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Microbiology Section

Changing Epidemiology of Influenza in Post COVID-19 Era: A Retrospective Observational Study

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ABSTRACT

Introduction: Coronavirus Disease (COVID-19) is a highly transmissible viral infection and has challenged the world's healthcare systems. COVID-19 co-infections with other respiratory pathogens may complicate the diagnosis, treatment and prognosis. Despite Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) high transmissibility and dominance, influenza circulation persisted throughout the COVID-19 pandemic. Due to their evolving nature and capability to evade the immune system, the available vaccines for these viruses protect from severe disease but not infection. There are varying strains of influenza and SARS-CoV-2 viruses and also their transmission is dynamic over time, thus emphasising the need to continue and expand surveillance across countries for improved decision-making.

Aim: The present study was conducted with a aim to study Severe Acute Respiratory Infections (SARI) and Influenza-like Illness (ILI) with reference to COVID-19 and influenza.

Materials and Methods: The present retrospective observational study was carried out at the tertiary health care centre at Department of Microbiology of Rajiv Gandhi Medical College and Hospital, Kalwa, Thane, Maharashtra, India, from August 2022 to September 2024. The study population includes all patients presenting with ILI and SARI whose samples have been tested for COVID-19 and influenza at the RT-PCR Laboratory during the above-mentioned period. Since it was a retrospective study, the sampling method was consecutive sampling. A total of 1170 patients presenting with ILI and SARI were studied in the given period. Patients of all age groups, presenting at Outpatient Department and hospitalised patients were included in the study. Retrospective analysis of Influenza and SARS-CoV-2 positive cases was carried out. Different clinical and epidemiological parameters were noted. As the data is quantitative in nature, the proportions and percentages were computed accordingly. To study the association of meteorological seasons with that of surge of the Influenza cases, Chi-square test was performed and p-value was noted.

Results: A total of 1170 patients were tested in the given period. Among these 893 presented with SARI and 277 presented with ILI. SARS-CoV-2 infection was found in 61 (6.83%) of SARI and 35 (12.64%) of ILI patients, respectively. The total Influenza positive cases were 62 (6.94%) in SARI and 61 (22.02%) in ILI patients. SARS-CoV-2 variant was predominant in the year 2022 and Omicron and recombinant XBB variant were predominant in 2023. Significant surge in Influenza cases was seen in monsoon season in 2023. COVID-19 and Influenza co-infection was seen in 2 (0.17%) of 1170 cases. In ILI, 5 (20%) patients having co-morbidities while in SARI 15 (10.34%) patients having co-morbidities were positive for either SARS-CoV-2 or Influenza. Mortality was seen in 2 (3.23%) SARI influenza patients.

Conclusion: Due to the varying circulating strains, seasonal variations of SARS-CoV-2 and influenza viruses, continuous surveillance is essential for management and prevention of SARI and ILI cases.

Keywords: Co-infection, Disease outbreaks, Reverse transcriptase polymerase chain reaction

INTRODUCTION

The COVID-19 pandemic has caused huge setbacks in the management of other infectious diseases [1]. Influenza viruses can cause high levels of morbidity and mortality seasonally [2]. It can cause illnesses that range in severity and sometimes lead to hospitalisation and death with the latter occurring mainly in high-risk groups, such as under-five children, the elderly, and people with immunosuppressive and chronic medical conditions. There is a strong element of seasonality with outbreaks occurring mainly during the winter season in temperate climates, while in tropical regions, it may occur throughout the year. Because of annual outbreaks and occasional pandemics, the control of influenza has become a major public health challenge [1]. Despite SARS-CoV-2's high transmissibility influenza circulation persisted throughout the pandemic. Due to their evolving nature and capability to evade the immune system, the available vaccines for these viruses protect from severe disease but not infection [3].

