The association between COVID-19 and atopy in Baghdad, Iraq, 2022

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ABSTRACT

Introduction: Coronavirus disease 2019 (COVID-19) has high morbidity and mortality especially in preexisting risk groups. In atopic diseases the IgE and eosinophils are commonly elevated. This study aims to determine the potential association between COVID-19 and atopic diseases in Iraqi patients.

Materials and Methods: A cross-sectional study done in Baghdad on 112 patients who attended Al-Zahraa Allergic Center. Their demographic characteristics, total IgE, eosinophil counts and PCR result for COVID-19 were determined.

Results: The means for IgE and eosinophils were 245.7±260.1IU/ml and 444.5±117.1cells/microliter sequentially. Around 32.1% had high IgE level (i.e., atopic) and 11.6% had COVID-19. Among the atopic patients, 33.3%, 30.5% and 36.2% had atopic dermatitis, allergic rhinitis and asthma respectively. More than half (58.3%) of them were male, 55.5% aged <45 years, 36.2% were retired or had no job, 69.5% were graduated from secondary school or more and 88.8% lived in urban areas. There is no significant association in IgE level between those with and without COVID-19, which means that exposure to SARS Cov2 virus could not be a trigger or exacerbation for atopic diseases. Also, there was no association between atopic patients with COVID-19 and those without it regarding type of atopy, age, sex, occupation, education, type of living area.

Conclusions: Atopy is not a risk factor for COVID-19.

KEYWORDS:
COVID-19, atopy, allergy, atopic diseases

INTRODUCTION

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) infection is a new, rapidly spreading infectious disease.[1] Recently, there was a rapid increase in cases worldwide due to the omicron (B.1.1.529) variant of the virus, even in vaccinated populations.[2] COVID-19 affects all the age groups, with high morbidity and mortality especially in pre-existing risk groups.[3] It demonstrates a clinically different manifestations ranging from asymptomatic presentation to critically illness with severe pneumonia, acute respiratory distress syndrome, respiratory failure or multiple organ failure. Accumulating evidences demonstrated that COVID-19 has also an extrapulmonary involvement, including neurological, smelling sensation, cardiovascular, digestive, hepatobiliary, renal, endocrinologic, dermatologic system and others.[4] Atopy is defined as a personal and/or familial tendency, usually in childhood or adolescence, to become sensitised and produce Immunoglobulin E (IgE) antibodies in response to ordinary exposure to allergens.[5,6] It is a genetically determined deposition to develop allergic rhinitis, asthma and atopic dermatitis as a result of type I hypersensitivity reactions.[7-9] Atopic diseases are characterised by high level of total serum IgE.[10] Those atopic diseases are common, and they have a great burden on the communities as well as on the individuals, especially in developing countries.[11] Elevation in the measurements of total serum IgE and eosinophil cells are common in those diseases.[12,13] Atopic diseases especially asthma and rhinitis are of concern during COVID-19 pandemic, since their symptoms overlap during the early stages. There are controversial findings in publications on COVID-19 and type I hypersensitivity. Therefore, this study was carried out to report on the association between them.

MATERIALS AND METHODS

It is a cross – sectional study carried out in Al-Zahraa Consulting Center for Allergy and Asthma in Baghdad which deals with patients who had allergy, asthma or any type of atopic diseases. Iraqi people who had atopy were considered as a study population in this work. A total of 112 adult atopic patients who attended that centre were included in the study for the period April to July 2022, through four working days per week. The cases were selected according to the following inclusion criteria: (1) Their age was 18 years and more. (2) They were diagnosed to have atopic hypersensitivity (asthma, allergic rhinitis or atopic dermatitis). The exclusion criteria of cases were: (1) Those who refused to participate. (2) Those who attended the mentioned centre for conditions other than atopy. (3) Those who were not sure about their status of infection with COVID-19. The requested data from the enrolled patients were demographic characteristics, total IgE level, eosinophil counts and polymerase chain reaction (PCR) result for checking the COVID-19 infection (whether acute or not) at the interview or within the last two weeks, regardless the onset of their symptoms.

