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COVID-19, Cancer, and Congregation: An Observational Study from a Tertiary Care Hospital in New Delhi

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Abstract

Objective Indian data on cancer patients with coronavirus disease 2019 (COVID-19) infection and its outcome are limited. Infectivity and outcome among cancer patients staying in large congregations are not known. We conducted this study to address this lacuna in literature.

Methods This was a retrospective–prospective, observational study of hospitalized cancer patients with proven COVID-19 infection, conducted at tertiary care hospital in New Delhi after ethical approval. We analyzed clinical, laboratorial parameters, and outcomes in these patients.

Results All 32 admitted male patients became COVID-19 positive and 10 (31%) patients were symptomatic. Median age was 37.5 years (range: 16–64). Sixteen health-care workers (HCWs) were working in the cancer ward (paramedical staff: 4, nurses: 6, residents: 4, and consultants: 2). Among HCWs, two nursing staff and three paramedical staff contracted asymptomatic COVID-19. Eighteen (56%) and 14 (44%) patients were on curative and palliative treatment, respectively. Leukopenia (total leukocyte count <4,000/μL) was seen in 37.5% of cases. Grades 4, 3, 2, and 1 neutropenia were present in 12.5% of patents. Two (6.25%) patients had features of critical COVID-19. Eight (25%) patients received treatment with hydroxychloroquine + azithromycin. Five patients died. Three patients had features of progressive disease with poor performance status. One critical COVID patient survived and one succumbed to COVID-19. Patients shared a common dining room, sanitation area.

Conclusion Seventy percent of cancer patients were asymptomatic. Cancer patients living in congregation areas are susceptible to COVID-19 with 3% mortality rate. Recent chemotherapy and associated cytopenias may not increase the risk in cancer patients with COVID-19 treated with curative intent. Palliative intended patients are at increased risk of death. N-95, personal protective equipment, and adherence to infection control measures should be encouraged.

Keywords
- cancer
- congregation
- coronavirus disease 2019
- outcomes
- RT-PCR negativity

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Introduction

As novel coronavirus disease 2019 (COVID-19) pandemic is worsening, newer challenges are also emerging. People living in congregations such as long-term care facilities and dormitories are at increased risk of infection as norms of social distancing are not executional.[1-3] Malignancy is a major risk factor for COVID-19-related mortality.[4,5] Congregation of large number of people on ships (e.g., Diamond Princess ship) face difficulties in mobility and limited access to sanitation, drinking water, and food supply makes them more vulnerable.[6,7] Cancer care during this pandemic is challenging.

Objective

Indian data on cancer patients with COVID-19 infection and its outcome are limited. Infectivity and outcome among cancer patients staying in large congregations are not known. We conducted this study to address this lacuna in literature and present our experience in managing these patients who lived together and shared common areas of sanitation and food. We analyzed the factors associated with mortality.

Methods

Study Design

This was a retrospective–prospective observational study conducted in a tertiary care center at New Delhi after ethical approval.

Hospital Policy

After April 1, 2020, all patients were admitted to a separate screening (new admission) ward. All such patients underwent screening for COVID-19. After negative results, patients were shifted to specialty wards. Positive patients were shifted to designated COVID-19 hospital.

Patient Population

In the 1st week of May 2020, one admitted cancer patient (who was initially negative for COVID-19 in the screening ward) to the cancer ward was detected to have COVID-19 during evaluation for fever. Subsequently, screening was done for all admitted patients and health-care workers (HCWs). Patients were congregated in one ward with three cubicles and one common hall; they shared common areas of dining, wash rooms, and utility areas. All patients were provided with triple layer face masks and regular briefing was done for adherence. Patients were asked for compliance of use of face masks after the outbreak. Details of the past treatment were assessed. Eastern Cooperative Oncology Group performance status (PS) scale was used to assess the PS.

