

# **Unexpected allergic reactions to food in adult patients with peanut or hazelnut allergy: an explorative study**

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## Introduction

The prevalence of food allergy is estimated around 3% of the adult population. Food allergy is defined as a reaction to food allergens that trigger the immunoglobulin E mechanism, resulting in symptoms like pruritus, angioedema and anaphylaxis. (1,2)

Currently it is not possible to cure food allergy. The only interventions are preventing unexpected allergic reactions by strict avoidance of food allergens, use of medication like antihistamines (2) and information from nurses and other health care professionals about management of food allergy and prevention of unexpected allergic reactions (1,2).

Greenhawt et al. (3) showed percentages of symptoms caused by unexpected allergic reactions in adults with a known or suspected food allergy: hives (30%), dyspnoea (21%), gastro intestinal symptoms (18-22%) and anaphylaxis (36%).

Avoidance of food allergens requires constant dietary vigilance. Patients always have to pay attention to food labelling. The most common food allergens must be identified on the label when intentionally added to a product. Currently there are no rules about the hazardous levels of allergenic residues that may occur in food caused by common food industry.

However, these residues can cause severe allergic reactions. (4) Readability of labels is also a problem, for example through allergens written in unfamiliar terminology (5). Another issue is eating location. For instance, 13% to 55% of the allergic reactions occur at restaurants (3,6). Further, the attitude of patients influences the way patients avoid risks for allergic reactions. For example, 58% to 60% of the patients is not strict in avoiding food allergens (3,7). Finally, avoidance of some food allergens, like peanut, hazelnut, cow's milk, chicken egg and wheat, profoundly influences food choice. These allergens are increasingly used in processed food, resulting in an increasing number of food products that patients cannot eat (8).

Avoidance of food to prevent unexpected allergic reactions can negatively affect several domains of life, like family activities, social activities (9) and family economy (10). In the end, the restrictions in diet and risks for allergic reactions, affects the quality of life (11).

Clear information from nurses and other health care professionals, and food safety (e.g. clear food labelling) are essential for prevention of unexpected allergic reactions (1,2).

Presumably, lack of knowledge about the prevalence, incidence, severity and causes of unexpected allergic reactions to food in adult patients, negatively affects this. Previous studies about unexpected allergic reactions, are often carried out in mixed populations of adults and children (5,12,13), focused on all types of food allergy (3,5,14), often with participants with self-reported allergies (6,15,16). Sicherer (17) reported that only 19% of the

self-reported food allergies are verified on oral food challenges. Further, most studies are retrospective (5,18,19) which can cause recall bias (20) and some are qualitative studies (5,18,19) which are often hard to generalize (20).

Peanut allergy profoundly influences food choice and is a common food allergy in adult, with a prevalence of 0.6% - 0.7% (17). Tree nut allergy is also common, with a prevalence of 0.5% - 1.0% in all ages (17). Hazelnut is one of the nuts in the tree nut group and also profoundly influences food choice. The largest contribution to severe reactions is provided by peanuts and nuts (8). This makes health care and food safety especially important for peanut and hazelnut allergic patients.

### *Problem statement*

There is lack of knowledge about the prevalence, incidence, severity and causes of unexpected allergic reactions to food in adult patients with peanut and hazelnut allergy. Studies about this subject are often threatened by bias. This can negatively affect information from nurses and other health care professionals, and food safety. Possibly leading to more unexpected allergic reactions, more sick leave at work and a lower quality of life than necessary and to patients who not always seek medical care after severe reactions.

### *Objective*

The aim of this study is to determine the period prevalence, incidence, severity and causes of unexpected allergic reactions to food in adult patients with peanut and hazelnut allergy. The results will contribute to optimize information from nurses and other health care professionals. Further, more knowledge about the causes (e.g. labelling issues) will improve food safety.

### *Primary research questions*

1. What are the period prevalence, severity and causes of unexpected allergic reactions to food over a one-year and five-year retrospective period in adult patients with peanut and/or hazelnut allergy?
2. What are the incidence, severity and causes of unexpected allergic reactions to food over a prospective period in adult patients with peanut and/or hazelnut allergy?

