RESEARCH PAPER

"Effectiveness Of Buteyko Breathing Technique On Pulmonary Function And Dyspnea In Patients With Guillain-Barré Syndrome".

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ABSTRACT

Background: Guillain-Barré Syndrome (GBS) is an acute immune-mediated peripheral neuropathy commonly associated with respiratory muscle weakness, impaired pulmonary function, and dyspnea. Respiratory involvement is a major determinant of morbidity and functional limitation in GBS. Conventional respiratory physiotherapy focuses mainly on breathing exercises and airway clearance; however, breathing retraining techniques targeting ventilatory control and dyspnea perception have received limited attention. The Buteyko Breathing Technique (BBT), a controlled breathing method, aims to normalize breathing patterns, reduce hyperventilation, and improve ventilatory efficiency.

Objective: To evaluate the effectiveness of the Buteyko Breathing Technique on pulmonary function and dyspnea in patients with Guillain-Barré Syndrome.

Methods: A randomized controlled study was conducted on patients with sub-acute GBS. Participants were allocated into an experimental group receiving Buteyko Breathing Technique along with conventional physiotherapy and a control group receiving conventional physiotherapy alone. Pulmonary function parameters and dyspnea levels were assessed at baseline and after 6 weeks of intervention.

Results: The experimental group demonstrated statistically significant improvements in pulmonary function parameters and dyspnea scores compared to the control group ($p < 0.05$).

Conclusion: The Buteyko Breathing Technique is an effective adjunct to conventional physiotherapy in improving pulmonary function and reducing dyspnea in patients with Guillain-Barré Syndrome..

Keywords: Guillain-Barré Syndrome, Buteyko Breathing Technique, Pulmonary Function, Dyspnea, Respiratory Rehabilitation

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INTRODUCTION

Guillain-Barré Syndrome (GBS) is an acute immune-mediated inflammatory polyneuropathy characterized by rapidly progressive symmetrical muscle weakness, hyporeflexia or areflexia, and varying degrees of sensory and autonomic dysfunction. It is one of the most common causes of acute flaccid paralysis worldwide and remains a major cause of neuromuscular respiratory failure requiring intensive care support. Although advances in medical management such as intravenous immunoglobulin and plasma exchange have improved survival, a significant proportion of patients experience persistent functional limitations during recovery, particularly related to respiratory dysfunction[1].

Respiratory involvement in GBS is multifactorial and results primarily from weakness of the diaphragm, intercostal muscles, and accessory respiratory muscles. Approximately 20–30% of patients with GBS require mechanical ventilation during the acute phase, while many

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non-ventilated patients demonstrate subclinical or overt respiratory impairment during the sub-acute and recovery phases[1,2]. Reduced forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), and peak expiratory flow rate (PEFR) have been consistently reported, indicating a restrictive pattern of pulmonary dysfunction[3]. Even after neurological recovery, residual respiratory muscle weakness and altered breathing patterns may persist, contributing to dyspnea, reduced exercise tolerance, fatigue, and impaired quality of life[4].

Dyspnea in GBS is not solely explained by reductions in lung volumes or respiratory muscle strength. Altered ventilatory control, increased respiratory muscle workload, anxiety, and dysfunctional breathing patterns may amplify the subjective perception of breathlessness[5]. Conventional respiratory physiotherapy for GBS typically includes deep breathing exercises, incentive spirometry, positioning, chest expansion exercises, and airway clearance techniques. While these approaches are effective in preventing pulmonary complications and maintaining lung expansion, they primarily focus on mechanical aspects of ventilation and may not sufficiently address dysfunctional breathing behavior or dyspnea perception[6].

Breathing retraining techniques have gained increasing attention as adjuncts to conventional respiratory rehabilitation. These techniques aim to normalize breathing patterns, reduce excessive ventilation, improve ventilatory efficiency, and enhance patient awareness and control of breathing. The Buteyko Breathing Technique (BBT) is a structured breathing retraining method that emphasizes nasal breathing, reduced breathing volume, breath control, breath-holding (control pause), and relaxation. The physiological rationale of BBT is based on reducing chronic hyperventilation, improving carbon dioxide tolerance, optimizing oxygen delivery, and decreasing unnecessary respiratory muscle activity[7].

