



Epidemiological Study of Influenza A(H1N1) Virus Infection during Lockdown Due to COVID-19 Pandemics in Uttarakhand

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Authors' contributions

This work was carried out in collaboration among all authors. Author JC designed the study, wrote the protocol and performed the analysis. Authors PS, S. Singh, S. Semwal and KG managed the analyses and contributed in the performing of study. Author NS managed the literature searches and guided in the paper writing. All authors read and approved the final manuscript.

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ABSTRACT

Objectives: The purpose of this research was to study the epidemiology of H1N1 influenza A virus infection during lockdown due to COVID-19 pandemic in Uttarakhand.

Methodology: An analysis of primary data, obtained from DNA Labs-A Center for Applied Sciences, Dehradun after detection of the throat and nasal swabs by RT-PCR method. The total number of samples were 102 which were collected from the suspected cases for influenza like illness (ILI) in and around Uttarakhand region in different age groups. Molecular Characterization was done for all the cases. The data contained the cases from the month of March, 2020 to the month of November, 2020.

Results: Results showed that after the onset of lockdown, the number of positive cases for H1N1

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influenza viral infection were less in comparative to the negative cases (30 positive cases and 72 negative cases). Age group from 21 to 40 years and above 70 years became infected with the H1N1 swine flu and suffered with Category C symptom.

Conclusions: This research provides the significant findings for the epidemiological study of H1N1 influenza viral infection during lockdown due to COVID-19 pandemics in Uttarakhand. It could be said that due to the similarities of the symptoms of H1N1 influenza A virus and COVID-19, all the cases were referred to COVID-19 testing due to its impact even though that case could have been suffering from any other disease including H1N1 as the symptoms similarities between these two viruses are almost the same.

Keywords: Lockdown impact; H1N1 influenz A virus; epidemiological study; RT-PCR; influenza like illness.

1. INTRODUCTION

The 2009 swine flu pandemic was an influenza pandemic that lasted for about 19 months, from January 2009 to August 2010 and was second of the two pandemics involving H1N1 influenza virus. First described in April 2009, the virus appeared to be a new strain of H1N1 which resulted from a previous triple reassortment of bird, swine and human flu viruses that further combined with a Eurasian pig flu virus [1], leading to the term "swine flu" [2]. The number of lab confirmed deaths reported to the World Health Organisation is 18,449 [3], though the 2009 H1N1 flu pandemic is estimated to have actually caused about 284,000 deaths [4]. Unlike, most strains of influenza, the Pandemic H1N1/09 virus does not disproportionately infect adults older than 60 years; this was an unusual characteristic feature of the H1N1 pandemic [5].

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case was identified in Wuhan, China in December 2019. Till now, that is, on November 29, 2020, total 6,20,94,127 cases are confirmed around the globe in which 93,92,919 cases itself from India and 73,951 cases from Uttarakhand, India [6]. Common symptoms of COVID-19 include fever, cough, fatigue, breathing difficulties and loss of smell and taste. Symptoms begin 1-14 days after exposure to the virus. While most people have mild symptoms, some people develop acute respiratory distress syndrome (ARDS). ARDS can be precipitated by cytokine storms [7], multi-organ failure, septic shock and blood clots. Longer-term failure, to organs (in particular, the lungs and heart) has been observed. The long term effects include severe fatigue, memory loss and other cognitive

issues, low-grade fever, muscle weakness and breathlessness [8,9,10,11]. COVID-19 spreads via a number of means, primarily involving saliva and other body fluids and excretions. The virus may also spread by direct contact and it is unknown how often it spreads via fomites (contaminated surfaces) [12,13]. Around 1 in 5 people are infected with the virus but do not develop noticeable symptoms at any point in time [14,15]. These asymptomatic carriers tend to get tested, and they can spread the disease [16,17,18]. The death-to-case ratio reflects the number of deaths divided by the number of diagnosed cases within a given time interval. The global death-to-case ratio is 2.3% (1,452,430/62,246,665) [19].

Due to COVID-19 outbreak, the whole nation was put on a lockdown from the last week of March to the first week of September to incur social distance and to keep people in quarantine as these are the only preventive measures because there are no proven vaccines or specific treatments for COVID-19, though several are in development. During this lockdown period, the impact was also shown on other diseases as several useful studies conducted for this purpose and some are still going on. However, this study focuses on the impact on the H1N1 influenza A viral infection. This study aims to find out the lockdown impact in the epidemiology of H1N1 swine flu viral infection in Uttarakhand.

