Original Article

COVID-19 Vaccine Attitudes among Allergy Patients in Babylon: A Cross-Sectional Study

Tamara Abdul Hussein Mahdi [1], Ammar Saaed [2], Marwa Abdul-Ameer [3], Ahmed Adil Ali [4,*], Ahmed Hasan Jebur [5]

[1] Board Certified Family Medicine, Public Health Department, Babil Health Directorate, Babylon Province, Hilla, Iraq
[2] Board Certified Pediatrician, Imam Sadiq Hospital, Babil Health Directorate, Babylon Province, Hilla, Iraq
[3] Diploma of Family Medicine, The Specialized Center for Sensitivity in Babylon, Babil Health Directorate, Babylon Province, Hilla, Iraq
[4] Department of Medical Microbiology, Hammurabi College of Medicine, University of Babylon, 51002 Hillah, Babylon, Iraq.
[5] M.Sc. Pulmonary Medicine, The Specialized Center for Sensitivity in Babylon, Babil Health Directorate, Babylon Province, Hilla, Iraq
[*] Corresponding author: ahmed.alzubaidi@uobabylon.edu.iq

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Abstract

Background: COVID-19 vaccine hesitancy is a global health problem, particularly among individuals with allergic diseases who fear severe allergic reactions as a side effect. **Objectives:** This study explores attitudes towards COVID-19 vaccine acceptance and refusal among patients with various allergic disorders and identifies their primary sources of vaccine information. **Materials and Methods:** A cross-sectional study was conducted at a specialized center for sensitivity in Babylon, Iraq, from September 30, 2023, to June 30, 2024. The study included 1,211 patients with allergic disorders who provided verbal consent. Data were collected through personal interviews using a validated data collection form. **Results:** The mean age of the study group was 39.82 years (± 14.9 SD), and 57.1% were females. The most prevalent allergic diseases were allergic rhinitis (28.3%) and urticarial (27.4%). Vaccine acceptance was 62%, with significant differences based on gender, occupation, academic achievement, marital status, economic status, residence, and tobacco use ($p < 0.05$). Family history of allergic diseases was associated with lower acceptance ($p = 0.019$). The most common sources of information were family/local community (39.6%) and healthcare centers (30%), both associated with higher acceptance rates ($p = 0.00$). **Conclusion:** This study revealed a 62% COVID-19 vaccine acceptance rate among allergy patients in Babylon, Iraq. Factors associated with higher acceptance included male gender, government employment, higher education levels, and receiving information from healthcare providers. Efforts to combat misinformation and provide accurate information through trusted sources may help improve vaccine uptake in this population.

Keyword: COVID-19 vaccine, Acceptance, Hesitancy, Refusal, Allergic patients, Vaccine hesitancy, Allergic diseases, Allergic rhinitis

Introduction

The first emerged Coronavirus Disease 2019 (COVID-19) was in Wuhan, Hubei Province, China at the end of 2019, then spread to the rest of China,[1] followed by the spread of the COVID-19 epidemics into the world caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).[2] In Iraq the first confirmed case was reported in Najaf governorate on 24 February followed by 4 confirmed cases in one family in Kirkuk governorate one day later.[3]

COVID-19 infected people of all ages, however, studies showed that older people (over 60 years), and those with underlying medical conditions such as cardiovascular disease, diabetes, chronic respiratory disease, hepatic dysfunction and cancer, are at a higher risk of getting severe

disease.[4,5]

Several vaccines have been developed, with some licensed vaccines and others continuing in clinical studies. Notably, the Pfizer-BioNTech, Moderna, and the Oxford/AstraZeneca vaccinations have all been licensed for urgent application and are now in use in a number of countries, including Iraq.[6]

On Thursday 25 March 2021, the AstraZeneca vaccines manufactured by SK-Bio Institute of South Korea, arrived at Baghdad International Airport by the Minister of Health, Iraq and The Ministry of health immediately dispatched these vaccines to all departments of health in Baghdad, in all governorates and Kurdistan to be used for protecting people within the priority groups according to the national vaccine deployment plan and framework.[7]

It was estimated that the number of COVID-19 vaccination doses administered per 100 people in Iraq would rise to 44 as of October 27, 2023[8].

Many studies have demonstrated that when a new vaccine is launched, a variety of factors contribute to its social acceptance. These concerns include new vaccine safety and effectiveness, negative health impacts, misunderstandings about the importance of vaccination, lack of faith in the health system, and lack of community information about vaccine-preventable illnesses[9].

