Original Article

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Clinico-epidemiological Profile and Outcomes of COVID-19 Patients Admitted in Jawaharlal Nehru Medical College and Hospital: A Retrospective Study

Internal Medicine Section

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ABSTRACT

Introduction: Coronavirus Disease-2019 (COVID-19) has taken the world by storm since its detection in China. The pandemic swept across the globe and affected India. The presence or absence of co-morbidities may determine the clinical outcome. Clinical manifestations include cough, fever and dyspnoea mainly.

Aim: To elucidate epidemiological findings, clinical features, co-morbidities of COVID-19 disease and clinical outcomes in first 500 COVID-19 patients admitted at a tertiary care teaching hospital in Northern India.

Materials and Methods: The retrospective observational study was conducted at Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University, Aligarh, Uttar Pradesh, India, from 21st April to 27th October 2020 on first 500 Reverse Transcription-Polymerase Chain Reaction (RT-PCR)/Rapid Antigen or TruNatBeta positive patients. During January to March 2021 period data was collected and analysed. Data was analysed for epidemiological parameters, symptoms and clinical hospital outcomes of patients. Data was analysed using Statistical Package for the Social Sciences (SPSS) version 21.0 IBM and p-value <0.05 was taken as significant.

Results: Out of total patients, 284 (56.80%) and 216 (43.20%) were males and females respectively and 11.12% of females were pregnant. Difference in mean ages of males and females was significant (p-value <0.001). The results show that 434 patients (86.80%) recovered fully and were discharged (more males were discharged), whereas 47 (9.40%) patients died. Out of total 500 patients 75.60% patients stayed in the hospital for more than 72 hours and 24.40% stayed for less than 72 hours. The mean age of patients who stayed for less than 72 hours was 48.85±17.93 as compared (44.23±17.45) to those who stayed for more than 72 hours and the difference was significant (p-value=0.012). Most common symptom was fever (58%) followed by cough (32%) and dyspnoea (31%). The association between the duration of stay and clinical outcome was significant (p-value <0.001).

Conclusion: Gender, advancing age, duration of stay and associated co-morbidities appear to play role in infection and outcome of COVID-19.

Keywords: Association, Co-morbidities, Coronavirus disease-2019, Duration of stay, Discharge, Gender, Mortality, Trends

INTRODUCTION

The Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) took the world by storm after appearing the first time in Wuhan, Hubei Province, China in December 2019 [1]. Since, then it has spread globally and as per latest World Health Organisation (WHO) reports there were 188,655,968 confirmed cases as on 16/07/2021 with over 4,067,517 deaths. After the first case of COVID-19 that was reported on 31/1/20 in India 31,026,829 active cases have been detected so far with 412,531 confirmed deaths as reported by WHO on 16/07/21 [2-4]. Fever and cough were the main symptoms in COVID-19 patients as reported by a study from India [5].

A prospective observational study of 235 COVID-19 patients admitted at the Intensive Care Unit (ICU) of All India Institute of Medical Sciences (AIIMS), New Delhi between May and June 2020 described the epidemiological data, clinical features, co-morbidities and ICU outcomes of patients admitted there. Nearly half of their patients presented with severe COVID-19 disease and required high flow oxygen therapy or mechanical ventilation. Those patients who presented for the first time with Severe Acute Respiratory Illness (SARI) and had deranged haematological parameters were found to have worse prognosis and higher mortality making these two parameters important predictors of early death than epidemiological features and co-morbidities [6]. The objectives of our study were to further elucidate demographic findings, clinical features, co-morbidities and clinical outcomes of patients admitted at a tertiary care teaching hospital in Northern India.

MATERIALS AND METHODS

This retrospective observational study was conducted on first 500 COVID-19 patients admitted between 21st April 2020 to 27th October 2020 at Jawaharlal Nehru Medical College and Hospital (JNMCH), Aligarh Muslim University, Aligarh, Uttar Pradesh, India, which was designated as an L2 hospital by the Uttar Pradesh Government. The data was analysed between January 2021 to March 2021. The Institutional Ethics Committee approval was taken (ECR/1418/Inst/UP/2020). Written/telephonic consent was taken.

