

Salt-dependent aquagenic urticaria, challenge test and histological features. Case report

Laiseca García J¹, González Bravo L¹, Gomez de la Fuente E², Tristán Martín B³, Sarró Fuentes C², Rosado A¹

¹Allergy Unit. Hospital Universitario Fundación Alcorcón (Madrid, Spain)

²Dermatology Unit. Hospital Universitario Fundación Alcorcón (Madrid, Spain)

³Pathology Department. Hospital Universitario Fundación Alcorcón (Madrid, Spain)

Corresponding author

Jimena Laiseca García.

Hospital Universitario Fundación Alcorcón.

Calle Budapest 1, 28922, Alcorcón, Madrid, Spain

Allergy Unit

Email: jimenalaiseca91@gmail.com

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.18176/jiaci.0735

Key words: Salt-dependant aquagenic urticaria, Histological features, Water challenge test, Biopsy, Physiopathology.

Palabras clave: Urticaria acuagénica dependiente de sal, Características histológicas, Test de exposición con agua, Biopsia, Fisiopatología.

Aquagenic urticaria (AU) is an uncommon but acknowledged type of physical urticaria that involves mainly young women. Salt-dependent aquagenic urticarial (SDAU) is a particular subtype of aquagenic urticaria, characterized by millimetric, very itchy wheals, commonly located in the areas where saltwater contacts the skin. It occurs immediately, or within short minutes, after early contact with salt water, and non-related to other factors such as sunlight, heat, or cold [1]. The pathogenic mechanisms that accompany this particular entity persist uncertain and not clearly understood. Although pathologic features of aquagenic urticaria are already described, the particular microscopic data of SDAU have not been detailed yet [2]. We hypothesized that understanding its histological examination could help to better characterize this subtype of urticaria.

We report the case of a 34-year-old woman, with a past medical history of seasonal rhinitis and asthma, who complained of pruritic, erythematous wheals distributed through the neck, scruff, face, neckline back and arms, a few minutes after seawater baths. These episodes were not reported either with fresh water, or by pool water or rainwater contact, and irrespective of temperature. Systemic symptoms were not documented. The symptomatology was replicated by challenge tests done in the back by placing sterile gauzes irrigated in seawater (which was brought additionally by the patient from her vacation place), with saline solution at different concentrations (3% NaCl, 5% NaCl), and with anhydrous glucose 10 g/20 ml (50% concentration, 2770

mOsm/l). Well-localized urticarial response arose, consistent of millimetric and pruritic hives in the region in contact with seawater, and with saline water at both saline concentrations; in contrast, this phenomenon was not seen on the skin in contact with tap water and hypertonic glucose. Control test using a gauze soaked in tap water resulted negative. Dermato graphism was positive. A wheal on the posterior part of the thorax was biopsied after the challenge test, showing a superficial perivascular lymphocytic infiltrate with slight increase of interspersed mast cells. There was not involvement of the overlying epidermis (Figure 1). The woman was managed with antihistamines (loratadine 10 mg) taken half an hour before seawater contact, with favorable response and disappearance of symptoms.

A few cases resembling ours have been reported previously in the available literature, allowing a correct approach, classification, description, and management of this singular type of aquagenic urticaria. It seems to be reliant exclusively on the saline water content and/or osmolality, although its pathogenic process still remains controversial [2]. Our data support that it might be dependent on the saline water content and not on osmolality, as the challenge test with hypertonic glucose was negative. SDAU is described mainly in young women, but it has also been reported in children during sea baths [2]. Lesions show a selective location at the collar area and lower part of the face, which suggests the existence of a local factor at the origin of this particular topography region. Mast cell hyper-reactivity at this region has been suggested as a causal hypothesis [2]. We highlight that, in our patient, lesions were more extended, and appeared in arms and back as well, perhaps indicating a more severe form of this peculiar entity.

Management of SDAU is based on avoidance, by minimizing the time seawater maintains contact with the skin. Treatment consists of antihistamines taken half an hour before sea baths, although its response and effectiveness may vary between patients; barrier creams, and even preparations containing capsaicin, can be used additionally [3,4]. This entity has been scarcely reported and is probably underdiagnosed, and must be thought up and considered in all subjects describing pruritic small wheals following sea baths [2,3]. Histological features showed in our findings are non-specific and comparable to features observed in other types of aquagenic urticaria described in the

literature [4]. Therefore, we think demonstrated that histological study does not provide additional information in this subtype of aquagenic urticaria.

In conclusion, we describe the case of a young woman who presents an aquagenic local urticarial reaction provoked exclusively by seawater, which is a particular form of physical urticaria. It has typical characteristics of aquagenic urticaria in its mode of occurrence, the morphology of lesions, and its histopathological examination. Future research is needed to clarify the pathogenesis of this condition, which seems to be dependent on saline water content. To our knowledge, this is the first case reporting pathological features (although nonspecific) in this particular form of aquagenic urticaria.

Conflict of interest

Any author has any conflict of interest.

Funding

The authors declare that no funding was received for the present study.

References

1. Vieira M, Rosmaninho I, Lopes I, Guilherme A, Moreira da Silva JP. Localized salt-dependent aquagenic urticaria, a rare subtype of urticaria: a case report. *Eur Ann Allergy Clin Immunol*. 2018 May;50(3):141-4.
2. Gallo R, Gonçalo M, Cinotti E, Cecchi F, Parodi A. Localized salt-dependent aquagenic urticaria: a subtype of aquagenic urticaria? *Clin Exp Dermatol*. 2013 Oct;38(7):754-7.
3. Margerin F, Wettlé C, Merklen-Djafri C, Cribier B. Urticaire aquagénique localisée à l'eau de mer [Localized salt-dependent aquagenic urticaria: A case report]. *Ann DermatolVenerol*. 2015 Dec;142(12):771-5.
4. Fukayama M, Domoto Y, Sato S, Asano Y. Case of aquagenic urticaria: Case report and the results of histopathological examination. *J Dermatol*. 2021 Jan;48(1):88-91. doi:10.1111/1346-8138.15615. Epub 2020 Sep 17. PMID: 32940373.
5. Napolitano M, Gallo R, Donnarumma M, Patruno C. Salt-dependent aquagenic urticaria in children: Report of two cases. *Pediatr Allergy Immunol*. 2018 May;29(3):324-6.

Figure 1. (a) Water challenge test. (b) Positive challenge test; an erythematous 2 millimeters wheal observed at solution 5% NaCl. (c, d) Histological analysis with hematoxylin and eosin shows perivascular and interstitial infiltration of lymphocytes and discrete increase of interspersed mast cells. The overlying epidermis was unaffected.

