

Received: 14 August 2024 / Accepted: 02 December 2024 / Published online: 30 December 2024

DOI 10.34689/SH.2024.26.6.026

UDC 616.34-002-053.2



This work is licensed under a
Creative Commons Attribution 4.0
International License

A CASE OF AUTOIMMUNE COMPLICATIONS FOLLOWING COVID-19 VACCINATION WITH SINOVAAC-CORONAVAC (CHINA)

Bayan Nurgaliyeva^{1,2}, <https://orcid.org/0000-0003-2555-8644>

Yulia Akzhalova²,

Saken Khaidarov³, <https://orcid.org/0000-0001-7770-8427>

Aizhan Moldakaryzova³, <https://orcid.org/0000-0003-0186-978X>

¹ Kazakh National Medical University named after S. Asfendiyarov, Department of Propaedeutics of internal diseases, Almaty, Republic of Kazakhstan;

² LLP «Kazmed», Almaty, Republic of Kazakhstan

³ Kazakh National Medical University named after S. Asfendiyarov, Department of biology and medical genetics, Almaty, Republic of Kazakhstan

Abstract

During the COVID-19 pandemic, vaccination in the Republic of Kazakhstan utilized the vaccine SinoVac-CoronaVac (China), which contains a chemically inactivated form of the SARS-CoV-2 virus and an adjuvant to stimulate immunity. A retrospective analysis was conducted on the medical history and observation of a patient, T., born in 1989, who developed overlap syndrome, rheumatoid arthritis, and systemic lupus erythematosus (SLE) after receiving the SinoVac-CoronaVac vaccine.

Blood analysis revealed leukopenia (2.8×10^9), thrombocytopenia (104 units/ μ L), hypochromic anemia (hemoglobin 87 g/L), increased ESR, elevated rheumatoid factor (13.9), increased CRP (70.4), and elevated anti-streptolysin O (218 IU/mL). Antibodies to nuclear antigens (ANA) were also detected (32 units). The patient was treated with hormones, non-steroidal anti-inflammatory drugs, and rituximab.

This case suggests that COVID-19 vaccination with the SinoVac-CoronaVac vaccine activated the immune system and acted as a trigger for the development of autoimmune overlap syndrome. Recognizing the possibility of autoimmune complications enables better patient monitoring and care post-vaccination.

Keywords: SinoVac-CoronaVac (China), vaccination, COVID-19, overlap syndrome, systemic lupus erythematosus, rheumatoid arthritis.

Резюме

СЛУЧАЙ АУТОИММУННЫХ ОСЛОЖНЕНИЙ ПОСЛЕ ВАКЦИНАЦИИ ОТ COVID-19 ПРЕПАРАТОМ SINOVAAC-CORONAVAC (КИТАЙ)

Баян Нургалиева^{1,2}, <https://orcid.org/0000-0003-2555-8644>

Юлия Акжалова²,

Сакен Хайдаров³, <https://orcid.org/0000-0001-7770-8427>

Айжан Молдакарызова³, <https://orcid.org/0000-0003-0186-978X>

¹ НАО «Казахский Национальный медицинский университет им. С.Д. Асфендиярова», Кафедра пропедевтики внутренних болезней, г. Алматы, Республика Казахстан;

² ТОО «Kazmed company», г. Алматы, Республика Казахстан

³ НАО «Казахский Национальный медицинский университет им. С.Д. Асфендиярова», Кафедра биологии и медицинской генетики, г. Алматы, Республика Казахстан

Во время пандемии COVID-19 в Республике Казахстан для вакцинации использовалась вакцина SinoVac-CoronaVac (Китай), содержащая химически инактивированную форму вируса SARS-CoV-2 и адъювант для стимуляции иммунитета. Был проведен ретроспективный анализ истории болезни и наблюдения пациента Т., 1989 года рождения, у которого после вакцинации препаратом SinoVac-CoronaVac развился оверлап-синдром, ревматоидный артрит и системная красная волчанка (СКВ).

Анализ крови выявил лейкопению ($2,8 \times 10^9$), тромбоцитопению (104 ед/мкл), гипохромную анемию (гемоглобин 87 г/л), повышенную СОЭ, увеличенный ревматоидный фактор (13,9), повышенный уровень С-реактивного белка (70,4) и повышенный антистрептолизин О (218 МЕ/мл). Также были обнаружены антитела к ядерным антигенам (ANA) (32 единицы). Пациенту проводилось лечение гормонами, нестероидными противовоспалительными препаратами и ритуксимабом.

