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REVIEW

Factors associated, symptoms, and treatments of Guillain-Barré Syndrome: a narrative review

Factores asociados, síntomas, y tratamientos del Síndromde de Guillain-Barré: una revisión narrativa

Emilia López-Peña[1], Diana Camizán-Julca[1], Jonathan Dávila-Pezo[1], Sayra Morales-Ruiz[1], Víctor Álvarez-Manrique[1], Mardel Morales-García[2], Liset Z. Sairitupa-Sanchez[2], Wilter C. Morales-García[3]

[1]Escuela Profesional de Enfermería, Facultad de Ciencias de la Salud, Universidad Peruana Unión, San Martín, Perú.
[2]Universidad Peruana Unión, Lima, Perú.
[3]Dirección General de Investigación, Universidad Peruana Unión, Lima, Perú.

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Corresponding author: Wilter C. Morales-García

ABSTRACT

Introduction: Guillain-Barré Syndrome (GBS) is commonly linked to infections caused by Campylobacter jejuni, Cytomegalovirus, Epstein-Barr virus, Mycoplasma pneumoniae, and hepatitis. It triggers an immune response leading to neurological complications.
Objective: to conduct a brief literature review on Guillain-Barré Syndrome (GBS), its associated factors, and available treatments. *Design:* Literature review based on a narrative synthesis. **Method:** documents were selected through a critical literature review, considering inclusion and exclusion criteria from Scopus, ScienceDirect, SciELO, Google Scholar, and PubMed.
Results: the literature analysis included a corpus of 15 articles, comprising 2 statistical analyses, 6 narrative reviews, 3 systematic reviews, 2 observational studies, and 2 clinical cases. The studies primarily involved a population of adult men and women, children, and pregnant women, mostly from low-income and vulnerable backgrounds. Patients diagnosed with GBS were associated with COVID-19, Systemic Lupus Erythematosus (SLE), Posterior Reversible Encephalopathy Syndrome (PRES), Zika virus, and dengue.
Conclusions: research related to GBS highlights numerous causes and complications. GBS is significantly associated with muscle weakness, reduced mobility, and conditions such as SLE and PRES. During the COVID-19 pandemic, a slight increase in GBS cases was recorded. Although uncommon, GBS complications can lead to cardiovascular, respiratory, and gastrointestinal issues. Research does not explore in-depth preventive strategies or early management of these complications. There are currently limited treatments available to improve patient outcomes.

Keywords: Guillain-Barré Syndrome; Associated Factors; Treatments.

RESUMEN

Introducción: el síndrome de Guillain-Barré (SGB) se asocia comúnmente a infecciones causadas por Campylobacter jejuni, citomegalovirus, virus de Epstein-Barr, Mycoplasma pneumoniae y hepatitis. Desencadena una respuesta inmunitaria que conlleva complicaciones neurológicas.
Objetivo: realizar una breve revisión bibliográfica sobre el síndrome de Guillain-Barré (SGB), sus factores asociados y los tratamientos disponibles. Diseño: Revisión bibliográfica basada en una síntesis narrativa.
Método: los documentos se seleccionaron mediante una revisión crítica de la literatura, considerando los

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criterios de inclusión y exclusión de Scopus, ScienceDirect, SciELO, Google Scholar y PubMed.
Resultados: el análisis bibliográfico incluyó un corpus de 15 artículos, compuesto por 2 análisis estadísticos, 6 revisiones narrativas, 3 revisiones sistemáticas, 2 estudios observacionales y 2 casos clínicos. Los estudios se centraron principalmente en una población de hombres y mujeres adultos, niños y mujeres embarazadas, en su mayoría de entornos vulnerables y de bajos recursos. Los pacientes diagnosticados con SGB se asociaron con COVID-19, lupus eritematoso sistémico (LES), síndrome de encefalopatía posterior reversible (SEPR), virus del Zika y dengue.
Conclusiones: la investigación relacionada con el SGB destaca numerosas causas y complicaciones. El SGB se asocia significativamente con debilidad muscular, movilidad reducida y afecciones como LES y SEPR. Durante la pandemia de COVID-19, se registró un ligero aumento en los casos de SGB. Aunque poco frecuentes, las complicaciones del SGB pueden provocar problemas cardiovasculares, respiratorios y gastrointestinales. La investigación no explora estrategias preventivas exhaustivas ni el manejo temprano de estas complicaciones. Actualmente, existen tratamientos limitados para mejorar la evolución de los pacientes.

