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ORIGINAL ARTICLE

Caracterización clínica y electroneuromiográfica de pacientes diagnosticados con síndrome de Guillain-Barré

Clinical and electroneuromyographic characterization of patients diagnosed with Guillain-Barré syndrome

[I]Dra. Judith Cabrera González, [II]Est. Shaúl Bauzá González, [III]Dra. Melissa Madely Rivero Viol
[I]Dra. Elianet Viera Espinosa

[I]Leopoldito Martínez General Teaching Hospital. Faculty of Medical Sciences of Mayabeque. San José de las Lajas, Cuba.
[II]Faculty of Medical Sciences of Mayabeque. Güines, Cuba.
[III]Neuroscience Center. Victoria de Girón Institute of Basic and Preclinical Sciences. Havana, Cuba.

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RESUMEN

Introducción: El síndrome de Guillain-Barré es una polineuropatía adquirida inmunomediada. Los estudios de electrodiagnóstico, definen el tipo de fibra afectada: motoras o sensitivas. Son la principal herramienta para establecer si es una polineuropatía desmielinizante o axonal. **Objetivo:** Caracterizar desde la clínica y la electroneuromiografía el síndrome de Guillain-Barré. **Métodos:** Estudio descriptivo con un corte transversal, en el periodo entre el primero de enero de 2022 al 30 de noviembre de 2025, con un total de población de 21 pacientes. Las variables fueron: la edad, sexo, año de diagnóstico, estación del año, antecedentes de proceso infeccioso, hallazgos al examen neurológico, criterios de diagnóstico electroneuromiográfico, variantes electrofisiológicas y características fisiopatológicas. **Resultados:** El 33.33 % de los casos fueron mayores de 60 años y el 47.62 % diagnosticados en el 2022. Un 52.38 % presentó antecedentes de arbovirosis recientes y en el 23.81 % de COVID-19. El síntoma que predominó, fue la disminución de la fuerza muscular en el 100 %. Los nervios más afectados fueron ambos tibiales con prolongación de las latencias distales en todos los pacientes. **Conclusiones:** Los estudios de conducción nerviosa y la Electroneuromiografía, constituyen un examen indispensable en el manejo del síndrome de Guillain-Barré, porque complementan el diagnóstico diferencial, la

ABSTRACT

Introduction: Guillain-Barré syndrome is an immune-mediated acquired polyneuropathy. Electrodiagnostic studies define the type of affected fiber: motor or sensory. They are the main tool for establishing whether it is a demyelinating or axonal polyneuropathy. **Objective:** To characterize Guillain-Barré syndrome clinically and by electroneuromyography. **Methods:** Descriptive cross-sectional study from January 1, 2022 to November 30, 2025, with a total population of 21 patients. The variables were age, sex, year of diagnosis, season of the year, history of infectious process, findings on neurological examination, electroneuromyographic diagnostic criteria, electrophysiological variants, and pathophysiological characteristics. Results: A total of 33.33 % of cases were older than 60 years, and 47.62 % were diagnosed in 2022. A total of 52.38 % had a history of recent arbovirus infection and 23.81 % of COVID-19. The predominant symptom was decreased muscle strength in 100 %. The most affected nerves were both tibial nerves, with prolongation of distal latencies in all patients. **Conclusions:** Nerve conduction studies and electroneuromyography constitute an indispensable examination in the management of Guillain-Barré syndrome because they complement the differential diagnosis, classification, and detection of possible sequelae in peripheral nerves. Motor clinical

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clasificación y la presencia de posibles secuelas en los nervios periféricos. Los hallazgos clínicos motores predominan en los miembros inferiores asociados a daño axonal con prolongación de las latencias distales y disminución de su amplitud potencial.

Palabras clave: síndrome Guillain-Barré, electrofisiología, conducción nerviosa, reflejo anormal, hipotonía muscular, enfermedades desmielinizantes
Descriptores: síndrome Guillain-Barré/diagnóstico; electrofisiología; conducción nerviosa; reflejo anormal; hipotonía muscular; enfermedades desmielinizantes

clinical findings predominate in the lower limbs, associated with axonal damage with prolongation of distal latencies and reduced potential amplitude.

