

CASE REPORT

Ant-induced alopecia: A new differential diagnosis for nonscarring alopecia

Zakiye Ganjei¹  | Vahid Reisi-Vanani² | Seyede Zahra Razavi² | Maryam Alizadeh³ 

¹Department of Dermatology, Faculty of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran

²Student Research Committee, Shahrekord University of Medical Sciences, Shahrekord, Iran

³Resident of Dermatology, Skin Diseases and Leishmaniasis Research Center, Department of Dermatology, Isfahan University of Medical Sciences, Isfahan, Iran

Correspondence

Maryam Alizadeh, Resident of Dermatology, Skin Diseases and Leishmaniasis Research Center, Department of Dermatology, Isfahan University of Medical Sciences, Isfahan, Iran.
Email: maryam.alizadeh87@gmail.com

Abstract

Ant-induced alopecia is a rare condition caused by *Pheidole pallidula* species. This particular cause of nonscarring alopecia should be considered a new differential diagnosis.

KEYWORDS

alopecia, ants, arthropods, hair, *Pheidole pallidula*

1 | INTRODUCTION

Ant-induced alopecia is a rare condition; however, due to the increasing number of affected cases, this cause of nonscarring alopecia should be considered a new differential diagnosis. This article presents a case of ant-induced alopecia.

Hair is a part of the body with a bold cosmetic aspect that affects people's life.¹ Some studies have shown the association of alopecia with psychological disorders such as depression and anxiety; therefore, physicians should consider this condition more than a cosmetic disorder.^{2,3} Different types of alopecia are categorized into two groups, including nonscarring and scarring alopecia. Various conditions can cause nonscarring alopecia, ranging from infections such as tinea capitis to autoimmune conditions like alopecia areata.⁴ An ant species called *Pheidole pallidula* (*P. pallidula*) has also been shown to cause hair loss in some parts of the head in

some cases.⁵ This study reports on an Iranian woman with a case of ant-induced alopecia.

1.1 | Case presentation

A 45-year-old woman was admitted to Shahrekord University of Medical Sciences' dermatology clinic with a sudden hair loss that had occurred overnight. She had no history of any specific diseases or medication consumption. Moreover, she had taken a trip from Isfahan to Shahrekord the day before and this incident had taken place in her mother-in-law's house.

In the examination, there were multiple nonscarring, nearly round patches of alopecia with a diameter of 1–2 cm in the vertex, which was nonexistent in the other regions, and no signs of scaling, erythema, and inflammation were observed in her skin.

The caliber, fragility, and shape of the hair were normal, and there was no exclamation mark hair. In addition, the alopecic patches were rough to touch and the hair looked cut to the same length about a few millimeters above the hair shaft (Figure 1) and parts of a dead ant were found in the patient's hair. The pull test was also negative for this case. There were no erythema, scaling, and crusting in the hair loss areas. The patient had no history of any psychiatric disturbances, and there was no broken hair in different sizes on her head. Based on her history and physical examinations, the patient was diagnosed with ant-induced alopecia. The patient was sent home with reassurance and no treatments. She was advised to bring with her a sample of the ants, if possible, to be sent to the entomology laboratory.

1.2 | Outcome and follow-up

Three weeks after her discharge from the clinic, she came for her follow-up with her mother-in-law, and her alopecic regions seemed to have been cured and she had brought some of the responsible ants with her (Figure 2). The ants were sent to the entomology laboratory and were then identified as the



FIGURE 1 Short hairs that has been cut a few millimeters above the surface of the skin



FIGURE 2 Ants brought by the patient

P. pallidula sp. Her mother-in-law had not experienced the same incident ever in her life.

2 | DISCUSSION

There are many reasons for hair loss in women, thus necessitating thorough history-taking and physical examinations.⁴ In general, the causes of hair loss can be categorized into two groups, such as scarring and non-scarring alopecia.⁶ Physical examination, history-taking, and some other para-clinical tests can help physicians differentiate between the causes of this health condition, including infectious (including tinea capitis) and psychiatric (including trichotillomania) causes, autoimmune reasons (such as alopecia areata), and other metabolic diseases or malnutrition. Moreover, healthcare providers should know the pathophysiology of this condition in different age-groups, since having a thorough understanding of the various causes of hair loss is crucial for its management.^{4,7} Besides these frequent causes, there are some other rare causes that could induce alopecia, such as arthropod bite reactions.⁸

Ant-induced hair loss was first described by Radmanesh et al.⁹ in 1999, who reported three cases of ant-induced

