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Profile of Peanut Sensitization in Children Attending a Pneumo-Allergology Consultation at the Teaching Hospital Campus of Lomé, Togo

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Abstract

Introduction: Food allergies are on the constant increase worldwide. Among them is peanut allergy, which also affects children. The aim of this study was to determine the profile of peanut sensitization in children attending a pneumo-allergology consultation. **Methods:** This was a cross-sectional study, which ran from January 1, 2018, to December 31, 2022, on children sensitized to peanuts seen in pneumo-allergology consultations at the Teaching Hospital Campus of Lomé. **Results:** The sample included 137 children aged 3 months to 18 years. The frequency of peanut sensitization was 25.3%. The mean age of patients was 6.3 ± 4.3 years (minimum 6 months and maximum 18 years). The 6 months to 5 years age group was the most represented (43.1%). The sex ratio was 1.3. The main reasons for consultation were rhinorrhea (67.9%), sneezing (36.5%) and cough (35.8%). Allergic rhinitis was identified as a personal history in 75.2% of patients. Peanut allergy was manifested as rhinorrhea (62.5%), asthma (26.8%) and eczema (8.9%). The risk of onset of symptoms within 15 - 30 minutes was 1.87 times (p = 0.001, CI = [1.2 - 2.1]) for peanuts consumed in roasted form with shell. Severe clinical signs such as Quincke's Edema and anaphylactic shock were found in 1.4% of cases. **Conclusion:** Peanut allergy was common in children. Severe clinical signs were rare.

Keywords

Peanut, Sensitization, Allergy, Child, Togo

1. Introduction

In recent years, the incidence of food allergies has been rising steadily worldwide. It has doubled in five years and represents a major public health issue [1]. The

peanut (*Arachis hypogaea*), whose fruit is called "cacahuète", is a plant in the Fabaceae family, cultivated for its oil seeds [2]. In Africa, peanuts are an early ingredient in many family dishes, unlike in European countries. Peanuts contain proteins and fats whose benefits are said to be invaluable. However, peanuts can be the cause of severe clinical manifestations through an allergic mechanism in some children [3]-[5]. The aim of this study was to determine the profile of peanut sensitization in children.

2. Methods

This was a cross-sectional study covering the period from January 1, 2018, to December 31, 2022, *i.e.* a total of 60 months. The study involved all children and adolescents who were seen in the pneumo-allergology unit of the Teaching Hospital Campus during the study period.

We included in the study children aged 3 months to 18 years who were sensitized to peanut after acceptance and completion of the skin test. We did not include in our study patients who had refused to do the skin test, patients who were not sensitized to peanut, patients sensitized to peanut but who had refused to answer the questions; patients with dermographism.

The parameters studied were demographic data (age, sex, residence); clinical data (reason for consultation, time of onset of symptoms, nature of peanut, personal and family history of allergy, clinical signs) and prick test results. The oral provocation test was carried out in patients who had clinical signs suggestive of allergy, but in whom the skin prick test was negative.

In these children, we checked that there were no contraindications to prick testing (extensive dermatitis, history of anaphylactic accident) or recent medications that could interfere with the results, such as antihistamines, corticoids, codeine products or dermocorticoids.

The prick test was performed by pricking the skin through a drop of allergen extract or, in the case of a native test, by pricking into the food containing peanuts and then into the skin (prick to prick). We used plastic needles (Staller point 1 or ALK prick lancet). Control tests were carried out to check skin reactivity (positive control) and eliminate dermographism (negative control). Histamine hydrochloride 10 mg/ml was used for the positive control, and a glycerin solution for the negative control. The location of each allergen was marked with a ballpoint pen. A safety distance of 2 cm was maintained between allergens, and the diameter of the papules was measured. The reading was taken at 20 minutes. The criterion for positivity was defined by the diameter of the papule. The European Academy of Allergology defines a positive test as a papule greater than or equal to 3 mm compared with the negative control, or a papule whose diameter is greater than or equal to half the diameter of the positive control papule [6] [7].

Sampling was defined by convenience sampling according to the inclusion criteria. Data collection was based on an individual survey form administered during an interview session with patients and their parents, together with the results of

skin tests. Data was entered using Epi Data software version 4.7.0. Epi info version 7.2.6 was used for data processing and analysis.

3. Results

During the study period, 1750 patients consulted the pneumo-allergology unit of the Teaching Hospital Campus of Lomé. Of these, 1625 were eligible for skin testing (prick test). The number of patients who performed the skin test was 542, representing a skin test frequency of 33.3%.

Of the 542 patients who completed the test, 137 were sensitized to peanut. The frequency of peanut sensitization was 25.3%.

