Original Article

Neuropathic Pain in Guillain-Barre Syndrome: Association with Rehabilitation Outcomes and Quality of Life

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Abstract

Background: Neuropathic pain contributes significantly to the morbidity and affects the quality of life adversely in Guillain-Barre syndrome (GBS). **Objective:** To study neuropathic pain profile in GBS and association with rehabilitation outcomes and effect on the quality of life. **Methods:** Observational study conducted in rehabilitation setting of a tertiary care hospital among adult GBS patients of less than 3 months duration. Assessment was done at the time of admission and discharge with Pain-detect questionnaire (PD-Q), Neuropathic pain scale (NPS), SF 36 survey, Medical Research Council (MRC) score, INCAT sensory sum score (ISS), Overall Disability sum-score (ODSS), Hughes disability score (HDS), Hospital Anxiety and Depression scale (HADS), and Fatigue Severity scale (FSS). Neuropathic pain was managed as per routine protocol and rehabilitation program was individualized. **Results:** 32 participants (26 males) with median age of 34.50 years were included. Eighteen (56.25%) patients had neuropathic pain on PD-Q at admission. The median intensity of pain on NPS scale was 47 at admission which decreased significantly to 14 at discharge. Pain group showed significant association with sensory impairment, CSF protein, and emotional domains of QOL while no association with disability. **Conclusion:** Neuropathic pain is associated with sensory impairment in GBS and markedly affects the quality of life, especially emotional, family, and social activities.

Keywords: Guillain-Barre syndrome, neuropathic pain, quality of life

Introduction

Guillain-Barre Syndrome (GBS) is a severe acute paralytic neuropathy leading to significant morbidity and disability. There has been a recent emphasis on the need of integrated care for GBS patients and to look beyond the physical disability.[1] Several studies have mentioned about the presence of pain and other sensory symptoms as an additional burden to the disease.[2,3] Pentland and Donald described various types of pain in GBS but multiple pain patterns can coexist and overlap which can further complicate the objective assessment.[4] Reported frequency of pain has also been highly variable ranging from 29%–89% in the acute phase of GBS and of severe intensity in some cases. However, most studies have recorded overall pain and not specified neuropathic per se.[5-7] Recently few studies have quantified neuropathic pain and are prospective in nature.[8-10]

There is growing acceptance recently for comprehensive assessment even in the acute phase of disease which includes not only motor weakness but also associated pain and psychological distress and finally the impact of illness on quality of life (QOL). QOL and disability can also be influenced by factors like individual ability of patients to adapt to illness, rehabilitation, and extend of psychosocial support. Factors like depression, anxiety, and poor QOL may influence the subjective interpretation of pain.[2,11]

The literature available on neuropathic pain (frequency, character, intensity) in subacute GBS and its association with neurological status and QOL is limited. This study was aimed at evaluating the profile of neuropathic pain in individuals with GBS who were undergoing rehabilitation and observe its association with outcomes and QOL.

Materials and Methods

A prospective observational study was conducted in neurological rehabilitation unit of a tertiary care Institute between October 2019 and March 2020. The study was approved by the Institutional Ethics Committee and informed written consent was obtained from all participants. All adult participants diagnosed with GBS according to National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) criteria,[12] who had received treatment as per the standard guidelines and admitted for inpatient rehabilitation with duration of illness less than 3 months were included in the study. Individuals with recurrent GBS, presence of pain

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prior to onset of illness, and unwilling to give an informed consent were excluded. Baseline data and characteristics with detailed history were recorded on admission. The data collected included duration of illness, weakness, sensory symptoms, history of antecedent infections, respiratory, bladder, and bowel involvement, and details of management. The subtyping was done based on electrophysiological findings. A detailed clinical and neurological examination was performed along with administration of questionnaires within 24 h of admission. Each participant received customized inpatient rehabilitation program. The participants were assessed, and questionnaires were readministered 24 h prior to discharge from inpatient rehabilitation facility. The above assessment including administration of questionnaires was done by the same clinician.