COVID-19 and influenza illness both present with a similar clinical picture and have similar World Health Organisation (WHO) case definition. WHO released interim guidance in November 2020 recommending the integrated surveillance of influenza and SARS-CoV-2 [4]. The surveillance system needs to be expanded to include important additional indicators, such as number of patients with respiratory illness visiting the health facilities and influenza positivity rate. This will help in a comprehensive analysis of surveillance data and track influenza transmission. As a mitigation strategy, the operational guidelines on influenza surveillance have to clearly describe the actions to be taken to negate the disruption due to pandemics in the future. Also, sentinel surveillance sites can deduce a site-specific plan for continued service during any pandemic. Such study should be undertaken at periodic intervals to track the change going forward so that appropriate actions can be initiated quickly [1]. A comprehensive research study which includes ongoing surveillance, timely detection of circulating influenza virus strains, analysis of the pathophysiology of disease and clinical outcomes in patients, will aid in the development of effective vaccination strategies. Incorporation of such strategies into broader immunisation programmes will help to reduce the morbidity and mortality especially in hospitalised patients.

The present study aimed to study the SARI and ILI with reference to COVID-19 and Influenza, post COVID-19 pandemic. The objectives of the study were to understand the demographic, clinical profile of COVID-19 and influenza Reverse Transcriptase-polymerase Chain Reaction (RT-PCR) positive patients presented post pandemic and to know the seasonal variation and circulating strains of COVID-19 and Influenza virus.

MATERIALS AND METHODS

The present retrospective observational study was carried out at Molecular biology laboratory, Department of Microbiology of tertiary health care centre at Rajiv Gandhi Medical College and hospital Kalwa, Thane, Maharashtra, India, from August 2022 to September 2024. The current study was approved by the Institutional Ethical Committee and the requirement for informed consent was waived (IRB No. 215/2024). The study population includes all patients presenting with ILI and Severe Acute Respiratory Illness (SARI) whose samples has been tested for COVID-19 and Influenza at RT-PCR Laboratory during period August 2022 to September 2024. Consecutive sampling was done for this retrospective study. Being a time bound study all subjects available were taken into consideration. Patients were randomly selected based on below inclusion and exclusion criteria

Inclusion criteria: All the SARI and ILI patients referred by clinicians, during the above mentioned period for COVID-19 and influenza testing with properly collected sample and properly filled test requisition form for RT-PCR testing were included in the study. Patients presenting at Outpatient Department as well as hospitalised patients of all age groups and gender were also included.

Exclusion criteria: Patients having incomplete details on Sample requisition form and inconclusive results on RT-PCR test were excluded from study.

Study Procedure

The WHO global influenza surveillance standards define the surveillance case definitions for ILI and SARI as follows [4]:

ILI: An acute respiratory infection with measured fever of 38°C and cough with onset within the last 10 days

SARI: An acute respiratory infection with measured fever of 38°C and cough with onset within the last 10 days and requiring overnight hospitalisation.

Different clinical, epidemiological parameters, treatment history and vaccination status of influenza and SARS-CoV-2 positive cases were noted by collecting data from the laboratory information system and the medical record section of the hospital for hospitalised patients. The data accuracy was ensured by appropriate data quality control procedures.

In the laboratory sample was processed by viral Ribonucleic Acid (RNA) extraction using commercially available HiPurA Viral RNA Purification Kit [5]. These RNA were further tested by a two step RTPCR kit designed by Indian Council of Medical Research-National Institute of Virology (ICMR-NIV), Pune, India, for simultaneous qualitative detection and differentiation of influenza viruses and SARS-CoV-2. The first step of the assay detects virus type (influenza A/influenza B/SARS-CoV-2), and the second step differentiates between influenza virus subtypes. The assay has an internal control, primers and probes against the target genes: ORF1b for SARS-CoV-2, M1 for influenza A (influenza A H1N1 pdm09 and H3N2), and NS2 for influenza B (Yamagata and Victoria lineages). The unsubtypable Influenza A strains were sent to NIV Pune, reference laboratory for further identification [6]. The SARS-CoV-2 positive samples with positivity >10% per month were sent for whole genome sequencing to NIV Pune to identify the circulating strain [7]. All the quality control procedures were followed in the molecular biology laboratory for RTPCR testing.