Keywords: Guillain-Barré syndrome, electrophysiology, nerve conduction, abnormal reflex, muscle hypotonia, demyelinating diseases
Descriptors: Guillain-Barré Syndrome/diagnosis; electrophysiologie; neural conduction; reflex abnorm

INTRODUCTION

Guillain-Barré syndrome (GBS) corresponds to an acquired polyneuropathy that is acute, peripheral, and immune-mediated. The typical clinical picture is muscle weakness that begins in the lower limbs, symmetric and progressive, accompanied by hyporeflexia or areflexia, although atypical forms such as Miller-Fisher syndrome exist.[1] One of the most frequent causes is post-infectious, in which various microorganisms are involved, such as: *Campylobacter jejuni, Haemophilus influenzae, Mycoplasma pneumoniae, viruses such* as *cytomegalovirus*, Epstein-Barr, hepatitis E, influenza A, Zika, and other arboviruses including dengue and chikungunya.[2] Likewise, other less common causes are paraneoplastic, postsurgical, postpartum, and post-vaccinal.[3,4]

In 1916, neurologists Guillain, Barré, and Strohl described an ascending paralysis with osteotendinous areflexia in two soldiers of the French army. Strohl contributed the electroneuromyographic changes that occur in the disease.[5] Authors such as Asbury and his collaborators proposed the first description of nerve conduction criteria in 1978. However, those proposed by Hadden and Rajabally and their research teams are among the most widely used in the study of GBS. Through these, each variable and the study as a whole can be classified into the categories: axonal, demyelinating, inconclusive, inexcitable, and normal. These studies are used to support the diagnosis and are necessary to reach the first level of diagnostic certainty.[6]

GBS cases have been reported worldwide throughout the year, with a frequency of one to two cases per 100,000 inhabitants. The incidence is higher in men than in women, with a similar age distribution.[7] More than 90 % of patients reach maximum involvement between two and four weeks after onset. Then a plateau phase is established that can last for months. Recovery is much slower.[5] Approximately 20 % of patients are left with some disability, and between 3 % and 7 % die.[8]

In Cuba, no significant data are collected on the incidence, prevalence, and morbidity and mortality of this disease.

The prevalence of GBS is related to the endemicity of certain pathogens that create infectious outbreaks; thus, the incidence in Latin America and the Caribbean increased 2.6-fold during the 2016 Zika epidemic. The COVID-19 pandemic brought with it an increase in cases of GBS and Miller Fisher syndrome, associated with severe acute respiratory illness.[2]

Cuba, like the rest of the countries of Latin America and the Caribbean, has a high incidence of arbovirus infections every year and, like the rest of the world, suffers from the SARS-CoV-2 epidemic, although there are no national records demonstrating these nosological entities as causal elements of Guillain-Barré syndrome.

Electrodiagnostic studies define the type of affected fiber: motor or sensory. They are the main tool for establishing whether it is a demyelinating or axonal polyneuropathy. The following classic subtypes of GBS can be distinguished: Acute Inflammatory Demyelinating Polyradiculoneuropathy (AIDP), Acute Motor Axonal Neuropathy (AMAN), Acute Motor-Sensory Axonal Neuropathy (AMSAN),

and Miller Fisher syndrome. In addition, other variants have been described, such as cranial polyneuritis, pharyngocervicobrachial weakness, paraparesis, facial diplegia with paresthesias, and sixth cranial nerve palsy with paresthesias, among others.[5]

The AIDP variant is the most frequent in developed countries; on the other hand, AMAN occurs more often in Latin American countries. This may be explained by differences in genetic susceptibility and in infectious history that differ by region, in addition to the different electrodiagnostic criteria used.[9] The recovery patterns in axonal GBS and AIDP are different. The former takes much longer; an accurate electrodiagnosis has diagnostic, therapeutic, and prognostic implications.[10]

In the reviewed literature, there are no specified publications from Mayabeque describing the electrophysiological characteristics of patients diagnosed with Guillain-Barré syndrome. The analysis performed indicates the need to determine the clinical and neurophysiological characteristics in patients diagnosed with the disease in the province. This should guarantee the possibility of timely management, update the topic regarding diagnostic means, their interpretation, and the possibility of creating action protocols by health personnel.

An increase in the number of positive cases represents a challenge in medical care, due to the high cost of specific therapeutic treatment, intensive care services, and the social impact caused by the disease given the disability it generates in multiple spheres. For the diagnosis and treatment of GBS, it is necessary to apply the diagnostic criteria, which take into account the clinical and electrophysiological characteristics of patients.