Inclusion and Exclusion criteria: Study included first 500 patients admitted during the period of study. Patients who were positive on Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) or Rapid Antigen COVID-19 Detection Test or TruNatBeta test were included in the study. Patients not willing to participate in the study were excluded.

Study Procedure

The data of first 500 consenting patients was analysed for the following:

1. Epidemiological parameters such as age, gender and residential zone (within the city or from other adjoining areas).
2. Symptoms at the time of presentation and presence of co-morbidities like diabetes, systemic Hypertension (HTN), Chronic

Obstructive Pulmonary Disease (COPD)/asthma, tuberculosis, chronic kidney/liver disease, cancer etc., at presentation.

3 Clinical hospital outcomes: Discharged, expired and referred.

STATISTICAL ANALYSIS

The data of first 500 patients admitted in hospital was analysed using Descriptive statistics using SPSS version 21.0 IBM. Data was represented in terms of number (N), percentage (%) and mean±standard deviation. Number and percentage of mortality from COVID-19 was also represented. Descriptive data was analysed using Analysis of Variance (ANOVA) and unpaired t-test. Chi-square test was used to find association between the clinical outcome and study variables like gender, age-group, duration of stay in the hospital and locality (i.e., within the city and adjoining areas). The p-value of <0.05 was taken as statistically significant.

RESULTS

The mean age of the first 500 patients was found to be 45.36±17.67 years. The mean age (years) of males and females were 48.28±17.17 and 41.53±17.61, respectively. Out of first 500 patients admitted, 56.80% were males and 43.20% were females (out of which 11.12% were pregnant). Mortality percentage was 9.40% and 19/500 i.e., 3.80% were referred. The mean age of patients who stayed for less than 72 hours was 48.85±17.93 as compared (44.23±17.45) to those who stayed for more than 72 hours and the difference was significant (p-value=0.012). In present study, 19 patients i.e., 3.80% were referred. Patients were referred mainly due to unavailability of certain drugs during most initial parts of the pandemic (situation improved a lot due to timely intervention of the administration and Government as pandemic progressed and case load started to increase in India) [Table/Fig-1].

Study variables		Number (N)	%
Sex	Males	284	56.80
	Females	216 (24 i.e. 11.12% were pregnant at the time of admission)	43.20
Clinical outcome	Discharged	434	86.80
	Expired	47	9.40
	Referred	19	3.80
Duration of stay and age (mean±SD) in years**	<72 hours	122 (48.85±17.93)	24.40
	>72 hours	378 (44.23±17.45)	75.60
Locality	Within city	386 (215 males and 171 females)	77.20
	Adjoining areas	114 (69 males and 45 females)	22.80
Co-morbidities	Yes	309	61.80
	No	191	38.20
Age groups (years)	0-45	246	49.20
	46-60	143	28.60
	>60	111	22.20

[Table/Fig-1]: Summary of the first 500 cases. The difference in p-value (unpaired t test) was significant at 0.012.

At the time of admission the most common symptom was fever (58%) followed by cough (32%) and dyspnoea (31%). Descriptive analysis showed that top three co-morbidities were Diabetes Mellitus (DM) (22%), systemic HTN (20.20%) and cardiac diseases (9.80%) [Table/Fig-2,3].

The difference in mean age of males and females was found to be significant (p-value <0.001). The difference in age groups between males and females was found to be significant at p-value <0.001 [Table/Fig-4].

Results show that overall the percentage distribution of males was significantly higher in all age groups as compared to females

Symptoms	N (patients had one or more symptoms)	Percentage (%)
Fever	289	58
Cough	158	32
Breathlessness	154	31
Sore Throat	37	7.4
Loose Stool/Vomitting	30	6
GIT complaints	20	4
Chest pain	18	3.6
Bodyache	17	3.4
Fatigue	16	3.2
Loss of consciousness	15	3
Loss of smell	9	1.8
Headache	10	2
Pregnancy	6	1
Jaundice	6	1
Others	50	10

[Table/Fig-2]: Summary of the symptoms in first 500 cases.