Investigations and Diagnosis

COVID-19 diagnosis was established by reverse transcription-polymerase chain reaction (RT-PCR) of nasopharyngeal and oropharyngeal swabs. All basic investigations were done on admission to COVID-19 ward (at designated hospital) that included complete blood count, renal function test, liver function test, lactate dehydrogenase (LDH), D-Dimer, C-reactive protein (CRP), ferritin, and chest X-ray. We analyzed the time duration of RT-PCR positivity. Time was calculated from the date of the first positive report till the date of negative report. RT-PCR was conducted weekly.

Prophylaxis and Treatment

Hydroxychloroquine (HCQ) prophylaxis was given to HCWs. All symptomatic COVID-19 cancer patients were treated with HCQ and azithromycin as per the Indian Council of Medical Research guidelines.[8,9] Grades 3 and 4 neutropenic patients were treated with granulocyte colony stimulating factor (G-CSF) and prophylactic antibiotics as per institutional policy.

Health-Care Workers

As a policy and high-risk environment, HCWs used N-95 masks. None of them used complete personal protective equipment (PPE) including hazmat suit and face shield (PPE). Preexposure prophylaxis with HCQ was advocated to all HCWs.

Statistics

We analyzed clinical, laboratory parameters, and outcome of these patients. Demographics and other variables were entered as per pro forma (Appendix). STATA version 16 (Texas, United States) software was used to analyze the data. Descriptive statistics was used for analysis of variables. Patients were grouped in curative and palliative intent for analysis. Fisher's exact test was applied for deriving association between variables.

Results

Baseline characteristics of patients are depicted in ►**Table 1**. Twenty-eight percent of patients had hematolymphoid malignancies. Three patients were admitted in January 2020, 10 patients in March 2020, and remaining 19 were admitted in April 2020. The last admission was done on April 30, 2020. Ten patients stayed for 1 day and one patient stayed for 2 days in the screening ward before their transfer to the oncology ward. They all were negative at the time of admission in the cancer ward. One patient was admitted 1 day prior to the outbreak and became positive on D+3 of admission.

All 32 admitted patients were tested positive for COVID-19 by RT-PCR. On the day of the outbreak, 24 patients were positive and the rest became positive after 1 week.

The intent of treatment was curative and palliative in 18 (56%) and 14 (44%) patients, respectively. About 60% of patients received their last chemotherapy within 10 days prior to COVID-19 detection. Clinically, 10 (31%) patients had symptomatic COVID-19. The most common symptom was fever (n = 7.70%). Cough, breathlessness, altered taste, and smell were present in three (30%) patients each. Two (6.25%) patients had features of critical COVID-19.

Majority of the patients had hemoglobin levels of more than 10 g/dL (62.5%). Leukopenia (total leukocyte count <4000/µL) was seen in 37.5% of cases; Grades 4, 3, 2 and 1 neutropenia were seen in 12.5% each. Grade 3 and 4 neutropenic patients

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Table 1 Baseline characteristics (n = 32)

Variable	n (%)
Age, median (range)	37.5 (16–64)
Sex	
Male	32 (100)
COVID-19	
Symptomatic	10 (31)
Asymptomatic	22 (69)
Cancer subtype	
Hodgkin lymphoma	6 (18.75)
Sarcoma (bone and soft tissue)	6 (18.75)
Colon cancer	3 (9.37)
Germ cell tumor	3 (9.37)
Rectal cancer	2 (6.25)
Non-Hodgkin lymphoma	2 (6.25)
Lung cancer	2 (6.25)
Head and neck cancer	2 (6.25)
Stomach cancer	1 (3.12)
CNS tumor	1 (3.12
Gastrointestinal stromal tumor	1 (3.12)
Renal cell carcinoma	1 (3.12)
Periampullary region cancer	1 (3.12)
CLL (refractory to 3 lines)	1 (3.12)
Intent	
Curative	18 (56)
Palliative	14 (44)
Type of palliative treatment (n = 14)	
Chemotherapy	11 (78)
Best supportive care	5 (22)

Abbreviations: CLL, chronic lymphocytic leukemia; CNS, central nervous system; COVID-19, coronavirus disease 2019.

received G-CSF and prophylactic antibiotics. Lymphopenia (absolute lymphocyte count <1500/µL) was found in 78% of cases. Other abnormal findings were high LDH (90%), high serum ferritin (81%), and high CRP (25%). Two patients had typical radiological features of viral pneumonia.

