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# Pandemic in between waves: Epidemiological & clinical findings from a single COVID-19 screening centre of Madhya Pradesh, India

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***Abstract*---**Aim - The aim of this study was to assess the epidemiological & clinical characteristics of patients attending covid-19 screening centre in-between the first & second wave. The study period falls between receding first wave to beginning of second wave. Materials and method - The medical records and data from screening area of Government Medical Collage Datia, with confirmed Covid-19 cases, as reported between 1st October 2020 to 8th February 2021, were collected. Covid-19 symptoms were diagnosed on the basis of the WHO interim guidelines. A confirmed case of Covid-19 was defined as a positive result on real-time RAT assay of nasal swab. The RAT were performed by Standard Q Covid-19 Ag by SD BIOSENSOR. The procedure for collecting nasal swabs entails swabbing at least three times separately using a nylon-flocked swab. The entire procedure was in strict accordance with the standard protocol. Epidemiological data of all the patients with clinical findings and positivity rate was recorded in detail. Result - In our study, the total number of patients tested was 4427 of which 1987 were males & 2440 were females. Out of 1987 male suspects, 211 tested positive whereas out of 2440 female suspects, 64 tested positive. The overall positivity rate during this

period was 06.21% (275 positive cases out of total 4427 tests). Out of 4427, 483 patients were symptomatic & remaining asymptomatic. Out of 4427, 343 were having co-morbidities and 100 (29.15%) of them were found to be positive. Conclusion - The mean age of patients in present study was 32.1 years which is quite young compared to mean age found in studies done in other countries. The occurrence of symptoms in present study is less as compared to other studies probably owing to younger population and afraid of being declared positive. The rate of occurrence of co-morbidities and its effect on positivity rate seen in current study is comparable to many other studies. Similarly in current study, there is increased prevalence of symptoms among patients with co-morbidities and increased chances of spread of infection.

***Keywords*---**COVID-19, epidemiology, human coronavirus, rapid antigen test.

## Introduction

Severe Acute Respiratory Syndrome-Corona Virus 2 (SARS-COV-2) has been the cause of ongoing global pandemic COVID-19. The causative agent, initially named as 2019-nCOV by World Health Organization, was first identified on 7 January, 2020 being responsible for multiple unknown pneumonia cases in Wuhan city in China. Nucleotide sequencing of the viral particle revealed its 79% similarity with Severe Acute Respiratory Syndrome – Corona Virus (SARS-COV), hence due to similarities on clinical case presentation and molecular structure, it was renamed as SARS-COV- 2.[1]

This virus belongs to genera, Betacononavirus descending from the family of Coronaviridae and subfamily Coronavirinae. It is seventh discovered member of novel human infecting coronaviruses. Other two viruses in this genera are SARS-COV and Middle East respiratory syndrome Coronavirus (MERS-COV), which are similarly zoonotic and fatal in nature and utilize bats as natural reservoir whilst human are the terminal host.[2]

As SARS-COV-2 primarily travel through salivary droplets; main mode of transmission of pathogen has been person-person to contact, whether after directly by catching the infected persons moisture while talking, coughing or sneezing or indirectly through fomites that can carry the z virus particle and capable to sustain it for 9h to 9days on some surfaces . Hence, maintenance of personal hygiene and social distancing has been very essential to bring down the R0 and infection rate in the fight against global medical emergency caused by SARS-COV-2.

Once infected, Corona virus travel through the respiratory tract and primarily infect the lungs presenting symptoms of mild flu such as dry cough, fever and tiredness[3]. These symptoms often aggravate to fulminant pneumonia or fatal respiratory distress in some cases[4].

