

## Most Common Food Allergen in Pediatric Age Group in Maternity and Children Hospital, Makkah-Saudi Arabia: A Cross-Sectional Study

Fay Abdulsamad<sup>1\*</sup>, Matar Alsomali<sup>1</sup> and Husni Rayes<sup>2</sup>

<sup>1</sup>Saudi Board Pediatric Resident, Maternity and Children Hospital, Makkah, Saudi Arabia

<sup>2</sup>Pediatric Immunology and Allergy Consultant, Maternity and Children Hospital, Makkah, Saudi Arabia

\*Corresponding Author: Fay Abdulsamad, Saudi Board Pediatric Resident, Maternity and Children Hospital, Makkah, Saudi Arabia.

Received: May 16, 2023; Published: May 31, 2023

### Abstract

**Background:** Although food allergies have been more common over the last several decades, very little is known about them in Makkah, Saudi Arabia. This research set out to determine the most common food allergen among children under the age of 14 years in Makkah, Saudi Arabia.

**Methods:** Cross-Sectional study Conducted in Maternity and - Children Hospital Makkah, Saudi Arabia. Pediatric age group 4 month - 14 years both male and female Presented to maternity and children hospital Diagnosed with Food Allergy between 2016-2019, Makkah, Saudi Arabia. Date collection Tool was excel sheet spread based on our hospital Data Registry, Validity of the Excel form Checked by Pediatric Consultant. First part Included Socioeconomic Date of the Patient (Age-Gender-Nationality), Second Part Include Food allergy (History of the Disease), Third part (Anaphylaxis), fourth part (Types of food allergy). Sample size was 150 Patient (estimated sample, no need for sample size Calculation). Data entry and statistical analysis were done to Personal Computer and analysis of the Data was done Using SPSS Version 23.

**Results:** The researchers obtained 1066 children's result and information's collected from the data base of the maternity and children in Makkah in collaboration with IT department. The majority of the samples were males (62.7%). Age ranged from 7 months to 14 years and the median age among children included in this study was 5 years. There was not a significant difference in the rate of food allergy between the sexes (males 384 vs. females 150) in children included in this study ( $P > 0.05$ ). Males had a higher prevalence of food allergy than females did. Seafood allergies were the most prevalent kind of food allergy and skin symptoms were the most common type of allergic manifestation.

**Conclusion:** The most common food allergen in pediatric age group in maternity and children hospital Makkah - Saudi Arabia was shrimp followed by other seafoods, egg whites, wheat and orange.

**Keywords:** Food Allergen in Pediatric; Children Hospital; Makkah; Saudi Arabia

### Introduction

The term "food allergy" refers to a group of symptoms characterized by an inappropriate or excessive immune response to dietary proteins known as allergens. Pathophysiologies of food allergy may be either IgE-mediated, non-IgE-mediated (cell-mediated), or a combination of the two [1]. Skin, respiratory, digestive, and cardiovascular problems are also possible food allergy manifestations [2].

Recently, food allergy has emerged as yet another allergy pandemic [3], joining the ranks of asthma and allergic rhinitis. Over the last 30 years, the incidence of food allergy has risen over the world, and now affects 6 - 8% of children [4]. Children and their families are severely impacted by food allergy [14].

Food allergy is connected with regional and nutritional variances and myriad other unknown variables; hence, its precise prevalence is difficult to quantify [5]. Epidemiological evidence for food allergy shows that the rate of food allergy as reported by parents has been rising in recent years. There is a 1.2 percent rise in the reported prevalence of food allergy among the general population per decade, according to the studies [6]. To diagnose food allergy, doctors must collect patient medical and dietary history, do a physical exam, administer a skin prick test (SPT), measure specific IgE (sIgE), perform trial elimination diets, and then subject patients to food challenges. According to the World Allergy Organization (WAO), 10% of nations keep track of food allergy prevalence statistics using oral food challenges (OFCs) [7]. The incidence of food allergy has climbed to 18% [8] in the United States, according to data acquired by surveys and sIgE tests. It was shown in an Australian research [9] that roughly 10% of 12-month-old children tested positive for food allergy when an OFC was performed. Preschoolers in Thailand had a self-reported incidence of 9.3 percent for food allergy, with an OFC verified prevalence of at least 1.11% (95% CI, 0.41 - 2.98 percent) [10]. Although estimates of the true frequency of food allergy were difficult to get in Japan, it is estimated that 350,000 children have been diagnosed with the disorder so far [11].

