Original Article

Trends and clinico-epidemiological profile of COVID-19 patients at a designated COVID-19 hospital in Delhi, North India

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Abstract

Background: The coronavirus disease (COVID-19) presents across a spectrum of signs and symptoms and shows clinico-epidemiological predilections (elderly, those with comorbidities). Delhi is among the highest burden states in India. **Objectives:** To report the case detection trends and clinico-epidemiological profile of patients tested positive at a designated COVID-19 hospital in Delhi in Northern India. **Methods:** Using an observational (descriptive design) we analyzed data from the electronic medical records of the hospital. All individuals testing positive for SARS-CoV-2 RNA using reverse transcription polymerase chain reaction (RT-PCR) between 17th March and 07th May 2020 (both dates inclusive) were included. Case detection trend (7-day moving averages) was plotted. Clinico-epidemiological profile of patients was summarized statistically. **Results:** Total 308 positive cases were enrolled in this study. The median age of participants was 48 years (09–95 years) men (47.9 ± 16.4 years) and women (43.5 ± 14.0 years). Men to women ratio was 3.4:1 with a statistically significant difference ($P < 0.001$). During the study timeframe, 166 (54.0%) patients had an outcome: 11 (6.6%; 95% CI: 3.4–11.6) expired and 155 recovered (recovery rate: 93.4%; 95% CI: 88.5–96.7). Chance of death was significantly associated with the higher age group ($P = 0.005$). The commonest clinical symptoms noted were fever (38.9%) and cough (38.6%). Majority (56.6%) had mild to moderate symptoms, 12.6% had severe symptoms and the remaining were asymptomatic (30.8%). 31 patients (26.05%) needed ICU care. Total 119 patients (38.6%) had various preexisting comorbidities, most commonly diabetes mellitus (35.0%) and hypertension (34.0%). However, the comorbidities were not associated with age ($P = 1.000$). **Conclusion:** Triangulation of data and careful analysis of trends in designated COVID-19 hospitals and other institutional settings may help inform surge preparedness and care provisioning. Stringent containment strategies must continue as the pandemic is intensifying.

Keywords: Clinico-epidemiological profile, comorbidity, COVID-19, pandemic

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has overwhelmed healthcare systems worldwide. As on 25th September 2020, 0.3 billion individuals have got infected with SARS-CoV2 (the virus causing the disease) and 0.9 million have lost their lives across 213 countries and 2 international conveyances.[1] COVID-19 presents across a spectrum of symptoms. About 80% of the individuals with SARS-CoV-2 (the virus causing

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COVID-19) infection either remain asymptomatic or show mild symptoms of flu (e.g., fever, cough, sore throat); these may be managed at home or in isolation centers to check the spread of transmission. The remaining 10–15% have moderate to severe symptoms, and need institutional care ranging from oxygen therapy, intensive care to ventilator support.[2] The elderly and those with comorbidities (e.g., diabetes mellitus, hypertension, renal diseases, etc.) are at higher risk of developing florid symptoms and meet adverse outcomes.[3]

India reported its first case on 30th January, 2020 from Kerala.[4] Ever since over 0.2 million cases have been identified and 6367 people have lost their lives.[1] To combat the rapid upsurge of the pandemic in India, the country went under lockdown since 25th March with a graded exit strategy since 20th April. India ramped up its preparedness levels, a major initiative being setting up of COVID-19 hospitals across the country for in-patient care.

Delhi National Capital Region (NCR) has one of the highest burden of COVID-19 cases in the country. The situation seems explosive as hospitals in Delhi are gradually getting overwhelmed. According to the current data, total of 27,654 confirmed cases have been reported in Delhi with 761 deaths. It is speculated that the epidemiology, clinical presentation, and prognosis of COVID-19 in India could be different as compared to elsewhere. The population has unique vulnerabilities (e.g., health awareness, overcrowding, other living conditions). It has heterogenous risk profiles (e.g., preventive practices including personal hygiene and respiratory etiquettes, undiagnosed/uncontrolled comorbid health conditions, and care seeking patterns). A critical analysis of the profile of patients presenting with COVID-19 may help in response preparedness, resource mobilization and allocation, and in monitoring and predicting future trends. In this paper, we provide a descriptive analysis of the clinico-epidemiological profile of patients identified and admitted to one of the COVID-19 hospitals in Delhi.