**Impact of COVID-19 in India**

The first SARS-CoV-2 positive case in India was reported in the state of Kerala on January 30th, 2020. Subsequently, the number of cases drastically rose. According to the website of Ministry of Health & Family Welfare as of August 24, 2021, more than 32 million people have tested positive for Covid-19 of which 31.6 million have recovered & 4.35 lakh deaths have been reported taking the overall case fatality rate to 1.3%. As of August 24 2021, over 500 million tests have been done in India (including both RAT & RTPCR) giving an overall positivity rate of 1.6%.[5,6]

**COVID-19 pandemic in Madhya Pradesh**

The first four cases of the COVID-19 pandemic in Jabalpur, Madhya Pradesh were confirmed on March 20, 2020. According to the Corona bulletin dated August 23, 2021, Madhya Pradesh has confirmed a total of 7,92,000 cases, including over 10,500 deaths and over 7,80,000 recoveries. The overall case positivity rate & case fatality rate in MP is 2.8% & 1.3% respectively.[6]

**Diagnosis tests**

Diagnostic tests were developed rapidly after the start of the SARS-CoV-2 outbreak allowing early recognition and detection of this novel virus. Nasopharyngeal swabs are the recommended specimen for molecular analysis. As of 19 March 2020, the CDC made oropharyngeal, mid-turbinate, and nasal swabs acceptable specimen types if nasopharyngeal swabs are not available.[7] Samples are collected from the upper respiratory tract (oropharyngeal and nasopharyngeal) and lower respiratory tract (endotracheal aspirate, expectorated sputum, or bronchoalveolar lavage) of patients suspected SARSCoV-2 infection . At the initial stage of the outbreak, identification of COVID19 cases mainly involved virus isolation from swabs and viral nucleic acid detection by RT-PCR-based SARS-CoV-2 RNA detection in respiratory samples. Enzyme-linked immunosorbent assay (ELISA) kits for detection of IgM and IgG antibodies against N and other SARS-CoV-2 proteins have also recently been made available. Several other diagnostic tests are developed to detect other regions of the SARS-CoV-2 genome or targeting RdRp, Hel, S, E and N genes. Another easy-to-implement and accurate CRISPR–Cas12-based lateral flow assay for detection of SARS-CoV-2 from respiratory swab RNA extracts in just 30 min is under development. Currently there are 628 SARS-CoV-2 tests commercially available or in development for the diagnosis of COVID -19

**Aims & Objectives**

**Aim**

The aim of this study was to assess the epidemiological & clinical characteristics of patients attending covid-19 screening centre in-between the first & second wave. The study period falls between receding first wave to beginning of second wave.

**Objectives**

1. To evaluate epidemiological findings of patients attending covid-19 screening centre in terms of age, gender, residence & occupation.
2. To evaluate the clinical findings of patients attending covid-19 screening centre in terms of symptoms & pre-existing co-morbidities.
3. To evaluate the positivity rate against epidemiological & clinical findings.

**Material and Methodology**

The medical records and data from screening area of Government Medical Collage Datia, with confirmed Covid-19 cases, as reported between 1st October 2020 to 8th February 2021, were collected. Covid-19 symptoms were diagnosed on the basis of the WHO interim guidelines. The selection criteria of the population group were based on, any patient presenting in the fever clinic of GMC Datia were included in the study. A confirmed case of Covid-19 was defined as a positive result on real-time RAT assay of nasal swab. All health-care workers caring for infected patients received comprehensive training and demonstrated competence in implementing infection control practices and procedures. The procedure for collecting nasal swabs entails swabbing at least three times separately using a nylon-flocked swab, all biological samples were then placed on the marking slide provided by the developer and a waiting period of 45 minutes was observed before the results to be seen, the entire procedure was in strict accordance with the standard protocol.

**Rapid Antigen Test**

Rapid tests are a type of lateral flow tests that detect protein, distinguishing it from other medical tests that detect antibodies (antibody tests) or nucleic acid (RTPCR). RAT is an immunochromatographic assay which gives visual results that can be seen with the naked eye. It is considered to be a qualitative test i.e. the test will be either positive or negative & the infection cannot be classified as mild, moderate or severe.