STATISTICAL ANALYSIS

Descriptive statistical analysis- Data collected as per the case record proforma was entered in Microsoft Excel. As the data is quantitative in nature, the proportions and percentages were computed accordingly. To study the association of meteorological seasons with that of surge of the Influenza cases, chi square test was performed.

RESULTS

A total of 1170 patients presenting with ILI and SARI were tested by RTPCR from August 2022 to September 2024. Of these, 893 were SARI and 277 were ILI patients. The SARS-CoV-2 and Influenza positivity among these patients is as shown in [Table/Fig-1].

Virus detected	SARI (Total cases 893)	ILI (Total cases 277)
SARS-CoV-2	61 (6.83%)	35 (12.64%)
Influenza	62 (6.94%)	61 (22.02%)

[Table/Fig-1]: Distribution of SARS-CoV-2 and Influenza cases.

The seasonal variation of SARS-CoV-2 and Influenza cases was studied over the study period as in [Table/Fig-2]. We could not analyse seasonal trend for 2022 and 2024 as we did not test for all the months of year since the study period was from August 2022 to September 2024. To study significance in seasonal trends of Influenza virus in the year 2023, we have divided the samples tested and influenza positives according to the local meteorological

Time period	Total tested	Number of Influenza positive cases	Influenza percentage positivity	Number of SARS-COV-2 positive	SARS-COV-2 percentage positive cases
August 2022	135	40	29.63%	23	17%
September 2022	86	4	4.65%	11	12.79%
October 2022	43	2	4.65%	1	2.33%
November 2022	60	0	0.00%	2	3.33%
December 2022	42	1	2.38%	0	0.00%
January 2023	29	3	10.34%	0	0.00%
February 2023	24	2	8.33%	1	4.17%
March 2023	110	10	9.09%	19	17.27%
April 2023	145	12	8.28%	21	14.48%
May 2023	33	0	0.00%	1	3.03%
June 2023	9	1	11.11%	0	0.00%
July 2023	17	0	0.00%	0	0.00%
August 2023	37	6	16.22%	1	2.70%
September 2023	118	19	16.10%	11	9.32%
October 2023	38	6	15.79%	1	2.63%
November 2023	29	1	3.45%	0	0.00%
December 2023	60	2	3.33%	0	0.00%
January 2024	13	0	0.00%	1	7.69%
February 2024	12	0	0.00%	1	8.33%
March 2024	13	0	0.00%	0	0.00%
April 2024	12	0	0.00%	0	0.00%
May 2024	2	0	0.00%	0	0.00%
June 2024	13	1	7.69%	0	0.00%
July 2024	46	10	21.74%	1	2.17%
August 2024	38	2	5.26%	1	2.63%
September 2024	6	1	16.67%	0	0.00%

[Table/Fig-2]: Seasonal variation of SARS-CoV-2 cases.

seasons with summer (February 2023 to May 2023), Monsoon (June 2023-September 2023), Winter (October 2023-January 2024). In order to study the association of meteorological seasons with that of surge of the Influenza cases, chi square test was performed to the data in [Table/Fig-2] and p-value was noted. p-value was calculated using chi-square test. The Chi-square value was compared with degree of freedom using Chi-square distribution table (right tail probabilities). The significance level considered was 0.05. On analysis, it was found that there was surge of Influenza positive cases, in early monsoon June 2023 and July 2023 compared to summer and winter with p value of 0.0299 which was significant as in [Table/Fig-3].

Local meteorological seasons	Influenza positive cases	Influenza negative cases	Chi-square value	p-value
Summer 2023	24	288	7.022210355	0.0299
Monsoon 2023	26	155		
Winter 2023	9	131		

[Table/Fig-3]: Statistical analysis for association of local meteorological seasons with surge of the Influenza cases.

Influenza A virus was subtyped into Influenza A H3N2 and (H1N1) pdm09. All of the Influenza B subtypes belonged to Victoria lineage. None of the Influenza strain was unsubtypable. The distribution of various strains of Influenza virus in SARI and ILI is shown in [Table/Fig-4]. The clinical details like co-morbidities, treatment and vaccination history were studied. In ILI, out of 277 patients screened, 25 patients (9.03%) had co-morbidities while in SARI out of 893 patients tested, 145 patients (16.23%) had co-morbidities. The distribution of co-morbidities in these patients is as shown in [Table/Fig-5].