Этот случай позволяет предположить, что вакцинация препаратом SinoVac-CoronaVac активировала иммунную систему и стала триггером развития аутоиммунного оверлап-синдрома. Анализ данного клинического случая подчеркивает возможные побочные эффекты после вакцинации против COVID-19. Понимание этих рисков имеет ключевое значение для улучшения мониторинга и ухода за пациентами после вакцинации.

Ключевые слова: SinoVac-CoronaVac (Қытай), вакцинация, COVID-19, оверлап-синдром, системная красная волчанка, ревматоидный артрит.

Түйіндеме

SINOVAC-CORONAVAC (ҚЫТАЙ) ПРЕПАРАТЫМЕН COVID-19 ВАКЦИНАЦИЯСЫНАН КЕЙІНГІ АУТОИММУНДЫ АСҚЫНУЛАР ЖАҒДАЙЫ

Баян Нургалиева^{1,2}, <https://orcid.org/0000-0003-2555-8644>

Юлия Акжалова²,

Сакен Хайдаров³, <https://orcid.org/0000-0001-7770-8427>

Айжан Молдакарызова³, <https://orcid.org/0000-0003-0186-978X>

¹ С.Ж. Асфендияров атындағы Қазақ Ұлттық медицина университеті, ішке аурулар пропедевтикасы кафедрасы, Алматы қ., Қазақстан Республикасы;

² LLP «Kazmed», Алматы қ., Қазақстан Республикасы;

³ "С.Д. Асфендияров атындағы Қазақ ұлттық медицина университеті", Биология және медициналық генетика кафедрасы, Алматы қ., Қазақстан Республикасы

Пандемия кезінде Қазақстан Республикасында вакцинация үшін SARS-CoV-2 вирусының химиялық инактивацияланған SinoVac-CoronaVac (Қытай) вакцинасы қолданылды. 1989 жылы туған Т. есімді науқастың медициналық тарихы мен бақылауының ретроспективті талдауы жүргізілді. Вакцинациядан кейін пациентте оверлап-синдром, ревматоидты артрит және жүйелі қызыл жегі (ЖҚЖ) дамыды.

Қан талдауы лейкопенияны ($2,8 \times 10^9$), тромбоцитопенияны (104 бірлік/мкл), гипохромды анемияны (гемоглобин 87 г/л), жоғары ЭТЖ, артқан ревматоидты факторды (13,9), С-реактивті ақуыздың деңгейінің көтерілуін (70,4) және антистрептолизин О-ның жоғарылауын (218 ХБ/мл) көрсетті. Сондай-ақ ядролық антигендерге қарсы антиденелер (ANA) (32 бірлік) анықталды. Науқас гормондармен, стероидты емес қабынуға қарсы препараттармен және ритуксимабпен емделді.

Бұл жағдай SinoVac-CoronaVac препаратымен вакцинация иммундық жүйені белсендіріп, аутоиммундық оверлап-синдромның дамуына триггер болғанын болжауға мүмкіндік береді. Бұл клиникалық жағдайды талдау COVID-19-ға қарсы вакцинациядан кейінгі ықтимал жанама әсерлерге назар аударады. Бұл тәуекелдерді түсіну вакцинациядан кейінгі пациенттерді бақылау мен күтімді жақсарту үшін маңызды.

Түйінді сөздер: SinoVac-CoronaVac (Қытай), вакцинация, COVID-19, оверлап-синдром, жүйелі қызыл жегі, ревматоидты артрит.

For citation / Для цитирования / Дәйексөз үшін:

Nurgaliyeva B., Akzhalova Yu., Khaidarov S., Moldakaryzova A. A Case of Autoimmune Complications Following COVID-19 Vaccination with SinoVac-CoronaVac (China) // *Nauka i Zdravookhranenie* [Science & Healthcare]. 2024. Vol.26 (6), pp. 230-233. doi 10.34689/SH.2024.26.6.026

Нургалиева Б., Акжалова Ю., Хайдаров С., Молдакарызова А. Случай аутоиммунных осложнений после вакцинации от COVID-19 препаратом Sinovac-CoronaVac (Китай) // *Наука и Здоровоохранение*. 2024. Т.26 (6). С. 230-233. doi 10.34689/SH.2024.26.6.026

