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# A retrospective study of demographic profile and outcome of Sever acute respiratory illness (SARI) in Iraq

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**Abstract:**

**Background:** Severe acute lower respiratory infections considered as one of major causes of morbidity and mortality, especially in developing countries. There is a variation globally regarding the epidemiology, management and the outcomes as well as mortality rate.
**Objectives:** The aim of current study was to describe demographic features, Province of residence, occupation and the outcomes of patients severe acute lower respiratory infection.
**Patients and Methods:** This retrospective study for 1009 patients involved in a study, between the 1st of January 2019 and 28th of December 2019. Data were collected from the medical records at Communicable Diseases Control Centre (CDC) office in Baghdad. **Results:** Of the 1009 patients involved, 406 were positive for influenza A, and 603 were negative for influenza A, highest incidence was in age group ≤10 years for both positive (19.7%) and negative (25.0%) influenza A. Freelance was higher than other occupations (31.8%) for positive and housewife (32.2%) for negative influenza A. Death rates were 6.4% for positive and 1.5% for negative influenza A, the higher mortality rate was among males in age group ≤10 year for both positive (30.8%) and negative (18.9%) influenza A. **Conclusion:** Influenza A is an important cause of severe acute lower respiratory infection. In addition, childhood is a high risk for the disease with high mortality rate especially in males. Freelance and housewives have high occupation risk for severe acute lower respiratory infection. Baghdad has the higher rate than other governments for this disease in Iraq.
**Keywords:** Demographic profile, outcome, Severe acute lower respiratory infection, Influenza A, Occupation.

## Introduction:

The lower respiratory tract infections are considered leading causes of death among infectious diseases, worldwide (1). Severe acute respiratory disease (SARI) is an acute infectious respiratory disease, which is defined by Word Health Organization (WHO) as a history of fever or measured temperature of ≥ 38 C°, cough, an onset within the last 10 days and requires hospitalization of patient(2).
SARI is responsible for millions of deaths and admissions to hospital across the world annually (3). In addition, it is a leading cause for childhood hospitalization and death (4). SARI is caused by a number of different viruses such as influenza types A and B, parainfluenza viruses, respiratory syncytial viruses (RSV), rhinoviruses, coronaviruses, and adenoviruses (AV) (5). The surveillance of SARI-based influenza, globally, was increased over the past decade, especially in the low income and in tropical settings (6). Influenza carries a high burden of the disease and mortality all over the world, especially in those with high risk of complications, like children less than 5 years, elderly, and individuals with chronic medical diseases, and pregnant women (7, 8). The mortality rate from fourteen African countries in the period between 2006–2010 was 8.9% of the hospitalizations which have a case definition of SARI associated with influenza virus (9). SARI has a range of severity, the identified population

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subgroups who are at high risk of severity or mortality include pregnant women, individuals having diabetes or obesity and children (10, 11). There are many factors which contribute for increasing incidence of the acute respiratory illness such as poor health care facilities, low socioeconomic state (12), inability to get necessary vaccination for children less than 5 years old (13). Available data suggested that both respiratory disease and influenza may have higher mortality rates in populations with low income (14). There are lots of methods for diagnosis of respiratory viruses such as polymerase chain reaction (PCR), serology, immunofluorescence assay, etc. The Immunofluorescence can detect viral antigen in a short period, but it has low sensitivity and may need confirmation by other methods (15). The surveillance for influenza has importance to determine timing and spreading of the disease as well as for following changes in circulating influenza viruses to inform about seasonal influenza vaccine composition, and the alert mechanism for pandemic viruses. There are many surveillance systems for influenza in hospitalized patients, especially in poor settings, that focused on identifying the cases of SARI (16). WHO set recommendations for conducting surveillance about SARI and influenza-like illness (ILI) (17). SARI surveillances nowadays have been conducted in many countries, but in the Middle East they are conducted in only limited settings (18). Iraq has a functioning influenza surveillance system as part of a well-established national surveillance system for the SARI, which operates in 40 sites all over the 18 Iraqi Governorates. It also has been sharing laboratory data through FluNet, an online platform used for influenza virological surveillance (19).

