

## Hypothesis & Experience



# Cross-reactivity of pink peppercorn in cashew and pistachio allergic individuals

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### Conflict of interest

The authors have no financial conflicts of interest.

### Author Contributions

Conceptualization: Lynette Pei-Chi Shek. Data curation: Mohana Rajakulendran. Formal analysis: Mohana Rajakulendran. Funding acquisition: Lynette Pei-Chi Shek, Mohana Rajakulendran. Investigation: Mohana Rajakulendran. Project administration: Mohana Rajakulendran. Resources: Mohana Rajakulendran. Supervision: Mohana Rajakulendran. Writing - original draft: Joan

## ABSTRACT

**Background:** The Pink peppercorn belongs to the same Anacardiaceae family as cashew and pistachio. However, the cross-reactivity of pink peppercorn with cashew and pistachio has yet to be studied. To date, there has been a single case report of anaphylaxis to pink peppercorn in a cashew and pistachio allergic individual.

**Objective:** We aim to demonstrate cross-sensitization to pink peppercorn in cashew and/or pistachio allergic children.

**Methods:** A small descriptive cohort study looking at cross-sensitization of pink peppercorn in cashew and/or pistachio allergic children was conducted. Children with a history of reaction to pistachio and/or cashew nut underwent skin prick tests to the pink peppercorn species *Schinus terebinthifolius* to determine cross-sensitization.

**Results:** Out of the 21 cashew and/or pistachio allergic subjects, 16 (76.2%) demonstrated cross-sensitization to pink peppercorn. None of the subjects had any knowledge of previous exposure or allergic reactions to pink peppercorn.

**Discussion:** This study demonstrates potential cross-reactivity between pink peppercorn and cashew and pistachio. While an oral food challenge to pink peppercorn would have been important in demonstrating clinical cross-reactivity, this was not performed due to ethical constraints. We hope to increase the awareness of pink peppercorn as a potential and hidden source of allergen and encourage further studies to demonstrate the clinical cross-reactivity and to better delineate the major allergen involved.

**Keywords:** Cross reactions; Anacardium; Food hypersensitivity

## INTRODUCTION

Pink peppercorn, also known as Peruvian pepper, Brazilian pepper, American pepper, Californian pepper, and Molle de Peru, belongs to the same Anacardiaceae family as cashew and pistachio. While the cross-reactivity between cashew and pistachio allergy has been well established [1, 2], the cross-reactivity of pink peppercorn with cashew and pistachio has not been studied to date.

There are 2 species of pink peppercorn, namely the California/Peruvian type (*Schinus molle*) and the Brazilian type (*Schinus terebinthifolius*). Pink peppercorn can be found as hidden ingredients

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in pepper blends, which are available off the shelves and used in commercial food preparations. A single case report in 2012 describes an episode of anaphylaxis to seasoning containing pink peppercorn in a patient with known cashew and pistachio anaphylaxis [3]. A better insight to the cross-reactivity between these commercially available ingredients could predict pink peppercorn allergy and potentially prevent fatal anaphylactic reactions in allergic individuals.

## MATERIALS AND METHODS

A small descriptive cohort study looking at cross-sensitization of pink peppercorn in cashew and pistachio allergic individuals was conducted at the National University Hospital in Singapore between January and December 2017. Individuals presenting to the pediatric allergy specialist clinic known to have reactions to cashew and/or pistachio were recruited and skin prick tests to the relevant allergens was performed. Commercial extracts from GREER labs and Immunotek were used for the skin prick test to cashew and pistachio respectively and a prick-to-prick test with *S. terebinthifolius* was performed on the children who were recruited. *S. terebinthifolius* alone was chosen due to its more predominant availability as a commercial food product. The extracts were tested in 5 healthy controls and found to be nonirritative.

Children with a history of reaction to pistachio and/ or cashew nut as confirmed by the primary physician, and who were receiving skin prick tests to cashew and/or pistachio as part of routine clinical care, were included in our study. Exclusion criteria for the study included use of antihistamines within the past 72 hours, use of oral steroid medications within the past 5 days and history of any anaphylaxis within the past 6 weeks. A positive skin test reaction was defined as a wheal diameter of 3 mm greater than the negative control, as defined in the American Academy of Allergy, Asthma and Immunology practice parameters. Subjects were followed up 6 months after initial recruitment via a telephone call to ascertain if there had been any accidental exposures or possible reactions to pink peppercorn.

## RESULTS

Overall, 24 subjects aged 2 to 12, comprising of 10 males and 14 females, were recruited over the 1-year study period. Twenty-one subjects (10 males, 11 females) met the inclusion criteria: 18 subjects were allergic to both pistachio and cashew while 3 were allergic to cashew only, with allergy being defined as having had previous clinical or a positive oral food challenge. The remaining 3 subjects were excluded as they subsequently passed an oral food challenge to cashew and pistachio and were hence classified as not being allergic to these nuts.

The most common reaction to the cashew and/or pistachio was urticaria in 9 subjects, while the most severe reaction was anaphylaxis from cashew in 2 subjects. None of the subjects had any knowledge of previous exposure or allergic reactions to pink peppercorn.

Our skin prick test results demonstrated that out of the 21 subjects, 16 (76.2%) demonstrated cross-sensitization to pink peppercorn. Out of the 5 subjects (23.8%) with negative skin prick test, 3 were only allergic to cashew and not to pistachio. Subjects were contacted at the end of a 6-month follow-up period to check on any possible reactions to pink peppercorn. Four out of the 21 subjects could not be contacted as they had moved overseas during the follow-up period. None of the remaining 17 subjects had been exposed to pink peppercorn or had any

allergic reactions. This is postulated to be due to the limited availability of pink peppercorn in commercially available pepper blends and hence its limited use in commercial or domestic cooking within Singapore.

## DISCUSSION

In Western populations where pink peppercorn more commonly available and utilized in cooking preparations, there are potential implications of the positive results from this study demonstrating potential cross-reactivity between pink peppercorn and cashew and pistachio.

The obvious limitation of this study, due to ethical constraints, was the inability to proceed with an oral food challenge to pink peppercorn in the subjects who were skin prick test positive. This will be an important step in proving clinical cross-reactivity. Follow-up studies utilising radioallergosorbent test inhibition, immunoblotting and isoelectric focusing could also better delineate the allergenicity of pink peppercorn and potentially identify the major allergen involved.

If proven, education and advice could be given to cashew or pistachio allergic patients, to be aware of pink peppercorn as a potential source of allergens. Food regulation organizations could then also consider requirements to include warnings for cross-reactivity with cashew and pistachio nut allergies on food allergen labels of pink peppercorn-containing products.

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## REFERENCES

1. Noorbakhsh R, Mortazavi SA, Sankian M, Shahidi F, Tehrani M, Azad FJ, Behmanesh F, Varasteh A. Pistachio allergy-prevalence and in vitro cross-reactivity with other nuts. *Allergol Int* 2011;60:425-32.  
[PUBMED](#) | [CROSSREF](#)
2. Fernández C, Fiandor A, Martinez-Garate A, Martinez Quesada J. Allergy to pistachio: crossreactivity between pistachio nut and other Anacardiaceae. *Clin Exp Allergy* 1995;25:1254-9.  
[PUBMED](#) | [CROSSREF](#)
3. Kim J, Minikes N. 442 A rare case of food-induced anaphylaxis to pink peppercorns. *World Allergy Organ J* 2012;5 Suppl 2:S152.  
[CROSSREF](#)