COVID-19 Vaccination Rate in Patients Admitted to The Immunology and Allergy Outpatient Clinic

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Abstract

Aim: Misinformation, lack of awareness, and beliefs about vaccines can cause hesitations about vaccines and affect the rate of vaccination. We aimed to reveal the vaccination rates against coronavirus disease-19 (COVID-19) (vaccine types and dose), and the reasons for not being vaccinated in patients admitted to the immunology and allergy outpatient clinic. In addition, we aimed to find out whether allergic reactions were observed in vaccinated patients.

Methods: The history of COVID-19 and vaccination of patients admitted to the Immunology and Allergy Outpatient Clinic between December 2021 and February 2022 were evaluated retrospectively.

Results: In our study, which included 451 patients, the median age of the patients was 35 (range 18-82), and 61.2% were women. 16.9% of the patients admitted to the immunology and allergy outpatient clinic were never vaccinated, while the rate of those who did not receive two doses of vaccine was 26.6%. The top three reasons for not being vaccinated were fear of allergies, fear of adverse effects, and distrust of the vaccine, respectively. Unvaccinated patients were younger, which is statistically significant. Vaccination rate was found to be lower in drug allergy and immunodeficiencies compared to other disease groups.

Conclusions: Understanding the causes of vaccine hesitations and increasing the vaccination rate by organizing public health campaigns is an important point in the control of the pandemic. Despite being rare, allergic reactions can be observed with COVID-19 vaccines. Therefore, immunologists and allergists play an important role in the COVID-19 vaccine program.

Keywords: *Coronavirus disease-19, vaccination, hesitancy, allergic reaction*

1. Introduction

Vaccines against coronavirus disease-19 (COVID-19) are important to control the current pandemic. Side effects from the protective immune response of the vaccine are not considered an allergic reaction, and vaccines often cause side effects. Vaccines against COVID-19 are new and some have been created using a novel mechanism of action. Therefore, vaccines created with this new mechanism may have a higher risk of allergic reaction compared to conventional vaccines [1]. An extremely low rate of anaphylaxis is observed against COVID-19 vaccines. But public concern about adverse effects, including allergic reactions, still causes vaccine hesitancy [2]. Polyethylene glycol (PEG) is thought to be the most likely culprit for an allergic reaction, and report of anaphylaxis against PEG-containing messenger RNA (mRNA) vaccines raise public concern and increase vaccine hesitancy [3].

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Pre-vaccine allergy assessment is recommended for individuals with a history of anaphylaxis to an injectable drug or vaccine containing PEG or its derivatives, anaphylaxis to oral/topical PEG-containing products, recurrent anaphylaxis of unknown cause, suspected or confirmed allergy to any mRNA vaccine, and confirmed allergy to PEG or its derivatives [4]. Misinformation, lack of awareness and beliefs about vaccines can cause hesitations about vaccines. It is important to identify the population experiencing COVID-19 vaccine hesitancy and to reveal the reasons for hesitation in this population. In this way, vaccination hesitancy can be combated by organizing public health campaigns [5].

We aimed to reveal the rate of vaccination against COVID-19 of patients who admitted to the immunology and allergy outpatient clinic with various complaints, which vaccine and how many doses, and the reasons for not being vaccinated in patients who were not vaccinated. We wanted to have an idea about what we can do to support vaccine acceptance as an immunologist/allergist by revealing the reasons. In addition, we wondered whether allergic reactions were observed in patients who were vaccinated.

2. Materials and methods

2.1. Study design

In our retrospective study, patients who admitted to Immunology and Allergy Outpatient Clinic between December 2021 and February 2022 with various complaints were included. The study protocol was approved by the local Ethics Committee.

A data form including age, gender, employment status, marital status, comorbidities, smoking history, admission complaints and allergic diseases of the patients was created. We also added their COVID-19 history, whether they were vaccinated, if they were vaccinated, which vaccine, how many doses, and if they weren't vaccinated, the reasons for not getting vaccinated. Finally, we added the histories of allergic reactions to the vaccine. Demographic characteristics of the patients, information about COVID-19 and vaccination against COVID-19 were obtained from the medical records of the patients at their outpatient clinic applications.

