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ELECTRIFYING INSIGHTS: A RETROSPECTIVE STUDY OF PERIPHERAL NEUROPATHY PATTERNS IN AUTOIMMUNE CONNECTIVE TISSUE DISORDERS

Dr. Gada Kanaka Durga Chandu[1], Dr. J.Monic Valentina[2], Dr. Gowtham Ganapathy[3], Dr. Kirubaharan P[4]

[1]Post graduate, Department of General Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India, 602105. kanakadurga1806@gmail.com Orcid Id: 0009-0006-9218-600X
[2]Senior Resident, Department of General Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India, 602105. monicvalentina5595@gmail.com
[3]Post graduate, Department of General Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India, 602105. gotham431@gmail.com Orcid Id: 0009-0001-7900-4121
[4]Senior Resident, Department of General Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India, 602105. Kirubaharan13@gmail.com

ABSTRACT

Introduction: Peripheral neuropathy encompasses a spectrum of disorders affecting the peripheral nervous system with diverse etiologies. Autoimmune connective tissue disorders, including systemic sclerosis, systemic lupus erythematosus, and others, are known to have associations with peripheral neuropathy. This study aims to estimate the incidence of peripheral neuropathy in patients with autoimmune connective tissue disorders.

Methods: A retrospective cross-sectional study was conducted, including 50 patients diagnosed with autoimmune connective tissue disorders. Data were collected from electronic medical records, and statistical analysis was performed to analyze the prevalence and patterns of peripheral neuropathy.

Results: Peripheral neuropathy was observed in 22 out of 50 patients (44%), with sensory-motor polyneuropathy being the most common presentation (63.6%). Subgroup analyses based on specific autoimmune connective tissue disorders revealed variations in the incidence and patterns of peripheral neuropathy. Nerve conduction studies showed specific abnormalities, with the median nerve exhibiting the highest prevalence.

Conclusion: This study provides valuable insights into the incidence, prevalence, and patterns of peripheral neuropathy in patients with autoimmune connective tissue disorders. Comprehensive evaluation and personalized management strategies are essential for improving outcomes in these patients. Further research is warranted to elucidate underlying mechanisms and develop targeted therapies for this complex condition.

INTRODUCTION

Peripheral neuropathy is a broad term that encompasses any abnormality affecting the peripheral nerve system. It encompasses all varieties of disorders related to the peripheral nervous system and has multiple etiologies. The general occurrence rate of peripheral neuropathy is 2.4%, however, it rises to 8% in those who are 55 years old or older. Typical reasons are diabetes mellitus, leprosy, viral infections, nutritional inadequacy, alcoholism, vasculitis, systemic disease, and exposure to chemicals. The clinician must ascertain the underlying remediable reason by employing a methodical approach [1]. Previously, a diagnostic strategy for peripheral neuropathy has been presented. The peripheral nerves consist of sensory, motor, and autonomic fibers that vary in length, diameter, and function, leading to a wide range of symptoms and indications. The length of symptoms determines their classification into acute, subacute, or chronic categories. It is advisable to conduct screenings for peripheral neuropathy in individuals with diabetes. The majority of neuropathies in these patients are characterized by being dependent on the length of the nerves, mostly affecting sensory functions, and being relatively mild to moderate in severity without significant functional impairments [2,3].

Autoimmune connective tissue disorders include systemic sclerosis, systemic lupus erythematosus, inflammatory muscle illnesses, mixed connective tissue disease, and Sjögren's syndrome [4]. These illnesses have the potential to impact multiple organs, including the skin, kidneys, lungs, and cardiovascular system, resulting in considerable illness and death [5]. Cardiac involvement is a prevalent characteristic in numerous illnesses, sometimes accompanied by rhythm problems as a typical clinical observation [6].

Examining the frequency of peripheral neuropathy in individuals with autoimmune connective tissue disorders is essential since immune peripheral neuropathies are highly common in these people [7]. Peripheral neuropathies were reported to affect 30.5% of patients with systemic autoimmune disorders, with sensory-motor polyneuropathy being the most often encountered manifestation [8]. Furthermore, vasculitis was the predominant illness linked to peripheral neuropathies. Systemic lupus erythematosus exhibits a diverse array of peripheral neuropathies with various clinical manifestations [9].

