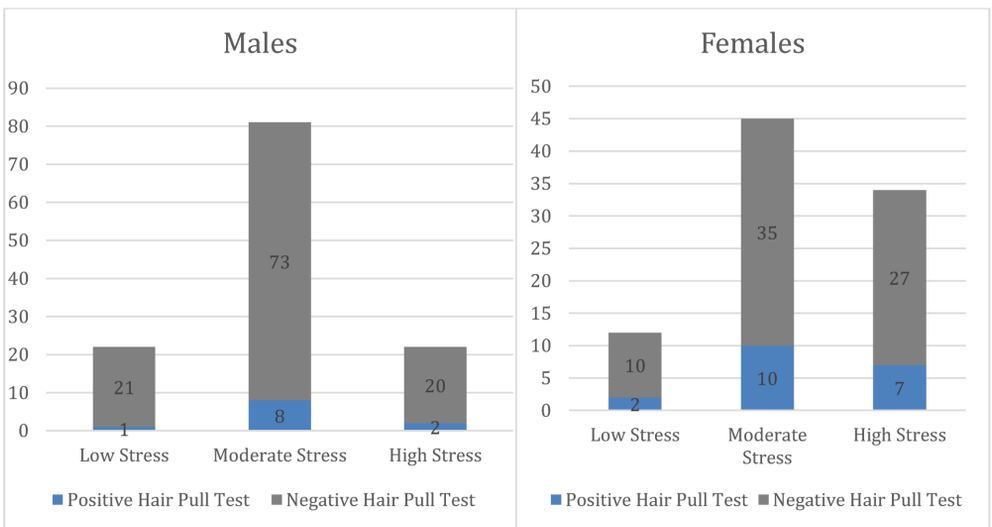

Figure 1: Distribution of Hair Loss Across Different Stress Levels among Medical Students

Among 19 females with hair loss, 2 had low stress, 10 had moderate stress and 7 had severe stress and among 11 males with hair loss, 1 had low stress, 8 had moderate stress and 2 had severe stress (Figure 1).

Table 3 presents the overall and gender-wise association between stress level and hair loss using Pearson's chi-square test. No statistically significant association was observed overall ($\chi^2 = 0.969$, df = 2, p = 0.616) or when analyzed separately among males (p = 0.735) and females (p = 0.914), indicating that the distribution of hair loss did not differ significantly across mild, moderate, and severe stress categories.

Table 3: Association Between Stress Level and Hair Loss (Chi-Square Analysis)

Group	χ^2 Value	df	p-value	Interpretation
Overall	0.969	2	0.616	Not significant
Male	—	2	0.735	Not significant
Female	—	2	0.914	Not significant

Table 4 presents the results of multivariate logistic regression analysis examining the association between stress level and hair loss after adjusting for gender. Stress level was not significantly associated with hair loss (overall p = 0.705). Gender was significantly associated with hair loss, with male students having 2.75 times higher odds of hair loss compared to female students (AOR = 2.746, 95% CI: 1.210–6.231, p = 0.016).

Table 4: Multivariate Logistic Regression Analysis of Factors Associated with Hair Loss

Variable	B	AOR (Exp(B))	95% CI	p-value	Interpretation
Stress Level (overall)	—	—	—	0.705	Not significant
Mild vs Severe	-0.446	0.64	0.156–2.621	0.535	Not significant
Moderate vs Severe	0.108	1.11	0.451–2.749	0.815	Not significant
Gender (Male vs Female)	1.010	2.746	1.210–6.231	0.016	Significant

Discussion

In this study, we found that the prevalence of hair loss in medical students was low; 30(13.88%) students had excessive hair loss, with a higher incidence in females which resonates with studies in similar demographics.[11] It was also found that the prevalence of moderate to high stress was high which is consistent with global trends; 182(84.26%) students were found to have moderate to high stress. Medical students experience significant stress due to academic pressure, clinical responsibilities, and concern about future careers.[1] However, we didn't find an association between the level of stress and hair loss in the medical students. The lack of significant association between stress level and hair loss in chi-square analysis was confirmed by multivariate logistic regression adjusting for gender, indicating that perceived stress alone may not be a primary factor in hair loss among this population.