The objective of this research is to characterize Guillain-Barré syndrome clinically and by electroneuromyography.

METHODS

An observational, descriptive cross-sectional study was conducted at the Leopoldito Martínez General Teaching Hospital, located in the municipality of San José de las Lajas, Mayabeque province, from January 1, 2022 to November 30, 2025.

The study population consisted of 21 patients diagnosed with Guillain-Barré syndrome who were treated at the Department of Medical Physiology of that hospital. They met common characteristics, including having a diagnostic impression of GBS and electrophysiological studies compatible with that diagnosis.

Data were collected from the official patient registry of the Medical Physiology Consultation, requests for nerve conduction examinations, referrals to the consultation by specialists in Neurology, Internal Medicine, Intensive Care, among others, as well as from nerve conduction results reports. The data were entered into a data collection form designed for this purpose.

The variables studied were:
-Biological sex, according to biological sex: male or female.
-Age groups: < 20 years, 20 to 29, 30 to 39, 40 to 49, 50 to 59, and 60 years and older.
-Year of diagnosis (2022, 2023, 2024, 2025).
-Season of the year: winter, spring, summer, autumn.
-History of infectious process: arbovirus infection, hepatitis B, acute diarrheal disease, COVID-19, anthrax, acute pharyngotonsillitis, nonspecific acute febrile syndrome.
-Findings on neurological physical examination: decreased muscle strength in lower limbs, decreased muscle strength in all four limbs; dysphagia, dyspnea; superficial sensory disturbances, deep sensory disturbances; osteotendinous areflexia in lower limbs, generalized osteotendinous areflexia; osteotendinous areflexia in all four limbs.
-Electroneuromyographic diagnostic criteria: presence in two or more examined nerves of decreased nerve conduction velocity of 70 to 80 % below the lower limit of normal; prolongation of distal latencies of 125 to 150 % above the lower limit of normal; presence of partial or total conduction blocks; absent F wave or with prolonged latencies greater than 125 to 150 % of the normal limit; temporal dispersion of nerve response potentials; decreased amplitude below 50 to 70 % of the lower limit of normal.

The electrophysiological criteria postulated by Cornblath and Asbury for the American Academy of Neurology since 1991 were used.(11)
-Pathophysiological characterization: axonal injury, demyelinating, axono-myelinic, and normal study.

The pattern of pathophysiological damage was

determined from the electrophysiological variables: proximal and distal latency of the Compound Muscle Action Potential (CMAP), proximal and distal amplitude and its relationship with the area under the curve, nerve conduction velocity, and the F wave.

-Diagnosis of electrophysiological variants of GBS: acute inflammatory demyelinating polyneuropathy, acute motor axonal neuropathy, acute sensorimotor axonal neuropathy, acute sensory axonal neuropathy (ASAN).

Nerve conduction studies were performed on the 21 patients in the lower and upper limbs using surface electrodes with the Neurótica 5® device. Through motor nerve conduction studies, the median, ulnar, deep peroneal, and posterior tibial nerves were evaluated, always in the distal and proximal portions; likewise, the sensory nerves—ulnar, median, and sural—were studied.

The tests were performed to assess the electroneuromyographic diagnostic criteria set out in the study variables. Through nerve conduction investigation, the functional status of peripheral motor and sensory nerve fibers was examined, providing information about pathological changes occurring in the myelin sheaths, the nodes of Ranvier, and the axons. These are the substantial basis of this investigation.

For the analysis of the study variables, a data matrix was designed using Microsoft Excel. For observation of the variables, these were coded and exported to the SPSS-19 statistical package, which included the description of the results of interest using tables and graphs. The statistical procedures used were summary measures: absolute frequency and percentage.

Ethical considerations: each patient was individually explained in what the test consisted. Their approval and signature of the informed consent form were requested, and the confidentiality of personal identity was preserved. Each patient was assigned an order number with which they were entered into the data matrix. The ethical principles of all biomedical research, as set forth in the latest Declaration of Helsinki,[12] were respected at all times, and institutional approval was obtained from the Research Ethics Committee of the Leopoldito

RESULT

Male sex predominated, at 66.66%. It was observed that 33.33 % of cases were 60 years and older, and 28.57 % were between 50 and 59 years old. It was evidenced that more than 50 % were over 50 years old. The female sex accounted for 14.28 %, distributed in the age range between 30 and 39 years, Table 1.