Eight patients received treatment with HCQ and azithromycin. They became asymptomatic in 4 days with no cardiac toxicity. Total five patients died (►**Table 2**). Three patients had features of progressive disease with poor PS lacking any definitive evidence suggestive of severe or critical COVID-19 and one patient committed suicide by hanging. Of 2 critical COVID-19 cases, one patient survived and one succumbed COVID-19. Three fatal outcomes were observed in palliative/best supportive care patients (►**Table 2**). When death was analyzed for intent of treatment, palliative intended patients had more probability of death as compared with curative intended patients (4 vs. 0 deaths, p = 0. 027 Fisher's exact) after excluding patient whose cause of death was suicide.

Median time for RT-PCR to become negative was 18.5 days (range: 9–40). Relationship of time taken for RT-PCR negativity to duration (days) is depicted in ►**Fig. 1**. At day 30, patients with hematolymphoid malignancies had more RT-PCR positivity as compared with solid tumors (n = 3/7 vs. 0/22, p = 0.02 Fisher's exact). After excluding deaths, (n = 3/5 versus 0/19), p-value remained 0.01.

Two medical oncologists, four resident doctors, six nurses, and four paramedical staff were working in the cancer ward on rotational duties. They were using N-95 masks and none of them wore Hazmat suits and face shields during the patient care. Among HCWs, those who had close and prolonged contact had contracted infection (5 out of 16). On subsequent screening, all doctors remained negative, two nursing staff were positive, and three out of four paramedical staff became positive. All RT-PCR-positive HCWs were asymptomatic. Only two HCWs used HCQ preexposure prophylaxis.

In the cancer ward, patients shared a common wash room and sanitation area. Dining room was common for all these patients. Twenty-four-hour consistent use of face masks was not practiced by any patient. Twenty-one (81%) and six (19%) patients used cotton cloth masks and surgical masks, respectively.

Discussion

This study clearly brought out the high infectivity rate among patients who are sharing common areas. This finding is of paramount importance for establishments such as armed forces, police departments, prolonged health-care facilities, and other institutions. One hundred percent infection rate among patients in the ward might be due to multiple factors such as viral infectivity, viral load, type and duration of exposure, immunocompromised state, lack of social distancing, and inconsistent use of masks. The 30% infection rate among HCWs further emphasized the national and international priority of protecting HCWs.[10,11] Epidemiological investigation of one COVID-19 patient in the general ward revealed protection from transmission with surgical mask, hand hygiene, and basic infection control.[12] However, surgical masks or triple layer masks may be not adequate for HCWs in cancer wards in pandemic situations. Ministry of Health, Government of India, recommends use of PPE while performing duty in a COVID-19 zone or during an aerosol-generating procedure.[13]

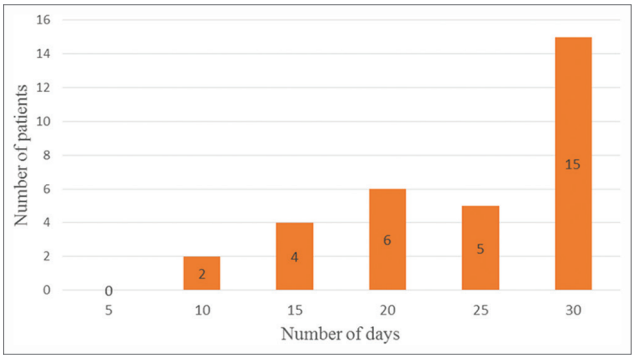

Fig. 1 Coronavirus disease 2019 negativity rate in relation to days by reverse transcription-polymerase chain reaction.

