

**Title:** Myasthenia Gravis Exacerbation Following COVID-19 Vaccine : A Case Report

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**Authors Contribution Statement:**

Contributor Role	Role Definition	Authors	
		1	2
<b>Conceptualization</b>	Ideas; formulation or evolution of overarching research goals and aims.	1	2

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## Highlights

- COVID-19 is a relatively new pandemic which was first noticed in Wuhan, China in 2019 .
- Vaccines were established to make a control over the spread of this virus.
- The effects of these vaccines on special subgroups like Myasthenia gravis patients is still questionable.
- In this case report we are shedding the light on the effect and consequences of AstraZeneca COVID-19 vaccine on a Myasthenia gravis patient.

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- **Twitter:** Not available
- **Instagram:** Not available
- **Linkedin:** 2 : <https://www.linkedin.com/in/hayat-abdoallah-462a48229>

## Discussion Points:

1. Covid-19 pandemic started in 2019 with rapid spread around the world.
2. Vaccines are major tool for prevention and control.
3. Among so many vaccines distributed by COVAX facility , AstraZeneca is the first to reach our country Sudan.
4. The effects and consequences of different Covid-19 vaccines on subgroups of patients with autoimmune diseases like myasthenia gravis .

1 5. In this study we reported myasthenia crisis after the second dose of AstraZeneca vaccine.  
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1 **ABSTRACT.**

2 **Background:** Coronavirus disease-2019 (COVID-19) is an infection caused by a virus named SARS-CoV-2.  
3 While COVID-19 results in millions of deaths worldwide, vaccination was the mainstay of infection control. The  
4 AstraZeneca vaccine was distributed in Sudan by the COVAX facility in March 2021. It was added to the  
5 emergency use list by WHO in the middle of February.

6  
7 **The case:** We report the case of a 37-year-old Sudanese female who presented to the emergency room (ER)  
8 with an exacerbation of her normally well-controlled myasthenia gravis following her second dose of the  
9 AstraZeneca COVID-19 vaccination. She continued to deteriorate and was admitted to the intensive care unit  
10 where she was intubated and placed on a mechanical ventilator. Low income setting was a major barrier against  
11 obtaining intravenous immunoglobulins (IVIG) until the patient died. Our study aims to present a myasthenia  
12 gravis case with features of myasthenia gravis exacerbation following administration of a second dose of the  
13 AstraZeneca COVID-19 vaccine.

14  
15 **Conclusion:** Little is known about the effect of different COVID-19 vaccines on subgroups of patients with  
16 autoimmune diseases like myasthenia gravis. In our case, an exacerbation of myasthenia gravis might be  
17 precipitated by the COVID-19 AstraZeneca vaccine. Therefore, more efforts and experimental studies are  
18 needed, and a closer vigilance in MG patients is recommended.

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21 **Key Words:** Myasthenia gravis , COVID-19 , Vaccine , AstraZeneca vaccine , Case report. (Source: MeSH-  
22 NLM).

23

## 1 INTRODUCTION.

2 On the January 30<sup>th</sup>, 2020, the World Health Organization (WHO) announced that the pneumonia outbreak  
3 which was first noticed in Wuhan, China is a public health emergency of international concern (PHEIC).  
4 Approximately one month later, this outbreak was named coronavirus disease-2019 (COVID-19) by the WHO  
5 and the etiological agent named SARS-CoV-2.<sup>1</sup>

6 To date, COVID-19 pandemic has resulted in millions of deaths worldwide. As of the 28<sup>th</sup> of December, 2021,  
7 the WHO reports that there have been 280,119,931 confirmed cases of COVID-19, including 5,403,662 deaths.<sup>2</sup>  
8 While COVID-19 continues to be a major cause of deaths in Sudan, the COVAX facility distributes more than  
9 800,000 doses of AstraZeneca vaccine into Sudan on 3<sup>rd</sup> of March 2021.<sup>3</sup> "AstraZeneca vaccine (AZD1222) is  
10 a recombinant replication-deficient chimpanzee adenovirus carrying a gene encoding the S protein antigen of  
11 SARS-CoV-2". It is synthesized by SK Bioscience Co. Ltd (SK Bio) in the Republic of Korea.<sup>4</sup>

12 AstraZeneca vaccine was added to the emergency use list by WHO in the middle of February.<sup>5</sup> However,  
13 vaccine safety among patients with autoimmune diseases, such as myasthenia gravis, is still questionable, and  
14 it needs further studies. Myasthenia gravis is a relatively rare illness with a worldwide prevalence rate of 12.4  
15 people per 100,000 population.<sup>6</sup> The principal underlying pathology is destruction of the postsynaptic membrane  
16 in the neuromuscular junction by autoantibodies, mostly anti-acetylcholine receptor (anti-AChR) antibodies, and  
17 it manifests clinically as fatigable weakness of ocular, bulbar, proximal extremities, neck, and respiratory  
18 muscles. Common exacerbating factors are physical exertion, high temperature, drugs, emotional stress,  
19 surgical procedures, infections, menses, or pregnancy.<sup>7</sup>