Table 1. Distribution of patients by age range, according to sex

Sex	Age range												Total	
	< 20 years*		20-29 years		30-39 years		40-49 years		50-59 years		60 years and more			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Female	1	4.76	0	0	3	14.28	1	4.76	2	9.52	0	0	7	33.33
Male	0	0	1	4.76	0	0	2	9.52	4	19.05	7	33.33	14	66.66

Legend: *Under 20 years of age; but of legal age, according to the current Family Code; the hospital does not have a Pediatric Intensive Care Service, so these patients are not treated there

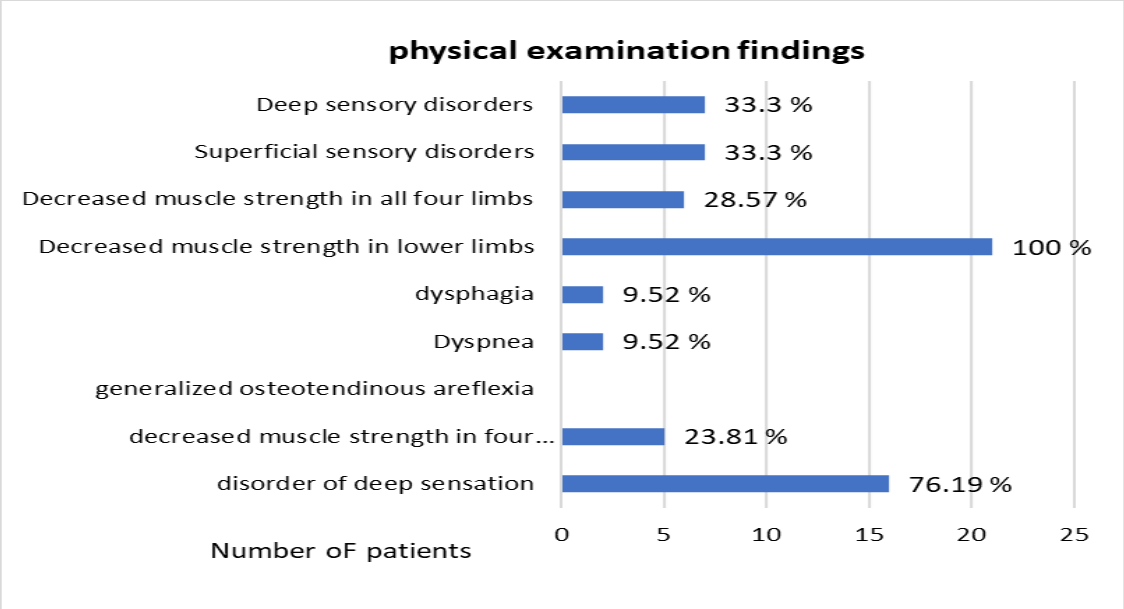
It was observed that the highest prevalence of the disease was in 2022, at 47.62 %. Among the histories of infectious disease, arbovirus infections stood out in most cases, at 52.38 %; these presented with a maximum of three weeks of evolution. Most of these, related to arbovirus infections, were diagnosed in the summer months of 2024. Meanwhile, 23.81 % of patients had a history of COVID-19, diagnosed in 2022. The other possible etiologies that were considered had an equal distribution among the patients, at 4.76 % each.

When analyzing the seasons of the year, it was observed that most cases were diagnosed in the summer and autumn months, at 80.95%, with the summer months prevailing at 61.90 %. In winter, only three cases of GBS associated with COVID-19 occurred, at 14.28 %; likewise, there was only one case in spring, diagnosed with anthrax, at 4.76 %, Table 2.

Table 2. Distribution of patients according to history of infectious disease by year and seasonal period

Infectious desease	Years								Seasonal period	Total	
	2022		2023		2024		2025				
	No.	%	No.	%	No.	%	No.	%			
Nonspecific acute febrile syndrome	1	4.76	-	-	-	-	-	-	Autumn	1	4.76
Acute pharyngotonsillitis	-	-	-	-	-	-	1	4.76	Autumn	1	4.76
COVID-19	2	9.52	-	-	-	-	-	-	Autumn	2	9.52
	3	14.28	-	-	-	-	-	-	Winter	3	14.28
Ántrax	1	4.76	-	-	-	-	-	-	Spring	1	4.76
Acute diarrheal disease	-	-	-	-	1	4.76	-	-	Summer	1	4.76
Hepatitis B	-	-	-	-	1	4.76	-	-		1	4.76
Arbovirosis infection	3	14.28	3	14.28	4	19.05	1	4.76		11	52.38
Total	10	47.62	3	14.28	6	28.57	2	9.52	Total	21	100

