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Original Research Article

Clinical Profile, Nerve Conduction Velocity Studies & Aetiological Diagnosis in Patients with Peripheral Neuropathy (PN) at a Tertiary Health Care Center

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Abstract

Neuropathy is a prevalent chief complaint in Indian clinical scenario with varied aetiopathogensis as causation. This study aims to bring up the most predominant causes and the effective decrease in quality of life as a reflection due to peripheral neuropathies.

Objective: This study was conducted to underline the aetiology and create clinical profile of patients suffering with peripheral neuropathies. Nerve conduction study based screening test with the dependent calculation of CAP PRI questionnaire scoring for determination of quality of life was done.

Methodology: The design of the study was a prospective observational clinical study. Patients, ages ranging from 18 to 80 years, suspected for peripheral neuropathies with the physician's advice to undergo NCS were included in the study. Patient evaluation through NCS was done on the day of admission and at the time of discharge if the patient was hospitalized and CAP PRI scores from on a scale of 0 (no), 1 (a bit), 2 (a lot) were calculated.

Results: 168 patients, Sex: 130 male and 38 female were screened and enrolled for the study. A high prevalence of neuropathies was observed in type 2 diabetes and the overall prevalence rate was 27.2. Nutritional deficiencies specifically B12 showed a prevalence of 4.2%. Trauma related neuropathies served to make a case of 43.7% in our tertiary care centre. Others remained under AIDP which succumbed and the other aetiologies remain undiagnosed.

Conclusion: Trauma related nerve damage remained the reason for highest deformity, disability and reduced quality of life in our study. We did find a prevalent proportion of patients suffering from diabetes related neuropathy which is confirmed by our study. Nutrition related formed an often over looked section of neuropathies though, our study's results remain to bring them to the forefront.

Introduction

Neuropathy is defined as disease or dysfunction of one or more peripheral nerves.

The overall prevalence of peripheral neuropathy is 2.4%; and increases to 8% in individuals aged above 55 years with the commonest cause being Diabetes mellitus. [1]

In India the incidence of diabetes has increased; therefore, the incidence of diabetic neuropathy is also likely to increase. Indian statistics show an overall prevalence of 5 to 2400 per 10000 population [2] Care of Diabetes and its complications has become essential in the form of foot care centres, dedicated Diabetologists and Early surgical management for both ulcers and deformities, to ensure a decent quality of life and limit disability.

In our clinical practice it is not uncommon to find patients with various vague aches and pains, which even after spending a significant amount of time and money are still a mystery to diagnose.

The commonest causes of neuropathy include Diabetes, and Nutritional deficiencies [3].

Other important causes of peripheral neuropathy are Hypothyroidism, alcoholism, vasculitis, systemic disease and exposure to toxins. There are over 100 causes of neuropathy which the clinician has to determine the underlying treatable cause, which can be achieved by adopting a systematic approach. [4]

This study attempts to use Nerve conduction Velocity studies as a screening tool to find the needle of true disease in the haystack of vague aches and pains, and if possible, find the aetiologies of one of the minor yet common challenges of clinical practice.

Objective

1. To study the clinical profile of patients suspected of having peripheral neuropathies.
2. To evaluate patients of peripheral neuropathy by using nerve conduction velocity studies.
3. To investigate for aetiologies of peripheral neuropathies.

Methodology:

Material and Methods:

A) **Study Type/ Design:** Prospective observational clinical study**.**

B) **Study Settings**: The study was done in Department of Medicine in a tertiary

C) **Duration of Study**: From August 2020 to December 2022.

D) **Study Population Sample Size:**

Minimum no. of patients = N
Prevalence of patients=P= 12 %
A= Significance= 5 %
d= Margin of error = 5%
Z= Critical Value= 1.96

$$N = \frac{Z^{1-\alpha} \times P(1-p)}{d^2} = 163$$

Eligibility Criteria:

Inclusion Criteria:

1) Both sexes and Age more than 18 and less than 80 years.
2) All adults on OPD/IPD basis who are suspected to have Peripheral Neuropathy.
3) Any adult advised to undergo NCV by any department.

