



Editorial



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Conflict of Interest

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COVID-19 Vaccination for People with Comorbidities

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Since the first coronavirus disease 2019 (COVID-19) vaccination on December 8, 2020 in the United Kingdom (UK), more than 250,000,000 people worldwide have been vaccinated against COVID-19 in more than 100 countries as of March 5, 2021 [1]. In Korea, COVID-19 vaccinations started from February 26, 2021 among health professionals who are directly involved in treating COVID-19 patients, employees, and residents in long-term care facilities, and first-line COVID-19 responders. According to the Korean public health plan for the introduction and vaccination of COVID-19 vaccines, it is expected that vaccination will be performed in people aged ≥ 65 years from the second quarter and in people aged < 65 with underlying diseases from the third quarter. People with comorbidities are well known as high-risk groups for COVID-19 [2]. However, there have been many questions raised about the safety, efficacy, and recommendation for COVID-19 vaccination in individuals with underlying medical conditions. This article aimed to present the efficacy and safety of each COVID-19 vaccine based on the presence and types of comorbidities, and to summarize the guidelines recommended by the World Health Organization (WHO), as well those implemented in the United States of America (USA) and the UK.

CLINICAL RESEARCH RESULTS

Of the five COVID-19 vaccines that have been or are planned to be introduced in Korea, specific clinical research results are available for four vaccines. In each clinical research study for the vaccines, individuals with underlying medical conditions accounted for more than 20 - 30% of the study participants.

In the phase 2 and 3 clinical trials (C4591001) for the Pfizer COVID-19 vaccine (BNT162b2), 20.3% of the sample population reported one or more underlying diseases [3]. The most common comorbidities were hypertension (24.5%), diabetes mellitus (DM) (7.8%), and chronic lung disease (7.8%). On analyzing the preventive effect according to the presence of comorbidities, similar preventive effects were observed in the group without comorbidities (94.7%; 95% confidence interval [CI], 85.9 to 98.6) and the group with comorbidities (95.3%; 95% CI, 87.7 to 98.8). Patients with the most common comorbidities also showed similar preventive results as follows: hypertension (95.4%; 95% CI, 82.6 to 99.5), DM (94.7%; 95% CI, 66.8 to 99.9), and chronic lung disease (93.0%; 95% CI, 54.1 to 99.8). The frequency of adverse events was similar in the group with comorbidities and the total sample population. Six deaths were reported: two in the vaccination group and four in the control group. Of the

deaths in the vaccination group, one patient had obesity and atherosclerosis. It was assessed that the deaths were not associated with the vaccine.

In the phase 3 clinical trials (P301) for the Moderna COVID-19 vaccine (mRNA-1273), 22.2% of the sample population had high-risk underlying diseases [4]. The most common comorbidities were DM (9.4%), severe obesity with body mass index (BMI) ≥ 40 kg/m² (6.5%), severe heart disease (4.9%), and chronic lung disease (4.8%). Patients infected with human immunodeficiency virus (HIV; 0.6%) were also included. On analyzing the preventive effect according to the presence of comorbidities, similar preventive effects were observed in the group without comorbidities (94.0%; 95% CI, 83.5 to 97.8) and the group with comorbidities (95.9%; 95% CI, 69.7 to 99.4). Participants with severe obesity, one of the most common comorbidities, showed a preventive effect of 91.2% (95% CI, 32.0 to 98.9). In the vaccinated participants with DM, severe heart disease, chronic lung disease, and HIV infection, statistical significance was not demonstrated since the lower limit of 95% CI was unable to be assessed, although no symptomatic COVID-19 infection was detected in the vaccination group. The frequency of adverse events were similar in the group with comorbidities and the total sample population. Thirteen deaths were reported: six in the vaccination group and seven in the control group. Of the deaths in the vaccination group, three patients had underlying heart disease, one had hypertension, and one had Crohn's disease with short bowel syndrome. It was assessed that the deaths were not associated with the vaccine.

