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Vaccine Hesitation in Parents of Children with Food Allergy

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Abstract

Objective: The term vaccine hesitation means "rejection or delay of vaccines despite the availability of vaccine services". Parents may delay the vaccination of their children when their children have a history of food allergies. The present study aims to evaluate the factors about vaccine hesitancy of parents with food allergic children.

Methods: A cross-sectional survey research, created by the researchers, was conducted to the parents of children who were already followed up with food allergy by the pediatric allergy department.

Results: The parents of 190 children with a median age of 24 (2-60) months who were followed up for food allergy were included in the study. The median follow-up period of the patients was 15.5 (4–160). Forty-four (23.1%) participants had delayed at least one vaccination of their children due to food allergy in the past. The most common vaccine hesitancy was toward the measles-mumps-rubella vaccine. The study also found that there were more delays in vaccination in children with egg allergy (100%) than in those without egg allergy (75.3%) (p = 0.01). As a result of our study, it was determined that the most frequent information about vaccination was obtained from doctors (89.5%)

Conclusions: It was understood that a substantial proportion of parents with food allergic children had vaccine hesitancy in the past. Families obtaining complete and accurate information about food allergy and vaccine interactions, especially from the health system, will prevent unnecessary delay due to vaccine hesitations.

Keywords: Food allergy, children, parents, delay, vaccine hesitancy

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Besin Alerjisi Olan Çocukların Ebeveynlerinde Aşı Tereddütleri

Öz

Giriş-amaç: Aşı tereddütü terimi "aşı hizmetlerinin kullanılabilirliğine rağmen aşıların reddedilmesi veya geciktirilmesi" anlamına gelmektedir. Aileler çocuklarında besin allerjisi öyküsü varsa çocuklarına aşı yapılmasını geciktirebilirler. Bu çalışma, gıda alerjisine sahip çocuğu olan ebeveynlerin aşı tereddütüne ilişkin faktörleri değerlendirmeyi amaçlamaktadır.

Yöntemler: Pediatrik alerji bölümü tarafından besin alerjisi ile takip edilen çocukların ebeveynlerine araştırmacılar tarafından oluşturulan kesitsel bir anket araştırması yapıldı.

Bulgular: Çalışmaya besin alerjisi nedeniyle takip edilen ortanca yaşı 24 ay olan 190 çocuğun ebeveynleri dahil edildi. Kırk dört (%23.1) katılımcı, geçmişte gıda alerjisi nedeniyle çocuklarının en az bir aşısını geciktirmişti. En yaygın aşı tereddütü kızamık-kabakulak-kızamıkçık aşısına yönelikti. Çalışmada ayrıca yumurta alerjisi olan çocuklarda aşılamada (%100), yumurta alerjisi olmayanlara (%75.3) göre daha fazla gecikme olduğu bulundu (p = 0.01). Çalışmamız sonucunda aşı ile ilgili en sık bilginin doktorlardan (%89,5) alındığı belirlendi.

Sonuç ve yorum: Besin alerjisi olan çocuğu olan ebeveynlerinin azımsanmayacak bir kısmının geçmişte aşı tereddütü yaşadığı anlaşıldı. Ailelerin özellikle sağlık sisteminden gıda alerjisi ve aşı etkileşimleri hakkında tam ve doğru bilgi almaları aşı tereddütlerinden kaynaklanan gereksiz gecikmelerin önüne geçecektir.

Anahtar kelimeler: Besin alerjisi,çocuklar,ebeveynler,gecikme,aşı tereddütü.

INTRODUCTION

The World Health Organization defines vaccine hesitation as "a rejection or delay of vaccines despite the availability of vaccine services"[1]. It is a fact that the number of under-vaccinated children is higher than those who refuse all vaccines. This delay in vaccination should, therefore, be eliminated by supporting the education of parents and taking the necessary precautions[2].

The measles-mumps-rubella, inactivated influenza vaccines contain an insignificant amount of egg protein[3,4]. In addition, diphtheria, tetanus, pertussis (Dtap or Tdap), pneumococcal and Haemophilus influenzae type b conjugate, and meningococcal vaccines may contain trace (nanogram) amounts of milk protein and/or casein[5]. These vaccines may cause vaccine hesitancy in parents of children with food allergies.

Specifically, in cases of children who have or are thought to have food allergies, many family doctors or parents delay the vaccination of food allergic children that should be given on time[3,6]. In the presence of self-contradictory, difficult-to-perceive information, numerous sources of information, information pollution, and anxiety of parents due to food allergy it can be very difficult for parents to make the right decision about their children's vaccinations. There have been limited studies in the literature on certain vaccines containing residual nutritional protein (such as MMR, influenza vaccines). Studies evaluating the hesitation in the general vaccination schedule in parents of food allergic children are limited. Knowing whether there is a relationship between food allergy and vaccine acceptance by parents may help us to develop solution recommendation and preventive measures for vaccine hesitancy.The present study, thus, aims to evaluate the factors that delay the general vaccination schedule of children with food allergies.