2.2. Statistics analysis

All statistical analyzes were performed using the SPSS software package for Windows 11.5 (SPSS Inc., Chicago, IL, USA). The median (minimum – maximum) for the non-normally distributed variables, and the number of persons (n) and (%) for the nominal variables will be shown. In order to compare independent groups in terms of categorical variables, chi-square test, that of metric variables, Mann-Whitney U test were done. Statistical significance score was given as 0.05.

3. Results

In our study, which included 451 patients, the median age of the patients was 35 (range18-82), and 61.2% were women. 67% of the patients were married and 41.2% were working. 14.2% of the patients had comorbidity and 23.1% were smokers. 67.8% of the patients have immunology and allergic diseases. Considering the reasons for admission to the immunology and allergy clinic, the first three reasons were rhinitis symptom, urticaria and/or angioedema, and drug allergy, respectively. The demographic characteristics of the patients are shown in Table-1.

Thirty-point four percent of the patients were diagnosed with COVID-19, and the information of two people is not available. While the rate of single dose COVID-19 vaccine of the patients who admitted to our immunology and allergy diseases outpatient clinic was 83.1%, the rate of patients who received at least two doses of vaccine was 73.4%. The highest rate among vaccinated patients was in patients vaccinated with 2 doses of m-RNA vaccine with a rate of 46.9%. This was followed by those vaccinated with 3 doses of m-RNA vaccine at the rate of 16.8% and those vaccinated with two doses of inactivated vaccine at the rate of 9.3%. The COVID-19 diagnosis rate and COVID-19 vaccination characteristics of the patients are given in Table-2.

The rate of those who were not vaccinated even one dose was 21.5% in the 18-40 age group, 9.3% in the 41-64 age group, and 0% in the 65 and older age group. The patients who were not vaccinated were younger. The median age of the unvaccinated patients was 29 (range 18-64) while the median age of the vaccinated patients was 36 (range 18-82) ($p<0.001$).

In the subgroups of immunology and allergy diseases, the rate of vaccination with at least two doses was highest in allergic rhinitis with 84.4% and the lowest in immunodeficiencies with 25%. 84.4% of those with allergic rhinitis were vaccinated at least 2 doses, and this rate was significantly higher than those without rhinitis ($p<0.001$). The vaccination rate in the immunology and allergy diseases subgroup is given in Table 3.

Table 1

Demographic characteristics of patients

Age (year) median (min-max)	35 (18-82)
Gender n (%)	
Female	276 (61.2)
Male	175 (38.8)
Marital status n (%)	
Single	149 (33)
Married	302 (67)
Employment status n (%)	
Is studying	35 (7.8)
Not working	230 (51)
Working	186 (41.2)
Comorbidity n (%)	
No	387 (85.8)
Yes	64 (14.2)
Smoking n (%)	
No	347 (76.9)
Yes	104 (23.1)
Presenting symptoms n (%)	
Pruritus	46 (10.2)
Urticaria and/or angioedema	79 (17.5)
Dermatitis	7 (1.6)
Rhinitis	162 (35.9)
Cough	27 (6)
Asthma	26 (5.8)
Drug allergy	74 (16.4)
Immunodeficiency	8 (1.8)
Food allergy	3 (0.7)
Others	19 (4.2)
Immunology and Allergic Disease n (%)	
No	145 (32.2)
Yes	306 (67.8)

Table 2

The COVID-19 diagnosis rate and COVID-19 vaccination characteristics of the patients

COVID-19 n (%)	
Yes	137 (30.4)
No	311 (69)
Unknown	2 (0.7)
At least one dose of vaccine against COVID-19 n (%)	
Yes	375 (83.1)
No	76 (16.9)
At least two doses of vaccine against COVID-19 n (%)	
Yes	331 (73.4)
No	120 (26.6)
Vaccination subgroups (n=375) n (%)	
1 dose of inactived	10 (2.7)
1 dose of m-RNA	34 (9.1)
2 doses of inactived	35 (9.3)
2 doses of m-RNA	176 (46.9)
3 doses of inactived	18 (4.8)
3 doses of m-RNA	63 (16.8)
2 doses of inactived, 1 dose of m-RNA	23 (6.1)
1 dose of inactived, 2 doses of m-RNA	1 (0.3)
4 doses of inactived	1 (0.3)
2 doses of inactived, 2 doses of m-RNA	13 (3.5)
2 doses of inactived, 3 doses of m-RNA	1 (0.3)

COVID-19: Coronavirus disease-19, m-RNA: messenger RNA

Forty-four patients (9.7%) did not receive the second dose of the vaccine and the reason was fear of adverse effects in 27% of all patients and was unknown in 30% of the patients. Other reasons for not getting the second dose were; not having the opportunity to be vaccinated, not needing to be vaccinated and fear of an allergic reaction, respectively. The reasons for not getting the second dose are shown in Figure 1.

