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Frequency of Hyperprolactinemia in Patients with Alopecia Areata

Beenish Tahir[1], Hafiz Bashir Ahmed[2], Erum Ellahi[3], Saima Liaqat Ali[4], Hira Shafquat Memon[5], Muhammad Ali[6]

[1]WMO at Liaquat University Hospital Hyderabad
[2]Associate Professor, Dermatology Department of LUMHS, [3]WMO, LUMHS, Sindh Health Department
[4]Senior Registrar Liaquat institute of Medical and Health Sciences LIMHS Thatta
[5]Senior Registrar, Department of dermatology, Liaquat University of medical and Health Sciences
[6]Postgraduate trainee FCPS Dermatology

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Address of Correspondent
Dr Beenish Tahir
WMO at Liaquat university Hospital Hyderabad
benish.tahir91@gmail.com

ABSTRACT

Objective: To determine the frequency of hyperprolactinemia in patients with alopecia areata (AA).

Methodology: This Cross sectional descriptive study was carried out at Department of Dermatology, Liaquat University Hospital, from June 2020 to March 2020. There were 201 patients of alopecia areata for > 1 year duration of either gender were included. Following a clinical evaluation, individuals diagnosed with alopecia areata underwent further assessment of serum prolactin levels. A 2 cc venous blood sample was collected from each participant under sterile conditions and sent to the hospital laboratory for analysis. The serum prolactin level ≥ 20 µg/L was considered as hyperprolactinemia. The data was collected on pre-designed proforma

Results: The average age of the patients was 42.37±10.42 years. There were 111(55.22%) males and 90(44.78%) females. Frequency of hyperprolactinemia in patients with alopecia areata was 70.15%. The frequency of hyperprolactinemia was statistically insignificant based on age, gender, diabetes, hypertension and obesity (p=>0.05).

Conclusion: Increased prolactin levels were observed to be highly frequent among patients with alopecia areata, suggesting that it may contribute to autoimmune mechanisms and serve as a biomarker for disease severity, while due to inconsistencies in existing research, further studies are needed to clarify its clinical significance and potential role in treatment.

Keywords: Alopecia areata, Hyperprolactinemia, Pathogen, Marker

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Introduction

Alopecia areata is a multifaceted autoimmune disorder that presents as a chronic inflammatory condition, leading to non-scarring patches of hair loss on the scalp, face, and other areas of the body,[1,2] that resolve within 6-12 months, as a chronic condition with recurrent episodes of hair loss over several years.[2] The incidence of alopecia areata (AA) is estimated to be between 0.1% and 0.2%, with a lifetime risk of developing the condition reaching approximately 1.7%.[2,3] The precise cause of alopecia areata remains unclear; however, existing evidence supports an autoimmune basis with a significant genetic component, further influenced by unidentified environmental factors.[4]

Various genetic factors play a role in the onset of alopecia areata, with familial occurrence observed in about 10% to 25% of individuals.[4] Extensive research has been conducted to understand its molecular foundation.

The condition is widely recognized as an autoimmune disorder driven by T-cell activity.[4] Alopecia areata impacts around 1–2% of the general population at some stage in their lifetime, as reported in multiple large-scale epidemiological studies.[5,6] While corticosteroids have traditionally been the primary treatment, various

evidence-based therapeutic options have emerged for managing the condition.[7]

Prolactin, also referred to as luteotropic hormone or luteotropin, is a protein primarily recognized for its role in stimulating milk production in mammals, particularly females.[8] Chemically, prolactin exists in multiple post-translational forms, including various size variants and modifications like as glycosylation and phosphorylation.[8] Prolactin is not exclusively produced in the pituitary gland, as initially believed, but is also synthesized in the central nervous system, immune system, uterus, and associated tissues of conception, as well as in the mammary gland itself.[9] Furthermore, it has been demonstrated to regulate a range of activities and even contribute to homeostasis, indicating that its biological effects extend beyond reproduction.[10] In addition to the nursing stimulation, other stimuli that release prolactin comprise light, sound, smell, and anxiety. Beyond its well-established roles in lactation and mammotropic functions, prolactin is also involved in immune system regulation and has been suggested to contribute to the pathophysiology of autoimmune conditions such as alopecia areata.[11,12]

