

# SARS-CoV-2 Positive Patients and the Associated Risk Factors During the Third Wave: A Study in a Tertiary Care Hospital of Punjab

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## Abstract

**Background:** SARS-CoV-2 has a high mutation rate, resulting in the emergence of multiple variants in a shorter time frame, starting with Wuhan strain during first wave, then Delta during second wave and Omicron during third wave. World faced distressing spread of novel corona virus. The reason for this study was to look at the third flood of SARS-CoV-2, clinical highlights and risk factors in northern India.

**Methods:** This study involved 1,43,983 individuals for testing the presence of SARS-CoV-2 infection during January 2022 by RT-PCR. The epidemiological record was collected as per the guidelines of ICMR from the patient forms.

**Results:** A total of 12.24% individuals were found positive with mean age of 29±10 years. Large portion of positive population (63.87%) was asymptomatic. Among the positive population, higher positivity rate was observed in males (57.51%) with age band of 21-40 years (51.17%). Significant association (p value = <0.00001) was found between positivity rate with age, gender and status (symptomatic/ asymptomatic). SARS-CoV-2 was shown to be more prevalent in Patiala, (49.66%) district followed by Ludhiana (24.24%), Sangrur (10.06%), Mansa (7.06%), Shaheed Bhagat Singh Nagar (6.90%) and Malerkotla (2.08%) during second and third week of January 2022. Hypertension and bronchial asthma were the most well-known comorbidities found in the current study.

**Conclusion:** In totality, current study showed positivity rate of 12.24% from large population size for SARS CoV-2 from period of 1st January 2022 to 31 January 2022. Current findings include younger age group (21-40 years), high percent of asymptomatic individuals, less disease severity and a little need of hospitalization.

**Keywords:** Covid -19; SARS-CoV-2; third wave; Comorbidities; Case fatality rate; RTPCR.

## Introduction

SARS-CoV-2 (acute respiratory syndrome coronavirus 2), formerly known as the new COV /

nCoV, is a coronavirus that causes high morbidity and mortality. It has emerged as one of humanity's most serious dangers, with a coronavirus pandemic declared by WHO in 2020. SARS-CoV-2 is evolving

continually due to point mutation or single nucleotide polymorphism (SNP) variants leading to numerous lines hastily all around the world <sup>(1)</sup>. Many new mutations of SARS-CoV-2 isolates were identified all around the world from 2020 to 2022. Earlier in India especially Punjab, during second wave in 2021 Delta variant was the major variant, now there is a transition from delta to the Omicron (B.1.1.529), New Variant of Concern (VOC) that was discovered in 2021. The S protein in this form contains a lot of mutations, and it's mostly linked to upper respiratory infections <sup>(2)</sup>. This illness may strike people of any age group, and it is more common in those who have co-morbid disorders like diabetes, hypertension, cardiovascular and cerebrovascular disease, also a higher morbidity and mortality is reported. During the third wave in 2022, positive patients with infection mostly had mild symptoms ranging from fever, cough, stomach and body aches but some also presented acute to severe respiratory symptoms. Hence, it is very important to investigate the clinical manifestations of SARS-CoV-2 in the regional population. To see how SARS-CoV-2 positive patients presented during the third wave in 2022, this study zeroed in on inhabitants in Punjab.

**Methodology:** This is a study of SARS-CoV-2 positive subjects at a tertiary care hospital in northern India. During the third wave, a total of 1,43,983 samples were analyzed between January 1st and January 31st, 2022. The individuals involved in the study were both symptomatic and asymptomatic. Epidemiological data on population characteristics, clinical features, comorbidities and mortality rate (CFR) (ICMR) were collected in accordance with the criteria of the Indian Council of Medical Research.

#### **Study Area:**

Punjab is located in northwestern part of India. The state is divided into three primary regions: Majha, Malwa and Doaba <sup>(3)</sup>. The Malwa locale, south of the Sutlej River, was the focal point of our study. During the third influx of the Covid19 wave in January 2022, 1,43,983 samples were overviewed. SARS-CoV-2 suspected samples were received from Sangrur, Mansa, Patiala, Malerkotla, and some

portion of Ludhiana and Shaheed Bhagat Singh Nagar (SBS Nagar) at tertiary care hospital, Patiala. Individuals infected with Covid 19 had their personal demographic information such as name, age, gender, geographic area, and contact information gathered in compliance with ICMR criteria.

