Introduction

People living with HIV with advanced disease, those with low CD4 and high viral load, and those who are not taking antiretroviral treatment have an increased risk of infections and related complications in general.[1] COVID-19 is a serious disease and all people living with HIV should take all recommended preventive measures to minimize exposure to, and prevent infection by, the virus that causes COVID-19.

At present, there is no evidence that the risk of infection or complications of COVID-19 is different among people living with HIV who are clinically and immunologically stable on antiretroviral treatment when compared with the general population.

As per systematic reviews, very few studies have been conducted among PLHIV with COVID-19 coinfection but none from India.[2-4] One study conducted in China about risk factors and antiretrovirals used among people living with HIV with COVID-19 reported similar rates of COVID-19 disease as compared to the entire population and increased risk with older age, but not with low CD4, high viral load level or antiretroviral regimen.[5]

Currently, we have limited information about the risk of COVID-19 in people with HIV, but as they are having a compromised immune system, they are at a higher risk of getting SARS-CoV-2, the virus that causes COVID-19. So far in corona

Abstract

Information on people living with HIV (PLHIV) and current COVID-19 pandemic is still scarce in Indian setting. This case series of PLHIV with COVID-19 describes clinical characteristics and outcome in this special group of patients. This case series included 11 confirmed cases of COVID-19 among PLHIV admitted at a tertiary care hospital in Gujarat, India during April–December 2020. This retrospective study was conducted by doing secondary data analysis from case records of patients for various variables including demographic, clinical characteristics, HIV-related parameters, and outcome (discharged/death). The mean age of patients was 39.2 years ranging from 20 to 55 years. Nearly, 18% (2/11) of patients had major comorbidities like diabetes and hypertension. All were taking antiretroviral therapy drugs with >95% drug adherence and had CD4 count ranging from 79/cu.mm. to 1189/cu.mm. Majority (91%) of patients recovered and were discharged while only one patient (9%) died during course of COVID-19 treatment. COVID-19 showed a similar clinical and epidemiological profile among PLHIV like other group of people. Further studies with large-sample size are recommended to find risks of COVID-19 among PLHIV and its impact on treatment outcomes.

Keywords: AIDS, COVID-19, HIV, SARS-CoV-2

Clinical features and outcome of COVID-19 among PLHIV in Gujarat, India: A case series

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pandemic it has been seen that people who are vulnerable either due to age, comorbidity, malignancy, or immunocompromised are easily getting infected and high mortality also reported in this group of people. It would be interesting to know how the coexistence of these two viruses undertakes and effect of ongoing ART on SARS-CoV2 in Indian settings. Therefore, this is the first case series to learn more about how HIV and COVID-19 together impact on PLHIV in India. So, this study was conducted with objectives to determine epidemiological and clinical characteristics of COVID-19 among PLHIV and the outcome of COVID-19 in this special group of patients.

Materials and Methods

The case series included confirmed cases of COVID-19 among PLHIV admitted at tertiary care hospital attached to BJ Medical College, Ahmedabad during April–December 2020. A confirmed case was defined by a positive result on SARS-CoV-2 polymerase chain reaction assay from nasopharyngeal sampling.

This retrospective hospital-based study was conducted by analyzing secondary data obtained from case papers of patients. We extracted following information from the case records of patients: (i) demographic characteristics including age, gender, marital status, education, occupation and socio-economic status, (ii) clinical history including addiction history and comorbidities, (iii) HIV-related information like risk factor, spouse status, HIV diagnosis date, date of ART initiation, CD4 count latest, ART regimen, ART drug adherence, viral load and WHO clinical staging and (iv) COVID-19-related information like symptoms at admission, date of COVID diagnosis, radiological findings – Chest X-ray, laboratory parameters (CRP, D dimer, HBsAg, Hemoglobin), treatment received (IV Remdesivir), ventilation required, outcome (Recovered/discharged, death), duration of hospitalization.

The extracted data was entered in Microsoft Excel worksheet. Descriptive statistics including means, standard deviation, medians, proportions and ranges were used to summarize data. Data analysis was done in Microsoft Excel.

