

# Gender difference in response to COVID vaccination; a letter to the editor on current findings



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Received: 7 May 2023

Accepted: 10 July 2023

Published: 31 July 2023

## Abstract

### Implication for health policy/practice/research/medical education:

This study found a difference in the immune response to the COVID vaccine between men and women. Women will have a more robust immune response and show more complications.

**Keywords:** COVID-19, Vaccines, Gender differences, Pandemic, SARS-CoV-2

**Citation:** Alem L, Nasri H, Mojtahedi Z. Gender difference in response to COVID vaccination; a letter to the editor on current findings. *J Prev Epidemiol.* 2023;x(x):e35206. doi: 10.34172/jpe.2023.35206.



## To Editor,

SARS-CoV-2 is a highly infectious and contagious coronavirus that appeared at the end of 2019 and has triggered a respiratory disorder called COVID-19 that affects public health (1). SARS-CoV-2, which was discovered in Wuhan, China, is a contagious virus that spreads swiftly by respiratory secretions (sneeze, cough) or close individual contacts with an infected individual (2). Coronavirus is a warning for global hygiene, affecting people in many nations (3), with over six million deaths recorded worldwide (4). While the majority of patients have mild to severe symptoms such as cough, fever, dyspnea, or loss of taste and smell, around 15% of patients develop pneumonia that requires supplemental oxygen and 5% develop respiratory failure and acute respiratory distress syndrome (ARDS) (5,6). Studies show that men are less likely than women to make an effort to reduce the transmission of viruses. Different gender theories, beliefs, and practices influenced the initial phases of COVID-19 (7). The spread of the disease has caused the rapid manufacturing and growth of COVID-19 vaccines; terminating the contagion is done by vaccines (4).

Vaccination is the most effective method of preventing the spread of infection (8). The COVID-19 vaccination was the most successful vaccination platform in the National Health Service's history (9). The general acceptance of COVID-19 vaccination in Geneva was 71.8%, with males being more

accepting than females, older people being more accepting than younger people and urban regions being more accepting than rural ones (10). The COVID-19 vaccination has resulted in numerous adverse effects. Myalgia, arthralgia, fever, weakness, headache, and discomfort or inflammation at the injection site are common complications after vaccination. In rare cases, it has been linked to neurological adverse effects such as cerebral venous sinus thrombosis, Bell's palsy, acute transverse myelitis, acute disseminated encephalomyelitis, and polyneuropathy (11). The outcome of different respiratory viral infections is influenced by gender. Respiratory viral diseases such as influenza, syncytial virus, and coronavirus differ between genders throughout life. Both genders are equally susceptible to infection; however, males are more vulnerable to mortality and morbidity. Investigations have revealed various responses to viral infections such as COVID-19. Women are more prone than men to have severe outcomes during reproductive times. Gender and pregnancy have an impact on disease processes.

Furthermore, to investigate gender variations in infection pathogenesis, men and women respond differently to treatment. Variations in chromosomal content, hormone profile, and sexual performance have all been proposed as important factors. Women's immunological responses are often more significant and appear to produce more antibodies; however, they suffer more severe outcomes than men (12,13).

The X chromosome is implicated in immune function regulation (14). Jensen et al. demonstrated that men and women responded differently to numerous vaccines introduced since the discovery of COVID-19 vaccines in 2020 (15). Furthermore, Fischinger et al discovered that females have higher antibody responses and experience more adverse effects than males (16). As a result, men and women have different immunological reactions to the COVID vaccine. Women will have a more robust immune response and show more complications.

#### Authors' contribution

Conceptualization: HN.

Data curation: HN and LA.

Funding Acquisition: HN.

Investigation: LA.

Resources: HN.

Validation: HN and LA.

Visualization: HN & LA, ZM.

Supervision: HN.

Writing—original draft: LA.

Writing—review and editing: LA, ZM.

#### Conflicts of interest

The authors declare that they have no competing interests.

#### Ethical issues

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

#### Funding/Support

None.

#### References

- Hu B, Guo H, Zhou P, Shi ZL. Characteristics of SARS-CoV-2 and COVID-19. *Nat Rev Microbiol.* 2021;19:141-154. doi: 10.1038/s41579-020-00459-7.
- Yüce M, Filiztekin E, Özkaya KG. COVID-19 diagnosis -A review of current methods. *Biosens Bioelectron.* 2021;172:112752. doi: 10.1016/j.bios.2020.112752.
- Majumder J, Minko T. Recent Developments on Therapeutic and Diagnostic Approaches for COVID-19. *AAPS J.* 2021;23:14. doi: 10.1208/s12248-020-00532-2.
- Mohseni Afshar Z, Barary M, Hosseinzadeh R, Karim B, Ebrahimpour S, Nazary K, et al. COVID-19 vaccination challenges: A mini-review. *Hum Vaccin Immunother.* 2022;18:2066425. doi: 10.1080/21645515.2022.2066425.
- Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al; China Medical Treatment Expert Group for Covid-19. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med.* 2020;382:1708-1720. doi: 10.1056/NEJMoa2002032.
- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet.* 2020;395:507-513. doi: 10.1016/S0140-6736(20)30211-7.
- Pflugeisen BM, Mou J. Gender Discrepancies in SARS-CoV-2 Pandemic Related Beliefs, Attitudes, and Practices. *Front Public Health.* 2021;9:711460. doi: 10.3389/fpubh.2021.711460.
- Leng A, Maitland E, Wang S, Nicholas S, Liu R, Wang J. Individual preferences for COVID-19 vaccination in China. *Vaccine.* 2021;39:247-254. doi: 10.1016/j.vaccine.2020.12.009.
- Arnold J, Winthrop K, Emery P. COVID-19 vaccination and antirheumatic therapy. *Rheumatology (Oxford).* 2021 Aug 2;60:3496-3502. doi: 10.1093/rheumatology/keab223.
- Wisniak A, Baysson H, Pullen N, Nehme M, Pennacchio F, Zaballa ME, et al; Specchio-COVID19 study group. COVID-19 vaccination acceptance in the canton of Geneva: a cross-sectional population-based study. *Swiss Med Wkly.* 2021;151:w30080. doi: 10.4414/smw.2021.w30080.
- Garg RK, Paliwal VK. Spectrum of neurological complications following COVID-19 vaccination. *Neurol Sci.* 2022;43:3-40. doi: 10.1007/s10072-021-05662-9.
- Ursin RL, Klein SL. Sex Differences in Respiratory Viral Pathogenesis and Treatments. *Annu Rev Virol.* 2021;8:393-414. doi: 10.1146/annurev-virology-091919-092720.
- Pegiou S, Rentzeperi E, Koufakis T, Metallidis S, Kotsa K. The role of sexual dimorphism in susceptibility to SARS-CoV-2 infection, disease severity, and mortality: facts, controversies and future perspectives. *Microbes Infect.* 2021;23:104850. doi: 10.1016/j.micinf.2021.104850.
- Libert C, Dejager L, Pinheiro I. The X chromosome in immune functions: when a chromosome makes the difference. *Nat Rev Immunol.* 2010;10:594-604.
- Jensen A, Stromme M, Moyassari S, Chadha AS, Tartaglia MC, Szoeki C, et al. COVID-19 vaccines: Considering sex differences in efficacy and safety. *Contemp Clin Trials.* 2022;115:106700. doi: 10.1016/j.cct.2022.106700.
- Fischinger S, Boudreau CM, Butler AL, Streeck H, Alter G. Sex differences in vaccine-induced humoral immunity. *Semin Immunopathol.* (2019) 41:239-49. doi: 10.1007/s00281-018-0726-5.