



Investigation of Cry J1 and Cry J2 Concentrations in Japanese Cedar Pollen and Non-Pollen Seasons

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Dear Editor-in-Chief

Japanese cedar pollinosis, a national disease, is one of the diseases affected a majority of the Japanese population and has a prevalence of >30%. Cryptomeria pollen allergen is the causative agent of cedar pollinosis and is known to present in the following two forms: Cry j1 and Cry j2. Cry j1 is located in small particles (approximately 0.7 μm) called as the Ubisch bodies on the surface of cedar pollen and the pollen outer wall, whereas Cry j2 is present in the cedar pollen membrane and starch grains of a pollen. Allergen-containing particles, such as the Ubisch bodies and starch granules, can enter the lower respiratory tract, which is considered to cause lower respiratory symptoms, such as asthma (1).

In the present study, we aimed to measure the pollen number and concentrations of Cry j1 and Cry j2 during the pollen season in Akita City and report the Cry j1 and Cry j2 concentrations before and after the pollen season.

Between Feb. 2 and Apr 13 and between July 6 and August 10, 2018, we set a Durham-type collector on the roof of the clinical building of Akita University and estimated the pollen numbers and Cry j1 and Cry j2 concentrations. We determined the pollen numbers by staining the collected pollen with the Calverula solution, followed by examination of the specimen. For determining the

Cry j1 and Cry j2 concentrations, we dripped 200 μL -distilled water on a slide glass, from which 20 μL water was recovered and analyzed using ELISA. Information on the weather was obtained with consultation from the home page of Japan Meteorological Agency.

Between Mar 7 and May 2 during the pollen season, the Cry j1 and Cry j2 concentrations showed a weak correlation, although the peak days differed. On Mar 23, despite the small number of pollen, we confirmed the high concentrations of Cry j1 and Cry j2. From Feb 2 to Mar 6, before pollen scattering began, Cry j1 concentration was measured despite the number of pollens being 0/day.

Therefore, we believed that Cry j1 existed in the atmosphere before the pollen season began (Fig. 1). In addition, the Cry j1 and Cry j2 concentrations were below the detection sensitivity level from July 6 to Aug 10 in the non-pollen season, and we believe that Cry j1 and Cry j2 did not exist in the atmosphere during this period.

We concluded that there was a difference between the pollen number and behavior of Cry j1 and Cry j2 concentrations, indicating a possibility of it being affected by the weather aspect, such as rainfall (Fig. 2).