Subjects and Methods

Setting: We report findings from a 650-bedded super-speciality hospital under the Government of National Capital Territory of Delhi (Northern India). It was designated as a COVID-19 hospital in March 2020. The hospital receives patients from Delhi and adjoining areas. It provides comprehensive services for COVID-19, that is, counselling, testing, triage, treatment, discharge, and follow-up.

Study design: We have utilized a descriptive design to elaborate on the profile of the patients presenting and tested positive for SARS-CoV-2 to the study hospital.

Study participants and timelines: We retrieved information of all patients who reported to our hospital between 17th March (date since the center was designated as a COVID-19 hospital) and 7th May 2020 (the ICMR revised testing criteria thereafter).

Standard operating procedure at the hospital: The hospital follows protocols for testing and triage of COVID-19 patients as per guidance provided by the Indian Council of Medical Research (ICMR) as illustrated in Figure 1.

Test eligibility: Individuals reporting to the hospital received screening for COVID-19 symptoms and risk exposure. Those with acute onset respiratory infections with fever and cough within the past 10 days or having returned, from an international travel within the past fortnight, or having close interaction with someone who is symptomatic and has been diagnosed with COVID-19 were offered testing for SARS-CoV-2 and triaged. A nasopharyngeal swab was collected and the sample tested for viral RNA using reverse transcription polymerase chain reaction (RT-PCR) at ICMR approved laboratories.

Classification: If viral RNA was detected, patient was labelled as "COVID-19 positive" as per the guidelines of World Health Organization (WHO).[5] Those asymptomatic were triaged to isolation centers, those with moderate symptoms and needing oxygen therapy (oxygen saturation >90%) were admitted to isolation wards and those with more severe symptoms were managed in Intensive Care Unit (ICU) with ventilatory support (as needed).

Repeat tests were done on Day 5 and Day 14 and those with consecutive "negative" samples were declared "recovered" and discharged.

Variables and data sources: We retrieved information on relevant variables from the hospital EMR. This included data on demographic parameters (age, gender, and place of residence), presenting signs and symptoms, history of comorbidities, triage details (isolation center, ward, ICU), and outcome. We included data from all patients in our records without extracting information that could potentially reveal the patient's identity.

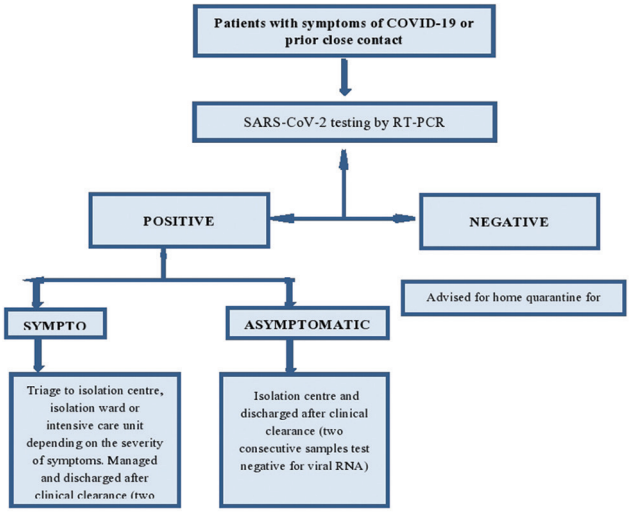

Figure 1: Hospital protocol for COVID-19 patients as per the ICMR guidelines (March 17th 2020)

Daily case detection rates (those testing positive) were compiled in the master sheet to draw trend lines.

Quality assurance: The hospital meticulously maintains a detailed database (electronic management record; EMR) of all patients and their course of disease using structured formats. It provides data records to the competent authorities from the Government for administrative purposes.

Statistical methods: Case detection trends were calculated as 7-day moving averages and compared with that of Delhi and India by extracting daily data from the official website of Ministry of Health and Family Welfare, Government of India (www.mohfw.gov.in). Patient information was summarized as frequency and proportion and wherever applicable, as measures of central tendencies. No patient was excluded from the analysis. We used Microsoft Excel (Microsoft Corporation, USA) 2017 for undertaking the statistical analysis.

