# Demographic Risk Factors for Mortality of Covid 19 Patients Admitted in A Tertiary Care Hospital: A Cross-Sectional Study

**Sandhya Singh[1], Shraddha Mishra[2], Shubhra Dubey[3]**

[1]Government Bundelkhand Medical College, Sagar, MP, India
[2]Government Bundelkhand Medical College, Sagar, MP, India
[3]Government Bundelkhand Medical College, Sagar, MP, India

## ABSTRACT

**Context/Background:** During the COVID-19 pandemic, government worldwide imposed severe restrictions on public life to limit its spread. For informed decision making it is important to quantitatively assess how the age, gender, and length of stay affects mortality of COVID 19 patients. It is important to find out more useful prognostic factor for mortality. This study revealed prevalence of mortality across age, gender, and length of stay and assessed determinants of mortality using independent variable age, gender, and length of stay.

**Methodology:** A Cross-sectional observational study was conducted on 3084 Covid 19 positive patients admitted during April 2020 to June 2021 at Bundelkhand Medical College Sagar.

**Results:** In this study mortality occurred in 510 patients. Age group analysis presented that majority of patients died in 60–74-year age group whereas maximum patients who died are having length of stay for 0-7 days, whereas gender has no significant role. There was significant influence of age group and length of stay on the mortality of Covid-19 positive patients ($\chi2_{(9)}$ =495.30, P<.001).

**Conclusions:** Mortality of covid positive patients being impacted by demographic risk factors like age group, length of stay.

**Keywords:** COVID-19, Age, Gender, Length of stay, Mortality, Demographic Risk Factors

## INTRODUCTION

In December 2019, the new coronavirus disease 2019 (COVID-19) outbreak began in Wuhan, China. It has swiftly spread around the world since then[1]. The outbreak was declared a Public Health Emergency of International Concern by World Health Organization (WHO) on January 30, 2020 and announced a name for the new coronavirus disease: COVID-19 on 11 February 2020 [2]. WHO has begun referring to the virus as "the virus responsible for COVID-19" or "the COVID-19 virus" when communicating with the public[3]. Although the outbreak is likely to have started from a zoonotic transmission event associated with a large seafood market that also traded in live wild an-

imals, it soon became clear that efficient person-to-person transmission was also occurring[4,5].It is the third epidemic coronavirus that has emerged in the human population in the Twenty-first century, following the severe acute respiratory syndrome coronavirus (SARS) outbreak in 2002, and the Middle East respiratory syndrome coronavirus (MERS) outbreak in 2012[6]. Given the high prevalence and wide distribution of coronaviruses, the large genetic diversity and frequent recombination of their genomes, and increasing human–animal interface activities, novel coronaviruses are likely to emerge periodically in humans owing to frequent cross-species infections and occasional spillover events[7–9]. In India

first case of COVID-19 infection reported in Kerala. On January 27, 2020, a 20-year-old female presented to the Emergency Department in General Hospital, Thrissur, Kerala, with a one-day history of dry cough and sore throat. There was no history of fever, rhinitis, or shortness of breath. She disclosed that she had returned to Kerala from Wuhan city, China, on January 23, 2020 owing to COVID-19 outbreak situation there[10]. Diverse risk factors intercede the outcomes of coronavirus disease 2019 (COVID-19)[11].This study was planned to find demographic risk factors responsible for mortality of covid 19 patients.

## METHODOLOGY

**Study Design, Period, and Setting:** It was a cross-sectional study, in which we investigated the demographic risk factors responsible for mortality of Covid 19 cases in a tertiary care centre who were admitted from April 2020 to June 2021.

**Sample Size Determination and Sampling Strategy:** In this study we had taken 3084 total number of positive patients admitted during study period at tertiary health care centre.

**Data Collection Procedures:** The Data was obtained from the case files present in the Medical Record Department of Bundelkhand Medical College & Hospital, Sagar in which details like age, sex, date of admission and date of discharge/Discharge against medical advice/ patient Absconded/ patient died/ Leave against medical advice/ Referral of patient were mentioned.