Screening for neuropathic pain was done with pain-DETECT Questionnaire (PD-Q);[13] individuals who scored ≥13 underwent quantitative assessment with Neuropathic Pain Scale (NPS).[14] QOL was assessed with 36-Item Short Form Health Survey (SF-36).[15] Neurological status and recovery was assessed with Medical Research Council (MRC) sum score[16] and INCAT sensory sum score (ISS),[17] functional status with Hughes disability score (HDS)[18] and overall disability sum score (ODSS),[19] and emotional status by Hospital Anxiety and Depression Scale (HADS).[20] In addition, sleep was studied with by Pittsburgh Sleep Quality Index (PSQI)[21] and fatigue with Fatigue Severity Scale (FSS).[22]

Neuropathic pain was managed with medications like gabapentin or pregabalin followed by addition of amitriptyline or duloxetine as per routine management protocol of the department. Rehabilitation program included physical therapy for range of motion (ROM) exercises, stretching, muscle strengthening program, sensory reintegration, coordination exercises, and gait training. Occupational therapy session focused on proper positioning, bed mobility, activities of daily living (ADL) and functional ability training, ADL modifications, and environmental modifications. Orthoses and mobility aids were prescribed as per the requirement of the patients. Psychological, social issues, and vocational concerns were addressed by clinical psychologist and psychiatric social worker.

Study tools

Pain-Detect Questionnaire (PD-Q) is an entirely patient-reported screening questionnaire that has been validated for screening and identification of components of neuropathic pain. It is a nine-item questionnaire developed to measure quality, chronology, and radiation of pain. The score ranges from 0 to 38, a total score <12 represents nociceptive pain, 13–18 possible neuropathic pain, and >19 has more than 90% likelihood of neuropathic pain.[13]

Neuropathic Pain Scale (NPS) has a total of 10 items, two of these quantify pain (intensity and discomfort) and eight evaluate the quality of neuropathic pain (stabbing, burning, freezing, boring, tender, itching, deep pain, superficial pain). Items are evaluated on a numeric scale from 0 to 10 with overall score range from 0 to 100.[14]

36-Item Short-Form Health Survey (SF-36) is a self-administered questionnaire measuring the quality of life. It consists of 8 domains (36 questions) which are assessed quantitatively. Total score ranges between 0 and 100 with a higher score indicating a better quality of life. Its validity and reliability has been reported in immune-mediated polyneuropathies.[15,23]

Medical Research Council (MRC) score ranges between 0 (paralysis) and 60 (normal strength). It is the sum of MRC grading of three muscles groups each in upper limb (shoulder abductor, elbow flexor, and wrist extensors) and lower limb (hip flexor, knee extensor, and ankle dorsiflexor).[16]

INCAT sensory sum score (ISS) has been extensively evaluated in patients with immune-mediated polyneuropathies. In brief, this sensory scale comprises pin prick and vibration sense plus a two-point discrimination value in the arms and legs, and ranges from 0 (normal sensation) to 20 (most severe sensory deficit).[17]

Hughes disability score (HDS) is used to assess outcome in GBS patients and focuses mainly focus on walking. It ranges from grade 0 to grade 6 (grade 0-healthy; grade 1 -minor signs or symptoms of neuropathy; grade 2-able to walk without support of a stick, grade 3-able to walk with a stick; grade 4-confined to bed; grade 5-requiring assisted ventilation; grade 6-dead).[18]

Overall disability sum score (ODSS) is composed of arm and leg disability scale with a total score ranging from 0 (no signs of disability) to 12 (most severe disability score). The ODSS comprises a functional description of the arms and legs in a checklist form suitable for interviewing patients. Daily arm activities like dressing the upper part of the body, doing and undoing buttons and zips are scored as being "not affected," "affected but not prevented" or "prevented." Subsequently, these results are translated into an arm grade [score range 0 (normal arm abilities) to 5 (preventing all purposeful movements)]. The leg scale highlights difficulty in walking and use of an assistive device. The results are also translated into a leg grade [score range 0 (walking is not affected) to 7 (preventing all purposeful movements of the legs)].[19]

Hospital Anxiety and Depression Scale (HADS) is used to identify anxiety and depression in nonpsychiatric hospital clinics. It is divided into an anxiety subscale [HADS-anxiety subscale (HADS-A)] and a depression subscale [HADS-depression subscale (HADS-D)]. Total score is 21 and subscale score ≥8 denotes anxiety or depression.[20]

