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THE TWO WAVES OF THE PANDEMIC: A DEMOGRAPHIC PROFILE OF COVID-19

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ABSTRACT **Background:** The virus causing COVID 19 pandemic was designated as "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" by the ICTV on 11 February 2020. **Objective:** To understand the demographic characteristics viz., age and gender of the patients including their socio-economic background for both the waves of the pandemic **Methods:** A retro-prospective observational study undertaken to compare the demographic profile of COVID positive patients between the two waves of the pandemic. The period September 2020 to January 2021 was taken as the first wave and February 2021 to May 2021 as the second wave of the pandemic. **Results:** During September 2020 to May 2021 covering both waves of the pandemic, 40,471 samples (nasopharyngeal/oropharyngeal swabs) were received in the BSL2 Virology lab for COVID -19 RT PCR among which 2368 were positive. The prevalence of COVID in our tertiary care hospital was hence calculated to be 0.06%. During the 1st wave, 45.74 % belonged to the age group of 20 to 40 years and during the 2nd wave 55.45% belonged to this age group During the 1st and 2nd wave, 35% of those affected were females and 65% were males. During the first wave it was observed that 30.99% of those affected were slum dwellers and 20% during the second wave.**Conclusion:** The younger population was more affected. Vaccines need to be made available to a greater chunk of the population. The need of the hour is implementation of stringent norms for transmission-based precautions in order to deflect a massacre similar to the one witnessed in 2021.

INTRODUCTION

Coronaviruses are known to have caused respiratory illness outbreaks earlier, viz., severe acute respiratory syndrome (SARS) outbreak in 2003 and Middle East respiratory syndrome (MERS) in 2012 with >10,000 cases globally causing mortality of around 10% and 37% for SARS and MERS, respectively. (1,2) The virus causing COVID 19 pandemic is designated as "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" by the ICTV (International Committee of Taxonomy of Viruses) on 11 February 2020. (3) Patients may have a mild to asymptomatic illness, but some rapidly progress to acute respiratory distress syndrome (ARDS), multi-organ dysfunction syndrome (MODS) and death. (4) Hence it is pertinent to identify the demographic characteristics of patients considering the novelty and substantial heterogeneity of the illness across the world. The World Health Organization (WHO) reported more than 414 million confirmed cases of SARS-CoV-2 infection and more than 5 million deaths globally, with India contributing to >42 million confirmed patients and >500,000 deaths till January 2022. (5)

In India, the first case of COVID-19 was identified on January 30, 2020 thereafter the number increased steadily due to local transmission and foci of community transmission. (6) In June 2021, the number of cases in India was more than 3 crore with mortality of 3.8 lakhs.(7) For the state of Uttar Pradesh, total confirmed cases of COVID-19 were more than 17 lakh with a mortality of about 22 thousand. (7)

A number of vaccines developed by Oxford–Astra Zeneca (Covishield/Vaxzevria), Pfizer–BioNTech (Comirnaty), Moderna, Johnson & Johnson's Janssen, Bharat Biotech (Covaxin), Gamaleya Research Institute of Epidemiology and Microbiology (Sputnik V) after approval of WHO, vaccination drives were immediately started (8). It is of utmost importance to identify the age group and gender affected most, so that if a pattern is found, that particular age group and gender can be provided with extra precautions.

Therefore a study was undertaken at a dedicated COVID 19 tertiary care hospital in north India to understand the demographic characteristics viz., age and gender of the patients including their socio-economic background for both the waves of the pandemic. The purpose of this study was to ascertain the section of the society, if any which was more prone to the infection so that section could be advised to take extra precautions.

METHOD

A retro-prospective observational study was undertaken to compare the age and gender wise demographic profile of COVID positive patients who presented themselves to a tertiary care hospital in Uttar Pradesh.

Study population and settings:

The study was conducted at the Sharda Hospital, a dedicated COVID hospital attached to School of Medical Sciences & Research, Sharda University, Greater Noida, Uttar Pradesh India, from September 2020 to May 2021. Individuals with influenza-like illness who fulfilled the ICMR screening criteria (dated May 18, 2020) (9)and asymptomatic close contacts of COVID-19 positive patients were screened. All patients who tested positive on real-time reverse transcriptase polymerase chain reaction (RT-PCR) assay for SARS-CoV-2 on a throat and/or a nasopharyngeal swab were included in the study.