It was not known why 14% of the patients were never vaccinated. The most common reasons for not getting the vaccine were fear of allergies and advers effects, distrust of the vaccine, being in the pregnancy-breastfeeding period, waiting for the Turkish vaccine, not considering the vaccine as a necessity. The reasons for patients who have never been vaccinated are shown in Figure 2.

Ten patients described an allergic reaction to the COVID-19 vaccine, 80% of whom were women. 80% of these patients had an allergic disease and 40% had a history of drug allergy. 80% of the patients had a reaction with the m-RNA vaccine. There were urticaria and/or angioedema in seven patients, delayed urticaria in one patient, and anaphylaxis in two patients. Two patients with anaphylaxis had received m-RNA vaccine.

Table 3

Vaccination rate in Immunology and Allergy Diseases subgroups

Immunology and Allergy diseases (n=306) n (%)	
No	45 (14.7)
Single dose	35 (11.4)
At least two doses	226 (73.9)
Asthma (n=59) n (%)	
No	8 (13.6)
Single dose	3 (5.1)
At least two doses	48 (81.4)
Allergic rhinitis (n=147) n (%)	
No	12 (8.2)
Single dose	11 (7.5)
At least two doses	124 (84.4)
Drug allergy (n=109) n (%)	
No	25 (22.9)
Single dose	11 (10.1)
At least two doses	73 (67)
Immunodeficiency (n=8) n (%)	
No	3 (37.5)
Single dose	3 (37.5)
At least two doses	2 (25)
Urticaria and/or angioedema (n=73) n (%)	
No	11 (15.1)
Single dose	12 (16.4)
At least two doses	50 (68.5)
Food allergy (n=5) n (%)	
No	0 (0)
Single dose	1 (20)
At least two doses	4 (80)

Figure 1

Reasons for not having a 2nd dose

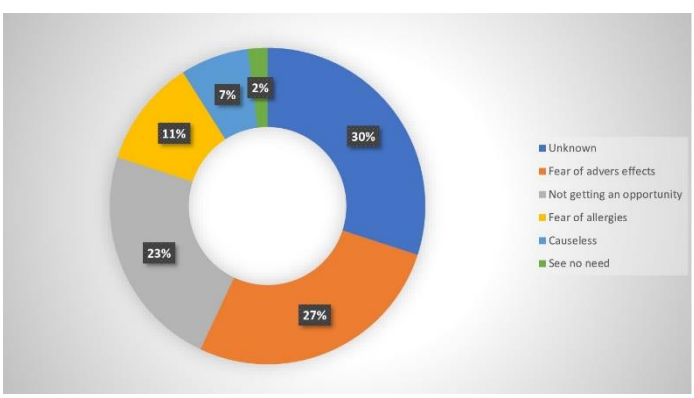
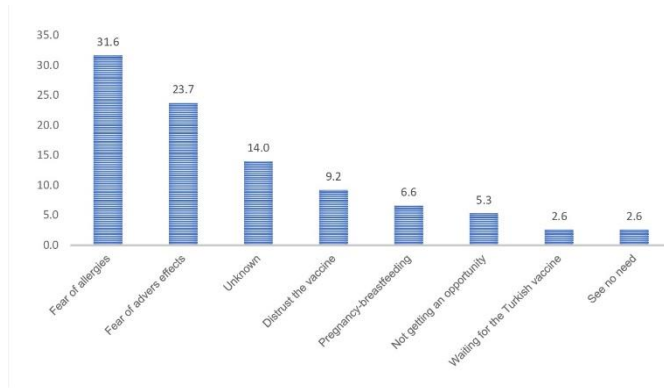


Figure 2

Reasons for not having a 2nd dose



4. Discussion

Here we present the COVID-19 vaccination rate of 451 patients who admitted to our immunology and allergy outpatient clinic. We assessed the patients characteristics, which vaccines and how many doses they received, the reasons why they were not vaccinated and whether there was an allergic reaction with the vaccine.