### *Secondary research questions*

1. What are the differences in period prevalence and severity of the unexpected allergic reactions to food over a one-year retrospective period between patients included for peanut allergy and hazelnut allergy?
2. What are the consequences of allergic reactions to food for medical treatment and sick leave?

## **Method**

### *Design*

This study had a quantitative, explorative design, with a retrospective and a longitudinal, prospective part. The retrospective part was suitable to collect data about the period prevalence, severity and causes of unexpected allergic reactions. The longitudinal, prospective part was suitable to get detailed information about unexpected allergic reactions, without recall bias (20). By collecting retrospective and prospective data, an exploration of differences between these types of data in prevalence, incidence and causes was possible.

### *Setting*

This study was conducted in an academic hospital in the middle of the Netherlands. Data collection took place in this hospital and at the participants' home. Every participant had a personal account on an internet portal, to collect data online. The internet portal was designed for this study.

### *Participants and ethics*

Participants were included between January and April 2012. The longitudinal period of participation varied from eight to fourteen weeks, depending on the inclusion date. A database of the Allergy department of an academic hospital in the middle of the Netherlands was used to find eligible patients. Eligibility criteria were:  $\geq 18$  years of age and a diagnosed peanut and/or hazelnut allergy based on anamneses, a positive skin prick test and/or IgE and a positive food challenge. Exclusion criteria were: no internet at home and not able to read and write Dutch. The selection procedure was non-random, due to the low number of eligible patients. Every eligible patient was approached for participation.

Eligible patients received global study information of their attending physician. Then, a researcher called to identify interest to participate. Patients were fully informed and were

given time to decide about participation. If the patient decided to participate, the informed consent was signed. The Secretary of the Medical research ethics committee had determined that the study was not covered by the Medical Research Involving Human Subjects Act (protocol number: 11-309/c).

#### *Outcome parameters, data collection and procedures*

Data collection took place between January and June 2012. Retrospective data collection was performed with two questionnaires and prospective data collection with one questionnaire. The main study parameter was the period prevalence of unexpected allergic reactions to food. Other parameters were incidence, severity, causes and consequences for medical treatment and sick leave (only measured on working participants) of these reactions, and the differences in period prevalence and severity between participants included for peanut allergy and hazelnut allergy.

The Caregivers questionnaire was used for retrospective data collection about disease related factors (history of food allergies, severity of peanut and hazelnut allergy, way of managing food allergy, hay fever, use of medication that suppresses allergic reactions). Topics about hay fever and medication that suppresses allergic reactions were included, because these were potential confounders. A researcher completed the questionnaire at the hospital, at the study baseline, based on a structured interview with the participant and the medical record. The questionnaire consisted of nine items, with varying numbers of sub-questions, depending on the responses. Items were measured on categorical and ratio scale. The Baseline questionnaire was used for retrospective data collection about period prevalence, severity, causes (type of product, type of allergen, way of contact with allergen) and consequences for medical treatment of unexpected allergic reactions, disease related factors (the year that food allergy was diagnosed) and patient demographics (sex, age, education, work situation, living situation). Also, up to five reactions of the past year were further questioned. The participant completed the questionnaire at home on the personal internet account, at the start of the study. The questionnaire consisted of eight items, with varying numbers of sub-questions, depending on the responses. Items were measured on categorical and ratio scale.

The Reaction questionnaire was used for prospective data collection about incidence, causes (type of product, type of allergen, food labelling issues, attitude issues), severity and consequences for medical treatment and sick leave, of unexpected allergic reactions. The participant completed the questionnaire at home on the personal internet account, every time when an unexpected allergic reaction occurred, during the longitudinal period. The

questionnaire consisted of eight items, with varying numbers of sub-questions, depending on the responses. Items were measured on categorical and ratio scale.

In case of ambiguities in a questionnaire, a researcher contacted the participant for clarification and corrected the data after consensus with the participant. To prevent information bias, participants received an e-mail with the question if he/she had allergic reactions to food, every two weeks. Every participant received detailed information about the procedures of data collection.