Exclusion Criteria:

1) Patients not willing to give consent.
2) Patients with permanent pacemakers, internal defibrillators.
3) Patients with electrode site infection/ulcers. (patients with burns/trauma included in the study without electrode site ulceration).

This is a prospective observational clinical study. In this study, the common causes of peripheral neuropathy and their findings was studied.

Patient evaluation was done on the day of admission and at the time of discharge if the patient was hospitalized.

Informed consent was taken from every patient. Patients will be give the CAP PRI questionnaire (Chronic Acquired Polyneuropathy – Patient Reported index) on a scale of 0 (no), 1 (a bit), 2 (a lot) and those patients who came for follow up will be requested to answer these question again.

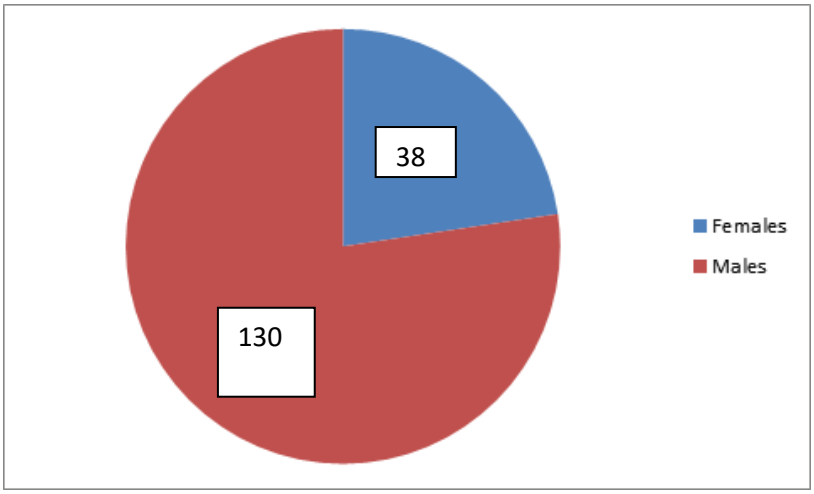
Results

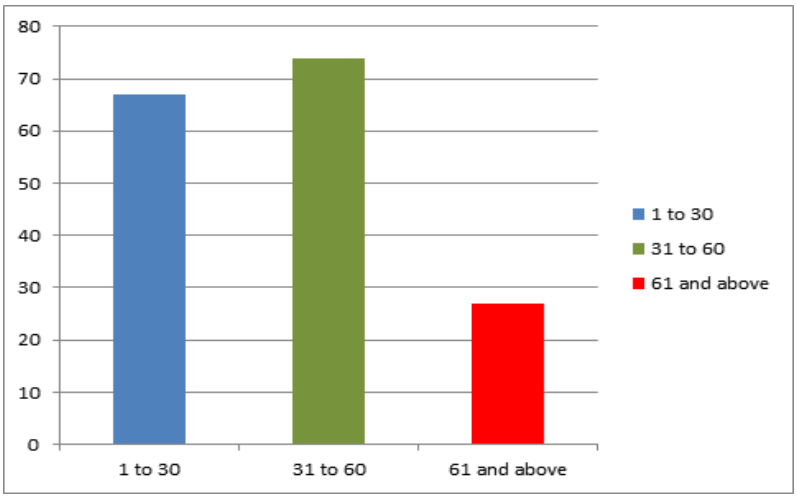
A total of 168 Patients were studied in the period from 2020 to 2022.

Though, not initially included in the study parameters, follow up data of 20 patients was available as repeat Nerve studies were required during their clinical course in the hospital. These findings have been added to the final results.

