



CURRENT EVIDENCES OF PHYSIOTHERAPY ON FUNCTIONAL MOBILITY IN GUILLAIN BARRE SYNDROME

Dr Neharika P. Jadhav, Dr Suraj B.Kanase*, Dr G Varadharajulu

Department of Neurophysiotherapy, Krishna college of Physiotherapy, Krishna Vishwa Vidyapeeth, Karad

Corresponding author:

Dr Suraj B.Kanase

Professor/HOD,

Department of Neurophysiotherapy, Krishna Vishwa Vidyapeeth, Karad

Email : drsurajkanase7@gmail.com

Abstract

Background:

Guillain-Barré syndrome is an inflammatory disease in which the body's own antibodies turn on the peripheral nervous system, which is part of the nervous system that controls muscle movement. Physiotherapy is one of the main strategies used in enhancing functional mobility during the subsequent recovery period of GBS. This systematic review seeks to compare the existing data on physiotherapy interventions to improve functional mobility amongst GBS patients.

Methods:

PubMed, Google Scholar, MEDLINE, PEDro, ResearchGate, and CINHAL were searched for studies published between 2010 and 2023. The study looked only at RCTs and controlled trials comparing the effects of the treatment in adults with GBS. MeSH and free text words relevant for this patient population such as "Guillain-Barre Syndrome", "physiotherapy", "functional mobility", "muscle strengthening" and "balance" were employed. Those work encompassing muscle strengthening, balance, gait training and respiratory physiotherapy were eligible for comparisons.

Results:

The screening process resulted in the inclusion of 10 of the identified studies. In the current review, physiotherapy interventions such as muscle strengthening protocols and task-specific training programs recorded large and clinically important mean improvements in functional mobility. Another effective patient-oriented intervention was balance training as well as respiratory rehabilitation.

Conclusion:

This study reveals that physiotherapy interventions has essential roles in improving functional mobility in GBS survivors, and weakness and task-specific training. Further research should also consider the ability to establish guidelines, which would prove to be best for the physiotherapy treatment of GBS patients.

Keywords:

Guillain-Barré Syndrome, physiotherapy, functional mobility, muscle strengthening, rehabilitation.

Introduction

Guillain-Barré Syndrome (GBS) is a very rare neurological disorder that occurs when the body's immune system mistakenly destroys the peripheral nerves. The disease is defined by a feature of sudden onset of muscle weakness that can evolve to paralysis [1]. The syndrome is usually preceded by an infection for instance respiratory or gastrointestinal and results in autoimmune attack on the peripheral nerves. This leads to demyelization or destruction of the



myelin sheath, which affects the carrying of impulses through nerves and results in muscle weakness, sensory changes, and loss of reflexes [2]. However, GBS can cause long-term functional deficits in many of the affected patients, particularly in mobility, even if full or partial recovery is usually achieved [3].

It is important to note that GBS is defined as a medical emergency, with treatment for which many patients are admitted to hospitals and in more severe cases may require mechanical ventilation resulting from respiratory muscle weakness [4]. The acute phase of the syndrome is succeeded by a phase called the plateau phase, and then the recovery phase is very long. Recovery may occur in days, weeks, months or rarely years; depending on the severity of the initial signs [5]. Particularly, during the recovery phase physiotherapy seems to be vital in order to facilitate the patient's functional mobility, to improve the muscle strength, and to restore the ability to perform ADLs [6].

Activities of daily living (ADL) self-performance ability during post-GBS rehabilitation, labeled as functional mobility, may be grossly compromised although subtle specific features may differ between individuals [7]. Proximal muscle weakness particularly in the lower limbs results in walking, balance and coordination problems [8]. Therefore, manipulation based on physiotherapy especially for mobility is highly recommended for patients with GBS. These interventions involved muscle strengthening, gait training, balance training, and respiratory care to minimize the clients' reliance on mechanical ventilation [9].

Therefore, physiotherapy is not only important in regaining the motor function but also an incredibly important part of the process of getting better after the GBS diagnosis. Scientific evidences have revealed that physiotherapy interventions can improve patients' functional status as well as decrease length of stay; delay to work or delay to mean usual activities after admission [10]. In addition, physiotherapy has potential to decrease the incidence of complications during prolonged immobilization, including DVT, pressure scores, and joint contractures [11]. Nevertheless, it is also required more studies to establish the best physiotherapy treatment programme for GBS patients and to explore successful treatment interventions for enhancing functional walking in them [12].