Co-morbidities	N	Percentage (%)
Type 2 DM	110	22
Systemic HTN	101	20.20
Cardiac diseases	49	9.80
TB/Infections	39	7.80
Cancer	14	2.80
Hypothroidism	14	2.80
COPD/Asthma	11	2.20
Haematological complaints	14	2.80
CKD	17	3.40
CLD	9	1.80
Auto immune diseases	3	0.60
CVA	3	0.60
Others	3	0.60

[Table/Fig-3]: Co-morbidities at the time of admission in first 500 cases. Multiple co-morbidities were present in few patients.
HTN: Hypertension; TB: Tuberculosis; COPD: Chronic obstructive pulmonary disease; CKD: Chronic kidney disease; CLD: Chronic liver disease; CVA: Cerebrovascular accident

Study variable	Males (Mean±SD)	Females (Mean±SD)	p-value
Age (years)	48.28±17.17	41.53±17.61	<0.001*
Age group (years)			
0-45	31.66±8.59	28.02±9.48	<0.001**
46-60	53.59±4.11	55.09±4.31	
>60	68.92±5.97	68.28±5.75	

[Table/Fig-4]: Mean age of the first 500 patient's gender wise.
*Unpaired t-test and **ANOVA; p-value of <0.05 was statistically significant

(p-value=0.001). The results also show that higher percentage of patients admitted were from within the city (males 55.70% and females 44.30%) [Table/Fig-5].

The association between the duration of stay and clinical outcome was found to be significant (p-value <0.001). The results showed that out of total 47 deaths, majority i.e., 35/47 (74.47%) were within 72 hours of the stay [Table/Fig-6]. Analysis of 47 deaths showed that 36.17% deaths occurred in 0-45 years of age. Out of 47 deaths the mean age of patients who died within 72 hours was 50.57±17.70 as compared to those who died after 72 hours (45.83±16.89) and the difference was insignificant (p-value=0.423, un paired t-test). The mean age of males and females were 53.04±12.73 and 45.83±20.67 years respectively [Table/Fig-7].

Study variables	Male (N=284)		Females (N=216)		p-value*
	N	%	N	%	
Age group (years)					
0-45 (n=246)	124	50.40	122	49.60	0.001
46-60 (n=143)	81	56.64	62	43.36	
>60 (n=111)	79	71.17	32	28.83	
Clinical outcome					
Discharged (n=434)	254	58.52	180	41.48	0.091
Expired (n=47)	23	48.94	24	51.06	
Referred (n=19)	07	36.84	12	63.16	
Locality					
Within the city (n=386)	215	55.70	171	44.30	0.361
Adjoining Areas (n=114)	69	60.52	45	39.48	
Co-morbidity					
Yes (n=309)	181	58.57	128	41.43	0.308
No (n=191)	103	53.93	88	46.07	

[Table/Fig-5]: Gender wise analysis of first 500 cases.
*Ch-square test; p-value of <0.05 was statistically significant

Parameters	Clinical outcome						p-value
	Discharged		Expired		Referred		
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)	
Gender							
Males (n=284)	254	58.52	23	48.94	07	36.84	0.091
Females (n=216)	180	41.48	24	51.06	12	63.16	
Age groups (years)							
0-45 (n=246)	222	90.24	17	6.91	07	2.85	0.238
46-60 (n=143)	121	84.61	16	11.19	06	4.20	
>60 (n=111)	91	81.98	14	12.62	06	5.40	
Duration of stay in the hospital (hours)							
<72 (n=122)	68	55.74	35	28.69	19	15.57	<0.001
>72 (n=378)	366	96.82	12	3.18	00	00	
Locality							
Within the city (n=386)	336	87.05	32	8.29	18	4.66	0.062
Adjoining areas (n=114)	98	85.96	15	13.16	01	0.88	
Co-morbidities							
Yes (n=309)	268	86.73	30	9.70	11	3.56	0.245
No (n=191)	166	86.91	17	8.90	08	4.19	