2. METHODOLOGY

2.1 Sample Collection

For the proposed study, throat and nasal swabs were collected from different hospitals from suspected cases of ILI in and around the

Uttarakhand region. The samples were collected according to the guidelines given by WHO [20].The analysis of the specimen were carried out at DNA Labs-A Center for Applied Sciences, Dehradun.

2.2 Molecular Characterization of Influenza A (H1N1) Virus

The genetic material RNA was extracted from the nasal and throat specimens by silica column method followed by reverse transcription real time PCR (rRT-PCR).The RNA was isolated by Aridia Viral DNA/RNA Extraction Kit Athnese-Dx (Lot No: 09/2020) based method followed by RT-PCR using Swine flu (H1N1) Real Time PCR Kits Athnese DX pre mix as per manufacturer’s protocol.

2.3 Data Preparation and Analysis

The primary data was obtained after the rRT-PCR test and the samples selected for the data were prepared from the month of March, 2020 to November, 2020. The size of the samples were 102 suspected cases lying in the age group between 22 to 80 years.

3. RESULTS

In the study, total number of 102 cases, with Category A, B and C symptoms were considered from March,2020 to November, 2020, with 30(29.41%) positive H1N1 cases and

72(70.58%) negative influenza A (H1N1) cases (Table 1). All positive cases showed Category C symptoms (Table 2, 3) and the affected age groups were between 21-40 years of age and above 70 years (Table 2, 3), average age groups were 30 years of age.

4. DISCUSSION

It is clearly shown in this research that all the positive H1N1 swine flu cases were less as compared to the negative influenza A (H1N1) cases (Fig. 1). The positive cases showed the Category C symptoms of influenza like illness. In Table 3., it is clearly mentioned that suspected cases with only category C symptoms are to be tested and category A and B need not be tested as these can be cured by prevention but still whether the person is suffering from any of the three categories of the symptoms, all of these symptoms are referred for testing.The study on Influenza A (H1N1) Virus in Uttarakhand has been done before [21]. In this research, we focused on the impact of the lockdown on the epidemiology of H1N1. Influenza A (H1N1) virus is an epidemic disease and it occurs throughout the year but in this study, during the lockdown period it can be seen that the number of negative cases were more as compared to positive cases. In the near future, where COVID-19 still persists, it is advisable to not only go for corona testing as there is a possibility of the presence of H1N1 influenza A virus as the symptoms are almost same for both the viruses.

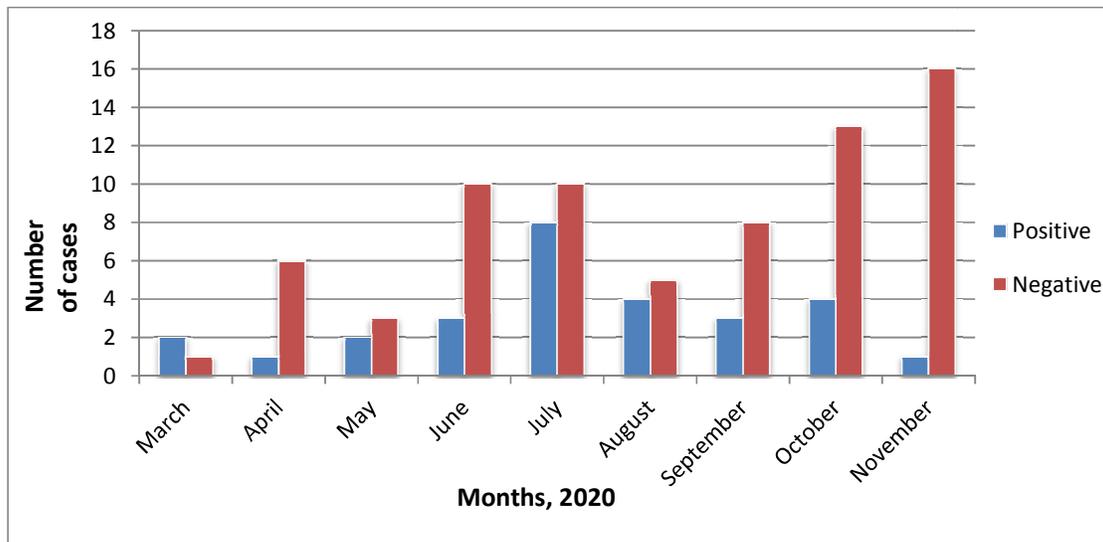


Fig. 1. The number of positive and negative cases for H1N1 Influenza A Virus from March, 2020 to November, 2020

