**International Journal of Health Services Research and Policy**
www.dergipark.org.tr/ijhsrp

**IJHSRP**

e-ISSN: 2602-3482

Research Article

# ELECTRODIAGNOSTIC STUDIES IN GERIATRIC PATIENTS

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***Abstract:*** *In this study, we evaluated the neurophysiologic examinations of elderly patients admitted to our electroneuromyography (ENMG) laboratory to examine whether neuromuscular diseases vary with age as in many other diseases. ENMG examinations of 215 patients aged 65 years and older who applied to our ENMG laboratory in the last 3 years were retrospectively evaluated. Data of 79 males (36.7%) and 136 females (63.3%) with a mean age of 73.2±7.02 years were analyzed. The most common diagnoses in elderly patients were entrapment neuropathies (37.2%), followed by carpal tunnel syndrome. The other main pathologies were various peripheral nerve lesions (15.8%), polyneuropathy (14.9%) and radiculopathy (13%). Electrodiagnostic examinations were normal in 16.4% of the cases. In our patients over 65 years of age, the most common electrodiagnostic diagnosis of carpal tunnel syndrome was bilateral (74.6%). Diabetes mellitus was diagnosed in a significant proportion of patients with polyneuropathy. The rate of chemotherapy-induced polyneuropathy was also remarkable. Sciatic nerve damage was the most common peripheral nerve lesion. It is thought-provoking that these rates are still observed even though it is a well-known injection complication and despite all precautions taken. Early diagnosis of neuromuscular diseases and timely initiation of treatment are very important for prognosis. Electrodiagnostic examinations have a valuable role in the diagnosis and follow-up of these diseases. These diseases should not be ignored in the elderly population and the importance of early diagnosis and treatment should always be considered.*

***Keywords:*** *Electroneuromyography, geriatrics, neuropathy*

*Received: May 5, 2024* *Accepted:June 29, 2024*

## 1. Introduction

Older age is a period of increased risk of many diseases and often presents additional challenges in diagnosis and treatment. As the proportion of elderly people in developed and developing societies increases due to developments in medicine, science and technology, and as the elderly age group brings with it special problems, the approach to the health problems of the elderly and the solution of these problems are gaining increasing importance in the medical world, and physicians are devoting an increasing amount of their time to their diagnosis and treatment. The spectrum of neuromuscular diseases seen in older ages also differs from the younger age group [1]. For example, the incidence of entrapment neuropathies, peripheral neuropathies and motor neuron diseases is reported to increase with age. Diseases such as diabetes mellitus (DM), cancer, etc., which have effects on the peripheral nervous system and muscles and whose frequency increases with age, are thought to contribute to this increase [2].

Electroneurophysiologic examinations have an important place in the diagnosis of various neuromuscular diseases and are frequently used for diagnosis in the elderly. Electrodiagnostic tests,

including nerve conduction studies and needle electromyography, is a method used to measure the electrical activity of the peripheral nervous system, which is considered an extension of neurological examination, and to evaluate neuropathies [3]. Electromyography (EMG) is detected in only a few patients with normal neurological examination. EMG also may reveal dysfunction of peripheral nerves or muscles [4, 5]. In this study, we aimed to evaluate the distribution of neuropathic diseases in the geriatric population by analyzing the results of nerve conduction studies and needle EMG in elderly individuals referred to our electroneuromyography (ENMG) laboratory.

## 2. Materials and Methods

### 2.1. Research Design and Participants

In this descriptive study, we retrospectively evaluated the electroneurophysiologic examinations and results of 215 patients aged 65 years and older who applied to the electroneurophysiology laboratory of our clinic between 2021 and 2024.

### 2.2. Data Collection

Data were collected by the researcher. Age, gender, neurologic examination findings, etiologic causes (traffic accident, work accident, gunshot or sharps injury, trauma) were recorded. All electrophysiologic examinations were performed using the Dantec Keypoint ENMG device and standard techniques. Normal values were based on age groups [6].

### 2.3. Statistical analysis

Data were processed using the Statistical Package for Social Sciences software (SPSS, Chicago, II) version 22.0 and the statistical significance level was set at 0.05.

### 2.4. Ethical considerations

Data collection was started with the permission of the Scientific Research and Ethical Committee of Inönü University (approval number 2024/6015). The study was carried out in accordance with the Helsinki Declaration.

## 3. Results

A total of 215 patients aged 65 years and older who applied to our electrophysiology laboratory in the last 3 years were included in the study. Electroneurophysiologic examinations performed in 79 male (36.7%) and 136 female (63.3%) patients with a mean age of 73.2±7.02 years were retrospectively analyzed.

