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Clinical Research

"EPIDEMIOLOGICAL AND CLINICAL CHARACTERIZATION OF COVID-19 PATIENTS: A RETROSPECTIVE OBSERVATIONAL STUDY OF 245 CASES IN A GOVERNMENT TEACHING INSTITUTE OF NORTH INDIA."

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ABSTRACT **Background and objectives:** Worldwide literature on presentation of patients infected with novel coronavirus shows huge variability in terms of severity and outcome depending on the demographic characteristics of the affected population. We aim to present epidemiological and clinical characteristics of COVID-19 patients admitted at our facility.

Methods: Retrospective analysis of epidemiological, and clinical characteristics of patients admitted at a dedicated COVID hospital in North India.

Results: Records of 245 patients were analyzed. The mean (SD) age was 32 (17.87) years ranging from 1 day to 81 years. Children <18 years of age constituted around 18% of the study population of which only about a fourth (23%) were symptomatic. About 52.4% of patients were males. Almost 40% cases were detected through contact tracing of known infected patients and in about 56% cases the source of infection was indeterminate. About 67% were asymptomatic and most of the symptomatic patients had mild disease. Among the symptomatic patients cough (19.9%) and fever (17.1%) were most common symptoms followed by throat irritation. Comorbidities were present in 32 (13.06%) patients, of which hypertension in 6.12% was the most common. There were 22 (8.97%) health care workers (HCW) among the patients. Majority of the affected HCW were working in areas with relatively low infection risk. Six (2.44%) patients required oxygen supplementation. The mean duration of stay in hospital was 9.6 ±.57 days.

Interpretations & Conclusions: Our observations indicate a relatively younger age of affected population and high proportion of asymptomatic patients. Children are usually asymptomatic with relatively better prognosis.

KEYWORDS : epidemiological –clinical -COVID-19- North India- Mild disease – Infection in children

INTRODUCTION

Coronavirus disease (COVID-19) pandemic has spread rapidly worldwide since the first case was detected in Wuhan, China in December, 2019[1]. On March 11, 2020, the disease was declared a pandemic by WHO [2] As on November 31, 2020, there were 65,085,685 confirmed cases of COVID-19, including more than one million deaths reported to WHO.[3] The expanding literature from different regions worldwide have documented varied findings of mean age of presentation ranging from 47-63 years [4-6], clinical spectrum ranging from mainly asymptomatic to critically ill patients, mortality rate from1.6% to 61.5%[7] depending on characteristics of the patient population studied.

In India, the first case was documented on 30th January 2020 in Kerala in a patient who had returned from Wuhan, China.[8]As on November 31, 2020, as per MOHFW, more than 7 million confirmed cases have been reported in India[9]. Presently India has the highest number of confirmed cases in Asia and has the 2nd highest number of confirmed cases in the world.

Indian literature[10-15] is expanding on epidemiological and clinical characteristics of COVID-19 patients from this part of the world. In this study, we aim to retrospectively review the epidemiological and clinical characteristics of COVID patients admitted to a public-funded COVID-19 facility in North India. These observations could be used in designing an effective strategy for containing the spread and improving the outcome of COVID-19 cases in India.

MATERIAL AND METHODS

A retrospective evaluation of archives of medical records of laboratory-confirmed COVID-19 patients admitted at a public-funded hospital in the urban part of North India was performed. A total of 245 cases admitted from 19th March to 28th June 2020 formed the basis of the study. All COVID-19 patients admitted were diagnosed on the basis of WHO interim guidelines.[16] A confirmed case of Covid-19 was defined as a positive real-time reverse-transcriptase–polymerase-chain-reaction (RT-PCR) assay of nasal and pharyngeal swab specimens. The study was approved by institutional ethical committee.