The effectiveness of the Buteyko Breathing Technique has been investigated primarily in patients with asthma and other chronic respiratory disorders. Randomized controlled trials and systematic reviews have reported improvements in symptom control, dyspnea, quality of life, and reduced reliance on bronchodilator medication following BBT intervention[8,9]. A Cochrane review on breathing exercises supports the role of controlled breathing techniques in improving respiratory symptoms and selected pulmonary function outcomes, highlighting their potential clinical relevance[10]. Although the pathophysiology of GBS differs from obstructive lung diseases, the principles of breathing efficiency, reduced respiratory muscle overuse, and improved dyspnea perception are applicable to neuromuscular respiratory dysfunction.

Despite the high prevalence of respiratory impairment in GBS, there is a paucity of literature exploring the role of breathing retraining techniques such as the Buteyko Breathing Technique in this population. Most physiotherapy protocols for GBS focus predominantly on limb strengthening, mobility, and general respiratory care, with limited emphasis on breathing control and dyspnea management during the recovery phase. Considering the simplicity, non-invasive nature, and low cost of BBT, investigating its effectiveness in patients with GBS is clinically relevant and may contribute to more comprehensive respiratory rehabilitation strategies.

Therefore, the present study aims to evaluate the effectiveness of the Buteyko Breathing Technique on pulmonary function and dyspnea in patients with Guillain-Barre Syndrome, with the objective of determining whether structured breathing retraining can enhance respiratory recovery when added to conventional physiotherapy management.

METHODOLOGY:

Study Design: Randomized controlled trial.
Study Setting: Physiotherapy department OPD
Participants: Patients diagnosed with Guillain-Barre Syndrome in the sub-acute recovery phase.

Inclusion Criteria

Age between 18 and 60 years
Diagnosed cases of Guillain-Barré Syndrome
Medically stable
Presence of respiratory muscle weakness or dyspnea
Ability to follow verbal commands

Exclusion Criteria

Mechanical ventilation dependency
Severe cardiopulmonary disorders
Cognitive impairment affecting participation
Unstable autonomic dysfunction

Sample Size: 40

Group Allocation

Participants were randomly assigned into:
Group A (Experimental Group)
Group B (Control Group)

INTERVENTION

Group A – Buteyko Breathing Technique (BBT) with Conventional Physiotherapy

Participants in Group A received the Buteyko Breathing Technique in addition to conventional physiotherapy. The intervention was administered under the supervision of a trained physiotherapist.

Components of Buteyko Breathing Technique:

Nasal breathing training: Patients were instructed to maintain nasal breathing during rest and activity to enhance humidification, filtration, and regulation of breathing patterns. Nasal breathing has been shown to improve ventilatory efficiency and reduce dysfunctional breathing patterns[7].

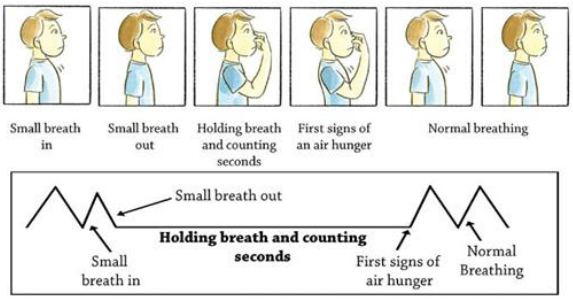
Breath control and reduced breathing exercises: Controlled breathing exercises emphasizing reduced tidal volume and slow respiratory rate were used to normalize ventilation and reduce hyperventilation. Reduced breathing improves carbon dioxide tolerance and decreases respiratory muscle overactivity, thereby reducing dyspnea perception[7,8].

Controlled breath-holding (Control Pause): Short, controlled breath-holding periods following passive expiration were performed to improve respiratory control and tolerance to carbon dioxide. Control pause has been reported to improve symptom control and functional respiratory outcomes in breathing retraining programs[8,9].

Relaxation and posture correction: Relaxation techniques were incorporated to reduce accessory muscle overuse and sympathetic arousal, while postural correction focused on optimizing thoracic alignment for efficient respiratory mechanics. Proper posture has been associated with improved lung volumes and respiratory muscle function[11].

Dosage:

- Duration: 20–30 minutes per session
- Frequency: 5 sessions per week
- Total duration: 6 weeks



Group B – Conventional Physiotherapy

Participants in Group B received standard physiotherapy care focusing on respiratory and motor rehabilitation.

Components:

Deep breathing exercises: Performed to enhance lung expansion, improve ventilation, and prevent atelectasis in patients with neuromuscular weakness[1].

Incentive spirometry: Used to promote sustained maximal inspiration and maintain vital capacity, which is critical in preventing respiratory complications in GBS[2,3].