Ethical consideration: We used secondary data from hospital-based records retrospectively. We could not seek an ethics approval as our hospital did not have an ethics committee then and given the unnatural pandemic situation, we could not apply for review from any other committee. Nevertheless, we received due permission from the competent authority (hospital administrative leadership) who has the overall custodianship of the data, for data access and use for this study. We managed the data and the study in compliance with the ICMR ethical guidelines for biomedical research involving human participants 2017. Patient identity was anonymized all through the process using unique identity numbers.

Results

7-day moving averages: The 7-day moving averages of number of cases reported as positive from the study hospital [Figure 2a] showed patterns of peaks and troughs. Overall, we noticed an upward trend in the number of cases, especially around the second fortnight of April. In the first week of May, the number of cases showed a dip. It should be noted that cases suddenly surged around last week of March and then in early April though the country was under lockdown. Around mid-March a religious congregation was held in Delhi. Participants from this congregation were mobilized to the study hospital for testing and many of them tested as positive. Number of cases reported across Delhi and India have shown a gradual upward trend [Figure 2b], especially around end April. This could be indicative of the increasing intensity of the pandemic as well of increasing scale of testing in India. Trends in the curve of the study hospital around end-May coincide with that in Delhi suggesting effect of ongoing containment efforts across Delhi.

Clinico-epidemiological profile: The clinico-epidemiological profile of the admitted patients with COVID-19 (n-308) is summarized in Table 1. Of 308 patients, there were 239 (77.6%; 95% CI: 72.5–82.1) men and 69 (22.4%; 95% CI: 17.9–27.5) women (ratio- 3.4:1; $P = 0.007$). Age of the participants ranged from 09 to 95 years (median: 48 years; inter-quartile range: 33–60) with a statistically significant difference ($P < 0.001$) between the age of men (47.9 ± 16.4 years) and women (43.5 ± 14.0 years). As many as 30.8% of the patients were asymptomatic. Among those symptomatic, fever and cough were the most common presenting symptoms; most had a combination of two or more symptoms. People were equally likely to manifest symptoms across both age groups ($P = 0.787$). About 38% of the participants had comorbidities and this was not associated with age ($P = 1.000$). A huge proportion (about 87%) were managed without any additional medical support (e.g., oxygen therapy, ICU care, or ventilatory support). Need for supportive therapy was higher among patients of younger age group ($P = 0.001$). Among systemic complications, respiratory (e.g., lung consolidation, acute respiratory distress syndrome, pleural conditions) and renal problems were the most common. During the study timeframe, about 54% of the patients met with an outcome; among these 166 patients with an outcome, 11 (6.6%; 95% CI: 3.4–11.6) expired while the remaining recovered (recovery rate: 93.4%; 95% CI: 88.5–96.7). Chance of death was significantly associated with the higher age group ($P = 0.005$).

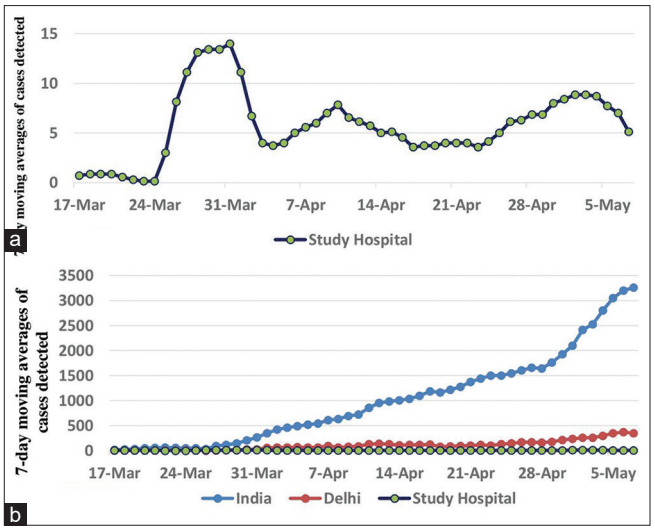

Figure 2: 7-day moving averages of cases detected positive for SARS-CoV-2 RNA at the study hospital (2a) and in Delhi and India (2b)

Discussion

In this study, we analyzed upcoming trends in the number of cases of COVID-19 and the clinico-epidemiological profile of the first 308 patients identified at a designated COVID-19 hospital from Delhi. The epidemiological trend line is not consistent with sudden change in directions but with an increasingly upward overall slope with time. We report that a quarter of the patients testing positive were over 60 years of age and majority (50%) were in the age range of 33–60 years (the inter-quartile range). We found that most patients were men, presented with a combination of flu symptoms, and could be managed without much need for

