

## Clinico-Epidemiological Characteristics and Severity of Patients with Influenza Virus in Baghdad, Iraq

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### Abstract

**Introduction:** influenza A is most frequent, with more mortality than other types. It is responsible for most seasonal cases and all known pandemics. **Aim:** to determine the clinico-epidemiological characteristics of Iraqi patients with confirmed influenza. **Methods:** A cross-sectional study carried out by selecting the confirmed influenza cases in 2 hospitals in Baghdad from Nov. 2021 till Jun. 2022. The data were summarized and analyzed statistically. **Results:** The total number of patients was 69. All had type A virus. 73.9% aged  $\geq 18$  years. 46.4% were males. 87% lived in urban areas. 91.3% presented with cough and fever. Small percents of them had hematological disease, immunological disease, asthma, diabetes, chronic renal disease, chronic lung disease, heart disease, muscular disease, or neurological disease. Only 7.2% got influenza vaccine, and 65.2% got COVID-19 vaccine. 97.1% had H3N2 and 2.9% had H1N1pdm09 strain. **Conclusions:** (1) Most confirmed influenza cases were of a mild grade. (2) Type A was only detected, where the H3N2 subtype constituted most cases. (3) The sex, living area, presence of asthma or an immunological disease were significantly associated with severity. **Recommendations:** Increasing the coverage of influenza vaccine in Iraq, especially against the influenza A- H3N2 subtype.

**Keywords:** Influenza, Seasonal influenza, Influenza A virus, H3N2, H1N1

### Introduction

There are three groups of influenza virus: influenza A, influenza B, and influenza C. Both influenza B and C viruses are associated with low-level sporadic diseases and limited outbreaks, and they never cause a pandemic influenza. On the other hand, influenza A is most frequent, with more mortality than influenza B, and it is responsible for most seasonal influenza cases and all known pandemics. [1] The outbreak of influenza virus that usually occurs annually each winter is called seasonal influenza, [2] which typically increases in its incidence throughout the late autumn and begins to decline in mid spring. The most common signs and symptoms related to influenza, which can include all or some of them, are fever, headache, myalgia, prostration, coryza, sore throat, and cough. [3] These seasonal epidemics are caused by the accumulation of mutations in the antigenic sites of circulating influenza viruses, i.e., antigenic drift. However, antigenic shift is another mechanism of antigenic change by influenza virus type A, and it occurs when an antigenically distinct virus emerges in the human population. Such a virus has the potential to cause a widespread global epidemic with high morbidity and mortality. Although seasonal influenza epidemics generally occur during the winter in temperate climates, but the transmission of the disease may occur throughout the year in the tropics.

Whilst the epidemiology and impact of influenza are well defined in developed countries, data in developing countries are still limited. [4] All known subtypes of influenza A viruses can infect birds, so called avian influenza viruses, except subtypes A(H17N10) and A(H18N11), which have only been found in bats. [5] Phylogenetically, all mammalian influenza viruses are derived from avian influenza viruses. [6] Only two influenza A virus subtypes A(H1N1) pdm09, and A(H3N2), are currently circulating among people in the world. Influenza A viruses have been detected and are known to circulate in seven different animal species or groups, including humans, wild water birds, domestic poultry, swine, horses, dogs, and bats. [5] The subtype H3N2 influenza virus became widespread in humans during the 1968 pandemic and have been a major cause of influenza epidemics ever since. [7]

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With the COVID-19 pandemic and the implementation of social and individual preventive measures, seasonal influenza activity has declined. However, infections with zoonotic influenza viruses have not appeared to decrease, suggesting that additional attention to avian influenza may still be required. [6]

The World Health Organization (WHO) global influenza surveillance standards clarified the surveillance case definitions for suspected influenza patients as both influenza-like illness (ILI) and severe acute respiratory infections (SARI). The ILI case definition by those standards is any acute respiratory infection case with measured fever of  $\geq 38$  °C, cough, and onset within the last ten days. While the SARI case definition is any acute respiratory infection case with history of fever or measured fever of  $\geq 38$  °C, cough, onset within the last ten days, and requires hospitalization. [8] Information on the prevalence of influenza, circulating virus subtypes and seasonality is essential for selecting strains for annual vaccines and for planning immunization programmes. [9] Influenza is responsible for notable morbidity and mortality worldwide. Annually, about three to five million cases of severe influenza disease, and quarter to half million deaths occur. [10] The aim of this study is to determine the clinical and epidemiological characteristics of patients with confirmed influenza virus in Baghdad, their severity, and the possible association between them.