Palabras clave: Síndrome de Guillain-Barré; Factores Asociados; Tratamientos.

INTRODUCTION

Guillain-Barré Syndrome (GBS) is commonly linked to infections caused by Campylobacter jejuni, Cytomegalovirus, Epstein-Barr virus, Mycoplasma pneumoniae, and hepatitis. It triggers an immune response leading to neurological complications (Puga et al., 2003). GBS presents two primary variants: demyelinating and axonal (Nanda et al., 2013). The demyelinating variant is a polyneuropathy that weakens muscles, causes areflexia, and affects the myelin sheath and Schwann cells (Phillips O., 2019; Puga et al., 2003), leading to endoneuronal hypercellularity (Tellería-Díaz & Calzada-Sierra, 2002). The axonal variant directly impacts nerve cells (Phillips Morales, 2019). GBS also affects the twelfth cranial nerve, causing numbness, tingling, and weakness in the lower limbs (Nanda et al., 2013). Symptoms typically appear between one to six weeks after a COVID-19 infection and are associated with strokes and acute disseminated meningoencephalitis (Lunn et al., 2021). It is more common in adults (Phillips O., 2019), causing muscle weakness in the neck, respiratory system, tongue, dysphagia, and loss of reflexes in the arms and triceps (Nanda et al., 2013). Patients may experience numbness, tingling sensations, and eventually, clinical paralysis (Puga et al., 2003), leading to flaccid quadriplegia and respiratory failure, potentially leaving them immobilized indefinitely (Tellería-Díaz & Calzada-Sierra, 2002).Key factors influencing diagnosis include age, motor deficits, lack of neurophysiological studies, and increased cerebrospinal fluid protein levels (Phillips O., 2019).

Studies indicate that GBS presents with neurological abnormalities such as weakness, paralysis, sensory deficits, and reflex changes, as well as cardiovascular, respiratory, and gastrointestinal issues (Elendu et al., 2024). It often develops after gastrointestinal or respiratory infections caused by Campylobacter jejuni, Mycoplasma pneumoniae, or Cytomegalovirus (Finsterer, 2022).During the COVID-19 pandemic, the incidence of GBS increased (Li et al., 2024), primarily affecting individuals over 40 years old, who developed acute inflammatory demyelinating polyneuropathy (de Matos et al., 2022).

The objective of this study is to review the literature on Guillain-Barré Syndrome (GBS), its symptoms, associated factors, and treatment options.

METHOD

A detailed narrative review was conducted to explore and analyze the relevant scientific literature on Guillain-Barré Syndrome (GBS). Recognized academic databases, including Scopus, ScienceDirect, SciELO, Google Scholar, and PubMed, were consulted due to their extensive coverage and rigorous academic standards. The search strategy was refined using specific keywords in English, such as “Guillain-Barré,” “treatments,” and “symptoms,” along with Boolean operators like “AND” to enhance the scope and precision of the results, optimizing the retrieval of significant documents. The literature review period extended from August to October 2024, focusing on recent articles and publications between 2017 and 2024. This approach ensured the inclusion of up-to-date information, guaranteeing the relevance and validity of the collected data. The review covered texts in multiple languages, including Spanish, English, and Portuguese, prioritizing case reports and scientific journal articles, which provided in-depth perspectives on the topic.

RESULTS

The literature analysis included a corpus of 15 articles, comprising 2 statistical analyses, 6 narrative reviews, 3 systematic reviews, 2 observational studies, and 2 clinical cases. The studies primarily involved a population of adult men and women, children, and pregnant women, mostly from low-income and vulnerable backgrounds.

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Patients diagnosed with GBS were associated with COVID-19, Systemic Lupus Erythematosus (SLE), Posterior Reversible Encephalopathy Syndrome (PRES), Zika virus, and dengue.