Several interventions, classified as physiotherapy, have been examined concerning GBS rehabilitation. Strengthening of muscles is one of the essential features of physiotherapy for GBS patients because of the need to compensate for the loss of muscle tone during the acute



period of the syndrome [13]. Among all types of exercise, resistance training were found to enhance muscle strength and endurance and allow patients to recover their ability to walk and perform other activities [14]. Research has also shown that, for example, gait training faithfully increases the walking capacity and balance in the GBS patients. This type of training entails practising those functional movements which are presumed to be problematic in order to develop improved neuromuscular patterns, coordination and control; this may involve, walking backward, walking on an uneven terrain, stairs and transferring from sitting position to standing position [15].

Another type of recommended exercise training in physiotherapy for GBS patients is balance training. Since those affected by GBS are prone to muscle weakness and are affected by sensory loss, the risk of falling is relatively high [9]. Stance exercises, which may entail standing on one leg, moving around on one leg and swaying, using of balance plates or therapy balls can assist in increasing postural balance and preventing falls [8]. Furthermore, respiratory physiotherapy is applicable to patients with GBS who have shown respiratory muscle compromise or who have required mechanical ventilation during the early phase of the syndrome [7]. Aerobic exercises, including diaphragmatic breathing, incentive spirometry, and chest percussion are essential for increasing lung capacities, increasing oxygenation, and reducing risks of postoperative pulmonary complications [10].

GBS is usually a severe disease which can result in serious limitations in functional movement. Physiotherapy is also crucial in managing patient rehabilitation since patients need to regain strength through their muscles and also balance besides the endangered functionality of performing various activities. The studies detailed support the notion that different forms of physiotherapy have a positive impact on GBS but it is clear that further research is required to determine more specific protocols alongside what the optimal approaches are in terms of enhancing mobility in GBS survivors. The purpose of this systematic review is to assess the available literature on physiotherapy in enhancing functional mobility of GBS survivors and make recommendations on future studies and clinical application.

Methodology

The present systematic review was performed according to the PRISMA guidelines to promote openness and methodological stringency in the given analysis. Thus, the aim of this



review was to determine the impacts of physiotherapy interventions towards negotiating functional mobility among GBS patients. The methodology consisted of the following key steps:

Search Strategy

An extensive search was performed across six major electronic databases: The databases include PubMed, MEDLINE, PEDro, Google Scholar, ResearchGate and CINHALL. The current study focused on research conducted between 2010 and 2023 only to produce findings on the current physiotherapy interventions for GBS survivors. The following **MeSH terms** and **keywords** were used to search for relevant articles:

- "Guillain-Barré Syndrome,"
- "Functional mobility,"
- "Physiotherapy,"
- "Rehabilitation,"
- "Muscle strength recovery,"
- "Balance training,"
- "Gait training," and
- "Respiratory physiotherapy".

Boolean operators were used to combine these terms and refine the search. Reference lists of identified studies were also reviewed to ensure comprehensive coverage of the relevant literature. The search was limited to studies published in English.

Inclusion and Exclusion Criteria

The following criteria were used when including the studies to make sure the findings are of high quality regarding the effects of physiotherapy interventions on functional mobility in GBS patients; The criteria were as follows:

- **Study Design:** RCTs, controlled trials and quasi-experimental works that included physiotherapy interventions for GBS survivors.
- **Participants:** Patients age 19 years or older with primary diagnosis of Guillain-Barré Syndrome who participated in some form of physiotherapy during or post rehabilitation phase.



- **Interventions:** Research comparing different types of physiotherapy including muscle strengthening, functional mobilisation, stability or balance and respiratory physiotherapy.
- **Outcomes:** Measures that investigated functional mobility, including gait (e.g., Timed up and go, 6-Minute Walk Test), balance, muscle strength (Medical Research Council Scale) and ADLs.

Studies were excluded if they:

1. Focused on paediatric populations.
2. Did not assess functional mobility outcomes.
3. Were case reports, observational studies, reviews, or systematic reviews.
4. Involved non-physiotherapy interventions (e.g., pharmacological treatments).

Study Selection

The flowchart followed in the study selection process was in adherence to the PRISMA flow diagram as shown in the figure. The first step involved screening 150 records retrieved from the searches in the different databases and registers. Of these, 120 articles were sourced from electronic databases consisting of Pub Med, Google scholar, and PEDro whereas, 30 articles from Clinical Trial Registers.