20 Our study aims to present a myasthenia gravis case with features of myasthenia gravis exacerbation following  
21 administration of a second dose of the AstraZeneca COVID-19 vaccine.  
22

1 **THE CASE.**

2 A 37-year-old Sudanese female with known myasthenia gravis since 2011 has been maintained on  
3 Pyridostigmine (60 mg tablet once daily), reporting high compliance to treatment. She received a second dose  
4 of the COVID-19 (AstraZeneca) vaccine and immediately developed generalized body weakness and inability  
5 to walk. One month later, she presented to the ER with complaints of shortness of breath (SOB) for one day  
6 which was not associated with fever or cough. Otherwise, the review of other systems is insignificant. On  
7 examination, vitals were as follows: pulse rate (95 beats per minute), blood pressure (175/125), respiratory rate  
8 (24 breaths per minute). The patient's temperature was within normal range and the Glasgow coma scale (GCS)  
9 was 6/15. After almost half an hour from the presentation, the patient developed cardiopulmonary arrest.  
10 Cardiopulmonary resuscitation (CPR) was initiated immediately and 10 minutes later, pulse regained. She was  
11 intubated and ventilation assisted with an Ambu bag. Thereafter, she started to breathe spontaneously. A few  
12 hours later, the patient developed respiratory arrest again and was assisted with an Ambu bag for about 6 hours  
13 until she was admitted to the Intensive care unit (ICU) where she was ventilated via a mechanical ventilator.  
14 Laboratory results were significant for hyperglycemia (470 mmol/L) at the time of presentation. Complete Blood  
15 Count (CBC) was normal and blood film for malaria was negative. Computerized tomography was performed  
16 and it revealed no evidence of COVID-19. Management at the ER started with rehydration and IV  
17 methylprednisolone 1g then she received IV hydrocortisone 200mg. IVIG were requested but couldn't be  
18 obtained , and fourteen days after admission patient died.

Accepted, imjms

**DISCUSSION.**

We reported a case of myasthenia gravis exacerbation after a second dose of the AstraZeneca COVID-19 vaccine. This is consistent with the findings in another case reporting an exacerbation of MG after a second dose of the Moderna COVID-19 vaccine.<sup>8</sup> This indicates that MG patients could experience a worsening of symptoms after receiving different types of COVID-19 vaccines. A one-center case series investigated 22 patients with Myasthenia gravis and reported that 90.9% of patients had no exacerbation of symptoms after 4 weeks of receiving vaccines, and only 9.1% reported mild symptoms like neck and limb weakness.<sup>9</sup> It may be that the difference depends on the type of vaccine itself as the cohort in this case series were vaccinated with inactivated vaccines and only one patient received a recombinant vaccine.

Moreover, a new MG diagnosis was reported in a patient who experienced slurred speech after receiving the BNT162b2 vaccine.<sup>10</sup> Additionally, another two individuals were newly diagnosed with myasthenia gravis following a second dose of the same vaccine.<sup>11</sup>

It has not been elucidated why the exacerbation happened after the second dose instead of the first, but their defective lymphocytes<sup>12</sup> may have responded differently to the vaccine and dealt with it as a foreign material. Sensitization may have occurred following the first dose, and because the second shot occurred after their lymphocytes already have a memory, a cytokine storm may have been stimulated,<sup>13</sup> but this is yet to be tested.

Infections are a well-known trigger of MG exacerbation,<sup>14</sup> and COVID-19 infection is reported to have an exacerbating effect on MG patients and can cause dysphagia, weakness and respiratory failure.<sup>15</sup> Outcomes can include: ICU admission, mechanical ventilation and death.<sup>16</sup> This exacerbation is suggested to be treated with steroids and IVIG.<sup>15</sup> Which is the case with our patient as she was on steroids at the ICU, and IVIG was requested but as a low income country it was not possible to get it until she died.

The use of immunosuppressive therapy is controversial. Some studies suggest that the use of immunosuppression can lead MG patients to a more severe course of COVID-19 disease,<sup>17</sup> while others suggest that MG patients who contracted COVID-19 might be in need for increasing immunosuppressive doses, but if sepsis occurs it should be stopped.<sup>18</sup>

**CONCLUSION.**

In summary, we reported a case of myasthenia gravis exacerbation following a second dose of the AstraZeneca COVID-19 vaccine. The course of illness started with an SOB and generalized weakness then deteriorated toward respiratory arrest which necessitate ICU admission followed by death. Little is known about the effect of different COVID-19 vaccines on subgroups of patients with autoimmune diseases like myasthenia gravis. Therefore, more efforts and experimental studies are needed, and a closer vigilance in MG patients is recommended.

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- 47

1 **FIGURES AND TABLES.**

2

3 **Figure 1.**

4 Not applicable , No figures are included

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7 **Figure 2.**

8 Not applicable , No figures are included

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12 **Table 1.**

13 Not applicable , No Tables are included

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17 **Table 2.**

18 Not applicable , No Tables are included

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