#### **Sample Handling:**

There were five distinct districts in the Malwa area that sent in respiratory samples to the Virus Research and Diagnostic Laboratory (VRDL) at Punjab Tertiary Care Hospital. The samples were subjected to RT-PCR and RNA extraction. The rest of the samples were put away at -80°C until required.

**RNA Extraction:** A 200 micro liter sample was used to extract RNA from the nasopharyngeal swab. To extract nucleic acids from 96-well plates, the MagMAX™ viral pathogen DNA extraction kit (according to the manufacturer's instructions) was used. RNA was extracted using a 50 µl elution buffer. A molecular analysis was performed on the recovered genetic material.

**RT-PCR:** SARS-CoV-2 DNA detected qualitatively using the COVID19 RT-PCR assay in pooled and single samples obtained in January 2022. The real-time PCR test converts viral RNA into DNA in order to identify the infection. We used the COVIPATH (COVID-19 RT-PCR Kit) multiplex real time PCR kit to detect the presence of SARS-CoV-2 RNA in 10 liters (sample volume). After 10 min counter-record, initiation at 95 ° C for 2 min, and improvement of 40 samples at 95 ° C for 3 s and 60 ° C for 30 s, the PCR response was complete. The reporter dye VIC was used for the N gene, Rox was used for the RNase P gene, and FAM was used for the ORF1ab gene. After analyzing the results, positive samples were considered which a cycle threshold of less than 25 while the others were taken as negative.

**Statistical analysis:** Mean and standard deviation were utilized to address ceaseless information, while recurrence and rate were utilized for clear cut information. The Chi square test was utilized to decide if the gatherings were tantamount. A p-esteem

under 0.05 was viewed as genuinely critical. For factual investigation, Microsoft Excel Office 2010 was used.

### Results

The research was carried out in the Malwa Tertiary Care Hospital. During the third wave, from January 1st to January 31st, 2022, 1,43,983 suspected people were tested for SARS-CoV-2. A total of 17,633 people tested positive for RT-PCR, whereas 1,26,350 tested negative. 1,20,752 people were asymptomatic negative, 11,263 people were asymptomatic positive, 5,598 people were symptomatic negative, and 6370 people were symptomatic positive.

Table 1 lists the characteristics of all of the

people who were examined. The average age of patients positively tested for Covid-19 was between 29±10 years. It was observed that individuals with age between 21-40 years showed highest rate of positivity for SARS-CoV-2 during third wave. Significant association ( $p$  value = <0.00001) was found between positivity rate with age, gender and status (symptomatic/ asymptomatic). A total of 36.13% were symptomatic, while 63.87% individuals were found to be asymptomatic. In other categories, pregnant females were 2.62%, symptomatic individuals with travel history were 0.53% and 11.99% were hospitalized among total symptomatic population, while category of 24.02% collected not mentioned in the month of January 2022.

**Table 1: Distribution of individuals tested for SARS-CoV-2.**

Characteristics	Number Of Individuals		P value (Chi square)
	Positive	Negative	
SARS-Cov-2 RT-PCR			
Negative	126350 (87.75%)		
Positive	17633 (12.25%)		
<b>Gender</b>	<b>Positive</b>	<b>Negative</b>	
Male	10141 (57.51%)	84234 (66.67%)	<0.00001
Female	7492 (42.49%)	42116 (33.33%)	
<b>Age (Years)</b>			
0-20	1795 (10.18%)	17986 (14.24%)	<0.00001
21-40	9021 (51.16%)	43056 (34.08%)	
41-60	5463 (30.98%)	39846 (31.53%)	
>60	1354 (7.68%)	25462 (20.15%)	
<b>Status</b>			
Symptomatic	6370 (36.13%)	35801 (28.33%)	<0.00001
Asymptomatic	11263 (63.87%)	90549 (71.67%)	

**Age And Gender Wise Distribution:** Females were outnumbered by males by a factor of 1.35. This study showed that the positivity rate was higher among males with age band of 21-40 years as shown

in figure 1. During the research period, there were no significant changes in the proportion of individuals of different ages being tested.