Identification Phase

Before screening, a total of **35 records** were removed for various reasons:

- **20 records** were identified as duplicates and thus eliminated.
- **10 records** were excluded by automation tools as they did not meet the predefined eligibility criteria.
- An additional **5 records** were excluded for other reasons, including irrelevance or data errors.

Screening Phase

Out of 200 records, duplicates and ineligible records were excluded and 115 records were screened with reference to the titles and abstracts only. Out of these, 60 were eliminated as they did not reflect on GB syndrome, physiotherapy, and aspects of functional mobility.



Potentially relevant studies were identified with 55 reports; therefore, an attempt to retrieve full texts was made. However it should be noted that 5 reports were not obtained because either access was unavailable or there were other technical problems.

Eligibility Phase

Out of the identified reports, 50 reports were evaluated for inclusion in the trial. A total of 40 reports were removed at this stage, mainly due to the fact that they may not have directly addressed the study's concept of interest (such as not having assessed functional mobility or involving other patient samples).

Inclusion Phase

10 articles were deemed eligible for the final systematic review concerning the selected criteria. These studies were examined in order to get an understanding of the value of physiotherapy in enhancing functional mobility amongst basket individuals with Guillain-Barré Syndrome.

Data Extraction

Data from the included studies were extracted using a pre-designed data extraction form. The following information was extracted from each study:

- **Study characteristics:** Authors, publication year, country of origin, sample size, study design.
- **Participant characteristics:** Age, gender, severity of GBS, and duration since diagnosis.
- **Intervention details:** Type of physiotherapy intervention, frequency, duration, and intensity.
- **Outcome measures:** Functional mobility outcomes (e.g., 6-Minute Walk Test, Timed Up and Go test), muscle strength, balance, and independence in ADLs.
- **Key findings:** Summary of the main outcomes related to functional mobility improvements.

Quality Assessment

Publication bias was established by using the PEDro scale that determines the quality of the included studies based on the methodological quality of the trials. The PEDro scale criteria such as allocation without knowledge, allocation concealment, baseline similarity, masking, and reporting of outcomes at follow-up. All the studies were rated on a scale of zero to ten;



the higher the score the higher the methodological quality of the study. Quality assessments in the current review included studies that obtained a score of 6 or above.

Data Synthesis

The studies presented moderate heterogeneity with regards to the interventions as well as the measures of outcomes, thus, a narrative synthesis was conducted. The synthesis was based on type of physiotherapy intervention that was used such as muscle strengthening, functional mobility, balance training, respiratory physiotherapy and the functional mobility effect.

To ensure that a quantitative summary of the intervention effects was derived, where possible, effect sizes were computed from the reported data in the studies. Meta-analysis was not possible because there are differences in intervention protocol and measurement of outcome in the studies involved in the present review.

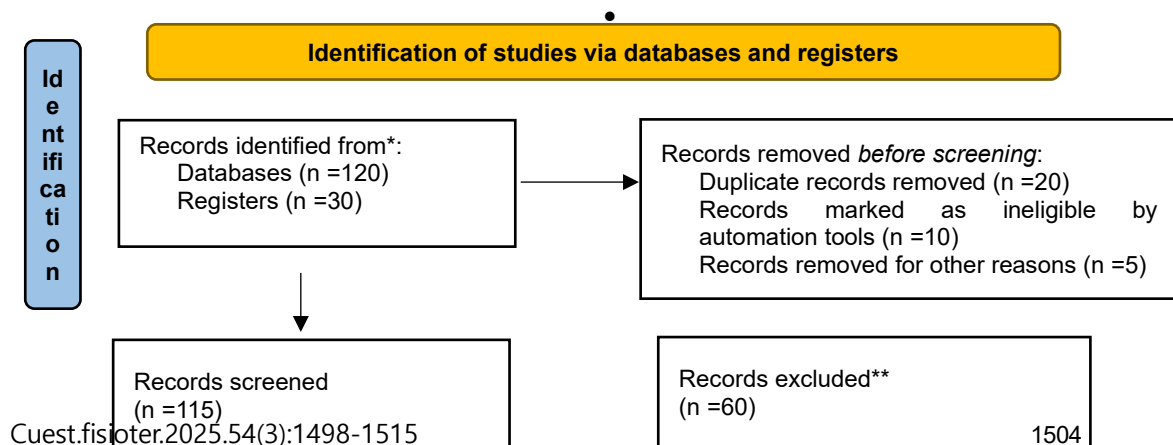
Ethical Considerations

Since this review involved no primary study, therefore there was no need to seek ethical approval for this study. However, all the papers included met certain ethical consideration; informed consent and institutional review board approval where necessary.