Influenza subtype	SARI (Total Influenza positive- 62)	ILI (Total Influenza positive- 61)
Influenza A (H1N1) pdm09	15 (24.19%)	18 (29.50%)
Influenza A H3N2	18 (29.03%)	37 (60.66%)
Influenza B	29 (46.78%)	6 (9.84%)

[Table/Fig-4]: Subtypes of Influenza virus.

Co-morbidities	Number of patients having co-morbidities in SARI (145)		Number of patients having Co-morbidities in ILI (25)	
	COVID-19 positive 8/145 (5.52%)	Influenza positive 7/145 (4.83%)	COVID-19 positive 2/25 (8%)	Influenza positive 3/25 (12%)
Hypertension	3 (37.5%)	2 (28.57%)	1 (50%)	1 (33.33%)
Diabetes mellitus	2 (25%)	1 (14.29%)	1 (50%)	1 (33.33%)
Kidney disease	2 (25%)	1 (14.29%)	-	-
Pulmonary tuberculosis	1 (12.5%)	-	-	-
Chronic obstructive pulmonary disease	-	3 (42.86%)	-	1 (33.33%)
Total	8 (100%)	7 (100%)	2 (100%)	3 (100%)

[Table/Fig-5]: Distribution of co-morbidities in SARI and ILI.

The treatment given for COVID-19 patients was symptomatic while for Influenza positive patient oseltamivir was given along with symptomatic management. In the present study, in SARI patients, 15 (24.59%) out of 61 COVID-19 positive patients and 17 (27.42%) out of 62 Influenza positive patients required Intensive Care Unit (ICU) admission. Among these 15 COVID-19 positive patients, 5 (33.33%) required oxygen support and none of the patient required ventilator. Among the 17 Influenza patients admitted to ICU, 5 (29.41%) patients required oxygen support and 3 (17.65%) patients required ventilator support of which 2 (11.76%) died and 1 (5.88%) was discharged. All of the COVID-19 and Influenza positive SARI and ILI patients were vaccinated for COVID-19 vaccine and none of these patients received Influenza vaccine.

In the current study, out of 37 ILI Influenza A H3N2 cases, 17 were found as clusters of cases in medical students residing in college hostels in the month of August 2022. Of these 17 cases, 14 (82.35%) cases were from boys' hostel. All of them presented with fever and cough and did not require hospitalisation. Gender wise and age wise distribution of SARS-CoV-2 and Influenza cases in SARI and ILI was as shown in [Table/Fig-6,7], respectively.

Virus detected	SARI (Total 893)		ILI (Total 277)	
	Male (Total 400)	Female (Total 493)	Male (Total 142)	Female (Total 135)
SARS-CoV-2	25 (6.25%)*	36 (7.30%)*	16 (11.27%)*	19 (14.07%)*
Influenza	25 (6.25%)*	37 (7.50%)*	45 (31.69%)*	16 (11.85%)*

[Table/Fig-6]: Gender-wise distribution of SARS-CoV-2 and Influenza virus in SARI and ILI.
*Percentage calculated from total males and females screened for SARI and ILI, respectively

Age group (years)	SARI (Total cases 893)			ILI (Total cases 277)		
	Total cases screened	SARS-CoV-2 positive cases	Influenza positive cases	Total cases screened	SARS-CoV-2 positive cases	Influenza positive cases
0-1	59	3 (5.08%)	4 (6.78%)	3	0	0
2-5	42	0	7 (16.67%)	3	0	2 (66.67%)
6-12	47	0	3 (6.38%)	13	1 (7.69%)	0
13-25	207	15 (7.25%)	17 (8.21%)	84	11 (13.10%)	24 (28.57%)
26- 40	196	12 (6.12%)	13 (6.63%)	71	8 (11.27%)	13 (18.30%)
41-60	217	17 (7.83%)	11 (5.07%)	58	10 (17.24%)	16 (27.59%)
61 and above	125	14 (11.20%)	7 (5.6%)	45	5 (11.11%)	6 (13.33%)

[Table/Fig-7]: Age-wise distribution of SARS-CoV-2 and Influenza positive patients.