The most common diagnosis was entrapment neuropathies in 80 cases, 67 of which had carpal tunnel syndrome (CTS). Nine cases had entrapment of the ulnar nerve at the elbow (cubital tunnel syndrome) (3 cases with CTS and 1 case with tarsal tunnel syndrome), while tarsal tunnel syndrome was diagnosed in 4 cases. Most of the cases with CTS (50 cases, 74.6%) had bilateral involvement, 10 cases had right-sided involvement and 7 had left-sided involvement, with a male/female ratio of 4.1. Of the 9 patients diagnosed with ulnar nerve neuropathy at the elbow, 5 had right, 3 had left and 1 had bilateral involvement.

34 patients had various peripheral nerve lesions (Figure 1). Peripheral nerve lesions varied according to etiology. 11 patients had sciatic nerve lesions and 8 of them developed after intramuscular injection in the hip region. The second most common brachial plexus lesion was due to traffic accident in 5 cases and cancer invasion in 4 cases. All other peripheral nerve lesions had a history of trauma (traffic accident, gunshot injury, etc.) (Figure 2).

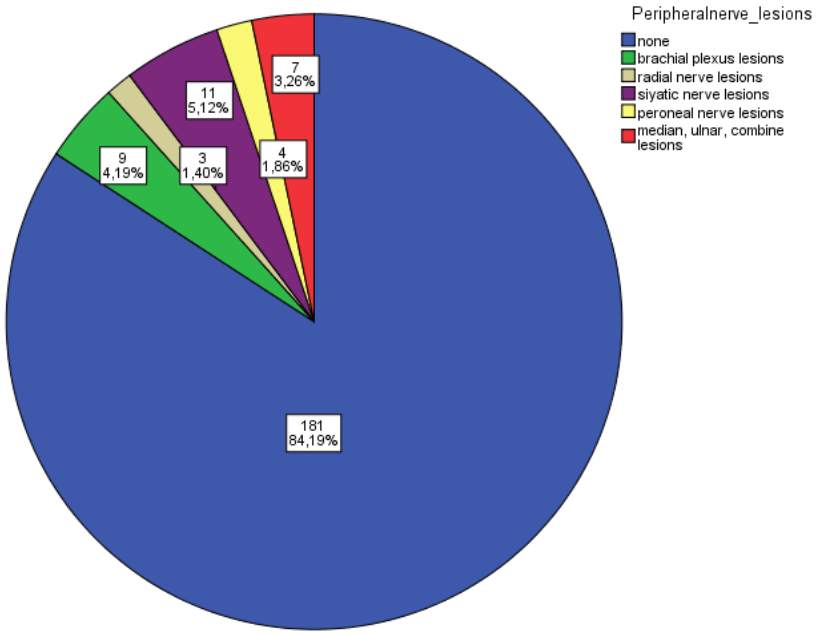


**Figure 1.** Peripheral nerve lesions frequency according to age

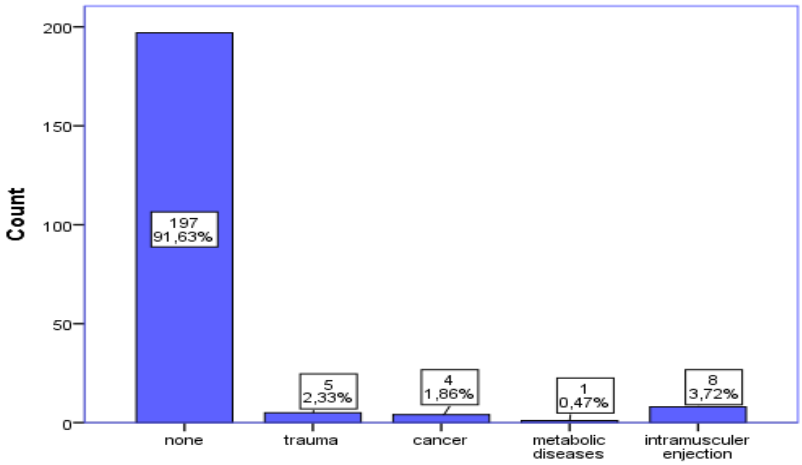


**Figure 2.** Etiology of peripheral nerve lesions

Polyneuropathy was diagnosed in 32 of all cases. Diabetes mellitus was present in 15 of these cases, paraneoplastic syndrome/chemotherapy-related side effects in 11 cases and severe vitamin B12 deficiency in 2 cases. Polyneuropathy was diagnosed in three patients who presented with clubfoot. Radiculopathy was found in 28 patients. Of these, 17 had lumbar radiculopathy and 2 had cervical radiculopathy (Table 1).