Pittsburgh Sleep Quality Index (PSQI) is a self-administered questionnaire which assesses sleep quality and disturbances. Nineteen individual items generate seven "component" scores. Each component score ranges from 0 (no difficulty) to 3 (severe difficulty) with total score (range of 0–21). A PSQI global score more than 4 is suggestive of significant sleep disturbance.[21]

Fatigue severity scale (FSS) is a self-reported questionnaire and measures fatigue by assessing the consequences of fatigue on daily functioning. The score ranges from 1 (no signs of fatigue) to 7 (most disabling fatigue). An average score of 4 and higher is indicative of fatigue.[22]

Statistical analysis

Statistical analysis was performed by SPSS version 21. Descriptive statistics were described with median with inter quartile range (IQR) (25th percentiles, 75th percentile) for continuous variables, and as frequency and percentage for categorical variables. The comparison between variable groups was done with Mann-Whitney U test for continuous variables and by Chi-square test for categorical variables. Wilcoxon rank-sum test was used to analyze pre and post rehabilitation outcome scores within the same group. The values of $P < 0.05$ was considered as statistically significant.

Results

Out of 35 patients who satisfied inclusion criteria, 3 patients dropped out due to clinical deterioration during inpatient rehabilitation. Among 32 participants analyzed, 26 were males. The median age was 34.5 (IQR 28, 47) years (range: 18–65 years). There was no history of antecedent infection in 19 (59.3%) participants. Cranial nerve involvement was seen in 18 (56.2%) participants, bulbar symptoms were present in 11 (34.4%), and facial palsy in 11 (34.4%) individuals. History of respiratory distress was present in 15 (46.9%) participants and eight individuals required mechanical ventilation. Electrophysiological subtyping showed axonal neuropathy in 25 (78.1%) and demyelination in 7 (21.9%) participants. Out of 25 participants with axonal neuropathy, 16 (64%) had acute motor axonal neuropathy (AMAN) and 9 (36%) had acute motor sensory axonal variant (AMSAN). Dysautonomia (increased sweating, dry mouth, constipation, urinary hesitancy) was recorded in 14 (43.8%) participants. Nine (28.1%) individuals had sensory impairment on clinical examination. The median duration from symptom onset of illness to rehabilitation admission was 20 (IQR 15, 30) days.

In participants with a score ≥13 on screening with PD-Q for neuropathic pain, NPS scale was administered for quantification of pain. Neuropathic pain was present in 18 (56.25%) participants (PD-Q ≥13) and median pain intensity was 47 (IQR 33.8, 53) as measured by NPS at admission. All patients (n = 18) with neuropathic pain at admission persisted to have neuropathic pain till discharge from rehabilitation setting.

Analysis was done by comparison between two groups, i.e., with neuropathic pain (n = 18) and without neuropathic pain (n = 14). Demographic and clinical features at admission for both groups were compared and are shown in Table 1. Comparison of both the groups for quality of life and rehabilitation outcome scores at admission is shown in Table 2. All participants had HDS grade of 4 at the time of admission. Higher ISS score suggesting sensory impairment was found in participants with neuropathic pain ($P = 0.006$). Physical functioning domain of SF36 was affected in both groups ($P > 0.05$); however, other scores (role limitation-emotional, emotional, vitality and social) were significantly ($P < 0.05$) lower in the neuropathic pain group. At the time of discharge, comparison of scores between groups showed no significant difference except ISS and pain component of SF-36 [Table 3].

Table 1: Demographic and clinical characteristics of subjects with neuropathic pain and those without neuropathic pain at the time of admission

Variable		Neuropathic pain present (n=18)	Neuropathic pain absent (n=14)	P*
Age (years)		34.5 (26,50)	32.5 (30,46)	0.69
Gender	Male	16	10	0.20†
Electrophysiological types	AIDP	5	2	001†
	AMAN	5	11	
	AMSAN	8	1	
Duration of symptoms of illness (days)		25 (15,30.5)	15 (13,25.5)	0.09
CSF analysis	Protein (mg/dL)	108 (40,141)	50.45 (42,75)	0.04
	Cell	1 (0,2)	0.5 (0,1.2)	0.77
Antecedent events	Absent	10	9	0.93†
	Fever	4	2	
	Respiratory	1	1	
	Gastrointestinal	3	2	
Cranial nerve involvement	Present	12	6	0.17†
Sensory impairment	Present	8	1	0.02†
Dysautonomia	Present	8	6	0.92†
History of mechanical ventilation	Present	6	3	0.45†