Data collection

All COVID-19 patients admitted were diagnosed based on WHO interim guidance.[16] The demographic data i.e., age distribution, sex distribution, contact history, travel history, or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset were noted. Subgrouping was done into asymptomatic and symptomatic patients depending on presenting symptoms, clinical course, the number of health care workers, co-morbidities, and the duration of stay in hospital were recorded. The disease was characterized into the mild, moderate, and severe disease by MOHFW guidelines[9] and mortality, if any, was also noted.

Statistical methods:

Continuous measures were expressed as mean ± SD and/or median and range and analyzed using't' test. Categorical variables were presented as proportions and analyzed using 'chi square' or fisher's exact test.

Statistical analysis was performed using SPSS software. Correlation among the variables was assessed using Pearson's correlation test. A p-value of less than 0.05 was considered significant.

RESULTS

Data from 245 case records was available for analysis. The median age was 32 years (range 1 day to 81 years, IQR 25 -46), with about 73% falling in the age group of 18-60 years of age and about 44 (17.9%) of patients were children <18 years of age. The age distribution is shown in Table 1.

Table 1 - Age distribution of patients

Age Distribution	No. of Patients
Infant (≤1 years)	5
Preschool (>1to ≤5 years)	9
School going (>5to ≤10 years)	15
Adolescent (>10 to ≤18 years)	14
Adult (>18to ≤60 years)	180
Elderly (>60 years)	21

Males constituted 52% (129) of the patients studied. About 40% patients had a history of contact with a known infected case, 2 patients had a history of international travel, 2 patients were incidentally diagnosed in presurgical workup and in 56% cases, the source of infection could not be determined. About 8% (22/245) of the affected population were health care workers of which the majority were working in low-risk areas. Only two of the healthcare workers had comorbidities, one was hypertensive and another had hypothyroidism. Table 2 shows baseline and epidemiological characteristics of our patients.

Table 2- Baseline and Epidemiological characteristics of patients

Age (Mean ± SD) Minimum Maximum	32 ± 17.87 SD 1 Day 81 Years
Males n (%) Females n (%)	129 (52.4%) 116 (47.2%)
International Travel history within 14 days of symptoms	2(0.8%)
Cluster cases (Commercial company workers)	25(10.2%)
H/o contact with known COVID-19 patient	98(40.7%)
Incidental finding	2(0.8%)
Source of infection not known	139(57.7%)
Health care worker a. Treating COVID-19 patients b. Working in Low Risk Areas	22(8%) 8(3.26%) 14(5.71%)
Duration of stay in hospital Median (IQR)	8(6-12 days)

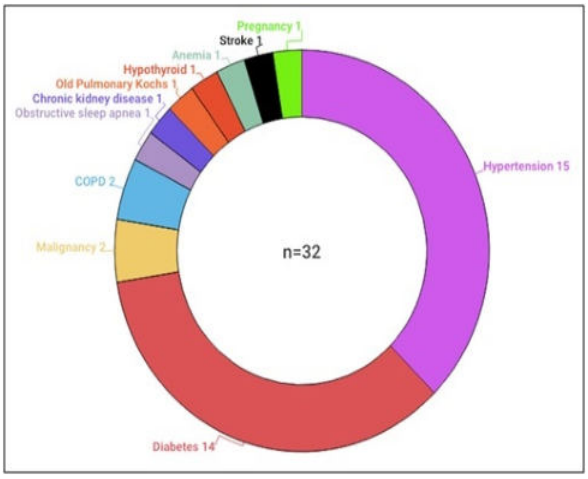
About 67% of the patients were asymptomatic. In those patients who were symptomatic, the duration of illness before admission ranged from 0 to 10 days with a mean ± SD of 0.5 days ±1.42. The majority of the symptomatic patients (96%) of patients had mild clinical features and the rest 4% of cases had a moderately severe presentation. The various symptoms observed in the study are tabulated in Table 3.