[Table/Fig-6]: Distribution and statistical analysis of clinical outcome as per various parameters.
*Chi-square test; p-value of <0.05 was statistically significant

Study parameters	Number	%
Co-morbidities		
Yes	30 (16 males and 14 females)	63.83
No	17 (07 males and 10 females)	36.17
Number of patients in different age groups as per the duration of stay		
<72 hours*	35 (19 males and 16 females)	74.47
0-45	11	31.43
46-60	13	37.14
>60	11	31.43
>72 hours	12 (04 males and 08 females)	25.53
0-45	06	50
46-60	03	25
>60	03	25
Age group (years)**		
0-45	17 (07 males and 10 females)	36.17
46-60	16 (09 males and 07 females)	34.04
>60	14 (07 males and 07 females)	29.79
Mean age of patient		
Stayed <72 hours	50.57±17.70	p-value=0.423 (unpaired t-test)
Stayed >72 hours	45.83±16.89	

[Table/Fig-7]: Analysis of 47 /500 deaths in admitted patients.
*35/47 deaths occurred within 72 hours and the association was significant at p<0.001. **Mean age of males and females was 53.04±12.73 and 45.83±20.67 (years) respectively

DISCUSSION

The results of the study show that 284 (56.80%) of first 500 patients admitted were males. Female reproductive hormones oestrogen have inhibitory role on translation of TMPRSS2 microRNA (mRNA), thereby hindering the COVID-19 infection and progesterone shifts the balance towards anti inflammatory cytokines like Interleukin 10 and 4 (IL 10 and 4), thereby preventing the severity of infection [7]. These two factors may be the possible explanation for lower infection in females as compared to males. The preponderance of COVID-19 in males could possibly be due to customary and cultural characteristic features of the region [8]. Other possible explanation could be higher prevalence of smoking as well as higher expressions of ACE-2 in males [9,10].

A 86.80% patients were discharged after recovery and testing COVID-19 negative. The overall recovery rate was 86.17% in India till mid October 2020 as per the Ministry of Health and Family Welfare statistics [11]. Overall mortality percentage was 9.40% i.e., 47/500. Gender wise break up in different age groups showed that ten females died in age group 0-45 and nine males died in age group 46-60 years. The higher risk of mortality in females has been reported earlier due to socio-economic factors [12].

Mortality was present in 9 (11.12%) males out of 81 admitted in age group 46-60 years, whereas in females out of 32 admitted in age group greater than 60 years 7 (21.87%) died. Thus, out of total 47 deaths, mortality was higher in age group 46-60 years and greater than 60 years in males and females respectively. Results of earlier study have shown that the risk of COVID-19 patients is equal in both males and females but the mortality is higher in former gender [13]. Review of literature suggests that in males, T-cell responses not only weaken with age but the immune responses to antigen are also not as strong as compared to females [14].

Mahajan P and Kaushal J found that 59% of infection is present in age group 20-49 years and 25% in age group 50-69 years and that majority of cases were present in males. Contradictory findings as far as gender is concerned were reported from across various countries. Das AK and Gopalan SS analysed the data of around 3500 confirmed cases of COVID-19 in North Korea between January 2020 to April 2020 and found that majority of the cases were females [15,16]. The difference in findings could be attributed to social differences in terms of travel and also due to testing of cases [15].

Study has shown higher levels of IL-10 and lower levels of Tumour Necrosis Factor (TNF-α) in females thus preventing aggressive immune responses. Hormonal effects result in higher expression of Angiotensin Converting Enzyme-2 (ACE-2) in males as compared to females. Animal studies have shown that expression of ACE-2 increases during pregnancy thus increasing vulnerability to infection [17].