On physical examination, decreased muscle strength in the lower limbs predominated in 100 % of patients. Quadriparesis occurred in 23.81 % of cases. The clinical picture was accompanied by osteotendinous areflexia in the lower limbs in 76.19 % of patients. The symptoms of dysphagia and dyspnea were found together in 9.52 % respectively. Superficial and deep sensory disturbances were present, indistinctly, in 33.3 %, Graph 1.



Graph 1. Main findings presented by patients on neurological physical examination

Legend: LL: Lower limbs

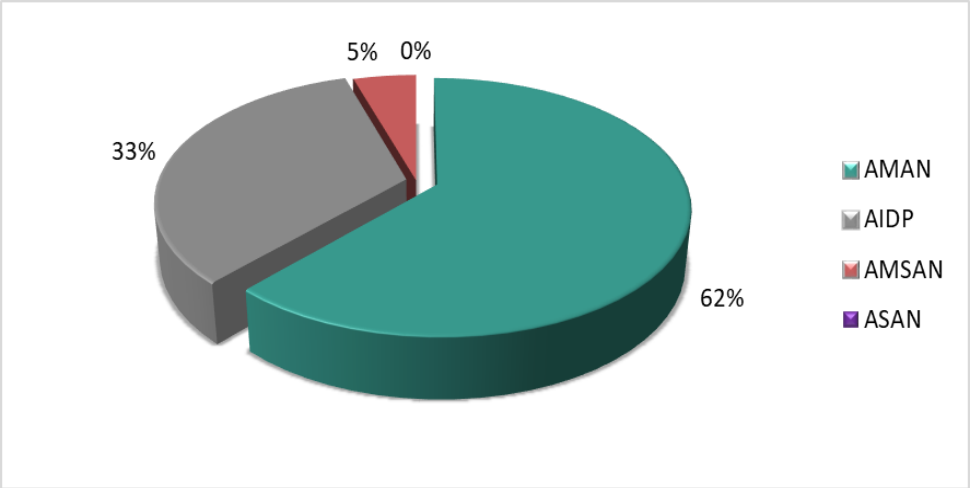
All diagnostic criteria exceeded 50 % in the patients studied. The most frequent diagnostic criterion was prolongation of distal latencies, present in 100% of patients; the second most evident criterion was decreased amplitude in 85.71 %, followed by temporal dispersion of nerve response potentials in 80.95 %.

Pathophysiological characterization based on findings from nerve conduction studies showed involvement of the nerves of the lower limbs. In the tibial nerves, nerve conduction blocks were determined most frequently. The predominant pattern of damage was axono-myelinic, present in 61.90 %; the myelinic pattern was present in 33%; likewise, pure axonal was present in only one patient, Table 3.

Table 3. Distribution of patients according to sex and electroneuromyographic diagnostic criteria

In two or more nerves	Male		Female		Total	
	No.	%	No.	%	No.	%
Decreased nerve conduction velocity of 70-80% below the lower limit of normal.	11	52.38	5	23.81	16	76.19
Prolongation of distal latencies of 125-150% above the lower limit of normal.	14	66.66	7	33.33	21	100
Presence of partial or total nerve conduction blocks.	10	47.62	4	19.04	14	66.66
Absent F wave or with prolonged latencies greater than 125-150% of the normal limit.	10	47.62	3	14.28	13	61.90
Temporal dispersion of nerve response potentials.	11	52.38	6	28.57	17	80.95
Decreased amplitude below 50-70% of the lower limit of normal.	12	57.14	6	28.57	18	85.71

Patients with an acute motor axonal neuropathy variant stood out, at 61.90 %, while 33.33 % presented acute inflammatory demyelinating polyradiculoneuropathy, and only 4.76 % of patients presented the sensorimotor axonal neuropathy subtype. No cases with the sensory axonal neuropathy variant were presented, Graph 2.



Graph 2. Distribution of patients according to electrophysiological variants

DISCUSSION

The age of highest GBS incidence in this research coincides with the results of researchers from multiple Nigerian hospitals. They state that the bimodal distribution of GBS incidence reveals peaks in young and older adults, with a notable increase in people over 50 years of age. They justify their result by the interaction between aging of the immune system and susceptibility to neurological injury.[13] We agree with this argument.

