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HIV Does Not Increase the Risk of Disease Severity in Patients with COVID-19 Infection

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Background

- Limited literature on the impact of COVID-19 infection in persons living with HIV infection (PLWHIV) has shown conflicting results especially on the degree of disease severity and morbidity/mortality risk impact.[1,2,3,4]
- Moreover, to study the immune response after vaccination in PLWHIV is understudied. Therefore, we conducted an observational study at the Positive Health Clinic (PHC) to evaluate COVID-19 infection clinical outcomes in vaccinated and unvaccinated PLWHIV. In addition, "SARS-CoV-2 Semi-Quantitative Total Antibody, Spike (SARS-CoV-2 antibody titer)" were measured after completion of vaccinations two doses for Pfizer, Moderna; one dose for J&J).
- PHC is a Pittsburgh urban Ryan White-funded HIV clinic which serves a culturally and economically diverse group of ~950 PLWHIV (Median age 52; male 84%, female; AA 41%, W 56%, H 2.4%; CD4 < 200 5%, HIV VL > 200 7.4%)

Methods

- A quality improvement project was conducted between 03/2020 to 03/2022 at PHC.
- Patients who tested positive for COVID-19 were followed up for their clinical presentations and outcomes.
- Goals were to observe:
  1. The longitudinal clinical impact with or without vaccinations,
  2. The COVID-19 vaccination acceptance rates and SARS-CoV-2 antibody titer after vaccinations,
  3. COVID-19 variants impact on risk of COVID 19 infection conferred post vaccination.
- Initial data from March 2020 to November 2021 showed a total of 46 unvaccinated cases and 11 vaccinated cases. The details for the unvaccinated and vaccinated groups from 03/20-11/21 are listed in tables 1 & 2, respectively.
- The time after the 2nd vaccination dose ranged from between 0 - 8.1 months.
- A teamwork approach of PHC administrators, social workers, and clinical staff promoted COVID-19 vaccinations to all PHC patients including educational, scheduling and transportation starting 02/21.

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Un-vaccinated – 46 cases
- Demographic:
  - 37 M/ 7 F/ 2 trans;
  - Median age: 49.9; 20 AA/ 22W/ 2 Asian/ 2 others
- CD4 range 166-1413 (Median 616);
- HIV VL: < 100 (43); VL 20-100 (2); VL 500-550 (1)
- Symptomatic:
  - Asymptomatic - 2
  - Symptomatic - 44
- Hospital Admission:
  - 2 (not related to COVID 19)
  - 6 (All have COVID19 Pneumonia)
- Death: Related to COVID - 0
  - Non-nature death – 1
  - Not related to COVID – 1 (ESRD, Sepsis, C. difficile)
- Post COVID 19 Health Sequela:
  - 1 (Hemiparesis and renal failure after CNS stroke)

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Vaccinated – 11 cases
- Time after 2nd vaccinations (range 0 – 8.1 months)
- Demographic:
  - 10 M/1 F;
  - Median age: 51.5; 2 AA/8 W/1 Asian
- CD4 range 324 - 1602;
- HIV VL: all < 20 copies
- Symptoms:
  - Asymptomatic - 2
  - Symptomatic - 9
- Hospital Admission:
  - one case (psychiatric admission; not related to COVID19)
- Death
  - none
- Post COVID 19 Health Sequela:
  - none

Tables 1 & 2 show patient characteristics as well disease outcomes in patients who contracted COVID-19 Infection from 03/20 to 11/21 in both vaccinated and unvaccinated groups.

- There was a total of 6 unvaccinated cases and 50 vaccinated cases who contracted COVID-19 infection from 11/21 to 03/22, the details of which are shown in tables 3 & 4, respectively.