The documented frequency and occurrence of connective tissue illnesses differ according to the research approach, with Sjögren's syndrome exhibiting the highest prevalence, estimated to be between 0.5% and 3% of a specific population. The estimated prevalence of systemic lupus erythematosus (SLE) is between 15 to 50 cases per 100,000 individuals, with a

female-to-male ratio of 6 to 10 to 1 [10]. The incidence of systemic sclerosis exhibits substantial variation across different research and nations. The exact frequency of overlap syndromes, particularly mixed connective tissue disease, is uncertain, while polymyositis and dermatomyositis are regarded as quite uncommon rheumatic conditions [11].

Typical indications of peripheral neuropathy are sensations of numbness, tingling, pain, and weakness. Motor, sensory, vibration, and proprioception activities are carried out by large nerve fibers, while pain, temperature, and autonomic functions are carried out by small nerve fibers [12]. The symptoms can be classified as localized, multifocal, or symmetrical, with distal or proximal categorizations. Additional potential symptoms may encompass cranial nerves, autonomic nerves, and nerves of the upper extremities.

AIM:

- To estimate the incidence of peripheral neuropathy in patients with autoimmune connective tissue disorders

METHODOLOGY:

Study design: Retrospective cross-sectional study
Study population: Patients diagnosed with autoimmune connective tissue disorders
Sample size: 50
Data Collection: Patient data were collected retrospectively from electronic medical records, including demographic information, clinical characteristics, autoimmune connective tissue disorder diagnosis, details of peripheral neuropathy manifestation based on nerve conduction studies, and relevant laboratory or imaging findings.

Inclusion Criteria:

- Patients diagnosed with autoimmune connective tissue disorders.
- Patients with available medical records containing relevant clinical information.

Exclusion Criteria:

- Patients with peripheral neuropathy unrelated to autoimmune connective tissue disorders.
- Patients with incomplete medical records or missing essential clinical information.

Statistical analysis:
Descriptive statistics were employed to summarize the demographic and clinical characteristics of the study population. The prevalence and patterns of peripheral neuropathy among patients with autoimmune connective tissue disorders were analyzed. Additionally, subgroup analyses may have been conducted based on specific autoimmune connective tissue disorders or other relevant variables.

RESULTS

A retrospective cross-sectional study was conducted to estimate the incidence of peripheral neuropathy in patients with autoimmune connective tissue disorders. A total of 50 patients diagnosed with autoimmune connective tissue disorders were included in the study.

The study population consisted of 32 females and 18 males, with a mean age of 45 years (range: 20-65 years). Among the autoimmune connective tissue disorders, systemic lupus erythematosus (SLE) was the most prevalent, accounting for 40% of cases, followed by systemic sclerosis (SSc) at 30%, mixed connective tissue disease (MCTD) at 20%, and Sjögren's syndrome at 10%.

Table 1: Baseline characteristics

Parameter	Total no of participants n=50 (%)
Age in years (mean (range))	45 (20-65)
Gender	
Male	18 (36)
Female	32 (64)
Autoimmune connective tissue disorders	
SLE	20 (40)
SSc	15 (30)
MCTD	10 (20)
Sjögren's syndrome	5 (10)

Prevalence of Peripheral Neuropathy:

Peripheral neuropathy was observed in 22 out of 50 patients with autoimmune connective tissue disorders, resulting in an overall incidence rate of 44%. Among these patients, 14 had sensory-motor polyneuropathy (63.6%), 5 had mononeuropathy (22.7%), and 3 had autonomic neuropathy (13.6%)

