

Abstract

Background: The chance of developing a severe coronavirus infectious (COVID-19) disease, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), increased especially in patients with hematological malignancies. These patients are more likely to produce less antibody protection due to the immunocompromised nature of the disease and the anti-cancer treatments. Therefore, the present systematic review intended to evaluate the seroconversion rate of COVID-19 vaccines in patients with hematological malignancies compared to healthy controls.

Methods: A comprehensive systematic search was conducted in Medline via PubMed, EMBASE, Cochrane Library and WHO COVID-19 research database as well as other searches (i.e., reference list from article search and manual searches) from December 2020 to May 2022. After receiving the COVID-19 vaccine, adult participants more than 18 years with hematologic malignancy were compared to healthy adults. The outcome of interest comprised of estimating the seroconversion rate following COVID-19 vaccination in both groups. Antibody response was measured through Immunoglobulin G (IgG) Level, Neutralizing antibody (nAb) level. All types of observational studies experimental studies and Clinical trials are included except studies with incomplete data, preprint and editorials. After the two-step screening, the data were extracted and the summary measures were calculated using a random-effect model.

Results: A total of 39 articles recording approximately 10,854 patients with a diagnosis of hematological malignancy were included in the present review. After a first dose of vaccination, these patients had considerably lower antibody response rates (37.0%) than healthy controls (74.5%). Following a second vaccine dose, the seroconversion rate in patients reached 66.8%, whereas it peaked at 97.9% in the healthy controls following

complete immunization. Notably, BNT162b2 and ChAdOx1 vaccine combination achieved highest seropositivity rate around 70%. Multiple myeloma, chronic leukemic leukemia and lymphoma were the cancers of interest in most of the studies.

Conclusion: The results of the present study, highlighted the comparatively low seropositivity rates in patients with hematological malignancies, with substantial variations in rates across disease groups. The findings emphasize the possibility of additional booster doses for these individuals in order to enhance their immunity against SARS-CoV-2.

Keywords: COVID-19 vaccines, hematological malignancy, seroconversion, immunogenicity, systematic review