The questionnaires were newly developed, based on literature and practical experiences regarding prevalence, incidence, severity and causes of unexpected allergic reactions. To achieve face validity, a multidisciplinary team was involved, consisting of an allergist, dietician, nurse scientist, senior allergy nurse and research scientist of the Netherlands Organisation for applied scientific research. Literature about the subject was systematically reviewed (publication in progress). To achieve feasibility of the Reaction questionnaire, a pilot study was conducted in five patients on the Allergy department, showing that it was readable, understandable and the time to complete it was acceptable.

#### *Study size*

The sample size was calculated based on a margin of error of 5%, a confidence level of 95%, a response distribution of 50% and an expected withdrawal of 10%. The sample size for peanut allergy, with a population size of 100, should have been 88 participants. The sample size for hazelnut allergy, with a population size of 170, should have been 130 participants. The population sizes were determined based on a database of an academic hospital in the middle of the Netherlands. However, since this study was the first part of a larger study, there was decided to include minimal nine peanut allergic participants and eleven hazelnut allergic participants.

#### *Statistical methods*

Data were analyzed with descriptive and univariate analysis, conducted with PASW Statistic 18.

Patient demographics on categorical scale were analyzed by calculating frequency data and on ratio scale by calculating the mean, median, minimum and maximum.

The main study parameter period prevalence, measured on categorical scale, was analyzed by calculating frequency data over the past year and the past five years.

Incidence, measured on categorical scale, was analyzed by calculating the person time incidence rate per person month. Causes, consequences for medical care and sick leave, and severity, measured on categorical scale, were analyzed by calculating frequency data. Severity was classified based on the Müller classification which ranges symptoms. Reactions with local complaint (Müller 0) were classified as mild, with skin and mucosa (Müller 1) or gastro-intestinal complaints (Müller 2) as moderate and with respiratory (Müller 3) or cardiovascular complaints (Müller 4) as severe (21).

To analyze whether there was a statistical significant ( $p < 0,05$ ) difference in period prevalence and severity between participants included for peanut allergy and hazelnut allergy, a chi-square test respectively Mann-Whitney U test was required.

Because of the explorative study design, missing data were not included for analyses and were coded as missing in PASW statistic 18.

## Results

Seventy-five eligible patients were approached, resulting in inclusion of 34 participants. (figure 1)

Most participants were female (76%), high educated (55%) and had multiple food allergies (91%). (table 1 and 2)

The Caregivers and Baseline questionnaire were completed by 100% respectively 88% of the participants. Sixty-five retrospective reported reactions were further questioned. All participants participated in the longitudinal period for prospective data collection.

Figure 1

Table 1

Table 2

### *Period prevalence and incidence*

The 5-year period prevalence of unexpected allergic reactions to food was: no reactions (3%), one to five reactions (17%), six to ten reactions (28%) and more than ten reactions (52%). The 1-year period prevalence was: no reactions (21%), one to two reactions (24%), three to five reactions (45%), six to ten reactions (7%) and more than ten reactions (3%).

During the longitudinal period of prospective data collection, fifteen reactions were reported. Showing a person time incidence rate of 0.17 reactions per person-month.

### *Severity*

The severity of the 65 retrospectively reported reactions, was in 29% mild (Müller 0), in 38% moderate (Müller 1: 19%, Müller 2: 19%) and in 30% severe (Müller 3: 25%, Müller 4: 5%). Of the prospectively reported reactions, five reactions were mild (Müller 0), five were moderate (Müller 1: n = 2, Müller 2: n = 3) and four were severe (Müller 3: n = 4).

### *Causes and location*

Causes of the 65 retrospectively reported reactions were prepackaged products (23%), fresh products (23%), constituted dishes at home (2%), constituted dishes at friends/family (7%) and constituted dishes at public eating places (23%). Allergens that caused reactions included peanut (25%), hazelnut (2%), other nuts (8%) and fruit (15%). Most reactions were caused by eating the allergen (89%).

Seven prospectively reported reactions were caused by prepackaged products. In three reactions food labelling was read, on two labels the allergen was not mentioned. Four reactions were caused by constituted dishes outside the house. In two reactions the person who prepared the dish was informed about the food allergy. (table 3)

Table 3
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### *Differences between participants with peanut and hazelnut allergy*

The dataset did not meet the criteria to use the proposed chi-square test and Mann-Whitney U test. Therefore frequencies were calculated to show differences between the participants included for peanut allergy and hazelnut allergy.