Another study conducted in Cuba in 2024 found that the mean age was 61.38 years and that most patients were male, results that agree with the present study.(1) Likewise, a study conducted in the Chinese city of Shenzhen highlights that the male-to-female ratio is 2.25:1; however, cases under 60 years of age predominate at 82.31 %.[14]

The higher incidence of GBS in men suggests biological factors linked to sex, such as hormonal influences on immunity that may be involved. However, current evidence is fragmentary and largely speculative, so more research on the topic is required. In previous studies, some authors have

proposed hypotheses about these biological differences; female estrogens ensure a more efficient humoral response and modulation of inflammation. This contrasts with the innate cellular response in men that predisposes to autoimmunity, where testosterone plays an important role by influencing greater permeability of the blood-nerve membrane, with an exaggerated response to antibodies against myelin gangliosides.[15,16]

In Latin American and Caribbean countries such as Peru, an increase in the incidence of cases associated with arbovirus infections has been demonstrated, which coincides with this research. On the other hand, according to a study conducted in Romania, the seasonality of the disease cannot be established because there are no differences in the behavior of GBS incidence by season.[17] Although according to another study,[13] a peak occurrence may occur in the winter months related to respiratory infections and other triggers. However, in the present presentation it is evidenced differently, since among the infectious antecedents with the highest incidence are arbovirus infections, these related to the increase in biological vectors in the summer months.

When evaluating the variable history of infectious process, authors have demonstrated that seven out of ten cases report having had a previous infectious picture, and neurological manifestations appear two to six weeks after the onset of the disease.[18]

Researchers on the subject conducted a literature review highlighting a multinational case-control study in which a history of arbovirus infection is present in 55 % of patients. Another study conducted in India by these authors found that 79.3 % of cases had a history of arbovirus infection. It is observed that more than half of the cases correspond to arbovirus infections, which coincides with the research presented.[19]

On the other hand, an author from the Technical University of Manabí, Ecuador, found a correlation between a history of COVID-19 infection and GBS in 436 patients.[1] This relationship is present in this research, where this antecedent is the second in incidence.

According to the signs found on neurological physical examination, in a previous study, all evaluated patients present decreased muscle strength in the lower limbs. Secondly, 94% show osteotendinous areflexia.[20] The present research reflects the same results. Likewise, an article that reports the behavior of the disease in 14 provinces of southern China highlights paraparesis as the predominant finding in 72.83 % of cases.[21] However, other scholars on the subject report that 59.67% of the studied population shows cranial nerve involvement and 67.74% superficial sensory alterations.[22] These results differ from the present research.

It has been demonstrated that nerve conduction studies are unavoidable. They support the diagnosis of this nosological entity and differentiate it from other etiologies of the Peripheral Nervous System. Among them, the spinal cord, the motor neuron, the neuromuscular junction, and the muscles that could cause similarity in symptoms and signs. In addition, they allow establishing a functional prognosis of the peripheral nerves affected during GBS. Likewise, they establish the degree of severity of the lesion and the prognosis.[23]

Authors from the Clinical Hospital at the University of Chile[9] state that the search for electrodiagnostic patterns early, before two weeks from symptom onset, may reflect normal study results in up to 10 % of cases despite the presence of involvement. The criteria increase from 30 % to 85% from the third week onward. This may demonstrate a decrease in test sensitivity if performed early.

From a pathophysiological standpoint, segmental demyelination and axonal damage occur, affecting peripheral nerves when the disease is severe.[18] AIDP is characterized by segmental demyelination of both motor and sensory nerves. This produces abnormalities in the F and H responses; as remyelination progresses, a decrease in conduction velocity is observed.[10]

In the AMAN variant, there is nodal and paranodal involvement due to antibody-mediated attack and complement activation, which causes conduction failure. This is reflected by conduction blocks, slowed conduction velocity, prolonged latencies, and absent F waves, as well as decreased amplitudes. Decreased potential amplitude is not a diagnostic criterion because axonal injury is not characteristic in classic GBS; therefore, this electrophysiological finding is not frequent. Even so, it was decided to include it in the analysis of criteria given the presence of variants with axonal injury that have been found.

