



Anaphylatic reaction after chamomile tea consumption

Elena Bravo · Estefanía Moreno · Juan Pedro Sola · Carmen García · Miriam Zamora-Verduga · Marcos Peñalver-Mellado

Received: 25 March 2021 / Accepted: 23 June 2021

© Springer Medizin Verlag GmbH, ein Teil von Springer Nature 2021

Keywords Anaphylaxis · Specific IgE · Cross-reactivity · *Artemisia* · Pollen

Background

Chamomile tea is obtained from the flowers of *Matricaria chamomilla*, and the presence of pollen in the tea has been demonstrated [1]. Several cases of anaphylaxis due to the consumption of chamomile tea have been described in patients sensitized to plants of the *Asteraceae* family [1–4], due to the cross-reactivity between pollen allergen of these species [5]. The allergens involved in this cross-reactivity are Art v 1, Mat c 1 of *M. chamomilla* (homologue to Bet v 1) and probably a number of proteins sized between 23 and 50 kDa detected in immunoblot with sera from sensitized patients [6, 7].

Case presentation

The authors present the case of a 26-year-old man with no previous history of allergy who suffered an episode of eye and pharyngeal itching, dry cough and bulging of the uvula after consuming chamomile tea with honey. These symptoms improved after treatment with intravenous hydrocortisone and adrenaline.

A standard battery of aeroallergens, latex and *Anisakis* were used in skin prick testing (SPT). To-

tal IgE and specific IgE were determined using several pollen extracts from *Asteraceae*, a number of foods (lettuce, honey and sunflower seed), bee venom and molecular components, specifically Art v 1, Art v 3, Amb a 1, Bet v 1 and Pru p 3. In SPT a positive result was obtained only against latex (minor wheal than histamine), *Artemisia* and Pru p 3.

Total IgE was 31.8 IU/mL and specific IgE tests were positive for *Ambrosia elatior* (1.44 kU/L), *Helianthus annuus* (3.02 kU/L), *M. chamomilla* (3.96 kU/L), *Artemisia vulgaris* (3.13 kU/L), Art v 1 (5.11 kU/L) and Pru p 3 (0.54 kU/L). Testing was negative for honey, lettuce, sunflower seed, bee venom, Amb a 1, Art v 3 and Bet v 1.

Therefore, sensitization to some foods derived from the family *Asteraceae* and some molecular components was discarded. The patient was clearly sensitized to Art v 1.

To determine possible cross-reactivity between *A. vulgaris* and Art v 1 with chamomile tea, protein extraction from tea was carried out in two ways: a protein extract (E1) was obtained from commercialized chamomile bags through extraction with phosphate buffered saline, and another (E2) was obtained from chamomile tea after 8 min in boiling water. The ability of the extracts to inhibit specific IgE binding to Art v 1 (w231) was evaluated by ImmunoCAP™ inhibition and an epithelium extract was used as negative control. The results showed inhibition of IgE binding to Art v 1 by both extracts. At the concentrations used, 90% of the binding of the Art v 1 allergen was inhibited and the inhibition curves were similar with both extracts (Fig. 1a). In the case of inhibition of IgE binding to *A. vulgaris* (w6), testing was performed with the extract E1, which inhibited 90% of the binding and the curve was similar to that obtained with Art v 1 (data not shown).

E. Bravo · J. P. Sola · M. Peñalver-Mellado (✉)
Research and Development Department, Probelte Pharma
S.L.U., S/Antonio Belmonte Abellán, 7, Murcia, Spain
drpenalver@probeltepharma.es

E. Moreno · C. García · M. Zamora-Verduga
Department of Allergology, Hospital General La Mancha
Centro, Alcázar de San Juan, Ciudad Real, Spain