Among Asian countries, the self-reported food allergy rate in preschoolers in Thailand was 9.3 percent [10]; among children aged 2 to 6 in Hue, the rate was 9.8 percent [12], and among children in Tien Giang, the rate was 7.9 percent [12]. Moreover, a multi-city study in China found that the self-reported food allergy rate in children aged 3 to 5 years was 6.6 percent [13]. Concerned parents may overstate their child's sensitivity to food allergy. As a whole, the prevalence of food allergy was lower than the rate reported by parents and students, although this gap was not present across geographic areas. There was a 10% frequency of food allergy among babies in certain wealthy nations [7]. The prevalence of food allergy was estimated to be 0.9% (95% CI: 0.8 - 1.1%) [13] in both children and adults aged 0 - 17 years by a systematic study. Preschool-aged children in Thailand had a prevalence of food allergy of 1.11 percent (95% CI, 0.42 - 2.98%) [10]. China's under 3 years old population has a prevalence rate of between 3.5% and 7.3% [14,15]. SPTs and sIgE measures corroborated a prevalence of 0.31 percent for food allergy in children 7 to 12 years old in a research conducted in Guangzhou, China [5]. The food allergy prevalence was greater in [12] research (0.58%) than in the study in Guangzhou. To a certain degree, the food allergy prevalence in the urban region of Wenzhou is not lower than the prevalence in Guangzhou. The prevalence of food allergy in [12] research (0.84%) was between that of babies and school-aged children in the abovementioned locations. Only 5.71 percent of food allergy children tested positive for more than one allergen, far lower than the 57.30 percent proportion reported by their parents. Some youngsters may have built up a tolerance to certain foods, such as milk, and this might be a contributing factor. An overwhelming majority (87%) of newborns with milk allergies outgrew their allergy by the time they were 3 years old, according to a research published in 2013 [16].

While researchers have devoted considerable time and energy to understanding the spread of food allergy in other parts of the world, this topic has received very less attention in Saudi Arabia. The incidence of pediatric food allergies in KSA is little understood. Imam Mohammad ibn Saud Islamic University Medical Centre, Riyadh, Saudi Arabia conducted a study which found that the incidence of food allergies has grown considerably over the last decade. Despite the fact that a different study out of Shaqra University in Saudi Arabia found that most people there were unaware of juvenile food allergies, which might potentially distort the true frequency there [5,14].

It is estimated that 8% of children less than 5 years old suffer from food allergies. Though there is currently no treatment, some children are able to outgrow their food allergies as they mature. often manifests itself during the first two years of a person's existence [17].

According to a study conducted at the College of Medicine and King Khalid University Hospital in Riyadh, Saudi Arabia, on a total of 217 patients, 17.5% of those with asthma, allergic rhinitis, and urticaria have Immunoglobulin E antibodies in a number of different foods,

with peanut (23%), egg (15%), and cow's milk (13%) [18,27]. One may be allergic to at least 70 different foods. Cow's milk, eggs, peanuts, tree nuts, wheat, and soy allergies are the most frequent types of food allergies in children [19-21,28].

The global prevalence of food allergy has not been reliably verified or updated, particularly among children. This study intends to help future researchers evaluate the frequency of food allergies in children by identifying the most prevalent allergens among children in the database of the Maternity and Children's Hospital in Makkah, Saudi Arabia.

### Methods

#### Study type and design

Cross-sectional study conducted in Maternity and - Children Hospital Makkah, Saudi Arabia.