Нургалиева Б., Акжалова Ю., Хайдаров С., Молдакарызова А. Sinovac-CoronaVac (Қытай) препаратымен COVID-19 вакцинациясынан кейінгі аутоиммунды асқынулар жағдайы // *Ғылым және Денсаулық сақтау*. 2024. Т.26 (6). Б. 230-233. doi 10.34689/SH.2024.26.6.026

Introduction

On February 1, 2021, mass vaccination against COVID-19 began in the Republic of Kazakhstan [1]. Vaccination serves as protection against infectious agents through antibody production [2]. During the COVID-19 pandemic, Kazakhstan utilized several vaccines: the combined vector vaccine Sputnik V (Russia), inactivated vaccines SinoVac-CoronaVac (China), Sinopharm, QazVac (Kazakhstan), and the RNA-based Pfizer/BioNTech (USA) vaccine [1].

The Pfizer-BioNTech COVID-19 is an mRNA-based COVID-19 vaccine developed by the German biotechnology company BioNTech [9].

SinoVac-CoronaVac, developed by Sinovac Biotech, is an inactivated COVID-19 vaccine containing chemically inactivated SARS-CoV-2 grown on Vero cells. These vaccines include aluminum hydroxide or similar adjuvants. The immune response targets the SARS-CoV-2 spike protein, along with matrix, envelope, and nucleoproteins [2,3].

A phase III clinical trial for evaluating efficacy and safety of the inactivated vaccine produced by Sinovac was started in 2024. The study will be double-blind placebo-controlled trial. Interim preliminary efficacy analysis can be triggered by reaching the target number of 61 cases [4]. Clinical trials on the effectiveness of the SinoVac-CoronaVac vaccine were conducted in Chile and Turkey [5,6].

Case description

In November 2021, a 32-year-old woman presented to her general practitioner with symptoms including joint pain, morning stiffness, dry eyes, dry mouth, weight loss, facial hyperpigmentation, and elevated blood pressure. Symptoms began two weeks after the second dose of the SinoVac-CoronaVac vaccine. A rheumatologist diagnosed her with rheumatoid arthritis.

Medical History

- Pregnancy complications in 2009 and in 2010, including eclampsia and cesarean sections, with blood transfusion. The children did not survive.

- Diagnosed with arterial hypertension in 2009, managed with angiotensin-converting enzyme inhibitor.

Examination and Findings

In February 2022, the patient was hospitalized in a rheumatology ward for further diagnostic clarification. Her general condition was moderate, with active positioning. Height was 153 cm, weight 40 kg, and BMI 17.1, indicating underweight.

Her body temperature was 36.6°C. She displayed facial skin erythema over the cheeks and nose, forming the characteristic "lupus butterfly." Peripheral lymph nodes were not enlarged. Examination of the hands revealed symmetrical involvement of the hand joints, deformities, and inflammation in the proximal interphalangeal joints with wrist joint swelling. A positive cross-compression test was noted.

Laboratory Results:

- Complete blood count: leukopenia at 2.8×10^9 , thrombocytopenia at 104 units/ μL , hemoglobin decreased to 87 g/L, ESR elevated to 52 mm/h (indicating an autoimmune process).

- Biochemical analysis: within normal limits, with total protein 65 g/L, urea 3.66 mmol/L, creatinine 88 mmol/L, glucose 4.4 mmol/L, ALT 10 U, AST 16 U, bilirubin 11.9, cholesterol 5.9 mmol/L.

- Coagulogram: increased PTI (135) and fibrinogen (4.9 g/L), indicating hypercoagulation; other parameters were normal (APTT 23.9, INR 0.85, PT 10.2 sec).

- Rheumatoid factor: at the upper limit of normal (13.9 U/mL), suggesting rheumatoid arthritis or systemic lupus erythematosus.

- ANA levels were significantly elevated (32 units), indicating an autoimmune process, common in rheumatoid arthritis.

- Anti-MPO ANCA PR3 and MPO were negative, ruling out vasculitis.

- Lupus anticoagulant increased to 43.5 sec, a marker of antiphospholipid syndrome and thrombosis, often seen in systemic lupus erythematosus.

- CRP was markedly elevated (70.4 mg/L), indicating inflammation and autoimmune activity.

- Elevated anti-streptolysin O (218 IU/mL), suggesting recent streptococcal infection.

- Urinalysis revealed proteinuria (0.323 g/L) and hematuria, with daily proteinuria (211 mg/day) indicating renal involvement.

- Ferritin was elevated to 577 $\mu\text{g/L}$, a marker of autoimmune processes.

- Imaging and Other Tests:

- X-rays showed arthritis.