Table 1: Clinico-epidemiological profile of patients with COVID-19 at the study hospital

Variable	Age category (in years); *n* (%; 95% Confidence Interval)		Total (*n*-308)	*P*
	<60 (*n*-218)	>=60 (*n*-90)		
Gender				
Female	58 (26.6; 20.9-33.0)	11 (12.2; 06.3-20.8)	69 (22.4; 17.9-27.5)	**0.007**
Male	160 (73.4; 67.0-79.1)	79 (87.8; 79.2-93.7)	239 (77.6; 72.5-82.1)	
Number of signs and symptoms				
Nil (Asymptomatic)	66 (30.3; 24.3-36.8)	29 (32.2; 22.8-42.9)	95 (30.8; 25.7-36.3)	0.787
At least one	152 (69.7; 63.2-75.8)	61 (67.8; 57.1-77.3)	213 (69.2; 63.7-74.3)	
One	47 (21.6; 16.3-27.6)	12 (13.3; 7.1-22.1)	59 (19.2; 14.9-24.0)	--
Two	44 (20.2; 15.1-26.1)	22 (24.4; 16.0-34.6)	66 (21.4; 17.0-26.4)	
Three	41 (18.8; 13.9-24.6)	18 (20.0; 12.3-29.8)	59 (19.2; 14.9-24.0)	
Four	09 (4.1; 1.9-7.7)	03 (3.3; 0.7-9.4)	12 (3.9; 2.0-6.7)	
Five	01 (0.5; 0.0-2.5)	00 (0.0; 0.0-4.0)	01 (0.3; 0.0-1.8)	
Signs and symptoms at presentation				
Fever	82 (37.6; 31.2-44.4)	38 (42.2; 31.9-50.1)	120 (39.0; 33.5-44.7)	--
Cough	78 (35.8; 29.4-42.5)	41 (45.6; 35.0-56.4)	119 (38.6; 33.2-44.3)	
Sore throat	28 (12.8; 8.7-18.0)	13 (14.4; 7.9-23.4)	41 (13.3; 9.7-17.6)	
Dyspnea	26 (11.9; 7.9-17.0)	13 (14.4; 7.9-23.4)	39 (12.7; 9.2-16.9)	
Myalgia	36 (16.5; 11.8-22.1	07 (7.8; 3.2-15.4)	43 (14.0; 10.3.-18.3)	
Diarrhoea	06 (2.8; 1.0-5.9)	00 (0.0; 0.0-4.0)	06 (2.0; 0.7-4.2)	
Vomiting	03 (1.4; 0.3-4.0)	01 (1.1; 0.0-6.0)	04 (1.3; 0.4-3.3)	
Rhinorrhea	23 (10.6; 6.8-15.4)	06 (6.7; 2.5-14.0)	29 (9.4; 6.4-13.2)	
Headache	14 (6.4; 3.6-10.5)	02 (2.2; 0.3-7.8)	16 (5.2; 3.0-8.3)	
Anosmia	03 (1.4; 0.3-4.0)	01 (1.1; 0.0-6.0)	04 (1.3; 0.4-3.3)	
Comorbidity				
Nil	136 (62.4; 55.6-68.8)	56 (62.2; 51.4-72.2)	192 (62.3; 56.7-67.8)	1.000
At least one comorbidity	82 (37.6; 31.2-44.4)	34 (37.8; 27.8-48.6)	116 (37.7; 32.2-43.3)	
One	50 (22.9; 17.5-29.1)	21 (23.3; 15.1-33.4)	71 (23.1; 18.5-28.2)	--
Two	25 (11.5; 7.6-16.6)	08 (8.9; 3.9-16.8)	33 (10.7; 7.5-14.7)	--
Three	05 (2.3; 0.8-5.3)	04 (4.4; 1.2-11.0)	09 (2.9; 1.3-5.5)	--
Four	02 (0.9; 0.1-3.3)	01 (1.1; 0.0-6.0)	03 (1.0; 0.2-2.8)	--
Support requirement				
Nil	196 (89.9; 85.1-93.6)	73 (81.1; 71.5-88.6)	269 (87.3; 83.1-90.8)	
Some support	22 (10.1; 6.4-14.9)	27 (30.0; 20.8-40.6)	39 (12.7; 9.2-16.9)	
Ventilator	01 (0.5; 0.0-2.5)	04 (4.4; 1.2-11.0)	05 (1.6; 0.5-3.8)	--
Intensive care (without ventilator)	21 (9.6; 6.1-14.4)	12 (13.3; 7.1-22.1)	33 (10.7; 7.5-14.7)	
Oxygen therapy only	00 (0.0; 0.0-1.7)	01 (1.1; 0.0-6.0)	01 (0.3; 0.0-1.8)	
Complications				
Respiratory	11 (5.1; 2.6-8.9)	05 (5.6; 1.8-12.5)	16 (5.2; 3.0-8.3)	--
Renal	02 (0.9; 0.1-3.3)	02 (2.2; 0.3-7.8)	04 (1.3; 0.4-3.3)	
Others/Nil	205 (94.0; 90.0-96.8)	83 (92.2; 84.6-96.8)	288 (93.5; 90.2-96.0)	
Outcome				
Under isolation	82 (37.6; 31.2-44.4)	60 (66.7; 56.0-76.3)	142 (46.1; 40.4-51.9)	--
With an outcome	136 (62.4; 55.6-68.8)	30 (33.3; 23.7-44.1)	266 (86.4; 82.0-90.0)	--
Discharged	131 (60.1; 53.3-66.6)	24 (26.7; 17.9-37.0)	155 (50.3; 44.6-56.0)	**0.005**
Expired	05 (2.3; 0.8-5.3)	06 (6.7; 2.5-14.0)	11 (3.6; 1.8-6.3)	