The mean age of the patients was 6.3 ± 4.3 years, with a minimum of 6 months and a maximum of 18 years. The 6 months to 5 years age group accounted for 43.1%. Males predominated in 56.9% of cases, with a sex ratio of 1.3.

The main reasons for consultation (Figure 1) were rhinorrhea (67.9%), sneezing (36.5%), cough (35.8%) and ocular pruritus (24.1%). Severe clinical signs such as Quincke's Edema and anaphylactic shock were found in 1.4% of cases.

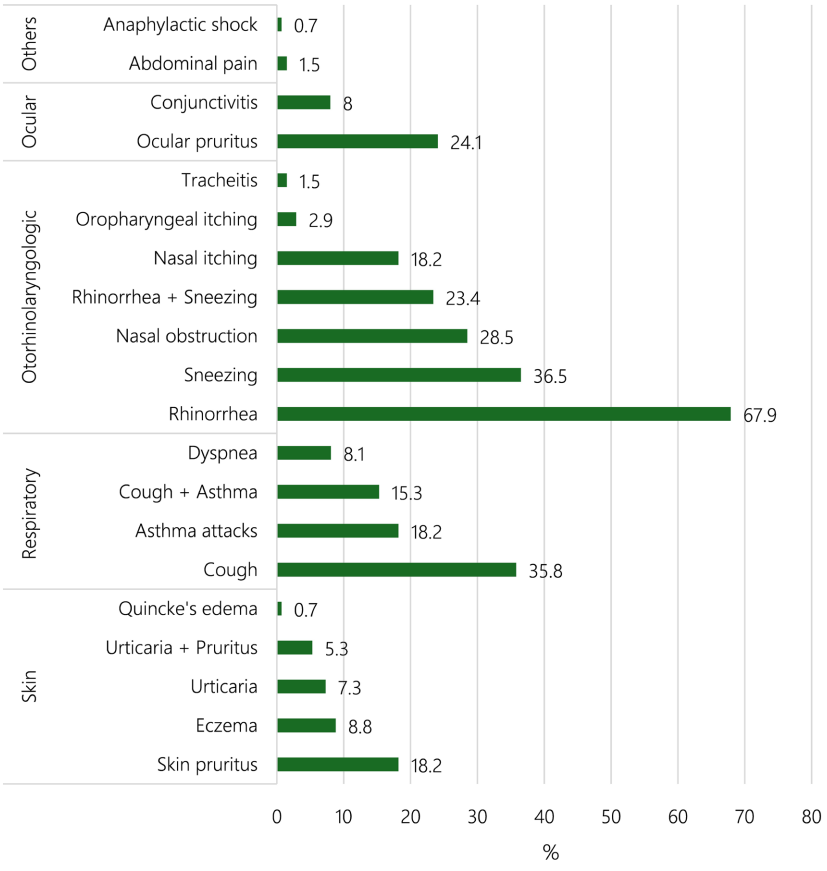
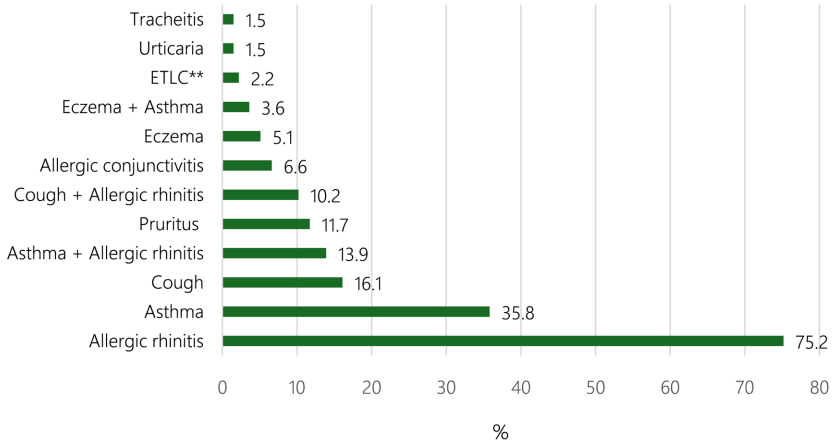


Figure 1. Distribution of patients by consultation reason.

All patients (100%) had a family history of allergy. The family allergy was allergic rhinitis in 72.3% of cases (Figure 2). The children's mothers had more allergy

history (44.8%) than the children's fathers (20.7%).



**ETLC: Endemic tropical limbo-conjunctivitis.

Figure 2. Distribution of patients by family history.

Patients who consumed peanut sauce accounted for 79.6% of cases (**Table 1**).

Table 1. Distribution of patients according to the form of peanut consumed.