Characterisation of waves:

The period September 2020 to January 2021 was taken as the first wave and February 2021 to May 2021 as the second wave of the pandemic.

Data collection:

A retro-prospective collection of data of the COVID positive patients was done. The data was tabulated based on age, gender and their socioeconomic background.

Case definitions:

ICMR guidelines were followed for categorization of SARS-CoV-2 infection. Viral RNA detection by RT-PCR was taken as the gold standard test for classifying a patient as positive.

Specimen collection and Laboratory test:

Throat and/or nasopharyngeal specimens were obtained using standard techniques, transported in 4 to 5 ml of viral transport media to the Bio Safety Level 2 Laboratory for further processing. General Biologicals separation kits were used for extraction and subsequent amplification of the viral RNA from the samples. The kit for amplification detected 3 genes by 3 separate fluorophores. The Vic (green) fluorophore detects the gene encoding human RNA polymerase which acts as an internal control for the RT PCR run. This gene should be present in all samples being amplified by the machine. The Fam (blue) fluorophore detects the presence of E gene which signifies the presence of Coronavirus family of viruses. This gene must be present in all positive samples. The Rox (orange) fluorophore detects the ORF1ab gene, which is specific to the SARS-CoV2 virus. The result is reported based on the cycle threshold value of

amplification of each fluorophore signifying each gene. A lower cycle threshold value indicates a higher load of the viral RNA which is therefore detected in fewer cycles, and vice- versa. As per the guidelines given in our kit, a cycle threshold value of ≥ 37 is considered as positive for the virus. However as per ICMR guidelines, since March 2021, a CT value of 35 is considered as positive.

Statistical analysis:
Statistical analysis was done using SPSS version 20 to determine a significant shift, if any in the demography of the patients between the two waves of the pandemic

RESULTS
During September 2020 to May 2021 covering both waves of the pandemic, 40,471 samples (nasopharyngeal/oropharyngeal swabs) were received in the BSL2 Virology lab for COVID -19 RT PCR among which 2368 were positive. The prevalence of COVID in our tertiary care hospital was hence calculated to be 0.06%. During September 2020 to January 2021 was 1010 out of 15921 samples tested positive. However, during February 2021 to May 2021 number of positive cases reported were 1348.

1. DEMOGRAPHIC PROFILE BASED ON AGE
The overall age distribution of those affected in the period under study indicated that among the total individuals affected during the first wave, 45.74 % belonged to the age group of 20 to 40 years (Fig.2) and during the second wave 55.45% belonged to this age group (Fig.4). Although numerically greater number of people were affected in the second wave compared to the first wave but this rise was however not statistically significant. Further it was found that the number of cases in the age group of 20 to 40 years was higher than the rest of the population. This was found to be true for both the waves. A higher prevalence of COVID-19 was hence found in the younger population.

2. DEMOGRAPHIC PROFILE BASED ON GENDER
During the first wave, 35% of those affected were females and 65% were males. A similar distribution was observed during the second wave as well. Hence there was no significant change in the gender distribution during the two waves of the pandemic. (Fig 1 and 3)

3. DEMOGRAPHIC PROFILE BASED ON SOCIO ECONOMIC STATUS
A discrepancy was observed between those affected by COVID-19. During the first wave it was observed that 30.99% of those affected were slum dwellers. This percentage was slightly lower during the second wave being 20%. This difference was again statistically insignificant.
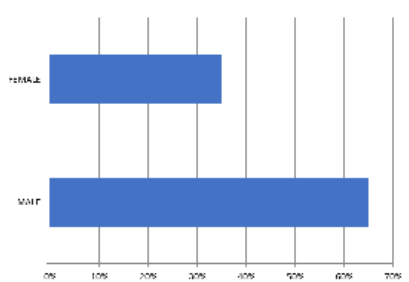

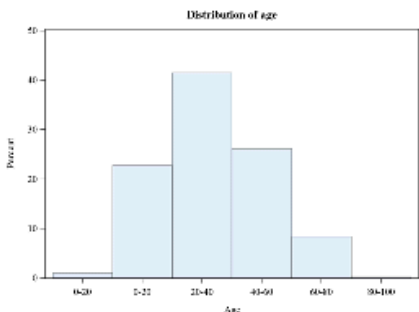**Fig 1: Gender Distribution of positive patients during September 2020 to January2021**