Table 1. The number of positive and negative cases for H1N1 Influenza A Virus from March, 2020 to November, 2020

Number of cases in a month		Number of positive cases for H1N1	Number of negative cases for influenza A/H1N1
March	(3) (2.94%)	2 (66.66%)	1 (33.33%)
April	(7) (6.86%)	1 (14.28%)	6 (85.71%)
May	(5) (4.90%)	2 (40%)	3 (60%)
June	(13) (12.74%)	3 (23.07%)	10 (76.92%)
July	(18) (17.64%)	8 (44.44%)	10 (55.55%)
August	(9) (8.82%)	4 (44.44%)	5 (55.55%)
September	(11) (10.78%)	3 (27.27%)	8 (72.72%)
October	(17) (16.66%)	4 (23.52%)	13 (76.47%)
November	(19) (18.62%)	3 (15.78%)	16 (84.21%)
Total Cases (102)		30(29.41%)	72 (70.58%)

Table 2. Category-wise H1N1 swine flu symptoms distribution of age-groups

Age-group(years)	Total number of cases	Category of Influenza like Illness Symptoms
01 – 20	0 (0%)	-
21 – 40	29 (28.43%)	Category C
41 – 60	40 (39.21%)	Category B
61 – 80	18 (17.64%)	Category A
Above 80	15 (14.70%)	Category C

Table 3. Categories of H1N1 influenza like illness symptoms given by the guidelines according to the Ministry of Health and Family Welfare Seasonal Influenza

Category A	Category B	Category C
Patients with mild fever plus cough/sore throat with or without body ache, headache, diarrhea and vomiting. They do not require Oseltamivir and should be treated for the symptoms mentioned above. The patients should be monitored for their progress and reassessed after 24-48 hours by the doctor. No testing is required. Patients should confine themselves at home and avoid mixing up with the public and high risk members in the family.	In addition to all signs and symptoms mentioned under Category A, individuals having one or more of the following high risk conditions shall be treated with Oseltamivir. Children with mild illness but predisposing risk factors. Pregnant women Patients with lung disease, heart diseases, diabetes, neurological disorders, cancer and HIV/AIDS. No testing is required. Patients should confine themselves at home and avoid mixing up with the public and high risk members in the family. Community acquired Pneumonia may be prescribed.	In addition to all the signs and symptoms mentioned under Category A, individual having one or more of the following: Breathlessness, chest pain, drowsiness, fall in blood pressure, sputum mixed with blood, bluish discoloration of nails. Children with influenza like illness manifested by red flag signs(Somnolence, high and persistent fever, inability to feed well, convulsions, shortness of breath difficulty in breathing etc.). Worsening of underlying chronic conditions. All these Patients Require Testing, Immediate Hospitalization and Treatment.

5. CONCLUSION

The impact of lockdown due to pandemic COVID-19 disease from March, 2020 to November, 2020 on epidemiological study of Influenza A (H1N1) viral infection can be observed from this study in the region of Uttarakhand. The symptoms for influenza A (H1N1) virus and the pandemic COVID-19 are almost same. The cases with ILI symptoms were referred to the COVID-19 test due to its high prevalence throughout the globe although the same cases may suffer from influenza A (H1N1) virus. We could say that there were very less numbers of positive cases as compared to negative cases as it has also been showed from the above data for swine flu (H1N1) virus during the lockdown period due to more focus towards COVID-19 testing. Therefore, it could be concluded from this study, that rather doing only the COVID-19 test, other tests should also be performed for the confirmation of any other SARS category of the virus.

CONSENT AND ETHICAL APPROVAL

The study was approved by ethical clearance body of the organisation, DNA Labs-A Center for Applied Sciences, Dehradun-248007, Uttarakhand, India. This study maintained strict standards for protecting the privacy and confidentiality of respondents during sample collection and data processing. As per international standard or university standard guideline participant consent has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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