	N*	%*
Sauce	109	79.6
Roasted with shell	100	72.9
Roasted without shell	60	43.8
Dried	52	37.9
Fresh	46	33.6
Boiled	21	15.3

*Some patients consumed several forms of peanut.

The mean time to onset of symptoms was 59.04 +/− 11.23 min (**Table 2**).

Table 2. Distribution of patients by time to symptoms onset.

	N	%
[15 - 30 min]	19	13.9
[30 - 60 min]	50	36.5
[1 - 2 h]	42	30.7
[2 - 6 h]	11	8.0
[6 - 24 h]	15	10.9
Total	**137**	**100**

The risk of onset of symptoms within 15 - 30 minutes was 1.87 times for peanuts consumed in roasted form with shell and was 1.51 times for peanuts consumed in

sauce form (Table 3).

Table 3. Distribution of patients by form of peanut and time of symptoms onset.

	Sauce N (%)	Roasted with shell N (%)	Roasted without shell N (%)	Dried N (%)	Fresh N (%)	Boiled N (%)	*p-value*	OR* [CI**]
[15 - 30 min]	15 (78.9)	16 (84.2)	8 (42.1)	9 (47.6)	8 (42.1)	2 (1.1)	**0.001**	1.87 [1.2 - 2.1]
[30 - 60 min]	46 (92)	40 (80)	27 (54)	25 (50)	20 (40)	9 (18)	**0.002**	1.51 [1.3 - 1.9]
[1 - 2 h]	28 (66.7)	25 (59.5)	13 (30.9)	12 (28.5)	11 (26.1)	7 (16.6)	0.321	0.51 [0.4 - 0.8]
[2 - 6 h]	8 (72.7)	7 (63.6)	8 (72.7)	3 (27.2)	2 (18.2)	2 (18.2)	1.21	0.41 [0.3 - 1.1]
[6 - 24]	12 (80)	12 (80)	4 (26.6)	3 (20)	5 (33.3)	1 (6.6)	2.12	0.51 [0.3 - 1.1]

*OR: Odds Ratio; **CI: 95% confidence Interval.

In this study, 54 patients (39.4%) had had their total IgE levels measured. Of these, 36 (66.7%) had elevated levels.

Chest X-rays were performed in patients with pulmonary signs. Twenty patients (14.6%) had had chest X-rays, with normal results. Radiography of the cavum was performed in 24 patients (17.5%). Enlarged adenoids were found in 11 patients (45.8%).

The diagnosis was allergic rhinitis (82.5%), allergic rhinitis associated with asthma (56.2%), eczema associated with asthma (25.5%), allergic conjunctivitis (19.7%), allergic rhinitis associated with adenoid hypertrophy (8%), bronchiolitis (6.6%), lymboconjunctivitis endemic of tropics (2.2%) and anaphylactic shock (0.7%).

An oral provocation test was performed in 19 (13.9%) patients. Of these, 18 presented clinical manifestations such as erythema on the internal mucosa of the lower lip (33.3%), coughing (22.7%) and sneezing (16.7%).

Patients were polysensitized to other food allergens such as egg (56.2%), shrimp (54.7%), crab (15.3%), soy (7.3%) and banana (6.6%). They were also sensitized to pneumallergens such as *Dermatophagoides pteronyssinus* (Dp) (96.4%), *Dermatophagoides farinae* (Df) (96.4%), *Blomia tropicalis* (Bt) (94.2%), cockroach (71.5%) and cat dander (32.1%).

4. Discussion

The skin test frequency was 33.3%. Douti *et al.* [8] in Togo had found a realization rate of 38.8% in 2019. For Agodokpessi *et al.* [9] in Benin in 2018, the skin test realization rate was 91.5%. This low skin test completion rate in this study is probably linked to the lack of awareness among the population of the importance of performing this allergological examination, and to the relatively high cost of the test in Togo.

The frequency of peanut sensitization was 25.3%. Mbainaissem *et al.* [10] in Togo in 2011 and Ghadi *et al.* [11] in Marrakech in 2007 found 12% and 6%

respectively. This frequency shows an increase in peanut sensitization among Togolese children over the years. This should prompt research into associated factors.

We found a predominance of males, with a sex ratio of 1.3. Peanut allergy in children is not unequivocally distributed according to sex in the literature. Indeed, Mbainaissem *et al.* [10] in Togo found a male predominance, with a sex ratio of 1.17. Guenard-Bilbault *et al.* [12] in France found a male predominance with a sex ratio of 1.9. However, Antoinette *et al.* [13] in 2016 in an urban school setting in Côte d'Ivoire noted a predominance of females, with a sex ratio of 0.78.