P<0.05 have been emboldened to indicate statistical significance

supportive therapy. We report that young patients were more likely to need supportive therapy while the elderly were more likely to encounter a fatal outcome. The overall fatality rate among those with an outcome was high (about 6.6%). Nevertheless, most (93.4%) patients recovered.

The upward trend in the 7-day moving averages indicates that the pandemic is intensifying. As we report, almost 50% of the patients admitted to our hospital were still on treatment and will likely need care for some more time. Each admitted patient would need a bed for several days together with a need for repeat testing before discharge. Even as during the study timeframe, testing and treatment services at our center were not overwhelmed, it is likely to be so if cases increased exponentially. Thus, stringent containment measures must continue to be in place with maximal public-administration cooperation. Faster testing strategies need to be adopted for decision-making and to avoid overwhelming load on testing and treatment centers. ICMR has been aggressively

working in this direction with focus on identifying antigen-based and antibody-based testing kits and a risk-based scale up approach and hopefully, this will help circumvent these bottlenecks.[6,7] Despite India's young demography (median age ~27 years) and about 49:51 female-to-male ratio, profile of patients in the study hospital showed higher proportions of older individuals and of men. This concurs with findings elsewhere and has also been highlighted by the World Health Organization.[8-10] However, patients with COVID-19 in India are likely to be younger given the country's demographic distribution and an age standardized estimation may be relevant. Pan India data of 20th May suggests that among active COVID-19 patients, about 3% need beds with oxygen and intensive care (ICU) each and about 0.5% require ventilator care.[11] In contrast, our study reports a lower proportion in each category with a wider confidence interval. In our study, the most commonly encountered symptom was fever (38.9%) followed by cough (38.6%) and myalgia (13.9%). Less common symptoms were sore throat, dyspnoea, rhinorrhoea, headache, diarrhoea, vomiting, and anosmia. Most patients presented with mild to moderate symptoms (56.6%) to our hospital, whereas a small set of cases had severe presentation (12.6%). This result was in concordance with studies from China and India.[12-14] The WHO-China Joint mission concluded that 80% of lab-confirmed COVID-19 cases had mild-to-moderate disease, 13.8% severe disease, and 6.1% needed intensive care.[2] Comorbidities like diabetes mellitus, hypertension, respiratory diseases, cardiac diseases, renal diseases, and malignancy in patients with COVID-19 have a poor prognosis.[3,15-17] The most common comorbid condition in our study population was diabetes mellitus (20.1%) followed by hypertension (19.2%).