The 1-year period prevalence of allergic reactions showed differences: no reactions (peanut: 25%, hazelnut: 11%), one to five reactions (peanut: 70%, hazelnut: 66%), six to ten reactions (peanut: 5%, hazelnut: 11%) and more than ten reactions (peanut: 0%, hazelnut: 11%).

The severity of the retrospective reported reactions of participants included for peanut allergy was in 24% mild (Müller 0) in 43% moderate (Müller 1: 17%, Müller 2: 26%) and in 31% severe (Müller 3: 24%, Müller 4: 7%). The reactions of the participants included for hazelnut allergy was in 39% mild (Müller 0), in 26% moderate (Müller 1: 22%, Müller 2: 4%) and in 26% severe (Müller 3: 26%).



### *Consequences for medical treatment and sick leave*

Medical care was sought by 54% of the participants that experienced allergic reactions in the past 5 year (97%). Of the fifteen participants who sought medical care, five participants went to the emergency department.

Medical care was sought in 11% of the 65 retrospectively reported reactions (n =7), including five times at an emergency department. Nineteen retrospectively reported reactions were severe. After five of these severe reactions medical care was sought.

In none of the prospectively reported reactions medical care was sought.

After none of the prospectively reported reactions, sick leave was reported. (table 4)

Table 4
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## **Discussion**

In this explorative study, the period prevalence, incidence, severity and causes of unexpected allergic reactions to food in adult patients are studied. Retrospective data shows that in five years, 52% of the patients have more than 10 reactions and in one year 25% have more than three reactions. The person time incidence rate is 0.17 reactions per person-month. Of the retrospective reported reactions, 30% is severe. Causes of retrospective reported reactions are prepackaged products (23%), fresh products (23%), constituted dishes at home (2%) and constituted dishes outside the home (30%). More than half of the prospective reported reactions are caused by prepackaged products (n = 7), whereof only three participants read the label.

Anibarro et al. (14) shows a mean of 1.98 unexpected allergic reactions per participant due to hidden allergens over 5-year. This is lower than the results in this study, possibly caused by differences in the samples. Anibarro et al. (14) included participants with all kind of food allergies and in this study every participant had at least a peanut or hazelnut allergy.

Additionally, the major part of the reactions in this study is caused by peanuts and nuts.

Further, the retrospective data in this study shows a slightly higher number of allergic reactions than the prospective data. This is remarkable, fewer reactions were expected in the retrospective part, because of the risk of recall bias.

Previous studies show different results about the severity of unexpected allergic reactions. In three studies, 20% to 36% of the reactions were classified as Müller 4 (3,14,22). However, Comstock et al. (15) reported about reactions aboard airliners, whereof only 4% was

classified as Müller 4, which is close to the results in this study. These differences are remarkable. More severe reactions were expected in this study, given the fact that all participants have a peanut or nut allergy, which are the allergies that provide the largest contribution to severe reactions (8).

Retrospective and prospective reported reactions were mostly caused by constituted dishes respectively prepackaged products. Possibly this difference is caused by bias through the small sample size and short longitudinal period.

Greenhawt et al. (3) reported that 21% of the allergic reactions occur at restaurants. Also, this study shows that reactions often occur at public eating places. Additionally, Bailey et al. (23), shows gaps of knowledge of restaurant staff. For example, over one-fifth of the restaurant staff indicated consuming a small amount of food is safe. This suggests feasible options for improvement of safety in public eating places.

This study shows some food labelling and attitude issues. For example, allergens that are not always mentioned on the label and some participants who ignore precautionary labelling (e.g. this product may contain trace amounts of allergen) or not read labelling. Similar findings were reported by Lämmel & Schnadt (22) who showed that 18% of the food allergic individuals buy products that contain allergens, and by Greenhawt et al. (3) who reported that 60% of food allergic individuals not always avoid products with allergens. These issues are worrying, certainly assuming the advice of Boyce et al. (1) who suggests that products with precautionary labelling must always be avoided.