#### Study duration and time line

- Stage 1: Proposal approval from the research committee - 1 month.
- Stage 2: Recruitment of patients: review medical records, data extraction and collection - 1 month.
- Stage 3: Data analysis - 1 week.
- Stage 4: Manuscript writing - 3 weeks.

#### Study population

Pediatric age group 4 month - 14 years both male and female Presented to maternity and children hospital Diagnosed with Food Allergy between 2016-2019, Makkah, Saudi Arabia.

#### Inclusion criteria

Any child age group (4 month -14 Years old).

Children with food allergy (Confirmed by pediatric consultant diagnosis based on clinical symptoms, confirmatory test: (Radioallergosorbent test (RAST), Immunoglobulin-E specific Food Antigen Antibodies, Prick Skin Test).

#### Exclusion criteria

Patients with (Food intolerance, Lactose intolerance).

#### Data collection methods

- Date collection tool: Excel sheet spread based on our hospital Data Registry, Validity of the Excel form Checked by Pediatric Consultant. First part Included Socioeconomic Date of the Patient (Age-Gender-Nationality), Second Part Include Food allergy (History of the Disease), Third part (Anaphylaxis), fourth part (Types of food allergy)
- Sample size: 150 Patient (estimated sample, no need for sample size Calculation).
- Data entry and statistical analysis: Data Entry done to Personal Computer and analysis of the Data was done Using SPSS Version 23.
- Ethics and confidentiality: All Data were Be Kept Confidential and protected by hospital policies, authors of this research solely have access to the data.

### Results

The researchers obtained 1066 completed questionnaires. There were 668 males (62.7%). Figure 1 shows participants distribution based on gender. The median age among children included in this study was 5 years. Age ranged from 7 months to 14 years.



Figure 1: Distribution of study participants based on gender.

Most of study participants were Saudi (n = 1008, 94.6%). Other nationalities are illustrated in figure 2.

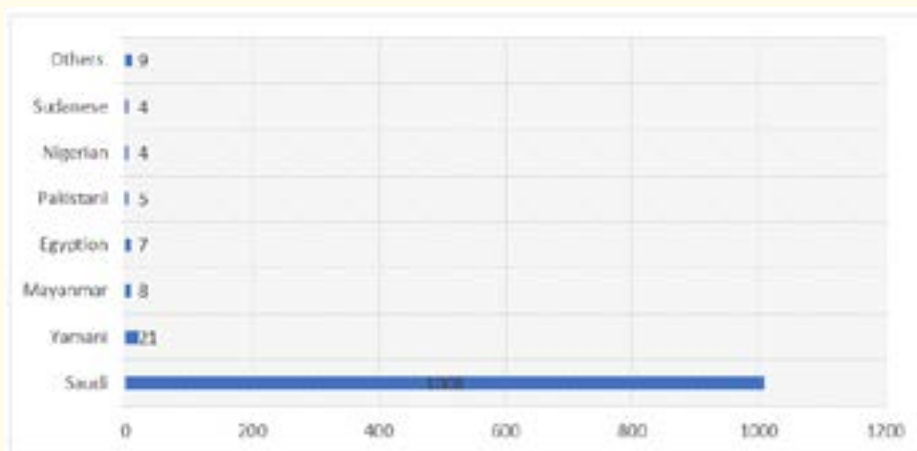


Figure 2: Distribution of study participants based on nationality.

Study included responses from 1066 parents of children by completing the questionnaires. As a result of this, the parent-reported rate of food allergy was 137 (12.86%), as there was a total of 498 parents who said that their children suffered from asthma (46.71%). There was not a significant difference in the rate of food allergy between the sexes (males 384 vs. females 150) in children included in this study ( $P > 0.05$ ). Males had a higher prevalence of food allergy than females did. In the instances Shrimp allergies were the most prevalent kind of food allergy, and (46.43%) of the Sample showed mild form of allergic reaction like skin manifestation, while only (10.31%) of the population showed severe form of allergic manifestation that might involve multiple system of the body. Skin symptoms were the most common type of allergic manifestation.