Table 3- Clinical features of patients

Symptoms	n (%)
Asymptomatic	164(66.9%)
Symptomatic	81(33.1%)
Fever	42(17.1%)
Cough	49(19.9%)
Throat Irritation	25(10.2%)
Nasal stuffiness	2(4.14%)
Breathlessness	17(6.9%)
Sputum	3(1.2%)
Diarrhea	4(1.6%)
Vomiting	4(1.6%)
Headache	6(2.4%)
Myalgia	7(2.8%)
Fatigue	9(3.7%)
Anosmia	1(0.4%)

The patients with moderate disease had mean age 55.5 ±14.4 as compared to those having milder presentation (mean age 33.42 ± 17.5) and the difference was statistically significant (p value <0.01). Patients with moderate disease had statistically significant association with comorbidities like hypertension, diabetes and lung disease (p value <0.01).Comorbidities were found in 32 patients (13.06%) and the distribution is depicted in Figure 1.

Figure-1: Pictorial distribution of comorbidities



Patients with preexisting lung disease were significantly more symptomatic as compared to patient with other comorbidities (p 0.04). Among the referred patients 5 (33.3%) had associated comorbidities. Among these patients with hypertension, diabetes and preexisting lung disease had statistically significant referral rate.

About 22(8.97%) patients were health care workers (HCW) with a mean age of 32.6 years (range 27-67 years). Out of healthcare workers 31.8% (7/22) were symptomatic. There was no statistically significant difference in healthcare workers presenting with symptoms (p value 0.55), duration of stay (p value 0.67), referral rate (p value 0.398) as compared to general population.

Children <18 years of age constituted around 18% (n=44) of study population. Mean age of affected children was 8.03 years. 23%(n=10) of children were symptomatic and presented predominantly with fever, cough and fatigue.

There was no gender predilection among symptomatic individuals. Males constituted 58% (47/81) of symptomatic individuals, which was not statistically significant (pearson correlation r .237, p value .147). Age showed a significant correlation with symptomatology and the outcome. The adults had severe symptoms as compared to children and the difference was statistically significant (p value.005). Fifteen patients who were referred to higher center were all adults but this difference was not statistically significant (r.06, pvalue.05).

Of the 17 cases (6.9%) which experienced breathlessness in our study, 6(2.44%) required oxygen support. None of the patients in our study had severe disease requiring mechanical ventilation during the course of the stay.

DISCUSSION

The study summarizes the demographic and clinical characteristics of patients infected with novel coronavirus admitted at a single facility. Patients admitted at our facility were younger and majority were asymptomatic. Children were noticed to have relatively better prognosis than adults. Our study sample from an institute catering to the population with wide range of socio-demographic characteristics reasonably reflects the population of the region As COVID spreads its roots across India, literature is expanding on its epidemiological and clinical characteristics in Indian scenario. Majority of published Indian studies have shown lower mean age of population [10-15] affected as compared to literature available worldwide and milder clinical presentation in this part of the world (Table 4), with severe manifestation seen in those with comorbidities [15]. This study focuses on mainly patients with mild to moderate clinical features and as this is a referral center for pediatric patients a larger cohort of our patients were below 18 years of age as compared to available Indian literature, hence this data will add on to existing Indian literature in building up strategy in fight against COVID-19.

Table 4– Comparison of the current study with other published studies.

