



Trends Of Respiratory Viral Infections in Punjab Pakistan In The Post COVID-19 Period

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ABSTRACT

Introduction: Respiratory infections caused by viruses are becoming a global concern, especially in the aftermath of COVID-19 pandemic. Due to massive impact of COVID-19 in the past 3 years globally, other viruses causing respiratory illnesses have largely been ignored. But as the COVID-19 pandemic declined, changing trends were seen in the pattern of respiratory viral infections in Pakistan.

Aims & Objectives: To study the trends of respiratory viral infections in Pakistan in the winter of 2022/2023 after the decline of Covid-19 pandemic.

Material & Methods: A total of 454 samples were evaluated for viral pathogens (Influenza A, Influenza B and Respiratory syncytial virus) by running them on Multiplex Polymerase chain reaction. We received 373 samples from Lahore, 46 from Multan, 24 from Islamabad, 6 from Rawalpindi, 4 from Okara and 1 from Sheikhupura. Data was analyzed by applying descriptive statistics using SPSS version 23, a p-value of ≤ 0.05 was considered significant.

Results: The prevalence of Influenza A virus was 26.4% (120/454 cases), followed by RSV which showed the prevalence of 10% (46/454 cases) whereas Influenza B showed a prevalence of 6% (27/454 cases).

Conclusion: Influenza A and RSV incidence has surged in the year 2022/2023 which is the post Covid -19 period. There is an increased incidence of Influenza A in the elderly population whereas RSV in children.

Keywords: Trends, Respiratory Viral Infections, post COVID-19.

INTRODUCTION

Acute respiratory viral infections rarely cause mortality in otherwise healthy individuals except for epidemic influenza and possibly respiratory syncytial virus¹. Moreover, they may cause morbidity and mortality in countries with low and middle socio-economic status especially in children and the elderly people². The occasional pandemics caused by respiratory viruses cause extreme disruption to societies and economies as seen during the current COVID-19 pandemic³. The observed rates of influenza, RSV, rhinovirus, and other respiratory viral infections were incredibly low during the COVID-19 period as compared to previous winters. But as the warmer summer months in 2022 ensued, rates of respiratory viral infections which would usually be very low or absent,

many countries reported unusually high rates non seasonal RSV, Influenza, and Parainfluenza⁴. Influenza, Human Corona Viruses and RSV show a peak during the winter period. Reasons for the seasonality seen with respiratory viruses include changes in contact rates and the stability of the pathogen in the environment, which is affected by factors such as temperature and humidity⁵.

However, viruses may circulate throughout the year, and peaks may coincide with lower temperatures, humidity, or rainfall⁶.

COVID-19 pandemic dramatically changed the epidemiology of respiratory viral infections⁷. Therefore, there is an increasing recognition that respiratory viruses are common cause of community acquired pneumonia, either as the sole pathogen or as a co-infecting organism⁸. Particularly in Pakistan, respiratory infections account for 20% to 30% of all deaths of children⁹. Even though these infections are common, insufficiency of data hinders development of a comprehensive summary of the issue¹⁰.

Moreover, since all the respiratory diseases show similar clinical symptoms, clinical picture alone cannot confirm the presence of a specific pathogen. Therefore, viral detection through molecular techniques using real time PCR becomes even more essential for a specific pathogenic diagnosis. However, due to limited resources and lack of

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availability of more specific diagnostic tools, respiratory viral infections remain undiagnosed. In this study, we have made an effort to determine the real burden of respiratory viral infections especially in the post COVID period.

MATERIAL AND METHODS

The study was conducted at Chughtai Institute of Pathology for a period of 6 months from 1st September 2022 to 28th February 2023 after approval from Institutional Review Board of Chughtai Institute of Pathology vide letter number 1166/CIP/IRB. The sample size (n) was calculated by using the formula $n = Z^2 P(1-P) / d^2$ where n is sample size, Z shows a level of confidence, P is expected prevalence or proportion, and d is Precision¹¹. In our study by reviewing the systematic literature and expert opinion, the prevalence of Influenza was found to be in the range of 7-8%¹² whereas that of RSV to be 6-8%¹³. With $P = 7\%$ and 99% confidence level the minimum sample size of 434 was calculated. So, a total of 454 samples received in viral transport medium (VTM) were processed. The samples of all ages above 1 year were included while samples of Infants less than 12 months were excluded. The Xpert® Xpress Flu/RSV kit was used on the GeneXpert™ Instrument Systems. The samples were processed with positive and negative controls as per manufacturer's instructions.