### Methodology

It is a cross - sectional study carried out in Baghdad by selecting the two hospitals responsible for receiving suspected influenza cases, which had been recorded according to the WHO definition and classified into either ILI cases, or SARI cases which need admission. One of them (Al- Numan hospital) located in the eastern side of Baghdad (Rusafa) and responsible for registration of cases with ILI and the other one (Al- Kadhimiya hospital) located in the western side (Karkh) and responsible for SARI cases registration. The sample size was all ILI and SARI cases recorded in those hospitals from November 2021 till June 2022. The tools of the study are the epidemiological characteristics of the participants according to their filled out special standard case- investigation forms which were registered in the mentioned hospitals. These characteristics include the following variables: age, sex, living area, classification of case (ILI or SARI), presence of some health problems, status of immunization against influenza and COVID-19, type of influenza virus and its strain after laboratory analysis. The data were analyzed by PC- SPSS programme, and chi-square test (with significant p-value of  $\leq 0.05$ ) was done for comparison between those variables.

### Results

The total number of confirmed influenza patients in this study was 69. All of them were of type A influenza virus. Out of them, 56 patients were registered as ILI cases and 13 patients were registered as SARI cases (Figure 1). The distribution and association of the personal and clinical variables of those cases regarding their severity (hospitalization) is illustrated by table 1, while figure 2 shows the common two kinds of virus strains that were detected among those confirmed influenza cases.

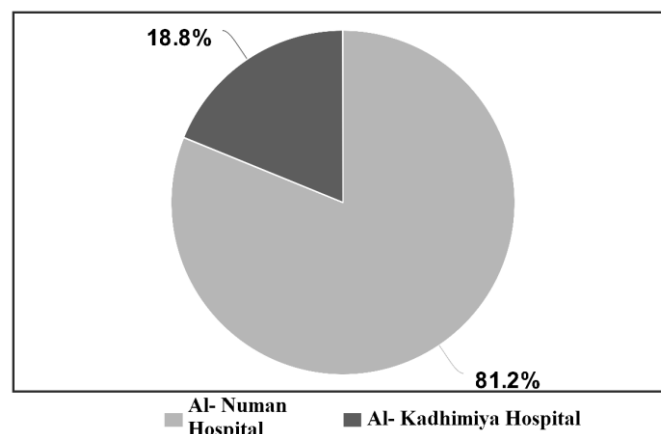
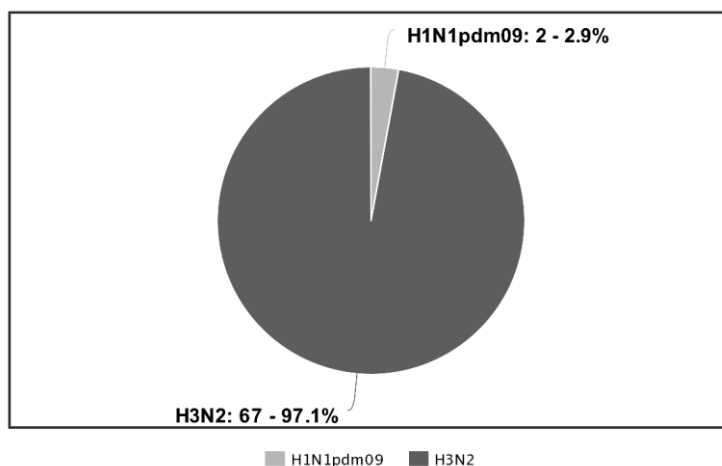


Figure (1): The distribution of influenza cases in Baghdad according to their site of registration

**Table (1): Frequency, percent, and association of the characteristics of influenza cases regarding their severity**

Variable		Mild No. (%)	Severe No. (%)	p-value
Age group	< 18 years	16 (23.2%)	2 (2.9%)	0.48
	≥ 18 years	40 (58%)	11 (15.9%)	
Sex	Male	30 (43.5%)	2 (2.9%)	0.015 *
	Female	26 (37.7%)	11 (15.9%)	
Living area	Urban	53 (76.8%)	7 (10.2%)	0.001 *
	Rural	3 (4.3%)	6 (8.7%)	
Presence of cough and fever	Yes	50 (72.4%)	13 (18.9%)	0.49 (¥)
	No	6 (8.7%)	0 (0%)	
Had Hematological disease	Yes	2 (2.9%)	0 (0%)	0.82 (¥)
	No	54 (78.3%)	13 (18.8%)	
Had Diabetes	Yes	1 (1.4%)	1 (1.4%)	0.34
	No	55 (79.8%)	12 (17.4%)	
Had chronic lung disease	Yes	1 (1.4%)	0 (0%)	0.42 (¥)
	No	55 (79.8%)	13 (18.8%)	
Had asthma	Yes	0 (0%)	2 (2.9%)	0.03 (¥) *
	No	56 (81.2%)	11 (15.9%)	
Had heart disease	Yes	1 (1.4%)	0 (0%)	0.42 (¥)
	No	55 (79.8%)	13 (18.8%)	
Had immunological disease	Yes	0 (0%)	2 (2.9%)	0.03 (¥) *
	No	56 (81.2%)	11 (15.9%)	
Had muscular disease	Yes	1 (1.4%)	0 (0%)	0.42 (¥)
	No	55 (79.8%)	13 (18.8%)	
Had chronic renal disease	Yes	1 (1.4%)	1 (1.4%)	0.25
	No	55 (79.8%)	12 (17.4%)	
Had neurological disease	Yes	1 (1.4%)	0 (0%)	0.42 (¥)
	No	55 (79.8%)	13 (18.8%)	
Get influenza vaccine	Yes	4 (5.8%)	1 (1.4%)	1.00
	No	52 (75.4%)	12 (17.4)	
Get COVID-19 vaccine	Yes	35 (50.7%)	10 (14.5%)	0.51
	No	21 (30.5%)	3 (4.3%)	
Type of influenza A strain	H1N1pdm09	1 (1.4%)	1 (1.4%)	0.34
	H3N2	55 (79.8%)	12 (17.4%)	
*: significant (¥): Yates' p-value				