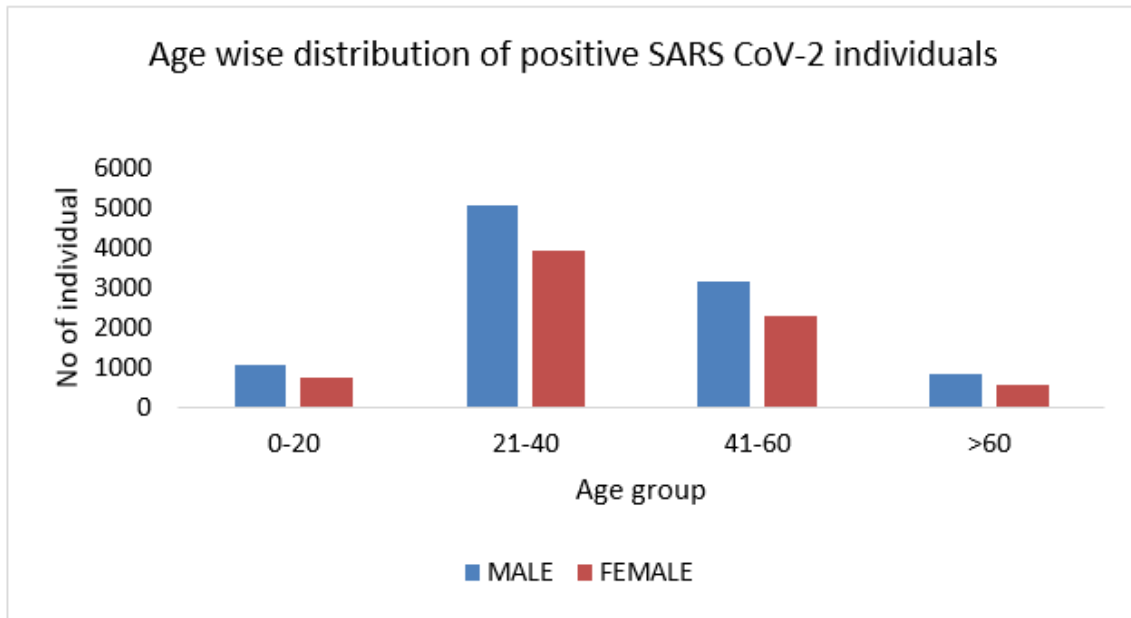


Figure 1: The pattern of age group and gender in SARS-Cov-2 positive individuals.

**District Wise Distribution:** The distribution trend of Covid-19 testing during third wave from 1<sup>st</sup> January 2022 to 31<sup>st</sup> January 2022 in 6 districts of Punjab has been represented in the figure 2. Analysis of distribution trend of positivity rate, out of samples

received at tertiary care hospital from studied districts revealed that district Patiala showed highest number of positivity rate with 8755 (49.65%) individuals while lowest number was found in district Malerkotla during third wave with 366 (2.08%) individuals.