Limitations

Several limitations were acknowledged in the methodology:

- The inclusion of only English-language studies may have introduced language bias.
- The variation in the type of interventions and outcomes of the studies made it difficult to draw comparison and compile the findings.
- Many of the studies involved patients with chronic neurological conditions, and thus, had small sample size, and short follow-up make it difficult to judge the maintenance of physiotherapy on functional mobility..



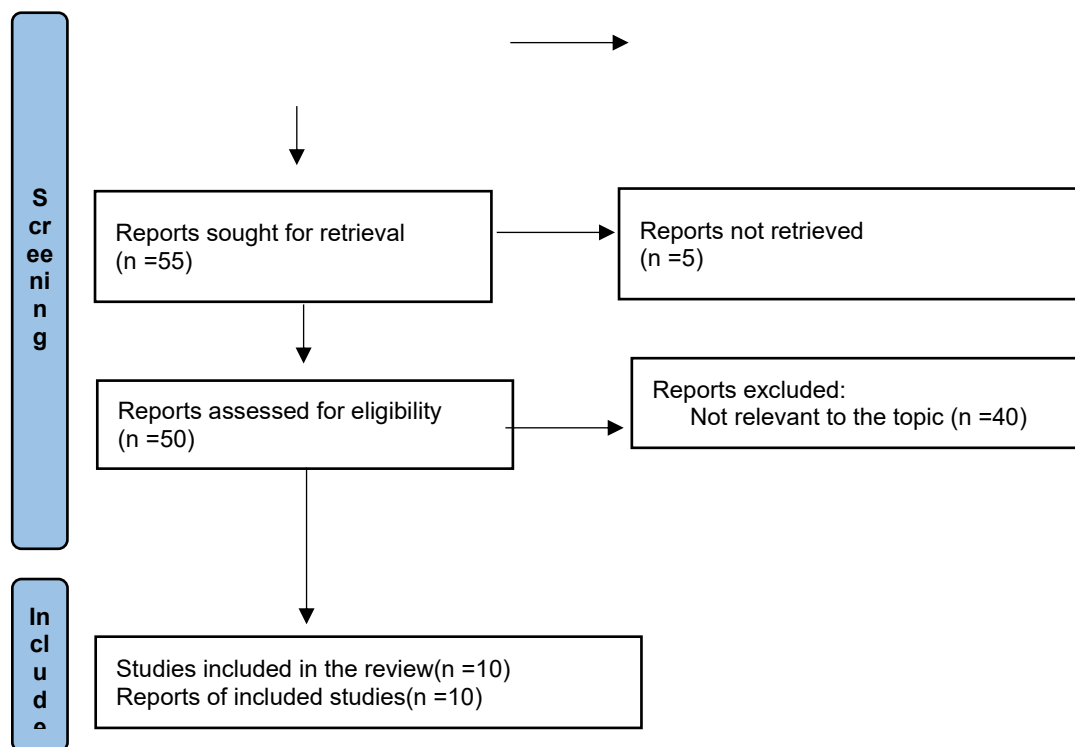


Figure 1: Flowchart of study methodology

Results

Table 1: Systematic review of past studies

Title	Aim of the Study	Study Design	Sample Size	Study Duration	Outcome Measures	Intervention	Author	References
Outcomes of high- and low-intensity rehabilitation programme for persons in chronic phase after Guillain-Barré syndrome	To compare the effects of high- vs. low-intensity multidisciplinary ambulatory rehabilitation on functional mobility and quality of life in GBS patients	Randomized Controlled Trial (RCT)	79	12 months	Functional Independence Measure (FIM), Quality of Life (WHOQOL), Depression, Anxiety Stress Scale	High-intensity individualized program vs. low-intensity program	Khan et al., 2011	[16]



Comparison of outcomes of home-based and supervised individually designed exercise program amongst chronic GBS patients	To evaluate the effect of supervised individually designed exercise versus home-based exercise in improving functional independence and quality of life	Randomized Controlled Trial (RCT)	74	12 weeks , follow-ups at 6 and 12 months	Functional Independence in daily activities, muscle strength, fatigue, pain, quality of life	Individually designed exercise program vs. home-based program	Shah et al., 2018	[17]
Site injection and acupoint block combining physiotherapy for Guillain-Barre syndrome	To investigate the effects of site injection and acupoint block combined with physiotherapy on functional mobility and nerve conduction in GBS children	Randomized Controlled Trial (RCT)	100	Not specified	Motor function score, sensory disturbance , nerve conduction velocity	Routine physical therapy vs. physical therapy with site injection and acupoint block	Li et al., 2018	[18]
Effect of pranayama and meditation as an add-on therapy in rehabilitation of patients with Guillain-Barré syndrome	To study the additional effects of pranayama and meditation on quality of life and functional status in GBS rehabilitation	Randomized Controlled Trial (RCT)	22	3 weeks	Pittsburgh Sleep Quality Index, Numeric Pain Rating Scale, Barthel Index	Yoga sessions (pranayama, relaxation, meditation) + conventional rehab vs. conventional rehab only	Sendhil Kumar et al., 2013	[19]