Chest expansion exercises: Facilitated thoracic mobility and improved ventilation distribution, commonly used in neuromuscular and post-acute care settings[6].

Range of motion and strengthening exercises: Designed to prevent joint stiffness, maintain muscle strength, and facilitate functional recovery during the rehabilitation phase of GBS[4].

Dosage:

- Duration: 20–30 minutes per session
- Frequency: 5 sessions per week
- Total duration: 6 weeks

OUTCOME MEASURES

Forced Vital Capacity (FVC)
Forced Expiratory Volume in 1 second (FEV_1)
Peak Expiratory Flow Rate (PEFR)
Dyspnea assessed using the Modified Borg Dyspnea Scale
Assessments were conducted at baseline and after 6 weeks of intervention.

STATISTICAL ANALYSIS & RESULTS

A total of **40 participants** diagnosed with Guillain-Barré Syndrome completed the study. Data were analyzed using statistical software. Paired t-test was used for within-group comparisons and Independent t-test was used for between-group comparisons.Statistical significance was set at $p < 0.05$.

Table: 1 Baseline characteristics of participants (mean ± SD)

Variable	Group A	Group B	Test Statistic	p-value
Age (years) Mean ± SD	41.3 ± 8.2	42.1 ± 7.9	t = 0.31	0.76
Gender n (%)			$\chi^2 = 0.10$	0.75
Male	12 (60%)	11 (55%)		
Female	8 (40%)	9 (45%)		
Duration of illness (weeks) Mean ± SD	5.8 ± 1.4	6.1 ± 1.6	t = 0.64	0.53
Type of GBS n (%)			$\chi^2 = 0.22$	0.90
AIDP	14 (70%)	15 (75%)		
AMAN	4 (20%)	3 (15%)		
AMSAN	2 (10%)	2 (10%)		
Mechanical ventilation history n (%)			$\chi^2 = 0.00$	1.00
Yes	5 (25%)	5 (25%)		
No	15 (75%)	15 (75%)		

Baseline FVC (L) Mean ± SD	2.10 ± 0.45	2.12 ± 0.48	t = 0.14	0.89
Baseline Dyspnea (Borg scale) Mean ± SD	5.6 ± 1.1	5.5 ± 1.2	t = 0.27	0.79

Table: 1 Pre and Post-Intervention Comparison of Group A

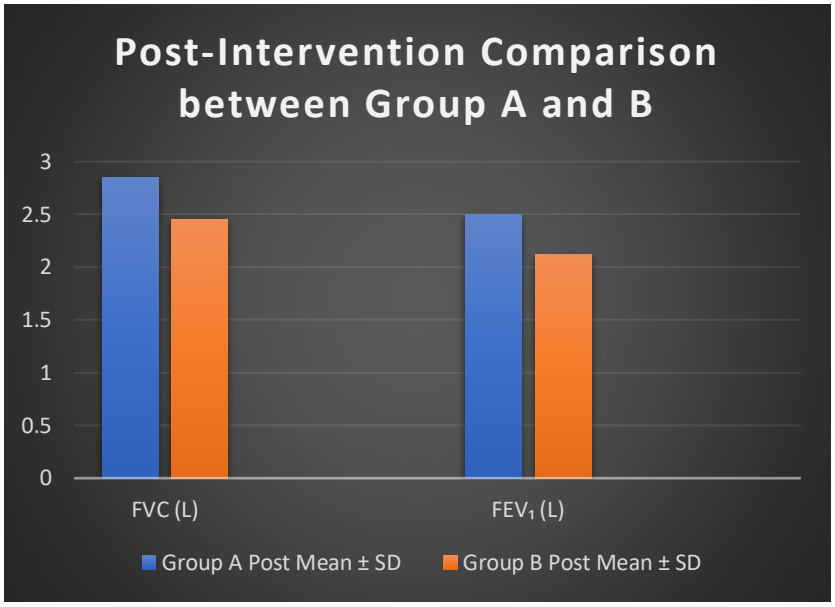
Outcome Measure	Pre-test Mean ± SD	Post-test Mean ± SD	Paired t-value	p-value
FVC (L)	2.10 ± 0.45	2.85 ± 0.40	7.92	<0.001
FEV_1 (L)	1.85 ± 0.38	2.50 ± 0.35	8.11	<0.001
PEFR (L/min)	280 ± 55	360 ± 50	6.84	<0.001
Dyspnea (Borg Scale)	5.6 ± 1.1	2.4 ± 0.9	9.05	<0.001