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Un-vaccinated – 6 cases
- Demographic:
  - 4 M/ 2 F; Median age: 51.5; 3 AA/ 3 W
  - CD4 range 314-881 (Median 775);
- HIV VL: < 20 (5); VL > 1000 (1)
- Symptomatic:
  - Asymptomatic - 0
  - Symptomatic - 6
- Hospital Admission:
  - 2 (one had Pneumonia; one had pneumonia with subsequent pulmonary embolism noted one month after COVID 19 diagnosed)
- Death
  - Related to COVID - 0
  - Non-nature death – 0
  - Not related to COVID - 0
- Post COVID 19 Health Sequela: 0

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Vaccinated – 50 cases (4 had prior unvaccinated COVID 19 infections. All had mild symptom)
- Had 3 doses: 24 cases
  - Days after 3rd dose: median 74 days; range 9 – 357 days)
- Had two doses: 24 cases
  - Days after 2nd dose (median 290 days; range 65-350 days)
- Had one dose only: 2 cases (28 days and 352 days)
- Demographic:
  - 38 M/9 F/1 trans; Median age: 51.5 (range 25-73); 22 AA/ 23 W/ 2 His/1 Asian
- CD4 range 324 - 1602; ; HIV VL: < 20 (39); 20-100 (5); 100-300 (3)
- Symptoms:
  - Asymptomatic - 5
  - Symptomatic - 45
- Hospital Admission: one case (pneumonia)
- Death (0)
- Post COVID 19 Health Sequela: 0

Tables 3 & 4 show patient characteristics as well as disease outcomes in both vaccinated and unvaccinated patients from 11/21 to 03/22.

Data Analysis

- Epiinfo (CDC) software was used to evaluate the significance of different variables such as age, gender, CD4 count, HIV VL, and vaccination types that affect immune response.
- The relationship between COVID-19 infection severity in vaccinated vs unvaccinated patients during different periods of COVID-19 infection strain surging were studied.

Measurement of Vaccination Response Conferred Post Vaccinations:

- To assess the level of immune response developed by the vaccinations in PLWHIV, we measured SARS-CoV-2 antibody titer after COVID19 vaccination (most were done ~ 4-8 week after the completion of vaccinations; one dose for J&J and two doses for Moderna or Pfizer).
- We used LabCorp and AHN Core Lab values.
- The LabCorp value ranged from 0.8 – 250 and 0.8 – 2500 and AHN Core Lab value ranged from 0.8 – 250.
- Non responder response was < 0.4.
- The total data was collected for 136 patients. The demographic data for these 136 patients is shown in table 5 & 6 respectively.

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RACE	Frequency	Percent
Asian	1	0.74%
Black or African American	63	46.32%
Hispanic	4	2.94%
Other	1	0.74%
White or Caucasian	67	49.26%

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GENDER	Frequency	Percent
Female	21	15.44%
Male	113	83.09%
Transgender M-F	2	1.47%
Total	136	100.00%

Tables 5 & 6 show patient demographics.

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COVID VACCINATION (TYPE)	Frequency	Percent
J&J	10	7.35%
Moderna	26	19.12%
Pfizer	99	72.79%
Sinopharm	1	0.74%
Total	136	100.00%

Table 7 shows the type and frequency of vaccinations in our patients.

Results

- By 02/21, a 70% vaccination rate was achieved for PHC PLWHIV (Figure 1).
- 136 SARS-CoV-2 antibody titer were collected at least 28 days after completing the primary vaccination series.
- Five non-responders were noted (2 renal transplant recipients, 2 with advanced AIDS with uncontrolled HIV, and 1 with liver cirrhosis).
- Low SARS-CoV-2 antibody titers were observed in patients with CD4 < 200 or HIV VL > 200.
- A total of 109 COVID-19 infections in 105 patients were seen.
- From 03/20 to 11/21, there were 53 infections noted (45 unvaccinated: 5 with severe disease; 8 vaccinated: 0 severe disease).
- 58 infections (8 unvaccinated, 2 severe, 50 vaccinated (including four 2nd infections: 0 severe) were observed during 11/221 – 03/22.
- No mortality was noted.

8 **Vaccination Response to COVID19 vaccinations - a PHC QI Project**

Total: 136 Variable (N)	Titer < 100 (N; %)	P-Value (Odds Ratio/cross)
CD4 < 200 (16)	11; 68.8%	< 0.0001 (6.40-74.25)
HIV VL > 200 copies (14)	8; 42.9%	0.0115 (1.52-16.2)
Moderna vaccine (26)	1; 3.85%	0.0749 (0.02-1.32)
Pfizer vaccine (99)	14; 14.1%	0.30367 (0.23-1.57)
J&J Vaccine (10)	6; 60%	0.0013 (2.62-40.56)
Test > 20 weeks after (17)	3; 17.65%	1.0000 (0.30-4.31)

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Total: 136 Variable (N)	Titer < 100 (N; %)	P-Value (Odds Ratio/cross)
Age > 60 (55)	5; 9.09%	0.0954 (0.13-1.09)
Female (21)	7; 33.33%	0.0463 (1.16-9.59)
African American (63)	12; 19.05	0.48 (0.59-3.71)

Table 8 & 9 show the relationship between different variables and antibody response to COVID-19 vaccinations.