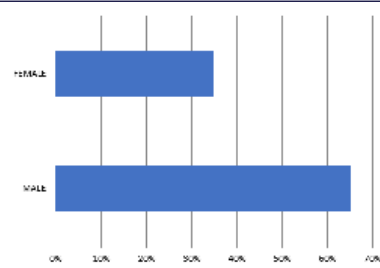**Fig. 2 : Age distribution of those affected during September 2020 to January 2021**

Fig 3: Gender Distribution of positive patients during February 2021 to May 2021
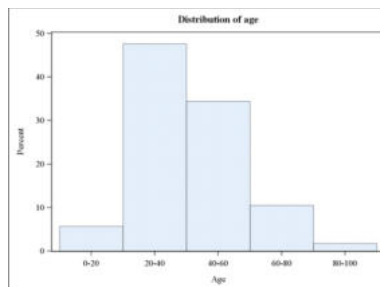

Fig. 4 : Age distribution of those affected between February 2021 to May 2021
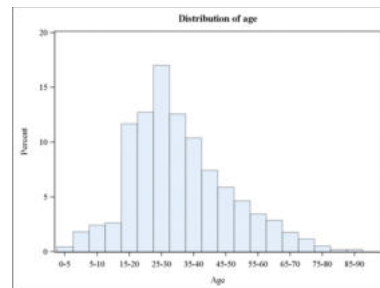

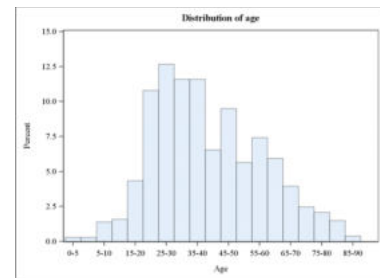**Fig. 5 : Age distribution of those affected between February 2021 to May 2021**

Fig. 6: Age distribution of those affected during September 2020 to January 2021

DISCUSSION
In December 2019, a novel coronavirus (SARS-CoV-2) emerged in China and rapidly spread globally. In India, the first case of COVID-19 was reported on January 30, 2020. The figures by January 2022, rose to >42 million laboratory-confirmed cases of COVID-19 resulting in about 4.91 lakh deaths. (6)

In India, the first and second waves were separated by about 5 months. The peak of the first wave was in September 2020 with daily cases of around 19,000 which declined by mid-February but thereafter there was a sharp increase. The end of the first wave was a result of several factors – effective implementation of government interventions, increase in awareness, and most importantly, the experience gained by medical professionals in treating the disease over the initial months. (8)

The increase in cases from mid-February to May 2021 was phenomenal. On April 15, 2021, the number of new cases was about 0.2 million which was more than double of the first peak value. The

sudden surge in the number of cases after a relatively long 'cooling' time may be attributed to the highly infectious double mutant variant of SARS-CoV-2 (B.1.617 lineage), to the ignorant behaviour of the population after relaxation of norms. All of the above mentioned factors led to increased transmission of the virus which occurs by direct, indirect, or close contact with infected people through infected respiratory secretions and aerosolised droplets which are expelled when an infected person coughs, sneezes, talks or sings. Respiratory droplets are >5-10 μm in diameter whereas droplets < 5 μm in diameter are referred to as droplet nuclei or aerosols (9). Respiratory droplet transmission can occur when a person is in close contact (within 1 metre) with an infected person who is coughing, sneezing or is talking or singing; in these circumstances, respiratory droplets containing the virus reach the mouth, nose or eyes of a susceptible person and may result in infection. (9) Indirect contact transmission involving contact of a susceptible host with a contaminated object or surface (fomite transmission) has also been noted. (9)

Gender Profile of those affected in both waves
The increase in the number of males affected was more than that of females getting infected. An analysis of background characteristics of 67,420 Covid cases in Karnataka between March 10 and July 20, revealed 63% of them as men while remaining 37% were females. This is in agreement with our study wherein 65% of those affected were males and 35% females.

The same study from Karnataka revealed that the proportion of men in the 30-59 years of age group was high (64%-65%) while 23% fell in 30-39 years age group 21% In the age group of 20-29 years and 18% in 40-49 years of age group. Our study shows that of those affected in the age group of 20-40 years, 69% were males during the first wave and 67% males in the second wave.