RESULTS

In total, 454 samples were tested for influenza A, Influenza B and RSV in 6 months of the post COVID-19 period from September 2022 to February 2023. The test count of every month was reviewed and analyzed. The number of test requests for respiratory viral infections were significantly higher 88.5% (402/454) in the last 3 months of winter season (December, January & February) as compared to 11.5% (52/454) in the earlier 3 months (September, October & November) as shown in Fig-1. Overall, Influenza A was the most common respiratory virus detected with a prevalence of 26.4% (120/454 cases). Whereas RSV was the second most common respiratory virus detected with a prevalence of 10% (46/454 cases) while Influenza B was found to be 6% (27/454 cases) as shown in Fig-2. We found no coinfection in the children group. However, Influenza A and Influenza B coinfection was seen in only one person from the adult group whereas Influenza A and RSV coinfection was seen in two persons from elderly group.

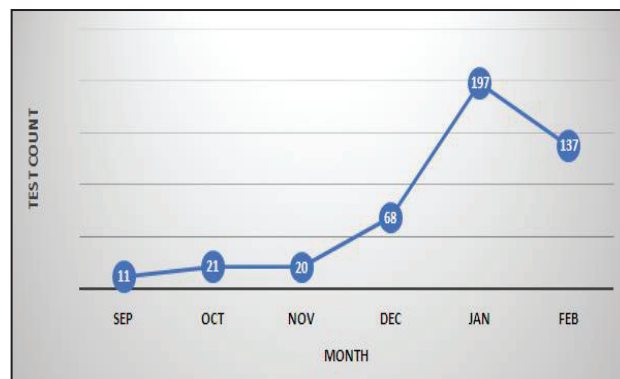


Fig-1: The Number Of Tests Requested Month Wise

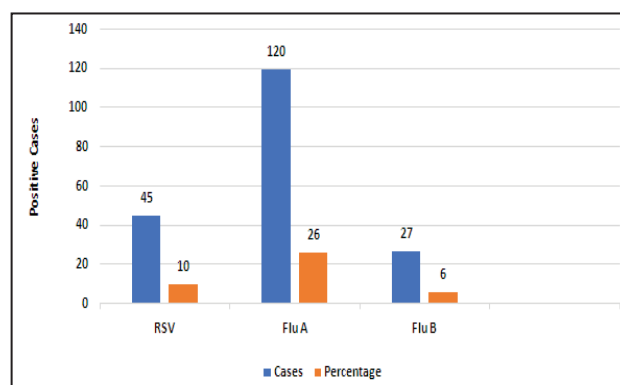


Fig-2: Higher Incidence Of Influenza A (26.4%) Followed By RSV (10%) And Influenza B (6%).

With reference to age, all the tested patients were divided into three groups: Children (1- <18 years), Adults (18-64 years) and Elderly (65 years and above). We received 18 samples from the children group, 235 from the adult group and 201 samples from the elderly group as shown in Table-1. We calculated the positive percentage of Influenza A, Influenza B and RSV for the above-mentioned age groups. The positive percentage of Influenza A, Influenza B and RSV, in children age group was 16.6%, 11.1% and 27.7% respectively, while in those from the adult age group, it was 25.9%, 9.3% and 8.0% respectively and in the elderly group it was 27.9%, 1.5% and 10.9% respectively as shown in Table-2. With respect to geographical location, we received 373 samples from Lahore, 46 from Multan, 24 from Islamabad, 6 from Rawalpindi, 4 from Okara and 1 from Sheikhupura as shown in Fig-3.

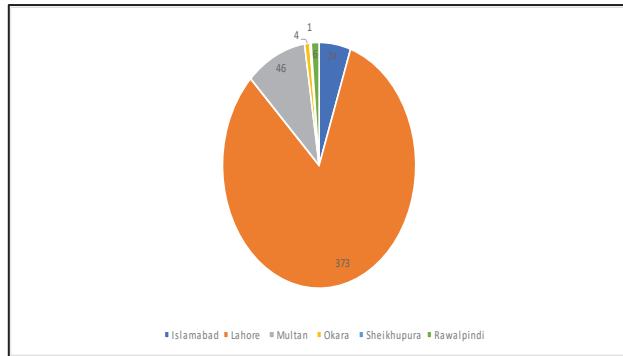


Fig-3: Number Of Samples Received From Different Cities Of Punjab

		Freq	%	Valid %	Cumulative %
Valid	Children	18	4.0	4.0	4.0
	Adults	235	51.8	51.8	55.7
	Elderly	201	44.3	44.3	100.0
	Total	454	100.0	100.0	-

Table-1: Frequency distribution in different age groups showing frequency and percentage.

	Influenza A	Frequency	Percentage
Children	Not Detected	15	83.0
	Detected	3	16.6
Adults	Not Detected	174	74.0
	Detected	61	25.9
Elderly	Not Detected	145	72.1
	Detected	56	27.9
	Influenza B		
Children	Not Detected	16	88.8
	Detected	2	11.1
Adults	Not Detected	213	90.6
	Detected	22	9.3
Elderly	Not Detected	198	98.5
	Detected	3	1.5
	RSV		
Children	Not Detected	13	72.2
	Detected	5	27.7
Adults	Not Detected	216	91.9
	Detected	19	8.0
Elderly	Not Detected	179	89.1
	Detected	22	10.9

Table-2: Positive percentage and frequency in different age groups.