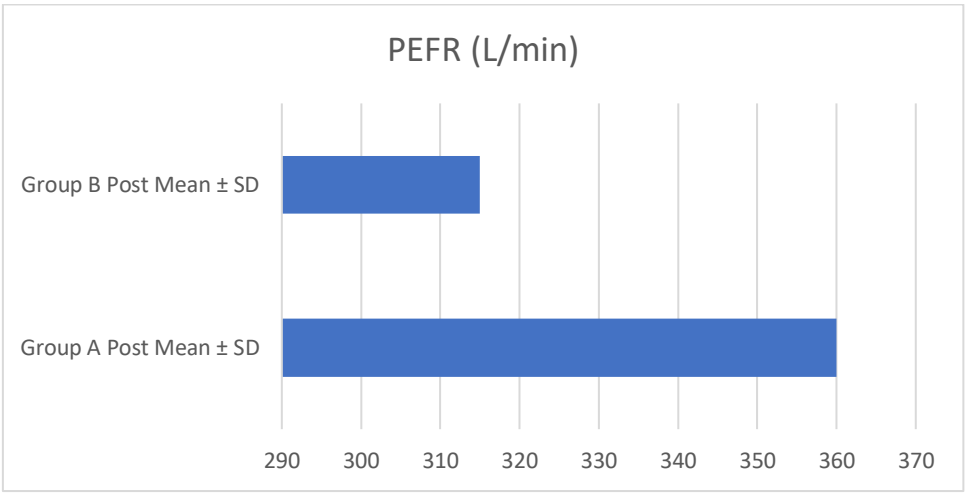
Table: 3 Pre and Post-Intervention Comparison of Group B

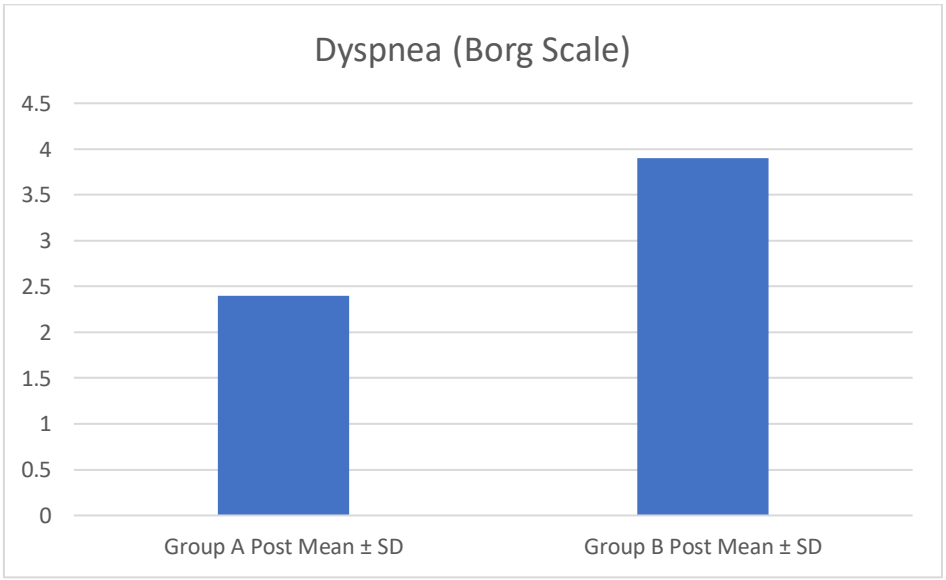
Outcome Measure	Pre-test Mean ± SD	Post-test Mean ± SD	Paired t-value	p-value
FVC (L)	2.12 ± 0.48	2.45 ± 0.44	4.21	<0.001
FEV_1 (L)	1.87 ± 0.41	2.12 ± 0.39	3.98	<0.001
PEFR (L/min)	282 ± 60	315 ± 58	3.64	0.002
Dyspnea (Borg Scale)	5.5 ± 1.2	3.9 ± 1.0	5.12	<0.001

Table: 4 Post-Intervention Comparison between Group A and B

Outcome Measure	Group A Post Mean ± SD	Group B Post Mean ± SD	Unpaired t-value	p-value
FVC (L)	2.85 ± 0.40	2.45 ± 0.44	3.01	0.004
FEV_1 (L)	2.50 ± 0.35	2.12 ± 0.39	3.28	0.002
PEFR (L/min)	360 ± 50	315 ± 58	2.69	0.010
Dyspnea (Borg Scale)	2.4 ± 0.9	3.9 ± 1.0	4.88	<0.001







RESULT: The results indicate that both interventions were effective in improving pulmonary function and reducing

dyspnea in patients with Guillain-Barré Syndrome. However, the addition of the **Buteyko Breathing Technique** resulted in **significantly superior improvements** in respiratory parameters and dyspnea reduction compared to conventional physiotherapy alone.

