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Letter to the Editor

Correspondence on Letter regarding “COVID-19 vaccine immunogenicity among chronic liver disease patients and liver transplant recipients: A meta-analysis”

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Dear Editor,

We would like to thank Mungmunpantipantip and Wiwan-itkit¹ for their response to our recent meta-analysis² on the possible confounding factors of vaccine recipients, including underlying medical conditions and prior coronavirus disease 2019 (COVID-19) infection. COVID-19 infection can cause not only gastrointestinal symptoms but also hepatic injury, including cholangitis and autoimmune hepatitis.^{3,4} Therefore, vaccination is of paramount importance to prevent COVID-19 infection and its disease severity.

We agree that patients with more comorbidities may have different vaccine immunogenicity compared to healthy individuals. Table 1 shows the list of comorbidities among patients included in our analysis. No study provided individual

data for the outcome of seroconversion regarding the presence of comorbidity. Importantly, non-alcoholic fatty liver disease, which may affect vaccine immunogenicity,⁵ is also associated with a higher risk of comorbidities, such as diabetes mellitus. Unlike the etiology of liver disease and cirrhosis status, wherein we used a prevalence of 80% as the cut-off for classification, the data for comorbidity were heterogeneous and no cut-off could be drawn. Hence, we could not perform subgroup analysis with respect to each comorbidity. In addition, certain medications (e.g., antibiotics, angiotensin-converting enzyme inhibitors, histamine 2 receptor antagonists) may affect either the COVID-19 vaccine response⁶ or disease severity.^{7,8} However, drug data were lacking in the included studies.

Although prior history of COVID-19 infection was part of

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Table 1. Comorbidities of patients in the included studies

Study	Hypertension	Diabetes mellitus	Hyperlipidemia	Cardiovascular disease	Respiratory disease	Chronic kidney disease
Chronic liver disease						
Ai et al.	38 (8.7)	23 (5.3)	/	7 (1.6)	1 (0.2)	/
Bakasis et al.	/	27 (31.0)	/	32 (36.8)	6 (6.9)	/
He et al.	/	/	/	/	/	/
Ruether et al.	18 (37.5)	12 (25.0)	/	/	/	7 (14.6)
Thuluvath et al.	109 (63.7)	/	98 (57.3)	21 (12.3)	14 (8.2)	25 (14.6)
Wang et al.	42 (11.0)	14 (3.7)	/	4 (1.5)	1 (0.3)	/
Xiang et al.	9 (6.0)	4 (2.7)	/	2 (1.3)	1 (0.7)	/
Liver transplant						
Alavijeh et al.	/	/	/	/	/	/
Bojarsky et al.	/	/	/	/	/	/
Cholankeril et al.	/	33 (47.8)	/	/	/	36 (52.2)
Davidov et al.	36 (47.4)	31 (40.8)	36 (47.4)	/	/	25 (32.9)
Erol et al.	/	/	/	/	/	/
Fernandez-Ruiz et al.	/	/	/	/	/	/
Guarino et al.	/	99 (22.3)	/	72 (16.2)	9 (2.0)	46 (10.4)
Hall et al.	/	/	/	/	/	/
Herrera et al.	33 (56.9)	21 (36.2)	22 (37.9)	/	/	15 (25.9)
Holden et al.	/	/	/	/	/	/
Huang et al.	/	/	/	/	/	/
Marion et al.	/	/	/	/	/	/
Mazzola et al.	/	24 (41.4)	/	26 (44.8)	2 (3.5)	/
Mulder et al.	/	/	/	/	/	/
Nazaruk et al.	/	/	/	/	/	/
Rabinowich et al.	45 (56.3)	26 (32.5)	/	/	/	/
Ruether et al.	85 (61.6)	29 (21.0)	/	/	/	46 (33.3)
Strauss et al.	/	/	/	/	/	/
Thuluvath et al.	50 (80.6)	/	35 (56.5)	12 (19.4)	8 (12.9)	40 (64.5)
Timmermann et al.	/	/	/	/	/	/

Values are presented as number (%).

Abbreviation:

COVID-19, coronavirus disease 2019

the exclusion criteria in our study, asymptomatic cases might have been enrolled, as the baseline levels of antibodies were measured. Timmermann et al.⁹ found 2/120 asymptomatic patients with positive anti-nucleocapsid-immunoglobulin G antibodies, and these patients were excluded from subsequent analysis. A meta-analysis revealed that 0.25% of the tested general population were asymptomatic infections.¹⁰ Nevertheless, this issue may not have a significant impact on our results due to a large sample size of 3,945 patients. It is noteworthy that vaccinated recipients, especially liver transplant patients, should still adhere to other infection prevention and control measures, such as social distancing.¹¹

Authors' contribution

Ka Shing Cheung and Chiu Hang Mok were involved in data retrieval, statistical analysis and drafting of the manuscript. Wai Kay Seto and Man Fung Yuen were involved in supervision.

Conflicts of Interest

The authors declare no conflicts of interest.

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