

1 **Title: Prurigo pigmentosa induced by ketosis (“keto rash”): a demonstrative case and**  
2 **Internet search results**

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25 **Conflict of interest:** None

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27 **Running head:** prurigo pigmentosa induced by ketosis

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35 Prurigo pigmentosa (PP) is an inflammatory skin disorder characterized by the development  
36 of erythematous papules with a net-like distribution<sup>1</sup>. Although there is no clear cause for PP,  
37 several mechanical factors have been associated with the disorder, including ketosis which  
38 appears to induce the eruption of PP<sup>1,2</sup>. On the Internet, there is a skin condition popularly  
39 coined “keto rash” in blogs and forum discussions. Researching medical information is  
40 currently the third most common use of the Internet, and the first source for health  
41 information before consulting a physician<sup>3</sup>. Although websites may include useful  
42 information and cite current literature, in other instances health-related information may be  
43 misleading. Herein, we report a case of self-diagnosed PP in a young woman who followed a  
44 ketogenic diet for weight loss and we evaluate content available on the Internet for keto rash.

45 A woman in her 20s was referred to our dermatology clinic for a pruritic skin rash that had  
46 been evolving for one month. Skin examination revealed scaly erythematous papules  
47 coalescing into plaques arranged in a reticulate pattern on the chest, the retro-auricular scalp,  
48 the neck and the nasolabial folds, along with pigmented macules on the lower back (Fig. 1). A  
49 skin biopsy on a pigmented macule demonstrated nonspecific lichenification with acanthosis,  
50 hyperorthokeratosis, keratinocytes apoptosis and lymphocytic perivascular infiltrate (Fig. 2).

51 In the absence of a clear diagnosis, the patient was reassessed two weeks later. She then  
52 spontaneously reported that she had been following a ketogenic diet for 3 months to lose  
53 weight. Our patient herself suggested the diagnosis of keto rash. Reintroduction of  
54 carbohydrates into the diet associated with doxycycline regimen resulted in the total  
55 disappearance of the skin rash within two weeks with no relapse after a 10-month follow-up.

56 Our Google search using the term “keto rash” produced 1,580,000 results. Of the first 10  
57 search results, 9 were websites attributed to self-proclaimed experts and promotional  
58 information and 1 was an educational resource. Most of the websites advised PP patients to  
59 wait and see (8/10), reintroduce carbohydrates (10/10), avoid “allergens” such as dairy, eggs,  
60 fish, shellfish, tree nuts or peanuts (6/10), take vitamin supplements (6/10), avoid various skin  
61 irritants, including heavy sweating (5/10), not use antibiotics, or only as a last resort (3/10).

62 The pathogenesis of PP is not well understood, but a strong association with ketosis arising  
63 with various etiologies has been reported. A ketogenic diet consists in reducing the  
64 carbohydrate content in the diet while increasing fat and protein intake. There is resurgence in  
65 the interest in this diet regimen because there are a growing number of reports of its beneficial  
66 effect in terms of weight control, cardiovascular disease, etc.<sup>4</sup> With the increasing popularity  
67 of ketogenic diets, more frequent accounts of PP have emerged. In most cases, reintroduction  
68 of carbohydrates into the diet is sufficient to cure keto rash; if this treatment is insufficient,

69 oral cycline antibiotics are usually the first-line therapy for PP<sup>5</sup>. Most of the results from our  
70 Internet search on ketosis-induced PP were webpages whose accuracy may be uncertain. The  
71 information and their recommendations (cited above) regarding PP are not evidence-based.  
72 Due to easy, widespread access to health-related information on the Internet, patients may opt  
73 to self-diagnose and therefore delay seeking professional care.  
74 In conclusion, PP should be considered in patients on a ketogenic diet who have cutaneous  
75 eruptions, especially in light of the growing interest in adopting such dietary regimens. It is  
76 important that physicians be aware of the latest information available on the Internet to  
77 discredit any unfounded recommendations regarding ketosis-induced PP.

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103 **Figure legends:**

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105 **Figure 1** Clinical presentation of prurigo pigmentosa. (a) Scaly erythematous papules  
106 arranged in a reticulate pattern on the chest. (b) Scaly erythematous and brown papules on the  
107 neck. (c) Pigmented macules arranged in a reticulate pattern on the lower back.

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109 **Figure 2:** pathological presentation of prurigo pigmentosa with nonspecific lichenification  
110 with acanthosis, hyperorthokeratosis, rare keratinocytes apoptosis and lymphocytic  
111 perivascular infiltrate of superficial dermis (HES, Original magnification x250).

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116 integrity of the data and the accuracy of the data analysis.