Parameters	Guan et, al.[4]	Richardson et, al.[6]	Mohan et, al.[14]	Bhandari et, al.[16]	Current study
Patients enrolled (n)	1099	5700	144	522	245
Median age (years)	47	63	40.1	35.42	32
Age range	0->65yrs	0-107yrs	NR	0-90yrs	0-81yrs
Population above 50 years (%)	NR	NR	NR	18.79	19.1
Males (%)	58.1	60.3	93.1	60.91	52.4
Symptomatic(%)	NR	NR	55.6	24.32	32.9
Fever (%)	88.7	30.7	17.4	55.90	17.1
Cough (%)	67.8	NR	34.7	52.75	19.9
Diarrhea (%)	3.8	NR	2.8	NR	1.6
Sore throat(%)	13.9	NR	21.5	49.60	10.2
Sputum (%)	33.7	NR	3.5	NR	1.2
Headache (%)	13.6	NR	1.4	26.77	2.4
Breathlessness (%)	18.7	NR	5.6	46.45	6.9
Severe disease (%)	15.8	14.2	2.8	4.98	None
Any Co morbidities (%)	23.7	88	15.9	13.98	13.06
Hypertension (%)	15	56.6	2.1	42.46	6.12
Diabetes (%)	7.4	33.8	11.1	39.72	5.71
Previous history of Koch's (%)	NR	NR	0.7	20.54	0.4
COPD/Bronchial asthma (%)	1.1	17	2.1	16.43	0.4
Renal disease (%)	0.7	8.8	NR	13.69	0.4
Cardiovascular disease (%)	2.5	18	0.7	20.5	0
Malignancy (%)	0.9	NR	NR	NR	0.8
Patients with co morbidities developing symptoms (%)	15.74	NR	3.5	60.27	53.5
Oxygen supplementation (%)	41.3	27.8	3.5	NR	2.45
Mechanical ventilation (%)	6.1	12.2	0.8	NR	0
Mortality (%)	1.4	21	1.4	2.87	0

The median age in our study was 32 ± 17.87 SD (IQR 25-46). This is slightly lower than a study done at AIIMS, Delhi where the mean age was 40.1 years.[14] Gandhi et al[13] has found mean age of affliction to range from 39.7 to 54 years in most Indian studies. In contrast higher age ranging from 47-63 years has been reported by studies from China and other countries.[4,17] This difference may be attributed to variable hospital admission criteria as well as to the fact that as Indian population has a lower mean age than most of the world. About 52.4% of males were affected in our study which is comparable to a study from China.[18] Male preponderance of up to 60-90% have been reported in many studies. [6,16,17] The outcome between males and females was not statistically different in our study (p value.08). Similarly, none of the Indian studies published till date have found any statistically significant association of gender and mortality, which has been seen in studies from other countries.[19]

A definitive history of contact with COVID positive patients could be deciphered in 39.8%(n=98) of cases, of these 25 were cluster cases originating from a commercial company following a breach in the quarantine guidelines by the owner after international travel. Around 0.8%(n=2) were incidentally discovered during presurgical work up while another 0.8%(n=2) had a history of international travel. In the rest 56.5% of cases, a definitive contact could not be traced and they were picked up from routine screening from containment zone or were screened due to symptoms. In the other Indian studies, the contacts could not be traced in 25% to 57.8% of cases.[12] The incidental discovery in presurgical workup emphasizes the importance of inclusion of testing for COVID-19 as a part of screening once routine outpatient and elective services are resumed in the region.These asymptomatic cases can pose a health hazard to those involved in healthcare, if not detected. Similar reports have been published of the incidental discovery of COVID-19 in low suspicion patients as part of routine screening.[20]

About 22(8.97%) patients were health care workers (HCW) with a mean age of 32.6 years (range 27-67 years). Similar age distribution has been observed in study on HCW by Chatterjee et al .[21] Majority of those affected (5.71%) were working in low-risk areas and were not directly involved in the care of COVID-19 patients. Hence stressing on the importance of hand hygiene and social distancing, use of proper precautions in a hospital setting. This is in concordance with the study done by Lia et al[22] where the non-frontline workers had higher infection rates as compared to frontline workers. The infection rate of hospital staff has been reported from 2.1–29% in other studies.[19,23] In our series cluster infection of 7 cases in HCW was observed. Similar findings of cluster cases in HCW have been reported from India.[24] There was no significant difference in the duration of stay (p value 0.67), the duration of current illness before admission, and the duration for which patient received oxygen among health care workers and others.