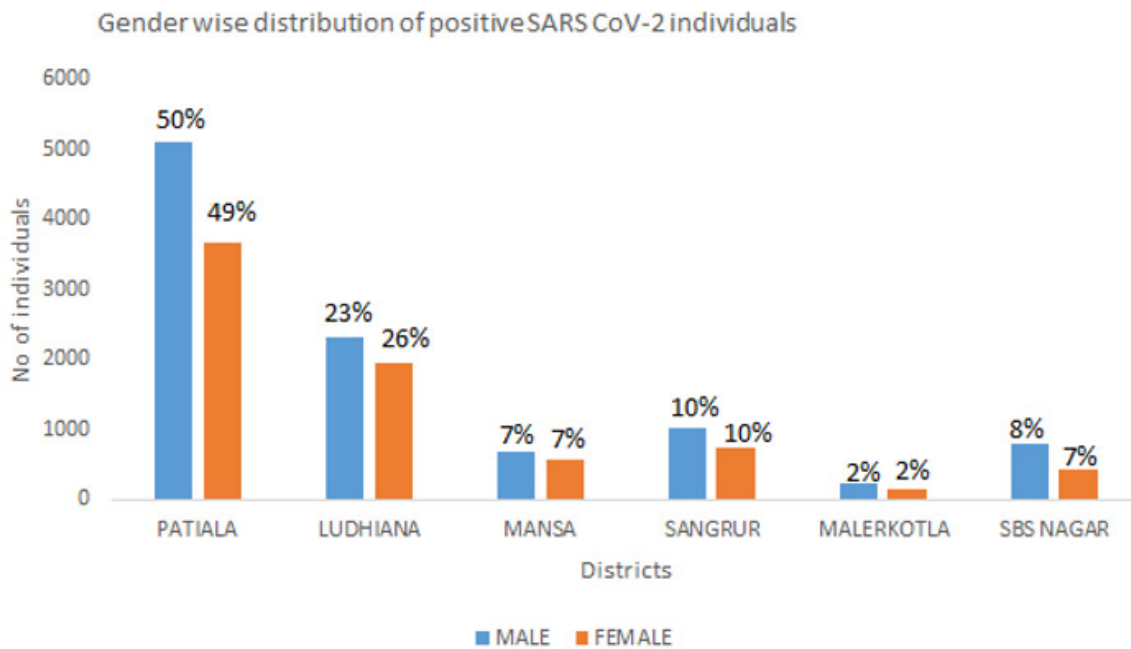


Figure 2: District wise distribution of SARS-CoV-2 positive samples.

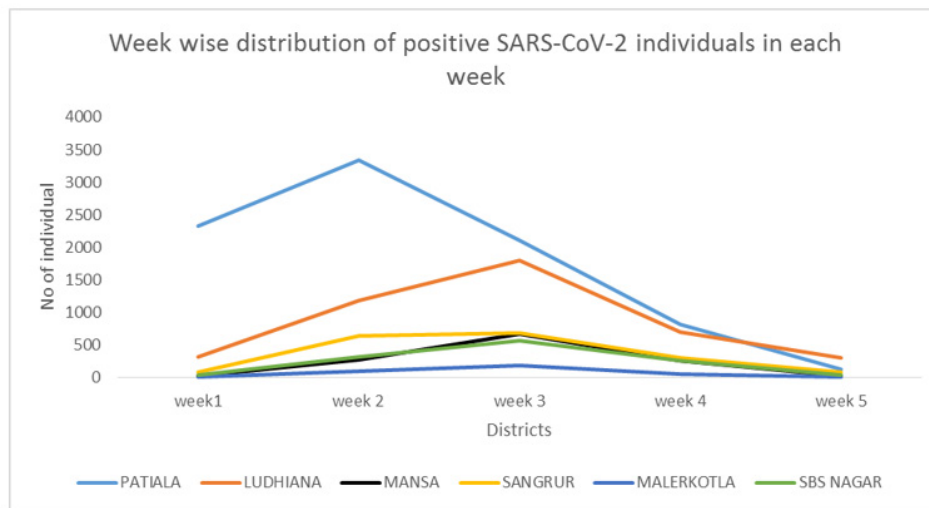
**Week Wise Distribution:** Since the first week of January, new cases have been quickly increasing

in six districts in Punjab, peaking at 3341 positive individuals in Patiala district during the second week

of January, followed by other districts in the Malwa area, where there is an uptick of positive cases every week.

The number of positive RT-PCR tests in patients was highest in second week of January in Patiala

district, while in Ludhiana district of Malwa region, the positivity rate was found to be high in third week of January, followed by Mansa, Sangrur, Malerkotla, and SBS Nagar as shown in figure 3.