Data in median (Interquartile range-25th percentile, 75th percentile), *Mann-Whitney U test unless specified, †Chi-square test

AIDP-Acute inflammatory demyelinating polyneuropathy, AMAN-Acute motor axonal neuropathy, AMSAN-Acute motor sensory axonal neuropathy, CSF-Cerebrospinal fluid

The median pain intensity in patients with neuropathic pain at the end of rehabilitation program was 14 (IQR 10.2, 21) and this improvement was statistically significant ($P < 0.05$). Duration of hospital stay was 20.5 (IQR 17, 27) days in neuropathic pain group versus 22 (IQR 15, 30) days in nonneuropathic group, which was not statistically significant ($P = 0.95$). Both the groups showed improvement in rehabilitation outcome scores and median change in scores was compared between both groups and is shown in Table 4. The analysis for change in rehabilitation outcome scores and QOL scores at admission and at discharge from rehabilitation setting for both the groups of GBS patients, i.e., those with neuropathic pain and those without, showed significant improvement [Table 5].

Discussion

In our study, 18 (56.25%) participants had neuropathic pain at the time of admission in neurological rehabilitation setting. Neuropathic pain was present in both upper and lower limbs with distal predominance, and it was constant from onset, with no patient reporting progressive pain. All the participants with neuropathic pain required medications for the management of neuropathic pain. Four individuals from nonneuropathic group reported musculoskeletal pain which responded well to analgesics.

Several studies have shown variable frequency of neuropathic pain ranging from 29% to 89%.[6,7,24] A prospective study done by Ruts *et al.* in 32 patients with GBS reported neuropathic pain among 43.7% in acute phase.[25] Martinez *et al.* studied neuropathic pain using standardized questionnaires like Douleur Neuropathique 4 (DN4), and observed pain in 70% GBS patients of which most (43%) had neuropathic pain.[10]

Pathophysiology of neuropathic pain is poorly understood. The different theories are spontaneous or abnormal activity from large myelinated sensory afferents, small fiber dysfunction, sensitization of nociceptors, ectopic firing in A delta and C fibers in dorsal root ganglia.[26] Neuropathic pain was more common in participants with a greater degree of sensory involvement assessed clinically and it was reflected by a higher ISS score. Martinez *et al.* found the association of pain with sensory impairment and postulated that small fiber degeneration contributed to pain and its persistence in GBS.[10] Ruts *et al.* also confirmed that small nerve fibers dysfunction as demonstrated by reduction of intraepidermal nerve fiber

Table 2: Comparison of rehabilitation outcome scores between patients with neuropathic pain and those without neuropathic pain at the time of admission

Quality of life and Rehabilitation Outcome scales	Neuropathic pain present ($n=18$)	Neuropathic pain absent ($n=14$)	P*
SF36			
Physical Functioning	0 (0,1.2)	0 (0,5)	0.83
Role	0 (0)	0 (0)	1.00
Limitation-physical	100 (0,100)	100	0.03
Role	62.5 (50,75)	75 (75,91)	0.02
Limitation-emotional	35 (12,48)	84 (72.5,90)	0.00
Social functioning	52.5 (39,62.5)	70 (64,71)	0.02
Pain	60 (45,74)	78 (70,80)	0.02
Vitality	55 (42.5,66)	62.5 (50,70)	0.23
Emotional			
General health			
HDS	4	4	1.00
MRC score	19 (13,31)	21 (15.5,25.7)	0.92
ISS	1.5 (0,7)	0	0.01
ODSS-UL	4 (3.7,4.2)	3 (3,4)	0.13
ODSS-LL	7 (6,7)	6 (5.7,7)	0.44
HADS-A (≥8)	7	2	0.12 †
HADS-D (≥8)	8	2	0.06 †
PSQI (≥5)	8	3	0.17 †
FSS (≥4)	6	6	0.58 †

Data in median (Interquartile range-25th percentile, 75th percentile), * Mann-Whitney U test unless specified, † Chi-square test,