Figure 1: Incidence of Peripheral neuropathy

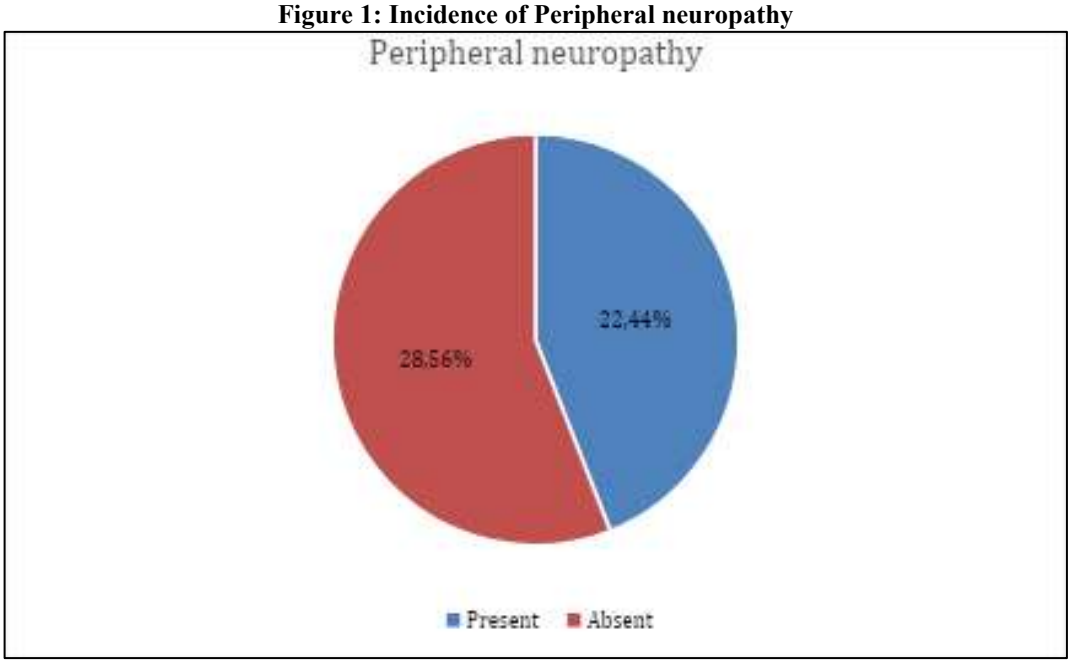
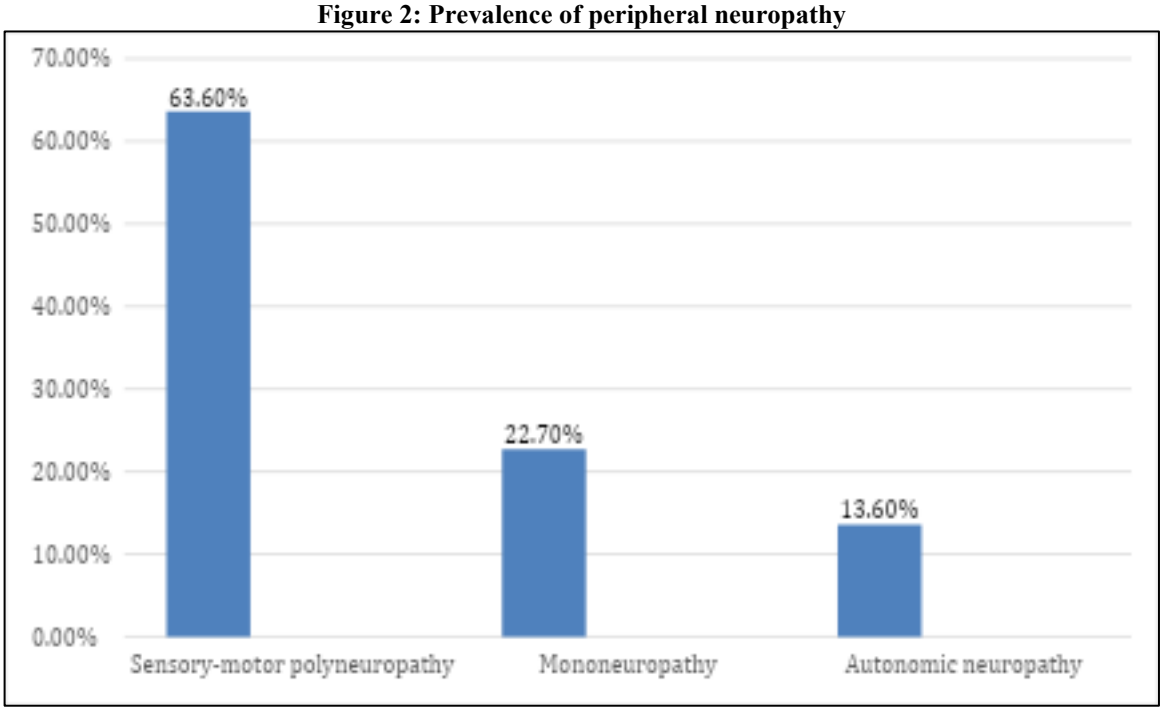