Table 1. Summary of the characteristics of the reviewed studies

No.	Study Title	Methodology	Objective/Sample	Main Findings
1	Falls in People Post-Guillain-Barré Syndrome in the United Kingdom: A National Cross-Sectional Survey of Community-Based Adults (Ian & Zachary, 2021)	Statistical analysis	Examine risk factors associated with Guillain-Barré Syndrome (GBS), such as falls and fatigue, through a cross-sectional survey of 216 individuals.	People who reported falls in the past 12 months showed lower mobility levels and poor balance.
2	Relative Frequencies and Clinical Features of Guillain-Barré Syndrome Before and During the COVID-19 Pandemic in North China (Li et al., 2024)	Clinical cases (observational study)	Explore whether the relative frequency of Guillain-Barré Syndrome (GBS) changed during the COVID-19 outbreak in the absence of social restrictions.	COVID-19 increased the incidence of Guillain-Barré Syndrome, with 13 cases per 14 408 patients pre-pandemic compared to 29 cases per 160 669 patients during the pandemic.
3	Guillain-Barré Syndrome as the Initial Presentation of Systemic Lupus Erythematosus: Case Report with a Systematic and Literature Review (Bhoi et al., 2023)	Literature review (narrative)	A 39-year-old woman presented with a disease resembling GBS, but further evaluation revealed characteristics of SLE.	Early recognition of SLE as a trigger for GBS changes the conventional treatment approach. SLE-GBS is rare, and no specific treatment exists. Symptoms also included autoimmune hemolytic anemia, class I lupus nephritis, mild splenomegaly, and pleural effusion.
4	Posterior Reversible Encephalopathy Syndrome in Pediatric Patients with Guillain-Barré Syndrome: A Case Series and Literature Review (Surve et al., 2024)	Systematic review	Analyzed 75 medical records of pediatric patients, 31 with dysautonomia and 3 with PRES.	PRES associated with GBS is a rare and potentially life-threatening complication in pediatric patients. With multimodal intensive care, improvement was observed, and patients were discharged after an average of 104 days.
5	Frequency of Exposure to Arboviruses and Characterization of Guillain-Barré Syndrome in a Clinical Cohort of Patients Treated at a Tertiary Referral Center in Brasília, Federal District (de Matos et al., 2022)	Clinical cases	A one-year follow-up study investigating the possible association between GBS and previous infections with arboviruses, including Zika, dengue, and chikungunya.	The majority of patients were men with an average age of 40 years, and 83 % had triggering events for GBS. 51 % had acute inflammatory demyelinating polyneuropathy. Four patients were seropositive for dengue, and most showed improved disability after 10 weeks of follow-up.
6	Guillain-Barré Syndrome Before and During the COVID-19 Pandemic in a Referral Center in Mexico (López-Hernández et al., 2023)	Statistical analysis	Included 123 patients during the pandemic and 78 before, analyzing the involvement of bulbar cranial nerves.	The pandemic saw a higher frequency of the demyelinating variant and bulbar cranial nerve involvement. There were more GBS cases associated with SARS-CoV-2 vaccines.
7	Guillain-Barré Syndrome: A Comprehensive Review (Bellanti & Rinaldi, 2024)	Narrative review and clinical studies	Provide an extensive understanding of GBS treatment.	GBS is a severe but treatable disorder. Early diagnosis and treatment are essential to prevent axonal neuropathy and minimize disability. New therapies and cerebrospinal fluid biomarkers are being evaluated to improve management.
8	Clinical Presentation and Symptomatology of Guillain-Barré Syndrome: A Literature Review (Elendu et al., 2024)	Literature review	Describe risks associated with this neurological disorder characterized by acute-onset ascending paralysis and sensory abnormalities.	Neurological examination findings included weakness, paralysis, sensory deficits, reflex changes, and cardiovascular, respiratory, and gastrointestinal problems.