SF-36-36-Item Short Form Health Survey, HDS-Hughe's disability score, MRC-Medical research council, ISS-INCAT sensory sum score, ODSS-Overall disability sum score, UL- Upper limb, LL-Lower limb, HADS-Hospital anxiety and depression scale, A-Anxiety, D-Depression, PSQI -Pittsburgh sleep quality index, FSS–Fatigue severity scale

Table 3: Comparison of rehabilitation outcome scores with neuropathic pain and those without neuropathic pain at the time of discharge

Quality of life and Rehabilitation Outcome scales	Neuropathic pain present ($n=18$)	Neuropathic pain absent ($n=14$)	P*
SF36			
Physical Functioning	5 (0,57.5)	10 (0,41.2)	0.89
Role	0 (0,56.2)	0 (0,62.5)	0.92
Limitation-physical	100 (0,100)	100 (0,100)	0.44
Role	87.5 (75,100)	87.5 (75,100)	0.69
Limitation-emotional	77.5 (67.5,90)	90 (86.8,100)	0.04
Social functioning	75 (65,85)	80 (78.7,82.5)	0.33
Pain	82 (71.5,92)	84 (80,89)	0.39
Vitality	75 (63.7,85)	82.5 (73.7,85)	0.22
Emotional			
General health			
HDS	3.5 (2,4)	4 (2,4)	0.77
MRC score	34 (23.5,50.5)	28 (25.5,41.7)	0.63
ISS	0 (0,4.25)	0	0.03
ODSS-UL	2 (1,4)	2 (1,2.2)	0.22
ODSS-LL	4 (2,6)	5 (2,6)	0.86
HADS-A (≥8)	0	1	0.24 †
HADS-D (≥8)	1	0	0.37 †
PSQI (≥5)	1	0	0.37 †
FSS (≥4)	0	1	0.24 †

*Mann-Whitney U test; Data in median (Interquartile range-75th percentile, 25th percentile), † Chi-square test

HDS-Hughe's disability score, MRC-Medical research council, ISS-INCAT sensory sum score, ODSS-Overall disability sum score, UL-Upper limb, LL-Lower limb, HADS-Hospital anxiety and depression scale, A-Anxiety, D-Depression, PSQI-Pittsburgh sleep quality index, FSS-Fatigue severity scale, SF-36-36-Item Short Form Health Survey

Table 4: Comparison of median change in rehabilitation outcome scores at the end of rehabilitation

Quality of life and Rehabilitation Outcome scales	Neuropathic pain present (*n*=18)	Neuropathic pain absent (*n*=14)	*P**
SF36			
Physical Functioning	5 (0,47.5)	7.5 (0,37.5)	0.92
Role	0 (0,56.2)	0 (0,62.5)	0.92
Limitation-physical	0 (0,33.3)	0	0.19
Role	25 (0,25)	0 (0,12.5)	0.02
Limitation-emotional	20 (10,35)	12.5 (8.7,21.2)	0.13
Social functioning	20 (12,28)	10 (4,13)	0.01
Vitality	15 (10,28.7)	20 (5,30)	0.89
Emotional			
General health			
HDS	−0.5 (−2,0)	0 (−2,0)	0.77
MRC score	11 (4,13.2)	11 (6,14.2)	0.56
ISS	0 (−2.2,0)	0	0.03
ODSS	−3.5 (−5.5, −1)	−3.5 (−4.5, −2)	0.92
HADS-A	−2 (−4.5, −0.7)	−1 (−3,0)	0.35
HADS-D	−3 (−6,0)	−1 (−3, −0.7)	0.15
FSS	−1.1 (−2.3, −0.2)	0 (−1.4,0)	0.10

*Mann-Whitney U test; Data in median (Interquartile range 25th percentile, 75th percentile)

SF-36-36-Item Short Form Health Survey, HDS-Hughe's disability score, MRC-Medical research council, ISS-INCAT sensory sum score, ODSS-Overall disability sum score, HADS- Hospital anxiety and depression scale, A-Anxiety, D-Depression, PSQI-Pittsburgh sleep quality index, FSS-Fatigue severity scale

density in patients with GBS was associated with a higher risk of developing neuropathic pain and correlated with its intensity, even in patients with the pure motor variant.[25] In the present study, neuropathic pain occurred in all the variants of GBS but more with AMSAN variant.