In the present study, 2 (0.17%) out of 1170 tested patients had co-infections. Both of these were SARI cases. One of the female patients of 40 years presented with fever and cough was positive for SARS-CoV-2 and Influenza A H3N2 virus. Other patient was a female of 65 years of age presenting with fever, cough and breathlessness and was positive for SARS-CoV-2 and Influenza B Victoria lineage. However, recovery was good in both of these patients.

In the ILI patients screened most common symptom was fever which was seen in 270 (97.47%) patients followed by cough in 225 (81.22%) patients. In SARI cases, 848 (94.96%) patients had fever, 803 (89.92%) of patients had cough, 179 (20.04%) of patients had breathlessness. No atypical presentation was found in any of these patients. In SARI patients, the average length of hospital stay for both illness (COVID-19 and Influenza positive patients) without co-morbidities was five days. The average length of hospital stay in patients with co-morbidities who were tested positive either COVID-19 or Influenza positive was nine days. 2 (3.23%) of the 62 influenza positive SARI patients succumbed to the infection. Both the patients had co-morbidities. One patient was a young 17-year-old male with pre-existing polycystic kidney disease and Influenza A H3N2 infection. He died of acute renal failure. Another patient was a 62-year-old male, a known case of diabetes mellitus, with (H1N1) pdm09 infection with pneumonia. Apart from these two patients no mortality was reported in the COVID-19 and Influenza positive SARI patients and recovery was good.

DISCUSSION

The overlap of COVID-19 and influenza, as two epidemics can occur at the same time [8]. Influenza has four types A, B, C and D, of which type A and B are mainly known to cause respiratory tract infection in humans [9]. The subtypes are based on two viral surface proteins: hemagglutinin (H) and neuraminidase (N) [10] Influenza B virus has two antigenically and genetically distinct lineages; B/Victoria/2/87-like (Victoria lineage) and B/Yamagata/16/88-like (Yamagata lineage) [11].

The comparison of percentage positivity of COVID-19 and Influenza of present study with other regional and international studies is as mentioned in [Table/Fig-8]. The difference in detection rate could be due to different seasonal outbreaks and geographical variation of the cases [3,12,13].

Study	Time period	Place of study	SARI (Total cases 893)		ILI (Total cases 277)	
			Virus detected		Virus detected	
			SARS-CoV-2	Influenza	SARS-CoV-2	Influenza
Present study	August 2022 to September 2024	Western India	61 (6.83%)	62 (6.94%)	35 (12.64%)	61 (22.02%)
Potdar V et al., [3]	2021-2022	Pan India	5%	9.2%	5.9%	6.2%
Akhtar Z et al., [12]	2019-2020	Bangladesh	14.3%	8.8%	-	-
Hazra A et al., [13]	2020	Chicago	18.1%	2.2%	-	-

[Table/Fig-8]: Comparison of SARS-CoV-2 and Influenza positivity with different studies [3,12,13].

Genomics has played a pivotal role in combating COVID-19 pandemic by understanding the characteristics of viruses, development of molecular diagnostics, epidemiological surveillance, vaccine development and therapeutics [14]. As shown in [Table/Fig-2], in the year 2022, the percentage positivity for SARS-CoV- 2 was highest in the month of August 2022(17.03%) and September 2022 (12.79%). These samples were sent for Whole genome sequencing to the reference laboratory at NIV. They were found to be Omicron BA.2 and other sub lineages of Omicron. Potdar V et al., also stated in their study that the SARS-CoV-2 “Variants Of Concern” (VOC) Omicron predominated in 2022 [3]. In the year 2023, SARS-CoV-2 positivity was highest in March 2023 (17.27%) followed by April 2023 (14.48%). All of these SARS-CoV-2 variants were found to be recombinant XBB variants on whole genome sequencing. From Summer 2022, XBB was the predominant strain. Phylogenetic analyses suggested that XBB emerged through the recombination of two co-circulating Omicron BA.2 lineages, BJ.1 and BM.1.1.1 (a progeny of BA.2.75) [15]. As in [Table/Fig-2], for the rest of the study period, the percentage positivity of SARS-CoV-2 per month was less than 10%. Over time though COVID-19 testing has significantly decreased all over the world, it is critical to monitor the virus through surveillance [3].