**Figure 3: Week wise distribution trend of Covid-19 positivity in each district of Malwa region during third wave (1<sup>st</sup> January 2022 to 31<sup>st</sup> January 2022).**

### Discussion

Understanding the transmission dynamics and pathophysiology of SARS-CoV-2 is crucial for halting the infection's progress and preventing the pandemic from spreading further. During the third wave in January 2022, the current investigation was done at a tertiary care facility in the Malwa area. People who had SARS-CoV-2 tested during the third wave were the focus of this study, which examined their demographics, from January 1 to January 31, 2022, of whom 17,633 were found to be positive for RT-PCR and 1,26,350 were found to be negative. Positive samples were chosen for further investigation. Positive covid-19 patients were on average 29 years old. The study includes all age groups with 0-20 years 10.18% individuals, 21-40 years 51.16% individuals, 41-60 years 30.98% individuals, and more than 60 years 7.68% individuals. Our test positivity for SARS-CoV-2 was maximum in individuals with age between 21-40 years and minimum in individuals with age >60 years during third wave. A total of 36.13% were symptomatic, while 63.87% individuals were found to be asymptomatic. In other categories, pregnant females were 2.62%, symptomatic individuals

with travel history were 0.53% and 11.99% were hospitalized among total symptomatic population, while category of 24.02% collected samples were not mentioned in the month of January 2022. Second and third week of month was considered epitome for covid-19 positive cases with hyper tension and bronchial asthma as comorbidities in Malwa region. It was concluded from the current study that Punjab has seen comparatively less number of fatalities and hospitalization during third wave.

Our age group results are similar to those published by Sahu<sup>(4)</sup> in Odisha, India, and Maechler<sup>(5)</sup> in Germany. The findings of present study reflects that intensity of infection was observed in the age group of 21-40 years (51.16%), due to state-wise lockdown, schools, colleges and workplaces were shut down. Age was found to have positive association with the infection as observed by various previous published studies<sup>(6-9)</sup>. As compared to younger age group the infection was found to be higher in middle and elderly age group which has been documented in many studies<sup>(10-12)</sup>. Concomitant comorbidities and likely exposure to other sick people owing to their unrestricted travel might explain the risk. Men

are more likely to be infected with SARS-CoV-2 than women. In prior investigations, men were regularly shown to have a greater infection rate than females (13-16). A nationwide surveillance conducted in India also found more positivity among males and had also observed higher fatality rates. This might be owing to the fact that different genders have distinct immunogenic responses to SARS-CoV-2.

Among the studied districts from Punjab Malwa region, Patiala reported highest number of positive cases during January 2022. Delhi is the neighboring state of Punjab which reported that maximum positivity rate was (approx. 6.3% to 20%) during 2021 (17).

Mild symptoms such as cough, fever, cold were observed during third wave in Malwa region as compared to other waves which witnessed the severe symptoms. These symptoms were similar to common flu, hence hospitalization was very minimal during this period as compared to other waves in Punjab. In addition, our research included a large number of asymptomatic positive people. Similar results were reported in Karnataka and other areas of the globe the previous year (18-21). Co-morbidities, on the other hand, have been linked to the onset of symptoms (22,23). SARS-CoV-2 infection has been associated to co-morbidities such as asthma.

The covid-19 outbreak's case mortality rate has become a serious source of worry. Previously, it was reported that the first and second waves of Covid-19 had a higher mortality rate than the first wave, especially in the second wave. The current study also highlighted the case fatality rate during the 3<sup>rd</sup> wave in January 2022. It was found that the rate was comparatively lower in the 3<sup>rd</sup> wave, however higher age group male population got affected in this wave. A second possible explanation for the low case-fatality rate may be due to less severity of the variant and majority of the population was fully vaccinated. Calculating the number of persons infected with the virus proved to be a huge difficulty. Asymptomatic cases and patients with mild symptoms could be left out resulting in overestimation of the CFR.

### Conclusion

To our knowledge, this is the first research to

offer an epidemiological and clinical picture of the SARS-Cov-2 positive population during the third wave, which began in January 2022. In totality, the current study showed positivity rate of 12.24% from large population size for SARS CoV-2 from period of 1<sup>st</sup> January 2022 to 31 January 2022. Most of the positive individuals were asymptomatic with mild symptoms, majorly in male persons with age group of 21-40 years. This data provides the blueprint of preparing imperative strategy for the management of disease spread.

**Ethical Approval-** Approval taken from Institutional Ethics Committee.

**Conflict of Interest** – Nil.

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