METHODS

Study design and participants

A cross-sectional survey research study was planned. The survey was carried out to parents whose children had been followed up by the

Paediatric Allergy and Immunology Department. Ethical approval was obtained from the local ethics committee of Dicle University Faculty of Medicine (Date: 22/04/2021, number: 390) and written, informed consent of all the participants was obtained. The survey was conducted face-to-face to parents between April 2021 and February 2022.

Food allergy diagnosis

The diagnosis of food allergy was made according to the food allergy guideline[7].

Questionnaire

All participants filled out the questionnaire.The first 17 questions inquired of the patients' and parents' demographic characteristics.The next seven questions included information about vaccine hesitancy in the past. The last two questions were about the sources of parents' information on food allergy and vaccine interaction (additional file 1). All of the questions were prepared using the literature[8-11].

Statistics

Statistical Package for the Social Sciences (SPSS v18) was used to analyze the data. Visual (histogram and probability graphs) and analytical (Kolmogorov–Smirnov/Shapiro–Wilk tests) methods were employed to verify whether the variables conformed to the normal distribution. Descriptive statistics were shown with the median for numerical non-normally distributed variables and the mean for normally distributed variables. The chi-squared ($\chi 2$) test was used to compare the categorical variables. The Mann–Whitney U test was employed to compare the non-normally distributed numerical variables (non-parametric), and the t-test was used to compare the normally distributed numerical variables (parametric) between the groups.

RESULTS

A questionnaire was applied to 203 parents. One hundred ninety parents who filled out the questionnaire appropriately were included in the study. 13 parents who did not fill out the questionnaires properly or completely were excluded from the study.

The parents of 190 food allergic children, 54.7% of whom were male, with a median age of 24 (2-60)months, were included in the study. The median follow-up period of the patients was 15.5 (4–160). More than half of the patients (58.9%) followed up for atopic eczema. In addition, most of them (76.8%) were on multiple diets. The foodmost frequently responsible for food allergy was cow's milk. The demographic characteristics of the patients are shown in Table 1. Sociodemographic characteristics of parents are shown in Table 2. Most of the parents were university graduates.

Table I: Demographic characteristics of food allergic patients

Characteristic features		n(%)
Type of the food allergy	Proctocolitis	32 (16.8)
	Acute enterocolitis	4 (2.1)
	Chronic enterocolitis	12 (6.3)
	Eczema	112 (58.9)
	Anaphylaxis	6 (3.2)
	Urticaria-Angioedema	18 (9.5)
	Proctocolitis and eczema	6 (3.2)
The number of foods eliminated from the diet*	Single	44 (23.2)
	Multiple	146 (76.8)
Egg protein allergy		154 (81)
Cow's milk protein allergy		164 (86.3)

**Foods are grouped as cow's milk, egg, meat, fish, nuts, and cereals. Multiple food eliminations are determinants eliminating more than one food group.*

Table II. Sociodemographic characteristics of parents with food allergic children

	n (%)
Parents who filled out the questionnare	
Father	159 (83.7)
Mother	31 (16.3)
Mother age, mean± SD (yrs)	28±4
Father age, mean± SD (yrs)	32±5
Mother education level	
Primary school	30 (15.8)
Secondary school	36 (18.9)
High school	53 (27.3)
University	71 (37.4)
Father education level	
Primary school	19 (10)
Secondary school	18 (9.4)
High school	58 (9.4)
University	95 (50)
Working mothers	52 (27.4)
Monthly income level	
Above minumum wage	124 (65.3)
Minumum wage and below	66 (34.7)
Place of residence	
Village	14 (7.4)
County or town	44 (23.1)
City	132 (69.5)
Number of children living at home	
Only one child	74 (38.9)
Multiple child	116 (61.1)
Exchange of information on social media	
Yes	82 (43.2)
No	108 (56.8)
The most frequently referenced source on food allergy and vaccine interaction	
Doctor	170 (89.5)
Internet	16 (8.4)
Article	4 (2.1)
Social media	0
Television and newspaper	0
Most trusted source for food allergy-vaccine interaction	
Doctor	174 (91.6)
Internet	9 (5.2)
Article	7 (3.7)
Social media	0
Television and newspaper	0