Among the Influenza viruses, in SARI patients, out of the total positive cases, percentage of (H1N1) pdm09, Influenza A H3N2, Influenza B subtype was found to be 24.19%, 29.03%, 46.78%, respectively. In ILI Influenza positive cases distribution of (H1N1) pdm09, Influenza A H3N2, Influenza B was found to be 29.50%, 60.66%, 9.84%, respectively. Potdar V et al., found among SARI cases, 66%, 14% and 20% infections were of A (H1N1) pdm09, A (Influenza A H3N2) and B/Victoria, respectively. Among ILI cases, 34.7%, 34% and 31.1% infections were of A (H1N1) pdm09, A (Influenza A H3N2) and B/Victoria respectively. No untypable A, B, or Yamagata strains were reported [3]. The difference in distribution of subtypes could be due to differences in the time frame of study and the seasonal outbreaks caused by the virus.

The distribution of influenza cases in different months of year is as shown in [Table/Fig-2]. In the year 2022 Influenza A (H1N1) pdm09 and Influenza A H3N2 were predominant subtypes. As in [Table/Fig-3], significant (p-value=0.029) increase in cases was seen in monsoon 2023 with predominant Influenza B/Victoria subtypes. Influenza A H3N2 cases were predominant in the winter season of 2023. In 2024 a rise in Influenza A (H1N1) pdm09 cases was seen in the monsoon season. Potdar V et al., found a peak of influenza cases in the post monsoon period with Influenza A subtype predominant in 2022 compared to Influenza B [3]. The Union Health Ministry of India also has reported a surge in Influenza A H3N2 cases from January 2023 to March 2023 all over India [16]. This is in concordance to the present study. In a study conducted by Dwibedi B et al., from 2009-2017 with respect to Influenza A (H1N1) pdm09 viral infection surge in post monsoon and winter season [17]. As per a study by Chadha MS et al., India, though physically located in northern hemisphere, has distinct seasonality for influenza virus that might be related to latitude and environmental factors. While cities with temperate seasonality will benefit from vaccination in September-October, cities with peaks in the monsoon season in July-September will benefit from vaccination in April-May. Continued surveillance is critical to understand regional differences in influenza seasonality at regional and sub-regional level, especially in countries with large latitude span [18]. The cluster of Influenza A H3N2 cases in medical college hostel could be as Influenza A H3N2 is highly contagious and spreads through respiratory droplets when an infected person coughs or sneezes [19]. The medical college hostel had rooms in sharing without adequate cross ventilation. Noncompliance to respiratory etiquettes also could have resulted in clustering of cases.

As per [Table/Fig-6] the gender wise distribution of influenza and COVID-19 cases in SARI and ILI patients in males and females is comparable except the percentage of Influenza A H3N2 cases in ILI was more in males as compared to females. This high positivity in males could be due to cluster of Influenza A H3N2 cases found in boys hostel of medical college in August 2022.The test positivity of influenza and COVID-19 cases in SARI and ILI was equal in males and females in the study by Potdar V et al., and Dwibedi B et al., [3,17].