Admission rates to the ICU as reported in literature from China ranges from 5.0% to 23.2%, 1.6–2.3% required mechanical ventilation, and death rates from 1.4% to 3.6%.[3,12,15] The findings are quite similar to our study where 12.6% patients were admitted in ICU, 1.6% patients required ventilation and 3.5% (of those with an outcome) succumbed to the illness. Case fatality rates and recovery rates as reported by us are on the higher side of contemporary reports and even compares with some countries in Europe.[18-20] The recovery rate in our study was 50.3%. As on 25th September, India's recovery rate was 81.74%.[21]

We report data from a single center and this may not be representative of the study population. Since the test was offered only to those meeting a relatively stringent eligibility criteria, and then confirmed by RT-PCR (considered as a gold standard, and hence likely to be less sensitive and more specific), we are mostly under-reporting the true burden. Our test eligibility criteria were biased against identification of those with SARS-CoV-2 infection but asymptomatic and without a traceable contact history. Only those asymptomatic identified during active contact tracing were offered a test and if positive, included in the study's analysis. Consequently, we may also be under-reporting the proportion of asymptomatic contacts. Since we report data from only 308 patients, our estimates have a wider confidence interval. The estimates will improve with a narrower confidence interval as data accrues over time. In the future analyses, we may be able to provide details of critical hospital administration and clinical outcome related parameters, for example, test positivity rates, bed occupancy rates, median length of stay of the patients in the hospital stratified according to disease severity, costing, and survival analysis along with identification of risk and prognostic factors based on hazards modeling. A detailed history can reveal associations with travel history and familial/geo-spatial clustering of cases.

Conclusion

The high fatality rates (especially in the elderly) and the need for advanced support for the young highlights that India's preventive efforts and institutional surge capacity shall play a pivotal role in mitigating the overall impact of the pandemic. Given the resource constrained context of India, the country must scale up and sustain its community-based approaches and non-pharmaceutical interventions—hospitals may not be the "best battleground to fight out" COVID-19.[22] The intensifying situation of the COVID-19 pandemic in India, and particularly in Delhi, suggests that implementation of stringent containment strategies must continue. We hope that triangulation of data and careful analysis of trends in designated COVID-19 hospitals and other institutional settings may help inform surge preparedness and care provisioning. This also calls for aggressive efforts at the primary care level for community engagement, surveillance, mobilization for test and prompt care seeking, strengthening referral linkages and follow-up after discharge from the hospital. As institutional resources are likely to be overwhelmed, those under home-isolation/quarantine must be monitored remotely or through regular contact—this requires activation of community-based workers and outreach mechanisms. Prioritization has to be done of areas reporting a surge in cases ('hotspots' and clusters) for setting up make-shift institutional arrangements in the vicinity so that the beds in advanced designated COVID-19 hospitals could be spared for care of the more serious patients. The above study findings should also help in informing preparedness activities in other parts of India given that the infection is now spreading to "deeper" into the country. This must include effective and consistent public health risk communication so that those with co-morbidities actively seek care to keep these under strict control. The general public must also take cognizance of the fact that hospital resources are likely to get overwhelmed if cases surge. Hence, the public must exercise maximal preventive practices in order to avoid a healthcare catastrophe as India combats the COVID-19 pandemic.

Key message

In this study, we analyzed trends and clinico-epidemiological profile of the first 308 patients identified at a designated COVID-19 hospital from Delhi. Most patients either had mild to moderate symptoms or were asymptomatic. The overall fatality rate among those with the outcome was high (about 6.6%). It increased with age. Nevertheless, most patients (93.4%)