We did not observe a significant difference in age and gender between the groups similar to a previous study.[10] Kinboshi *et al.* reported greater incidence of pain in younger individuals.[6] Ruts *et al.* observed an association of pain with history of diarrhea which was explained by preferential small sensory fiber damage associated with certain infections.[8] However, Kinboshi *et al.* did not find an association of pain with antecedent illness which is similar to our findings.[6] In our study, eight patients needed mechanical ventilation in acute phase but it was not significantly related to pain which is in contrast to the results of an earlier study.[24]

Our findings support the significant association of pain with high CSF protein concentration as reported in literature; possible explanation might be that higher protein concentration causes nerve root inflammation and stimulates afferent sensory nerves.[5,6] Our results concur with study by Moulin *et al.* that reported no association of MRC sum score with disability (HDS, ODSS) in subacute phase.[7] However, studies have observed negative correlation of pain with disability in acute phase, where likely reason is that pain tends to be ignored in the presence of severe physical disability.[8,27]

Significant psychological distress has been reported in GBS due to sudden onset of symptoms.[11] The neuropathic pain group had higher occurrence of psychological stress like anxiety and depression and sleep disturbances at the time of admission in our study but this association was not statistically significant. However, we observed an improvement in psychological distress at the time of discharge which may due to various factors like improvement in physical disability, achievement of independence in activities of daily living, and psychosocial interventions. In addition, we assume that reduction in neuropathic pain might have been a contributing factor.

Though neuropathic pain may be related to sleep disturbances and fatigue, no association was found in our study. Karkare *et al.* observed an improvement in sleep pattern after seventh day of illness due to stabilization and improvement in illness.[28] Kinboshi *et al.* reported extended hospital stay in GBS patients with pain unlike our study.[6] The duration of stay for both the groups in our study was similar; this could be due to the accomplishment of preset goals of rehabilitation like achievement of basic functional independence and ambulation/ mobility by 3 weeks.

We observed a significant impairment in emotional, social, and vitality components of SF-36 in GBS participants with neuropathic pain. There was a significant reduction in the intensity of neuropathic pain during rehabilitation. A greater degree of improvement in social and emotional components of SF-36 was seen in the neuropathic pain group. This suggests that neuropathic pain influences social and emotional functioning. Addressing pain along with individualized therapy sessions and psychosocial interventions like peer group support and recreational activities can lead to better QOL in people with GBS.

Rudolph *et al.* studied long-term functional status in 42 patients and found correlation of pain as measured by visual analog scale with physical functioning, disability, and fatigue.[2] Few other studies reported significant improvement in QOL in subsequent follow-up.[1,2] Alexandrescu *et al.* studied a national cohort of GBS patients and found that physical and cognitive disabilities are amenable to change with rehabilitation.[29] In our study, participants in both groups had significant reduction in anxiety, depression, fatigue with improvement in functional levels and all the components of SF-36 post-rehabilitation program.

Our study had a few limitations, namely, being a single-center and hospital-based observational study with a relatively smaller sample size; generalization of these findings should be done with caution. We were not able to comment upon the exact time of onset of neuropathic pain during the course of illness, since this information was not collected specifically. Due to limited number of beds in our setting, the patients with GBS who had good recovery were not offered inpatient rehabilitation and this led to selection bias. Further research is needed in a larger series with a longer follow-up. However, significant

Table 5: Quality of life (QOL) scores and Outcome scores before and after in-patient rehabilitation program