Vaccine hesitancy is not a recent phenomenon; it is defined by the World Health Organization (WHO) as a "delay in acceptance or refusal of vaccines despite availability of vaccination services"[10]. The World Health Organization has identified vaccine hesitancy as a critical global health concern, which poses recurring challenges in preventing seasonal influenza and has complicated previous pandemic responses, such as during the 2009 H1N1 outbreak[11,12]. In the aftermath of the COVID-19 pandemic, this issue has escalated into a worldwide health crisis[13,14].

An increasing body of research indicates a decline in vaccine acceptance, fueled by skepticism regarding vaccine safety and efficacy. This trend is exacerbated by the pervasive spread of unsubstantiated scientific misinformation and a growing distrust in political leadership[15].

A significant factor contributing to vaccine hesitancy is the apprehension about individual safety. The primary concern among those hesitant, particularly individuals with allergic conditions, is the fear of experiencing a severe allergic reaction as a side effect of the COVID-19 vaccine[16].

The genetic predisposition to allergic conditions, including allergic rhinitis, asthma, and atopic dermatitis (eczema), is known as atopy. This condition is characterized by an increased immune system reactivity to common allergens, particularly those that are inhaled or found in food.[17]

The "health belief model" is a theoretical approach to understanding health-related behaviors, suggesting that individuals take protective measures based on their perceived vulnerability to and the potential severity of a particular illness..[18]

Individuals suffering from chronic conditions, including allergic disorders, are likely to implement preventive measures against infection, such as getting vaccinated, once they become aware of the potential dangers associated with COVID-19 exposure. Allergic conditions increase the likelihood of infection, making it crucial for individuals with these conditions to be prioritized for vaccination[19]. Nevertheless, limited research has examined the role of allergic diseases in COVID-19 vaccine hesitancy. The objective of this research was to explore attitudes towards COVID-19 vaccine acceptance or refusal among patients suffering from various

allergic disorders and to identify their primary sources of vaccine information.

Materials and Methods

From September 30, 2023, to June 30, 2024, a cross-sectional analysis was undertaken at Specialized Centre for Sensitivity in Babylon. This study included all patients with allergic disorders who visited the facility during this period. Eligible participants were assured that their information would be used exclusively for research purposes, and that their responses would remain confidential. Based on this assurance, verbal consent was obtained from each participant prior to their inclusion in the study.

The data were collected through personal interviews using a data collection form written after performing a literature review and confirmed by experts for content validity. This includes the following:

1- Demographic and social factors (including age, gender, marital status, profession, educational level, economic status, place of residence, and tobacco use).
2- Allergy-related characteristics (type of allergic disease, family history of allergic diseases and associated chronic diseases).
3- COVID vaccine \ infection-related characteristics (type of COVID 19 vaccine, commitment to mask, source of information, and vaccine acceptance).
4- Attitude toward COVID vaccine (Persuaded, hesitant/afraid, unpersuaded, compelled).

Statistical Analysis:

SPSS version 22 was used to input and analyze the gathered information, which was then displayed in tables and figures illustrating the frequency and percentage distribution of participants across various subgroups. To examine the association between different variables and vaccine acceptance, cross-tabulation analysis was employed. The chi-square test was used to assess statistical significance, with p values below 0.05 considered significant.

Ethical Approval:

All the participants provided oral consent before the interviews. The researchers ensured the confidentiality of the data by storing the collected information in secure folders with restricted access. Approval from the relevant institution was obtained before the data collection process was initiated. The Research Ethics Committee of the Babylon Health Directorate Training and Human Development Centre approved this study.

Results

This study included 1211 participant of different allergic diseases, mean age of study group was 39.82 years (± 14.9 SD), females were 692 (57.1%) from the study sample, most of the study sample were unemployed [n= 466 (38.5%)], followed by Governmental employee [n= 354 (29.2%)], the most academic achievement of the participants were secondary school [n= 416 (34.4%)] and college\institute [n= 434 (35.8%)].

Of all the participants [n=977 (80.7%)] were married, most of them had average economic status [n= 852 (70.4%)], nearly 60 percent of them were from Babylon urban areas [n = 725 (59.9 %)], and most of the study sample were non-smokers [n=879, 72.6%)] (Table 1).

