

A COMPREHENSIVE INVESTIGATION ON STRESS-INDUCED HAIR LOSS IN SAUDI ARABIA: A SYSTEMATIC REVIEW

Dhaifallah Alenizi*¹, Renad Lafi Alanazi², Raghad Faisal Alruwailiy³, Roaa Salem Maqpal Alharbi³, Dhair Nasser Almutairi⁴, Osamh Dhaif Allah A Alenezi⁵, Shuruq Mohsen Abdullah Alshammari⁶, Bader Maiedh Mohsen Al Adainan⁷

¹Associate Prof. of Dermatology, Northern Border University, Saudi Arabia; ²General Practitioner, Prince Abdullah Bin Musaed Cardiac Centre (PAMCC), Arar, Saudi Arabia; ³Medical Intern, Faculty of Medicine, Northern Border University, Saudi Arabia; ⁴General Practitioner, King Khalid general hospital, Hafar Al-Batin, Saudi Arabia; ⁵Medical Student, Faculty of Medicine, Northern Border University, Saudi Arabia; ⁶General Practitioner, Prince Abdullah Bin Musaed Hospital, Arar, Saudi Arabia; ⁷General Practitioner, Najran New Hospital, Najran, Saudi Arabia

Abstract

Objectives: to conduct a thorough analysis of the body of research on hair loss in Saudi Arabians caused by stress.

Methods: After an extensive search on four databases, 400 relevant publications were discovered. After removing duplicates using Rayyan QCRI and evaluating relevance, 36 full-text publications were reviewed, with only five studies meeting the inclusion criteria.

Results: We included five studies with a total of 2909 Saudi participants and 2088 (37.4%) were males. Three studies used validated questionnaires to assess stress, while two relied on self-administered questionnaires. The findings show a strong link between stress and dermatological issues, particularly hair loss, across different demographics in Saudi Arabia. Among medical students, stress led to symptoms like hair loss, with higher-stressed students more likely to experience hair loss and hair-pulling behaviors. In the general population, stress was associated with conditions such as acne, eczema, and hair loss. Studies on COVID-19 patients indicated that the stress of acute illness may trigger telogen effluvium, a stress-related hair shedding condition.

Conclusion: The review highlights that stress-related hair loss affects both high-stress groups and the general population, with distinct psychological and physical symptoms. This suggests that healthcare providers should integrate stress assessment and mental health support in treating hair loss. In order to lower the prevalence of stress-induced hair loss, it also highlights the necessity of culturally appropriate therapies and public awareness campaigns that target certain stressors in Saudi Arabia. It also promotes more research and public health initiatives.

Keywords: Hair loss. Stress. Psychological disorders. Saudi Arabia. Systematic review

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*Corresponding Author: Dhaifallah Alenizi,

Associate Prof. of Dermatology, Northern Border University, Saudi Arabia

Correo-e: ptnservices2022@gmail.com

Introduction

The average adult's head has between 100,000 and 150,000 hairs. The life cycle of hair is set. There are three phases: growing (anagen), resting (catagen), and shedding (telogen). Although the daily loss of strands varies, it typically ranges from 50 to 100. Because new hair grows in at the same time, this rarely causes noticeable hair loss. Alopecia or baldness is the result of hair loss that happens when this cycle of growth and loss is disrupted [1].

According to many studies, hair loss in humans can be caused by various causes which can be organic: Alopecia areata, hormonal changes (thyroid issues, pregnancy/childbirth, menopause), and family history (androgenic alopecia or pattern hair loss). ("Spot balding is an autoimmune condition that causes hair follicle dormancy and loss.") Scalp infections (ringworm, etc.), skin conditions that affect the scalp (lupus, etc.), trichotillomania ("Hair pulling condition is an uncontrollable tendency to take out one's own hair, whether from the scalp, brows, or other parts of the body."), radiation/chemotherapy, excessive hair styling (traction, etc.), or non-organic: incorporating stress (telogen effluvium), etc., some patients' pain may be so severe that the burden of hair loss is comparable to many more serious chronic or life-threatening conditions [2]. Physical stressors like surgery, car accidents, childbirth, or serious illnesses like the flu can also cause temporary hair loss [3].