SD: standard deviation; yrs: years

Sixty-two (32.6%) participants had experienced vaccination hesitations and forty-four of them (70.9%)had vaccine hesitations due to food allergy in the past (VH group). When the reasons for vaccine hesitancy in parents with a child with food allergy were evaluated, 27 (61.4%) of 44 patients delayed their vaccinations because they were afraid of the side effects of the vaccine, and 11 (25%) were told to delay it until the food allergy was evaluated by the doctor, 6 (13.6%) of them had no idea. No hesitation was detected against BCG (Bacillus-Calmette-Guerin) and Oral Polio Vaccine (OPA) vaccines. The most common vaccine hesitancy was found toward the measles-mumps-rubella (MMR/) vaccine, in 20 (45.4%) families. It was determined that 20 (45.4%) of 44 families who had vaccination hesitancy due to food allergy delayed at least one vaccination for a period of 1–4 weeks; and nine of 18 families (50%) delayed at least one vaccination for a reason other than food allergy, for a period between 1–4 weeks. Information about the past vaccination hesitations of the parents with food allergic patients is shown in Table 3.

The hesitation of parents due to food allergy about non-routine vaccination calendar (rotavirus (13.7%), influenza (2.1%), meningococcus (8.4%), etc.) in our country in the past.

No significant difference was found between the groups in terms of the parents' education level, mother's age, father's age, gender of the participating parents mother's employment status, monthly income of family, place of residence, exchange of information on social media, and number of children living at home ($p>0.05$). No significant difference was found between the groups in terms of cow's milk protein allergy in a patient and multiple food allergies in a patient ($p>0.05$). The study also found that there were more delays in vaccination in children with egg allergy (100%) than in those without egg allergy (75.3%) ($p = 0.01$).

It was understood in both groups that the most common information about food allergy and vaccine interaction was obtained from doctors (89.5%).In addition, the most reliable information was also obtained from doctors (91.6%).

Table III. Information about the past vaccination hesitations of the parents with food allergic patients

Reasons behind vaccine hesitancy in the past n (%)	
Food allergy only	***44 (23.1)***
Other than food allergy only	***18 (9.5)***
A doctor had told them to delay vaccination until evaluated for food allergy	***11 (25)***
Which vaccine did you hesitate to use in the past due to a food allergy?	
Measles-Rubella-Mumps (MMR)	***20 (45.4)***
Diphtheria-Acellular Pertussis-Tetanus-Inactivated Polio Vaccine-Hemophilus Influenza vaccine (DaBT-IPA-Hib)	***4 (9.9)***
Only measles	***8 (18.1)***
Hepatitis B	***4 (9.1)***
Hepatitis A	***6 (13.7)***
Chickenpox	***12 (27.3)***
Conjugated pneumococcus (CPA)	***4 (9.1)***
Diphtheria-Acellular Pertussis-Tetanus-Inactivated Polio Vaccine (DaBT-IPA)	***4 (9.1)***
Vaccine delay time due to a food allergy, n=44	
1–4 weeks	***20 (45.6)***
5–8 weeks	***14 (31.8)***
9–12 weeks	***4 (9.1)***
>12 weeks	***6 (13.5)***
Vaccine delay time due to reasons other than a food allergy, n=18	
1–4 weeks	***9 (50)***
5–8 weeks	***5 (27.8)***
9–12 weeks	***2 (11.1)***
>12 weeks	***2 (11.1)***

DISCUSSION

Serious reactions due to nutritional ingredients such as residual egg or cow milk proteins in the vaccine are very rare. In cases with no history of serious reactions to foods or vaccine ingredients, these vaccines are recommended for administration without delay[3,11,12] Despite this, most parents of children with a food allergy/allergies may delay their vaccination due to lack of information and misguidance from the health system and may, therefore, experience hesitation. The current study evaluates the extent of delays and hesitation toward vaccines and the factors that may affect them.

In a study conducted in Australia, it was found that 3.3% of parents delayed their children's vaccinations for various reasons[13]. In a study conducted in Turkey including 314 parents, it was determined that 6% of the families included in the study delayed their children's vaccinations[14]. In our study, about one-third participants had experienced vaccination hesitations and about one fifth had vaccine hesitations due to food allergy in the past. The rate of participants' vaccine hesitancy due to any reason other than the food allergy (9.5%) was similar to the literature, but the rate of vaccine hesitancy due to their children's food allergy (23.1%) was found to be significantly higher than the normal population results reported in the literature. This may be due not

only to the rejection of the vaccine by the families, but also to the sending of the patients to the advanced center by health system, even though there is no contraindication to the vaccination.

A study found that the first dose of vaccination was delayed for more than 30 days in 81% of children who were referred the MMR vaccination by their family physician[15]. In a study by Barış et al., the median delay in MMR vaccination due to food allergy was found to be 20 days[16]. In the current study, the vaccine delay time for at least one vaccine was 1–4 weeks in the most of (45.6%)participants. Thus, the current study, as well as studies in the literature, show that parents of children with food allergies chose to postpone vaccinations in the past for various reasons.