Quality of life and Rehabilitation Outcome scales		Neuropathic pain present (n=18)	P*	Neuropathic pain absent (n=14)	P*
SF36					
Physical Functioning	Admission	0 (0,1.2)	0.003	0 (0,5)	0.005
	Discharge	5 (0,57.5)		10 (0,41.2)	
Role Limitation-physical	Admission	0	0.017	0	0.039
	Discharge	0 (0,56.2)		0 (0,62.5)	
Role Limitation-emotional	Admission	100 (100)	0.038	100	-
	Discharge	100 (0)		100	
Social functioning	Admission	62.5 (50,75)	0.001	75 (75,90.6)	0.024
	Discharge	87.5 (75,100)		87.5 (75,100)	
Pain	Admission	35 (11.8,48.1)	0.001	84 (72.5,90)	0.017
	Discharge	77.5 (67.5,90)		90 (86.8,100)	
Vitality	Admission	52.5 (38.7,62.5)	0.001	70 (63.7,71.2)	0.002
	Discharge	75 (65,85)		80 (78.7,82.5)	
Emotional	Admission	60 (45,74)	0.001	78 (70,80)	0.002
	Discharge	82 (71.5,92)		84 (80,89)	
General health	Admission	55 (42.5,66.2)	<0.001	62.5 (50,70)	0.001
	Discharge	75 (63.7,85)		82.5 (73.7,85)	
HDS	Admission	4	0.005	4	0.020
	Discharge	3.5 (2,4)		4 (2,4)	
MRC score	Admission	19 (13,31)	<0.01	21 (15.5,25.7)	<0.001
	Discharge	34 (23.5,50.5)		28 (25.5,41.7)	
ISS	Admission	1.5 (0,7)	0.011	0	-
	Discharge	0 (0,4.2)		0	
ODSS	Admission	11 (9.7,11.2)	0.001	9.5 (8.7,11)	<0.001
	Discharge	7 (3,10)		6.5 (4,8.2)	
HADS-A	Admission	5.5 (1.7,8)	0.001	3 (1,5)	0.005
	Discharge	2 (0,3.2)		1 (0,2)	
HADS-D	Admission	5.5 (1,9.25)	0.001	2.5 (1,5)	0.003
	Discharge	2 (0,3.2)		1.5 (0,2)	
FSS	Admission	2.4 (1.2,4)	0.001	1 (1,4)	0.042
	Discharge	1 (1,1.7)		1 (1,1.7)	

Data in median (Interquartile range -25th percentile, 75th percentile), *Wilcoxon rank-sum test; P<0.05 significant

SF-36-36-Item Short Form Health Survey, HDS-Hughe's disability score, MRC- Medical research council, ISS-INCAT sensory sum score, ODSS-Overall disability sum score, UL-Upper limb, LL-Lower limb, HADS-Hospital anxiety and depression scale, A-Anxiety, D-Depression, PSQI-Pittsburgh sleep quality index, FSS-Fatigue severity scale

findings for this relatively small sample size indicate that the intensity of neuropathic pain is related to sensory impairment and it can contribute significantly to psychological distress in GBS patients.

Conclusion

Neuropathic pain is associated with sensory impairment in GBS and it affects the quality of life, especially emotional, family, and social domains. Addressing neuropathic pain in the early stage of illness can alleviate morbidity and improve the emotional state and general well-being of the patient.

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Conflicts of interest

There are no conflicts of interest.

References

1. Merkies IS, Schmitz PI, van der Meché FG, Samjin JP, van Doorn PA. Inflammatory neuropathy cause and treatment (INCAT) group. Quality of life complements traditional outcome measures in immune-mediated polyneuropathies. Neurology 2002;59:84-91.
2. Rudolph T, Larsen JP, Farbu E. The long-term functional status in patients with Guillain-Barre´ syndrome. Eur J Neurol 2008;15:1332–7.
3. Bernsen RA, de Jager AE, van der Meche FG, Suurmeijer TP. How Guillain Barre patients experience their function after one year. Acta Neurol Scand 2005;112:51-6.
4. Pentland B, Donald SM. Pain in the Guillain-Barré syndrome: A clinical review. Pain 1994;59:159-64.
5. Yao S, Chen H, Zhang Q, Shi Z, Liu J, Lian Z, *et al*. Pain during the acute phase of Guillain-Barré syndrome. Medicine (Baltimore) 2018;97:e11595.
6. Kinboshi M, Inoue M, Kojima Y, Ono M, Nakagawa T, Kanda M, *et al*. Pain in the acute phase of Guillain–Barre syndrome. Neurol Clin Neurosci 2014;2:50–3.
7. Moulin DE, Hagen N, Feasby TE, Amireh R, Hahn A. Pain in Guillain-Barré syndrome. Neurology 1997;48:328-31.
8. Ruts L, Drenthen J, Jongen JL, Hop WC, Visser GH, Jacobs BC, *et al*. Dutch GBS study group. Pain in Guillain-Barré syndrome: A long term