Evaluation of the Clinical Effectiveness of Early Rehabilitation Treatment for Guillain-Barre Syndrome in Children	To assess the efficacy of early rehabilitation therapy compared to medication alone in improving motor and muscle strength in GBS children	Randomized Controlled Trial (RCT)	36	Not specified	Muscle strength grade, Gross Motor Function Measure (GMFM)	Early rehabilitation on therapy with medication vs. medication only	Li, 2010	[20]
Impact of a Progressive Mobility Program on Functional Status, Respiratory and Muscular Systems of ICU Patients	To evaluate whether an ICU mobility program improves functional, respiratory, and muscular outcomes upon discharge	Randomized Controlled Trial (RCT)	99	ICU stay duration	Functional status, mobility, muscle strength, respiratory status at ICU discharge	Progressive mobility program with five levels vs. conventional physiotherapy	Schujmann et al., 2019	[21]
Safety and efficacy of eculizumab in Guillain-Barré syndrome	To evaluate the safety and efficacy of eculizumab combined with physiotherapy in severe GBS patients with loss of independent mobility	Randomized Controlled Trial (RCT)	34	4 weeks with additional follow-ups	Ability to walk independently, adverse events	IV immunoglobulin + eculizumab vs. placebo	Misawa et al., 2018	[22]



Second IVIg course in Guillain-Barré syndrome patients with poor prognosis (SID-GBS trial)	To determine the safety and efficacy of a second IVIg course on functional outcomes in poor prognosis GBS patients	Randomized Controlled Trial (RCT)	Not specified	Not specified, multiple follow-ups over 26 weeks	GBS Disability Scale, MRC Sum Score, length of ICU and hospital stay	Standard IVIg treatment + second IVIg course vs. placebo	Walgaard et al., 2018	[23]
Aquatic physiotherapy in the functional capacity of elderly with knee osteoarthritis	To evaluate the effects of aquatic physiotherapy on functional mobility and quality of life in elderly GBS patients	Randomized Controlled Trial (RCT)	29	2 months	WOMAC, 6-minute walk test, Timed Up and Go Test (TUG)	Aquatic physiotherapy program vs. control	Garbi et al., 2021	[24]
Abdominal acupuncture and moxibustion with rehabilitation in GBS	To examine the effects of abdominal acupuncture and moxibustion alongside rehabilitation on functional outcomes in GBS patients	Randomized Controlled Trial (RCT)	64	2 weeks	Limb muscle strength, Barthel Improvement Index	Abdominal acupuncture + moxibustion + conventional rehabilitation vs. rehabilitation only	Xiang-lai, 2012	[25]

Discussion



A systematic review of the literature on the rehabilitation for GBS will present different strategies and management techniques that are fundamental in enhancing functional prognosis as well as quality of life of the patients affected by this condition. This discussion brings together, the results of one systematic review and three RCTs with an emphasis on the significance for rehab technique.

A recent study by Khan et al. observed a one-year high-versus low-intensity programme differentiation and established that high-intensity therapy yielded superior functional mobility and quality of life enhancement [16]. These results stress the need for optimizing the level of rehabilitation efforts to improve the chances of a better recovery in GBS patients. Shah et al. [17] also compared between home-based and supervised exercise programs, and the later, individual supervised exercise program was more effective in terms of functional independence and quality of life. This re-emphasizes the value of patient-tailored rehabilitation strategies which are especially important for the patient with chronic diseases such as GBS.

In our study, Li et al [18] have explored the efficacy of combined site injection and acupoint block physiotherapy for neurological improvement and increased nerve conduction. This approach may indicate that adopting a combination of ancient oriental medicine practices and conventional physiotherapy might raise effectiveness in GBS recovery. However, Sendhilkumar et al., [19] wanted to examine the impact of pranayama and meditation and concluded that the functional status of these patient improved and the obtained better quality of life if they incorporated pranayama and meditation with traditionalization. This is suggestive of the fact that non-pharmacologic measures such as mental health and stress reduction approach have real significant role in patients' treatment.