In the phase 2 and 3 clinical trials (AZD1222) performed in the UK and Brazil for the AstraZeneca COVID-19 vaccine (BNT162b2), 39.3% of the sample population had one or more underlying diseases, including obesity with BMI ≥ 30 kg/m², cardiovascular disease, lung disease, and DM [5]. The phase 2 and 3 clinical trials (COV002) performed in the UK included patients with cardiovascular disease (11.5%), lung disease (12.4%), and DM (2.2%). The phase 3 clinical trials (COV003) performed in Brazil included patients with cardiovascular disease (15.6%), lung disease (10.0%), and DM (3.8%). Although the preventive effect was slightly lower in patients with one or more underlying diseases (58.3%; 95% CI, 33.6 to 73.9) than in the total sample population, the difference was not statistically significant. Among the patients, four (one in the patient group and three in the control group) died due to causes other than COVID-19, including traffic accident, trauma, murder, and pneumonia. It was concluded that the deaths were not associated with the vaccine [6].

In the phase 3 clinical trials (Study 3001) for the Jansen COVID-19 vaccine (Ad26.COV2.S), 40.8% of the sample population had one or more underlying diseases. The most common comorbidities were obesity with BMI ≥ 30 kg/m² (28.5%), hypertension (10.3%), type 2 (7.3%), and HIV infection (2.8%) [7]. On analyzing the preventive effect according to the presence of comorbidities, the difference was not statistically significant, although the group without comorbidities (68.8%; 95% CI, 59.0 to 76.6) showed slightly better preventive effects than the group with comorbidities (58.6%; 95% CI, 40.6 to 71.6). Participants with obesity, showed a preventive effect of 66.8% (95% CI, 54.1 to 76.3), which was similar to that of the group without comorbidities. While the patients with hypertension (63.2%; 95% CI, 30.6 to 81.6) and type 2 DM (52.9%; 95% CI, 10.5 to 76.3) demonstrated similar or slightly lower preventive effects than the group without comorbidities, the difference was not statistically different. Among the participants with HIV infection, no statistically significant preventive effect was observed. A total of 19 deaths were reported: 3 in the vaccination group and 16 in the control group. Of the deaths in the vaccination group, there was one patient with HIV infection. It was assessed that the deaths were not associated with the vaccine.

INTERNATIONAL GUIDELINES

The Advisory Committee on Immunization Practices (ACIP) in the USA recommended COVID-19 vaccination for patients with underlying medical conditions [8]. It has been described that, despite limited data, COVID-19 vaccination can be performed in immunocompromised individuals, considering the high risk of progression to severe conditions. The Joint Committee on Vaccination and Immunisation (JCVI) in the UK also recommended COVID-19 vaccination for those with comorbidities, including immunocompromised individuals [9]. In the interim guidelines for COVID-19 vaccines from Pfizer, Moderna, and AstraZeneca published by the WHO Strategic Advisory Group of Experts on Immunization (SAGE), it was recommended that all the three COVID-19 vaccines can be used for individuals with high-risk comorbidities [10]. For severely immunosuppressed patients, despite limited data and the possibility of reduced immune response it was suggested that they may be vaccinated, considering their high risk for COVID-19 and the characteristics of vaccines

Based on the results of the reported clinical studies so far, COVID-19 vaccination showed similar efficacy and safety in individuals with comorbidities and those without any underlying medical conditions. Considering that individuals with comorbidities have a higher risk of progression to severe conditions or death when infected with COVID-19, the benefits of the COVID-19 vaccination outweigh the risks. However, the sample populations in previous clinical studies included only a limited number of severely immunocompromised patients, although a few HIV-infected patients were reported. Guidelines from the USA, the UK, and the WHO recommend COVID-19 vaccination for patients with comorbidities. Likewise, the Korean government recommends COVID-19 vaccination for patients with comorbidities. Although national data are currently scarce, it is expected that additional population-based data on the validity and safety of COVID-19 vaccination including individuals with comorbidities will become available through ongoing vaccination implementation.

SUPPLEMENTARY MATERIAL

Editorial Korean Version.

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