Ethics

Ethics approval was obtained from Institutional Ethics Committee of the BJ. Medical College, Ahmedabad, India. Permission was obtained from GSACS and all the advisories. Strict data confidentiality was maintained by keeping data collection forms in cabinet with securable cabinet having lock and key. The electronic data was kept in a password protected computer accessible only to the investigators.

Results

This study reports 11 PLHIV with COVID coinfection. The mean (SD) age of patients was 39.2 (12.7) years ranging from 20 to 55 years. There were nine males and two females. Out of 11, only 2 had major comorbidity, namely, diabetes and hypertension, while 1 was having Hepatitis B coinfection, 6 were anaemic and 6 had past history of tuberculosis. The mean duration since HIV diagnosis was 8.7 years ranging from 6 months to 18 years. Majority (7/11) were receiving ZLN and 4 were receiving TLE as ART regimen. Mean CD4 count was 586/cu.mm ranging from 79 to 1139/cu.mm. Only one PLHIV died, while others were discharged/recovered from COVID-19. The average hospital stay of patients was 15 days ranging from 3 to 54 days.

Discussion

This is first study, to our knowledge, reporting single centre case series of 11 PLHIV with COVID-19 infection in Indian setting. Since there was wide variation in age of patients ranging from 20 to 55 years, we could not observe any specific age wise distribution of COVID-19 among PLHIV. Similar finding was observed in studies conducted by Harter et al. in Germany and Ridgway et al. in Chicago.

As shown in Table 1, COVID-19 infection was observed in HIV naïve infected patients like 6 months since diagnosis to as long as even 18 years since diagnosis. All these 11 patients were taking ART drugs regularly with >95% drug adherence and all were provided standard treatment of COVID-19 as per guidelines. Similar findings were observed in studies conducted in Spain, China, Germany and New York.

Latest CD4 count among these PLHIV with COVID infection showed wide variation from 79 to 1139/cu.mm. As shown in Table 1, PLHIV number 1 with lowest CD4 count had maximum hospital stay of 54 days. However, that patient did not require any ventilatory support during hospital stay. On the contrary, PLHIV number 5 with high CD4 count of 1139/cu.mm. required ICU admission and ventilatory support and was discharged after 25 days. So, we could not establish any association between CD4 count and severity of COVID disease among PLHIV which may be due to small sample size. Similar findings were observed in studies conducted by Vizcarra et al., Childs et al. and Suwanwongse et al. However, primary hypothesis is that PLHIV with higher CD4 count may have short hospital stay compared to PLHIV with low CD4 count, irrespective of severity of COVID-19. However, we need more data with large sample size to certain this hypothesis.

Majority (8/11 = 72%) of patients presented with fever and cough as chief complaints on admission, while three patients presented with breathlessness and two patients with diarrhoea and abdominal pain.