While previous studies have reported varying prevalence rates of hyperprolactinemia in AA, ranging from 75% to 36%,[13] other research has found no significant difference in serum prolactin levels between AA patients and healthy controls.[14] On the other recently observed a significant raised serum prolactin levels in patients with alopecia areata (16.8) compared to healthy control subjects (9.7).[15] Given these conflicting findings and the lack of substantial local evidence, this study aims to assess the prevalence of hyperprolactinemia in individuals with AA. By evaluating serum prolactin levels, this research will contribute to generating relevant local data, which can aid in the prospective diagnosis and management of affected individuals. Furthermore, the study findings may helpful to healthcare institutions to provide insight into the prevalence of hyperprolactinemia in AA within our population.

Methodology

This was a cross-sectional descriptive study conducted at the Department of Dermatology, Liaquat University Hospital, Hyderabad. The study was conducted over duration of six months, from June 2019 to March 2020. A non-probability consecutive sampling technique was used for participant selection. Patients diagnosed with alopecia areata for ≥1 year, aged between 20 to 60 years, of either gender, who visited the dermatology outpatient department (OPD) for skin and hair consultation were included in the study. The exclusion criteria comprised patients with autoimmune disorders such as systemic lupus erythematosus (SLE), rheumatoid arthritis (RA), and psoriasis, as well as those with hyperthyroidism or hypothyroidism, epileptic seizures, hepatic insufficiency, chronic renal failure, or prolactinoma. Additionally, patients already on medications that may alter serum prolactin levels, including bromocriptine, phenothiazines, chlorpromazine, reserpine, metoclopramide, fluoxetine, haloperidol, clomiphene citrate, or gonadotropins, were excluded. Pregnant and lactating women were also excluded from the study. The disorders were evaluated based on previous hospital records and diagnostic cards provided by relevant consultant healthcare providers.

Alopecia areata was examined and diagnosed by a consultant dermatologist in the ward with ≥5 years of clinical experience. Alopecia areata was defined as hair loss presenting in one or more round spots, diffuse patches, wave-like patterns around the circumference of the head, or total hair loss on the scalp or the entire body. Informed consent was obtained from all patients before participation in the study. All subjects diagnosed with alopecia areata were further evaluated for serum prolactin levels. A 2cc venous blood sample was drawn using a sterilized disposable 5cc syringe by the principal investigator and sent to the laboratory for analysis.

Hyperprolactinemia was labeled based on a cutoff prolactin level of ≥20 µg/L, and effect modifiers were explored. Data was collected using a pre-designed proforma, and all financial expenses of the study were covered by the researcher herself. Data analysis was performed using SPSS version 26

Results

This study included 201 patients, with a slightly higher proportion of males (55.22%) than females (44.78%). The majority of the patients (68.66%) resided in urban areas, while 31.34% were from rural regions. More than half of the participants (56.22%) had hypertension, and 29.35% reported being smokers. Obesity was observed in 53.23% of the patients, while iron deficiency anemia was present in 51.74% of the individuals. Table I

A significant proportion of the patients (70.15%) were diagnosed with hyperprolactinemia, indicating a high prevalence of this condition in the study population. Figure 1

Table I: Baseline and clinical characteristics of the patients. (n=201)

Variable	N	%
Gender		
Male	111	55.22
Female	90	44.78
Total	201	100.0
Residential status		
Urban	138	68.66
Rural	63	31.34
Total	201	100.0
Hypertension		
Yes	113	56.22
No	88	43.78
Total	201	100.0
Smoking status		
Yes	59	29.35
No	142	70.65
Total	201	100.0
Obese status		
Yes	107	53.23
No	94	46.77
Total	201	100.0
Iron deficiency anemia status		
Yes	104	51.74
No	97	48.26
Total	201	100.0
Hyperprolactinemia		
Yes	141	70.15
No	60	29.85
Total	201	100.0

