



# The rate of locomotor system disability in patients undergoing electroneuromyography

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## Abstract

**Aim:** It was aimed to evaluate the characteristics of the patients who were referred to our electroneuromyography (ENMG) Laboratory to evaluate the rate of locomotor system disability from the Disabled Health Board (DMB).

**Materials and Methods:** Patients aged 18 years and over who applied to our hospital's DMB in the last three years (01.01.2019-31.12.2021) and were referred to the ENMG Laboratory to determine the disability rates related to the locomotor system were included. With the retrospective analysis, demographic characteristics of the patients, ambulatory levels, etiological factors, reasons for applying to the ENMG Laboratory, and diagnoses in ENMG reports were noted.

**Results:** Files of 1306 patients were reviewed, ENMG was performed in 139 (10.64%). The mean age was 45.34±12.2 years. One-hundred and eleven (79.9%) patients were male and 28 (20.21%) were female. Eighteen (12.9%) of the patients needed an assistive walking device. The most common etiological factors in locomotor system disability was disc herniation in 24 (17.2%) patients. The most common preliminary diagnosis was peripheral nerve injury in 67 (48.2%) patients. Peripheral nerve injury was the most frequently reported pathology in ENMG reports with 52 (37.4%) patients. While the ENMG report of 26 (18.7%) patients was normal; entrapment neuropathy was found in 14 (10.1%) patients, polyneuropathy in 10 (7.2%) patients, plexopathy in 8 (5.8%) patients, and cranial neuropathy in 1 (0.7%) patient.

**Conclusion:** Peripheral nerve injuries are the most common pathology in both preliminary diagnosis and ENMG reports. ENMG provides information such as the location and the severity of the lesion, so electrodiagnostic tests are very important in the evaluation of locomotor system disability.

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## Introduction

Disability is defined as the need for protection, care, rehabilitation, and support services, difficulty in adapting to social life, and difficulty in meeting daily needs, due to the loss of physical, mental, sensory, spiritual, and social abilities, whether congenital or acquired [1,2]. According to the World Health Organization (WHO), 10% of the population in the developed countries and 12% in the developing countries consists of individuals with disabilities. In our country, many patients apply to Disabled Medical Boards (DMB) in various hospitals in order to attain their social rights. In disability, not only the individual but also the society is affected in many ways. Therefore, disability information in a population reveals many parameters [3].

The most common reason for admission of patients to DMB is locomotor system diseases. Physical Medicine and Rehabilitation (PMR) physicians, who frequently deal with the disabled patient group and contribute to increasing the functional capacity of these patients, are among the physicians who make the most detailed evaluations in the DMB [4].

In the literature, there are studies revealing the rates of neurologic disability and locomotor system disability in patients applying to DMB, and studies examining Forensic Medicine cases applying to the electroneuromyography ENMG Laboratory [2-8].

While electrodiagnostic studies in the evaluation of locomotor disorders are very important in terms of accuracy and reliability of DMB reports, there was no study that investigated the disability assessment from an electrodiagnostic perspective. In this study, we aimed to retrospectively examine the locomotor system disability rates

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of patients evaluated in our ENMG laboratory affiliated to our PMR Clinic in the last three years.

**Materials and Methods**

Patients aged  $\geq 18$  years who applied to our hospital DMB within the last three years (01.01.2019-31.12.2021) and were referred to our ENMG Laboratory to determine the disability related to the locomotor system were included in the study. With the retrospective examination, demographic characteristics of the patients such as age, gender, nationality, year of admission, ambulatory levels, etiological factors, the reason for referral to the ENMG Laboratory, and diagnoses in ENMG reports were noted. Files of patients under the age of 18 and patients with missing information were not included in the study.

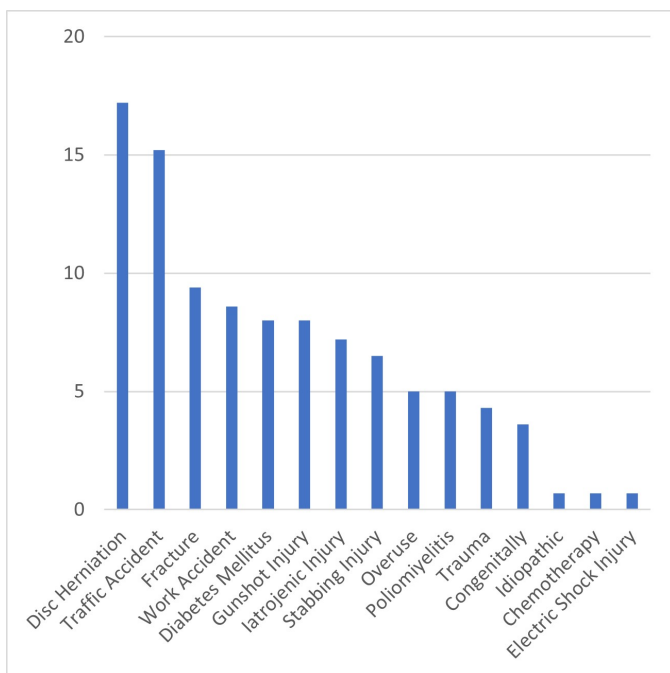
This study was carried out with the permission of Health Sciences University Dışkapı Yıldırım Beyazıt Education and Research Hospital Local Ethics Committee (Date: 21.03.2022, Decision No: 133/5) and it was conducted in accordance with the principles of the Declaration of Helsinki.