Chest X-ray abnormalities suggestive of COVID-19 with pulmonary involvement were observed in four patients (36%). Contrary to this a study conducted in New York city showed 89% chest X-ray abnormalities and Shalev Noga et al. reported 65% chest X-ray abnormalities among PLHIV with COVID-19 infection.
| Sr No | 1     | 2     | 3     | 4     | 5     | 6     |
|-------|-------|-------|-------|-------|-------|-------|
| Age (in years) | 32 | 45 | 43 | 30 | 54 | 45 |
| Gender | Male | Female | Male | Male | Female | Male |
| Marital Status | Married | Married | Married | Married | Widowed | Married |
| Education | Illiterate | Sec. School | Sec. School | Sec. School | Graduated | Primary school |
| Occupation | Truck Driver | Job | Diamond Worker | Laborer | house wife | Laborer |
| SES class | 1 | 1 | 1 | 2 | 4 | 2 |
| H/o Addiction | No | No | No | No | No | No |
| Tobacco uses | No | No | No | No | No | No |
| Alcohol | No | No | No | No | No | No |
| Comorbidities | None | None | None | None | HT | None |
| History of Tuberculosis | No | Yes | No | Yes | No | No |
| Type of TB | NA | Extra pulmonary | NA | Extra pulmonary | NA | NA |
| Any other associated illness | No | No | No | No | Seizure | No |
| HIV risk factor | trucker | Heterosexual | heterosexual | Blood transfusion | Unknown | Heterosexual |
| Spouse HIV status | Negative | Negative | Negative | Negative | Negative | Negative |
| HIV diagnosis | 24-08-20 | 11-04-02 | 10-01-15 | 29-06-11 | 10-07-07 | 27-06-05 |
| Years Since HIV Diagnosed | 0.5 | 18 | 5 | 9 | 13 | 15 |
| Date of start ART | 05-09-20 | 21-08-09 | 19-01-15 | 19-07-11 | 23-06-09 | 02-06-08 |
| Latest CD4 | 79 | 562 | 431 | 999 | 1139 | 1052 |
| Date of CD4 testing | 01-09-20 | 21-08-20 | 01-01-20 | 18-01-20 | 25-06-20 | 03-12-19 |
| Current Regimen | TLE | ZLN | TLE | ZLN | ZLN | ZLN |
| Adherence (mainly in last 6 months) | >95% | >95% | >95% | >95% | >95% | >95% |
| Viral load (copies/ml) | Not available | 230 | 20 | 22 | TND (target Not detected) | Not available |
| current WHO Clinical State | II | I | I | I | I | I |
| Date of COVID diagnosis | 24-08-20 | 28-07-20 | 03-07-20 | 29-05-20 | 24-07-20 | 22-05-20 |
| Chief complain | right upper limb bulla formation with fever, cough | Chest pain, weakness, breathlessness since 4-5 days | Right lower lobe, left mid lobes soft tissue opacity | Fever, breathlessness since 4-5 days | Fever, fever, abdominal pain since 3 days, seizure disorder | Fever, sore throat, dry cough, body ache since three days |
| Pulmonary involvement | No | Yes | No | Yes | Yes | No |
| X ray | - | - | - | - | - | - |
| SPO2 at the time of admission ventilator | 98% | 97% | 97% | 96% | 98% | 98% |
| Other important findings | Blood Transfusion given twice along with debridement | D-dimer: 0.5 (high), CRP: 18.5 (high), FibriNogen: 199 | D-dimer: 0.63 (high), Serum ferritin: 169.96 (high), CRP: 1.44 (high), Interlukin: 44.73 (high) | Remdesivir given | Remdesivir given | Remdesivir given |
| Drugs | Weight (kg) | 53 | 70 | 73 | 79 | 58 | 68 |
| HBS Ag | negative | negative | negative | negative | negative | negative |
| Hb (gm/dl) | 8.9 | 11.1 | 14.4 | 14.7 | 9.4 | 12 |
| Date of outcome | 17-10-20 | 10-08-2020 | 13-07-2020 | 15-06-20 | 18-08-20 | 05-06-20 |
| outcome | Discharged | Discharged | Discharged under home isolation | Discharged | Discharged | Discharged |
| Duration of stay in Hospital (days) | 54 | 13 | 10* | 17 | 25 | 14 |