The proportion of unvaccinated people who dislike and completely reject vaccines is approximately 14% worldwide [6]. In the study conducted in Turkey with 384 people in December 2020, 45.3% of the participants were hesitant about getting the COVID-19 vaccine approved by the Ministry of Health [7]. In another study, 31% of respondents in Turkey and 14% in the UK were unsure about getting a COVID-19 vaccine, while 3% of respondents in both countries refused to be vaccinated [8]. In Singapore, 98.9% of primary care healthcare workers were fully vaccinated and 73.8% of eligible healthcare workers taken the booster. Among healthcare workers, less hesitation was observed with booster compared to the first dose [9]. The pooled rate of COVID-19 vaccine acceptance in Ethiopia was found to be 56.02% [10]. In the study, which included low- and low-middle-income countries, the pooled effect size of the COVID-19 vaccine acceptance rate was 58.5% and the pooled vaccine hesitancy rate was 38.2%. The predictor of willingness to accept the vaccine was found to be male and perceiving the risk of COVID-19 infection [11]. In a survey conducted in Romania, 39.2% of the participants stated that they were vaccinated, 25.6% wanted to be vaccinated, 29.5% were against vaccination. The most important reason for vaccine rejection was that the vaccine was not safe enough and there was a risk of serious side effects [12]. In our study, the rate of people who could not be vaccinated was 16.9%. People's awareness and availability of vaccines may vary from country to country and may differ in various populations and times.

In a study of adults, the intention to vaccinate increased from 67.6% in November 2020 to 84.8% in May 2021. Individuals aged 65 and over were more willing to be vaccinated, but the differences between age groups decreased over time [13]. In a study conducted in Italy in young adults aged 18-40, vaccine hesitancy/resistance was observed as 25% [14]. In a study of adults aged 18-29 years, the intention to accept the vaccine was 84.3% and 59.7% in Canada and France, respectively [15]. In our study, the rate of not being vaccinated was quite high in the 18-40 age range compared to those over 40 years old. All people over the age of 65 were vaccinated. Unvaccinated patients were younger, which is statistically significant.

In our study, the highest rate of vaccination was observed in patients with food allergy, allergic rhinitis and asthma. The rate of vaccination of at least two doses in the allergic rhinitis group was

significantly higher than those without allergic rhinitis. Vaccination rate was found to be lower in drug allergy and immunodeficiencies compared to other disease groups. Especially in immunodeficiencies, the rate of vaccination with at least two doses is 25% and it is the group with the lowest rate. However, patients with immunodeficiencies are at risk of chronic COVID-19 due to inadequate immune response. This may lead to the rapid emergence of vaccine-resistant mutants and high-risk variants. For this situation, which is a public health emergency, it is important to vaccinate patients with immunodeficiency and to prevent chronic COVID-19 [16]. Providing information to patients and healthcare professionals about immunodeficiency and COVID-19 vaccination may increase this rate.

In a study of 730 consecutive unvaccinated patients hospitalized in Poland; the most common reasons for vaccine refusal were, concerns about advers effects, believing that the vaccine has not been adequately tested, and believing that one will not get sick with COVID-19 [17]. In our study, the three most common known reasons for not being vaccinated were found to be fear of allergy, fear of advers effects, and distrust of the vaccine, respectively.

Although the COVID-19 vaccine is recommended during pregnancy, the vaccine has lagged behind those who are not pregnant at the same age in pregnant women. As of February 2022, 68% of pregnant people are thought to have completed their primary COVID-19 vaccine [18]. In our study, 6.6% of the patients were not vaccinated due to pregnancy-breastfeeding.