*Statistical analysis*

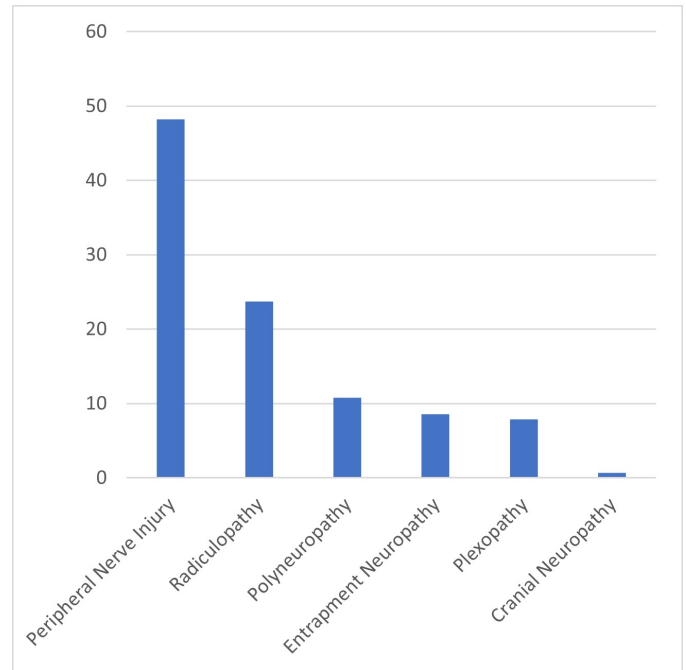
All data were analyzed using the Statistical Package for Social Science Windows version (SPSS) 22.00 program. Descriptive statistical methods (mean, standard deviation, percentage) were used in the evaluation of the data.

**Results**

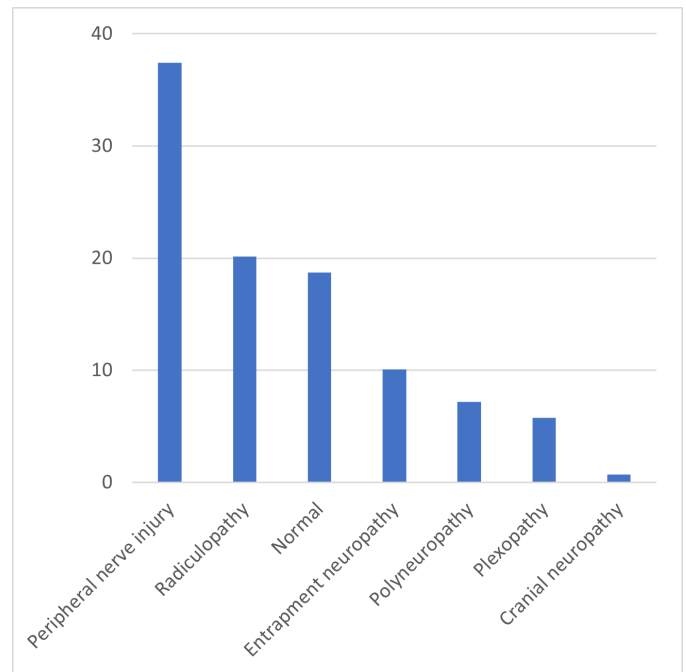
The number of patients admitted to DMB in our hospital in the last three years was 1,306. ENMG was performed to 139 (10.64%) of these patients. The mean age of the patients referred to the ENMG Laboratory was  $45.34 \pm 12.2$  years. 111 (79.9%) of the patients were male and 28 (20.21%) were female. While 123 of the patients



**Figure 1.** Etiologic factors that can cause disability.



**Figure 2.** Preliminary diagnoses.



**Figure 3.** Electroneuromyography reports.

were citizens of the Republic of Turkey, 16 (11.5%) were foreign nationals. 45 (32.4%) of the patients applied in 2019, 28 (20.1%) in 2020, and 66 (47.5%) in 2021. While 121 (87.1%) of the patients were ambulated independently, 18 (12.9%) of them needed the support of assistive walking devices such as canadian or walker. The demographic characteristics of the patients are given in Table 1.