Table 1: Sociodemographic characteristics of the study sample with cross-tabulation across the attitude subgroups

Sociodemographic characteristics		Total (%) n= 1211	Vaccination acceptance n (%)		*p* value
			Accepted n= 751(62)	Refused n=460 (38)	
Gender	Male	519 (42.9)	357_b (68.8)	162_a (31.2)	0.00
	Female	692 (57.1)	394_b (56.9)	298_a (43.1)	

Occupation	Unemployed	466 (38.5)	224_b (48.1)	242_a (51.9)	0.00
	Government employee	354 (29.2)	295_b (83.3)	59_a (16.7)	
	Private Job	206 (17.0)	114_b (55.3)	92_a (44.7)	
	Student	115 (9.5)	56_b (48.7)	59_a (51.3)	
	Retired	70 (5.8)	62_b (88.6)	8_a (11.4)	
Academic achievement	Illiterate	39 (3.2)	10_b (25.6)	29_a (74.4)	0.00
	Primary school	282 (23.3)	106_b (37.6)	176_a (62.4)	
	Secondary school	416 (34.4)	252_a (60.6)	164_a (39.4)	
	College \ institute	434 (35.8)	344_b (79.3)	90_a (20.7)	
	Higher education	40 (3.3)	39_b (97.5)	1_a (2.5)	
Marital status	Married	977 (80.7)	627_b (64.2)	350_a (35.8)	0.01
	Unmarried	227 (18.7)	117_b (51.5)	110_a (48.5)	
	Divorced	5 (0.4)	5_a (100.0)	0_a (0.0)	
	Widow	2 (0.2)	2_a (100.0)	0_a (0.0)	
Economic status	Good	145 (12.0)	116_b (80.0)	29_a (20.0)	0.00
	Average	852 (70.4)	533_a (62.6)	319_a (37.4)	
	Poor	214 (17.7)	102_b (47.7)	112_a (52.3)	
Residence	Babylon urban areas	725 (59.9)	480_b (66.2)	245_a (33.8)	0.01
	Babylon rural areas	390 (32.2)	213_b (54.6)	177_a (45.4)	
	Outside Babylon governorate	96 (7.9)	58_a (60.4)	38_a (39.6)	
Tobacco use	Smoker	312 (25.8)	221_b (70.8)	91_a (29.2)	0.00
	Non-smoker	879 (72.6)	514_b (58.5)	365_a (41.5)	
	Ex-smoker	20 (1.7)	16_a (80.0)	4_a (20.0)	

The lowercase letters (a,b) indicate groups within the Vaccination acceptance categories that do not show statistically significant differences in their column proportions at the 0.05 significance level.

Cross-tabulation of sociodemographic characteristics with vaccination acceptance toward the COVID 19 vaccine as shown in (Table 1) revealed that gender, occupation, academic achievement, marital status, economic status, residence, and tobacco use had significant differences in the vaccine acceptance subcategories (p <0.05).

As shown in (Table 2), the most prevalent allergic diseases among the participants were allergic rhinitis (n= 343, 28.3%) and urticaria (n= 332, 27.4%). More than half of the participants had no family history of allergic diseases (n= 618, 51.0%), and most of them had no chronic illnesses (n= 1187, 98.0%).

Vaccine acceptance was not significantly associated with the type of allergic diseases and associated chronic illnesses (p > 0.05), whereas family history of allergic diseases had a significant association (p =0.019) and negative family history was associated with higher acceptance.

Table 2: Allergy related characteristics of the study sample with cross tabulation across the attitude subgroups

Allergy related characteristics		Total n (%) 1211	Vaccination acceptance n (%)		*p* value
			Accepted n= 751	Refused n=460	
Type of allergic disease	Asthma - Allergic bronchitis	218 (18.0)	134a (61.5)	84a (38.5)	0.09
	Atopic dermatitis (Eczema)	34 (2.8)	26a (76.5)	8a (23.5)	
	Allergic Rhinitis	343 (28.3)	221a (64.4)	122a (35.6)	
	Urticaria	332 (27.4)	210a (63.3)	122a (36.7)	
	Heterogeneous allergic phenotype	284 (23.5)	160b (56.3)	124a (43.7)	
Family history of allergic disease	Positive	593 (49.0)	348b (58.7)	245a (41.3)	0.019
	Negative	618 (51.0)	403b (65.2)	215a (34.8)	
Associated chronic Disease	No chronic illness	1187 (98.0)	732a (61.7)	455a (38.3)	0.104
	One chronic illness	18 (1.5)	13a (72.2)	5a (27.8)	
	Two or more chronic illness	6 (0.5)	6a (100.0)	0a (0.0)	

The lowercase letters (a,b) indicate groups within the Vaccination acceptance categories that do not show statistically significant differences in their column proportions at the 0.05 significance level.

Table 3 shows the COVID vaccine and infection-related characteristics of the study sample. Thirty-eight percent were unvaccinated, of whom more than half received two or more vaccine shoots whereas nine percent received only one shoot.