recovered. The upward trend in the 7-day moving averages indicated that the pandemic was intensifying and calls for stronger preparedness at the primary care level.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. The Real Time Statistics Project. Available from: http//www.worldometers.info. [Last accessed on 2020 Sep 25].
2. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) 2020.
3. Guan WJ, Liang WH, Zhao Y, Liang HR, Chen ZS, Li YM, *et al.* Comorbidity and its impact on 1590 patients with COVID-19 in China: A nationwide analysis. Eur Respir J 2020;55:2000547. doi: 10.1183/13993003.00547-2020.
4. Srinivasan R, Gupta P, Rekhi B, Deb P, Nijhawan V, Prasoon D, *et al.* Indian academy of cytologists national guidelines for cytopathology laboratories for handling suspected and positive COVID-19 (SARS-COV-2) patient samples. J Cytol 2020;37:67-71.
5. Laboratory testing strategy recommendations for COVID-19-Interim guidance 21 March 2020. Geneva. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200424.
6. Advisory on Use of Rapid Antigen Detection Test for COVID-19. 14 June 2020, Indian Council of Medical Research, Department of Health Research, Ministry of Health And Family Welfare, Government Of India. Available from: https://www.icmr.gov.in/cteststrat.html.
7. Advisory on Rapid Antibody Blood Tests-regarding. 27 April 2020, Indian Council Of Medical Research, Department of Health Research, Ministry Of Health And Family Welfare, Government Of India. Available from: https://www.icmr.gov.in/cteststrat.html.
8. Preventing and managing COVID-19 across long-term care services: Policy brief. Geneva: World Health Organization; 2020 (WHO/2019-nCoV/Policy Brief/Long-term Care/2020.1). Licence: CC BY-NC-SA 3.0 IGO.
9. Fan BE, Chong VCL, Chan SSW, Lim GH, Lim KGE, Tan GB, *et al.* Hematologic parameters in patients with COVID-19 infection. Am J Hematol 2020;95:E131-4.
10. Chan JF-W, Kok K-H, Zhu Z, Chu H, To KK-W, Yuan S, *et al.* Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan. Emerg Microbes Infect 2020;9:221-36.
11. Press Trust of India. 6.39% of total active Covid-19 cases needed hospital support: Health ministry May 20, 2020 19:39 IST. Available from: https://www.hindustantimes.com/india-news/6-39-oftotal-active-covid-19-cases-needed-hospital-support-health-ministry/storysNxlnXCiOtFl6T4oPs8D1N.html.
12. Lee N, Hui D, Wu A, Chan P, Cameron P, Joynt GM, *et al.* A major outbreak of severe acute respiratory syndrome in Hong Kong. N Engl J Med 2003;348:1986-94.
13. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, *et al.* Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet 2020;395:1054-62. doi: 10.1016/S0140-6736 (20) 30566-3. Epub 2020 Mar 11. Erratum in: Lancet 2020 Mar 28;395:1038. Erratum in: Lancet 2020 Mar 28;395:1038. PMID: 32171076; PMCID: PMC7270627.
14. Singhal T. A Review of Coronavirus Disease-2019 (COVID-19). Indian J Pediatr 2020;87:281-6.
15. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, *et al.* China medical treatment expert group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020;382:1708-20.
16. Sepandi M, Taghdir M, Alimohamadi Y, Afrashteh S, Hosamirudsari H. Factors Associated with Mortality in COVID-19 Patients: A Systematic Review and Meta- Analysis. Iran J Public Health. 2020;49:1211-21. doi:10.18502/ijph.v49i7.3574. PMID:33083287; PMCID:PMC7548487.
17. Petrie JR, Guzik TJ, Touyz RM. Diabetes, hypertension, and cardiovascular disease: Clinical insights and vascular mechanisms. Can J Cardiol 2018;34:575-84.
18. He W, Yi GY, Zhu Y. Estimation of the basic reproduction number, average incubation time, asymptomatic infection rate, and case fatality rate for COVID-19: Meta-analysis and sensitivity analysis [published online ahead of print, 2020 May 29]. J Med Virol 2020;10.1002/jmv. 26041. doi: 10.1002/jmv. 26041.
19. Karadag E. Increase in COVID-19 cases and case-fatality and case-recovery rates in Europe: A cross-temporal meta-analysis [published online ahead of print, 2020 May 21]. J Med Virol 2020;10.1002/jmv. 26035. doi: 10.1002/jmv. 26035.
20. Hu Y, Sun J, Dai Z. Prevalence and severity of corona virus disease 2019 (COVID-19): A systematic review and meta-analysis. J Clin Virol 2020;127:104371. doi: 10.1016/j.jcv. 2020.104371.
21. Ministry of Health and Family Welfare. Government of India. Cited on 2020 Sep 25. Available from: https://www.mohfw.gov.in/.
22. Community-based health care, including outreach and campaigns, in the context of the COVID-19 pandemic. World Health Organization and the United Nations Children's Fund (UNICEF), 2020. Licence: CC BY-NC-SA 3.0 IGO.