The etiological factors in locomotor system disability were disc herniations in 24 (17.2%) patients, traffic accidents in 21 (15.1%) patients, fractures in 13 (9.4%) patients, work accidents in 12 (8.6%) patients, Diabetes Mellitus in 11 (8%) patients, gunshot injuries in 11 (8%) patients,

**Table 1.** Demographic data of patients.

n=139		
Age (years) mean± SS		45.34±12.21
Gender n(%)	Male	111 (79.9)
	Female	28 (20.1)
Nationality n(%)	Republic of Turkey	123 (88.5)
	Foreign	16 (11.5)
Year of Admission n(%)	2019	45 (32.4)
	2020	28 (20.1)
	2021	66 (47.5)
Ambulatory Levels	Independent	121 (87.1)
	Ambulation with assistive walking device	18 (12.9)

iatrogenic injuries in 10 (7.2%) patients, and stabbing injuries in 9 (6.5%) patients. Other causes were overuse in 7 (5%) patients, poliomyelitis in 7 (5%) patients, trauma in 6 (4.3%) patients, congenitally in 5 (3.6%) patients, chemotherapy in 1 (0.7%) patient, and electric shock injury in 1 (0.7%) patient and idiopathic in 1 (0.7%) patient. Etiological factors and the pathologies they cause are listed in Figure 1 and Table 2.

The preliminary diagnoses are peripheral nerve injury in 67 (48.2%) patients, radiculopathy in 33 (23.7%) patients, polyneuropathy in 15 (10.8%) patients, entrapment neuropathy in 12 (8.6%) patients, plexopathy in 11 (7.9%) patients, and cranial neuropathy in 1 (0.7%) patient. Peripheral nerve injury was the most frequently reported pathology in ENMG reports with 52 (37.4%) patients; radiculopathy was in second with 28 (20.1%) patients. While the ENMG report of 26 (18.7%) patients was reported as “normal”; entrapment neuropathy was found in 14 (10.1%) patients, polyneuropathy in 10 (7.2%) patients, plexopathy in 8 (5.8%) patients, and cranial neuropathy in 1 (0.7%) patient. The preliminary diagnoses and ENMG reports of the patients are given in Figure 2, Figure 3, and Table 3.

**Discussion**

Disability is an important health problem in our country as well as all over the world. According to a bulletin published in March 2021 in our country, the number of surviving disabled people registered in the National Disability Data System is approximately 2.5 million [8]. According to 2020 Turkey statistical data, 15.3% of the society in our country consists of disabled individuals [9]. In several studies examining the locomotor inadequacies of patients admitted to DMD, the mean age of the patients was found to be 60.7±20.4 and 49.6±26 [4,6].

In our study, the mean age was 45.34±12.21. The difference in the number of patients in the studies may be effective in obtaining different results. While 79.9% of the patients referred to the ENMG Laboratory in our study were male, the rate of locomotor disease in the two studies evaluating the locomotor system disability rates of the patients applying to DMB was 37.5% and 54.4%, respectively [4,6]. In another study evaluating the forensic medicine cases admitted to the ENMG Laboratory, the male rate

was found to be 84.3%. These differences may be due to the fact that conditions such as stabbing injuries, traffic accidents, gunshot injuries, work accidents, and electric shock injuries, which may lead to a referral to the ENMG Laboratory, are more common in males. In the study of Terzi et al., the most common locomotor system pathology was osteoarthritis among 672 patients, peripheral nerve injury was ranked 6th, and vertebral disc pathologies were ranked 11th [6].