While comparing our results with the findings of the parent study by Shaikh et al. (2016)[14] done on the general population, we found significant differences in prevalence and association of stress and hair loss among medical students. The parent study reported a lower overall prevalence of hair loss (9.9%) compared to our finding (13.88%). Although the crude prevalence of hair loss was higher among female students in this study, multivariate logistic regression analysis adjusting for stress levels showed that male students had significantly higher odds of hair loss. A similar trend was observed in the parent study by Shaikh S et al., where male participants demonstrated a stronger association between stress and hair loss compared to females. These findings suggest that gender-related biological or hormonal factors may influence susceptibility to hair loss, and that male gender may act as an independent risk factor when other variables are taken into account.[14] Although both studies used PSS, the parent study used 14-item PSS while this study used the more recent 10-item PSS. The parent study set a higher threshold for diagnosing excessive hair loss (≥6 hairs pulled), compared to our study's threshold (≥3 hairs pulled). All these methodological changes had been made in this study in accordance to the latest guidelines for both PSS and HPT respectively.[12,13]

Our findings are similar to what has been concluded in other studies with similar study populations. In a study conducted in Pakistan on female medical students to study the prevalence of stress and its relation to hair fall, it was found that there was no association between the level of stress and hair loss in the medical students.[11] A comprehensive review by Phillips et al. (2017) concluded that while stress is a known trigger for hair loss conditions like telogen effluvium, the relationship is complex and mediated by various factors, including individual susceptibility and concurrent health conditions.[15]

The inability of this study to find the association between stress and hair loss can be attributed to the small number of students who had excessive hair loss, even though the overall sample size was large. Only 30 out of 216 students had excessive hair loss. We need to have a larger sample size with excessive hair loss to state an association between stress and hair fall. The sample size was calculated to estimate the prevalence of hair loss among medical students rather than to detect associations between variables; therefore, the study may have had limited statistical power to identify a significant association between stress and hair loss. The use of non-probability convenience sampling limits the generalizability of the findings. Because participants were selected based on availability rather than random selection, the sample may not fully represent all medical students in terms of stress levels, hair loss prevalence, or other unmeasured characteristics. Similar cross-sectional studies assessing stress and hair loss among medical students have also employed non-probability sampling method and subsequently examined associations using statistical tests such as chi-square. For example, the study "Stress Related Hairloss in Medical Students" evaluated 300 medical students and analyzed the association between perceived stress and hair loss after estimating prevalence.[16]

The degree of hair loss is influenced by several genetics & hormonal factors, nutritional deficiencies as well as pre-existing medical conditions.[14] Potential confounders such as nutritional deficiencies and anemia were not evaluated. These unmeasured factors could influence hair loss and represent a limitation when interpreting the association between stress and hair loss in this population. According to Shaikh et.al, genetic predisposition has a massive role in influencing hair loss whereas environmental factors, such as stress act as a possible exacerbating factor rather than being primary causes.[14] Furthermore, the Perceived Stress Scale (PSS) used in this study is a subjective tool, and is incapable of measuring the physiological stress experienced by the students to a great degree of accuracy.[6,10] Additionally, the Hair Pull test (HPT) may be incapable of differentiating temporary hair shedding and chronic condition like telogen effluvium.[13]

Given the limitations of this study, future research should aim for larger, more diverse sample sizes to better understand the relationship between stress and hair loss. Longitudinal studies that track stress levels and hair loss over time would provide more insight into causal relationships. Furthermore, the findings could be clarified by controlling additional variables through objective assessments rather than self-report alone, including dietary habits (e.g., food diaries or nutritional biomarkers), sleep patterns (e.g., sleep logs), hormonal levels (assessed via laboratory investigations), and genetic predisposition (e.g., family history combined with clinical or genetic testing).

A more comprehensive assessment of stress and its impact on hair health can be done by combining subjective measures of stress like the PSS along

with objective measures, such as cortisol levels in hair or saliva.[6,10] Exploring the role of stress management interventions and their effectiveness in preventing hair loss among medical students could also be valuable. Significant stress reduction and improvement of overall health, including hair health can be achieved by interventions like mindfulness-based stress reduction (MBSR) and cognitive -behavioral therapy (CBT).[9,17]

Limited studies have been conducted on the topic "Stress and its relation to hair loss" in Nepal. It is advisable that further studies should be conducted with a greater sample size, more positive cases of hair loss and diverse group of population to demonstrate the relationship between stress and hair loss.

Conclusion

Our study found that while a significant proportion of medical students at Kathmandu Medical College experienced moderate to high levels of stress, there was no significant association between stress and hair loss. The higher prevalence of hair loss in female students but significantly higher odds of hair loss among males highlights the need for further research into gender-specific factors influencing hair health.

Future studies should aim for larger, more diverse populations and consider additional variables that could affect hair loss. By addressing these limitations, we can better understand the complex relationship between stress and hair loss and develop more effective interventions for those at risk.

Conflict of Interest: None

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