The age wise distribution was calculated by comparing with the total patients screened in that age group as in [Table/Fig-7]. In paediatric patients, SARS-CoV-2 positivity was seen only in SARI cases in 0-1 years (5.08%) and in ILI cases in 6-12 years (7.69%), while influenza positivity was highest in 2-5 years of age in ILI (66.67%) and in SARI (16.67%). In the study carried out by Mahesh DN et al., in ILI patients paediatric age group in South India, the prevalence Influenza in ILI was highest in the age group 4-5 years followed by school aged children. Identification of Influenza and SARS-CoV-2 in children will help in isolation, antiviral therapy usage in discretion and prevention of complications in high-risk children [20]. In the age group of 13-60 years, comprising of teenagers, young adults and middle age group in SARI cases, the percentage positivity of SARS-CoV-2 and influenza was comparable and <10%, while in ILI percentage positivity of both the viruses was >10% with influenza having higher percentage positivity than SARS-CoV-2. Young population was more commonly affected with Influenza in study by Raut S et al., and Kumar N et al., [21,22], while in the study carried out by Dwibedi B et al., 45-60 years of age group was more affected with influenza cases [17].

In the geriatric age group >60 years, maximum cases of SARS-CoV-2 were seen in SARI patients with positivity of 11.20% while influenza positivity in SARI was 5.6%. Prevention and treatment were critical for the reduction of morbidity and mortality in this population [23]. Hence, early diagnosis was important in these patients. In the current study we have detected, 2 (0.17%) patients out of 1170 tested with co-infections, one with SARS-CoV-2 and Influenza A H3N2 co-infection and other with SARS-CoV-2 and Influenza B Victoria lineage. In a study carried out by Aggarwal N et al., 0.04% cases of SARS-CoV-2/influenza virus co-infection was reported from three different sites in distinct geographic regions of India [6]. A systematic review and meta-analysis of 26 studies through September 2020 by Dadashi M et al., reported the pooled prevalence of COVID-19 and influenza co-infection as 0.8% [8]. Co-infections of SARS-CoV-2 with influenza virus have been highlighted as a cause of concern due to worsening of the clinical picture [6]. Early detection and close monitoring can improve the prognosis in co-infections. In ILI, 5 (20%) patients having co-morbidities while in SARI 15 (10.34%) patients having co-morbidities were positive for either SARS-CoV-2 or Influenza. According to the WHO, pregnant women, children under five years of age, the elderly, individuals with chronic medical conditions like cardiac, pulmonary, renal, metabolic, and individuals with immunosuppressive conditions are at a greater risk of developing a severe form of flu [10]. Hence, early diagnosis and early treatment can prevent complications, prolong hospitalisation, and even death by early intervention like antiviral treatment, oxygenation and if necessary, ventilator support.

As far as treatment is concerned, identification of causative agent is important as both influenza and COVID-19 can have similar presentations, the management and prognosis will be different. Glucocorticoids should be used with caution in patients with positive influenza virus due to the negative effects of steroids on the morbidity and mortality of these patients [24]. All of the COVID-19 and Influenza positive patients were vaccinated with COVID-19 vaccine. This would have been accomplished due to centralised vaccination policy implemented by the government [25]. In contrast to this, none of the patients were vaccinated for influenza. As being local government hospital, patients visiting the hospital mostly belong to low socioeconomic group. The cost-effectiveness can be major constraint as influenza vaccine is not the part of standard national immunisation schedule for all age groups [26].

Limitation(s)

Apart from Influenza and COVID-19 other viruses causing respiratory illnesses like, respiratory syncytial virus, parainfluenza virus, human metapneumovirus virus, adenovirus, rhinovirus, were not tested. The design of the current study is retrospective; the data collected has been restricted to a single hospital, and longitudinal monitoring of individuals was not possible. A prospective study with longer duration in this regard can be more useful to follow-up patients with respect to the clinical outcome.

CONCLUSION(S)

Due to the varying circulating strains, seasonal variations of SARS-CoV-2 and influenza viruses, strengthening continuous surveillance activities can help in formulating policy and guidelines for management of SARI and ILI cases. For this logistic support needs to be provided to the testing laboratories in the form of manpower, training of the staff, inventory for testing. Moreover, timely diagnosis and appropriate treatment can prevent the further spread of the virus and reduce its impact on vulnerable populations. The identification of circulating strains of virus will help in formulating prevention strategies and vaccine development. Increased vaccination will decrease the morbidity and mortality especially in the vulnerable population.

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