

# A Clinico-Hematological Study of Influenza Virus Infection

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## Abstract

**Background:** Influenza is a seasonal infectious viral disease which accounts for approximately 3-5 million cases of severe illness and 250,000 to 500,000 deaths in a yearly outbreak. The objectives of our study were to study the various clinical presentation of influenza infection and to correlate the demographic data and clinical symptoms with hematological parameters. **Subjects and Methods:** 95 cases which were positive by One-step RT-PCR were included in the study. Elevation of serum transaminase levels, thrombocytopenia and raised creatinine levels are important parameters which mandates vigilant follow up in patients with influenza infection. **Results:** The most common symptoms were fever in 88.42% and cough in 88.42% of cases. 51.57% of patients presented with anemia on admission. 11.5% of patients had thrombocytopenia of which 36.36% had elevated liver enzymes. 35.78% of cases had leukocytosis of which 32.35% had elevated liver enzymes. 15.78% of patients had raised creatinine levels. **Conclusion:** Authors suggested that elevation of serum transaminase levels, thrombocytopenia and raised creatinine levels are important parameters which mandates vigilant follow up in patients with influenza infection.

**Keywords:** Influenza, Hematological parameters, Liver enzymes.

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Received: October 2019

Accepted: October 2019

## Introduction

Influenza is an infectious viral disease caused by the RNA virus - influenza virus (A, B and C). The virus spreads mainly through direct transmission-coughing or sneezing into eyes, nose or mouth of another person. It is also transmitted through the airborne route and hand-to-eye/hand-to-mouth route. Approximately 33% of people with influenza are asymptomatic. In those who were symptomatic, the most common symptoms include: a high fever, extreme chills and rigor, nasal congestion, runny nose, cough, sore throat, muscle pains, body ache, tearing and reddened eyes, petechial rash, headache and fatigue. These symptoms typically begin two days after exposure to the virus and most last less than a week. In children, there may be gastrointestinal symptoms like nausea, vomiting, abdominal pain and diarrhea.<sup>[1]</sup>

Influenza is an acute respiratory illness that has been recognised since the 16th century and spreads rapidly through communities in outbreaks. Two forms of influenza occur globally: epidemic (seasonal or interpandemic) influenza caused by influenza A and B viruses, and sporadic pandemics caused by influenza viruses. These epidemiological forms of influenza result from distinct mechanisms of antigenic variation in the surface glycoproteins of the virus, referred to as antigenic drift and antigenic shift.

Complications of influenza may include viral pneumonia, secondary bacterial pneumonia and sinus infections. Influenza spreads around the world in a yearly outbreak, resulting in about three to five million cases of severe illness and about 250,000 to 500,000 deaths.<sup>[2,3,4,5]</sup> The aim of this study was to study the various clinical presentation of influenza infection and to correlate the demographic data and clinical symptoms with hematological parameters.

## Subjects and Methods

The present retrospective study included cases of Influenza conducted from April 1, 2016, until August 31, 2016 at Kasturba Hospital, Manipal. Study proceeded after the approval of Department Scientific Committee and Institutional Ethics Committee. All patients who met with the inclusion criteria (Only cases of influenza virus infection confirmed by One-step real time PCR) were included in the study. 95 patients fulfilled the inclusion criteria and their records were extracted for collection of clinical and laboratory data.

Data such as name, age, gender, clinical features, etc. was retrieved from case files. Results of routine complete blood count, liver function tests and renal function tests performed on hospitalization before commencing drug therapy. Confidentiality was maintained by not disclosing the identity of the patients. Statistical analysis was performed using SPSS 16. The demographic, clinical and laboratory data were

evaluated and presented descriptively. Descriptive statistics (percentage, mean and standard deviation) were used primarily to summarize and describe the data.

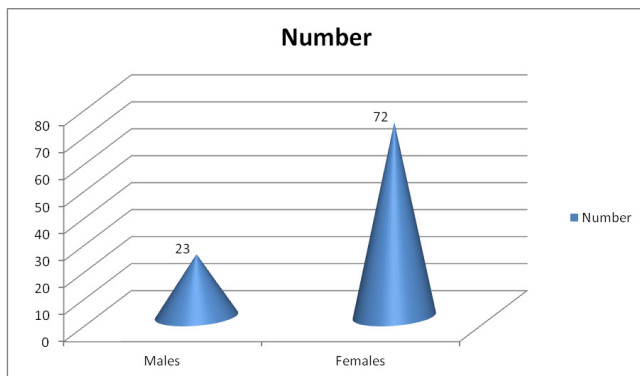
**Results**

A total of 72 cases admitted to our hospital between Jan 2017 to Dec 2018 were statically analyzed. Most of the dengue cases presented during the month of August and September which depicts the role of rainy season for case clustering during that season.