*Contd...*
| Sr No | 7    | 8    | 9    | 10   | 11   |
|-------|------|------|------|------|------|
| Age (in years) | 24   | 55   | 54   | 20   | 29   |
| Gender | Male | Male | Male | Male | Male |
| Marital Status | Single | Married | Married | Single | Single |
| Education | Sec. School | Graduated | Graduated | Sec. School | Graduated |
| Occupation | Job | Job | Job | Details Not Available | Skilled Worker |
| SES class | 1 | 2 | 5 | 4 | 1 |
| H/o Addiction | Yes | No | No | Yes | Yes |
| Tobacco uses | Yes | No | No | No | Yes |
| Alcohol | No | No | No | Yes | No |
| Comorobidity | None | None | HT | None | None |
| History of Tuberculosis | Yes | Yes | Yes | No | Yes |
| Type of TB | On TREATMENT | Extra pulmonary | Extra pulmonary -cured | NA | On TREATMENT |
| Any other associated illness | Pul TB, HBsAg | Positive, RPR | Positive | Mother to child | Migrant |
| HIV risk factor | unknown | unknown | unknown | Mother to child | Migrant |
| Spouse HIV status | NA | Negative | Negative | NA | NA |
| HIV diagnosis | 05-05-20 | 02-07-04 | 24-12-10 | 30-05-12 | 29-01-20 |
| Years Since HIV Diagnosed | 0.5 | 16 | 10 | 8 | 0.5 |
| Date of start ART | 26-05-20 | 16-02-09 | 04-02-11 | 30-05-12 | 08-06-20 |
| Latest CD4 | 131 | 870 | 649 | 374 | 161 |
| Date of CD4 testing | 06-05-20 | 18-02-20 | 20-08-19 | 12-11-19 | 08-06-20 |
| Current Regimen | TLE | ZLN | ZLN | ZLN | TLE |
| Adherence (mainly in last 6 months) | >95% | >95% | >95% | >95% | >95% |
| Viral load (copies/ml) | Not available | Not available | Not available | Not available | Not available |
| current WHO Clinical State | III | I | I | I | IV |
| Date of COVID diagnosis | 08-05-20 | 19-05-20 | 03-05-20 | 15-08-20 | 30-04-20 |
| Chief complain | fever, dry cough, generalize weakness since 20 days | Fever, cough, diarrhoea | low grade fever, generalize weakness, breathlessness at rest, cough with expectoration since 3 days | Fever, diarrhoea, weakness | Weakness, cough, abdominal pain |
| Pulmonary involvement | No | No | Yes | B/L consolidation | 55% on air |
| X ray | SPO2 at the time of admission | 98% | 98% | 98% | 98% |
| ventilator | No | No | Yes | No | No |
| Other important findings | RBS high, insulin started D-dimer:(high), 3.7, Serum ferritin: 1589 (high), CRP: 19 (high) | - | - | - | - |

**Table 1: Demographic and clinical profile of study participants (n=11)**

*discharged with advice of home isolation*
In this study, out of 11 patients, 10 patients recovered and were discharged, while 1 patient died indicating mortality rate of 9% for this study. Similar findings were observed in different studies conducted by Harter et al. and Tuohy et al.\textsuperscript{[7,9]}

Regarding severity of disease, in this study, two patients needed ventilatory support and were admitted in ICU, of which one patient died. Both these patients were more than 50 years of age with other comorbidities like hypertension. One patient who died within 4 days of COVID diagnosis was having comorbidities including hypertension and diabetes and his investigations showed low viral load and high levels of CRP and D-dimer. The other patient who was on ventilator and had bacterial meningitis, treated with antibiotics and antivirals including remdesivir, showed clinical improvement and was discharged after 25 days of COVID diagnosis. We could not establish any specific clinical features in PLHIV with COVID-19 patients on ventilatory support. Similar finding was observed in a study conducted by Tuohy et al.\textsuperscript{[9]}

The specific challenges in clinical management of COVID-19 among PLHIV is to take care of critical issues like drug side effects, drug–drug interactions, taking care of mental health with dual viral infection in this group of cases.

It is imperative for primary care physicians to understand that the course of COVID-19 among PLHIV is almost normal as non-PLHIV and this knowledge would help them in counsel the patients.

There are some limitations in this study. First, it includes data from small number of subjects admitted to one tertiary care hospital. Second, data were extracted from case records of patients which may have some missing information or errors. Third, we have not taken any comparative group like COVID patient without HIV infection for further data analysis.

Conclusion

We did not find any unique or specific epidemiological or clinical characteristics among 11 PLHIV with COVID-19 infection in this study. COVID-19 showed similar clinical and epidemiological picture among PLHIV like other group of people. Although PLHIV are more vulnerable to COVID-19, but disease severity, clinical manifestations and outcome remain similar to other non-PLHIV COVID-19 patients. Further studies with large sample size are required to analyse the effect of COVID-19 among PLHIV in terms of mortality or other clinical parameters.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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