There were 146 children were given SPTs in addition to having their sIgE levels measured. Shrimp was the allergen included in the SPT with the greatest positive rate, accounting for 13.01% of all positive reactions. This was followed by seafood with a 12.33% positive rate,

egg whites with an 11.64% positive rate, fish with a 10.88% positive rate, and Wheat with a 10.03% positive rate. Shrimp was the most prevalent allergy out of the 9 allergens that were measured by sIgE. Table 1 shows the detailed parent-reported food allergen.

Food	Frequency	Percentage
Shrimp	138	12.94
Seafood	131	12.28
Egg White	124	11.63
Fish	116	10.88
Wheat	107	10.03
Orange	82	7.69
Milk	81	7.59
Tuna	74	6.94
Gluten	35	3.28
Rice	31	2.90
Acacia	30	2.81
Banana	14	1.31
Mango	13	1.21
Peanut	10	0.94
Soybean	9	0.84
Sesame	5	0.46
Tomato	4	0.37
Buckwheat	4	0.37
Hazel	2	0.18
Caco	0	0
Chicken	0	0
Gelatin	0	0
Barley	0	0

**Table 1:** Food allergy type among study participants.

## Discussion

An epidemiological study conducted in Maternal and Children Hospital in Makkah, Saudi Arabia Aim to identify the most common food allergen. Shrimp, Seafood, egg white, wheat and orange appeared to be the most frequently encountered allergies among participants in this research. The majority of allergic reactions manifested themselves in the form of skin problems. The most common food allergen was Shrimp accounting for 12.94% among study participants. The most common hyper-allergic food was wheat, peanut and gluten. Some participants reported more than one type of food allergy (4.36%).

Only 31.43 percent of the 35 youngsters in the research actually received a formal diagnosis from their physicians [12]. This finding further demonstrates a shortcoming in food allergy diagnosis and highlights the need of obtaining a professional allergist’s opinion when dealing with food allergy. In order to diagnose food allergy, a thorough medical history is required. SPTs, sIgE measures, and the oral food

challenge are only a few of the available food allergy diagnostic tools, while skin prick tests (SPTs) and specific immunoglobulin E (sIgE) measures are useful for diagnosing food allergy, their increased sensitivity might lead to false positives; as a consequence, the patient's medical history should also be taken into account [18,22].

To a greater extent in other regions of the world fish and shellfish allergies are prominent in the Americas and Northern Europe, whereas Prunoideae fruit allergies are prevalent in the Mediterranean [23]. Egg allergies are more common than cow's milk allergies in children less than 5 years old across most of Asia (China, Korea, and several South East Asian nations) [24]. According to research conducted by Le., *et al.* [25], most Vietnamese children between the ages of 2 and 6 who suffer from food allergies are allergic to crustaceans. Even inside China, allergens vary by area. Eggs were the most often reported food allergy by infants 0-12 months old [15], shrimp by those 13 - 24 months old, and fish by those 25 - 36 months old, according to a study by Liu., *et al.* [26]. Shrimp and crab were the most prevalent allergens in Guangzhou.

### Conclusion

This study and most of the previous studies showed that the most common food allergen was Shrimp and the most common hyper-allergic foods was wheat, peanut and gluten. In addition to that skin reactions were the most common sign of allergic reactions. Although This research has some limitations as most of study participants were Saudi and it was conducted in one Hospital only. So to have a better understanding of the Topic, further study is required.

### Acknowledgment

We thank the participants who were all contributed samples to the study and Dr. Arwa Hashim MD for the biostatistics review of the research.

### Ethical Approval for Study Protocol/Study Design/Methodology

The study was approved by the IRB Committee (ethical approval code: H-02-K-076-0522-727).

### Conflicts of Interest

The authors declare that they have no conflict of interest.

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**Volume 12 Issue 6 June 2023**

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