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Table 2 Clinical and laboratorial parameters in patients with fatal outcome

Sr. no	Disease	Stage treatment received	ECOG PS	Age (y)	ALC (μ/dL)	NLR	Serum LDH (U/L)	Serum ferritin (μg/L)	Serum albumin (g/dL)	Cause of death
1	Refractory CLL	Relapsed/refractory post ibrutinib, R-CHOP	2	33	400	1.5	312	1,460	2.8	COVID-19
2	NPC	Stage IV post CT-RT, palliative chemotherapy	4	37	330	5.16	402	1,314	3.6	Not related to COVID-19
3	Hodgkin lymphoma	Relapse/refractory post two lines ASCT and nivolumab	4	25	816	3.1	459	1,496	2.6	Not related to COVID-19
4	Pancreatic cancer	Stage IV, post single agent Gemcitabine (1 cycle)	4	53	760	1.5	356	1,631	2.9	Not related to COVID-19
5	Lung cancer	Stage IV, post multiple lines	2	31	550	–	272	1,287	3.7	Suicide

Abbreviations: ALC, absolute lymphocyte count; ASCT, autologous stem cell transplantation; CLL, chronic lymphocytic leukemia; COVID-19, coronavirus disease 2019; CT-RT, chemotherapy radiotherapy; ECOG PS, Eastern Cooperative Oncology Group performance status; LDH, lactate dehydrogenase; NLR, neutrophil/lymphocyte ratio; NPC, nasopharyngeal carcinoma.

Sixty percent of patients received their last chemotherapy within 10 days prior to COVID-19 infection; even though they had Grades 3 or 4 neutropenia, we did not find increased morbidity for patients receiving chemotherapy.

The role of RT-PCR in asymptomatic COVID-19 patients is not studied.[14] Our patients were negative on the day of admission; repeated testing for a span of 2 to 3 weeks is suggested. Two weeks of quarantine period need to be explored in future studies.

Hematological cancers have the worst outcomes with COVID-19.[1,15,16] The time for RT-PCR negativity in our study was significantly more in hematological malignancies as compared with nonhematological malignancies (p = 0.02). Only death directly attributed to COVID-19 in our study suggests augmenting the strategies to save these patients.

COVID-19 infection is associated with profound psychological and social effects. Higher suicidal rates were also observed in patients with advanced malignancies especially lungs as the primary site.[17-19] We had one patient with metastatic lung cancer who committed suicide. Psychological counseling and measures to reduce stress among these patients are equally important.

Transfer of oncology patients from peripheral hospitals and stagnation at this hospital led to more congregations of patients and remained the same after national lock down. Telemedicine and digital platforms of communication may help curb these issues to some extent.[20]

Cancer patients are more susceptible to COVID-19, so we recommend that oncology departments, wards, and day care centers should remain in a COVID-free zone. As most of the cancer patients with good PS and nonmetastatic disease had a comparable COVID-19-related mortality with the general population and delay in cancer treatment can worsen the disease outcome, their cancer directed therapy should not be delayed. Patients with metastatic disease and poor PS had an increased COVID-19-related mortality and their treatment with increased toxicities should be preferably avoided during the pandemic. Patients on chemotherapy should be closely monitored for cytopenias and prophylactic growth factors may be given to prevent prolonged and profound cytopenia in these patients.

To the best of our knowledge, only limited data are available in the management of cancer patients with COVID-19 and this is the first Indian study conducted exclusively in cancer patients with COVID-19. However, our study has a few limitations. Even though this study included patients with a wide spectrum of malignancies, the number of patients was limited to 32.

Conclusion

Cancer patients living in congregation areas are more susceptible to COVID-19. However, COVID-19-specific mortality was low. Recent chemotherapy and associated cytopenia may not pose increased risk. Palliative intended patients are at increased risk of death. RT-PCR clearance is delayed in patients with hematological malignancies. N-95, PPE, and adherence to infection control measures should be encouraged in cancer wards. Telemedicine and digital platforms of communications must be utilized to avoid congregation.

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Nil.

Conflicts of Interest
There are no conflicts of interest.

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