Twenty four females were pregnant at the time of admission as per the data of present study. The data is however inconclusive to comment upon the risk of COVID-19 in pregnant females. Moreover, there appears varying reports about the susceptibility of pregnant females to COVID-19 infections. Sun J et al., reported that there was no evidence that pregnant females were at higher risk [18]. Since, the hospital where present study was conducted is referral

centre thus, pregnant COVID-19 positive females were sent for antenatal care and further management.

Results indicated that fever was the most common presentation followed by cough and dyspnoea. Similar results were reported from earlier study as well [19]. In COVID-19 patients admitted in our hospital, DM and HTN were the leading co-morbidities. Sharma R et al., in their review article reported that fever was the most common clinical presentation in COVID-19 followed by cough, fatigue/malaise, difficulty in breathing, headache, loose stools and vomiting [20]. However, country wise variations in presenting features have been reported. Cough was reported to be the chief symptom in countries like Australia and certain regions of United States of America (USA) [21]. Severe infections are reportedly more likely to be associated with male gender and presence of co-morbidities like DM, HTN, cardiovascular diseases and COPD. Elderly and those with co-morbidities are at higher risk owing to dwindling immunity and not so strong T and B cell immune responses and also due to greater inflammation and D dimers [22].

Laxminarayan R et al., reported that male gender and higher age groups were at higher risk of mortality. Also, they found that in decreasing order the commonly associated co-morbidities were diabetes (45%), elevated blood pressure (36.2%), coronary artery disease (12.3%) and renal diseases (8.2%), respectively [23].

The presence and absence of co-morbidities and racial differences play role in severity of infection, mortality and clinical features. Studies have reported that DM, COPD, asthma, HTN, CVD, CLD, CKD are associated with severity of COVID-19 infection [24-26]. Racial differences and severity of the disease are associated with the presenting symptoms. Reportedly, loose stools, vomiting, nausea and dyspnoea were more common in New York as compared to China [27]. In present study, loose stools/vomiting (present in 30 i.e., 6%) and GIT complaints (present in 20 i.e., 4%) was present in overall 50/500 i.e., 10% of patients. Thus, racial differences appear to be a factor. In this study, loss of smell was present in 1.80% of patients. Previous study has reported anosmia as non specific symptom in 14.8% patients [28]. The difference may possibly due to sample size. We analysed the first 500 patients as compared to 74 analysed in the study. Another argument for lower percentage in our study could be that the anosmia may not be noted by the patients [28] and hence may remain under reported.

In present study, 122 patients stayed in the hospital of less than 72 hours and 378 stayed for more than 72 hours. Out of total 47 deaths, 35 occurred in those who stayed for less than 72 hours whereas mortality in later group was 12. Thus, 35/47 deaths occurred within 72 hours of stay and the association was found to be significant (p-value<0.001). Previous study has shown that duration of stay was reportedly shorter in patients who died as compared to those who were discharged from hospital [29]. Results of the present are suggestive that patients who died within 72 hours had low oxygen saturation, were referred late, were sick or died due to complications from co-morbidities.

The difference in mean age of patients having shorter duration of stay was significant (p-value=0.012) as compared to those who had stayed longer. The results indicate that age may not be the only criterion deciding the duration of stay, but other factors like co-morbidities also play contributory role. Similarly, even younger patients may suffer mortality owing to factors like presence and absence of co-morbidities [30]. Since, during initial outbreaks duration of stay could have been longer due to strict discharge criterions and need to isolate patients from healthy population to contain the spread of virus, thus much inference and conclusion may not be drawn from the observed trend in our study.

Association between the clinical outcome and clinical features at the time of admission was found to be significant in our study. Research indicates that the risks of mortality include age, associated co-morbidities and occurrence of symptoms like difficulty in breathing and abdominal discomfort [31].

Limitation(s)

Analysis of data of patients admitted after October 2020 helped to draw conclusions about the observed trends. Division of cases on the basis of severity, socio-economic status, dietary history, smoking, education status, inflammatory markers, radiological findings and blood reports were not studied.

CONCLUSION(S)

It was concluded that gender, advancing age, duration of stay and associated co-morbidities appear to play role in infection and outcome of COVID-19.

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