**Table 1.** Distribution of diagnoses according to ENMG results

| Diagnosis | n (%) | M/F |
|---|---|---|
| Entrapment Neuropathies | 80 (%37,2) | 13/67 |
| Carpal tunnel syndrome | 67 | 12/55 |
| Cubital tunnel syndrome | 9 | 1/8 |
| Tarsal tunnel syndrome | 4 | 0/4 |
| Peripheral Nerve Lesions | 34 (%15,8) | 27/7 |
| Sciatic nerve lesion | 11 | 4/7 |
| Brachial plexus lesion | 9 | 9/0 |
| Radial nerve lesion | 3 | 3/0 |
| Peroneal nerve lesion | 4 | 4/0 |
| Median nerve lesion | 7 | 7/0 |
| Polyneuropathy | 32 (%14,9) | 9/23 |
| Radiculopathy | 28 (%13) | 18/10 |
| Normal Findings | 44 (%20,5) | 16/28 |

Enmg: Electroneuromyography, M: Male, F: Female.

## 4. Discussion

The characteristics of patients referred for electrodiagnostic examination may vary according to the characteristics of the laboratory, the referring departments and the physicians' knowledge of electrodiagnosis. Our electrodiagnosis laboratory, which operates within the Physical Medicine and Rehabilitation Clinic of our tertiary care hospital, which is a reference center, receives patient referrals from all departments, especially neurosurgery, orthopedics and plastic surgery departments.

A heterogeneous group of focal neuropathies is defined by entrapment neuropathies. These are the most common neuropathies [7]. Symptoms such as pain and paresthesia occur due to compression of the peripheral nerve [8]. In our study, we observed that the rate of CTS was higher than the other diagnoses in accordance with the literature. CTS is the most common entrapment neuropathy. It is a syndrome with a prevalence of 3% in the general population, 5-15% in industrialized societies, and more common in women than in men [9, 10]. In our study, the rate of CTS was found to be higher than other neuropathies (31.1%). CTS was bilateral in most of the cases. Various studies have reported that the rate of bilateral CTS is up to 85% clinically and 50% electrophysiologically [11]. The high rate we found in our study is a finding indicating that the bilateral incidence of CTS is significantly increased in the geriatric population.

Peripheral nerve lesions are a heterogeneous group of disorders that occur due to many different causes. Electrophysiological studies have an important role in patients with peripheral nerve injury [12]. In our study, we observed that peripheral nerve lesions due to traumatic causes were lower in elderly patients. Here, the excess of injection-related sciatic nerve lesions is a remarkable finding. In previous studies, more sciatic nerve damage was observed in men than in women in patients over 60 years of age [13]. Despite all the precautions taken and information given to healthcare personnel about injection-induced sciatic nerve neuropathy, this complication still occurs. This risk should be kept in mind when recommending and performing gluteal intramuscular injection in the elderly population, especially in patients with low body mass index [14]. In other peripheral nerve lesions (median, radial, ulnar, etc.) the diagnosis should be made as early as possible. Because the earlier the surgical treatment, the better the recovery and functional outcome [15].

Of the 215 elderly patients who underwent electrodiagnostic examinations, 43 (20%) were diagnosed with diabetes mellitus. Polyneuropathy was present in 28 of these patients. It is known that the prevalence of DM increases in the elderly and can reach up to 40% over the age of 65 [16]. More

frequent referral of these cases to electrodiagnostic laboratories will allow early diagnosis of this disease that can cause neuropathy.

The etiology of polyneuropathies is very heterogeneous. Diabetes mellitus, alcohol use, genetics, nutrition disorders, drug toxicity, autoimmunity, infection, malignancy, and older age are some examples [17, 18]. When we looked at the etiology of polyneuropathy patients in our study, we observed that 11 patients had chemotherapy-induced polyneuropathy. These patients had mostly lower extremity involvement and axonal damage findings in which sensory fibers were affected. It also involved mostly the lower extremities. Since sensory fibers are mainly affected by chemotherapy, complaints such as paresthesia, numbness and pain occur [19]. The patients in our study had similar findings in accordance with the literature.

## 5. Conclusion

In our study, we can say that the disease profile in geriatric patients referred to our electroneuromyography laboratory in our Physical Medicine and Rehabilitation clinic did not show a significant difference when all age groups were evaluated together and was consistent with the literature. Considering that neuropathies are more difficult to treat and have a worse prognosis in elderly patients, we would like to emphasize the importance of early electrodiagnostic studies for diagnosis.

### Limitations of the study

The major limitation of our study is that it is a single-center study.

### Ethical Statement

The study was carried out in accordance with the Helsinki Declaration and approved by the Scientific Research and Ethical Committee of Inönü University with the number 2024/6015.

### Conflict of interest

No potential conflict of interest was reported by the author.

### Authors' Contributions

S.A: Conceptualization, idea concept, literature review, data collection, data analysis, findings, writing up the original draft, critical review.

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