TABLE 1 Ant-induced alopecia cases reported around the world

Report	Region	Age/sex	Area	Distribution	Other signs and symptoms	Skin and hair characteristic	Ant spp.
Present report	Shahrekord/Iran	45/F	scalp	1–2-cm patchy alopecic reigns in vertex	mild pruritus	greasy scalps	<i>Pheidole</i> genus
Namazi et al. ¹⁷	Shiraz/Iran	35/M	scalp	3 × 3.5-cm area on the right vertex	tiny erythematous macules	greasy scalps	<i>Pheidole</i> genus
Razmyar et al. ¹⁸	Mashhad/Iran	34/M	scalp	3 × 4-cm alopecic patch on the vertex	Not anything	N/M	<i>Pheidole</i> genus
Mortazavi et al. ¹⁹	Mazandaran/Iran	29/M	scalp	nearly round area of alopecia at the vertex	Not anything	mild androgenetic alopecia (grade III)	<i>Pheidole</i> genus
Shamsadini et al. ²⁰	Mazandaran/Iran	25/F	scalp	large, linear area of hair loss at the vertex	Not anything	mild seborrheic dermatitis	<i>Pheidole</i> genus
	Kerman/Iran	18/M	scalp	3.5 × 3.5-cm on the right side of the vertex	mild erythema and mild pruritus	n/m	<i>Pheidole</i> genus
	Kerman/Iran	21/F	n/m	n/m	pruritus that needs diphenhydramine lotion	n/m	<i>Pheidole</i> genus
Radmanesh et al. ²¹	Ahwaz and Behbahan/Iran	13 M and 3 F	scalp	n/m	Mild erythema and signs of screeching in some	n/m	<i>Pheidole</i> genus
Veraldi et al. ²²	Milan/Italy ^a	14/M	scalp	3.5-cm on the vertex	mild pruritus	n/m	<i>Pheidole</i> genus
Kapdagli et al. ²³	Adana/Turkey	5/F	scalp	3 × 4-cm on the vertex	Not anything	Normal scalp skin	<i>Pheidole</i> genus
Feily et al. ²⁴	Jahrom/Iran	18/M	scalp	alopecia with a vertical linear distribution on occiput	Not anything	Normal scalp skin	Probably <i>Pheidole</i> genus
Aghaei et al. ²⁵	Shiraz/Iran	32/F	scalp	the circular patch of alopecia on the vertex	Several red macules	Normal scalp skin	Probably <i>Pheidole</i> genus

Abbreviations: F, female; M, male; n/m, not mentioned; spp, Species.

^aThe reported case had a trip to Iran.

alopecia in Ahwaz, Iran. Afterward, some additional cases were also reported, as summarized in Table 1. All the cases of ant-induced alopecia were due to the genus *P. pallidula* (Table 1).

P. pallidula (barber ants) has been reported to cause such types of alopecia, mainly in Iran, but there have been two reported cases in Turkey and Italy as well, one of whom had taken a trip to Iran. It thus seems that this species is becoming more and more dominant in some regions, such as across the Mediterranean countries and in tropical and subtropical regions.^{10,11}

Several hypotheses can explain the development of this condition, including the following: First, similarities between the pheromones in *P. pallidula* and some chemicals in the sebaceous glands and skin of some humans¹⁰; second, the infection of *P. pallidula* with some parasites causes neural shock and seizure-like behaviors in ants, which cause the ants to attack the hair. In a similar study, Lefebvre showed that parasitic infection causes behavioral changes in *P. dentate*¹² and results in specific gene mutations in some ants of the *P. pallidula* sp. that may cause the ants to attack the hair. In addition, studies on the behavior of *P. pallidula* ants have shown that their behavioral changes following environmental changes are based on gene expression switch¹³⁻¹⁵; however, further studies are needed to identify the exact cause or causes of this behavior in ants.

In this type of hair loss, the patient complains of sudden hair loss with no history of other diseases and is concerned about having their hair cut short on a certain area of their scalp, usually forming an irregular patch with no scaling or crusting. The diagnosis of this type of alopecia is mainly performed by ruling out the other conditions.⁵

Our patient had no erythema, scaling, and crusting related to tinea capitis on her scalp lesions. There were also no signs of alopecia areata and trichotillomania in her¹⁶; therefore, they were ruled out from the diagnosis.

The patient's mother-in-law had not experienced the same condition even though she had had greater exposure to these ants, making the etiology of this phenomenon more interesting. One possible reason may be the difference in skin greasiness, as our case had greasy scalps while her mother-in-law did not. Studies have shown that this species is lipophilic and more inclined to attack greasy scalps.⁵

3 | CONCLUSION

Ant-induced alopecia is a rare condition that needs to be differentiated from other causes of hair loss; however, further studies are needed to elucidate the exact mechanism by which ants attack the hair.

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Published with written consent of the patient.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

AUTHOR CONTRIBUTIONS

Dr. Z.G was responsible for management of the patient and patient follow-up and provided photographs. Dr. V.R.V and Dr. S.Z.R were drafting the manuscript and reviewed the literature. Dr. M.A was responsible for revising the manuscript and also follow-up of the patient.

ETHICAL APPROVAL

This study was reviewed by the ethics committee of Shahrekord University of Medical Sciences and was approved with the code of IR.SKUMS.1400.075.

DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are available within the article.