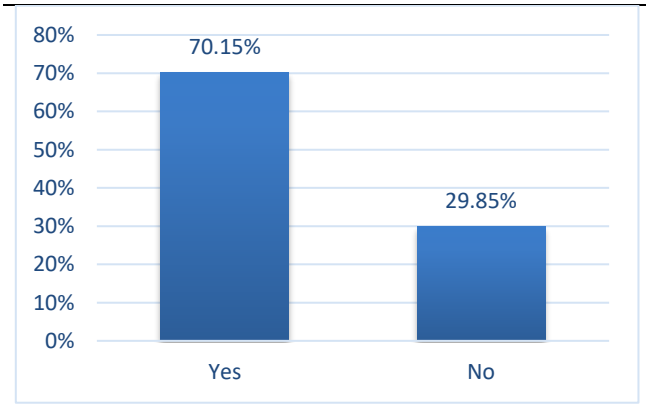

Figure 1. Frequency of hyperprolactinemia. (n=201)

Among 201 patients, hyperprolactinemia was more prevalent in younger (≤30 years: 80.8%) and rural patients (81.0%, p=0.024). Gender, obesity, smoking, diabetes and hypertension showed no significant associations (> 0.05). Other variables, including disease duration and hyperlipidemia, did not significantly impact hyperprolactinemia prevalence. Table II

Table II: Prevalence of hyperprolactinemia according to effect modifiers. (n=201)

Variables	Hyperprolactinemia		Total	P-Value
	Yes	No		
Age Groups				
≤30	21(80.8%)	5(19.2%)	26(100%)	
31-40	37(63.8%)	21(36.2%)	58(100%)	
41-50	52(71.2%)	21(28.8%)	73(100%)	0.463
51-60	31(70.5%)	13(29.5%)	44(100%)	
Gender				
Male	78(70.3%)	33(29.7%)	111(100%)	0.967
Female	63(70.0%)	27(30.0%)	90(100%)	
Resident				
Rural	51(81.0%)	12(19.0%)	63(100%)	
Urban	90(65.2%)	48(34.8%)	138(100%)	0.024
Duration				
1-2	102(69.4%)	45 (30.6%)	147(100%)	0.697
>2	39(72.2%)	15(27.8%)	54(100%)	
Hypertension				
Yes	73(64.6%)	40(35.4%)	113(100%)	0.55
No	68(77.3%)	20(22.7%)	88(100%)	
Smoking				
Yes	46(78.0%)	13(22.0%)	59(100%)	0.119
No	95(66.9%)	47(33.1%)	142(100%)	
Obese				
Yes	75(70.1%)	32 (29.9%)	107(100%)	0.985
No	66(70.2%)	28(29.8%)	94(100%)	
Uncontrolled DM				
Yes	64(62.7%)	38(37.3%)	102(100%)	0.020
No	77(77.8%)	22(22.2%)	99(100%)	

Discussion

Alopecia areata is a condition characterized by non-scarring hair loss, which may present as a single oval patch or multiple affected areas. While its exact cause remains unclear, AA is believed to have an autoimmune origin with a strong genetic predisposition. In recent years, research on the relationship between prolactin and autoimmunity has advanced significantly. Prolactin has been investigated in various autoimmune diseases, including systemic lupus erythematosus, systemic sclerosis, psoriasis vulgaris, Sjögren's syndrome, and AA.[16] This study was conducted on 201 patients to assess the prevalence of hyperprolactinemia in individuals with alopecia areata. The overall mean age of the participants was 42.37 ± 10.42 years, with a male-to-female distribution of 111 (55.22%) males and 90 (44.78%) females. These findings are consistent with the study by El Tahlawi SM et al,[16] which reported a mean age of 29.4 ± 8.82 years and a gender distribution of 53.3% males and 46.7% females. However, in contrast, Uzuncakmak TK et al[17] reported a slightly different gender distribution in their AA group, with 53.4% females and 46.6% males, and an overall mean age of 29.86 ± 14.48 years. The observed variations in gender distribution and mean age across studies may be attributed to differences in sample sizes, study populations, and geographical or genetic factors.