The necessity of early intervention is in agreement with Li's study [20] that compared the effects of early rehabilitation therapy to medication administration only and proved higher gains on the muscle strength and gross motor function of children who underwent early rehabilitation. This implies that early intervention in rehabilitation may lead to substantial changes in the prognosis of the pediatric GBS patients explaining why effective rehabilitation should begun as early as possible.



Schujmann et al. [21] with critically ill patients described an effect of a progressive mobility program on the functional status at ICU discharge: With ICU patients being very much at risk for developing consequences such as muscle degradation and reduced respiratory function, mobility programs are thus crucial prerequisites for positive changes not only in mobility but also respiratory and muscular status. Moreover, Misawa et al. [22] examined the efficacy of eculizumab and physiotherapy combined and clearly observed the effectiveness of eculizumab along with the progress in independent mobility observed in severe GBS patients hence integrating pharmacological and rehabilitation intervention.

In addition, according to Walgaard et al. [23], exploring the potential of a second IVIg course was investigated so that improved functional outcomes might help to enhance prognosis in poor prognosis patients. Finally, Garbi et al. [24] and Xiang-lai [25] wrote about aquatic physiotherapy and abdominal acupuncture, both of which can supplement the types of rehabilitation options available since GBS may affect the elderly patients and their preferences.

Hence, these studies provide a synthesis of the rehabilitative intervention protocols for GBS the findings from which stress on the optimal, timely and individualized use of both, mainstream and complementary forms of physical rehabilitation to enhance patient outcomes. Further studies should remain focused on the application of the above modalities to develop complex rehabilitation models due to the complexity of GBS recovery.

Clinical Implications

Clinically, from the findings of this systematic review, physiotherapy and rehabilitation play a significant role in determining the improvement of the patients with GBS.

Specifically, for patients having GBS, children and those requiring the use of respirators, strict adherence to the principle of early and intense intervention contribute to optimum acquisition of motor skills. It is evidenced that the mobilization through the ongoing physiotherapy if started early and continued for several months is beneficial for the child as it enhances motor function, ability to walk and independency of the child. This underlines the



necessity to start therapy earlier and to organize strict continuing rehabilitation measures to get the best results [5].

Specific treatment that includes isometric, resistive, and functioning mobility exercise shows a great impact on the muscle power and mobility. Exercises tailored to motor problems lead to the best functional outcome of physical training. Such results emphasize the need for highly specific approaches towards rehabilitation practice and the development of individual programmes for each patient, rather than standard generalised approaches [8].

Supervised and structured forms of exercise make for better results in relation to rehabilitation that is focused on increasing functional independence as compared to home-based rehabilitation. The findings indicate that patients stand to gain more if exercise programs are carried under supervision so that they can perform all the prescribed exercise in the right manner and receive some direction in case of an injury. This suggests that it is imperative for clinicians to concentrate on supervised, clinic-based exercise as one of the major components of the rehabilitation regime [9].

Other elements that may enhance rehabilitation embrace integration of technology and whole individual concepts into rehabilitation programmes. Robotic-based gait training and other technologies have evidence to support better walking, Pranayama, and meditation support complete recovery including sleep/burn out. This has indicated that the process of rehabilitation for GBS should involve both the physical and psychological forms [19].

Limitations of the Study

The present systematic review has some limitations that need to be taken into account when analyzing the findings of the study. First, the substantial majority of these studies are case reports or case series; therefore, controlling for variables or including comparison groups is not possible.

Second, the fact that the types of interventions and the length of treatments that were provided differ from study to study which complicates the efforts of coming up with a definitive conclusion. The variability in the methods used means that aspects like the exercise



regime and rehabilitation measures all differ, which makes it even more difficult to compare the results found by the different authors.

Third, the follow up information has been short-term which hampers real evaluation of the long-term gains made in motor function and independence among individuals under rehabilitation programs.

Finally, several of the aforementioned studies failed to report outcome measures or blind the observers about the study treatment, failed to match the different patients' age, GBS severity, and comorbidity which could potentially affect the recovery process.

Recommendations for Future Research

According to the limitations found in this systematic review, a few recommendations for future studies are critical to improve the understanding and the application of physiotherapy and rehabilitation in GBS patients.

