Supplemental Online Content

Kim YE, Huh K, Park Y-J, et al. Association between vaccination and acute myocardial infarction and ischemic stroke after COVID-19. *JAMA*. Published online July 22, 2022. doi:10.1001/jama.2022.12992

eMethods

eReference

This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods

Data source

This study was conducted using a combined database of coronavirus disease 2019 (COVID-19) constructed by the Korea Disease Control and Prevention Agency (KDCA) and the National Health Insurance Service (NHIS) of the Republic of Korea. The KDCA curates a registry of all individuals diagnosed with COVID-19 as a notifiable infectious disease designated by law. The NHIS is a quasi-governmental agency that acts as a single-payer for universal health care coverage in Korea. The NHIS reimburses all medical costs within coverage except for certain occupation-related injuries, motor vehicle accidents, and military personnel. The combined database included demographic characteristics (age, sex, and area of residence), date of COVID-19 diagnosis, date and type of COVID-19 vaccination, and healthcare reimbursement.

Case definitions

AMI was identified as hospital admissions with AMI as the primary diagnosis.

Category	**International Classification of Disease, 10th Revision (ICD-10) codes**
Acute myocardial infarct	I21, I21.0, I21.1, I21.2, I21.3, I21.4, I21.9

Ischemic stroke was defined as hospital admission 1) with compatible primary diagnosis and 2) during which advanced brain imaging (i.e., computed tomography or magnetic resonance imaging) was performed.

Category	**International Classification of Disease, 10th Revision codes or Electronic Data Interchange medical procedure codes**
Cerebral infarct	I63, I63.0, I63.1, I63.2, I63.3, I63.4, I63.5, I63.6, I63.8, I63.9
Advanced brain imaging	HA441, HA451, HA461, HA471, HA511, HA521, HA531, HA551, HA561, HA851; HI101, HI201, HI301, HJ401, HI501, HI535, HJ101, HJ201, HJ301, HJ401, HJ501, HJ535, HF101, HF102, HF201, HF202, HE101, HE201, HE301, HE401, HE501, HE135, HE235, HE535

Demographic characteristics (age, sex, and insurance type), Charlson comorbidity index (CCI),[1] diabetes, hypertension, dyslipidemia, previous history of outcome events, and the severity of COVID-19 were collected. Severe COVID-19 was identified using electronic data interchange (EDI) procedure codes for supplementary oxygen. Critical COVID-19 was identified by the EDI codes for high-flow nasal cannula, intubation, tracheostomy, mechanical ventilation, and extracorporeal membrane oxygenation.

The Cox proportional hazard model with inverse probability of treatment weighting (IPTW) was used to account for baseline differences in patient characteristics. The propensity score (PS) was calculated using logistic regression with full vaccination as an independent variable and age, sex, CCI, hypertension, and insurance type as covariates. Fully vaccinated individuals were weighted with 1/PS and never vaccinated individuals with 1/(1-PS). The imbalance of covariates before and after IPTW was assessed using standardized differences, and standardized difference <0.1 was considered the optimal balance between groups. The Cox proportional hazard model was constructed with sex, age, previous history of outcome events, diabetes, hypertension, hyperlipidemia, CCI, and the severity of COVID-19 as covariates, weighted using IPT. Subgroup analysis was conducted for sex, age, CCI, diabetes, hypertension, and dyslipidemia.

Statistical analyses were performed using SAS Enterprise Guide 7.1 (SAS Institute, Cary, NC, USA).

eReference

1. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis 1987;40(5):373-83. (In eng). DOI: 10.1016/0021-9681(87)90171-8.