In the study, which included 113 patients with a COVID-19 vaccine reaction, 86.7% of the vaccine reactions occurred in women. Anaphylaxis was observed only in women, all of these patients had a history of allergic disease and two-thirds of them were diagnosed with asthma [2]. The mean age of 12 patients with delayed systemic urticaria reaction following mRNA COVID-19 vaccine was 52 years. 75% of patients were female, 50% had drug allergy and one had a history of chronic spontaneous urticaria [19]. Allergic reactions due to vaccine were observed in 10 of our patients and as in other studies, the majority (%80) were women. 80% of all patients had a history of allergic disease and 40% had a history of drug allergy, which was similar to the studies in the literature. Although extremely rare, cases of vaccine-induced anaphylaxis have been reported in the literature, confirming their safety without a higher mortality rate than previous vaccines [20, 21]. Anaphylaxis with inactivated COVID-19 vaccine is extremely rare, case series involving 12 patients are available in the literature [22]. While anaphylaxis with inactivated vaccine was not observed in our study, anaphylaxis with mRNA vaccine was observed in 2 patients. It was observed that most of the patients who described an allergic reaction to the m-RNA vaccine were revaccinated safely after allergy and immunology evaluation [2]. In addition, it is reported in the literature that two patients who experienced anaphylaxis with the first dose of m-RNA vaccine were able to receive the vaccine successfully with the graded dose increase protocol [23]. This shows that immunologists and allergists play a key role in the COVID-19 vaccine program.

5. Conclusion

In conclusion, 16.9% of the patients who admitted to the immunology and allergy outpatient clinic were never vaccinated, while the rate of those who did not receive two doses of vaccine was 26.6%. The top three reasons for not being vaccinated were fear of allergies, fear of advers effects, and distrust of the vaccine, respectively. The limitations of our study were being retrospective and covering a certain time period and a certain population admitted to the immunology and allergy outpatient clinic. Information about COVID-19 vaccines and reasons for vaccine refusal can be obtained from larger studies with longer follow-up. In this context, understanding the causes of vaccine hesitations at different times in different populations and increasing the vaccination rate by organizing public health campaigns is an important point in the control of the pandemic. In addition, it is important to refer patients who describe an allergic reaction with the COVID-19 vaccine to an immunology and allergy specialist.

Statement of ethics

The study protocol was approved by the local Ethics Committe of Gaziantep University, Gaziantep Turkey (No: 2022/126).

Conflict of interest statement

The authors declare that they have no financial conflict of interest with regard to the content of this report.

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Author Contributions

Concept/Design, data acquisition, data analysis and interpretation, drafting manuscript: ME, SSM

References

1.Turner PJ, Ansotegui IJ, Campbell DE, et al. COVID-19 vaccine-associated anaphylaxis: A statement of the World Allergy Organization Anaphylaxis Committee. World Allergy Organ J 2021; 14: 100517. https://doi.org/10.1016/j.waojou.2021.100517

2.Kaplan B, Farzan S, Coscia G, et al. Allergic reactions to coronavirus disease 2019 vaccines and addressing vaccine hesitancy: Northwell Health experience. Ann Allergy Asthma Immunol 2022; 128: 161-168 e161. https://doi.org/10.1016/j.anai.2021.10.019

3.Erdeljic Turk V. Anaphylaxis associated with the mRNA COVID-19 vaccines: Approach to allergy investigation. Clin Immunol 2021; 227: 108748. 20210428. HTTPS://DOİ.ORG/ 10.1016/j.clim.2021.108748.

4.Barbaud A, Garvey LH, Arcolaci A, et al. Allergies and COVID-19 vaccines: An ENDA/EAACI Position paper. Allergy, 2022/02/04. https://doi.org/10.1111/all.15241

5.Mewhirter J, Sagir M and Sanders R. Towards a predictive model of COVID-19 vaccine hesitancy among American adults. Vaccine 2022; 40: 1783-9. https://doi.org/10.1016/j.vaccine.2022.02.011

6.Storey D. COVID-19 Vaccine Hesitancy. Glob Health Sci Pract 2022; 10 20220301. https://doi.org/10.9745/GHSP-D-22-00043

7.Ikiisik H, Akif Sezerol M, Tasci Y, et al. COVID-19 vaccine hesitancy: A community-based research in Turkey. Int J Clin Pract 2021; 75: e14336. 20210526. https://doi.org/10.1111/ijcp.14336

8.Salali GD and Uysal MS. COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. Psychol Med 2020: 1-3. 20201019. https://doi.org/10.1017/S0033291720004067