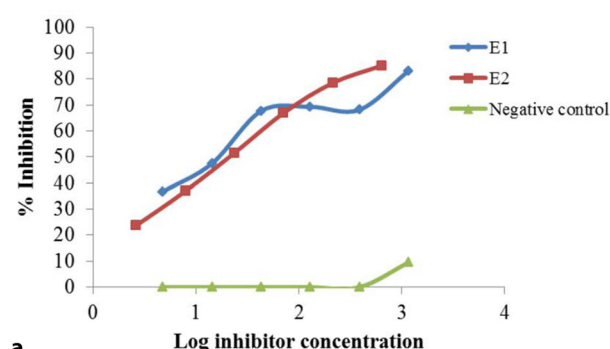
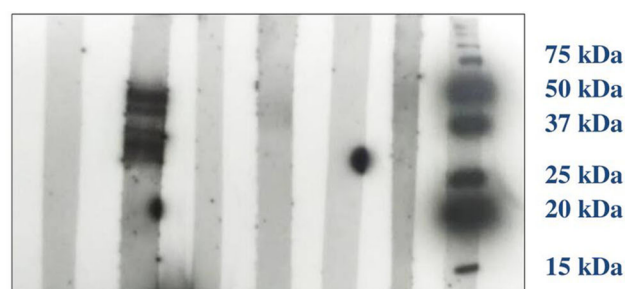


Fig. 1 **a** Inhibition enzyme-linked immunosorbent assay using Art v 1 in solid phase (CAP) as antigen and extracts E1 (blue), E2 (red) and an animal epithelium extract (green) as inhibitors. **b** Immunoblot assay with patient serum with different



b AV- AV E2- E2 E1- E1 M

extracts and negative controls (without serum). AV Artemisia vulgaris extract, E1 E1 extract, E2 E2 extract, -immunoblot without serum, negative control. M Precision Plus Protein™ WesternC™ Blotting Standards (Bio-Rad, Ca, USA)

An immunoblot was performed using a pollen extract from *A. vulgaris*, E1 or E2 as antigens. After sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) proteins were transferred to a nitrocellulose membrane that was incubated with patient serum and then with secondary anti-human IgE antibody. Allergenic profile evaluation showed bands of molecular sizes between 25 and 50 kDa for *A. vulgaris* (Fig. 1b) that could include allergen Art v 1 (28 kDa), among others. In the case of chamomile extracts a very slight sign in the range of 35–45 kDa in E1 and 40–50 kDa in E2 was observed (Fig. 1b). Negative controls were performed without patient serum. The absence of signal in chamomile extracts could be explained by the low concentration of homologous Art v 1 in chamomile, although this protein could be responsible for allergic reactions after the consumption of chamomile.

Conclusion

The authors conclude that there is cross-reactivity between allergen Art v 1 and the extracts of chamomile tea due to a homologous protein of Art v 1 in the pollen of *M. chamomilla*, which is present in chamomile tea. The primary respiratory IgE sensitization to *A. vulgaris* pollen could lead to allergic symptoms in patients that consume chamomile tea.

Conflict of interest E. Bravo, J.P. Sola and M. Peñalver-Mellado are employees of Probelte Pharma S.L.U. E. Moreno, C. García and M. Zamora-Verduga declare that they have no competing interests.

References

1. Subiza J, Subiza JL, Hinojosa M, Garcia R, Jerez M, Valdivieso R, et al. Anaphylactic reaction after the ingestion of chamomile tea: a study of cross-reactivity with other composite pollens. *J Allergy Clin Immunol*. 1989;84:353–8.
2. Andres C, Chen WC, Ollert M, Mempel M, Darsow U, Ring J. Anaphylactic reaction to chamomile tea. *Allergol Int*. 2009;58:135–6.
3. Benner MH, Lee HJ. Anaphylactic reaction to chamomile tea. *J Allergy Clin Immunol*. 1973;52:307–8.
4. Nakagawa M, Hanada M, Amano H. A case of anaphylactic reaction to chamomile tea in a patient with mugwort pollinosis. *Allergol Int*. 2019;68:396–8.
5. de la Torre Morín F, Sánchez Machín I, García Robaina JC, Fernández-Caldas E, Sánchez Triviño M. Clinical cross-reactivity between *Artemisia vulgaris* and *Matricaria chamomilla* (chamomile). *J Investig Allergol Clin Immunol*. 2001;11:118–22.
6. Reider N, Sepp N, Fritsch P, Weinlich G, Jensen-Jarolim E. Anaphylaxis to chamomile: clinical features and allergen cross-reactivity. *Clin Exp Allergy*. 2000;30:1436–43.
7. Popescu F-D, Vieru M. The presence of aeroallergens in food products: a potential risk for the patient with allergic rhinitis. *Rom J Rhinol*. 2018;8:11–5.