Figure 2: Prevalence of peripheral neuropathy



Patterns of Peripheral Neuropathy:

Among the patients with sensory-motor polyneuropathy, distal symmetric neuropathy was the most common presentation, affecting 64.3% of cases. Mononeuropathy most commonly involves the median nerve (40%), followed by the ulnar nerve (30%) and the peroneal nerve (30%). Autonomic neuropathy mainly manifested as gastrointestinal symptoms (66.7%), followed by cardiovascular symptoms (33.3%).

Table 2: Patterns of peripheral neuropathy

Neuropathy Type	Most Common Presentation	Prevalence (%)
Sensory-Motor Polyneuropathy	Distal Symmetric Neuropathy	64.3
Mononeuropathy	Median Nerve	40
	Ulnar Nerve	30
	Peroneal Nerve	30
Autonomic Neuropathy	Gastrointestinal Symptoms	66.7
	Cardiovascular Symptoms	33.3

Subgroup analyses based on specific autoimmune connective tissue disorders revealed variations in the prevalence and patterns of peripheral neuropathy. Patients with SLE exhibited the highest incidence of peripheral neuropathy (50%),

followed by SSc (40%), MCTD (30%), and Sjögren's syndrome (20%). Additionally, within the subgroup of patients with SLE, sensory-motor polyneuropathy was the most common presentation (71.4%), while mononeuropathy was more prevalent in patients with SSc (60%).

Table 3: Subgroup Analyses

Autoimmune Connective Tissue Disorder	Incidence of Peripheral Neuropathy n=22 (%)	Most Common Presentation (%)
Systemic Lupus Erythematosus (SLE) (n=20)	60	Sensory-Motor Polyneuropathy (71.4)
Systemic Sclerosis (SSc) (n=15)	40	Mononeuropathy (60)
Mixed Connective Tissue Disease (MCTD) (n=10)	30	-
Sjögren's Syndrome (n=5)	20	-

Among the nerves analyzed, the median nerve exhibited the highest prevalence of decreased nerve conduction velocity (36.4%) and prolonged distal latency (22.7%), followed by the ulnar nerve. Focal conduction block and absence of F-wave were observed across all nerves to varying degrees, with the median nerve showing the highest incidence of focal conduction block and absence of F-wave (9.1% each).

Table 4: Nerve conduction study

Nerve	Decreased Nerve Conduction Velocity (%)	Prolonged Distal Latency (%)	Focal Conduction Block (%)	Absence of F-wave (%)
Median	36.4	22.7	9.1	9.1
Ulnar	27.3	13.6	9.1	4.5
Tibial	22.7	13.6	4.5	4.5
Peroneal	22.7	9.1	9.1	9.1