Human hair loss is commonly seen clinically during periods of high stress, and while it does not indicate a biological issue, it can be distressing for both the patient and their physician [4, 5]. It was postulated that stress stimulates neuroendocrine-immune pathways in humans, similar to the animal models [6, 7], may inhibit hair development when no other medically discernible health issues are present [8, 9]. A person's hairs may go into the resting phase while they are under stress. Two to six months after the incident, hair loss is frequently apparent.

Given the longstanding recognition of stress as a significant trigger for hair loss, it is crucial to have easily accessible information on the correlation between stress and hair loss. Both acute and chronic stress are identified as key factors in triggering telogen effluvium, linking psycho-emotional stress to hair loss. Continuous stress can worsen hair loss conditions with underlying causes such as endocrine, toxic, metabolic, or immunological factors. Stress can also manifest as a secondary syndrome following initial hair loss, such as alopecia areata or AGA, potentially exacerbating or extending the hair loss, setting up a detrimental cycle [10].

While a substantial body of evidence links stress to inflammation in both humans and animals, the relationship between stress, immune response, and tissue regeneration in healthy, uninjured individuals has only been minimally explored in human research. Presently, there is no scientific confirmation of stress-induced hair loss in individuals resulting from prolonged exposure to stress in real-world scenarios [11, 12].

Certain pharmacological treatments have shown promise in alleviating stress-induced hair loss in men. Effective interventions in this area would aim to prolong the anagen phase of the hair cycle to prevent the premature onset of catagen, the underlying mechanism of stress-induced telogen effluvium [12].

There is still a dearth of research on how stress affects hair health in Saudi citizens. Hair loss brought on by stress, particularly telogen effluvium and alopecia areata, are frequently reported but under-investigated conditions, and the specific cultural, environmental, and lifestyle factors in Saudi Arabia may present unique patterns or triggers. A systematic review of existing literature is essential to consolidate current knowledge, identify research gaps, and build a foundation for more targeted studies. By understanding the prevalence, etiology, and potential prevention strategies for stress-related hair loss in Saudi Arabia, health professionals and policymakers could be better equipped to address this multifaceted issue.

The goal of this systematic review is to thoroughly investigate the corpus of research on stress-related hair loss in Saudi Arabians. The primary objective is to identify, evaluate, and synthesize evidence regarding the prevalence, risk factors, and psychological impact of stress-induced hair loss within the Saudi context.

Methods

Search strategy

The systematic review followed the guidelines of the PRISMA and GATHER criteria. In the pursuit of relevant research on stress-induced hair loss among individuals in Saudi Arabia, a thorough search was conducted. Reviewers searched four electronic databases—SCOPUS, Web of Science, Cochrane, and PubMed—for studies published up to October 2024. Duplicates were removed, and all identified abstracts and titles from electronic searches were uploaded to Rayyan. Subsequently, studies meeting the inclusion criteria based on the abstract or title were collected for detailed evaluation. Two reviewers independently assessed the suitability of the retrieved papers and resolved

any discrepancies through discussion.

Study population-selection

The PICO (Population, Intervention, Comparison, and Outcome) factors were implemented as inclusion criteria for our review: (i) Population: Saudi individuals suffering from hair loss, (ii) Intervention: The incidence of stress, (iii) Comparator: Normal individuals (if present), (iv) Outcome: Effect of psychological stress on hair loss.

Data extraction

Two unbiased reviewers employed a predetermined and uniform method to gather data from papers meeting the inclusion criteria. The reviewers extracted and documented the following information: (i) Primary author, (ii) Publication year, (iii) Study design, (iv) Number of participants, (v) Age, (vi) Gender, (vii) Type of population, (viii) Stress diagnostic tool, and (ix) Principal outcomes.