ORCID

Zakiye Ganjei  <https://orcid.org/0000-0002-9673-5911>

Maryam Alizadeh  <https://orcid.org/0000-0001-6602-6252>

REFERENCES

- Williamson D, Gonzalez M, Finlay AY. The effect of hair loss on quality of life. *J Eur Acad Dermatol Venereol*. 2001;15(2):137-139.
- Marahatta S, Agrawal S, Adhikari BR. Psychological impact of alopecia areata. *Dermatol Res Pract*. 2020;2020:1-5.
- Okhovat J-P, Marks DH, Manatis-Lornell A, Hagigeorges D, Locascio JJ, Senna MM. Association between alopecia areata, anxiety, and depression: a systematic review and meta-analysis. *J Am Acad Dermatol*. 2019;80(6):30890-30894. <https://doi.org/10.1016/j.jaad.2019.05.086>
- Shapiro J. Hair loss in women. *N Engl J Med*. 2007;357(16):1620-1630. <https://doi.org/10.1056/NEJMcp072110>
- Mortazavi M, Mansouri P. Ant-induced alopecia: report of 2 cases and review of the literature. *Dermatol Online J*. 2004;10(1):19.
- Lin J, Saknite I, Valdebran M, et al. Feature characterization of scarring and non-scarring types of alopecia by multiphoton microscopy. *Lasers Surg Med*. 2019;51(1):95-103.
- Imhof RL, Davis DMR, Tollefson MM. Hair loss. *Pediatr Review*. 2020;41(11):570-584.
- Lynch MC, Milchak MA, Parnes H, Ioffreda MD. Tick bite alopecia: a report and review. *Am J Dermatopathol*. 2016;38(11):e150-e153. <https://doi.org/10.1097/DAD.0000000000000598>
- Radmanesh M, Mousavipour M. Alopecia induced by ants. *Trans R Soc Trop Med Hyg*. 1999;93(4):427.
- Ali MF, Morgan ED, Detrain C, Attygalle AB. Identification of a component of the trail pheromone of the ant *Pheidole pallidula* (Hymenoptera: Formicidae). *Physiol Entomol*. 1988;13(3):257-265.

11. Detrain C. Field study on foraging by the polymorphic ant species, *Pheidole pallidula*. *Insectes Sociaux*. 1990;37(4):315-332.
12. Lefebvre ML. *Who is in control? Behavioral changes in the ant Pheidole dentata after parasitism by the fly Apocephalus feeneri*, Volume 1, 1st edn. Michigan, United States: The University of Utah; 2005. <https://www.proquest.com/openview/241d6282e40f25b1b6a56b0f596dbf0d/1?pq-origsite=gscholar&cbl=18750&diss=y>
13. Lucas C, Sokolowski MB. Molecular basis for changes in behavioral state in ant social behaviors. *PNAS*. 2009;106(15):6351-6356.
14. Wilson EO. The relation between caste ratios and division of labor in the ant genus *Pheidole* (Hymenoptera: Formicidae). *Behav Ecol Sociobiol*. 1984;16(1):89-98.
15. Detrain C, Deneubourg J-l. Scavenging by *Pheidole pallidula* a key for understanding decision-making systems in ants. *Anim Behav*. 1997;53(3):537-547.
16. Griffiths C, Barker J, Bleiker TO, Chalmers R, Creamer D. *Rook's Textbook of Dermatology*. John Wiley & Sons; 2016.
17. Namazi MR, Jorizzo JL. Ant-induced alopecia: a case report and literature review. *Arch Dermatol*. 2008;144(11):1526-1527.
18. Razmyar M, Pishgouy M, Mashayekhi V, Abbasi A. Ant-induced alopecia. A case report. *Authorea*. 2020. <https://doi.org/10.22541/au.158981370.00385458>
19. Mortazavi M, Mansouri P. Ant-induced alopecia: report of 2 cases and review of the literature. *Dermatol Online J*. 2004;10(1):19.
20. Shamsadini S. Localized scalp hair shedding by pheidole ant and overview of similar case reports. *Dermatol Online J*. 2003;9(3):12.
21. Radmanesh M, Mousavipour M. Alopecia induced by ants. *Trans R Soc Trop Med Hyg*. 1999;93(4):427.
22. Veraldi S, Lunardon L, Francia C, Persico MC, Barbareschi M. Alopecia caused by the "barber ant" *Pheidole pallidula*. *Int J Dermatol*. 2008;47(12):1329-1330.
23. Kapdağlı S, Seçkin D, Baba M, Özgür AF. Localized hair breakage caused by ants. *Pediatr Dermatol*. 2006;23(5):519-520.
24. Feily A, Lal K, Elston DM. What's eating you? Ant-induced alopecia (pheidole). *Cutis*. 2015;96(4):221-222.
25. Aghaei S, Sodaifi M. Circumscribed scalp hair loss following multiple hair-cutter ant invasion. *Dermatol Online J*. 2004;10(2):14.

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