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9	Understanding Neurological Manifestations Induced by Infections with the Novel Coronavirus: An Integrative Review (Felipe et al., 2021)	Narrative review	Understand the neurological clinical manifestations in patients with SARS-CoV-2/ COVID-19.	Notable manifestations included olfactory and gustatory disorders, myalgia, headaches, dizziness, encephalitis, and Guillain-Barré Syndrome. Neurological symptoms were prevalent in patients with SARS-CoV-2/ COVID-19.
10	The Neurological Implications of COVID-19: A Comprehensive Narrative Review (Cheyne et al., 2024)	Narrative review	Explore the long-term neurological manifestations of COVID-19 in individuals with and without pre-existing central nervous system (CNS) disorders. No direct samples were used, as this is a review study.	Identified neurological complications included encephalitis, Guillain-Barré Syndrome, Parkinson's disease, multiple sclerosis, among others. The study highlighted challenges in diagnosing, treating, and managing neurological conditions during the pandemic, with the most vulnerable populations being those with pre-existing neurological disorders.
11	Relationship Between COVID-19 and Guillain-Barré Syndrome in Adults: A Systematic Review (Oliveira et al., 2024)	Systematic literature review	Examine and synthesize available evidence on the relationship between COVID-19 infection and the incidence of GBS in adults. No direct patient sample was used, as this is a review of existing studies.	Most reported GBS cases occurred within weeks of COVID-19 infection, suggesting an immune-mediated mechanism. Symptoms ranged from mild weakness to severe paralysis, with age, comorbidities, and COVID-19 severity influencing outcomes.
12	COVID-19-Induced Guillain-Barré Syndrome (Brooks et al., 2021)	Observational study	Case of a 47-year-old man with COVID-19 who developed Guillain-Barré Syndrome with acute inflammatory demyelinating polyradiculoneuropathy.	He was treated with intravenous immunoglobulin and underwent four weeks of intensive rehabilitation with minimal improvement at discharge.
13	Neurological Manifestations of COVID-19: A Systematic Review and Detailed Comprehension (Ousseiran et al., 2023)	Systematic review	Investigate neurological manifestations of COVID-19, including headaches, encephalitis, encephalopathy, anosmia, ageusia, Guillain-Barré Syndrome, myalgia, and myasthenia.	More studies are needed for prevention and treatment. GBS was associated with longer hospital stays in COVID-19 neurological patients.
14	Relationship Between Acute Phase Reactants and Disability in Guillain-Barré Syndrome During the COVID-19 Pandemic (Yevgi, 2022)	Observational study	Analyzed patients diagnosed with GBS from 2018-2022, including pre-pandemic, pandemic, and post-COVID-19 cases.	Few differences were found between pandemic periods. Post-COVID-19 GBS patients had the worst Hughes Functional Grading Scale (HFGS) scores at admission and discharge.
15	Guillain-Barré Syndrome and SARS-CoV-2 Infection: A Systematic Review and Meta-Analysis on a Debated Issue and Evidence for the Italian Factor (Censi et al., 2024)	Systematic review	Analyzed 209 case reports and 26 cohort studies.	GBS patients infected with SARS-CoV-2 exhibited demyelinating factors. SARS-CoV-2 affected cranial nerves, showing a relationship between the virus and GBS.

DISCUSSION

The purpose of this brief inquiry has been to identify key aspects related to the symptoms, associated factors, and treatments currently being used for Guillain-Barré Syndrome (GBS).

Associated Factors

Several studies have reported that GBS is linked to reduced mobility and poor balance, which can lead to falls (Ian & Zachary, 2021). Additionally, a relationship has been found between systemic lupus erythematosus (SLE) and GBS, with SLE acting as a trigger for GBS, presenting symptoms such as autoimmune hemolytic anemia, lupus nephritis, and mild splenomegaly (Bhoi et al., 2023). GBS has also been associated with Posterior Reversible Encephalopathy Syndrome (PRES) in pediatric populations (Surve et al., 2024). During the COVID-19

pandemic, an increase in GBS cases was observed (Li et al., 2024), particularly in adults over 40 years old, who developed acute demyelinating polyneuropathy (de Matos et al., 2022), affecting cranial nerves (Censi et al., 2024). Studies also suggest that GBS manifested in individuals vaccinated against COVID-19 (López-Hernández et al., 2023). Other risk factors include age, comorbidities, dengue, Parkinson's disease, and multiple sclerosis (Cheyne et al., 2024), alongside symptoms like olfactory and gustatory disorders, myalgia, headaches, dizziness, and encephalitis (Felipe et al., 2021), with patients scoring poorly on the Hughes scale (Yevgi, 2022).

GBS is associated with low mobility and poor balance, leading to falls (Ian & Zachary, 2021), with progressive, symmetrical muscle weakness causing the loss or reduction of reflexes in the legs, which ascends to the upper limbs. This is accompanied by dysautonomia symptoms (Mehdizadeh et al., 2023). Hospitalized patients within two weeks of symptom onset were unable to walk 10 meters independently, but after immunization, (Thomma et al., 2023), many were able to walk independently after six months (GBS disability scores >3) (Thomma et al., 2023).

