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Guillain-Barré Syndrome as a Neurological Disorder and Its Association with Post-COVID-19 Vaccination: A Review

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Abstract

Guillain-Barré syndrome (GBS) is a rare autoimmune neurological disorder affecting the peripheral nervous system. It is commonly triggered by infections and has also been reported rarely after vaccination. During the COVID-19 pandemic, cases of GBS following COVID-19 vaccination were reported, raising safety concerns. This review summarizes recent literature (2016–2025) on the pathophysiology, clinical features, diagnosis, and management of GBS, with special importance on post-COVID-19 vaccination cases. Evidence suggests a temporal association, particularly with adenovirus-based vaccines; however, the overall incidence remains very low. Early diagnosis and rapid treatment result in favourable outcomes. The benefits of COVID-19 vaccination overshadow the rare risk of neurological complications.

Keywords

Guillain-Barré syndrome, COVID-19 vaccine, neurological disorder, autoimmune disease.

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1. INTRODUCTION

Guillain Barre Syndrome (GBS) is an acute disorder in which immune system attacks body's own tissues leading to inflammation and damage to peripheral nervous system (PNS) usually triggered by an infection or sometimes vaccinations. It is also a most common cause of acute flaccid paralysis (sudden weakness of all four limbs) worldwide. This syndrome was first referred over 100 years ago by Guillain, Barre, and strohl, who identified the characteristic finding of albumin cytological dissociation in cerebrospinal fluid (CSF). It affects about 1-2 people per 100,000 per year. More common in men as compared to women and risk increases with age, but occurs at any age. GBS is now considered a miscellaneous group of related disorders, including Miller Fisher syndrome (MFS) and several regional variants. GBS shows a wide range of clinical patterns, which involves mild nerves up to severe paralysis and cause problems in respiratory functions.

The coronavirus disease 2019 (COVID-19) pandemic has posed a unique challenge to global public health system, resulting in many diseases, deaths and socio-economic disturbance worldwide. Since its arrival in late 2019, severe acute respiratory syndrome coronavirus-2 (SARS-COV-2) has led to repeated waves of infection, massive overload on healthcare infrastructures and demanding the rapid development of preventive strategies. Among these,

vaccination is the most effective method to reduce severe illness and COVID-19 related deaths. Vaccination campaigns were later implemented across both high income and low to-middle-income countries on large scale, leading to the administration of billions of vaccine doses worldwide.

Recent research suggests a possible temporal association between COVID-19 vaccination and onset of GBS in some individuals, but causality remains unproven and the overall risk is low compared to the public health benefits of vaccination.

2. EPIDEMIOLOGY PARAMETER

Description

Global incidence 1–2 per 100,000 persons/year
Gender More common in males
Vaccine association Rare, mostly adenovirus-vector vaccines Onset time 7–21 days post-vaccination

3. PATHOPHYSIOLOGY

GBS is autoimmune in nature. Molecular mimicry — where immune cells mistake nerve components for vaccine or viral proteins — may play a role. In COVID-19 vaccination, especially with adenovirus-based vaccines, the immune response may sometimes trigger antibodies that attack nerve tissue.

Main mechanisms discussed in literature:

- Autoimmune attack on myelin/axon of peripheral nerves
- Possible involvement of pro-inflammatory cytokine response
- Vaccination may trigger immune activation in rare sensitive individuals

Figure 1: Immunopathogenesis of Guillain-Barre Syndrome

4. Clinical Features

- Ascending muscle weakness
- Loss of deep tendon reflexes
- Sensory disturbances
- Facial nerve involvement
- Autonomic dysfunction in severe cases
- Paresthesia (Numbness)