One of the most important results of our study is that not only physicians' guidance but also families' fears against residual nutritional contents in vaccines play a role in delaying vaccinations. Ainsworth et al stated that some health professionals could not read the Green Book or could not understand the phrase 'anaphylactic reaction' but also health professionals could also be confused by the differing advice given about vaccines[15]. There is ongoing debate among healthcare professionals regarding the MMR vaccine for children with egg allergies[16,17]. Goodyear-Smith et al reported three of 78 parents did not carry out MMR vaccine to their children due to egg allergy. These parents declared that they thought there was not enough information to explain the purpose and the urgency about the vaccine schedule[18]. So, it has been determined that the opposition to vaccination in parents with a child with food allergy may be due not only to the health system, but also to the possible lack of information in the families. Perhaps it will not solve the problems if health providers have enough information about the vaccination of children with food allergies. Parents of children with food allergy should be adequately informed and enlightened about unreal contraindications. Many parents do not want to vaccinate their children because they are not aware of their importance; do not know where, when and how to vaccinate their children; do not view vaccination as a public health problem; and are concerned about vaccine safety. Healthcare professionals are the most common source of information regarding vaccinations for families, including parents who do not vaccinate their children[9,15]. In our study, it was shown that doctors were the most common source of information for food allergy and vaccine interaction in both the VH (77.3%) and NVH groups (91.8). Our study reveals the importance of doctors as the most reliable source for informing families about vaccination.

When the factors affecting children's vaccination status were examined in the literature, the results were found to be conflicting. Xeuatvongsa et al. found that factors such as mother's education level and monthly average income level affected children's vaccination 19, while Oleribe et al. found that factors such as mother's and father's education levels, geographical location, occupation and economic status affected parents' choice to vaccinate their children[20]. Additionally, Saeed et al. found that factors such as parents' occupation and monthly income level had no effect on children's vaccination status[21]. Furthermore, Ahmad et al. found that the routine vaccination rate was better in families with higher education and better socioeconomic status[22]. The literature data on the effect of socio-demographic factors on vaccine hesitancy are, thus, conflicting. In our study, no significant difference was found between the VH and NVH groups in terms of parents' education level or gender, mother's employment status, family's average monthly income, the place of residence, and the use of social media. Delays in the vaccination of

children with food allergies in the past were, thus, found to be independent of parents' socio-demographic characteristics.

It was shown that children with egg allergy had often been referred to advanced health care levels for MMR vaccination by their family physicians[15]. In the prospective cohort study of Cronin et al., it was reported that 69.5% of the patients who were sent for vaccination in the hospital, which had not been performed in the primary care setting, were referred for MMR vaccine[23]. In our study, it was found that the MMR vaccine was most frequently delayed (45.4%). One of the most important results of this study was the hesitation of parents due to food allergy about other vaccines that were included in the vaccination calendar (chickenpox, conjugated pneumococcal, etc.) and non-routine vaccination calendar (rotavirus, influenza, meningococcus, etc.) in our country in the past. As a result, food allergic children were put at risk of infectious diseases that could be avoided using these vaccines. Considering that vaccine hesitancy is increasing in the world day by day, delays in routine and non-routine vaccinations for a reason that is not actually a contraindication, such as food allergy, put unvaccinated children at great risk of infection. MMR vaccines may contain residual egg proteins. In this study, while cow's milk protein allergy was not found to be an important risk factor in the delay of vaccinations, a significant difference was found between the vaccine-delayed and non-delayed groups for egg allergy. This may explain the delay in the MMR vaccine.

CONCLUSION

It was understood that some of the parents of patients with food allergies followed up in our allergy outpatient clinic, as they were hesitant toward vaccines and had delayed their children's vaccinations in the past at a higher rate compared to the normal population results reported in the literature. Families obtaining complete and accurate information about food allergy and vaccine interactions, especially from the health system, will prevent unnecessary delay due to vaccine hesitations. Primary healthcare professionals who are responsible for vaccination should be informed on this issue.

Limitations of our study

First, the present study is a single-center trial. It can reflect our region, it cannot be generalized. Second, as this was a questionnaire-type study, all vaccination information was evaluated according to the statements of the parents. As a result, the reliability of the available information can be questioned. Third, reasons for vaccine hesitancy other than food allergy were not evaluated, as they were not a part of the aims of the study. Additional factors causing hesitation about vaccination and delayed delivery of healthcare services (delayed testing, late appointments to the outpatient clinic, lack of an allergy and immunology specialist in the local area, etc.) were not evaluated in the questionnaire. Hence, cohorts and prospective studies that comprehensively address these issues are needed.

Ethics Committee Approval: Ethical approval was obtained from the local ethics committee of Dicle University Faculty of Medicine (Date: 22/04/2021, number: 390) and written, informed consent of all the participants was obtained.

Conflict of Interest: The authors declared no conflicts of interest.

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