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Antibody Response to the Janssen COVID-19 Vaccine in Solid Organ Transplant Recipients

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In contrast to the mRNA vaccines, Ad26.COV2.S (Janssen COVID-19 vaccine) is single-shot replication-incompetent adenovirus-type-26 vectored vaccine encoding a stabilized variant of the SARS-CoV-2 S protein.[1] Adenovirus vaccines have been widely used,[2] efficiently infect host cells, and may be expected to elicit stronger Th1-biased cellular immunity than mRNA vaccines, which contributes to B cell differentiation and antibody production.[3] For transplant recipients, given limited immunogenicity of mRNA vaccines,[4] the Janssen vaccine platform might be a better choice. We sought to quantify the anti-spike antibody response to Janssen COVID-19 vaccination in transplant recipients and compare it to recipients of the mRNA series.

We leveraged our prospective cohort of transplant recipients without prior COVID-19 who underwent SARS-CoV-2 vaccination between 12/16/2020-3/27/2021.[5] Serologic testing was

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AUTHORSHIP STATEMENT

• Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work
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• Drafting the work or revising it critically for important intellectual content
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• Final approval of the version to be published
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• Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
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DISCLOSURE

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undertaken on the Roche Elecsys anti-SARS-CoV-2 S enzyme immunoassay (range <0.4 to >250 U/mL [positive ≥0.8 U/mL]) which tests for antibodies against the receptor binding domain (RBD) of the spike protein at one month after COVID-19 vaccine (Janssen or mRNA).

We compared the percentage of participants with detectable anti-RBD antibody in the Janssen group (n=12) to the mRNA group (n=725) using Fisher's exact test (Supplemental Table 1). We compared the two platforms using logistic regression adjusting for age (excluding those >70 in the mRNA group to match the Janssen group), sex, race, years since transplant (excluding those >20 years since transplant in the mRNA group to match the Janssen group) and immunosuppression. Two sensitivity analyses were undertaken weighting-by-the-odds, first weighting on age and years since transplant, and second weighting on anti-metabolite immunosuppression and years since transplant. We then used the Wilcoxon rank-sum test to compare non-negative anti-RBD titers of the Janssen group to those of the mRNA group (n=430). This study was approved by the Johns Hopkins institutional review board.

We studied 12 transplant recipients who underwent Janssen vaccine (Supplemental Table 2). At a median (IQR) 33 days (31-44) after vaccination, anti-RBD antibody was detectable in only 2/12 participants who received the Janssen vaccine compared to 430/725 who completed the mRNA vaccine series (17% versus 59%, p=0.005). Those who received the Janssen vaccine had lower odds (aOR 0.11 95%CI 0.02-0.53, p=0.006) of developing anti-RBD antibodies than those who completed the mRNA series. This association was similar in sensitivity analyses weighting by age and years since transplant (aOR 0.13 95%CI 0.03-0.61, p=0.01) and immunosuppression and years since transplant (aOR 0.17 95%CI 0.04-0.76, p=0.02). Median anti-RBD Ig titers in the Janssen group were significantly lower than the mRNA group (2.39 versus 106.9 U/mL) (p=0.047) (Figure 1).

In this case series of humoral response to the Janssen vaccine, only 2 of 12 participants mounted a detectable anti-RBD antibody response, which was significantly lower than what was seen among recipients of the mRNA vaccine series. Additionally, titers were significantly lower than those in the mRNA group.

These early results suggest that Janssen vaccine may result in even lower humoral immunity than mRNA vaccines in immunosuppressed transplant patients. The generalizability of these findings to other immunosuppressed populations merits further investigation.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Services, nor does mention of trade names, commercial products or organizations imply endorsement by the US Government.