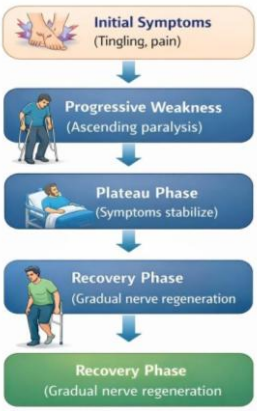


Figure 2: Clinical Course of Guillain-Barre Syndrome

5. DIAGNOSIS

Diagnosis is based on**: -**

- **Clinical Symptoms**
- **Nerve conduction Studies**
- **CSF analysis**: shows albumin cytologic dissociation (high protein, normal cells

6. TREATMENT AND OUTCOME

Treatment Effect IV Immunoglobulin (IVIg) Most commonly used

Plasmapheresis: Effective in severe cases

Physical therapy: Important for recovery

Most patients respond well if treated early, but recovery varies by case severity.

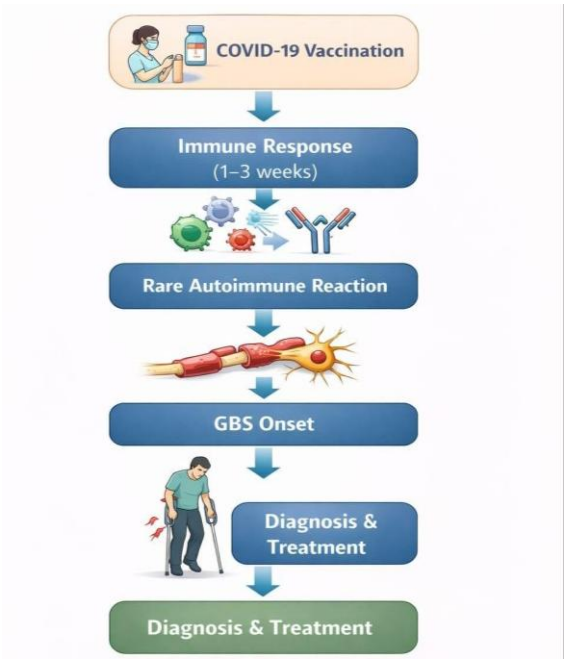


Figure 3: Timeline of Guillain-Barre Syndrome following COVID-19 vaccination

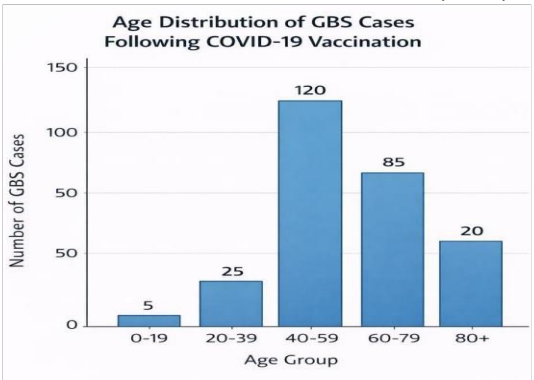
7. GBS FOLLOWING COVID-19 VACCINATION

Although rare, several reviews and systematic analyses reported GBS cases after COVID-19 vaccination:

- **AIDP (Acute Inflammatory Demyelinating Polyneuropathy) subtype** was the most common form post-vaccination.
- Multiple case series reported onset typically within ~14 days after vaccination.
- It appears to be **higher association with adenovirus-vector vaccines** than with mRNA vaccines.

Post-vaccination GBS is rare and usually presents within two weeks of vaccination. Most reported cases respond well to standard treatment.

Graph constructed based on data reported by Hanson et al. (2022)



Flowchart 1: Selection process of studies included in the review

8. CONCLUSION

Guillain-Barré syndrome is a rare autoimmune neurological disease that can follow infections and, very rarely, vaccinations. While some cases have been reported after COVID-19 vaccines, the overall risk remains extremely low and significantly less than the risk of neurological complications from natural SARS-CoV-2 infection. Early recognition, diagnosis, and appropriate immunotherapy can lead to good recovery in most patients. Continued monitoring and

research are essential to improve understanding and vaccine safety.

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Conflicts of Interest
The author declares no conflict of interest.

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