

Editorial



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Identification and Standardization of Hum j 6 is Crucial to the Diagnosis of Pollinosis Due to Japanese Hop

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Japanese hop (*Humulus japonicus*: HJ) pollen has been considered one of the major Autumn pollen allergens in East Asia and recently invaded into Western countries. Autumn pollinosis in Korea is mainly elicited by HJ, ragweed, and mugwort.¹ The sensitization rate, pollen count, and allergenicity of HJ pollens are increasing in this region because of air pollution and climate change. Interestingly, it exhibited no essential cross-reactivity with a common hop, a closely related species including ragweed and mugwort.^{2,3} However, the molecular details of HJ allergens have yet to be characterized. Commercial skin test agents for the diagnosis and allergen extracts for the allergen immunotherapy are not available.

HJ is an annual or weakly perennial climber (climbing twining vine), growing 3–6 m high. It has deeply 5- to 7-lobed large leaves with serrated edges and rough surface, with pubescent underside, on a long petiole and prickly stems. The flowers are green spikes. Variegated forms are common. Hop is dioecious, with separate male and female plants. Male flowers are yellow-green, arranged on 15–25 cm-long, narrowly spreading panicles. Female flowers are catkin-like drooping spikes with 5 mm in diameter. The flowers are symmetrical. These plants are pollinated by the wind. As an adaptation to this kind of pollination, the calyx is short and there is no corolla. Flowers are grouped to form cymes. The pistil is made of two connate carpels, the usually superior ovary is unilocular, and there is no fixed number of stamens.⁴ The pollen grains may be distinguished by three pores and variable in size (22–26 μm).^{5,6}

Cannabaceae is a small family of flowering plants grouped into about 11 genera, including HJ, hop (*Humulus lupulus*), marijuana and hemp (*Cannabis sativa*), etc. An extensive cross-reactivity among the different individual species of the family could be expected.⁷ Members of this family include Hemp and commercial hop. Patients allergic to HJ pollen were noted to have an associated sensitization to hop (*H. lupulus*), celery and sunflower pollen.^{8,9} Ginkgo pollen, a prominent aeroallergen in Korea, was shown to have a minor degree of cross-reactivity with pollen from HJ. In patients with immunoglobulin E (IgE) antibodies to ginkgo pollen, inhibitory enzyme-linked immunosorbent assay tests demonstrated that IgE binding to ginkgo pollen was inhibited by more than 80% with oak, ryegrass, mugwort, and ragweed and by 34% with HJ. In inhibitory immunoblot tests, IgE binding to ginkgo pollen proteins was almost completely inhibited by oak, ryegrass, mugwort and ragweed, but only partially by HJ and rBet v 2.¹⁰ The allergic reaction of *Cannabaceae* is not common in America and Europe. By contrast, HJ is a very frequent trigger of asthma and allergic rhinitis in autumn in Korea and Japan.¹¹ Among Korean patients with asthma, rhinitis and conjunctivitis attending an allergy clinic, 6.1%–14% were sensitized to this allergen,^{12,13} and similarly high prevalence

rates were found in China.^{14,15} Recent studies in Korea suggest that sensitization to this pollen is increasing.^{16,17} Although exposure to pollen from this plant appears to be less prevalent in Europe and the USA, aerobiological studies have detected this pollen in Spain, as well as the western United States Gulf Coast.^{18,19}

Although sensitization rates are rising in East Asia with increasing pollen counts of HJ, there have not been any molecular identification of major allergen. Some reports showed that several proteins belonging to allergenic families such as pathogenesis-related 1 (PR-1) protein, pectin methylesterase (PME), polygalacturonase, and profilin were identified in HJ pollen by expressed sequence tag analysis, but displayed low allergenicity.^{20,21}

Identifying and characterizing major allergenic molecules is crucial to standardize and improve the quality of allergen extracts. Great advances have been made in characterizing allergen properties using molecular biology techniques, and many efforts are being made to replace the extracts with recombinant molecules of the major allergen. Molecular cloning and allergenic characterization of the major allergen from HJ pollen have not been successful until now. Eventually, the present study purified the major allergen from HJ and characterized its properties.²² This allergen was designated as Hum j 6 according to the World Health Organization/International Union of Immunological Societies Allergen nomenclature subcommittee. These findings would be useful for developing component-resolved diagnosis and immunotherapy for HJ pollinosis.

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