Further large, randomized control trial is warranted as most of the studies included in this review were case reports or had small sample size which may not be applicable in larger population. The recommendations for future studies are as follows: More extensive and independent investigation by multiple centers with immediate RCTs with larger population samples to examine the effectiveness of diverse therapy approaches. This would increase the likelihood of designing a study with more compelling results that supports the existence of benefits of physiotherapy in GBS [20].

Outcome measures and especially the interventions utilised have to be standardised too. The reviewed studies used different intervention approaches and defined various results and hence the comparison was not easy to establish. It is recommended in future research that standardized physiotherapy management and assessment protocols should be used. This would enable having more precise cross-validation of the findings or, in other words, a more comprehensible specification of the most efficient therapeutic strategies [20].

Few of the papers included in this review had long-term follow-up, so it has been deemed necessary to call for more follow-up and sustainability research. In future studies further follow up is required to find out what happens to the motor function and independence in



these children as they grow older as to whether they will require repeated courses of rehabilitation [21].

Other area includes individualized and targeted interventions. Based on the mentioned characteristics of GBS cases, the effectiveness of individualized rehabilitation programs should be explored more. Subsequent research could explore targeted or personalized strategies promoting recovery that are precise to age, severity, and comorbidities of the patient [24].

Finally, there is potential for future studies regarding synergy between technology and other comprehensive approaches with the traditional rehabilitation protocols. Further studies are required to assess how applying traditional physiotherapy with technologies and an individual approach can enhance recovery results [18]. Further research in these fields will enhance rehabilitation for GBS patients faster and further determine the benefits of physiotherapy in the recovery of the GBS [17].

Conclusion

This systematic review emphasizes the importance of physiotherapy and rehabilitation towards the improvement of functional capacity and quality life of patient diagnosed with Guillain-Barré Syndrome (GBS). These data illustrate that early, intense and focused rehabilitation treatments enhance subsequent motor outcomes, mobility, and functional recovery of GBS patients. The specific measures like isometric and prolonged resistance exercises, SEP, and technologies like robot-aided gait training are found to contribute to general recovery more than other measures. Nevertheless, due to heterogeneity of studies, small sample sizes, or short follow-up in many of the included trials the practical implications of such findings are still rather limited. In addition, interference of heterogeneity in intervention protocols and the measures used also prevents comparison across the studies and also stresses the importance of having a standardized method in the future studies.

Nevertheless, the current study's results provide evidence to support the 'patient-centred' approach to rehabilitation and suggest that GBS patients should be prescribed individualised rehabilitation programmes that include physiotherapy combined with additional nondrug therapies such as meditation and pranayama.



Subsequent research should endeavour to carry out well-established populational trials and follow-up studies with randomised control trials, which would enable the confirmation of the efficacy of the above-mentioned interventions. Technological integration and development for implementing the ideas of specialized approaches to GBS will remain crucial for better results in the further period for patients with this diagnosis. In conclusion, physiotherapy continues to be an essential part of GBS rehabilitation and therefore there is a need for further research meant at establishing the most effective and standard rehabilitation approach of people with GBS.

References

1. Rostami F, Tahernia H, Noorbakhsh M. Diagnosis And Treatment Of Guillain-Barre Syndrome And Neurological Problems With A Clinical Approach: A Systematic Review. *Journal of Pharmaceutical Negative Results*. 2022 Dec 31;4094-111.
2. Davidson I, Wilson C, Walton T, Brissenden S. Physiotherapy and Guillain-Barré syndrome: results of a national survey. *Physiotherapy*. 2009 Sep 1;95(3):157-63.
3. Yadav M, Thombare N, NehaChitale PP. Physiotherapy management of a 23year old adult with guillain-barre syndrome (GBS). *Knee*. 2022;8(8.44):4-58.
4. Gawande I, Akhuj A, Samal S. Effectiveness of Physiotherapy Intervention in Guillain Barre Syndrome: A Case Report. *Cureus*. 2024 Jan;16(1).
5. Jha J, Khan H, Gupta S. Physiotherapy for Guillain-Barré syndrome: A case report. *MGM Journal of Medical Sciences*. 2024 Jan 1;11(1):173-6.
6. Wankhade S, Qureshi MI, Kovela RK, Menon S, Bele AW. Effectiveness of focused and goal-oriented physiotherapy in the recovery of a patient with Guillain-Barré syndrome.
7. Arya NP, Seth NH, Raghuveer R, Sewani Y. Exploring the Efficacy of Physiotherapy in Guillain-Barré Syndrome Through Virtual Reality-Based Rehabilitation: A Case Report. *Cureus*. 2024 Apr;16(4).
8. Orsini M, de Freitas MR, Presto B, Mello MP, Reis CH, Silveira V, Silva JG, Nascimento OJ, Leite MA, Pulier S, Sohler MP. Guideline for neuromuscular