Age Profile of those affected in both waves
The mean age group of individuals affected in the first wave was found to be 43.56 +/- 17.44 yrs. and in the second wave was 35.64 +/- 15.48 yrs.

Experts opined that higher Covid-19 infection in young India is directly linked to the ratio of the population. More young people got infected with COVID-19 as cases flared up throughout India. Our study showed that the number of cases increased sharply in the age group of 20-40 years with 45.74 % of those affected during the first wave and 55.45% during the 2nd wave. One of the reasons for this could be that as the lockdown slowly eased the working age group started going back to work which increased the transmission of the virus. A study by JSS Institute of Economic Research and Population Research Centre, Dharwad came to a similar conclusion that men in the 20-49 years age group made up a huge chunk of those infected with SARS Cov2 virus. (Table 1 and Table 2) As per our study number of cases were surely more in the second wave as compared to the first wave in a much shorter duration of time, however this difference was not found to be statistically significant. A further analysis of those affected revealed that in the first wave a majority of the patients were 25 to 30 years of age which is true for the 2nd wave as well. (Fig 5 & Fig 6)

Table 1: Age distribution of those affected during the First wave

unit				
age	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0-20	51	5.05	51	5.05
20-40	462	45.74	513	50.79
40-60	307	30.40	820	81.19
60-80	160	15.84	980	97.03
80-100	30	2.97	1010	100.00

Table 2: Age Distribution of those affected in the Second wave.

unit				
val	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0-10	1	0.07	1	0.07
10-20	422	31.08	423	31.15
20-30	768	56.55	1191	87.70
30-40	167	12.30	1358	100.00

Socioeconomic Profile of those affected
Another result of interest obtained from the study was that people from lower socioeconomic status were affected to a lesser extent, 30.99% between September 2020 and January 2021 and a mere 20% between February 2021 to May 2021. There could be multiple reasons for this observation. Lack of awareness and education also led to them remaining ignorant about even the existence of the said virus. Further not many slum dwellers were willing to get tested due to the social stigma associated with getting tested and labelled as COVID-19 positive.

It is clear from available evidence and experience, that limiting close contact between infected people and others is central to breaking chains of transmission of the virus causing COVID-19. The importance of preventing transmission and vaccinating individuals increases in the current scenario when new variants such as the O Micron and IHU are constantly emerging. In order to prevent a major massacre similar to what the country witnessed in the first half of 2021 from recurring in a developing country like India, it is of paramount importance that we follow stringent norms for wearing masks, social distancing and sanitisation. The people of the country need to realise the importance of staying at home as much as possible and stepping out only for important work.

The prevention of transmission is of utmost importance and best achieved by identifying suspect cases as quickly as possible, followed by testing and isolating them appropriately. In addition, it is critical to identify all close contacts of infected people so that they can be quarantined to limit onward spread (10). By quarantining close contacts, potential secondary cases will already be separated from others before they develop symptoms or they start shedding virus if they are infected, thus preventing the opportunity for further spread. The incubation period of COVID-19, is on average 5-6 days, but can be as long as 14 days. Thus, quarantine should be in place for 14 days from the last exposure to a confirmed case. If it is not possible for a contact to quarantine in a separate living space, self-quarantine for 14 days at home is required; those in self-quarantine may require support during the use of physical distancing measures to prevent the spread of the virus. (10)

Vaccination drives have been underway in India since January 2021, however now it is high time to initiate booster doses for the whole population and precautionary doses for those at high risk groups. Since the number of cases are maximum from the 20-40 year age group, booster doses should focus on this age group as well. Prior to the second wave, vaccination drives were focused mostly on healthcare workers and the elderly and the major chunk of the population remained unvaccinated which might have contributed to the increased severity of infection the nation witnessed during the second wave. It is also important that the socioeconomically deprived section of our society also gets vaccinated.

CONCLUSION
This study concludes that the most affected group during the first as well as the second wave of the pandemic were those in the age group of 20 to 40 yrs. Vaccines need to be made available to a greater chunk of the population. The society needs to be educated and made aware of the benefits of vaccination in order to do away with the misinformation being spread about vaccines and their safety. Focus now should be on booster doses for all in view of the Delta, Delta plus variant, and recent Omicron cases in India. The need of the hour is implementation of stringent norms for transmission-based precautions in order to deflect a massacre similar to the one witnessed in 2021.

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