Researchers from North American health organizations[20] highlight that the most frequent

electroneuromyographic diagnostic criterion is the absence of the F wave in 25 patients, accounting for 84 % of their study population; prolongation of distal latencies is present in only 65 %, and it should be noted that 61 % of cases show decreased amplitudes in the upper limbs. All these results differ significantly from the present research.

Authors from the University of Health Sciences, Haryana, India,[24] reflect in their research a homogeneous distribution of variables: 76.92 % of the study population exhibits absent F wave, decreased nerve conduction velocity, and prolonged latencies. In the present research, the behavior of the variables is heterogeneous; for example, absence of the F wave is the least frequent criterion.

A cohort study was conducted with 1,137 patients from 19 countries, in which all variants are present. The sensorimotor variant predominates in 60.9 % of the study population, which does not coincide with the present research, in which only 4.76 % present said variant. The ASAN variant does not appear in Mayabeque patients; this is indeed a result of the aforementioned study, in 13 patients.[6]

In a study conducted in Pakistan, the predominant variant was AMAN, present in 46.2 %.[25] This coincides with this study, in which 61.9 % show said variant and the others in lower proportion. In another study, authors highlight that the ASAN variant is present in 3.5 %; this is a low-incidence variant.[26] In another investigation, the AIDP variant predominates in 84.33 %,[24] which does not coincide with this presentation, although it has been demonstrated to be the most common in GBS.[1]

The acute motor axonal neuropathy variant is the electrophysiological variant with the highest incidence in this research. Involvement of proximal, intermediate, and distal nerve trunks is observed due to a conduction block, resulting from dysfunction of nodal sodium channels following a reaction with antibodies against ganglioside antigens. Macrophage invasion and axonal injury occur at the nodes of Ranvier; axons are significantly damaged, and myelin sheaths remain almost intact.[27] The selective involvement of axonal structures prolongs recovery and leaves more persistent sequelae. The AIDP variant, because the axon is not affected, allows effective remyelination and better functional recovery.[22]

Demyelinating polyneuropathy (AIDP) is in second place in frequency. The innate and cellular immune mechanisms involved bring about axonal damage and demyelination that are triggered by helper T lymphocytes (CD4+ T cells) and cytotoxic lymphocytes (CD8+ T cells), B cells, natural killer (NK) cells, and macrophages. These cross-react with antigens against myelin peptides such as protein P0, P2, and PMP22 present in the endoneurium, and cytokines such as interleukins 1 and 6 and tumor necrosis factor alpha are released, activating a cellular response against Schwann cells through the production of anti-myelin antibodies.[18,28]

Axonal degeneration is often present in demyelinating subtypes, and decreased conduction velocities may be present in axonal neuropathies, where slowing of conduction depends on the CMAP amplitude.[6]

Among the limitations of the study, greater importance is attributed to the impossibility of cerebrospinal fluid analysis, for multiple reasons, and of serum quantification of antibodies that relate the disease to a specific type of lesion. All of this makes clinical diagnosis and electroneuromyographic confirmation necessary. Nerve conduction is compatible with a pathological process such as axonal degeneration or demyelination in peripheral nerves; however, anatomopathological studies are not generally available to confirm it.

It is concluded that nerve conduction studies and electroneuromyography constitute an indispensable examination in the management of Guillain-Barré syndrome because they complement the differential diagnosis, classification, and detection of possible sequelae in peripheral nerves. Motor clinical findings predominate in the lower limbs, associated with axonal damage with prolongation of distal latencies and decreased potential amplitude.

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Author	**Contribution**
Dra.Judith Cabrera González	Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, resources, supervision, validation, writing (original draft, review and editing).
Student Shaúl Bauzá González	Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, resources, writing (original draft, review and editing).

Authorship Contribution.
Participation according of the order agreed upon by each of the authors of this work.

Author	**Contribution**
Dra.Melissa Madely Rivero Vio	Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization.
Dra. Elianet Viera Espinosa	Formal analysis, methodology, validation, visualization.

Corresponding author:
Dra.Judith Cabrera González ✉
Medical Science Center of Mayabeque. Faculty of Medical Sciences of Mayabeque.

Translation and proofreading.
Beatriz Barranco González. ✉ Bachelor`s Degree in Traslation and Interpreting. Provincial

Reviewers.
Dr. C. Daniel Quintana Hernández
Dr. C. Idalberto Aguilar Hernández

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