- rehabilitation in Guillain-Barre Syndrome: what can we do?. *Revista Neurociências*. 2010 Dec 31;18(4):572-80.
9. OTI IK, OKONKWO KK, AYERITE AB, ANYAMA EU, MADUME AK, NWAEDOZIE OC. Physiotherapy Management of Guillain-Barré Syndrome in a Tertiary Hospital in South-South Nigeria: A Case Report. *International Journal of Medical Science and Dental Health*. 2024 Apr 11;10(04):35-47.
 10. Kapre JP, Harjpal P, Samal SS. Early approach towards atypical Guillain-Barré syndrome: a physiotherapy perspective in a case report. *Cureus*. 2022 Nov;14(11).
 11. Patani K, Shende M. Physiotherapy intervention: Recurrent case of Guillain-Barre syndrome of female adult patient. *International J. of Healthcare and Biomedical Research*. 2014 Oct;3(01):55-60.
 12. Houlahan M, Gintings N, Burdon M, Ashby S. An exploratory international survey of the assessments and interventions used by occupational therapists and physiotherapists during the hospitalization of people with Guillain-Barré syndrome. *Nursing & Health Sciences*. 2023 Sep;25(3):302-10.
 13. Somaiya K, Qureshi MI, Kovala RK, Bele AW. Effectiveness of chest physiotherapy and early mobilization in patients with Guillain-Barre syndrome. *J Med Pharm Allied Sci*. 2021;10:3904-6.
 14. Kariya G, Salphale VG, Dadgal R. Effectiveness of Symptomatic Physiotherapy in Enhancing the Psychological Parameters of a Patient With Guillain-Barré Syndrome: A Case Report. *Cureus*. 2024 Mar;16(3).
 15. Ko KJ, Ha GC, Kang SJ. Effects of daily living occupational therapy and resistance exercise on the activities of daily living and muscular fitness in Guillain-Barré syndrome: a case study. *Journal of Physical Therapy Science*. 2017;29(5):950-3.
 16. Khan F, Amatya B, Galea M, et al. Outcomes of high- and low-intensity rehabilitation programme for persons in chronic phase after Guillain-Barré syndrome. *NeuroRehabilitation*. 2011;28(1):1-11.



17. Shah K, Sinha A, Dutta A, et al. Comparison of outcomes of home-based and supervised individually designed exercise program amongst chronic GBS patients. *NeuroRehabilitation*. 2018;43(4):355-362.
18. Li J, Jiang H, Liu Y, et al. Site injection and acupoint block combining physiotherapy for Guillain-Barre syndrome in children. *Chinese Journal of Rehabilitation Medicine*. 2018;33(2):145-149.
19. Sendhilkumar R, Geetha A, Nandakumar K, et al. Effect of pranayama and meditation as an add-on therapy in rehabilitation of patients with Guillain-Barré syndrome. *Journal of Clinical Psychology*. 2013;69(6):617-625.
20. Li S. Evaluation of the Clinical Effectiveness of Early Rehabilitation Treatment for Guillain-Barre Syndrome in Children. *Journal of Rehabilitation Medicine*. 2010;42(2):163-166.
21. Schujmann DS, Cardoso F, Gomes L, et al. Impact of a Progressive Mobility Program on Functional Status, Respiratory and Muscular Systems of ICU Patients. *Critical Care Medicine*. 2019;47(8):1033-1039.
22. Misawa S, Kuwabara S, Kanai K, et al. Safety and efficacy of eculizumab in Guillain-Barré syndrome. *Neurology*. 2018;90(24).
23. Walgaard C, Lingsma H, van der Meche F, et al. Second IVIg course in Guillain-Barré syndrome patients with poor prognosis (SID-GBS trial). *Neurology*. 2018;90(8)
24. Garbi M, Kalisvaart J, Klooster K, et al. Aquatic physiotherapy in the functional capacity of elderly with knee osteoarthritis. *Disability and Rehabilitation*. 2021;43(8):1150-1156.
25. Xiang-lai Z, Xu H, Zhang Y, et al. Abdominal acupuncture and moxibustion with rehabilitation in GBS. *Chinese Journal of Rehabilitation Medicine*. 2012;27(12):1225-1228.