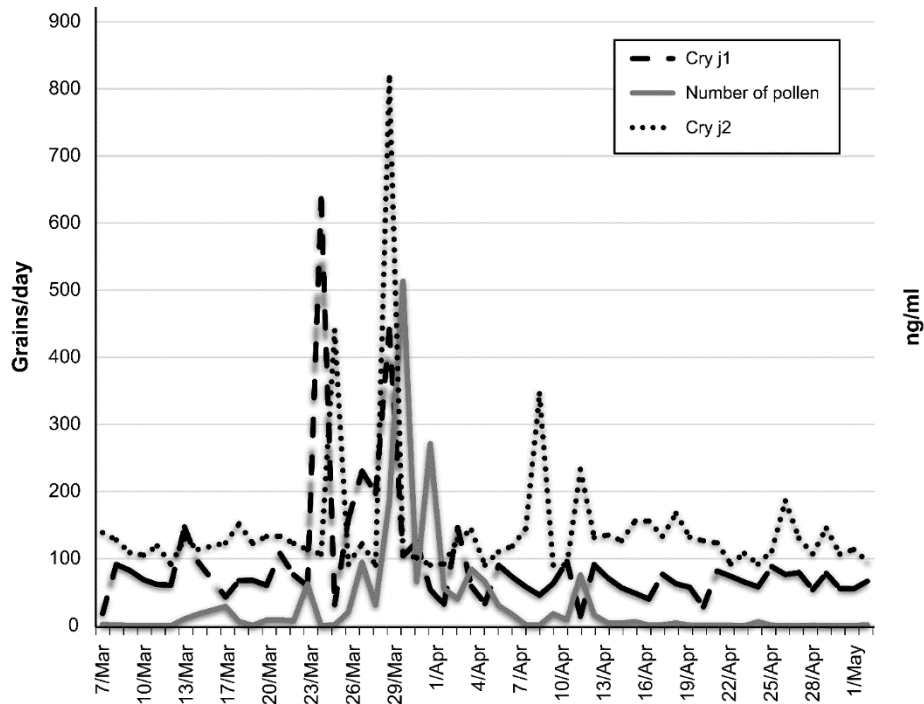


Fig. 1: The number of cedar pollen scattering, Cry j1 and Cry j2 concentration from March 7th to May 1st, 2018. Cryj1 and Cryj2 increased before the peak of pollen counts, and days with high concentration were observed even on days with few pollen counts

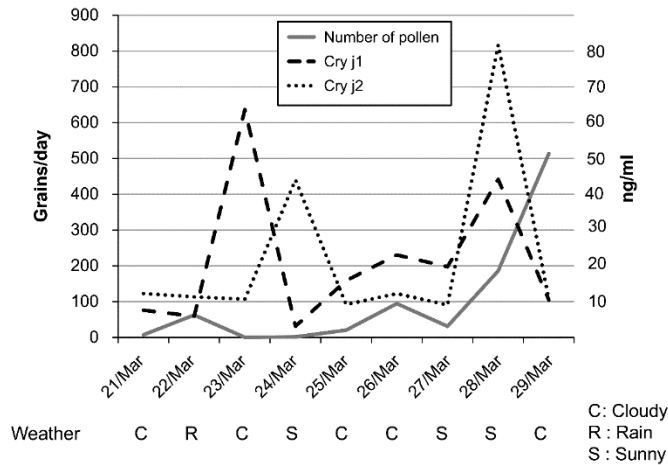


Fig. 2: Focusing from March 21 to 29, Cry j1 and Cry j2 tend to be more on sunny days. This is the same for cedar pollen scattering, but it exists in the atmosphere even on days with little pollen scattering, Cry j1 and Cry j2 are higher after rainy days

Regarding the difference between the pollen number and the Cry j1 and Cry j2 concentrations, there are some reports that the Cry j1 level is high despite the small number of pollen on a sunny day, following rain (1). In this survey,

heavy rain was recorded the day before the huge difference was observed in pollen numbers and Cry j1 concentration, which supports the findings of the previous reports. Moreover, we confirmed that even before the pollen season, Cry j1 was

scattered at a constant concentration in the atmosphere. Approximately 40% of their patients expressed few hay fever symptoms even before the pollen season when the Cry j1 concentration reached a certain level (1–3 pg/m³ days) (2).

In the future, we plan to investigate the relationship between Cry j1 concentration and the symptoms of hay fever. In addition, between 2006 and 2016, we examined the cedar-specific IgE levels and classified cases as positive for sensitization to Class 2 or higher. Notably, we found no significant relationship between the positive rate of cedar sensitization and number of cedar pollen (3). We also plan to study the association between the positive rate of cedar sensitization and concentrations of Cry j1 and Cry j2. Regarding the method of measurement, most reports used atmospheric aspiration (2,4). Herein, we measured Cry j1 and Cry j2 using distilled water and ELISA. Therefore, the difference in the measurement method also warrants investigation. After the next season, we plan to use two types of pollen collector.

In this study, there was a divergence between pollen scattering number as well as Cry j1 and Cry j2 concentration. Cry j1 and Cry j2 values increased prior to pollen scattering. Therefore, the Cry j1 and Cry j2 concentrations might be used as a predictor of pollen scattering period (5). We will continue these observations and use these for the prevention of pollen exposure of Japanese cedar.

Conflict of interest

The authors declare that there is no conflict of interest.

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