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Table I: Frequency, percent and association between some variables and COVID-19 among the atopic participants with high total IgE

Variable		Total No.	+ve COVID-19 No.	Chi- square	p-value
Type of atopy	Allergic rhinitis	11	1	1.87	0.39
	Asthma	13	4		
	Atopic dermatitis	12	2		
Age classification	˂40 years	20	3	0.56	0.67
	≥40years	16	4		
Sex	Male	21	3	0.85	0.41
	Female	15	4		
Occupation	Governmental work	12	4	3.91	0.27
	Private company	3	1		
	Self-employed	8	0		
	Retired or no job	13	2		
Education	˂ Secondary graduation	11	2	0.01	1.00
	≥ Secondary graduation	25	5		
Living place	Urban	32	5	2.68	0.16
	Rural	4	2		
Total IgE (Ln) ± SD		**-ve COVID-19**	**+ve COVID-19**	**t-test**	**p-value**
		2.66 ± 0.24	2.63 ± 0.29	-0.23	0.81

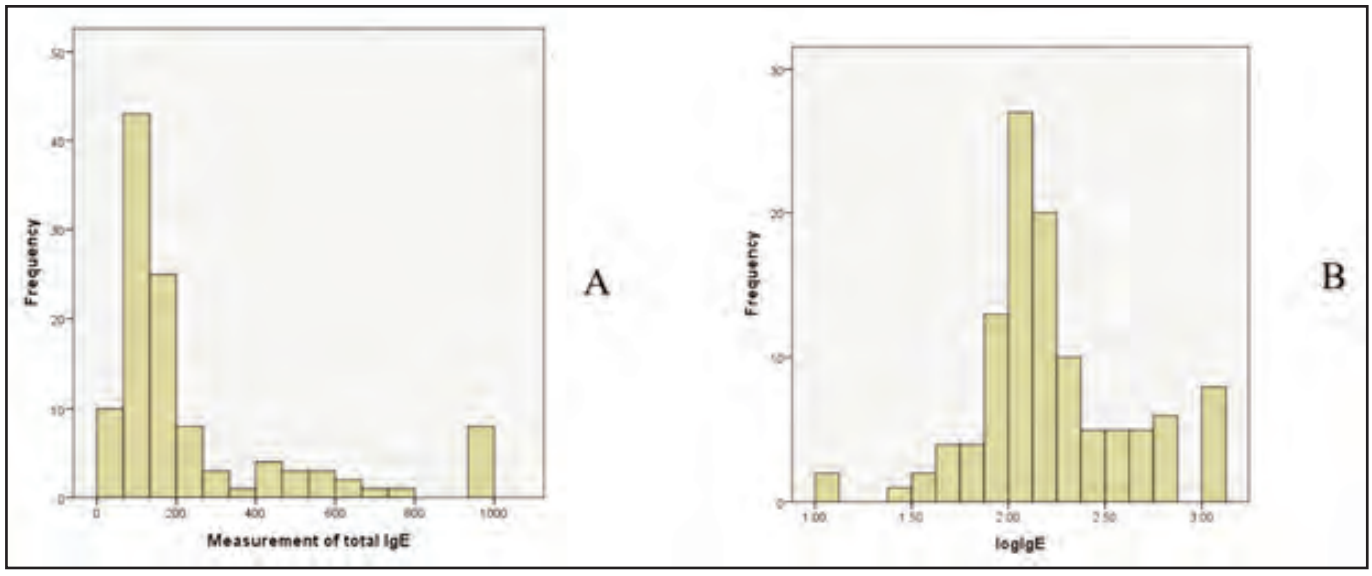

Fig. 1: Histogram charts of the frequency distribution of arithmetic values (A) and natural logarithm values (B) of serum total IgE for all participated patients.

RESULTS

The serum total IgE mean was 245.7±260.1IU/ml. The eosinophil count measurements mean was 444.5±117.1cells/microliter. The distribution of total IgE was skewed to the left Figure 1(A), then data were transformed to natural logarithm (ln) to get a normal distribution Figure 1(B).