In this study, a significant proportion of patients (70.15%) were diagnosed with hyperprolactinemia,

indicating a high prevalence of this condition within the study population. These findings are consistent with the study by AbdEl-Fattah Habib HN et al[15], which reported a significant positive correlation between lesion size in alopecia areata and serum prolactin levels ($P < 0.005$), suggesting that prolactin may play a role in disease severity. Conversely, El Tahlawi SM et al[16] found no significant difference in serum prolactin levels when comparing AA patients to controls. However, they observed that the mean tissue level of the prolactin receptor was notably higher in patients, indicating a potential local role of prolactin in the pathogenesis of the disease.[16] Supporting this, Elsherif NA et al[18] reported a significant correlation between serum prolactin levels and disease severity in patients with alopecia areata and psoriasis ($P > 0.05$). This suggests that prolactin may contribute to the pathogenesis of both conditions and could serve as a biological marker of disease activity. On the other hand, Gönül M et al[19] found that although six patients and three controls were diagnosed with hyperprolactinemia, the difference between the two groups was not statistically significant ($P > 0.05$).

Additionally, no significant correlation was observed between prolactin levels and age, sex, family history, or disease activity in alopecia areata, suggesting that prolactin may not be a primary influencing factor in all cases. Similarly, Lutz G et al.[20] reported that moderately elevated prolactin levels in cases of diffuse or androgenetic hair loss are unlikely to be a causative factor, as there was no evidence indicating an impact on the pattern, severity, or duration of hair loss. In contrast, Pathak P et al.[21] reported a significant increase in prolactin levels among patients with androgenetic alopecia. Their findings showed that the mean serum prolactin level in AGA patients was 15.50 ± 5.11, which was statistically significant when compared to controls.

This suggests that prolactin may have a role in the pathophysiology of AGA, although further studies are needed to establish its exact contribution. The differences in findings across different studies highlight the complexity of the relationship between prolactin and AA. While some evidence suggests a link between prolactin and disease severity in alopecia areata and psoriasis, other studies indicate that elevated prolactin levels may not be directly causative. This study also possesses several limitations like limited sample size, not compared control group and pathophysiological insights. The discrepancies of above studies and significant limitations of this study underscore the need for further large-scale investigations to better understand the role of prolactin in hair loss conditions and its potential as a diagnostic or prognostic marker.

Conclusion

The study concluded a high prevalence of hyperprolactinemia among patients with alopecia areata, suggesting a potential association between elevated prolactin levels and AA. The observed increase in prolactin levels supports the hypothesis that prolactin may contribute to the autoimmune mechanisms underlying alopecia areata and could serve as a potential biomarker for assessing the disease and its severity. However, due to significant limitations and discrepancies in findings across existing literature, these results cannot be considered conclusive. Therefore, further well-designed studies are recommended to explore the clinical implications of prolactin in alopecia areata, as well as its potential role in disease management and therapeutic interventions.

References

1. Fatani MI, Alkhalifah A, Alruwaili AF, Alharbi AH, Alharithy RA, Khardaly AM, et al. Diagnosis and management of alopecia areata: a Saudi expert consensus statement. Dermatol Ther. 2023 Oct;13(10):2129-51. https://doi.org/10.1007/s13555-023-00991-3
2. Malhotra K, Madke B. An updated review on current treatment of alopecia areata and newer therapeutic options. Int J Trichology. 2023 Jan 1;15(1):3-12. https://doi.org/10.4103/ijt.ijt_28_21
3. Juárez-Rendón KJ, Rivera Sánchez G, Reyes-López MÁ, García-Ortiz JE, Bocanegra-García V, Guardiola-Avila I. Alopecia areata. Current situation and perspectives. Arch Argent Pediatr. 2017;115:e404-11. https://doi.org/10.5546/aap.2017.eng.e404
4. Brzezińska-Wcisło L, Bergler-Czop B, Wcisło-Dziadecka D, Lis-Święt A. New aspects of the treatment of alopecia areata. Postepy Dermatol Alergol. 2014;31(4):262-5. https://doi.org/10.5114/pdia.2014.40923
5. Amin SS, Sachdeva S. Alopecia areata: an update. J Pak Assoc Dermatol. 2013;23(2):209-20. https://doi.org/10.1016/j.jssdds.2013.05.004
6. You HR, Kim S. Factors associated with severity of alopecia areata. Ann Dermatol. 2017;29(5):565-70. https://doi.org/10.5021/ad.2017.29.5.565
7. Fricke ACV, Miteva M. Epidemiology and burden of alopecia areata: a systematic review. Clin Cosmet Investig Dermatol. 2015;8:397-403. https://doi.org/10.2147/CCID.S53985
8. Zhang Y, Cai Y, Shi M, Jiang S, Cui S, Wu Y, et al. The prevalence of alopecia areata: a meta-analysis. PLoS One. 2016;11(9):e0163806. https://doi.org/10.1371/journal.pone.0163806