Quality review

Given the common occurrence of bias stemming from omitted factors in studies within this domain, we employed the ROBINS-I technique to conduct a thorough analysis of confounding. The ROBINS-I tool is specifically suited for evaluating bias in non-randomized studies, particularly in cohort designs where individuals exposed to varying staffing levels are monitored over time. Two reviewers independently assessed the risk of bias in each paper, resolving any discrepancies through group discussion [13].

Results

The defined search approach resulted in the identification of 400 publications (see Figure 1). Following the elimination of duplicates (n = 189), 211 studies were assessed based on their titles and abstracts. Out of these, 175 did not meet the eligibility criteria, narrowing down the selection to 36 full-text articles for a detailed examination. Among these, only 5 studies met the eligibility criteria for evidence synthesis and analysis, all of which were cross-sectional studies (Figure 1).

Sociodemographic and clinical outcomes

We included five studies with a total of 2909 Saudi participants and 2088 (37.4%) were males. Two studies were implemented in Riyadh [16, 18], one

in Al Baha [15], one in Makkah [17], and one in Al-Majmah [19]. Two studies included medical students [15, 16], two included the general population [17, 19], and one included COVID-19 cases [18].

Regarding the assessment of stress, three studies used validated questionnaires [14-16] and two used self-administrated predesigned questionnaires [17, 18]. The main outcomes from these studies highlight a significant link between stress and dermatological issues, particularly hair loss, among different demographic groups in Saudi Arabia. Among medical students, stress was shown to manifest in various dermatological symptoms, with hair loss being a prominent issue. Other stress-related symptoms included oily skin, pimples, itchy skin, and excessive perspiration. Additionally, students experiencing higher stress levels were more prone to hair loss and hair-pulling behaviors compared to their less-stressed peers [15, 16].

In the general population, psychological stress was associated with common skin conditions such as acne and eczema, with hair loss being notably prevalent. This association underscores the impact of stress on skin health across a broader demographic [17, 19]. Furthermore, studies among individuals who had COVID-19 suggested that the physiological stress of acute illness could contribute to conditions like telogen effluvium, a form of hair shedding linked to stress-related disruption in the hair growth cycle [18] (Table 1, Table 2).

Discussion

This review is uniquely the first systematic analysis to explore stress-related hair loss within Saudi Arabia, addressing a previously unmet need in the literature. Prior research has typically focused on individual health issues related to stress or dermatological concerns without consolidating findings on how stress uniquely impacts hair health across diverse groups within the Saudi population.

We found that stress has been linked to a number of dermatological complaints in medical students, with one of the most prevalent being hair loss. Additionally, compared to their classmates who were less stressed, students who were under more stress were more likely to have hair loss and engage in hair-pulling behaviors [15, 16]. Maher et al. also mentioned the prevalence of hair loss among international clinical college students. Additionally, stress has been linked to hair loss, particularly in women. Furthermore, it was discovered that harmful substances accumulated in people from various places as a result