The retrospective part of this study is threatened by recall bias. Information bias probably influenced the results, because participants self-reported their reaction, which can result in insufficient reporting of reactions and in reporting about reactions caused by other allergens than food (e.g. hay fever). Further, 30% of the participants used antihistamines daily. This medicine suppresses allergic reactions, probably resulting in fewer reactions to food. The power of the sample size is low, causing a higher risk for incorrect conclusions. Differences between participants included for peanut allergy and hazelnut allergy were to be analysed with a chi-square test and Mann-Whitney U test. However, since the dataset did not meet the criteria for these tests, only frequency data were calculated, which weakens the results.

The generalizability is limited through the limited number of participants. The results about food labelling issues can only be generalized to countries which legislation corresponds with the European legislation about food labelling (24).

The large number of unexpected allergic reactions points out the need for better information from nurses and other health care professionals about management of food allergy and prevention of unexpected reactions. Assuming the causes of the reactions, improvement of

food safety seems feasible. For example, through improvement of food labelling and knowledge in public eating places about food allergy.

### *Conclusion*

Adult patients with peanut and hazelnut allergy often experience unexpected allergic reactions to food. The 5-year period prevalence is in 52% of the patients more than 10 reactions, the person time incidence rate is 0.17 reactions per person-month. Retrospective data shows that 30% of the reactions is severe. However only 5% is classified as Müller 4 (cardiovascular complaints). Causes of reactions vary from prepackaged to fresh products and constituted dishes. Reactions to constituted dishes often occur outside the home, where participants do not prepare their own food. Prospective data shows that not every participant is strict in avoiding allergens, which strengthens the results of previous studies about attitude issues. Further there are notable food labelling issues, like allergens that are not mentioned on the label.

However, the retrospective data are threatened by recall bias and the low sample size could cause incorrect conclusions.

### *Recommendations*

Considering the prevalence and incidence of reactions, better information about management of food allergy and prevention of unexpected allergic reactions from nurses and other health care professionals is needed. Given the findings about causes, improvement of food safety seems important. Options to achieve this are improvement of food labelling and knowledge about food allergy in public eating places.

Future research in a larger population with a prospective design and a longer longitudinal period is needed, to acquire more information about the incidence and causes of unexpected allergic reactions to food.