**Patients and Methods:**

**Setting and study design**: A retrospective study involved 1009 patients; , 406 patients were positive for influenza A, and 603 patients were negative for influenza A. The study was undertaken between the first of January 2019 and twenty eight of December 2019. Data were collected from medical records in Communicable Diseases Control Centre (CDC) office in Baghdad/ Minatory of health in Baghdad in which all the registered infectious diseases are sent to this center. Influenza A diagnosis is made by polymerase chain reaction (PCR) in the respiratory sample that included nasopharyngeal swab. The demographic and clinical information of participantsincluded age, gender, address of patients (Governorates), and occupational history, in addition to the outcome of patients (admission to hospital and discharged well, admission to hospital & death) on all microbiologically-confirmed cases.

**Inclusion criteria:** All patients who have positive and negative results for influenza A, by PCR test.

**Exclusion criteria:** The patients with incomplete data in theeir medical records, influenza have been excluded.

**Ethical approval:** This was obtained from the administration of CDC office in Baghdad.

**Statistical Analysis:** The statistical package for the social sciences (SPSS) version 24 was used for data analysis. Continuous variables were showed as mean with standard deviation, and discrete variables were showed as numbers and percentages.The Chi-squared test was used to test the significance of association between different variables. Mann-Whitney test was used to test the significance of difference between means of two independent samples. The *P* value of less than 0.05 was considered significant.

**Results:**

In this stud,y 1009 patients were involved, 406 patients were positive for influenza A with mean age of 38.3 years and 603 patients were negative for influenza with mean age of 34.3 years. Patients positive for Influenza A had significantly higher mean age than those tested negative (Table 1).

**Table (1) Distribution of patients with influenza A (positive or negative) according to age**

| Patients category | | No. | Mean age/ yr | Std. Deviation | *P* value |
|---|---|---|---|---|---|
| Influenza positive | A | 406 | 38.3 | 24.0 | 0.010 |
| Influenza Negative | A | 603 | 34.3 | 24.4 | |

The distribution of patients with SARI according to age and gender showed that in patient who were positive for influenza A, the highest rate was in age group ≤10 years (19.7%), and the lowest rate was in age group >70 years (7.6%). In patient who were negative for influenza A, the highest rate was in age group ≤10 years (25.0%), and the lowest rate was in age group between 11-20 years (6.0%), the

difference was statistically significant (*P* value= 0.003, Table 2).

Regarding gender distribution in patient who were positive for influenza A, the highest incidence was in males (56.7%) while in patients who were negative for influenza A, the highest incidence was in females (50.4%), the difference between the two groups was statistically significant (*P* value= 0.028; Table 2 and Figure 1).

**Table (2) Distribution of patients with SARI according to age and gender**

| | Influenza A | | | | |
|---|---|---|---|---|---|
| | Positive | | Negative | | |
| | No. | % | No. | % | *P* value |
| **Age Group** | | | | | **0.003** |
| ≤10 yr | 80 | 19.7% | 151 | .25.0% | |
| 11-20 yr | 31 | 7.6% | 36 | 6.0% | |
| 21-30 yr | 43 | 10.6% | 98 | 16.3% | |
| 31-40 yr | 52 | 12.8% | 88 | 14.6% | |
| 41-50 yr | 65 | 16.0% | 80 | 13.3% | |
| 51-60 yr | 55 | 13.5% | 45 | 7.5% | |
| 61-70 yr | 49 | 12.1% | 58 | 9.6% | |
| > 70 yr | 31 | 7.6% | 47 | 7.8% | |
| **Gender** | | | | | **0.028** |
| Male | 230 | 56.7% | 299 | 49.6% | |
| Female | 176 | 43.3% | 304 | 50.4% | |