There are various brands of Covid-19 antigen detection assays available in the market. All these assays function in a similar way by detecting the nucleocapsid protein (N protein) of SARS-CoV-2 from upper respiratory samples. The N protein plays an important role in both SARS-CoV and SARS-CoV-2 infection by packaging viral RNA and aiding in the release of additional viral particles from infected cells.[8]

In our study the RAT were performed by Standard Q Covid-19 Ag by SD BIOSENSOR**.** STANDARD Q COVID-19 Ag Test has two pre-coated lines, “C” Control line, “T” Test line on the surface of the nitrocellulose membrane. Both the control line and test line in the result window are not visible before applying any specimens. Mouse monoclonal anti-SARS-CoV-2 antibody is coated on the test line region and mouse monoclonal anti-Chicken IgY antibody is coated on the control line region. Mouse monoclonal anti-SARS-CoV-2 antibody conjugated with color particles are used as detectors for SARS-CoV-2 antigen device. During the test, SARS-CoV-2 antigen in the specimen interact with monoclonal anti-SARS-

CoV-2 antibody conjugated with color particles making antigen-antibody color particle complex. This complex migrates on the membrane via capillary action until the test line, where it will be captured by the mouse monoclonal anti-SARS-CoV-2 antibody. A colored test line would be visible in the result window if SARS-CoV-2 antigens are present in the specimen. The intensity of colored test line will vary depending upon the amount of SARS-CoV-2 antigen present in the specimen. If SARSCoV-2 antigens are not present in the specimen, then no color appears in the test line. The control line is used for procedural control, and should always appear if the test procedure is performed properly and the test reagents of the control line are working.[9]

**Results**

The study period extended from 1st October 2020 to 8th February 2021. Total number of cases recorded in our study centre during this period were 4427. Total cases recorded in the month of October 2020 were 665 of which 72 were positive (10.83%). Total cases recorded in the month of November 2020 were 669 of which 92 were positive (13.75%). Total cases recorded in the month of December 2020 were 1650 of which 86 were positive (04.71%). Total cases recorded in the month of January 2021 were 1019 of which 22 were positive (02.16%). Total cases recorded in the month of February 2021 (till 08 Feb) were 424 of which only 03 were positive (0.7%). The overall positivity rate during this period was 06.21% (275 positive cases out of total 4427 tests)

Table 1: Relation between Age & Sex distribution & positivity rate among cases attending COVID-19 screening centre

| Age group (n) | Total No. of Cases (4427) | | Total Positives (275) | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 0-6 (33) | 18 | 15 | 00 | 00 |
| 7-10 (27) | 18 | 09 | 00 | 01 |
| 11-20 (404) | 265 | 139 | 18 | 05 |
| 21-40 (3070) | 1075 | 1995 | 105 | 27 |
| 41-60 (654) | 454 | 200 | 62 | 15 |
| 61 & above (239) | 157 | 82 | 26 | 16 |
| Total | 1987 | 2440 | 211 | 64 |

*n= no. of patients in that age group

In our study, the total number of patients tested was 4427 of which 1987 were males & 2440 were females. Out of 1987 male suspects, 211 tested positive whereas out of 2440 female suspects, 64 tested positive.(Table No.1) Total 33 patients were pre-school age group i.e. 0-6 year of which 18 were males & 15 females. Total 27 patients were 07-10 year age group of which 18 were males & 09 females. Total 404 patients were of teen age i.e. 11-18 year age group of which 265 were males & 139 females. Thus total 464 patients belonged to paediatric age group (0-18 years). Total 3070 patients were active adults i.e. 19-40 year age group of which 1075 were males & 1995 females. Total 654 patients were of middle age i.e. 41-60 year age group of which 454 were males & 200 females.

Total 239 patients were elderly i.e. above 61 year age of which 157 were males & 82 females. (Table No.1)

None of the patients tested positive in 0-6 year age group and one patient tested positive in 7-10 year age group. Out of 404 patients tested in 11-18 year age group, 23 tested positive (05.69%). So the total number of positives in paediatric age group (0-18 years) was 24 out of 464 tests (05.06%). Maximum number of patients tested positive in 19-40 year age group - 132 out of 3067 patients (04.30%). Out of 654 patients tested in 41-60 yr age group, 77 tested positive (11.77%). Out of 239 patients tested in 61 years & above age group, 42 tested positive (17.57%). (Table No.1)

Table 2: Relation between Residence & Positivity rate among cases attending COVID-19 screening centre

| Age group (n) | Total No. of Cases (4427) | | Total Positives (275) | |
|---|---|---|---|---|
| | Urban | Rural | Urban | Rural |
| 0-6 (33) | 22 | 11 | 0 | 0 |
| 7-10 (27) | 13 | 14 | 0 | 1 |
| 11-20 (404) | 205 | 201 | 18 | 5 |
| 21-40 (3070) | 1162 | 1908 | 105 | 27 |
| 41-60 (654) | 380 | 274 | 62 | 15 |
| 61 & above (239) | 131 | 108 | 26 | 16 |
| Total (4427) | 1913 | 2514 | 210 | 65 |