Age and Sex Distribution of patients presenting with Neuropathy:

130 Males and 38 Females

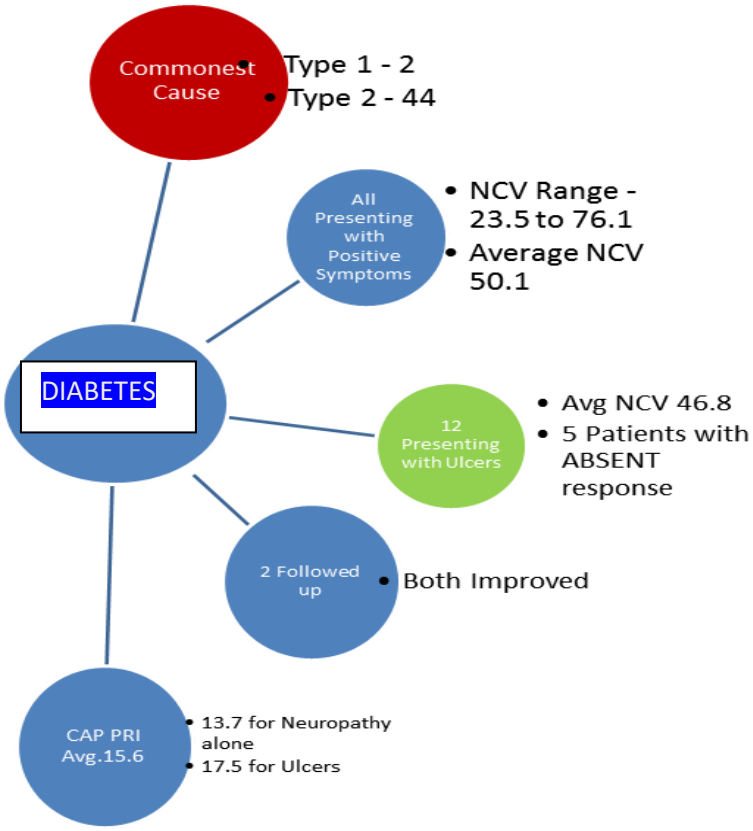


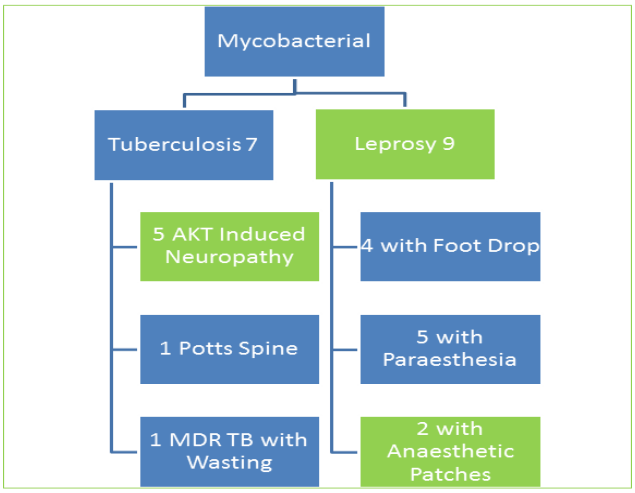


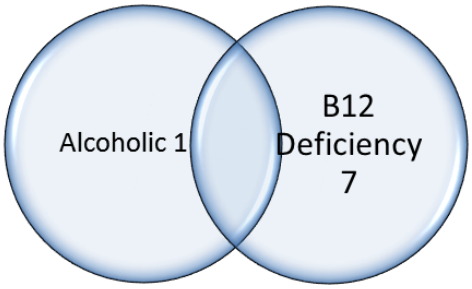
Age Wise Distribution

The Findings of this study have been grouped according to their broad Etio-pathological Diagnosis for Ease of understanding and analysis.