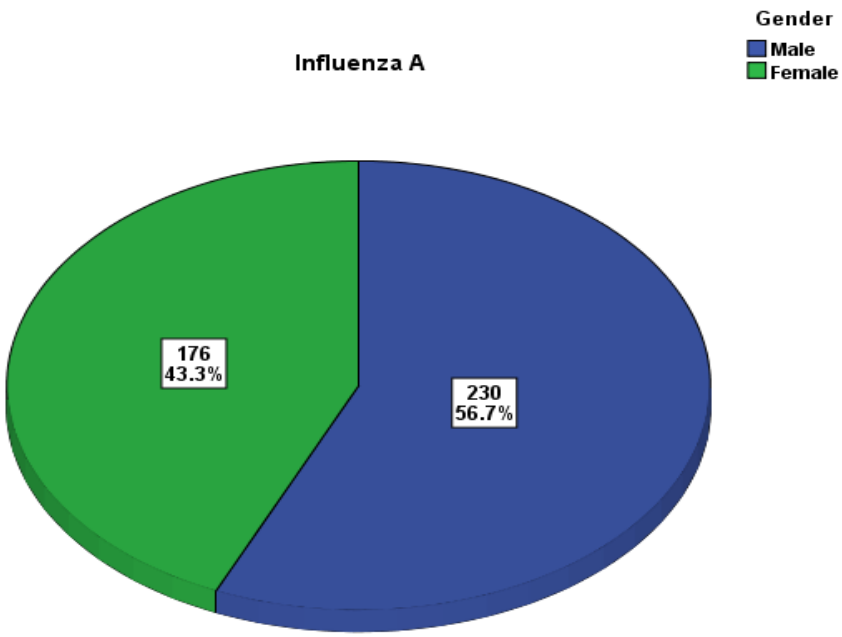


**Figure 1: Gender distribution of patients confirmed having influenza A.**

Distribution of patients with SARI according to the province of residence showed that in patients who were positive for influenza A, the highest incidence was in Baghdad (Resafa 12.8% and Karkh 18.7%) and the lowest incidence was in Kirkuk (0.7%). In patient who were negative for influenza A, the highest incidence was also in Baghdad (Resafa 6% and Karkh 22.6%) and the lowest incidence was in Kirkuk (0.00%), the difference between the two groups was statistically significant (*P* value < 0.001; Table 3).

**Table (3) Distribution of patients with SARI according to residence.**

| Province of residence | InfluenzaA | | | |
|---|---|---|---|---|
| | Positive | | Negative | |
| | No. | % | No. | % |
| WASSIT | 41 | 10.1% | 155 | 25.7% |
| THI-QAR | 5 | 1.2% | 2 | 0.3% |
| SULAYMANIYAH | 9 | 2.2% | 10 | 1.7% |
| SALAH AL-DIN | 21 | 5.2% | 10 | 1.7% |
| NINEWA | 25 | 6.2% | 14 | 2.3% |
| NAJAF | 20 | 4.9% | 17 | 2.8% |
| MUTHANNA | 36 | 8.9% | 3 | 0.5% |
| MISSAN | 18 | 4.4% | 14 | 2.3% |
| KIRKUK | 3 | 0.7% | 0 | 0.0% |
| KERBALA | 19 | 4.7% | 2 | 0.3% |
| ERBIL | 13 | 3.2% | 1 | 0.2% |
| DIYALA | 16 | 3.9% | 88 | 14.6% |
| DIWANIYA | 4 | 1.0% | 10 | 1.7% |
| DAHUK | 15 | 3.7% | 19 | 3.2% |
| BASRAH | 13 | 3.2% | 29 | 4.8% |
| BAGHDAD-RESAFA | 52 | 12.8% | 36 | 6.0% |
| BAGHDAD-KARKH | 76 | 18.7% | 136 | 22.6% |
| BABYLON | 13 | 3.2% | 42 | 7.0% |
| ANBAR | 7 | 1.7% | 15 | 2.5% |

*P* value was<0.001.

Distribution of patients with SARI according to the occupation revealed that in patient who were positive for influenza A, the highest incidence was in freelance (31.8%), and the lowest incidence was in health profession (0.2%). In patients who were negative for influenza A, the highest incidence was in housewives (32.2%) and the lowest incidence was in military (1.2%). The difference between the two groups was statistically significant (*P* value <0.043; Table 4).

**Table (4) Distribution of patients with SARI according to occupation**

| | Influenza A | | | | |
|---|---|---|---|---|---|
| | Positive | | Negative | | |
| **Occupation** | No. | % | No. | % | *P* value |
| | | | | | **0.043** |
| Under 5 child | 68 | 16.7% | 127 | 21.1% | |
| Student | 33 | 8.1% | 46 | 7.6% | |
| Retired | 28 | 6.9% | 32 | 5.3% | |
| Military | 7 | 1.7% | 7 | 1.2% | |
| Housewife | 114 | 28.1% | 194 | 32.2% | |
| Health Profession | 1 | 0.2% | 11 | 1.8% | |
| Freelance | 129 | 31.8% | 151 | 25.0% | |
| Employed | 26 | 6.4% | 35 | 5.8% | |

Distribution of patients with SARI according to the outcome showed that in patient who were positive for influenza A, the patients who discharged well were 380 (93.6%), and the deaths were 26 (6.4%). Moreover, in patients who were negative for influenza A, the patients who discharged well were 594 (98.5%) and the deaths were 9 (1.5%). The difference between the two groups was statistically significant (*P* value <0.001; Table 5).

