

# Hula-hooping as an unusual cause of Koebner phenomenon in a psoriatic patient

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## ABSTRACT

Koebner phenomenon was first described almost 150 years ago as an appearance of psoriatic lesions on an uninvolved skin as a result of trauma. Since then, a large number of triggering factors taking part in its development have been reported. This study presents a patient with an unusual, not presented before cause of the Koebner phenomenon in a waist area following physical activity in a form of hula-hooping.

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**Key words:** hula-hooping, Koebner phenomenon, psoriasis

## CASE REPORT

A 67-year-old woman was referred to a dermatology department with skin lesions consisting of papules and plaques partially covered with whitish scales located around her back, abdomen, lower limbs and scalp. During clinical examination unusual shape of linear lesions around her waist were visible (Fig. 1). First papules appeared 12 months before admission and gradually spread with the waist lesions becoming visible around 9 months later. The patient was in good general condition with no concomitant diseases and was not on any medications. There was no history of allergies, but there was a family history of psoriasis on the maternal side of the family. After detailed questioning, the patient admitted starting physical activity in the form of hula-hoop exercises 3 times a week about 1 to 2 months before the lesions started to appear around her waistline. She also admitted performing hula-hooping only around her waistline as she was a beginner in this form of exercise. The clinical picture and history suggested a diagnosis of psoriasis. Psoriasis activity and severity index (PASI) score was 11.9, body surface area (BSA) –26% and Dermatology Life Quality Index (DLQI) — 14. As she used only topical corticosteroids before, narrow band UVB was introduced with gradual improvement of the lesions. On top of that, a suggestion of changing her physical form of activity was made. On the control phone call a few months later according to the patient the skin was almost clear. The final diagnosis of psoriasis vulgaris with a Koebner phenomenon around her waistline caused by hula-hoop exercise was made.



**Figure 1.** Partially treated psoriatic lesions in a waistline area after hula hooping

## DISCUSSION

Hula-hoop is a name of a ring made with a plastic tube that is twirled around the waist, limbs or neck. There are many benefits of hula-hoop exercise. It helps to burn calories, boosts cardiovascular fitness, challenges core muscles and improves body balance. Moreover, it is inexpensive and does not require a lot of space. Hula-hooping has been practised in fitness classes worldwide and introduced in fitness

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video games such as the Nintendo Wii [1]. The study patient started hula-hooping in an attempt to lose weight and increase her physical activity. At the time she already had active psoriasis which was treated with topical medications only and was gradually deteriorating. After around 4–8 weeks of hula-hooping, she noticed scaly patches appearing in a linear manner around her waist where the hula-hoop ring was putting regular pressure on her skin, which was diagnosed as the Koebner phenomenon.

The Koebner phenomenon is defined as the development of lesions characteristic of the disease in the areas of uninvolved skin following an injury [2, 3]. As the new lesions appear identical clinically and histopathologically to the disease it was also named isomorphic response (“equal shape” from Greek) [4, 5]. Heinrich Koebner was the first to present during a scientific meeting a case of a patient developing psoriatic lesions in areas of trauma from horse riding, tattooing and horse biting. A few years later (1876) he published a report on this patient with the Koebner phenomenon [3, 6]. Although the Koebner phenomenon is mostly described in psoriasis it has been reported in many other skin diseases [2, 5].

Classification of the Koebner phenomenon was first proposed by Boyd and Nelder in 1990 [3]. They suggested that the term “Koebner phenomenon” should be reserved for reproducible lesions caused by several triggering factors. This group, called category I, consists of psoriasis, lichen planus and vitiligo. The others include category II — pseudo-koebnerization (molluscum contagiosum and viral warts), secondary to spreading of infectious agents along the sites of injury, category III — occasional traumatic localization of lesions (Darier disease, erythema multiforme) and category IV including other, possibly injury-induced processes (pemphigus vulgaris, lichen nitidus, lupus erythematosus and dermatitis herpetiformis) [3, 7, 8]. The list of conditions where any category of Koebner phenomenon was reported is currently very long, as more and more of them are described in that context [2, 4, 9–11]. Classification of severity of the response has been also introduced starting from none, through “abortive” meaning the lesions disappear spontaneously within 2 weeks, minimal — focal around the area of trauma and maximal — describing widespread lesions across the whole injury area [4, 5]. In the study patient type I category Koebner phenomenon with maximal severity was diagnosed, as the psoriatic lesions covered the area of the pressure from the hula-hoop ring on the skin around the waistline.

In psoriasis the typical time for the development of the lesions after trauma is 10 to 20 days, however, it was described in the range from 3 days to 20 years [2, 4, 5]. Triggering factors include burns, trauma, friction, bites, surgical procedures, UV and other types of irradiation [2, 4, 5]. The incidence of the Koebner phenomenon in psoriatic patients was

reported depending on the study from 11% to 75% [2]. In the 1980s first Eyre and Krueger [12] and then Baker et al. [13] showed that after standardised trauma procedures in patients with psoriasis the Koebner phenomenon was positive in 25% and 21.6% of those patients respectively. In Kalaciyan et al. [14] study 27.4% of patients showed a positive phenomenon 28 days after induced injury. The majority of authors suggest that early onset, active disease and stress are predisposing factors in the appearance of the Koebner phenomenon [2, 4, 5]. Early onset of the disease together with at least four treatments used for psoriasis are connected to the more frequent presence of the Koebner phenomenon, which could be explained by the greater activity of the condition [3, 5]. However, there are also reports available that patients with mild disease were more likely to develop the Koebner phenomenon than those with widespread one (75% vs. 34%) [3]. Overall, the evidence that the Koebner phenomenon appearance is connected to psoriasis activity or severity is inconclusive [2, 3]. In the study patient, the duration of the disease was only 12 months with the only treatment of topical corticosteroids used before admission, however, according to the scales used, her psoriasis was moderate to severe.

It is not known exactly how strong stimulus is needed to produce the reaction, however, it was suggested that more severe trauma may cause more extensive and faster-appearing lesions [3]. The specific localization of the Koebner phenomenon is not necessarily connected to the pathognomonic areas of the skin disease [2]. The impact of the hula-hoop in the above patient was regular and quite intense, two to three times a week in a group activity and more at home. The areas covered with psoriatic lesions were not typical for psoriasis and related closely to the pressure of the hula-hoop ring.

The exact mechanism behind the appearance of the Koebner phenomenon is still unknown, however, it was studied especially in psoriasis [2]. Baker et al. [13] revealed that in patients with the Koebner phenomenon the balance between CD4 and CD8 T cells in the epidermis was different from the psoriatics without it (1.68 vs. 0.75 respectively), with no change in the number of dendritic cells. In more recent years the theories behind the Koebner phenomenon appearance included an immune-mediated process with the involvement of cytokines and autoantigens, proliferation of keratinocytes and angiogenesis with a suggestion that not only an epidermal injury but also inflammation of the dermis are both needed to induce it [2, 4, 5]. Ji and Liu in 2019 [15] presented the current theories and evidence behind the psoriatic Koebner phenomenon with many pathways most likely involved, including not only keratinocytes but also mast cells derived mediators.

To the many causes of Koebner’s phenomenon described in the literature, the authors would like to add one more

— hula-hooping. It would be prudent to advise patients with active disease connected with positive Koebner's phenomenon to avoid fitness activities which can put significant pressure on the patient's skin.

### Conflict of interest

The authors declare that they have no conflict of interest.

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