GBS associated with systemic lupus erythematosus (SLE) is rare and lacks a specific treatment. It presents symptoms such as autoimmune hemolytic anemia, class I lupus nephritis, mild splenomegaly, and pleural effusion (Bhoi et al., 2023). This multifactorial autoimmune disease involves genetic factors, sex hormones, environmental influences, infections, medications, and diet. Patients often experience numbness and limb weakness before diagnosis (Gao et al., 2018). While SLE predominantly affects women of reproductive age, men with SLE exhibit more severe clinical manifestations, complications such as renal failure, and poorer prognoses (Páez-Macías et al., 2022). One of its most severe complications is diffuse alveolar hemorrhage, which can lead to respiratory and renal failure (Althagafi et al., 2023).

PRES associated with GBS is a rare and potentially life-threatening complication in pediatric patients (Surve et al., 2024). Moreover, when combined with a COVID-19 infection, it can lead to acute hypoxemic respiratory failure, requiring mechanical ventilation and hemodynamic support (Dominguez-Rojas et al., 2022). The coexistence of these two syndromes is extremely rare and often underdiagnosed. PRES may present either simultaneously or after the initial GBS symptoms, leading to encephalopathy, multiple infarcts, and hemorrhages in some cases (Xiromerisiou et al., 2020), with persistent neurological deficits and ischemia, resulting in a poor prognosis. GBS can also trigger systemic inflammation leading to endothelial dysfunction (Belgrado et al., 2022).

During the COVID-19 pandemic, an increase in GBS cases was observed (Li et al., 2024), with the most affected individuals being adults over 40 years old, who developed acute demyelinating polyneuropathy (de Matos et al., 2022) affecting cranial nerves (Censi et al., 2024). Additionally, GBS has been linked to SARS-CoV-2 vaccines (López-Hernández et al., 2023), with symptoms such as numbness/tingling, loss of taste and smell, vision impairment, paralysis, seizures, personality changes, and difficulty with basic functions occurring within seven days of vaccination—though these cases are rare (Top et al., 2024). Patients with prior neuroradiculitis before COVID-19 vaccination are more likely to develop GBS (Zhu et al., 2024). GBS has also been reported following vaccination, with symptoms including hypertension and anxiety-depressive syndrome (Coviello et al., 2024). Other studies indicate that GBS cases increased following SARS-CoV-2 vaccinations (López-Hernández et al., 2023), with a notable spike occurring within six weeks after the first dose of the AstraZeneca vaccine (Keh et al., 2023).

Symptoms

GBS also presents with symptoms such as muscle weakness, paralysis, sensory deficits, reflex changes, cardiovascular issues, respiratory problems, gastrointestinal dysfunction, mild weakness, and severe paralysis, with the most affected individuals being those with preexisting neurological disorders.

Guillain-Barré Syndrome presents symptoms including weakness, paralysis, sensory deficits, and reflex changes. Cardiovascular complications are of particular concern (Elendu et al., 2024), often leading to heart abnormalities and, in some cases, cardiac arrest (Zöllei Eva et al., 2000). Severe dysautonomia occurs during the acute phase, even in patients who do not require invasive ventilation (Cheng-Yin et al., 2022), presenting with tachycardia, bradycardia, labile hypertension, and fluctuating heart rate (Kuroiwa et al., 2023). In rare cases, febrile congestive heart failure occurs as a manifestation of pheochromocytoma, with symptoms including hypertension, shock, arrhythmias, myocardial injury, and cardiomyopathy (Heidarpour et al., 2021).

GBS also causes respiratory complications (Elendu et al., 2024), with severe cases resulting in respiratory failure due to muscle paralysis, leading to fatal outcomes (Oguri et al., 2021). Patients should be immediately transferred to intensive care for monitoring and mechanical respiratory support (López et al., 2014). During the COVID-19 pandemic, cases of Guillain-Barré Syndrome combined with pulmonary embolism were observed in association with COVID-19 infection (Tetteh-Wayoe et al., 2023).

This syndrome is also linked to gastrointestinal problems (Elendu et al., 2024). The Helicobacter pylori bacterium has been associated with multiple sclerosis, Alzheimer's disease, Parkinson's disease, and Guillain-Barré Syndrome (Santos et al., 2020). Cases of gastric lymphoma progressing to Guillain-Barré Syndrome have been reported (Kuriyama et al., 2020), along with acute flaccid paralysis caused by gastrointestinal infections,

primarily due to Campylobacter jejuni (Khatib et al., 2018).