- MSCT of the chest revealed pneumonia, pleurisy, pneumofibrosis, and pericarditis.

Diagnosis and Treatment

The patient was diagnosed with: M35.1 Other overlap syndromes. M32.8 Other forms of systemic lupus erythematosus, subacute course, Grade 2 activity with skin and vascular involvement (hyperpigmentation and cheilitis), joints (polyarthritis, FC 2), kidneys, lupus nephritis, muscles (myalgia), trophic disorders (hair loss), Sjogren's syndrome (xerostomia, xerophthalmia), heart (carditis), hematologic syndrome (autoimmune anemia, thrombocytopenia, leukopenia), constitutional syndrome (weight loss), immunopositivity for ANA, lupus anticoagulant, and anti-DNA antibodies. Rheumatoid arthritis, polyarthritis, seronegative variant, advanced stage, DAS-28 >5.1, X-ray Grade 2, FC 2.

Treatment included corticosteroids, non-steroidal anti-inflammatory drugs, and rituximab. The patient passed away in 2023.

Discussion

This case describes the development of an overlap syndrome, rheumatoid arthritis, and systemic lupus erythematosus (SLE) in a patient vaccinated with the inactivated SinoVac-CoronaVac COVID-19 vaccine. The examination findings indicate autoimmune involvement triggered post-vaccination. It is hypothesized that antibodies generated in response to the vaccine might have cross-reacted with the patient's own cells, initiating an autoimmune overlap syndrome.

Globally, cases of autoimmune complications, such as thrombocytopenia, acquired hemophilia, anterior uveitis have been reported following the administration of the Pfizer BNT162b2 mRNA COVID-19 vaccine, which encodes a mutant form of the SARS-CoV-2 spike protein [6,10,11].

In 2021, Eleanor R. King and colleagues [6] reported a case of thrombocytopenia in a 39-year-old woman after receiving the Pfizer vaccine complications following Moderna and Pfizer-BioNTech vaccinations, such as hemophilia, uveitis, and Bell's palsy, have been documented.

In 2022 Chantal Lemoine et al. reported a case of SLE in a previously healthy 68-year-old woman who developed myalgia and was found positive for ANA and dsDNA antibodies following vaccination with Pfizer-BioNTech (BNT162b2) [7].

A meta-analysis of 45006 cases made by Meijiao Wang et al. (2024) found no significant link between vaccination Covid-19 and SLE but identified an association between hepatitis B vaccination and SLE onset [8].

In the described case, COVID-19 vaccination acted as a trigger for an autoimmune complication, with symptoms appearing two weeks post-vaccination, possibly due to molecular mimicry, as suggested by Wraith D.C. and colleagues (2021) in *The Lancet* [14].

This hypothesis proposes that the vaccine antigen closely resembles endogenous antigens, leading to an autoimmune response against the body's own cells.

Another proposed mechanism involves T-cell activation without antigen recognition [12]; however, the full mechanism by which vaccines may provoke autoimmune responses remains unclear.

Conclusion

COVID-19 vaccination with SinoVac-CoronaVac likely triggered autoimmune complications in this case. Autoimmune reactions are rare and influenced by factors such as genetic predisposition, comorbidities, and prior infections. Despite isolated complications, COVID-19 vaccination significantly mitigated severe outcomes during the pandemic.

This clinical case analysis highlights potential side effects following COVID-19 vaccination. Understanding these risks is crucial for managing adverse reactions in individuals with pre-existing autoimmune disorders. Recognizing the possibility of autoimmune complications enables better patient monitoring and care post-vaccination.

Conflict of Interest. We declare no conflict of interest.

Author Contributions

Concept development, manuscript writing, and scientific interpretation of results – Nurgaliyeva Bayan Kadirovna;

Literature search and analysis – All authors;

Patient management – Akzhalova Yulia;

We declare that this material has not been previously published and is not under consideration by other publishers.

Funding: None.