**Table (5) Distribution of patients with SARI according to the outcome**

| | Influenza A | | | | |
|---|---|---|---|---|---|
| | Positive | | Negative | | |
| Outcome of patients | No.= 406 | % | .=603 | % | *P* value |
| Discharged well | 380 | 93.6% | 59 4 | 98.5% | < 0.001 |
| Death | 26 | 6.4% | 9 | 1.5% | |

Age and gender characteristics of patients who were confirmed having influenza according to

outcome of death showed that the highest rate was in age group ≤10 years (30.8%) followed by age groups 41-50 years and 51-60 years (19.2%). The difference between the two groups (death and non-death groups) was statistically not significant (*P* value=0.482; Table 6). In terms of gender, male patients had higher mortality rate (65.4%) than females (34.6%). the difference between the two groups was statistically not significant (*P* value=0.353; Table 6).

**Table(6) Age and gender characteristics of patients confirmed having influenza according to outcome of death**

| | Death | | | | |
|---|---|---|---|---|---|
| | Death | | Non-death | | |
| | N o. | % | No. | % | *P* value |
| **Age Group** | | | | | |
| ≤10 yr | 8 | 30.8% | 72 | 18.9% | |
| 11-20 yr | 1 | 3.8% | 30 | 7.9% | |
| 21-30 yr | 1 | 3.8% | 42 | 11.1% | |
| 31-40 yr | 4 | 15.4% | 48 | 12.6% | |
| 41-50 yr | 5 | 19.2% | 60 | 15.8% | |
| 51-60 yr | 5 | 19.2% | 50 | 13.2% | |
| 61-70 yr | 1 | 3.8% | 48 | 12.6% | |
| > 70 yr | 1 | 3.8% | 30 | 7.9% | |
| **Gender** | | | | | 0.353 |
| Male | 17 | 65.4% | 213 | 56.1% | |
| Female | 9 | 34.6% | 167 | 43.9% | |

**Discussion:**

In current study, 1009 patients had features of SARI were involved, 406 patients were with positive for influenza A (42.2%). SARI patients who were positive for influenza varied widely between the countries and seasons, from 2.1% in Armenia in the season 2011–2012 to 100% in Albania in the season 2009–2010 (20). In current study the highest incidence was in age group≤10 years was in both groups (influenza positive and negative; 19.7 % and 25.0%, respectively), and the lowest incidence was in age groups (11-20 years) and >70 year in patients with influenza (both groups 7.6%). On the other hand, in those who were influenza negative, the lowest incidence was in age group (11-20 years) (6.0%), with statistically significant difference (*P* value= 0.003). In the study conducted by (21), the highest incidence was in age groups (0-4 years) followed by (5-14 years), in those influenza positive and negative, and the lowest incidence wass in age group >70 year, also in both groups (influenza positive and negative) with statistically significant difference (*P*value= 0.02). In the study conducted by (22), the highest incidence of influenza A that cause SARI was in age group <1 year followed by age group 1-4 years, the lowest incidence was in age group >44 years. In current study, the incidence in males was higher (56.7%) than in females (43.3%) in patients with influenza A,while in those who were influenza negative, females (50.4%) were higher than males (49.6%). These results were in agreement with those of (21) where males were higher (54%) than females (46%) in patients with influenza A, while in those who were influenza negative, males (54%) were higher than females (46%), but statistically not significant.The females may be at high risk of getting acute respiratory infections because of their roles in families and society. For Governorates distribution of patients with influenza A, the highest incidence was in Baghdad (BAGHDAD-KARKH 18.7% and BAGHDAD-RESAFA 12.8%) followed by Wassit (10.1%), in patients who were negative for influenza A, the highest incidence was in Baghdad (BAGHDAD-KARKH 22.6% and BAGHDAD-RESAFA 6.0%) followed by Wassit (25.7%). This finding may be due to highest population in Baghdad which is the capital of Iraq as crowded provinces in Baghdad can facilitate the transmission of Influenza virus. In the study of (23), the highest incidence of influenza A was in Baghdad followed by Babylon. For the occupation distribution of patients in current study, freelance had higher incidence (31.8%) in influenza A infection, those group of workers having job at different areas so may be exposed to different levels of educated people and different hygiene levels. In patients with influenza negative, higher incidence was in housewives (32.2%). This is may be due to their jobs in taking care of children who have high incidence of influenza (21). The health professionals had low incidence and this might be due to getting vaccine annually against influenza. According to the CDC 2018 (24), flu vaccination

coverage was 81.1% among health care personnel. Flu vaccination coverage was (96.7%) among physicians, (98.1%) among nurses and (91.5%) among pharmacists. However, we couldn't get the exact incidence of vaccination history in health care workers in Iraq.