9. Ezzedine K, Eleftheriadou V, Whitton M, van Geel N. Alopecia areata. Lancet. 2015 Jul 4;386(9988):74-84. https://doi.org/10.1016/S0140-6736(14)60763-7
10. Faria AR, Tarle RG, Dellatorre G, Mira MT, de Castro CCS. Alopecia areata - Part 2: classification, histopathology, and treatment. An Bras Dermatol. 2014;89(5):784-90. https://doi.org/10.1590/abd1806-4841.20142717
11. Dillon AB, Sideris A, Hadi A, Elbuluk N. Advances in alopecia areata: an update on medical and surgical treatments. J Clin Aesthet Dermatol. 2017;10(1):15-28.
12. Yaghoobi R, Omidian M, Bagherani N. Alopecia areata: a review of the published work. J Dermatol. 2011;38(5):419-31. https://doi.org/10.1111/j.1346-8138.2010.01139.x
13. Keen MA, Hassan I. Serum prolactin levels in psoriasis and its association with disease activity: a case-control study. Indian J Dermatol. 2014;59(6):562-6. https://doi.org/10.4103/0019-5154.143512
14. Arı B, Çenesizoğlu E, Denli Y. Serum prolactin levels in patients with alopecia areata. J Turk Acad Dermatol. 2012 Dec 1;6(4).
15. AbdEl-Fattah Habib HN, Ghanayem NM, El-Farargy SM. Clinical significance of serum prolactin levels in patients with alopecia areata. Menoufia Med J. 2020;33(3):1011-5.
16. El Tahlawi SM, El Eishi NH, Kahhal RK, Hegazy RA, El Hanafy GM, Hay RM, et al. Do prolactin and its receptor play a role in alopecia areata? Indian J Dermatol. 2018 May 1;63(3):241-5. https://doi.org/10.4103/ijd.IJD_590_17
17. Uzuncakmak TK, Engin B, Serdaroglu S, Tuzun Y. Demographic and clinical features of 1,641 patients with alopecia areata, alopecia totalis, and alopecia universalis: a single-center retrospective study. Skin Appendage Disord. 2021 Oct 28;7(1):8-12. https://doi.org/10.1159/000510880
18. Elsherif NA, El-Sherif AI, El-Dibany SA. Serum prolactin levels in dermatological diseases: a case-control study. J Dermatol Dermatol Surg. 2015 Jul 1;19(2):104-7. https://doi.org/10.1016/j.jdds.2015.03.002
19. Gönül M, Gül U, Çakmak SK, Kilinç C, Kilinç S. Prolactin levels in the patients with alopecia areata. J Eur Acad Dermatol Venereol. 2009 Mar 16;23(11):1343-4. https://doi.org/10.1111/j.1468-3083.2009.03222.x
20. Lutz G. Hair loss and hyperprolactinemia in women. Dermatoendocrinol. 2012 Jan 1;4(1):65-71. https://doi.org/10.4161/derm.19472
21. Pathak P, Adil M, Sarshar F, Singh J. Androgenetic alopecia: evaluation of hormonal profile and its systemic implications. Int J Res Dermatol. 2024;10:11-8. https://doi.org/10.18203/issn.2455-4529.IntJResDermatol20233873