ABBREVIATIONS

Ad26.COV2.S	adenovirus type 26 vectored vaccine (Janssen COVID-19 vaccine)
Ig	immunoglobulin
EIA	enzyme immunoassay
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
U/ml	units per milliliter
RBD	receptor-binding domain
COVID-19	coronavirus disease 2019
mRNA	messenger ribonucleic acid
IQR	interquartile range
PCR	polymerase chain reaction

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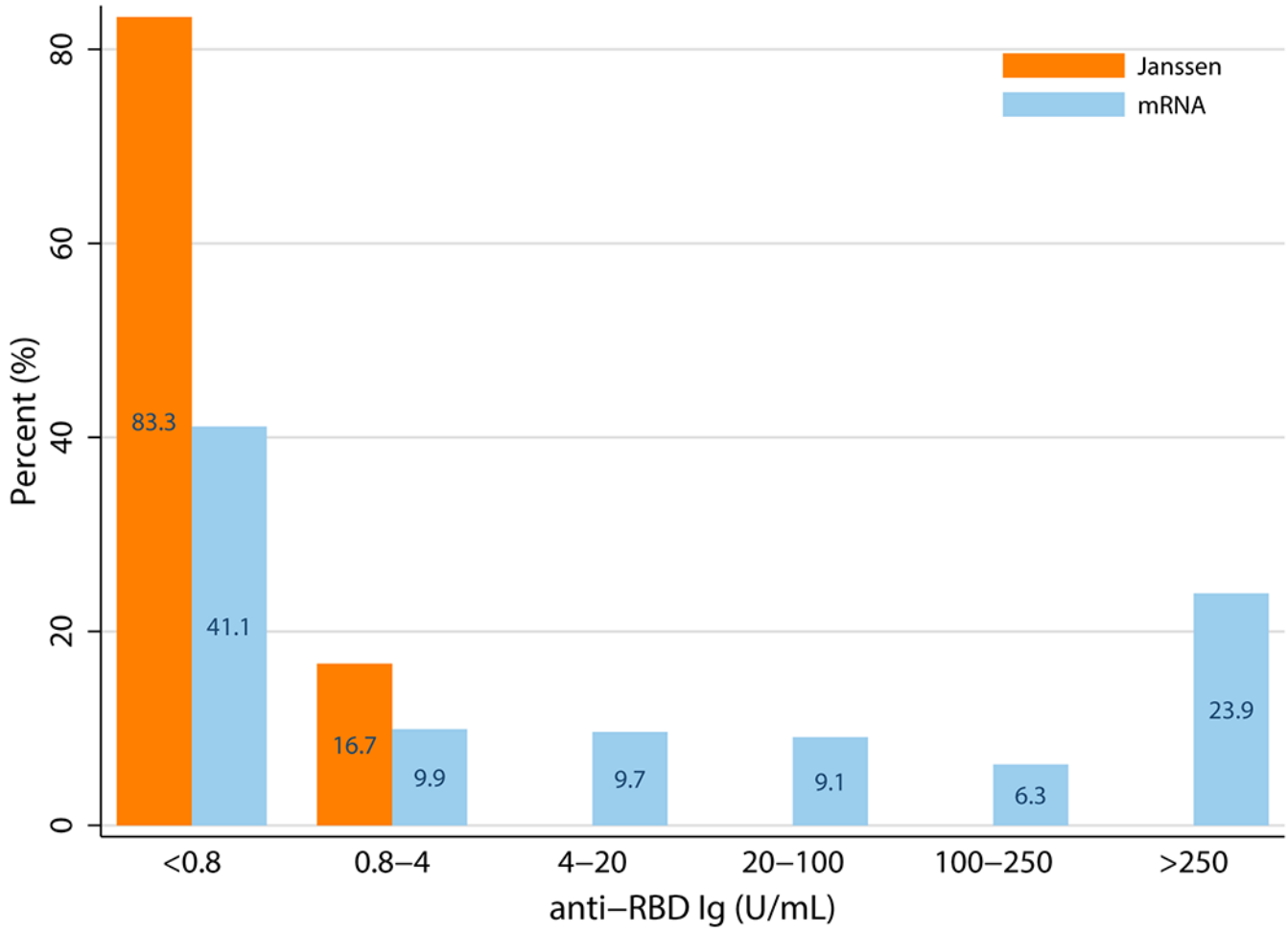

Figure 1.
SARS-CoV-2 Anti-Receptor Binding Domain Antibody Titers Among Recipients of mRNA versus Janssen Vaccine.