Effectiveness of COVID-19 Vaccines in People Living with HIV in British Columbia: A Test Negative Design

H. Samji[1, 2], A. Fowokan[2], J. Puyat[3], N. Janjua[2, 3], J. Wilton[2], J. Wong[2, 3], T. Grennan[2], C. Chambers[4], A. Kroch[4], C. Costiniuk[5], C. Cooper[6], A. Burchell[4, 7], A. Anis[3]

[1]Faculty of Health Sciences, Simon Fraser University; [2]British Columbia Centre for Disease Control; [3]School of Population and Public Health, University of British Columbia; [4]University of Toronto, Dalla Lana School of Public Health, Toronto, Canada; [5]McGill University, Division of Infectious Diseases, Montreal, Canada; [6]University of Ottawa, Department of Medicine, Ottawa, Canada; [7]St. Michael's Hospital, Toronto, Department of Family and Community Medicine and MAP Centre for Urban Health, Toronto, Canada

Introduction

The efficacy of COVID-19 vaccines against severe disease, hospitalizations, and deaths was rapidly established in drug approval trials. Less is known, however, about their effectiveness among immunocompromised individuals such as people living with HIV (PLWH). Given the paucity of research in this area and the rise of new COVID-19 variants, it is necessary to evaluate COVID-19 vaccine effectiveness (VE) to inform vaccine strategies for PLWH.

Study Objectives

We estimated the effectiveness of Pfizer-BioNTech (BNT162b2), Moderna (mRNA-1273) and AstraZeneca (ChAdOx1) vaccines in a population-based cohort against laboratory confirmed SARS-CoV-2 infections among PLWH.

Methods

We used the British Columbia (BC) COVID-19 Cohort (BCC19C), which integrates data on SARS-CoV-2 tests, COVID-19 cases, hospitalizations, and immunization with provincial health services administrative data. PLWH status was assessed using an adapted version of a previously validated case-finding algorithm by Nosyk et al. All PLWH who were living in BC, ≥19 years old, and tested for SARS-CoV-2 between December 15, 2020 (when vaccines became available in BC), and November 21, 2021 (time before Omicron variant), were eligible.

Those who tested positive during the study period were considered cases, while those who tested negatives were considered controls. VE was estimated with a test-negative design using multivariable logistic regression to compare the odds of vaccination between cases and controls, adjusting for age, sex, area-level income, health region, number of COVID-19 tests 3 months prior to study period, Elixhauser comorbidity index, and bi-weekly testing periods. We used the formula (1-AOR) x100% to compute VE.

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Results

Table 1: Demographic and Clinical Characteristics of Study participants by Testing Status (n=2700)

Study Characteristics	Positive (n=351)	Negative (n= 2349)	SD
Mean Age (SD)	48.7 (11.9)	50.6 (13.2)	0.15
Sex			
Female	127 (36.2%)	646 (27.5%)	0.19
Neighborhood Income (quintiles)			
Lowest	157 (44.7%)	971 (41.3%)	0.07
2	60 (17.1%)	461 (19.6%)	0.07
3	57 (16.2%)	421 (17.9%)	0.04
4	51 (14.5%)	319 (13.6%)	0.03
Highest	26 (7.4%)	174 (7.4%)	0.00
Persons who Inject Drugs			
Yes	176 (50.1%)	922 (39.3%)	0.22
Number of Vaccine Doses			
0	75 (21.4%)	248 (10.6%)	0.30
1	26 (7.4%)	155 (6.6%)	0.03
2	224 (63.8%)	1549 (65.9%)	0.04
3	26 (7.4%)	397 (16.9%)	0.29
Elixhauser Comorbidity Index			
0	39 (11.1%)	268 (11.4%)	0.01
1	37 (10.5%)	342 (14.6%)	0.12
2	58 (16.5%)	339 (14.4%)	0.06
3 or more	217 (61.8%)	1400 (59.6%)	0.05
Health Authority			
Interior	23 (6.6%)	189 (8.1%)	0.06
Fraser	111 (31.6%)	651 (27.7%)	0.09
Vancouver Coastal	175 (49.9%)	1218 (51.9%)	0.04
Vancouver Island	20 (5.7%)	217 (9.2%)	0.14
Northern	22 (6.3%)	71 (3.0%)	0.15
Vaccine Received*			
Pfizer	217 (61.8%)	1592 (67.8%)	0.12
Moderna	74 (21.1%)	659 (28.1%)	0.16
AstraZeneca	20 (5.7%)	222 (9.5%)	0.14

**Among vaccinated participants; Most participant received an mRNA vaccine*

Adjusted VE against laboratory confirmed infection 7 to 59 days after second vaccine dose was 79.2% (95% CI = 52.5 to 90.9%); this increased to 91.6% (95% CI = 75.2 to 97.2%) 60-89 days after dose 2 and was preserved up to 90 to 119 days. We found slight evidence of vaccine waning 120 to 179 days after dose 2 (VE = 72.7% (95% CI = 39.1 to 87.8%).

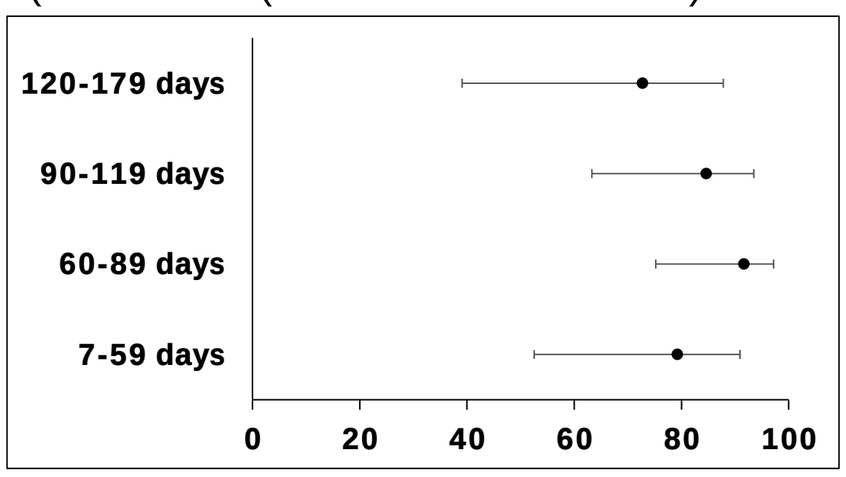

Figure 1: Adjusted Vaccine Effectiveness Estimates of COVID-19 vaccines against symptomatic infection during the study period, by time since vaccine dose

Conclusion

There were few COVID-19 infections limiting the precision of estimates; nevertheless, findings confirm that receipt of two doses of (mostly mRNA) COVID-19 vaccines protects against SARS-CoV-2 infections from pre-Omicron variants.

When compared to estimates from the larger BC population, different patterns were observed. VE 7 to 59 days after 2 doses was 91.0% (90.5, 91.5%), this was sustained for up to four months after which evidence of wanning was observed, dropping to 83.8% (82.9, 84.7%) four to six months.

Future efforts will focus on the impact of variants of concern on VE and comparing VE estimates with a matched HIV-negative cohort.

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