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124 **References**

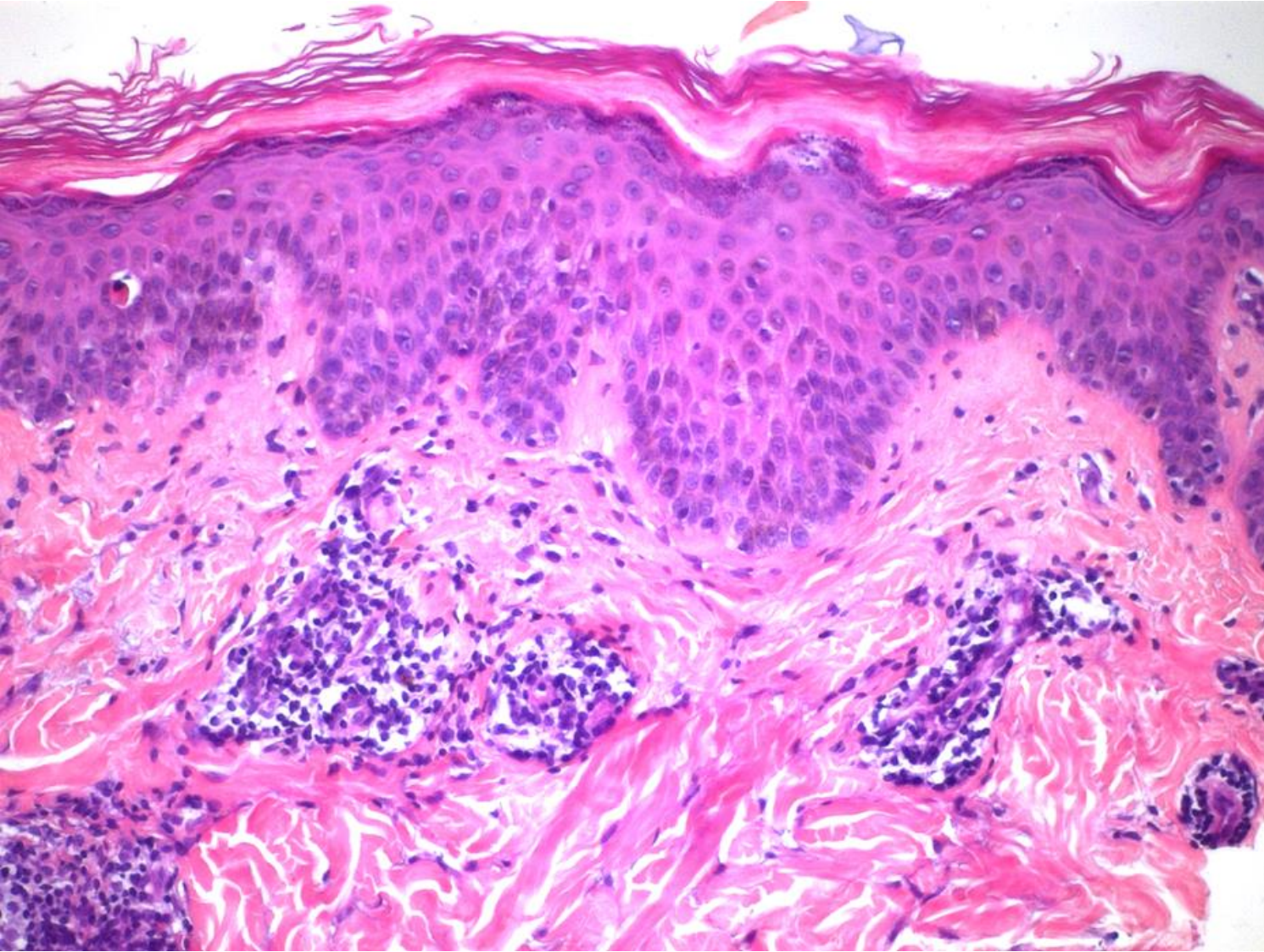
125

- 126 1. Oh YJ, Lee M-H. Prurigo pigmentosa: a clinicopathologic study of 16 cases. *J Eur*  
127 *Acad Dermatol Venereol.* 2012;26(9):1149-1153. doi:10.1111/j.1468-  
128 3083.2011.04263.x  
129
- 130 2. Hartman M, Fuller B, Heaphy MR. Prurigo pigmentosa induced by ketosis: resolution  
131 through dietary modification. *Cutis.* 2019;103(3):E10-E13.  
132
- 133 3. Prestin A, Vieux SN, Chou W-YS. Is Online Health Activity Alive and Well or  
134 Flatlining? Findings From 10 Years of the Health Information National Trends  
135 Survey. *J Health Commun.* 2015;20(7):790-798. doi:10.1080/10810730.2015.1018590  
136
- 137 4. Paoli A, Rubini A, Volek JS, Grimaldi KA. Beyond weight loss: a review of the  
138 therapeutic uses of very-low-carbohydrate (ketogenic) diets. *Eur J Clin Nutr.*  
139 2013;67(8):789-796. doi:10.1038/ejcn.2013.116  
140
- 141 5. Böer A, Misago N, Wolter M, Kiryu H, Wang XD, Ackerman AB. Prurigo

142  
143  
144

pigmentosa: a distinctive inflammatory disease of the skin. *Am J Dermatopathol.*  
2003;25(2):117-129. doi:10.1097/00000372-200304000-00005

**Figure 2 :**



**Figure 1 :**