*n= no. of patients in that age group

In our study, total number of patients tested was 4426 of which 1913 were residents of urban areas and 2513 were residents of rural areas. Total 1913 patients were residents of urban areas of which 210 (10.98%) were positive while 2513 patients were residents of rural areas of which 65 (02.59%) were positive. (Table No.2)

Table 3: Relation between Symptoms & Positivity rate among cases attending COVID-19 screening centre

| Symptoms* | Total Cases | Positivity (%) |
|---|---|---|
| Respiratory Symptoms | 340 | 222 (65.29%) |
| Loss of Sensation | 222 | 195 (87.84%) |
| Oral symptoms | 73 | 37 (50.68%) |
| Abdominal Pain | 12 | 04 (33.33%) |

*Multiple responses given by patients

In our study, total number of patients tested was 4427 of which 483 patients were symptomatic & remaining asymptomatic. Many patients were experiencing more than one type of symptoms. In present study respiratory symptoms were reported by 340 patients (56.34%), loss of sensation (smell and taste) reported by

222 patients (46.34%), oral symptoms were reported by 73 patients (22.34%) and abdominal pain reported by 12 patients (02.48%). (Table No.3)

Out of 533 symptomatic patients, 340 had respiratory symptoms like cough, cold & breathlessness of which 222 (60.40%) were positive; 222 patients had loss of smell and taste sensation of which 195 (87.84%) were positive; 73 patients had oral symptoms like dryness & redness of oral mucosa of which 37 (50.68%) were positive; 12 patients had abdominal pain of which 04 (33.33%) were positive. The positivity rate was highest among patients with loss of smell and taste sensation (87.83%) followed by respiratory symptoms (60.40%) and oral symptoms (50.68%). (Table No.3)

Table 4: Relation between Pre-existing co-morbidities & Positivity rate among cases attending Covid-19 screening centre

| Pre-existing Co-morbidities | Total Cases | Positivity (%) |
|---|---|---|
| Diabetes | 82 | 21 (25.61%) |
| Hypertension | 56 | 19 (33.93%) |
| Renal | 14 | 06 (42.86%) |
| Diabetes + Hypertension | 138 | 40 (28.99%) |
| Others | 53 | 14 (26.41%) |
| Total | 343 | 100 (29.15%) |

In our study, total number of patients tested were 4427 of which 343 were having co-morbidities and 100 (29.15%) of them were found to be positive. Total 82 patients were diabetic of which 21 (25.61%) were positive, 56 were hypertensive of which 19 (33.93%) were positive, 138 were both diabetic and hypertensive of which 40 (28.99%) were positive and 11 were renal patients of which 06 were positive. Total 53 patients were in others category which included immune-compromised patients & patients on immune-suppressants and 14 (26.41%) of them were positive. (Table No.4)

Table 5: Relation between pre-existing co-morbidities, symptomatology & Positivity rate among cases attending COVID-19 screening centre

| Pre-existing Co-morbidities (n) | Symptomatic Positive | Asymptomatic Positive |
|---|---|---|
| Diabetes (21) | 20 | 1 |
| Hypertension (19) | 16 | 3 |
| Renal (06) | 6 | 0 |
| Diabetes + Hypertension (40) | 36 | 4 |
| Others (14) | 1 | 13 |

*n= total positive cases presenting with the specific co-morbidity

In our study, total number of patients tested were 4427 of which 343 were having co-morbidities and 100 (29.15%) of them were found to be positive. Out of 82

diabetic patients, 21 were positive of which 20 were symptomatic & 01 asymptomatic. Out of 56 hypertensive patients, 19 were positive of which 16 were symptomatic & 03 asymptomatic. Out of 138 diabetic cum hypertensive patients, 40 were positive of which 36 were symptomatic & 04 asymptomatic. Out of 14 renal patients (CKD), 06 were positive and all were symptomatic. Out of 53 other patients, 14 were positive of which 01 were symptomatic & 13 asymptomatic.