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## Tables and figures

Figure 1: flowchart recruitment of participants

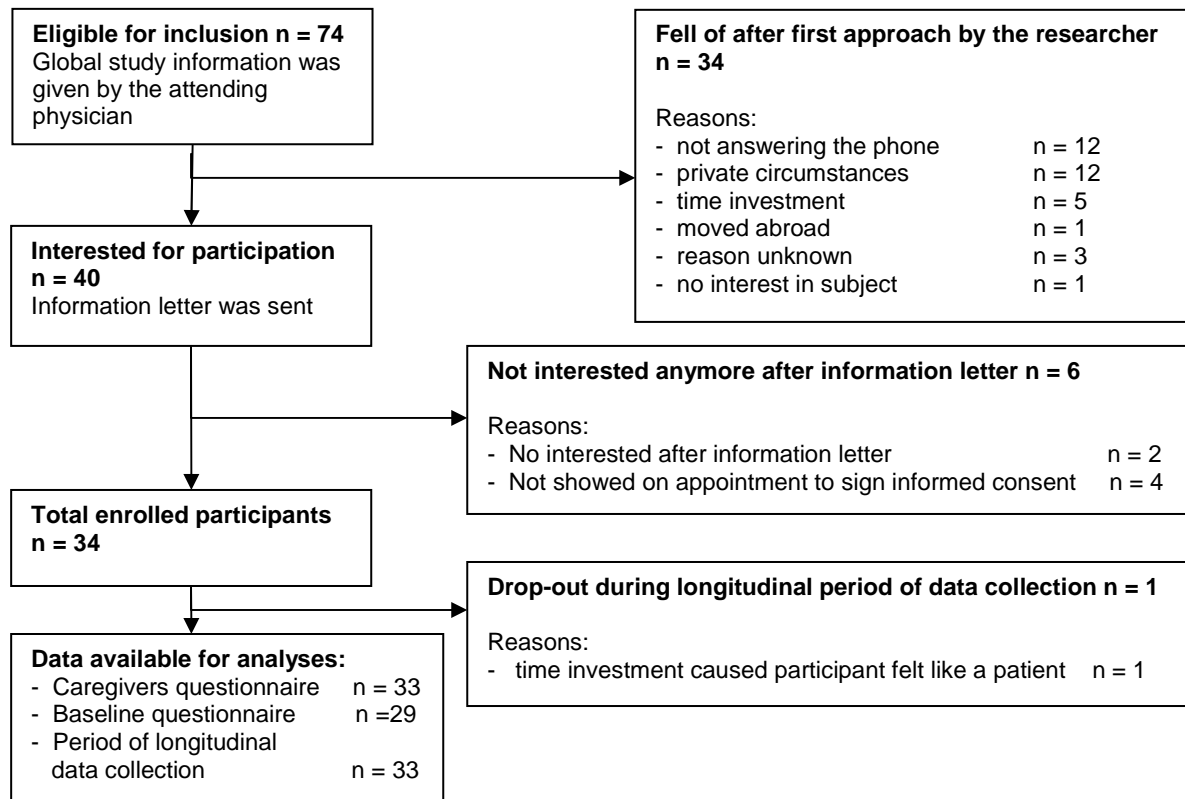


Table 1. Demographics and disease characteristics of the study participants

Characteristics	N (%)
<b>Demographics</b>	
<b>Gender (n = 33)</b>	
Female	25 (76%)
<b>Age (n = 33)</b>	
Mean age at enrolment, in years (SD, minimum-maximum)	37 (11.9, 19-76)
<b>Education (n = 29)</b>	
Primary school, high school or vocational training	12 (41%)
University	16 (55%)
Other	1 (3%)
<b>Work situation (n = 29)</b>	
Paid work or studying	26 (90%)
Retired	1 (3%)
Unemployed, looking for work	1 (3%)
Incapacitated for work, or chronology	1 (3%)
<b>Living situation (n = 29)</b>	
Alone	5 (17%)
With partner	5 (17%)
With partner and children	16 (55%)
With parents/caregivers and brother(s) / sister(s)	1 (3%)
With housemates	2 (7%)
<b>Disease characteristics</b>	
<b>Years of having food allergy (n = 28)</b>	
Mean amount of years that the diagnoses food allergy is known (SD, minimum-maximum)	22 (11.7, 1-47)
<b>Hay fever (n = 33)</b>	
Yes	23 (70%)
<b>Use of medication that suppresses allergic reactions (more answers possible) (n = 33)</b>	
Oral antihistamines	10 (30%)
Oral Corticosteroids	0 (0%)
Inhaled corticosteroids	4 (12%)
None/other	20 (61%)
<b>Read food labels (n = 33)</b>	
Never	2 (6%)
Sometimes/always	31 (94%)
<b>Handling of 'may contain' food labelling (n = 33)</b>	
Always ignores it	14 (42%)
Sometimes/never ignores it	19 (58%)
<b>Handling of 'is made in a factory that uses Ingredients with allergens' food labelling (n = 31)</b>	
Always ignores it	18 (58%)
Sometimes/never ignores it	13 (42%)
<b>Use of brand list (n = 30)</b>	
Never	29 (97%)
<b>Severity of peanut allergy, of participants included for peanut allergy (n = 22)</b>	
Mild	2 (9%)
Moderate	9 (41%)
Severe	11 (50%)



Severity of hazelnut allergy, of participants included for hazelnut allergy (n = 11)	
Mild	6 (55%)
Moderate	3 (27%)
Severe	2 (18%)

*Table 2. History of food allergies*

Category (more answers possible)	Total N (%) N = 33	Participants included for peanut allergy N (%) N = 22	Participants included for hazelnut allergy N (%) N = 11
<b>History of food allergies</b>			
Peanut	27 (82%)	22 (100%)	5 (46%)
Hazelnut	21 (64%)	10 (46%)	11 (100%)
Other nuts <sup>1</sup>	22 (67%)	13 (59%)	9 (82%)
Fruit	18 (55%)	11 (50%)	7 (64%)
Vegetables	12 (36%)	10 (46%)	2 (18%)
Soya	4 (12%)	3 (14%)	1 (9%)
Lupine	4 (12%)	3 (14%)	1 (9%)
Sesame	3 (9%)	2 (9%)	1 (9%)
Shellfish	1 (3%)	0	1 (9%)
Fish	0	0	0
Mollusc	0	0	0
Chicken egg	0	0	0
Cow's milk	0	0	0
Other food allergies	3 (9%)	2 (9%)	1 (9%)
No other food allergies	3 (9%)	2 (9%)	1 (9%)