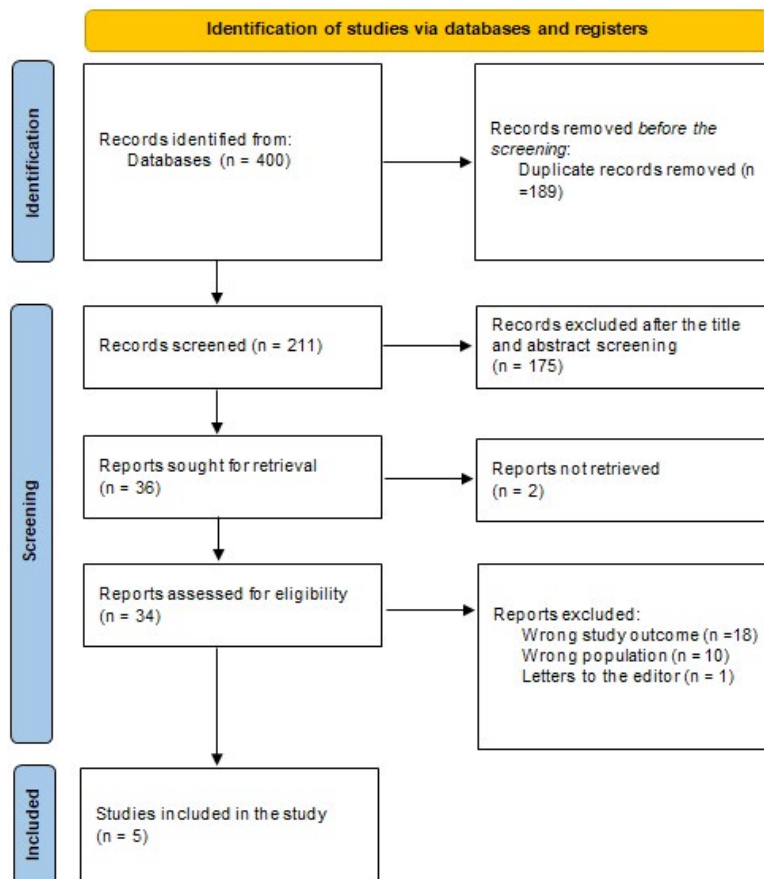


Figure 1. PRISMA flowchart [14].

Table 1. Outcome measures of the included studies.

Study ID	Study design	City	Sociodemographic	Population type	Stress diagnostic tool	Main outcomes
AL-Ghamdi et al., 2020 [15]	Cross-sectional	Al Baha	N=251 Mean age: 20.7 Males: 166 (66%)	Medical students	PSQ	The most prevalent and important dermatological symptoms across all students at varying perceived stress levels were hair loss, pimples in addition to oily, waxy spots on the head, itchy skin, and excessive perspiration.
Saif et al., 2018 [16]	Cross-sectional	Riyadh	N=529 Mean age: 20.6 Males: 208 (39.3%)	Medical students	PSQ	Compared to the least stressed students, highly stressed individuals had hair pull-out (p=0.008) and hair loss (p≤0.0001).
Altalhi et al., 2023 [17]	Cross-sectional	Makkah	N=629 Age range: 18 to >60 Males: 388 (71.7%)	General population	SSCQ	Psychological stress has been linked to a number of common skin diseases, such as acne, eczema, and hair loss (P<0.05).
Alajlan et al., 2023 [18]	Cross-sectional	Riyadh	N=420 Age range: 18 to >50 Males: 41 (9.8%)	COVID-19 cases	A self-administered predesigned questionnaire	The physiological stress of acute fever disease was closely linked to the suggested pathophysiology of telogen effluvium in these patients.
Alanazi et al., 2023 [19]	Cross-sectional	Al Majma'ah	N=1080 Age range: 18-65 Males: 285 (26.4%)	General population	A self-administered predesigned questionnaire	The study emphasizes how common stress-related hair loss is in the general population. Numerous sociodemographic and behavioral factors, as well as stress, have been identified as important causes of hair loss.

*PSQ= Perceived Stress Questionnaire, SSCQ= self-reported skin complaints questionnaire.

Table 2. Risk of bias evaluation with ROBINS-I.

Study ID	Bias brought on by confusion	bias in the way participants were chosen for	Prejudice in how interventions are categorized	Bias brought on by departures from the planned interval	Bias brought on by incomplete data	Inaccuracy in outcome measurement	Prejudice in the choice of the reported outcome	All-around prejudice
AL-Ghamdi et al., 2020 [15]	Low	Low	Low	Low	Low	Mod	Low	Low
Saif et al., 2018 [16]	Low	Low	Low	Low	Low	Mod	Low	Low
Altalhi et al., 2023 [17]	Mod	Mod	Low	Low	Low	Mod	Low	Moderate
Alajlan et al., 2023 [18]	Low	Mod	Mod	Mod	Low	Mod	Low	Moderate
Alanazi et al., 2023 [19]	Mod	Mod	Low	Low	Low	Low	Mod	Moderate

of their hair cosmetics. According to the data collected, medical students experience more hair loss related to stress and other factors than the general population [20].