**Discussion**

In our study the mean age of the patients was 32.1 years. In a meta-analysis study by Bhaskar Thakur et. al, the mean age of the patients was 56.2 years.[10] In our study 10.48% patients belonged to paediatric age group. A study from Israel reported the clinical presentation of 206,377 individuals of which 21,567 were children.[11] In our study the positivity rate was 10.98% and 02.59% from urban and rural areas respectively. A study by Devarupa Gupta et al. reported that Mumbai, New Delhi, Hyderabad, and other million-plus cities primarily became the hotspots of the pandemic, confirming the urban-centric character of this virulent disease.[12]

A study in South Carolina, America showed significant differences in cases and deaths between urban and rural counties, with rural county case rates (2757.40 per100,000) being higher than those in urban counties (2373.14 per 100,000).[13] In our study respiratory symptoms were reported by 56.34% patients, loss of sensation (smell and taste) reported by 46.34% patients and oral symptoms were reported by 22.34% patients. A study by Barak Mizrahi et al revealed that the most prevalent self-reported symptoms were cough (21%), fatigue (19%), rhinorrhea, and/or nasal congestion (17%), headache (16%), and myalgia (11%). The other less frequently reported symptoms included abdominal pain, chest discomfort/chest pain, loss of appetite, bitter taste and chills. In the same study, the most prevalent symptoms recorded among children in primary care visits throughout the study period included fever (7%), cough (5.5%), abdominal pain (2.4%), and fatigue (2.3%).[11] A study by Jing Yang et. Al reported the most prevalent clinical symptoms as fever (91.3%), cough (67.7%), fatigue (51%) and dyspnea (30.4%). The same study reported most prevalent comorbidities as hypertension (21.1%) and diabetes (9.7%).[14]

In our study the most prevalent co-morbidity was Diabetes combined with Hypertension (40.23%) followed by diabetes alone (23.91%) while immuno-compromised conditions were seen in 15.45% cases & renal co-morbidities were seen in 04.08% cases. A meta-analysis study by Bhaskar Thakur et al. revealed that the most prevalent comorbidity was HTN (32%) followed by obesity (25%), DM (18%), CVD (16%), lung disease (09%), and CKD (06%).[10]

In our study 08.22% patients were having some co-morbidity. A study by Kalpna Thapa Bajgain et. al revealed that 42.3% patients were without any chronic comorbid condition, while 57.7% had one or more comorbidity, of which the major ones were HTN (27.4%), Diabetes (17.4%), CVD (8.9%), and COPD (7.5%).[15] A meta-analysis study by Yong hu et. al showed that the prevalence of co-morbidities like diabetes and hypertension was 7.7 % and 15.6 %, respectively. [16]

## Conclusion

The mean age of patients in present study was 32.1 years which is quite young compared to mean age found in studies done in other countries. In India, the positivity rate has been low in rural areas and high in urban areas as they are densely populated. The present study has been conducted in a predominantly rural area and reflects the same trend. Most of the patients in current study presented themselves for test due to contact history. The occurrence of symptoms in present study is less as compared to other studies probably owing to younger population and afraid of being declared positive. The rate of occurrence of co-morbidities and its effect on positivity rate seen in current study is comparable to many other studies. Similarly in current study, there is increased prevalence of symptoms among patients with co-morbidities and increased chances of spread of infection.

## Recommendations

It is an established fact that India has a huge young population below 50 years age. During the first wave, most of the focus was on preventing elderly population from infection and now the focus is on prevention and control of infection among paediatric age group. But the trends of present study show that we need to be equally cautious for 18-50 year age group as this is working population and is under constant threat of acquiring infection. The universal prevention strategy of masking and social distancing must be stringently followed by methods like community participation, reward-punishment approach and increased awareness by continuous IEC activities etc.

The fact is on record that India is home to large population with co-morbidities like diabetes and hypertension. A separate strategy must be evolved to control infection in such patients as they may act as super spreaders. Authorities must not forget the destructive effect of pandemic on urban areas and reduction in density of population in urban areas may be taken as a long term goal.

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