1: walnut, almond, pecan, cashew nut, macadamia nut, pistachio, brazil nut or kemiri nut

Table 3. Causes and attitude issues related to unexpected allergic reactions to food

Subject	N (%)
<b>Retrospective reported reactions: type of product patient reacted on (n = 65)</b>	
Prepackaged product	15 (23%)
Fresh product	15 (23%)
Constituted dish at home	1 (2%)
Constituted dish at family	1 (2%)
Constituted dish at friends	3 (5%)
Constituted dish at public eating places	15 (23%)
Other	4 (6%)
Unknown	11 (17%)
<b>Prospective reported reactions: type of product patient reacted on (n = 15)</b>	
Prepackaged product with a food label	6
Prepackaged product without a food label	1
Fresh product	3
Product/dish in a foreign country	1
Constituted dish at work	1
Constituted dish at family	2
Constituted dish at friends	1
<b>Retrospective reported reactions: allergen that caused reaction (n=65)</b>	
Peanut	16 (25%)
Fruit	10 (15%)
Other nuts (walnut, almond, pecan, cashew nut, macadamia nut, pistachio, brazil nut or kemiri nut)	5 (8%)
Hazelnut	1 (2%)
Shellfish	1 (2%)
Sesame	1 (2%)
Soya	1 (2%)
Lupine	1 (2%)
Cow's milk	1 (2%)
Vegetables	1 (2%)
Other	3 (5%)
Unknown	24 (37%)
<b>Way of contact with the allergen (n=65)</b>	
Eating the allergen	58 (89%)
Skin contact with another person	4 (6%)
Inhaling the allergen	3 (5%)
<b>Prospective reported reactions: handling of food labels on prepackaged product (n=6)</b>	
Not read label, participant not expected the product contained allergens	1
Not read label, reaction was caused by cross contamination by dirty dinner	1
Not read label, reason unknown	1
Read label, but no allergens were mentioned	2
Read label, participant ignored warning 'is made in a equipment that processes allergens'	1
<b>Prospective reported reactions: person who prepared a constituted dish outside the home was informed about the food allergy (n = 4)</b>	
Yes, the participant called	2
No, because the constituted dish was prepared by family	1
No, because the constituted dish was prepared by a colleague	1

*Table 4. Consequences for medical care and sick leave of unexpected allergic reactions to food*

<b>Category</b>	<b>N (%)</b>
<b>Frequency of seeking medical care in the past 5 years (n = 28)</b>	
0 times	13 (46%)
1 – 5 times	9 (32%)
6 – 10 times	3 (11%)
> 10 times	3 (11%)
<b>Type of medical care that was sought in the past 5 years (n = 15)</b>	
General practitioner	10 (67%)
Emergency department	5 (33%)
<b>Retrospective reported reactions: sought medical care (n = 65)</b>	
No	58 (89%)
Yes, at general practitioner	2 (3%)
Yes, at emergency department	5 (8%)
<b>Retrospective reported severe reactions: sought medical care (n=19)</b>	
No	14 (74%)
Yes, at general practitioner	2 (11%)
Yes, at emergency department	3 (16%)
<b>Prospective reported reactions: frequency of seeking medical care (n = 15)</b>	
0 times	15 (100%)
<b>Prospective reported reactions: sick leave after reactions (n = 11)</b>	
No	11 (100%)

## Samenvatting

**Titel:** Onverwachte allergische reacties op voedsel bij volwassen patiënten met hazelnoot of pinda allergie: een exploratieve studie.

**Achtergrond:** Er is weinig bewijs over de prevalentie, incidentie, ernst en oorzaken van onverwachte allergische reacties op voedsel bij volwassenen. Voorgaande studies zijn vaak uitgevoerd in gemixte populaties, soms met een kwalitatief en/of retrospectief design.