**Figure (2): The distribution of cases with influenza A virus according to the strain kind of the virus**

## Discussion

During the specified six month- study duration, the total number of patients who had a confirmed laboratory diagnosis of positive influenza virus in Baghdad was 69. Those patients were recorded in the two hospitals in Baghdad which are responsible for registration of suspected influenza viral infection. Most of them (81.2%) were diagnosed as ILI cases and recorded in Al- Numan hospital and they did not need a hospitalization.

Others (18.8%) were diagnosed as SARI cases and recorded in Al- Kadhimiya hospital and they were hospitalized in it, so they were considered as severe cases. A similar Tanzanian study showed that less than half of patients (44.2%) was recorded as ILI cases. [11] Most of the enrolled positive influenza cases in Baghdad (73.9%) aged eighteen years or more. This goes with the fact that influenza affects adults and elderly more than children. An Iraqi study done in 2018 showed that about sixty percent of patients with positive influenza virus located within two age groups; 21-50 and < 2 years. [12] Slightly more than half of the patients in this study (53.6%) were females. In contrast to an Iraqi study done in Baghdad in 2009 which showed that the males were about two-thirds (64.4%) among the cases of positive influenza virus. [13] The majority of patients with influenza virus in the current work (87%) lived in urban areas. This might be due to the settings of the two mentioned hospitals which are located in the center of Baghdad. The vast majority of enrolled patients with influenza (91.3%) had cough and fever in their clinical presentation. This goes with the typical presentation of the disease. Concerning the presence of comorbidities, some of patients with influenza in this study had hematological disease (2.9%), immunological disease (2.9%), asthma (2.9%), diabetes mellites (2.8%), chronic renal disease (2.8%), chronic lung disease (1.4%), heart disease (1.4%), muscular disease (1.4%), or neurological disease (1.4%). About the immunization status of the enrolled patients with influenza virus in this study, only a very small percent of them (7.2%) got vaccinated against the virus. This reflects the low coverage rate of influenza vaccination generally among Iraqi people, as the findings of a study done in Baghdad and revealed that only about one- quarter (24.5%) of Iraqi patients who attended the primary health care centers in 2019 were vaccinated against influenza. [14]

More than two- thirds of the patients with influenza in the current work (65.2%) got immunized with COVID-19 vaccine. This might be due to the wide- spread enriched health educational programmes and tools about the preventive measures of COVID-19 and the importance of its vaccine which were implemented in Iraq throughout the pandemic period. Among all the studied clinico- epidemiological characteristics of patients in Baghdad with influenza virus, the variables that were appeared in this study to have a significant association with the severity of the virus are: the sex, type of living area, asthma, and the presence of an immunological disease. So, being male, living in an urban area, non- asthmatic, and having no immunological disease are more susceptible to have mild influenza viral infection. All the positive cases of influenza virus in the current study were of type A. Other types (influenza B and C) were not detected. Regarding the laboratory- diagnosed influenza A subtypes, it was appeared in this study that there were only two kinds of them; the vast majority (97.1%) was H3N2 strain and others (2.9%) were H1N1pdm09 strain. Other subtypes of influenza A (H5N1, H7N9, Yamagata, and Victoria) were not detected. In a survey carried out for studying seasonal influenza in Iraq during the years 2015 to 2017, the most common form of influenza virus was reported to be type A (where H1N1 strain was more than H3N2), followed by a low frequency of influenza type B. [1] As an Indian surveillance for influenza virus which revealed that the subtype H1N1pdm09 was more than other subtypes during the years 2016 to 2018. [15]

## Conclusion

(1.) Most of the confirmed influenza cases in Baghdad was of a mild grade. (2.) The detected type of influenza was only type A virus, where the H3N2 subtype constituted the vast majority of cases among them. (3.) The sex, type of living area, presence of asthma or an immunological disease were significantly associated with the severity of influenza viral infection.

## Recommendation

(1.) Increasing the coverage of influenza vaccine in Iraq, especially against the influenza A- H3N2 subtype. (2.) Focusing on females, asthmatic patients, and those with an immunological disease, for raising their awareness about influenza and promoting them to get the influenza vaccine every year.

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