Medical students are more likely than the general population to have hair loss, thus it's critical to understand the underlying reasons of this condition. Hair loss can be a major worry for medical students in especially for a number of reasons, including the demanding academic program that requires extensive study sessions and clinical rotations, which can result in high levels of stress, sleep deprivation, and poor diet [21].

We also found that according to research conducted on COVID-19 patients, the physiological strain of acute sickness may be a factor in diseases such as telogen effluvium, A kind of hair loss linked to the disruption of the hair development cycle caused by stress [18]. Czech et al. further showed that,

even though this systematic review identified confusion and a lack of strong data addressing the relationship between COVID-19 and hair loss, COVID-19 related hair loss may predominantly affect TE and be reversible. To completely comprehend the cause and risk factors of hair loss in COVID-19, more research is required. This includes examining the possible roles of pro-inflammatory cytokines, progesterone, and estrogen [22].

It is yet unknown what pathophysiology underlies hair loss caused by COVID-19. One theory links hair loss to interleukin-6 (IL-6), a pro-inflammatory cytokine linked to severe and serious COVID-19. It is believed that IL-6 causes and exacerbates hair loss by inhibiting the growth of hair follicles and the elongation of hair shafts [23, 24]. Considering that only few participants in the included studies required hospitalization, hair loss appears to have mostly affected mild COVID-19 individuals. Female sex hormones including progesterone

and estrogens may also play a crucial role in the underlying pathophysiology of hair loss, given the significant female predominance in these patients. Estrogens and progesterone block pro-inflammatory cytokines via their immunomodulatory and anti-inflammatory qualities [25, 26]. Repurposing progesterone and estrogens for COVID-19 treatment has been the subject of an ongoing investigation [27]. Progesterone and estrogen also have protective actions at the hair follicle. Estradiol is recognized for its ability to modify the growth and cycling of hair follicles via its receptors, whereas progesterone is believed to reduce the conversion of testosterone to dihydrotestosterone, a potent form of testosterone that encourages hair loss [28].

Considering the robust correlation between stress and hair loss in a number of demographics, healthcare providers should consider integrating stress management and mental health support into dermatological care. For patients presenting with hair loss, particularly those in high-stress occupations or environments, clinicians might benefit from assessing stress levels as part of the diagnostic process. This approach could lead to more personalized and effective treatment plans that address not only the physical symptoms of hair loss but also the psychological factors contributing to it. Furthermore, Stress-induced hair loss may be less common if patients are informed about how stress affects hair health and lifestyle changes are encouraged.

Strengths and limitations

This review's innovative focus on stress-related hair loss in the Saudi populace is one of its main advantages, addressing a previously unexplored aspect of dermatology in this specific context. By synthesizing data from multiple studies, the review offers a comprehensive perspective on the prevalence and contributing factors of hair loss linked to stress, presenting insights relevant to both medical professionals and policymakers. The review's inclusion of diverse population groups—ranging from medical students to the general public—adds to its robustness, allowing for a more nuanced understanding of how stress impacts hair loss across different demographics within Saudi Arabia.

Despite its contributions, this review has certain limitations that should be acknowledged. First, the majority of studies included are cross-sectional, which limits the ability to draw conclusions about causation between stress and hair loss. Additionally, while some studies employed standardized diagnostic tools, others relied on self-reported questionnaires, which could introduce bias and variability in results. The geographic focus within Saudi Arabia was also uneven, with certain cities or regions studied more than others, potentially impacting the generalizability of the findings across the entire population. Furthermore, the reliance on English-language studies may have excluded relevant research published in Arabic, thus missing valuable insights from locally conducted studies.

Conclusion

The review synthesizes evidence that stress-related hair loss affects not only high-stress groups like medical students but also the general population, with distinct psychological and physiological manifestations. This connection suggests a need for healthcare providers to incorporate stress assessment and mental health support when treating patients with hair loss. The findings point to a necessity for culturally tailored interventions and awareness programs that address the specific stressors relevant to the Saudi population. By offering this fundamental understanding, the review promotes additional investigation into the fundamental processes of stress-induced hair loss and aids in the creation of public health initiatives meant to lower its incidence.

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