About 66.7% of patients in our study were asymptomatic, among the symptomatic patients 9 (3.7%) had moderate disease, rest were in the mild category. Our cohort of patients mainly presented with cough in 49 cases (19.9%), fever in 42 cases (17.1%), and throat irritation in 25 cases (10.2%), breathlessness in 17(6.9%). An Indian study [14] also concluded that fever may not be the predominant symptom confirming that undue stress should not be given to fever as the presenting symptom, especially in an Indian scenario, as this can lead to missing of COVID19 cases. Though the studies from other continents have reported a higher incidence of fever in up to 83-99% cases, cough in 59-82% and breathlessness in 31-40% of patients.[16,17,25] Of the 17 cases which experienced breathlessness in our study, 6 required oxygen support. None of the patients in our study had severe disease requiring mechanical ventilation during the course of the stay.

Children <18 years of age constituted around 18% (n=44) of the study population. A greater proportion of pediatric patients as compared to other studies[26] may be attributed to the fact that our center was a dedicated pediatric hospital before being converted to a dedicated COVID center. The majority were admitted and diagnosed during contact tracing of positive parents or relatives. The mean age of children was 8.03 years which is in tune with a study done in China [27]. Out of 44, 23% (n=10) children were symptomatic and the most commonly presenting symptom were with fever(n=6), cough(n=5) and fatigue(n=2). About 13.06% of children presented with fever in contrast to other studies [28,29] reporting that fever may not be the predominant feature in children. Though this finding is limited by small sample size and needs to be validated in a larger cohort of patients. All children had asymptomatic to mild presentation. These findings are supported by a study on a larger pediatric cohort [29], where 50.9% had mild presentation. As far as comorbidities are concerned, one child was on treatment for Acute Lymphoid Leukemia but the rest did not have any comorbidities. The larger number of asymptomatic children in our study underscores the importance of enhanced coverage of pediatric testing, as they may serve as silent disseminators of infection.

Associated comorbidities have been seen in 13.06% of our patients similar to the findings in study from AIIMS ,Delhi[14]. This is in contrast to studies reporting 25-88% of associated comorbidities. This may be due to our cohort of patients being of mild to moderate severity. Hypertension in 6.12%was the most common co-morbidity observed

in our study followed by diabetes in 5.71% patients. Another Indian study [15] has also found hypertension to be a commoner association to COVID-19 as compared to diabetes in Indian patients. Similar results have been observed in a metanalysis done by Sanyaolu et, al[30]. The association between comorbidities and the development of symptoms in patients was not found to be statistically significant except for preexisting lung disease. Patients with comorbidities had higher chances of disease progression and had a statistically significant referral rate. The correlation of comorbidity with severity of disease was statistically significant.

The mean duration of stay in hospital in our study was 9.6 ±.57 days. The patients were discharged based on the clinical condition of the patient and as per the prevailing government discharge policy. Initially, two negative RT-PCR were required before discharge which was subsequently changed to one negative report before discharge. Later, patients were being discharged after 10 days of admission or 3 days of symptom free period, whichever was later. About 6% of patients were referred. No mortality was observed in our study.

The limitations of our study are the primarily descriptive nature, small sample size and limited spectrum of patients, only presenting with mild to moderate illness. Despite this fact, the author believes that the data being presented in combination with other studies from the sub-continent can help design effective strategies to counter the growing menace of the disease especially considering the fact the majority of the patients currently being witnessed are either asymptomatic or are mildly symptomatic. The current data shows the favorable outcome of the cases thereby giving credence to the strategy of home isolation and monitoring rather than hospital admission and treatment of carefully selected cases. This step may go a long way in effectively utilizing the already stretched resources.

CONCLUSION

COVID -19 patients presenting with milder to moderate disease have better prognosis in Indian cohort and patients with asymptomatic to mild clinical presentation can be managed in home isolation under medical supervision. Associated comorbidities increased the chances of progression and these patients had higher referral rate. Mortality was not there in our group of patients. Policies need to be formulated to protect healthcare workers during this pandemic and caution at individual level, proper precautions are also warranted as incidences of infection in low risk areas have been noted. Children have milder presentation usually and can serve as asymptomatic carriers of disease so surveillance needs to be strengthened in order to prevent spread of disease.

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Conflict of Interest: Nil

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