

Re – Examining Allergies to Fern Spores

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Abstract

The incidence of fern spores in airspora was demonstrated as early as 1935, but the knowledge about fern spore allergens is limited. Fern spores are important aeroallergens in tropical countries, may be the third most common allergens in Thailand and Philippines. Despite the fern species namely *Adiantum peruvianum*, *Anemia rotundifolia*, *Christella parasitica*, *Thelypteris augescens*, *Acrostichum aureum*, *Diplazium esculentum*, *Abacopteris multiligneata*, *Drynaria quarcifolia*, *Dryopteris setigera*, *Adiantum capillus*, *Arachniodes adiantiformis*, *Lycopodium* sp, *Cheilanthes* sp, *Dryopteris filixmas*, *Notholaena distans*, *Notholaena sinuata*, and *Pteridium aquilinum* are reported as chief sensitizers, their spore extracts are not available commercially. Among the fern spore sensitized patients, 50% had an ornamental fern at their home for 3-5 years. The removal of the fern had given relief in their symptoms. Hence, atopic subjects should avoid having ferns as ornamentals and also visiting the areas rich in different fern species.

Key words: Fern spores, Respiratory allergy, Skin allergy

INTRODUCTION

Allergy is one of the most widespread diseases of the modern world. More than 25% of the population in industrialized countries suffers from allergies¹. Allergies, also known as hypersensitive reactions, occur when the immune system overreacts to certain innocuous substances that do not affect many people. Allergic reaction are caused by a variety of biological materials, such as pollen grains, fungal spores, insects and mites. Wodehouse (1935)² listed several fern

spores in aerobiological surveys but such spores have been neither considered of any significant relevance as an allergen nor are included in the list of antigens that are used in the clinical practice of allergy. However, ferns grow abundantly in tropical and subtropical forests producing a large quantity of spores which fall loose when dry and may serve as allergen.

Ferns in general thrive in a wide variety of habitats even profoundly, having ability to succession in places where various environmental factors limit the survival of other plants³. Some ferns are among the world's most severe weed species, including the bracken fern (*Pteridium* sp) in mountains and the mosquito fern (*Azolla* sp) of marshes, forming large aggressively spreading colonies^{3,4}. The ferns are commonly found in moist, shady forests, crevices in rock faces,

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especially when sheltered from the full sun, acid wetlands including bogs and swamps, and tropical trees, where many species are epiphytes⁴.

Ferns have enormous antiquity and ability to survive through ages and are still in the state of active evolution. The remarkable independence of the sporophytic (2n) and gametophytic (n) interns become attractive to study differentiation and evolution by the cytogeneticists and morphogeneticists⁵. Attempts have also been made for identification of viable air borne fern spores which manifest allergic reaction in human being and other plant and animal diseases³. The present article reviews the knowledge accrued on allergies due to fern spores.

Two main factors to be considered while assessing the risk posed by ferns to human health are (i) identification of fern spores and their species producing spores having health hazards and (ii) to define the extent to which humans are exposed to the fern spores.

ALLERGIES TO FERN SPORES

The ornamental species namely *Adiantum peruvianum*, *Anemia rotundifolia*, *Christella parasitica* and *Thelypteris augescens* were reported to induce certain histopathological changes in humans. The changes started to subside when the exposure was interrupted⁶. The spores of *Acrostichum aureum* caused sloughing of the stratum corneum and a slight skin oedema in those exposed to *Diplazium esculentum*. Exposure to spores of *Abacopteris multineata* and *Drynaria quarcifolia* caused a slight slackening of the skin⁶. The main adverse effect of bio-particulate air pollutants on human health arise from affecting the respiratory system through inhaled air causing allergic manifestations and related diseases. Considerable information is available regarding the allergenic potential of pollen, fungal spores, insects and mites but very little is known regarding allergy to fern spores⁷.

The fern spores were later recognized among the important aeroallergens in tropical countries e.g. Thailand and Philippines⁸. The incidence of sensitization to fern spores in Asian countries is nearly 65% among asthma or rhinitis cases by skin prick tests. However, the fern spore extract also

showed positive skin tests in 25% of non atopic subjects⁹. Bunnag et al.,⁸ found positive nasal provocation test with spore extracts in fern sensitized patients with an ornamental fern at their home for 3-5 years.

The ornamental value of ferns as indoor plants and their extensive use for interior decoration and floral arrangements subject them to constant contact with human skin⁸. Hausen and Schulz¹⁰ reported a case of contact dermatitis in a florist due to contact with leather leaf fern (*Arachniodes adiantiformis*) during its sporulation period. Koboyashi¹¹ observed an allergic reaction in a dental technician due to *Lycopodium* spores. Rodriguez¹² and co-workers reported a case of rhino conjunctivitis and asthma to pollen, mites and Cat dander, several months later, the patient developed local pruritus and wheals after handling the fern frond (*Polypodium vulgare*), used to decorate boxes of fish. His rhinoconjunctivitis symptom started worsening due to occupational exposure at the work place. Specific IgE was elevated 7 times of normal control in this patient's sera. IgE immunoblotting with patient sera showed binding with 12 and 35 kDa proteins of fern extract. Kofter et al.,¹³ presented a case of rhinitis due to fern genus *Nephrolepis* sp. Immunoblot analysis revealed IgE binding to 35 and 40 kDa proteins of fern extract with this patient's sera.

Many ferns sporulate profusely and release spores into the environment in tropical and temperate regions and could pose health problems due to their allergenicity³. In India, Devi^{6,7} and co-workers recorded the incidence of fern spores in the ambient air and performed skin tests on allergic patients with antigenic extracts. They demonstrated the sensitization of atopic subjects to fern species namely *Adiantum peruvianum*, *Anemia rotundifolia*, *Christella parasitica*, *Thelypteris augescens* and *Acrostichum aureum*. Further, Yasmeen and Co-workers¹⁴ investigated the sensitization potential of the mangrove fern like *Acrostichum aureum* on atopic subjects.

Geller-Bernstein¹⁵ and co-workers reported positive skin test reaction to fern spores extracts in patients suffering from allergic rhinitis. Some common house hold ferns like *Dryopteris setigera* gave severe allergic reaction in subjects. However, *Adiantum*

capillus veneris, *Cryptomium falcatum* and *Pteris vittata*, induced milder allergic reaction. Bunnag⁸ and group used the spore extracts of *Achrostichum aureum* for skin test and nasal provocation test and the tests were carried out both on atopic and non-atopic subjects identifying allergic reaction.

CONCLUSION

In conclusion, atopic subjects having allergies to pollen or other plant products should avoid ferns as ornamentals at their residences. They may suffer with direct fern spore allergy or cross allergenicity on contact or inhalation of fern spores.

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