The most commonly reported sources of information were family/local community (n= 479, 39.6%) and healthcare centers (n= 363, 30%), both of which were associated with a higher proportion of vaccine acceptance (p = 0.00). Social media as a source of information was reported in 304 (25.1%) participants and was associated with a higher proportion of refusal; obviously (100%) of the participants with no prior knowledge about the vaccine accepted to vaccinate.

As presented in the last row of table 3 the attitude towards COVID 19 vaccination was divided into 4 sections (persuaded, hesitant \ afraid, unpersuaded, and Compelled), it was significantly clear that all of the persuaded participants (100%) accepted the vaccine, while (93%) who were hesitated, refused the vaccine

Table 3: COVID vaccine\infection related characteristics of the study sample with cross-tabulation across the attitude subgroups

COVID vaccine\infection related characteristics		Total n (%) n=1211	Vaccination acceptance n (%)		p value
			Accepted n= 751	Refused n=460	
Number of COVID vaccine Shoots	Unvaccinated	460 (38.0)	0_b (0.0)	460_a (100.0)	0.00
	One vaccine shoot	109 (9.0)	109_b (100.0)	0_a (0.0)	
	Two or more vaccine shoots	642 (53.0)	642_b (100.0)	0_a (0.0)	
Source of information	No prior Knowledge	65 (5.4)	65_b (100.0)	0_a (0.0)	0.00
	Social media	304 (25.1)	131_b (43.1)	173_a (56.9)	
	Family \ local community	479 (39.6)	258_b (53.9)	221_a (46.1)	
	Health care centres	363 (30.0)	297_b (81.8)	66_a (18.2)	
Attitude toward COVID vaccine	Persuaded	696 (57.5)	696_b (100.0)	0_a (0.0)	0.00
	Hesitant \ Afraid	416 (34.4)	27_b (6.5)	389_a (93.5)	
	Unpersuaded	82 (6.8)	11_b (13.4)	71_a (86.6)	
	Compelled	17 (1.4)	17_b (100.0)	0_a (0.0)	

The lowercase letters (a,b) indicate groups within the Vaccination acceptance categories that do not show statistically significant differences in their column proportions at the 0.05 significance level.

Discussion

In this study, we evaluated the acceptance and refusal of some allergic patients regarding the COVID 19 vaccine. To the best of our knowledge, this is the first study to investigate this aspect in our setting. It may participate in focusing on the lights in allergic centers in Iraq and developing countries to introduce information about the benefits of receiving the vaccine and correcting the misinformation that prevents this segment of society from getting the vaccine.

Current revealed that 62% of participants were willing to receive the vaccine. Anderson et al. utilized a formula to calculate the attainment of herd immunity (assuming the COVID vaccine offers complete and long-lasting protection post-vaccination) and determined that immunizing between 60% and 72% of the population would be adequate to establish herd immunity against COVID-19.[20,21]. Keeping in mind the factors that delay the achievement of herd immunity, such as the emergence of new mutations in the virus, vaccine efficacy rate of less than 100%, rejection by people, vaccine cost, and storge and requirement[20], which may delay Iraq from reaching herd immunity, studies examining Iraqi acceptance rates for the COVID-19 vaccine have yielded inconsistent results. A notable example

is the research by Shareef LG. et al. 2022, which utilized a concise web-based survey to gather data from participants across various Iraqi regions. Their investigation revealed that 56.2% of the respondents expressed willingness to receive the COVID-19 vaccine[22]. A cross-sectional study conducted by Zahraa Albasry in Baghdad province utilized a random sample of participants. The research revealed that 73.4% of those enrolled recognized the significance of COVID-19 vaccination in safeguarding the community from infection[23].

This study revealed a significantly higher rate of vaccine acceptance among males (p = 0.000). This finding aligns with a systematic review conducted by Sileo et al., which examined peer-reviewed studies in the United States focusing on individuals aged 12 years and above published prior to 2022. These studies investigated the impact of gender/sex on COVID-19 vaccine intentions and/or uptake. The review suggested that "Women may have been more hesitant to get the vaccine than men early in the pandemic, but these differences may not translate to actual behaviour"[24], this goes with our study in which hesitancy were reported in 34% from total sample, and 6.5% of them accept the vaccine.