The reasons for consultation in this study were dominated by rhinorrhea (67.9%), sneezing (36.5%) and coughing (35.8%). Mbainaissem *et al.* [10] found a predominance of sneezing (40.2%), coughing (39.2%) and rhinorrhea (38.2%). Ghadi *et al.* [11] in Marrakech found a predominance of asthma (48%), rhinoconjunctivitis (28%) and atopic dermatitis (4%). Rhinorrhea, sneezing and coughing must be investigated for an allergic cause if they become recurrent or chronic in children.

Severe clinical signs such as Quincke's Edema and anaphylactic shock were found in 1.4% of cases. This low frequency of severe allergy symptoms could be explained by the fact that peanuts are included in children's diets in Togo from a very early age. In fact, studies have shown that early introduction of peanuts into children's diets results in less sensitization, and even fewer severe signs of allergy [14]-[16]. Also, the rate of exclusive breastfeeding is 58% in Togo, with a rate of 94% for continued breastfeeding for up to one year [17]. Yet maternal consumption of peanuts during pregnancy and breastfeeding has a preventive effect on the degree of peanuts allergy in children [18]-[20].

Familial allergy is a well-known risk factor in allergic diseases [21]-[23]. In this study, all patients (100%) reported a history of familial allergy. Ghadi *et al.* [11] in Morocco and Antoinette *et al.* [13] in Côte d'Ivoire found a 43% and 60% history of familial allergy respectively. The dominant familial allergy was allergic rhinitis (73.3%). Paty *et al.* [24] found allergic rhinitis in 27% of cases. For Mbainaissem *et al.* [10], asthma (41.2%) was the most common familial allergy. Mothers (63.5%) of patients were most concerned by a family history of allergy. Ghadi *et al.* [11] found that mothers predominated in 59% of cases.

The time to onset of symptoms was between 30 and 60 minutes (36.5%). A similar delay was found in France by De Boissieu [25] in 2002. According to his study, symptoms of peanut allergy occur within a few minutes to a few hours after ingestion, and in most cases within half an hour.

Peanuts were consumed mainly in sauce form (79.6%), followed by roasted with shell (72.9%) and roasted without shell (43.8%). In the series by Guenard-Bilbault *et al.* [12] in France, peanuts were consumed mainly in butter form (59.6%). This can be explained by the fact that the way peanuts are consumed is linked to the customs of each people.

Total IgE levels were elevated in 66.7% of cases. However, elevated total IgE is

not necessarily indicative of an allergy, as total IgE can be elevated in certain cases, such as parasitosis. This was demonstrated by Rancé *et al.* [26] in a study carried out in France, who stated that total IgE levels can be normal in 20% to 30% of patients with a definite allergy, and conversely, they can be elevated in various pathological circumstances unrelated to allergy (parasitosis, smoking).

Enlarged adenoids were found in 45.8% of cases. Adenoid hypertrophy is frequently found in allergic children [27].

Nineteen (19) patients had received oral provocation tests. They were positive in 18 patients (94.7%). Guenard-Bilbault *et al.* [12], carried out oral provocation tests in 40 patients, and it was positive in 35 (87.5%).

All patients (100%) in this study were polysensitized. Polysensitization is often common in allergic diseases [11] [26]. Indeed, patients were also sensitized to egg (56.2%) and shrimp (54.7%). In Togo, two decades earlier, Bakondé *et al.* [28] found that, apart from peanuts, eggs predominated among food allergies (16.7%), followed by cow's milk (7.1%). For Rancé *et al.* [26] in France, egg (51.8%) was the predominant food allergy, followed by cow's milk (11.6%). All patients (100%) sensitized to peanut also had sensitization to pneumallergens. House dust mites were the most represented, namely *Dermatophagoides pteronyssinus* (96.4%), *Blomia tropicalis* (94.2%) and *Dermatophagoides farinae* (96.4%). Patients were sensitized to cockroach in 71.5% of cases and to cat dander in 32.1%. Ghadi *et al.* [11] found sensitization to *Dermatophagoides pteronyssinus* in 12% of cases, *Blomia tropicalis* in (10%) of cases and *Dermatophagoides farinae* (8%), noting sensitization to cockroach in 14% of cases and cat dander in 13% of cases.

5. Conclusion

This study showed that peanut allergy is common in Togolese children. Clinical signs were dominated by rhinorrhea, asthma and eczema. Severe clinical signs were rare, as peanuts are a food staple consumed from an early age in Togo, resulting in a natural tolerance. Most patients were polysensitized to other food allergens and pneumallergens such as house dust mites.

Conflicts of Interest

The authors declare no conflict of interest.

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