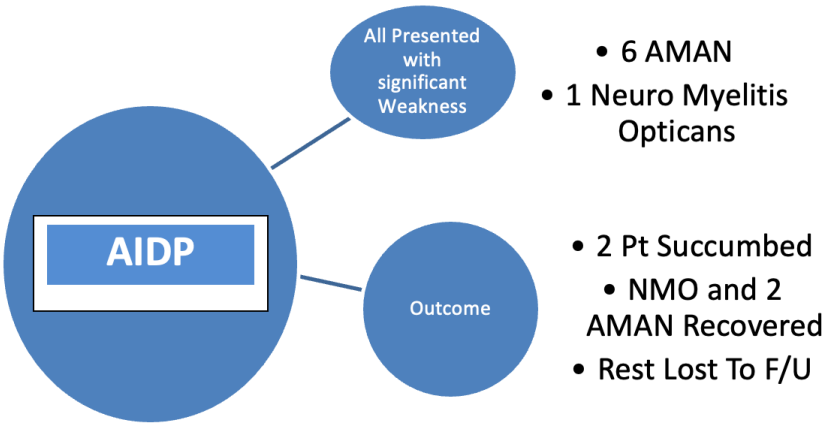
The Diabetics



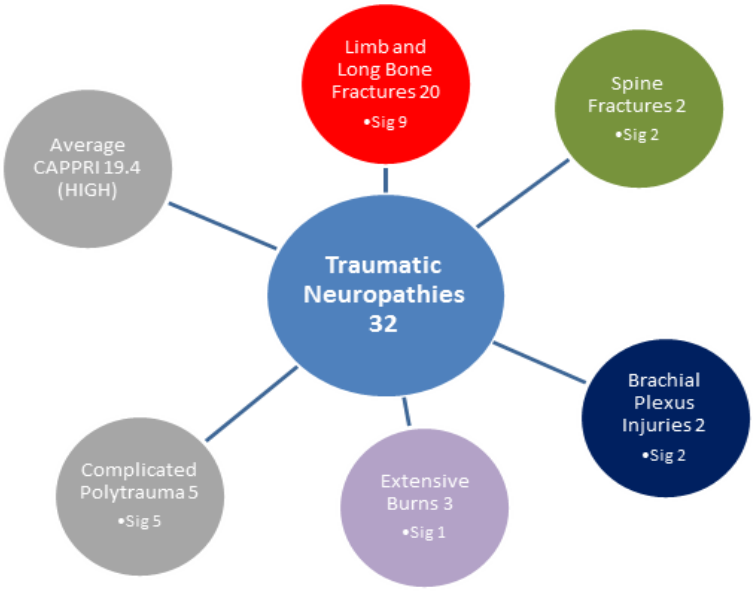




Acute Inflammatory Demyelinating Polyneuropathy

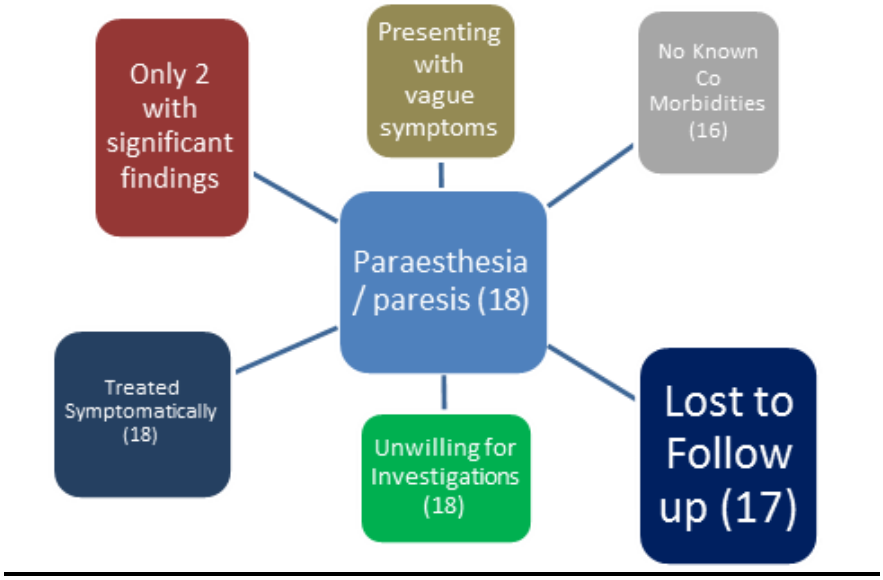


Trauma



Carpal Tunnel Syndrome	3 Patients in total of which 2 had significant neuropathy
Other significant Causes with	Myasthenia Gravis (1)
	Psychosomatic (Known Psychiatric illness) (1)
	Cerebral Palsy (1)
	Invasive Cervical Carcinoma (Ref from ENT) (1)
	Birth Injury (1)
	Post Spinal Anaesthesia Paraesthesia (1)

The Unknown



Discussion

The Patients

It is important to mention that all the patients in this study were advised EDx studies for a variety of reasons, of which the aetiology or differential was not always clear in the mind. This resulted in the addition of many confounding reports as a patient referred for paraesthesia may not have been evaluated for the cause before being advised an EDx study to "see what they get". This led to a few patients being undiagnosed and under evaluated.