DISCUSSION

The present study investigated the effectiveness of the Buteyko Breathing Technique as an adjunct to conventional physiotherapy on pulmonary function and dyspnea in patients with Guillain-Barré Syndrome. The findings demonstrated that both intervention groups showed significant improvements following six weeks of rehabilitation; however, participants who received Buteyko Breathing Technique in addition to conventional physiotherapy exhibited significantly greater improvements in pulmonary function parameters and dyspnea reduction compared to those who received conventional physiotherapy alone.

Respiratory dysfunction is a well-recognized complication of Guillain-Barré Syndrome, resulting from weakness of the diaphragm, intercostal muscles, and accessory respiratory muscles[1]. Even in patients who do not require mechanical ventilation, restrictive pulmonary patterns and reduced ventilatory efficiency are commonly observed during the recovery phase[2]. In the present study, baseline pulmonary function values were reduced in both groups, supporting previous evidence that respiratory impairment persists beyond the acute stage of GBS[3].

Within-group analysis revealed statistically significant improvements in forced vital capacity, forced expiratory volume in one second, peak expiratory flow rate, and dyspnea scores in both groups. These findings are consistent with earlier studies indicating that conventional respiratory physiotherapy including deep breathing, incentive spirometry, chest expansion exercises, and positioning plays an important role in maintaining lung volumes and preventing pulmonary complications in neuromuscular disorders[4,5]. However, the magnitude of improvement observed in the experimental group was substantially greater, suggesting an additional benefit of structured breathing retraining.

The superior outcomes observed in the Buteyko group may be attributed to its focus on breathing control, reduction of hyperventilation, and improved ventilatory efficiency. The Buteyko Breathing Technique emphasizes nasal breathing, reduced breathing volume, and breath-holding exercises, which aim to normalize respiratory patterns and improve carbon dioxide tolerance[6]. Evidence from randomized controlled trials in asthma populations has demonstrated that BBT significantly improves symptom control, reduces dyspnea, and enhances functional respiratory outcomes[7,8]. Although the underlying pathology in GBS differs from obstructive lung disease, dysfunctional breathing patterns and altered dyspnea perception may similarly contribute to respiratory discomfort and inefficiency.

Dyspnea is a complex symptom influenced not only by pulmonary mechanics but also by neural, psychological, and autonomic factors[9]. In patients with neuromuscular disorders, increased respiratory muscle workload and inefficient breathing patterns may amplify the sensation of breathlessness. The marked reduction in Borg dyspnea scores observed in Group A suggests that breathing retraining may positively influence dyspnea perception by reducing unnecessary respiratory effort and promoting relaxation. This is supported by previous research demonstrating that controlled breathing and relaxation techniques reduce sympathetic overactivity and improve patient comfort[10].

Postural correction and relaxation exercises incorporated within the Buteyko protocol may have further contributed to improved respiratory outcomes. Optimal posture enhances thoracic expansion and respiratory muscle efficiency, while relaxation reduces accessory muscle overuse and respiratory fatigue[11]. Studies in neuromuscular and cardiopulmonary rehabilitation have highlighted the importance of integrating posture and breathing control to optimize ventilatory mechanics[12].

The findings of the present study align with systematic reviews that support the role of breathing exercises in improving respiratory symptoms and selected pulmonary function outcomes across various clinical populations[13]. However, literature specifically addressing breathing retraining techniques in Guillain-Barré Syndrome remains scarce. This study therefore contributes novel evidence supporting the inclusion of structured breathing control techniques such as Buteyko Breathing Technique in the rehabilitation of patients with GBS.

CONCLUSION

The study concludes that the Buteyko Breathing Technique combined with conventional physiotherapy is more effective than conventional physiotherapy alone in improving pulmonary function and reducing dyspnea in patients with Guillain-Barré Syndrome. The intervention resulted in greater improvements in lung volumes and perceived breathlessness over a six-week rehabilitation period. These findings support the inclusion of structured breathing retraining as an adjunct to conventional physiotherapy to enhance respiratory recovery in patients with Guillain-Barré Syndrome.

CONFLICT OF INTEREST:
None
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