In present study governmental employee and those who are retired had higher vaccine acceptability (83.3%, 88.6% respectively) in comparison to unemployed and students (48.1%, 48.7% respectively), we compare these findings with two different studies one of them was a cross-sectional study done in Japan by Shuko Takahashi during 2021, who find that governmental workers (acceptance percent higher than current study) and unemployed who were vaccinated or willingness to get vaccinate had higher percent (95.9%, 91.2% respectively)[25], the second one was done in Iraq among university students in Baghdad which revealed acceptance rate of the vaccine among the total participants (vaccinated and willing to vaccinate) was 93.5% this finding was higher than this study.[26]

It was clear that the acceptance in smokers and non-smokers was significantly differ, it was higher in smokers 70.8% while in non-smoker group 58.5% respectively, p value =0.00) this was higher than study was done in Pennsylvania from August 2015 to April 2021, all participants were current tobacco users, over half of them reported receiving at least one dose of the COVID-19 vaccination 59.3% and 44.2% reported full-vaccination[27]

The acceptance of COVID-19 vaccines among people with and without a history of allergies may be influenced by concerns regarding potential allergic reactions. Although the occurrence of allergic responses to COVID-19 vaccines is rare, apprehension regarding such reactions remains one of the most frequently mentioned worries documented in scientific publications..[28]

In present study, vaccine acceptance had no significant association with the type of allergic diseases and associated chronic illnesses ($p > 0.05$), whereas in a retrospective Turkish study conducted by Erkoç *et al.* (2024) on patients treated in the Immunology and Allergy Outpatient Clinic 2021 – 2022, the rate of vaccination with at least two doses was highest in allergic rhinitis (84.4 %) and the lowest in immunodeficiency (25 %). 84.4% of those with allergic rhinitis were vaccinated at least 2 doses, and this rate was significantly higher than those without rhinitis ($p<0.001$).[29]

Although a family history of allergic diseases had a significant association (p=0.019) and a negative family history was associated with higher acceptance, this may be related to less fear of allergic reactions to the vaccine in those

who had not previously experienced allergic attacks.

In this study, the primary sources of information for participants were their families or local communities (39.6%), and healthcare centers (30%). These findings are not consistent with those of a study conducted in Africa, where social media served as the main information source for over two-thirds of the participants[30]. Vaccine hesitancy and opposition are often fueled and sustained by social media initiatives. The abundance of misleading and unfavorable information about COVID-19 circulating on social media platforms may be indicative of an increased tendency towards negative attitudes regarding vaccine acceptance in this particular instance[30].

At that time, government regulations necessitated 17 (1.4%) participants to receive the vaccine. This was lower than the findings of Ali S. *et al*.'s 2021 study on vaccine acceptance and rejection factors among Iraqi university students, where 37% of participants were obligated to accept vaccination to attend classes[26].

The rate of vaccine hesitancy was 34.4%, aligning with results from other European studies (31.1% in Italy, 20.0% in Denmark, 38.0% in France)[31]. Comparable rates were documented in the United States, ranging from 25.0% to 43.1%[32–35].

It is important to acknowledge certain limitations of our research. The cross-sectional nature of this study provides only a snapshot of the specific time period examined. In addition, being conducted at a single center limits its generalizability. Furthermore, this research design was not appropriate for establishing causal relationships.

Notwithstanding these constraints, our investigation sheds light on a particular segment of the Iraqi society that seeks treatment at the allergy center due to various allergic reactions, which contribute to their hesitancy regarding vaccine uptake. This research approach was well suited for gathering information about vaccine acceptance and refusal within our specific context.

Conclusion

This cross-sectional study examined COVID-19 vaccine attitudes among allergy patients in Babylon, Iraq. The findings revealed a 62% vaccine acceptance rate among participants, several factors were associated with higher vaccine acceptance, including male gender, government employment, higher education levels, and receiving information from healthcare providers. Family history of allergies was associated with lower acceptance.

Notably, the type of allergic disease did not significantly impact vaccine acceptance. This suggests that concerns about allergic reactions to the vaccine may not be a major barrier in this population. However, the 34.4% rate of vaccine hesitancy indicates there is still work to be done in addressing concerns and promoting uptake.

The study highlights the importance of healthcare providers as trusted sources of vaccine information. Efforts to combat misinformation, especially on social media, and provide accurate information through healthcare channels may help improve acceptance rates.

While this single-center study has limitations in generalizability, it provides valuable insights into vaccine attitudes among a key population of allergy patients in Iraq. Further research across multiple centers and regions is warranted to develop tailored strategies for increasing COVID-19 vaccine uptake in allergic and general populations in Iraq. Addressing hesitancy and promoting acceptance will be

crucial for achieving adequate vaccination coverage to control the spread of COVID-19.

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Data availability statement

Not applicable

Conflict of interest

The authors declare no conflicts of interest.

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