Conclusion

- This report did not show mortality directly associated with COVID-19 infection in PLWHIV at PHC Clinic.
- Moreover, COVID-19 vaccination is known to reduce the risk and severity of COVID-19 infection in the general population, which was consistent across our study.
- Interestingly, there were very few COVID-19 infections diagnosed in PLWHIV who had low CD4 count and uncontrolled HIV (CD4 < 200 & HIV VL > 500 copies) even after the surge of the Omicron variant.
- COVID19 vaccinations reduce the risk of COVID19 infection in PLWHIV; however, it dose not reduce risk of infection after the surge of Omicron variant. Vaccination surely reduce the severity of the COVID19 disease in this observation.
- Asymptomatic COVID19 infection may be seen in vaccinated and unvaccinated PLWHIV and general population.
- We have seen COVID19 re-infection occurred after the surge of Omicron variant in this report.
- Person with high level of SARS-CoV-2 antibody titer may still be at risk of vaccine break-through COVID19 infection.

Figure 1

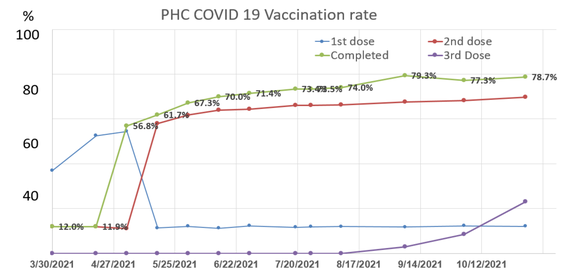
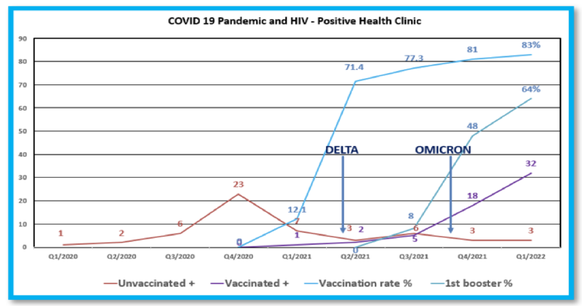


Figure 2



Discussions

- Interestingly, prior to Omicron variant, COVID19 vaccinations reduced the risk of acquiring the infection as well as the severity of the infection. However, after the Omicron surge, the vaccination did not show benefit in either reducing the risk of infection or the severity of disease. This could be related to a combination of both virus factors (less virulence but higher transmissibility) and host factors (weakened immunity conferred by the vaccination to this variant). We hope that the newer COVID 19 bivalent vaccination may effectively reduce the risk of infection by Omicron and the newer surge of future COVID 19 variants.

- This also poses another question of the significance of pre- and post- exposure prophylaxis for COVID-19 infection in immunocompromised hosts such as PLWHIV with advanced AIDS.

References

[1] WHO-2019-nCoV-Clinical-HIV-2021.1-eng.pdf
[2] Bhaskaran K, Rentsch CT, MacKenna B, Schultze A, Mehrkar A, Bates CJ et al. HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform. Lancet HIV. 2021;8:e24-e32. doi: 10.1016/s2352-3018(20)30305-2.
[3] Tesoriero JM, Swain CE, Pierce JL, Zamboni L, Wu M, Holtgrave DR et al. COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State. JAMA Netw Open. 2021;4:e2037069. doi: 10.1001/jamanetworkopen.2020.37069. 10. Jassat W, Cohen C, Masha M, Goldstein S, Kufa T, Savulescu D et al.
[4] COVID-19 in-hospital mortality in South Africa: the intersection of communicable and non-communicable chronic diseases in a high HIV prevalence setting. medRxiv. 2020:2020.12.21.20248409. doi: 10.1101/2020.12.21.20248409

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