**Data Processing and Analysis:** Using date of admission and date of discharge duration of stay at hospital was calculated. Mortality of only those patients were considered who died in tertiary care Hospital, other categories were considered as survived. This study reveals prevalence of mortality across age, gender and length of stay among Covid 19 admitted patients. we had taken the patients who died at Bundelkhand Medical College & Hospital, Sagar out of total 3084 admitted patients. We had categorized the patients using discharge status, age-group, length of stay and gender and using this we had assessed mortality of patients in different categories. To observe determinants of mortality of Covid 19 admitted patients we had taken mortality as dependent variable whereas age group, sex and length of stay was taken as independent variables. We categorized age into six groups i.e., 0-14, 15-29, 30-44, 45-59, 60-74 and >74 years and length of stay in four groups i.e., 0-7, 8-14, 15-21 and >21 days. We had analyzed the data by using reference categories. For age-group, 0-14 years was taken as reference category, for length of stay, >21 days stay at hospital is taken as reference category and for gender, female group is taken as reference category as the mortality was least in these categories. For Analysis SPSS 28 version was used to determine impact of age, gender and length of stay on mortality of Covid 19 positive patients for which

we had used binary logistic regression. For descriptive data we had used frequency and percentages.

## RESULTS

A total of 3084 patients were admitted in tertiary health care center during study period. In those Covid positive patients 68.7% were males and 31.3% were females and when classified according to Discharge status 16.5% died and 83.5% survived. When further classified according to length of stay category majority of patients were admitted for 0-7 days i.e., 56.4% and minimum patients admitted for >21 days only i.e., 1.3%. and when we classified according to age group most of the patients belong to 45-59 years age group i.e., 29.5% followed by 30-44 years i.e., 29.2%. On cross tabulation of died patients according to their age, gender, Length of stay we found that 16.98% female patients died in female positive patients' group and 16.34% male patients died in male positive patients' group. In age group category majority of patients died in 60-74 years age group and in duration of stay category majority of patients died in 0-7 days duration of stay. A logistic regression analysis shows that there is significant influence of age group and length of stay on the mortality of Covid19 positive patients ($\chi2_{(9)}$ =495.30, P<.001). The model explained 25.1% variance in mortality of patients and was able to identify 83.5% of cases accurately. The specificity of model was 100%. The result showed that duration of stay, and age group are important factor for determining mortality of patients whereas gender has no significant role.

**Table1: Distribution of Covid Positive patients according to demographic characteristics**

| Characteristics | Cases (%) |
|---|---|
| **Gender** | |
| Male | 2118 (68.7) |
| Female | 966 (31.3) |
| **Disease Status** | |
| Died | 510 (16.5) |
| Survived | 2574 (83.5) |
| **Length of Stay (Days)** | |
| 0-7 | 1740 (56.4) |
| 14-Aug | 1175 (38.1) |
| 15-21 | 128 (4.2) |
| >21 | 41 (1.3) |
| **Age-Group (Years)** | |
| 0-14 | 50 (1.6) |
| 15-29 | 479 (15.5) |
| 30-44 | 901 (29.2) |
| 45-59 | 911 (29.5) |
| 60-7 | 588 (19.1) |
| >74 | 155 (5) |

**Table2: Distribution of COVID positive died patients according to Gender**

| Disease status | Female (%) | Male (%) | Total (%) |
|---|---|---|---|
| Survival | 802 (83.02) | 1772 (83.66) | 2574 (83.46) |
| Death | 164 (16.98) | 346 (16.34) | 510 (16.54) |
| Total | 966 (100) | 2118 (100) | 3084 (100) |

**Table 3: Distribution of Covid positive patients according to length of stay (in days)**

| Disease status | Duration of stay | | | | Total (%) |
|---|---|---|---|---|---|
| | 0-7 (%) | 44787 (%) | 15-21 (%) | >21 (%) | |
| Survival | 1316 (75.63) | 1097 (93.36) | 121 (94.53) | 40 (97.56) | 2574 (83.46) |
| Death | 424 (24.37) | 78 (6.64) | 7 (5.47) | 1 (2.44) | 510 (16.54) |
| Total | 1740 (100) | 1175 (100) | 128 (100) | 41 (100) | 3084 (100) |

**Table 4: Distribution of Covid positive patients according to their Age Group (in years)**

| Disease status | Age-Group | | | | | | Total (%) |
|---|---|---|---|---|---|---|---|
| | 0-14 (%) | 15-29 (%) | 30-44 (%) | 45-59 (%) | 60-74 (%) | >74 (%) | |
| Survival | 46 (92) | 468 (98) | 828 (92) | 729 (80) | 397 (68) | 106 (68) | 2574 (83) |
| Death | 4 (8) | 11 (2) | 73 (8) | 182 (20) | 191 (32) | 49 (32) | 510 (17) |
| Total | 50 (100) | 479 (100) | 901 (100) | 911 (100) | 588 (100) | 155 (100) | 3084 (100) |