**Doel en onderzoeksvraag(vragen):** Een bijdrage leveren aan verbetering van informatievoorziening in de gezondheidszorg, en voedselveiligheid, om het aantal allergische reacties te verminderen. De verkorte onderzoeksvraag was: wat is de periode prevalentie, incidentie, ernst en oorzaken van onverwachte allergische reacties op voedsel bij pinda en/of hazelnoot allergische volwassenen?

**Methode:** Een kwantitatieve, exploratieve studie met een retrospectief en longitudinaal, prospectief gedeelte. Pinda- en hazelnootallergische volwassenen zijn niet-random geselecteerd vanuit een Nederlands academisch ziekenhuis. Datacollectie vond plaats tussen januari en juni 2012. De hoofd studieparameter was de periode prevalentie. Twee vragenlijsten werden gebruikt voor retrospectieve datacollectie. Eén vragenlijst werd gebruikt voor prospectieve datacollectie, gedurende een longitudinale periode van 8-12 weken. Parameters werden geanalyseerd met beschrijvende en univariate analyses.

**Resultaten:** Vierendertig deelnemers zijn geïnccludeerd. De periode prevalentie over 5 jaar was in 52% meer dan tien reacties. De persoonstijd incidentie proportie was 0,17 reacties per persoonsmaand. Van de retrospectief gerapporteerde reacties was 30% ernstig. Oorzaken waren voorverpakte/verse producten (46%), samengestelde maaltijden thuis (2%) en samengestelde maaltijden buitenshuis (30%). Van de prospectief gerapporteerde reacties op voorverpakte producten (n = 7), hadden drie deelnemers de voedsletikettering gelezen.

**Conclusie:** Pinda- en hazelnootallergische volwassenen ervaren regelmatig allergische reacties, waarvan bijna één derde ernstig. Reacties op samengestelde maaltijden vinden vaak buitenshuis plaats. Er zijn voedsletikettering en attitude problemen, bijvoorbeeld niet op ieder label staat het allergeen vermeld en niet iedere patiënt leest de voedsletikettering.

**Aanbevelingen:** Verbetering van informatievoorziening vanuit de gezondheidszorg over het managen van voedselallergie en preventie van allergische reactie. Verbetering van voedselveiligheid, bijvoorbeeld door verbetering van voedsletikettering en kennis over voedselallergie in publieke eetgelegenheden.

**Trefwoorden:** voedselallergie, reacties, prevalentie, ernst, etikettering

## Abstract

**Title:** Unexpected allergic reactions to food in adult patients with hazelnut or peanut allergy: an explorative study.

**Background:** There is lack of knowledge about the prevalence, incidence, severity and causes of unexpected allergic reactions to food in adult. Previous studies are often carried out in mixed populations, with a qualitative and/or retrospective design.

**Aim and research question(s):** Contribute to improvement of information from health care professionals, and food safety to reduce the number of allergic reactions. The abbreviated research question was: what is the period prevalence, incidence, severity and causes of unexpected allergic reactions to food in peanut and/or hazelnut allergic adults?

**Method:** A quantitative, explorative study, with a retrospective and longitudinal, prospective part. Peanut and hazelnut allergic adults were non-random recruited from a Dutch academic hospital. Data collection took place between January and June 2012. The main study parameter was period prevalence. Two questionnaires were used for retrospective data collection. One questionnaire was used for prospective data collection, during a longitudinal period of 8-12 weeks. Parameters were analysed with descriptive and univariate analyses.

**Results:** Thirty-four participants were included. The 5-year period prevalence was in 52%, > 10 reactions. The person time incidence rate was 0.17 reactions per person-month. Of the retrospective reported reactions, 30% was severe. Causes were prepackaged/fresh products (46%), constituted dishes at home (2%) and constituted dishes outside the home (30%). Of the prospective reported reactions on prepackaged products (n=7), three participants read the label.

**Conclusion:** Peanut and hazelnut allergic adults often experience allergic reaction, whereof almost a third is severe. Reactions on constituted dishes mostly occur outside the home. There are food labelling and attitude issues, for example not every label mentions all allergens and not every patient reads labelling.

**Recommendations:** Improve information from health care professionals about management of food allergy and prevention of allergic reactions. Improve food safety, e.g. improving food labelling and knowledge about food allergy in public eating places.

**Keywords:** food allergy, reactions, prevalence, severity, labelling