DISCUSSION

A wide variety of respiratory viral infections have been reported from around the globe in the year 2022/23 especially after the COVID-19 pandemic waned¹⁴. For example, Treggiari D et al from Italy reported the extremely low prevalence of Influenza virus among hospitalized patients and outpatients during the first two COVID-19 winter seasons, with a reemergence of RSV in the late 2021¹⁵. In a review by Eric J. Chow et al, the Influenza B/Victoria virus infections largely dominated the 2019–2020 Influenza season. Whereas Influenza infections were found to be very low in the following years in 2020–2021 season, with influenza B virus predominating. Again in 2021–2022 season, Influenza activity returned but was still lower than before the COVID-19¹⁶. However, the exact prevalence of these respiratory viruses in percentages is not mentioned in this review. Our study also found variation in the trends of respiratory viruses as requests for respiratory viral infection tests were significantly higher in the last 3 months of winter season (December, January & February) of the year 2023 as compared to the earlier 3 months (September, October & November) of the year 2022.

In one of the studies by Alkharsah KR, the overall percentage of RSV detection was found to be 26.3% among the tested individuals from the Eastern Province of Saudi Arabia between January 2015 and February 2022. RSV infection was more common among children below five years and elderly above 60 years of age with the peak level of infection was during December and January. No RSV infections were reported during the COVID-19 pandemic and the following winter whereas the cases increased again in August 2021, with an unusual out-of-season peak¹⁷. Likewise, our study has also shown the RSV prevalence of 27.7% in the children group. In another study by Lumley SF et al it was found that the detection of RSV, Influenza, Parainfluenza, Adenoviruses and Rhinovirus was very low during the first national lockdown in the UK, however as the schools re-opened there was an inter-seasonal rise in RSV in July 2021 although Influenza was largely suppressed during the COVID-19 pandemic years¹⁸.

A few studies have been conducted in our country on the prevalence of different respiratory infections before the post-COVID -19 period, however, the data of these infections in the post COVID-19 period is very limited. A literature review conducted by Naz R et al. has mentioned various pathogens like RSV, rhinovirus, HMPV,

coronavirus, influenza and, parainfluenza virus, and adenovirus as responsible for causing respiratory viral infections¹⁹. Again, the exact prevalence is not mentioned in percentages. A study by Aamir UB et al. has shown the prevalence of RSV from all the provinces of Pakistan to be 24% in children from the years 2010-2013 (RSV A 78% and RSV B in 22%)²⁰. Another study conducted by Aziz Fat el. has shown a high prevalence of RSV genotype B (20%) in children in Pakistan²¹. Another cross-sectional study conducted by Raza S et al. in Islamabad from April 2016 to March 2019 showed a prevalence of 73.8% for Influenza A virus whereas 26.1% for Influenza B. Similarly, our study elucidated the prevalence of Influenza A to be 26.4%, RSV to be 10% and Influenza B to be 6%. As far as geographical areas are concerned, we received the majority (373/454) of samples from Lahore. The positive percentage of Influenza A, Influenza B and RSV, in children age group was 16.6%, 11.1% and 27.7% respectively, while in those from the adult age group, it was 25.9%, 9.3 % and 8.08% respectively and in the elderly group it was 27.9% 1.5% and 10.9%.

However, our study was limited to the fact that it was mainly carried on samples received from different collection centers of Chughtai Lab and there was no clinical interaction with patients regarding their symptoms. Secondly, the Xpert® Xpress Flu/RSV assay does not provide subtyping for influenza A virus which is crucial for confirming subtypes in suspected human cases of avian or novel influenza and RSV. Thirdly, it was carried only on the samples received from Punjab. The growing interest in respiratory viral illnesses after the triumph of COVID-19 is an opportunity for the medical community to invest more resources in research and development of techniques for viral detection methods. Efforts should be done to make them easily available and accessible to the general public so that viral illnesses can be easily and readily diagnosed and treated.

CONCLUSION

Studying the burden of respiratory viral infections in our country is necessary to understand the magnitude and extent of disease and to develop effective preventive strategies. This will also reduce the inappropriate use of antibiotics, which contributes to antibiotic resistance. Climate change, air pollution, and viral respiratory infections are interconnected. The increased prevalence of such diseases in Lahore could be linked to higher levels of smog pollution and environmental problems.

Unfortunately, without interventions to stop global warming, the nationwide burden of viral respiratory diseases is poised to increase. We also need to focus on the availability of Influenza vaccines with broader and longer duration of protective immunity than current vaccines, especially in the elderly population.

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