A few of the patients included in the study were referred from Civil Hospital, with already diagnosed disabilities. Their studies were needed to certify their disability, and added a valuable insight to the study.

Data Comparison and Analysis

The data from our major etiopathological diagnoses are being compared to pre-existing data in the form of prevalence.

Diabetes:

Compared to a study in Mangalore by Bansal et al (4), who had an average prevalence of 29.2% (Divided into Mild, Moderate and Severe) with a range of 9.2 to 50 depending on age groups, our study is compared below. [12]

Prevalence	Bansal Et al.	Study
	29.2	27.2

B12 Deficiency

This study gave a prevalence rate of 4.2 percent.

It is important to mention that there are no large scale international studies for B12 related neuropathy alone, but there are many correlating a relative B12 deficiency with diabetes and metformin use, with a definite correlation.

Thus it is not uncommon to see b12 supplements being prescribed to diabetics with paraesthesia. [5]

Trauma

The Prevalence, Degree and Relative Disability caused by Traumatic Neuropathy depends on a wide number of factors Specific to Region and Socio-economic state.

Being a Tertiary care hospital we are referred a variety of complicated polytrauma cases along with Chemical and Thermal burns and Spine injuries.

Though a number of EDx studies were carried out for medico legal reasons in cases of RTA or Burns to Prove Grievous Hurt, their findings remain valuable to our study

nonetheless. A number of International Studies are available for comparison.

Out of the total of 32 patients who presented with symptoms of neuropathy post trauma, 19 of them had significant findings. They were further classified depending on broad subtypes, (table below)

Subtype	Total	Significant	Percentage of subset	Percentage of Total (32)
Limb and Long Bone (RTA)	20	9	45	28.1
Spine	2	2	100	6.2
Brachial Plexus	2	2	100	6.2
Burns	3	1	33.33	3.12

An International study from Turkey of 802 patients of traumatic neuropathies showed the commonest cause to be obstetric with 46.7%, iatrogenic with 16.9% and Road traffic accidents with 26.9%. [6]

This is in similar to our study but with a much higher rate of 43.7 % of Road Traffic accidents with limb and long bone fractures and high energy complicated polytrauma. Though Multifactorial, a reason for this could be the lower index of suspicion and low prioritization in cases of polytrauma along with a delay in referral to a tertiary care center, but further research is warranted.

Acute Inflammatory Demyelinating Polneuropathy: 7 patients presented with AIDP, of which 6 were classified as suffering from Acute motor axonal neuropathy (AMAN) and 1 diagnosed to have NMO (Neuro-myelitis Opticans) 4 of these patients required ventilatory support and 2 of them succumbed. 5 Recovered of which 2 have documented NCV findings.

All of them had significant EDx findings and the study was essential for the diagnosis of the same.

Conclusion and Summary:

Presenting as a wide variety of complaints, aches and pains, Neuropathy is a challenge to diagnose even with the most modern facilities. It requires a high index of suspicion, intelligent approach and a keen eye for supportive signs. EDx studies are no doubt helpful to diagnose these disorders but a skilled operator is essential to improve its diagnostic significance.

Through this study we can draw the following conclusions-

- Neuropathy is widely prevalent in our country and has many causes, each with its own variable prevalence rate and socio-economic factors.
- The most common cause found in our study and worldwide is Diabetes Mellitus and the prevalence rate from our study fits on the broad spectrum of our national average.
- Dietary deficiencies are an important cause of neuropathy and should not be overlooked in patients especially with co morbidities.
- Traumatic Neuropathies have with a higher rate of significant damage to nerves and result in more disabling and debilitating Neuropathies.

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