

## COVID-19 Vaccination and Abnormal Blood Glucose Level

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new coronavirus, was the cause of the most difficult pandemic of the century, coronavirus disease 2019 (COVID-19).<sup>[1]</sup> Due to the pandemic's high fatality rate and quick spread, an effective vaccination is urgently needed.<sup>[1]</sup> The literature that is currently available indicates that both vaccines aid in preventing SARS-CoV-2 infection. The greatest concern, though, is with any potential side effects because immunization is new.<sup>[2,3]</sup>

When new COVID-19 vaccines were already produced to correspond to the pandemic, received approval in emergency mode, and were distributed worldwide in late 2020,<sup>[2]</sup> vigilance of the new vaccine was unintentionally run into the clinical focused. Unintentionally, vigilance was made public. The importance of a strong global post-marketing safety monitoring system<sup>[2]</sup> was restated owing to the use of novel vaccine technology despite the fact that the vaccines underwent rigorous clinical testing and regulatory authority inspection. The negative effects of COVID-19 immunization have been the subject of numerous reports, with an emphasis on their variety. The endocrinological problem which develops after getting the COVID-19 immunization is of great concern to clinical endocrinology. The authors of this paper emphasize the important concern regarding the possibility of a clinical problem following COVID-19 vaccination, which is an abnormal blood glucose level.

Diabetes is a problem for COVID-19 patients, according to various sources. The first issue that needs to be addressed is hyperglycemia aggravation in those with diabetes mellitus type 2 after getting the COVID-19 vaccine administration.<sup>[4]</sup> According to Mishra *et al.*,<sup>[4]</sup> a slight increase in plasma glucose is thought to be produced by an early inflammatory event to the immunization and a subsequent immunophysiological response. Since all bouts of excessively high blood glucose were spontaneously resolved and did not need adjustments of therapy, the cause of the transient clinical problem was further supported in the case series published by Mishra *et al.*<sup>[5]</sup> A vaccine appears to be the cause of a significant elevation in plasma glucose. A little to moderate rise in blood sugar levels has been hypothesized to occur after vaccination.<sup>[5]</sup> One patient's newly developed diabetes mellitus type 2 complication, also known as hyperosmolar hyperglycemia state, following the COVID-19 vaccine.<sup>[5]</sup> Additionally, there have been rumors that the vaccine administration and diabetic development of ketoacidosis may be clinically associated. Half a week after the administration of first dose of vaccine, the vaccine recipient often develops a lot of water drinking, a lot of urination, rapid pulse rate, nausea, and loss of strength without previous clinical diabetic history.<sup>[6]</sup> Hyperglycemia, anion gap metabolic

acidosis, and ketonuria are the three main signs of classic diabetic ketoacidosis.<sup>[6]</sup> Latent thyroid autoimmunity and insulin autoantibody positivity can both be found.<sup>[7,8]</sup>

Ganakumar *et al.* recommended that persons with diabetes, particularly those with type 1 diabetes mellitus (T1DM) and poor glycemic control, be monitored for hyperglycemia and ketonemia for at least two weeks after receiving the COVID-19 vaccine.<sup>[9]</sup> Despite the fact that the particular pathophysiological mechanisms underlying type 1 diabetes are unknown, autoimmune disease and genetic predisposition may have played a role in the disease's development.<sup>[9]</sup> According to Tang *et al.*,<sup>[9]</sup> intangible effects of immunization include diabetes mellitus type 1, permanent loss of pancreatic beta cells, and autoimmune problem. If a person already has type 1 diabetes, the clinical event may be very significant and easily occur. Patients with diabetes mellitus type 1 who are managed by intensive insulin treatment and/or glucose-sodium transporting agent should only receive the vaccine with caution, claim Yakou *et al.*<sup>[10]</sup> As a preventative strategy, patients should continue receiving insulin injections.<sup>[10]</sup> According to the European Safety Analysis Report,<sup>[11]</sup> type 1 or 2 diabetes, and excessive blood sugar are becoming more common after receiving messenger ribonucleic acid (mRNA) vaccines.

Comparing mRNA COVID-19 vaccinations to viral vector COVID-19 vaccines, it was shown that there was a higher reporting frequency of changes in glucose homeostasis.<sup>[11]</sup> Less is written on the hypoglycemia issue that can arise following COVID-19 vaccination. A report on the COVID-19 vaccine in pregnant women with an emphasis on neonatal outcomes is fascinating.<sup>[12]</sup> That study found that a total of 15.3% of newborns needed to be admitted to the neonatal critical care unit (NICU).<sup>[11]</sup> Hypoglycemia accounted for 61.5% of NICU admissions.<sup>[12]</sup> There have only been a few isolated case reports of hypoglycemia following COVID-19 immunization. The majority of instances have other negative effects and may have delayed consequences. A patient who had overall weariness and fever was described by Morita *et al.*<sup>[13]</sup> The patient also experienced headaches, nausea, and diarrhea during the next few days.<sup>[13]</sup> The patient went to the hospital four days after receiving the vaccination because these symptoms had gotten worse.<sup>[13]</sup> Hyponatremia, hypoglycemia, and incredibly low plasma Adrenocorticotrophic hormone (ACTH) and serum cortisol levels were discovered through laboratory testing.<sup>[13]</sup> The final diagnosis, in this case, is isolated ACTH deficiency. Unknown is the exact mechanism. Following ChAdOx1 nCoV-19 immunization, Cirillo *et al.* reported an intriguing case of acute rhabdomyolysis and multiorgan failure.<sup>[14]</sup> Following 48 days of intensive care in the hospital, the patient experienced severe multilineage cytopenia, uncontrollable

hypotensive shock, hypoglycemia, and a sharp rise in procalcitonin, before ultimately succumbing to his or her injuries.<sup>[14]</sup>