Out of the total participants, thirty-six patients (32.1%) had a high level of total IgE (more than 200IU/ml) i.e atopic patients.[14,15] Thirteen patients (11.6%) were infected with COVID-19. The characteristics of COVID-19 patients are shown in Table I.

DISCUSSION

The distribution of total IgE was skewed to the left, which is similar to that reported in some literatures.[14,16] A transformation to ln was carried to get the normal distribution. An atopy state was found in 32.1%. It might be due to the type of patients who are attending the study setting which is a specialised centre for allergy and asthma i.e., most of patients complain of allergy. Allergies other than atopy (serum sickness, arthus reaction, etc.) were out of the scope of that centre, due to limited resources of diagnosis. The rate of COVID-19 was 11.6%. This relatively low rate might be explained by the fact that the data collection period (April to July 2022) was a time of regressed epidemic of COVID-19 in Iraq. PCR was limited to those patients with respiratory symptoms. Uncleared information in case detection of

COVID-19 could be behind this low figure of the disease, because Iraqi ministry of health officially consider only the PCR results in its diagnosis, regardless the CT-scan findings (if present). Globally, asthma and other atopic diseases 'allergic rhinitis and atopic dermatitis' have profoundly increased in frequency within the last decades. Notably, all combined, they now affect approximately 20% of the global population. Allergic rhinitis and atopic dermatitis are more prevalent than asthma around the world,[17] but the current study shows that the percent of those three manifestations of atopy is approximately equal. More than half of patients (58.3%) were males. Another Sweden study showed the female percent was 50.5%.[18] Slightly more than half of the studied atopic patients (55.5%) were below 40 years of age, this might reflect the relatively ordinary age groups of patients who attend the mentioned centre. Slightly more than one-third (36.2%) of the studied patients were retired or had no job. Another study done in Poland revealed that 42% of attended allergic patients were also retired.[19] The largest proportion of the studied patients (69.5%) completed their secondary school or university; as mentioned in the Polish study, which revealed that the largest group (36%) of allergic patients were also graduated from high school.[19] The majority of participants (88.8%) lived in urban areas, this might be due to the place of the study setting that is located inside Baghdad centre which is an urban area. There is no significant association in IgE level between those with and without COVID-19, which means that exposure to SARS Cov2 virus could not be a trigger or exacerbation for atopic diseases. Also, there was no statistical difference between atopic patients with COVID-19 and those without it regarding the following variables: type of atopy (whether it was asthma, allergic rhinitis, or atopic dermatitis), age of patients, sex of them, their occupation, their educational status and their type of living area. Multiple studies published recently do not prove that SARS Cov2 virus could cause a serious illness in individuals with atopy.20 There are controversy findings in literation about atopy and COVID-19.[21] Many studies indicated that atopic diseases do not represent a risk factor for COVID-19 susceptibility or its severity.[22,23] Moreover, there are studies revealed that asthma and atopic diseases are associated generally with a lower risk of infection and severity of COVID-19.[22] Some studies proposed that the inhaled steroids might give some degree of protection against COVID-19 infection and severity. In contrast, chronic or recurrent use of systemic corticosteroids before getting COVID-19 could be a risk factor for poor outcomes and worse survival in patients with asthma and atopy. Some studies showed that treatment for severe asthma 'especially the biological therapy' does not increase the risk of getting COVID-19 or increasing its severity.[24] In addition, an Iranian study showed that allergic rhinitis was reversely associated with the severity of COVID-19.[25] Spectacularly, a Swedish study has found that the genetic factors underlying predisposition to atopic diseases are protective against COVID-19.[26]

LIMITATIONS OF THE STUDY

Since the cycle threshold values of COVID-19 PCR (or their cut off point) could not be traced in the current study for the patients with positive results of SARS CoV2 in order to estimate the viral load or the duration of infection, the recently infected cases could not be identified from the oldest ones, and thus the probable effect of this confounding issue on the measurements of serum total IgE could not be assessed.

CONCLUSION

Among the atopic patients, there is no significant association between COVID-19 and total serum IgE, type of atopy, age, sex, occupation, education, and living area, so atopy is not a risk factor for COVID-19.

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