References:

1. Вакцинация против COVID-19 в Казахстане — Википедия <http://ru.wikipedia.org/wiki/>
2. Вакцина против COVID-19 в мире ru.wikipedia.org/wiki/Вакцина_против_COVID-19
3. Вакцинация против COVID-19 вакциной CoronaVac компании SinoVac (SinoVac CoronaVac): Краткое руководство. World Health Organization. July 2021:1–6.
4. Clinical Trial of Efficacy and Safety of Sinovac's Adsorbed COVID-19 (Inactivated) Vaccine in Healthcare Professionals (PROFISCOV). Available at:

Author Information:

Nurgaliyeva Bayan – Doctor of Medical Sciences, MSP, Head of the Department of Propedeutics of Internal Diseases at NPJSC "Kazakh National Medical University named after S.D. Asfendiyarov", Chief Physician of the "Kazmed Company" Clinic, Almaty, Republic of Kazakhstan. ORCID: 0000-0003-2555-8644; Postal Address: 050012, Almaty, Tole Bi Street, 94, Department of Propedeutics of Internal Diseases; E-mail: nurgaliyeva.b@kaznmu.kz, +7 701 210 62 81;

Akzhalova Yuliya Ivanovna – a physician at "Kazmed Company"; E-mail: yuliya.lipai@mail.ru, +7 747 484 6050

Khaidarov Saken - a lecture on molecular biology nonprofit joint stock company "Kazakh National Medical University named after S.D. Asfendiyarov, ORCID:0000-0001-7770-8427

Moldakaryzova Aizhan Zhanarbekova - Cand. Sc. Biology, associate professor, NPJSC "Kazakh National Medical University named after S.D. Asfendiyarov", Almaty, Tole Bi Street, 94, Kazakhstan; 8 701-557-52-23; ORCID:0000-0003-0186-978X

Corresponding Author:

Nurgaliyeva Bayan – Doctor of Medical Sciences, MSP, Head of the Department of Propedeutics of Internal Diseases at NAO "Kazakh National Medical University named after S.D. Asfendiyarov," Chief Physician of the "Kazmed Company" Clinic, Almaty, Republic of Kazakhstan. ORCID: 0000-0003-2555-8644

Postal Address: 050012, Almaty, Tole Bi Street, 94, Department of Propedeutics of Internal Diseases;

E-mail: nurgaliyeva.b@kaznmu.kz,

Tel:+7 701 210 62 81;

[clinicaltrials.gov]<https://clinicaltrials.gov/study/NCT04456595>). Last updated February 15, 2024.

5. Chile initiates clinical study for COVID-19 vaccine. Available at:

[web.archive.org](<https://web.archive.org/web/20201011190302/https://chilereports.cl/en/news/2020/08/04/>). (Accessed August 4, 2020).

6. King E.R., Towner E. A case of immune thrombocytopenia after BNT162b2 mRNA COVID-19 vaccination. Am J Case Rep. 2021. 22:e931478. doi:10.12659/AJCR.931478.

7. Lemoine C., Padilla C., Krampe N. et al. Systemic lupus erythematosus after Pfizer COVID-19 vaccine: a case report. Clin Rheumatol. 2022. 41(5):1597–1601. doi:10.1007/s10067-022-06126-x.

8. Meijiao Wang, Huanpeng Gu, Yingqi Zhai, Xuanlin Li, Lin Huang, Haichang Li, Zhijun Xie, Chengping Wen. Vaccination and the risk of systemic lupus erythematosus: a meta-analysis of observational studies Arthritis Res Ther. 2024 Mar 4;26:60. doi:10.1186/s13075-024-03296-8

9. Pfizer–BioNTech COVID-19 vaccine. Available at: [Wikipedia](https://en.wikipedia.org/wiki/Pfizer%E2%80%93BioNTech_COVID-19_vaccine). Accessed [Insert Date].

10. Radwi M., Farsi S. A case report of acquired hemophilia following COVID-19 vaccine. J Thromb Haemost. 2021.19(6):1515–1518. doi:10.1111/jth.15291.

11. Renisi G., Lombardi A., Stanzione M., et al. Anterior uveitis onset after BNT162b2 vaccination: is this just a coincidence? Int J Infect Dis. 2021. 110:95–97. doi:10.1016/j.ijid.2021.07.035.

12. Tang Y., Tao H., Gong Y. et al. Changes of serum IL-6, IL-17, and complements in systemic lupus erythematosus patients. J Interferon Cytokine Res. 2019.39(7):410–415. doi:10.1089/jir.2018.0169.

13. Turkey begins phase three trials of Chinese COVID-19 vaccine. Available at: [trtworld.com](<https://www.trtworld.com/turkey/turkey-begins-phase-three-trials-of-chinese-covid-19-vaccine-39806/>). (Accessed August 4, 2020)

14. Wraith D.C., Goldman M., Lambert P.H. Vaccination and autoimmune disease: What is the evidence? Lancet. 2003.362:1659–1666. doi:10.1016/S0140-6736(03)14802