Cardiac Arrhythmias Associated with Coronavirus Disease and Post-COVID Vaccinations: A Target Trial Emulation Using Real-World Data

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Background

The assessment of Cardiac Arrhythmias in patients who had coronavirus disease (COVID-19) has emerged as a critical area of research, given the significant cardiovascular complications associated with COVID-19. Studies indicate that approximately 18.27% of hospitalized COVID-19 patients experienced arrythmias. Further, there has been a growing focus on the association of COVID-19 vaccinations and arrhythmic events.

Objective

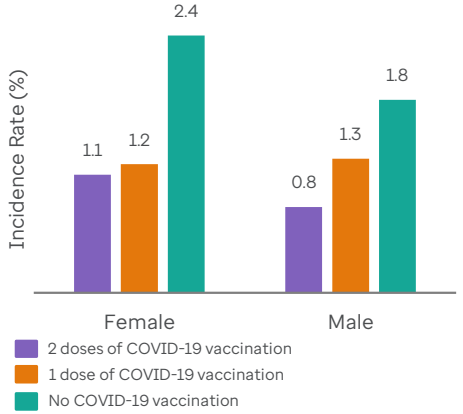
- This target trial emulation (TTE), utilizing real-world data, aims to evaluate occurrences of cardiac arrhythmias in COVID-19 patients and in sub-cohorts of patients who had received the first and second doses of COVID-19 vaccines.
- TTE makes real-world observational studies more comparable to randomized controlled trials. It provides a structured framework for study design and data analysis, enhancing the validity and reliability of the findings.

Methodology

- The study utilized the Optum® de-identified Market Clarity database, identifying patients diagnosed with COVID-19 through both claims and electronic health records data from January 1, 2020, to December 31, 2022, with the first COVID-19 diagnosis date being the index date.
- After applying 12-month pre- and 18-month post-eligibility criteria and excluding patients with cardiovascular conditions during the baseline period, a total of 3,253,789 patients aged ≥18 years were accrued from the database.
- Patients with at least one incidence of cardiac arrhythmia (CA) were studied during the follow-up period. The study compared the incidence rates of CA in patients who received one or at least two doses of the COVID-19 vaccine with those who were unvaccinated. Additionally, analyses were conducted based on gender, age, region, race, and ethnicity.

Results

- Overall, 7.37% of patients had at least one incidence of CA during the follow-up period.
- However, this percentage significantly decreased to 3.59% (OR: 0.47; p<0.001) after receiving at least one dose of any COVID-19 vaccine (**Figure 1**).



- The incidence of CA dropped even further to 1.90% (OR: 0.24; p<0.001) among patients who received two doses of the vaccine.
- The rate of patients experiencing CA events was consistently and significantly (p<0.001) lower after two doses of COVID vaccines compared to one dose of COVID vaccine (**Figure 2**).
- The analysis was conducted by age groups, geographic locations, and ethnicity.

Figure 1. Incidence rate of CA by Gender

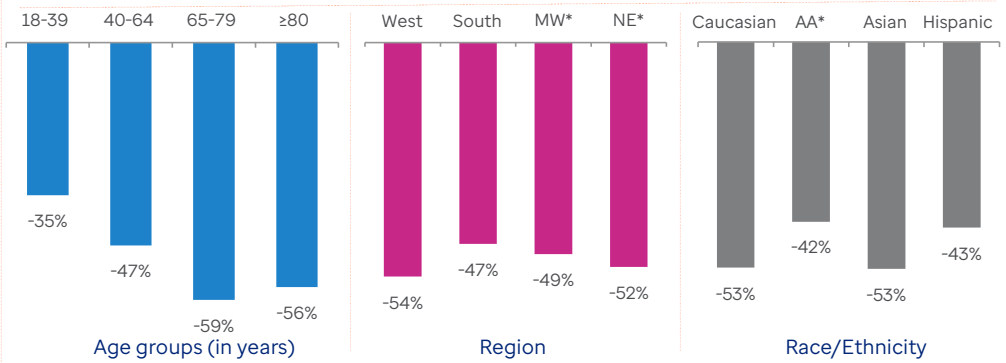


Figure 2. Reduction (%) in CA for patients who took 2 *vs.* 1 dose of COVID-19 vaccine

Conclusions

COVID-19 vaccination may reduce the risk of CA in patients diagnosed with COVID-19, indicating potential protective effects against such complications. Further analysis will account for other risk factors and extend the follow-up period to provide more comprehensive insights.

Abbreviations: * MW: Mid-west | NE: North-East | AA: African American

Reference: Abutaleb MH, Makeen HA, Meraya AM, Alqahtani SS, Al-Mass BI, Aljazaeri RO, Alhazmi BD, Kalakattawi AMN, Alajam AA. Risks of Cardiac Arrhythmia Associated with COVID-19 Vaccination: A Systematic Review and Meta-Analysis. Vaccines. 2023; 11(1):112. https://doi.org/10.3390/vaccines11010112

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