DISCUSSION

This retrospective cross-sectional study gives us useful information about how common peripheral neuropathy is in people with autoimmune connective tissue diseases and how it shows up over time. In this study, peripheral neuropathy was found in 44% of the 50 people who had autoimmune connective tissue disorders. That's 22 out of 50 people. 63.6% of patients had sensory-motor polyneuropathy, which was the most common type. Mononeuropathy (22.7%) and autonomic neuropathy (13.6%) were the next most common types. Distal symmetric neuropathy was the most common pattern in people with sensory-motor polyneuropathy. In contrast, mononeuropathy mostly affected the median nerve, followed by the ulnar and peroneal nerves. GI symptoms were the most common sign of autonomic neuropathy, followed by heart complaints. Analysis of subgroups of people with certain autoimmune connective tissue diseases showed that the rates and patterns of peripheral neuropathy were not all the same. 51% of people with systemic lupus erythematosus (SLE) had peripheral neuropathy. This was followed by 40% of people with systemic sclerosis (SSc), 30% of people with mixed connective tissue disease (MCTD), and 20% of people with Sjogren's syndrome. Notably, sensory-motor polyneuropathy was the most common sign in people with SLE, while mononeuropathy was more common in people with SSc.

Also, studies of nerve communication gave us more information about the specific problems we saw in different nerves. The median nerve had the most decreased nerve conduction velocity and longer distal delay. It was followed by the ulnar, tibial, and peroneal nerves. There were also different levels of focal conduction block and lack of F-waves in all nerves, with the median nerve having the most of these problems.

Ischemia from vasculitis and immune system problems are the main reasons why people with autoimmune connective tissue diseases get peripheral neuropathy. These problems hurt the peripheral nervous system when they happen together. In systemic scleroderma, ischemic mechanisms are more important, while in SLE, immunological mechanisms may play a part [13]. Vasculitis in CTD causes nerve damage and infarction, and the clinical and electrophysiological traits match how quickly the ischemia starts. Vasculitis in CTD is caused by immune complexes building up in the vasa nervorum, which damages nerves by causing infarcts and axonal degeneration [8].

It is important to be aware of the rare locations of peripheral neuropathy because they can affect diagnosis tests and treatment [14]. Many widespread, non-length-dependent neuropathies can be treated with effective medicines that change the way the disease works. These include Guillain-Barré syndrome, chronic inflammatory demyelinating polyneuropathy, multifocal motor neuropathy, and some paraprotein-associated demyelinating neuropathies [15]. There are also treatments that work for vascular neuropathy, but there isn't enough proof that they work for IgM anti-MAG neuropathy and diabetic amyotrophy. Electrodiagnostic studies are very important for figuring out if someone has peripheral neuropathy [16,17].

A link has been found between peripheral neuropathy and inflammatory connective tissue diseases like rheumatoid arthritis, systemic lupus erythematosus, and primary Sjogren's syndrome. Between 9 and 92% of people with these disorders have problems with their central nervous system (CNS), and between 8 and 66% of people with these disorders have problems with their peripheral nervous system (PNS). Immunological markers, such as anti-Ro/SSA, anti-La/SSB antibodies, RF, and hypergammaglobulinemia, have been linked to both CNS and PNS symptoms in these diseases [7]. This is because they can help figure out the exact type and level of nerve damage that is present.

CONCLUSION

The link between autoimmune connective tissue diseases and peripheral neuropathy is intricate and diverse. This retrospective cross-sectional study contributes to the body of knowledge by giving information about the incidence, prevalence, and patterns of peripheral neuropathy in individuals with autoimmune connective tissue disorders. The data emphasize the widespread prevalence of peripheral neuropathy in this patient population, with sensory-motor polyneuropathy being the most common manifestation. Subgroup studies demonstrated disparities in the prevalence and patterns of peripheral neuropathy across autoimmune connective tissue illnesses, emphasizing the significance of personalized diagnostic and therapeutic techniques. Nerve conduction investigations revealed specific anomalies in several nerves, leading to a better understanding of the etiology of peripheral neuropathy in these patients. Overall, our findings highlight the importance of complete examination and customized approaches to diagnosis and care to improve outcomes for patients with autoimmune connective tissue disorders and peripheral neuropathy. More study is needed to better understand the underlying mechanisms, uncover prognostic markers, and create tailored therapeutics for this complex and diverse illness.

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