**Table5: Result of logistic regression analysis**

| | B [95%C.I. B] | S.E.(B) | Wald | Odds Ratio |
|---|---|---|---|---|
| Gender (1) | -.004[.79,1.24] | 0.114 | 0.001 | 0.996 |
| Length of stay | | | 169.083*** | |
|   Length of stay (1) | 2.698[2.01,109.78] | 1.021 | 6.991** | 14.854 |
|   Length of stay (2) | 1.075[.39,21.86] | 1.026 | 1.097 | 2.929 |
|   Length of stay (3) | .702[.23,17.15] | 1.092 | 0.413 | 2.017 |
| Age | | | 212.391*** | |
|   Age (1) | -1.314[.08,.89] | 0.611 | 4.632* | 0.269 |
|   Age (2) | .126[.39,3.29] | 0.543 | 0.054 | 1.135 |
|   Age (3) | 1.225[1.19,9,72] | 0.536 | 5.233* | 3.404 |
|   Age (4) | 1.884[2.29,18.85] | 0.537 | 12.320*** | 6.582 |
|   Age (5) | 1.877[2.18,19.56] | 0.56 | 11.242*** | 6.532 |
| Constant | -4.748 | 1.15 | 17.048*** | 0.009 |

Omnibus $\chi^2(9)$ =495.30, P<.001, $R^2$ =.251(Negelkerke), .148(Cox and snell); *p<.05, **p<.01, ***p<.001; 95% C.I.for EXP (B)

Further on comparing category 4 (duration of stay >21 days) in which least number of mortalities occurred to category 1 (duration of stay 0-7 days) the odds of mortality of Covid positive patients are 15 times. When we move towards age group as compared to reference category (0-14 years age group) the age group (15-29), (45-59), (60-74), (>74) have odds of mortality as .269 times, 3.404 times, 6.6 times, 6.5 times respectively.

## DISCUSSION

During study period 3084 COVID positive patients admitted in hospital among them 510(16.54%) patients died. The primary objective of the study was to assess impact of demographic risk factors on mortality of covid 19 patients. Out of positive patients' majority (68.7%) were males whereas 31.3% were females. Out of total female positive patients 16.98 % died whereas in male positive patients 16.34% died. Further distribution of patients according to age group majority of them belong to 30-59 age group i.e., approx. 60% patients. A logistic regression analysis showed that there was significant influence of age group and length of stay on the mortality of Covid19 positive patients *($\chi^2_{(9)}$ =495.30, P<.001)* whereas gender has no significant influence on mortality of Covid 19 patients. According to Pijls, Jolani et al men had a higher risk for infection with COVID-19 than women (relative risk (RR) 1.08, 95% CI 1.03 to 1.12). When infected, they also had a higher risk for severe COVID-19 disease (RR 1.18, 95% CI 1.10 to 1.27), a higher need for intensive care (RR 1.38, 95% CI 1.09 to 1.74) and a higher risk of death (RR 1.50, 95% CI 1.18 to 1.91). Age group analyses showed that patients aged 70 years and above have a higher infection risk (RR 1.65, 95% CI 1.50 to 1.81), a higher risk for severe COVID-19 disease (RR 2.05, 95% CI 1.27 to 3.32), a higher need for intensive care (RR 2.70, 95% CI 1.59 to 4.60) and a higher risk of death once infected (RR 3.61, 95% CI 2.70 to 4.84) compared with patients younger than 70 years which is similar to present study findings[12]. Booth, Reed et al in his study found many risk factors were associated for COVID-19. Patient age >75 years (OR: 2.65, 95% CI: 1.81–3.90), male gender (OR: 2.05, 95% CI: 1.39–3.04) were associated with increased risk of severe outcome and age group outcome was similar to present study whereas gender has contrary role as compared to present study[13]. Another study done by Biswas M, Rahaman et al found that COVID-19 male patients had significantly increased risk of mortality compared to females (RR 1.86: 95% confidence interval [CI] 1.67–2.07; p < 0.00001) whereas in present study gender has no significant role. Patients with age ≥50 years were associated with 15.4-folds significantly increased risk of mortality compared to patients with age <50 years (RR 15.44: 95% CI 13.02–18.31; p < 0.00001) which is similar to present study[14]. Study conducted by Noor FM et al has found a significant association between mortality

among COVID-19 infected patients and older age (> 65 years vs. < 65 years) [RR 3.59, 95% CI (1.87-6.90), p < 0.001], gender (male vs. female) [RR 1.63, 95% CI (1.43-1.87), p < 0.001][15]. Our study has some limitations like few cases had incomplete documentation of clinical symptoms and demographic information of patients was also missing.

## CONCLUSION

Mortality of covid positive patients being impacted by demographic risk factors like age group, length of stay whereas gender has no significant role. Early detection and effective treatment among covid positive patients are needed for preventing mortality of covid positive patients.

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