In some unique scenarios in clinical practice, a case who receives COVID-19 vaccine might encounter events with aberrant blood glucose changes, including high blood glucose and hypoglycemia. Basic clinical management might be effective and the results in successful case management in some patients. If vaccine recipient experiences post-vaccination problems, including one with underlying diabetic illness, it is advisable to give them special concern.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

**Rujittika Mungmunpantip<sup>1</sup>, Viroj Wiwanitkit<sup>2,3,4</sup>**

<sup>1</sup>Private Academic Consultant, Bangkok, Thailand, <sup>2</sup>Adjunct Professor, Joseph Ayobabalola University, Ikeji-Arakeji, Nigeria, <sup>3</sup>Honorary Professor, Dr. DY Patil Medical College - Dr. D. Y. Patil Vidyapeeth, Pune, India, <sup>4</sup>Distinguished Professor, Parasitic Disease Research Center, Suranaree University of Technology, Nakhon Ratchasima, Thailand

**Address for correspondence:** Dr. Rujittika Mungmunpantip,  
Private Academic Consultant, Bangkok, Thailand.  
E-mail: rujittika@gmail.com

**Submitted:** 08-Jun-2023;

**Revised:** 26-Jun-2023;

**Accepted:** 02-Jul-2023;

**Published:** 29-Nov-2023

## REFERENCES

- Li YD, Chi WY, Su JH, Ferrall L, Hung CF, Wu TC. Coronavirus vaccine development: From SARS and MERS to COVID-19. *J Biomed Sci* 2020;27:104.
- Meo SA, Bukhari IA, Akram J, Meo AS, Klonoff DC. COVID-19 vaccines: Comparison of biological, pharmacological characteristics and adverse effects of Pfizer/BioNTech and Moderna Vaccines. *Eur Rev Med Pharmacol Sci* 2021;25:1663-9.
- Rudolph A, Mitchell J, Barrett J, Sköld H, Taavola H, Erlanson N, *et al.* Global safety monitoring of COVID-19 vaccines: How pharmacovigilance rose to the challenge. *Ther Adv Drug Saf* 2022;13:20420986221118972.
- Mishra A, Ghosh A, Dutta K, Tyagi K, Misra A. Exacerbation of hyperglycemia in patients with type 2 diabetes after vaccination for COVID-19: Report of three cases. *Diabetes Metab Syndr* 2021;15:102151.
- Abu-Rumaleh MA, Gharaibeh AM, Gharaibeh NE. COVID-19 vaccine and Hyperosmolar Hyperglycemic state. *Cureus* 2021;13:e14125.
- Sakurai K, Narita D, Saito N, Ueno T, Sato R, Niitsuma S, *et al.* Type 1 diabetes mellitus following COVID-19 RNA-based vaccine. *J Diabetes Investig* 2022;13:1290-2.
- Yano M, Morioka T, Natsuki Y, Sasaki K, Kakutani Y, Ochi A, *et al.* New-onset Type 1 diabetes after COVID-19 mRNA vaccination. *Intern Med* 2022;61:1197-1200.
- Ganakumar V, Jethwani P, Roy A, Shukla R, Mittal M, Garg MK. Diabetic ketoacidosis (DKA) in type 1 diabetes mellitus (T1DM) temporally related to COVID-19 vaccination. *Diabetes Metab Syndr* 2022;16:102371.
- Tang X, He B, Liu Z, Zhou Z, Li X. Fulminant type 1 diabetes after COVID-19 vaccination. *Diabetes Metab* 2022;48:101324.
- Yakou F, Saburi M, Hirose A, Akaoka H, Hirota Y, Kobayashi T, *et al.* A case series of ketoacidosis after coronavirus disease 2019 vaccination in patients with type 1 diabetes. *Front Endocrinol (Lausanne)* 2022;13:840580.
- di Mauro G, Mascolo A, Longo M, Maiorino MI, Scappaticcio L, Bellastella G, *et al.* European safety analysis of mRNA and viral vector COVID-19 vaccines on glucose metabolism events. *Pharmaceuticals (Basel)* 2022;15:677.
- Trostle ME, Limaye MA, Avtushka V, Lighter JL, Penfield CA, Roman AS. COVID-19 vaccination in pregnancy: Early experience from a single institution. *Am J Obstet Gynecol MFM* 2021;3:100464.
- Morita S, Tsuji T, Kishimoto S, Uraki S, Takeshima K, Iwakura H, *et al.* Isolated ACTH deficiency following immunization with the BNT162b2 SARS-CoV-2 vaccine: A case report. *BMC Endocr Disord* 2022;22:185.
- Cirillo E, Esposito C, Giardino G, Azan G, Fecarotta S, Pittaluga S, *et al.* Case report: Severe rhabdomyolysis and multiorgan failure after ChAdOx1 nCoV-19 vaccination. *Front Immunol* 2022;13:845496.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

### Access this article online

#### Quick Response Code:



**Website:**  
www.advbiores.net

**DOI:**  
10.4103/abr.abr\_195\_23

**How to cite this article:** Mungmunpantip R, Wiwanitkit V. COVID-19 vaccination and abnormal blood glucose level. *Adv Biomed Res* 2023;12:258.

© 2023 Advanced Biomedical Research | Published by Wolters Kluwer - Medknow