**Table 1: Distribution of patients**

<b>Total- 95</b>		
<b>Gender</b>	<b>Male</b>	<b>Female</b>
Number	23 (24.21%)	72 (75.78%)

[Table 1] shows that out of 95 patients, males were 23 (24.21%) and females were 72 (75.78%).

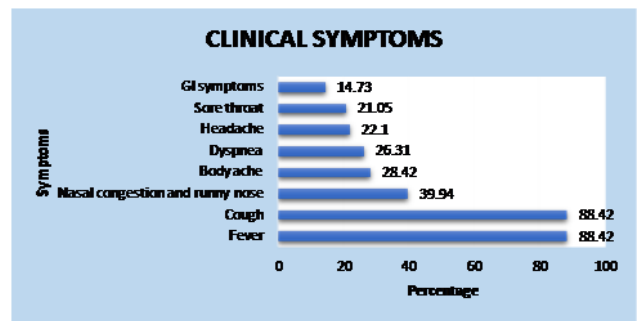


**Graph 1: Distribution of patients**

**Table 2: Clinical features in patients**

Clinical features	Number	P value
Fever	84	0.01
Cough	84	
Running nose	37	
Dyspnea	25	
Sore throat	20	
Nausea	3	
Vomiting	9	
Diarrhea	2	
Fatigue/ malaise	27	
Headache	21	
Abdominal pain	5	
Dizziness	4	
Chest pain	13	
Joint pain	3	

[Table 2], Graph II shows that common symptoms were fever and cough in 84 patients each, running nose in 37, dyspnea in 25, sore throat in 20, Fatigue/ malaise in 27 and headache in 21. The difference was significant (P< 0.05).



**Graph 2:**

**Table 3: Hematological parameters and liver enzymes**

[Table 3] shows that Anemia, thrombocytopenia and leucopenia was present in 51.57% (n=49), 11.57% (n=11) and 4.21% (n=4) respectively. Leucocytosis was present in 35.78% (n=34). Serum urea and creatinine was elevated in 10.52% (n=10) and 15.78% (n=15) respectively. Elevated liver enzymes like AST in 26.31% (n=25), ALT in 8.42% (n=8) and ALP in 3.15% (n=3) was seen.

**Table 4: Correlation of liver enzyme elevation versus hematological parameters**

Elevated liver enzymes	Thrombocyto penia present (%)	Thrombocyto penia absent (%)	Leucocyto sis present (%)	Leucocyto sis absent (%)
	11.57% (n=11)	88.42 (n=84)	35.78% (n=34)	64.21% (n=61)
AST	36.36 (n=4)	25 (n=21)	32.35 (n=11)	22.95 (n=14)
ALT	18.18 (n=2)	7.14 (n=6)	11.76 (n=4)	6.55 (n=4)
ALP	18.18 (n=2)	1.19 (n=1)	5.68 (n=2)	1.63 (n=1)

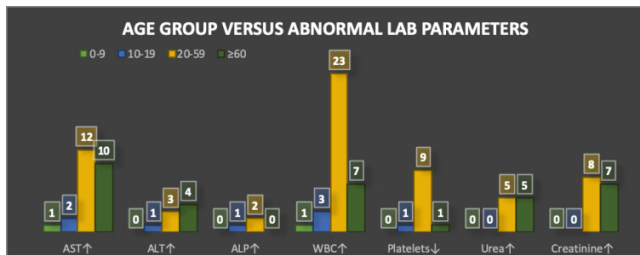
[Table 4] shows that of those who had thrombocytopenia 11.57% (n=11), 36.36% (n = 4) had elevated liver enzymes as compared to 25% (n=21) who did not have thrombocytopenia. Of those who had leukocytosis 35.78% (n=34), 32.35% (n=11) had elevated liver enzymes as compared to 22.95% (n=14) who did not have leukocytosis. Of those who had elevated liver enzymes and abnormal hematological values, statistical analysis was done to see for their age groups.

**Table 5: Correlation of clinical symptoms versus hematological parameters**

Sympto ms	Thrombocyto penia present (%)	Thrombocyto penia absent (%)	Leucocyto sis present (%)	Leucocyto sis absent (%)
	11.57% (n=11)	88.42 (n=84)	35.78% (n=34)	64.21% (n=61)
Fever	100 (n=11)	86.9 (n=73)	91.11 (n=31)	86.88 (n=53)
Cough	100 (n=11)	86.9 (n=73)	94.11 (n=32)	88.52 (n=54)
Dyspnea	36.36 (n=4)	25 (n=21)	38.23 (n=13)	19.67 (n=12)

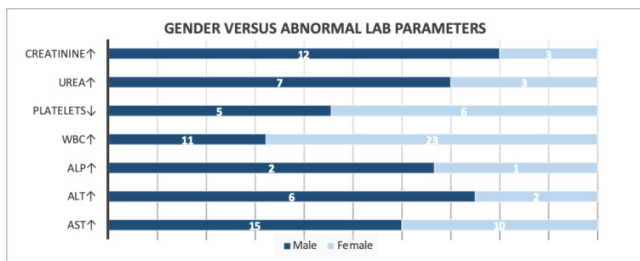
[Table 5] shows that of those who had thrombocytopenia,

100% (n=11) had fever and respiratory symptoms as compared to 86.9% (n=73) who did not have thrombocytopenia. Of those who had leukocytosis, 91.11% (n = 31) had fever as compared to 22.95% (n=14) who did not have leukocytosis.