9.Koh SWC, Tan HM, Lee WH, et al. COVID-19 Vaccine Booster Hesitancy among Healthcare Workers: A Retrospective Observational Study in Singapore. Vaccines (Basel) 2022; 10 20220317. https://doi.org/10.3390/vaccines10030464

10.Mekonnen BD and Mengistu BA. COVID-19 vaccine acceptance and its associated factors in Ethiopia: A systematic review and meta-analysis. Clin Epidemiol Glob Health 2022; 14: 101001. 20220307. https://doi.org/10.1016/j.cegh.2022.101001

11.Patwary MM, Alam MA, Bardhan M, et al. COVID-19 Vaccine Acceptance among Low- and Lower-Middle-Income Countries: A Rapid Systematic Review and Meta-Analysis. Vaccines (Basel) 2022; 10 20220311. https://doi.org/10.3390/vaccines10030427

12.Ionescu TC, Fetecau BI, Giurgiuca A, et al. Acceptance and Factors Influencing Acceptance of COVID-19 Vaccine in a Romanian Population. J Pers Med 2022; 12 20220313. https://doi.org/10.3390/jpm12030452

13.Sypsa V, Roussos S, Engeli V, et al. Trends in COVID-19 Vaccination Intent, Determinants and Reasons for Vaccine Hesitancy: Results from Repeated

Cross-Sectional Surveys in the Adult General Population of Greece during November 2020-June 2021. Vaccines (Basel) 2022; 10 20220318. https://doi.org/10.3390/vaccines10030470
14.Moscardino U, Musso P, Inguglia C, et al. Sociodemographic and psychological correlates of COVID-19 vaccine hesitancy and resistance in the young adult population in Italy. Vaccine 2022,2022/03/21. https://doi.org/10.1016/j.vaccine.2022.03.018
15.Coulaud PJ, Ablona A, Bolduc N, et al. COVID-19 vaccine intention among young adults: Comparative results from a cross-sectional study in Canada and France. Vaccine 2022:20220303. https://doi.org/10.1016/j.vaccine.2022.02.085
16.Ameratunga R, Longhurst H, Steele R, et al. Common Variable Immunodeficiency Disorders, T-Cell Responses to SARS-CoV-2 Vaccines, and the Risk of Chronic COVID-19. J Allergy Clin Immunol Pract 2021; 9: 3575-83. https://doi.org/10.1016/j.jaip.2021.06.019
17.Zarebska-Michaluk D, Rzymski P, Moniuszko-Malinowska A, et al. Does Hospitalization Change the Perception of COVID-19 Vaccines among Unvaccinated Patients? Vaccines (Basel) 2022; 10 20220319. https://doi.org/10.3390/vaccines10030476
18.Kharbanda EO and Vazquez-Benitez G. COVID-19 mRNA Vaccines During Pregnancy: New Evidence to Help Address Vaccine Hesitancy. JAMA 2022 2022/03/25. https://doi.org/10.1001/jama.2022.2459
19.Pitlick MM, Joshi AY, Gonzalez-Estrada A, et al. Delayed systemic urticarial reactions following mRNA COVID-19 vaccination. Allergy Asthma Proc 2022; 43: 40-3. https://doi.org/10.2500/aap.2022.43.210101
20.Castells M, Demoly P and Tanno LK. [Anaphylaxis and COVID-19 vaccines]. Rev Fr Allergol (2009) 2021; 61: 8S30-38S35. https://doi.org/10.1016/S1877-0320(21)00439-5
21.Armstrong L and Maguire N. A Case Report of Prolonged Anaphylaxis after COVID-19 Vaccine. Clin Pract Cases Emerg Med 2022; 6: 21-4. https://doi.org/10.5811/cpcem.2021.9.53690
22.Laisuan W, Wongsa C, Chiewchalermsri C, et al. CoronaVac COVID-19 Vaccine-Induced Anaphylaxis: Clinical Characteristics and Revaccination Outcomes. J Asthma Allergy 2021; 14: 1209-15. https://doi.org/10.2147/JAA.S333098
23.Cahill JA, Kan M. Successful administration of second dose of BNT162b2 COVID-19 vaccine in two patients with potential anaphylaxis to first dose. Allergy 2022; 77: 337-8. https://doi.org/10.1111/all.14996