The mortality rate was higher in influenza A positive group (6.4%) than influenza negative (1.5%) with statistically significant difference. In the study of (25), the mortality rate in influenza A positive was 4%, while in influenza negative was 1%. In the study conducted in Egypt (26) the mortality rate in patients with SARI was 5.5 % of all viral cases. The difference in mortality rates maybe based on viral surveillance data, statistical modeling of national mortality, and the annual estimation of influenza mortality.These data of mortality should inform the programmers of influenza control and prevention, with focusing on the introduction and expansion of vaccination programmers. Countries with the influenza vaccination programmers had estimated a reduction in severity and mortality of the disease (27). In current study, higher mortality rate was in age group ≤10 years, in both groups (influenza positive and negative). In the study of (28) the death was higher in age group between 25-35 years, but in the latter study a small number (only 3 patients died). Host, disease characteristics, socioeconomic and the environmental determinants can affect the mortality from acute lower respiratory illness in children (29). In current study, males were with higher mortality, in both groups, than female. This result goes with that of (30) who showed higher mortality in male [odds ratio 5.25, confidence interval (CI) 1.22-28.95].

**Auther's contributions:**

**Haider N. Dawood:** analysis & interpretation of data , writing and organisation of the article

**Sinan Gh. Mahdi:** data collection

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# النتائج السريرية لأمراض الجهازالتنفسي الحادة لعينة من المرضى العراقيين: دراسة بأثررجعي

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**الخلاصة:**
**المقدمة:** تعد التهابات الجهازالتنفسي السفلي الحادة أحدالأسباب الرئيسية للمراضة والوفيات،خاصة في البلدان النامية. هنا كاختلاف اتعالمية كبيرةمن ناحية اعداد الاصابات والمعالجات السريرية والنتائج، بمافيذلكالوفيات.
**هدف الدراسة:** وصف السماتالديموغرافية،محافظة الإقامة،المهنة ونتائج السريرية لمرضى التهابات الجهازالتنفسي الحادة.
**المرضى والطرق:**تناولت دراسة بأثر رجعي 1009 مريض، 406 مريضا كانوا مصابين بالانفلونزا نوع أ و603 مريض سلبي للإنفلونزاأ تمإجراؤهابينالأولمنينايرالثالثا من والعشرين منديسمبر 2019. من السجلات الطبية في مكتب مركز السيطرة على الامراض الانتقالية في بغداد
**النتائج:** 1009 مريض،و 406 مصابين بالإنفلونزاأو 603 سلبيين للأنفلونزا. ، كانت أعلى نسبة للمرض كانتفي الفئةالعمريةبين 0-10 سنوات لكل منالإيجابية للإنفلونزاأ (19.7بالمئة) والسلبية للإنفلونزاأ (25بالمئة). نسبة الذكور كانت اعلى (56.7 بالمئة) من الاناث للانفلونزا أ. النسبة في بغداد اكثر من بقية المحافظات في العراق لكلا المصابين الايجابيين والسلبيين للانفلونزا أ. العملالحرأعلىمنالمهن للانفلنزا أ (31.8بالمئة), وربات البيوت للانفلنزا السلبية (32.2بالمئة). نسبة الوفيات كانت 6.4بالمئة فيلإيجابيةللإنفلونزاأ و 1.5 بالمئة للانفلنزاالسلبية.كانمعدل الوفيات الأعلى عندالذكورفي الفئة العمرية 0-10 سنةلكل من الإنفلونزا أالإيجابية والسلبية..
**الاستنتاج:**الأنفلونزاأهي سبب مهم لاتهابات الجهازالتنفسي السفلي الحادة،الاطفال هم معرضون لخطورة الاصابة بهذة الالتهابات ونسبة الوقيات فيهم تكون كبيرة وخصوصا. العمل الحر وربات البيوت لديهمامخاطرعالية للاصابة بهذا المرض. بغداد لديها معدل اكثر من بقية المحافظات للاصابة بهذا المرض.
**الكلمات المفتاحية:**الاتهابات الجهازالتنفسي السفلي الحادة,الأنفلونزاأ,الإجراءات السريرية.