**Graph 3: Age grouping of abnormal laboratory investigations**

[Graph 3] shows that 0-9 years – Infancy and childhood, 10-19 years – Adolescents, 20-59 years – Adults and ≥60 – Old. Most of them belonged to adult age group.



**Graph 4: Gender proportion of abnormal laboratory investigations**

[Graph 4] shows that increase creatinine level, urea, WBC, ALP, ALT and AST was more prevalent in males than females.

## Discussion

Influenza outbreaks are often first recognized in children presenting with febrile illness. An increase in hospital admissions and respiratory or circulatory deaths are reported as the epidemic progresses. A typical influenza epidemic peaks within 2–3 weeks of onset and lasts 5–6 weeks.<sup>[6]</sup> Seasonal influenza accounts for thousands of deaths and hospital admissions annually in the European Union and the USA, with an even greater impact in developing countries.<sup>[7]</sup> Influenza epidemics in which H3N2 strains predominate are associated with the highest overall morbidity and mortality. The panel summarises the risk factors associated with severe illness, complications, or mortality due to influenza.<sup>[8]</sup>

We found that majority of patients came with fever and respiratory symptoms. Fever was seen in 84 patients (88.42%) out of which 65 had associated chills. The most predominant respiratory symptom was cough, which was seen in 84 patients (88.42%). 53 patients out of 84 had dry cough as compared to 31 with expectoration. Other respiratory symptoms like runny nose and nasal congestion was present in 37 patients (38.94%), dyspnea in 25 patients (26.31%) and sore throat in 20 patients (21.05%). Gastrointestinal symptoms like nausea (3 patients), vomiting (9 patients) and diarrhea (2 patients) were seen in a total of 14 patients (14.73%). Other symptoms like fatigue and

malaise was seen in 27 patients (28.24%), headache in 21 patients (22.1%), abdominal pain in 5 patients (5.26%), dizziness in 4 patients (4.1%), chest pain in 3 patients (3.15%) and joint pain in 3 patients (3.15%).

We found that Anemia, thrombocytopenia and leucopenia was present in 51.57% (n=49), 11.57% (n=11) and 4.21% (n=4) respectively. Leucocytosis was present in 35.78% (n=34). Serum urea and creatinine was elevated in 10.52% (n=10) and 15.78% (n=15) respectively. Elevated liver enzymes like AST in 26.31% (n=25), ALT in 8.42% (n=8) and ALP in 3.15% (n=3) was seen.

We found that of those who had elevated liver enzymes and abnormal hematological values, statistical analysis was done to see for gender proportion. Males had more abnormal laboratory parameters compared to females. The presentation of seasonal influenza ranges from an asymptomatic infection to a fulminant illness, depending on the characteristics of both the host and virus. Symptoms appear suddenly after an incubation period of 1–2 days and are characterized by various systemic features, including fever, chills, headache, myalgia, malaise, and anorexia, accompanied by respiratory symptoms, including non-productive cough, nasal discharge, and sore throat. Ocular symptoms can also be present and include photophobia, conjunctivitis, lacrimation, and pain with eye movement.<sup>[9]</sup>

Allyn et al<sup>[10]</sup> reported two cases of severe influenza infection imported by tourist patients from their country of origin and developed during travel. No international recommendation exists concerning influenza vaccination before travel, and few countries recommend it for all travelers. Authors suggested that travel should be canceled when infectious signs are observed before departure. Influenza is a very common infection that is often benign, but sometimes very severe. The most severe cases include shock, acute respiratory distress syndrome (ARDS), myocarditis, rhabdomyolysis, and multiple organ failure. Management can require exceptional therapies, such as extracorporeal membrane oxygenation.

## Conclusion

Authors suggested that elevation of serum transaminase levels, thrombocytopenia and raised creatinine levels are important parameters which mandates vigilant follow up in patients with influenza infection.

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**How to cite this article:** K Shenoy S, Shekhar R, Mathew M, Kumar GA. A Clinico-Hematological Study of Influenza Virus Infection .*Acad. J Med.* 2019;2(2):24-27.

DOI: [dx.doi.org/10.21276/ajm.2019.2.2.8](https://doi.org/10.21276/ajm.2019.2.2.8)

**Source of Support:** Nil, **Conflict of Interest:** None declared.