Treatments

Intravenous immunoglobulin (IVIG) has been widely used, while new therapies and neuropathic fluid biomarkers are still under evaluation for the prevention and treatment of GBS.

IVIG is commonly used in treatment (Brooks et al., 2021), as well as corticosteroid boluses for early intervention and rituximab for nodopathies involving anti-contactin and neurofascin antibodies (Expósito et al., 2022). IVIG or plasmapheresis improves patient outcomes in the acute phase of GBS (Pérez, 2018), yet further studies are needed for prevention and treatment. Additionally, GBS results in prolonged hospital stays for COVID-19 patients with neurological complications (Ousseiran et al., 2023). For diagnosis, lumbar puncture and neurophysiological studies are used, with treatment varying depending on severity and variant type (Expósito et al., 2022).

New therapies and neuropathic fluid biomarkers are under evaluation for treatment (Bellanti & Rinaldi, 2024). Biomarkers such as serum, cerebrospinal fluid (CSF), and peripheral nerves are key indicators of GBS pathogenesis, progression, and recovery. Immunoglobulin remains a first-line immunotherapy for combating Guillain-Barré Syndrome (Wang et al., 2015). Elevated interleukin-8 levels in CSF help distinguish inflammatory neuropathic variants from chronic inflammatory demyelinating polyneuropathy (Breville et al., 2021). Diagnosing GBS remains complex due to its heterogeneous course, and international clinical guidelines are still lacking (Leonhard et al., 2021). Further studies are necessary for GBS prevention and treatment (Ousseiran et al., 2023).

This study began with a general approach to Guillain-Barré Syndrome, and as the literature review progressed, key aspects such as associated factors, symptoms, and treatments were identified. Some specific studies were generalized in this paper. Additional health-specific databases could have been consulted for further insights.

CONCLUSIONS

GBS is associated with reduced mobility, decreased reflexes, and dysautonomia, with favorable outcomes following immunization. It is also linked to systemic lupus erythematosus (SLE), presenting symptoms such as autoimmune hemolytic anemia, pleural effusion, and other complications, primarily affecting women of reproductive age. SLE in men is associated with more severe manifestations, including renal failure and respiratory distress. Additionally, GBS is related to Posterior Reversible Encephalopathy Syndrome (PRES), which is rare and often fatal in pediatric patients. When compounded by COVID-19 infection, patients may develop acute hypoxemic respiratory failure, sometimes requiring mechanical ventilation, leading to a worsened prognosis. In some cases, PRES presents with hemorrhage and infarctions.Another significant factor associated with GBS is SARS-CoV-2 vaccination, which led to an increased number of cases during the pandemic. This resulted in demyelinating polyneuropathy affecting cranial nerves.

GBS presents critical cardiovascular symptoms, often leading to heart anomalies, tachycardia, bradycardia, hypertension, and in severe cases, cardiac arrest. Respiratory complications are also a major concern, as GBS can cause respiratory failure due to paralysis of respiratory muscles. Immediate intensive care and mechanical ventilation are often required. Additionally, gastrointestinal complications arise due to infections caused by Helicobacter pylori and Campylobacter jejuni, both linked to Guillain-Barré Syndrome.

For treatment, intravenous immunoglobulin (IVIG) has proven effective in improving the condition of GBS patients. Corticosteroid boluses and rituximab are also being used. However, more research is necessary to refine prevention strategies and improve treatment efficacy, reducing patient hospitalization duration. Biomarkers such as serum, cerebrospinal fluid (CSF), and peripheral nerves have shown promise in understanding GBS pathogenesis, progression, and recovery. Immunoglobulin remains a key immunotherapy for treating GBS. However, further studies are essential to enhance prevention and treatment strategies for this syndrome.

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The authors declare that there is no conflict of interest.

CONTRIBUTION OF AUTHORSHIP

Conceptualization: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Data curation: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Formal analysis: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Research: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Methodology: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Project administration: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Resources: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Software: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Supervision: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Validation: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Visualization: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Writing – original draft: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.

Writing – review & editing: Emilia López-Peña, Diana Camizán-Julca, Jonathan Dávila-Pezo, Sayra Morales-Ruiz, Víctor Álvarez-Manrique, Mardel Morales-García, Liset Z. Sairitupa-Sanchez, Wilter C. Morales-García.