**Table 2.** Electroneuromyography reports according to the etiologies of the patients.

Etiology n=139	N (%)	Electroneuromyography Report	
Disc Herniation	24 (17.2)	Radiculopathy	22 (91.7)
		Normal	2 (8.3)
Traffic Accident	21 (15.1)	Peripheral nerve injury	11 (52.4)
		Plexopathy	3 (14.3)
		Radiculopathy	1 (4.8)
		Normal	6 (28.6)
Fracture	13 (9.4)	Peripheral nerve injury	7 (53.8)
		Entrapment neuropathy	2 (15.4)
		Normal	4 (30.8)
Work Accident	12 (8.6)	Peripheral nerve injury	7 (58.3)
		Entrapment neuropathy	1 (8.3)
		Radiculopathy	1 (8.3)
		Entrapment neuropathy and Peripheral nerve injury	1 (8.3)
		Normal	2 (16.7)
Diabetes Mellitus	11 (8)	Polyneuropathy	8 (72.7)
		Entrapment neuropathy	1 (9.1)
		Normal	2 (18.2)
Gunshot Injury	11 (8)	Peripheral nerve injury	7 (63.7)
		Plexopathy	1 (9)
		Normal	3 (27.3)
Iatrogenic Injury	10 (7.2)	Peripheral nerve injury	8 (80)
		Entrapment neuropathy	1 (10)
		Radiculopathy	1 (10)
Stabbing Injury	9 (6.5)	Peripheral nerve injury	7 (71.8)
		Polyneuropathy	1 (11.1)
		Normal	1 (11.1)
Overuse	7 (5.0)	Entrapment neuropathy	7 (100)
Poliomyelitis	7 (5.0)	Radiculopathy	7 (100)
Trauma	6 (4.3)	Peripheral nerve injury	3 (50)
		Plexopathy	1 (16.7)
		Radiculopathy	1 (16.7)
		Normal	1 (16.7)
Congenitally	5 (3.6)	Plexopathy	2 (40)
		Radiculopathy	2 (40)
		Plexopathy and Hereditary polyneuropathy	1 (20)
		Idiopathic	1 (0.7)
Chemotherapy	1 (0.7)	Polyneuropathy	1 (100)
Electric Shock Injury	1 (0.7)	Normal	1 (100)

**Table 3.** Electroneuromyography reports According to preliminary diagnoses of patients.

Preliminary Diagnosis n=139	N (%)	Electroneuromyography Report	N (%)
Peripheral Nerve Injury	67 (48.2)	Peripheral nerve injury	50 (74.6)
		Normal	13 (19.4)
		Entrapment neuropathy	2 (3)
		Radiculopathy	1 (1.5)
		Polyneuropathy	1 (1.5)
Radiculopathy	33 (23.7)	Radiculopathy	25 (75.8)
		Normal	4 (12.1)
		Entrapment neuropathy	2 (6.1)
		Peripheral nerve injury	2 (6.1)
Polyneuropathy	15 (10.8)	Polyneuropathy	9 (60.0)
		Normal	4 (26.7)
		Entrapment neuropathy	2 (13.3)
Entrapment Neuropathy	12 (8.6)	Entrapment neuropathy	8 (66.7)
		Normal	4 (33.3)
Plexopathy	11 (7.9)	Plexopathy	8 (72.7)
		Radiculopathy	2 (18.2)
		Normal	1 (9.1)
Cranial Neuropathy	1 (0.7)	Cranial neuropathy	1 (100)

On the other hand, we only examined patients referred to the ENMG Laboratory and found that disc hernias were the leading etiological factors and peripheral nerve injury was the most reported pathology. Differences in study designs may have contributed to the different results. People with disabilities apply to the DMB to use various rights (such as disability detection, tax relief, home care, to retire from disability). It has been shown in various studies that the most frequently observed pathologies in patients applying to DMB are musculoskeletal pathologies. This rate was 29.6% in the study of Terzi et al.; 62.18% in the study of Sarı İF et al., and 37% in the study of Benli et al. [6,8,10]. These studies are important since the most important disability that affects the individual's independence/partially dependent/full dependency is due to musculoskeletal pathologies. In our study, all patients were referred to the ENMG Laboratory due to musculoskeletal pathologies. This study is important because it is the first study to look at locomotor system disability from the ENMG perspective. We think that we have seen our place in applying electrodiagnostic methods when calculating the rate of locomotor system disability by making pre-diagnosis-definite diagnosis comparisons. On the other hand, our study has some limitations. First, the number of applications to DMB may have been affected due to the SARS-CoV-2 pandemic experienced all over the world and in our country during the research process. In addition, our hospital is not the only hospital in Ankara that evaluates DMB. In this respect, it may not fully reflect the epidemiological data on disability in the city.

### Conclusion

PMR physicians are among the physicians who frequently deal with the disabled patient group and contribute to the rehabilitation and functional capacities of these patients. Electrodiagnostic studies are frequently used in

the evaluation of locomotor disorders. We think that the data obtained in our study will contribute to the detection of pathologies affecting the locomotor system, which are common and frequently causing disability, to control the modifiable risk factors that may cause these pathologies, and to identify the obstacles caused by these pathologies. These data on disabled individuals can also be effective in reintegrating them into society and increasing their quality of life.

### Ethical approval

This study was carried out with the permission of Health Sciences University Dışkapı Yıldırım Beyazıt Education and Research Hospital Local Ethics Committee (Date: 21.03.2022, Decision No: 133/5).

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