follow-up study. Neurology 2010;75:1439-47.
9. Pazzaglia C, Briani C, Nobile-Orazio E, Caliandro P, Granata G, Tonali PA, *et al*. Occurrence and characterization of pain in immune-mediated neuropathies: A multicenter prospective study. Eur J Neurol 2011;18:177-83.
10. Martinez V, Fletcher D, Martin F, Orlikowski D, Sharshar T, Chauvin M, *et al*. Small fibre impairment predicts neuropathic pain in Guillain-Barré syndrome. Pain 2010;151:53-60.
11. Davidson I, Wilson C, Walton T, Brissenden S, Campbell M, McGowen L. What constitutes a 'good' recovery outcome in post-acute Guillain-Barré syndrome? Results of a nationwide survey of post-acute GBS sufferers in the United Kingdom. Eur J Neurol 2010;17:677-83.
12. Asbury AI, Cornblath DR. Assessment of current diagnostic criteria for Guillain-Barre syndrome. Ann Neurol 1990;27(Suppl):21-4.
13. Freynhagen R, Baron R, Gockel U, Tolle TR. painDETECT: A new screening questionnaire to detect neuropathic components in patients with back pain. Curr Med Res Opin 2006;22:1911–20.
14. Galer BS, Jensen MP. Development and preliminary validation of a pain measure specific to neuropathic pain: The Neuropathic Pain Scale. Neurology 1997;48:332-8.
15. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 Health Survey. Manual and Interpretation Guide. Boston, MA: New England Medical Center, The Health Institute; 1993.
16. Kleyweg RP, van der Meche FGA, Schmitz PIM. Interobserver agreement in the assessment of muscle strength and functional abilities in Guillain-Barre syndrome. Muscle Nerve 1991;14:1103-9.
17. Merkies IS, Schmitz PI, van der Meche FG, van Doorn PA. Psychometric evaluation of a new sensory scale in immune-mediated polyneuropathies. Neurology 2000;54:943-9.
18. Hughes RA, Newsom-Davis JM, Perkin GD, Pierce JM. Controlled trial prednisolone in acute polyneuropathy. Lancet 1978;2:750-3.
19. Scharrack B, Hughes RA. Scale development and Guy's neurological disability scale. J Neurol 1999;246:226.
20. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361-70.
21. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193-213.
22. Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. The fatigue severity scale. Application to patients with multiple sclerosis and systemic lupus erythematosus. Arch Neurol 1989;46:1121-3.
23. Sinha R, van den Heuvel WJ, Arokiasamy P. Validity and reliability of MOS short form health survey (SF-36) for use in India. Indian J Community Med 2013;38:22-6.
24. Karkare K, Taly AB, Sinha S, Rao S. Temporal profile of pain and other sensory manifestations in Guillain-Barré syndrome during ten days of hospitalization. Neurol India 2011;59:712–6.
25. Ruts L, van Doorn PA, Lombardi R, Haasdijk ED, Penza P, Tulen JH, *et al*. Unmyelinated and myelinated skin nerve damage in Guillain-Barré syndrome: A correlation with pain and recovery. Pain 2012;153:399-409.
26. Pan CL, Tseng TJ, Lin Y, Chiang MC, Lin WM, Hsieh ST. Cutaneous innervation in Guillain–Barré syndrome: Pathology and clinical correlations. Brain 2003;126:386-97.
27. Rekand T, Gramstad A, Vedeler CA. Fatigue, pain and muscle weakness are frequent after Guillain-Barré syndrome and poliomyelitis. J Neurol 2009;256:349-54.
28. Karkare K, Sinha S, Taly AB, Rao S. Prevalence and profile of sleep disturbances in Guillain-Barre Syndrome: A prospective questionnaire-based study during 10 days of hospitalization. Acta Neurol Scand 2013;127:116-23.
29. Alexandrescu R, Siegert RJ, Turner-Stokes L. Functional outcomes and efficiency of rehabilitation in a national cohort of patients with Guillain-Barré Syndrome and other inflammatory polyneuropathies. PLoS One 2014;9:e110532.