

CHARACTERISTICS OF ENMG EXAMINATION IN MORBUS HANSEN PATIENT IN NEUROLOGY POLYCLINIC SANGLAH GENERAL HOSPITAL

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ABSTRACT Background: Morbus Hansen (MH) is one of the leading causes of nontraumatic neuropathy which manifests clinically as lesions on the skin and peripheral nerves. Electroneuromyography (ENMG) tests can help to assess the severity and prognosis of neuropathy in Morbus Hansen patients. **Methods:** This was a retrospective descriptive study using data taken from the medical records of Morbus Hansen's patients who performed an electromyography examination at the Sanglah General Hospital Polyclinic from February 2019 to March 2020. An ENMG examination was performed to every Morbus Hansen patient to assessed the distal latency, amplitude, and nerve conductivity at the peripheral nerve from all four extremities. **Results:** We found the number of Morbus Hansen multibacillary type in both women and men were the same. Disturbances of a sural sensory nerve and peroneus motor nerve conduction were the most common. **Conclusions:** Majority of Morbus Hansen patients had abnormal ENMG results. Patients with MH should undergo an ENMG examination at the early onset of the disease to detect asymptomatic neuropathy, to reduce the severity and progression of the disease.

KEYWORDS Morbus Hansen, ENMG, Distal Latency, Nerve conduction

Introduction

Morbus Hansen (MH) or Leprosy is a granulomatous infection of the skin and peripheral nerves caused by *Mycobacterium leprae* (*M. leprae*). This bacteria is unique because it attacks the peripheral nerves, which cause impaired sensory, motor, and autonomic nerve function. Damage to the nerves can cause disabilities that affect the quality of life of patients and cause bad stigma in the community. [1-3]

One of the characteristics of peripheral nerve involvement due to *Mycobacterium leprae* infection is the enlargement of peripheral nerve with a viz pattern (maximal thickening in the superficial, and stopping when the nerve enters the fascia).

The presence of inter funicular plexus in the peripheral nerve could cause damage in the sensory nerve. Inflammatory cells in *M.leprae*-infected sensory nerve can be observed under a microscope.[1]

This demyelinating process caused damage to the myelin sheath, which is located between two Ranvier nodes, causing a delay in nerve conduction. Loss of myelin continuously will cause damage to the axons. This demyelinating process cause numbness, tingling, and weakness of the muscles in the nerve area affected [2,3]

The neuropathy process can also be axonal. This neuropathy process causes the neuron to loses its axons, the connection between nerve fibers with sensory nerve receptors and motor nerves is disturbed, causing no response from sensory and motor nerves. Loss of axons in one area will cause myelin degeneration in other areas nearby the axon loss area. Clinically, axonal neuropathy progressing slowly, characterized by loss of sensory perception, no tendon reflexes, impaired balance, weakness, and muscle atrophy in the affected area.[2,3] The neuropathy can occur mixed between axonal and demyelinating. It generally begins with myelin damage as a primary lesion, then continues

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Table 1 Characteristics of Subject Research.

No	Variable	Total n=21 (%)
1	Age (years)	
	17-25	1 (4,7%)
	26-35	3 (14%)
	36-45	3 (14%)
	56-65	9 (42%)
2	Sex	
	Male	11 (52%)
	Female	10 (48%)
3	MH Type	
	Multibasiler	16 (76%)
	Pausibasiler	5 (24%)

Table 2 ENMG Examination In MH Patients.

No	Variable	Total n=21 (%)
1	Distal Latency	
	Normal	2 (14,3%)
	Abnormal	18 (85,7%)
2	Amplitude	
	Normal	2 (9,6%)
	Abnormal	19 (90,4%)
3	Nerve Conductivity	
	Normal	5 (23,8%)
	Abnormal	16 (61,9%)

to axonal loss as a secondary lesion.[3]

Neuropathy in leprosy involving the sensory, motor, and autonomic nervous system, which will manifest if the damage has occurred more than 30% of nerve fibers.[3] Peripheral neuropathy in leprosy can be confirmed by electroneuromyography (ENMG). ENMG examination is useful for identifying mononeuropathy, polyneuropathy, axonal neuropathy, demyelinating neuropathy, or mixed neuropathy. ENMG can confirm the diagnose of neuropathy and detect the involvement of damaged nerves earlier so the leprosy defects can be minimized.[4]

Methods

This was a retrospective descriptive study using data taken from the medical records of Morbus Hansen's patients who performed an electromyography examination at the Sanglah General Hospital Polyclinic from February 2019 to March 2020. An ENMG examination was performed to every Morbus Hansen patient to assessed the distal latency, amplitude, and nerve conductivity at the peripheral nerve from all four extremities. ENMG examination includes the sensory examination, including the radial, median, ulnar and sural nerves. Whereas motor examination, including the radial nerve, median, ulnar, peroneus, and tibialis.

Results

This research was conducted in February 2019 to March 2020 in the Neurology Polyclinic at Sanglah Hospital by involving 21 subjects who met the criteria. Data on the characteristics of research subjects, including gender, age, type of leprosy, is presented in table 1.

Gender distribution in this study found that male was not much different compared to female, each as many as 11 people (52%) and 10 people (48%). The age characteristics of the study subjects showed that the youngest age was 21 years, and the oldest age was 60 years. The average age of the study subjects was 39 years, with the most age group was the age of 46-55 years as many as 9 people (42%), and the least was the age over 17-25 years of 1 person (4.7%). Based on the type of leprosy, the multibacillary was the most type with a total of 16 people (76%), and the rest was the paucibacillary type as many as 5 people (24%).

From the ENMG examination, the distal latency examination found abnormalities in 18 people (85.7%). The lengthening or the absence of the distal latency response mostly were found in the tibial CMAP of the right limb by 16 people (76%), followed by the right radial CMAP by 15 people (71%), and the left radial CMAP by 13 people (61%). While on amplitude examination, as many as 20 people (95%) experienced a decrease or no amplitude response. The most disturbing nerves were in the right peroneus by 17 people (80.5%), followed by the left median by 15 people (71%), and the left peroneus by 13 people (61%).

Also, 16 people (61.9%) of the total sample experienced impaired nerve conductivity velocity. On nerve velocity examination, the most affected nerve was left tibial nerve by 11 people (52%), followed by left median and right tibialis, 10 people each (47%).

Discussion

Neuropathy in leprosy involves the sensory, motor, and autonomic nervous system, which will provide clinical manifestations if nerve damage is attacking more than 30% of nerve fibers. Peripheral neuropathy in leprosy can be confirmed by

electroneuromyography (ENMG). ENMG examination is useful for identifying mononeuropathy, polyneuropathy, axonal neuropathy, demyelinating neuropathy, or mixed neuropathy. ENMG can confirm the diagnose of neuropathy and detect the involvement of damaged nerves earlier so the leprosy defects can be minimized.[4]

The age characteristics of the study subjects showed that the youngest age was 21 years, and the oldest age was 60 years. The average age of the study subjects was 39 years, with the most age group was the age of 46-55 years as many as 9 people (42%). Productive age is the age of a person having a social relationship and higher activity compared to the non-productive age so that the productive age is more prone to infected to leprosy. Also, the incubation period of *M. leprae* is 3-10 years, with the most prolonged period of up to 30 years. Thus, infected individuals from an early age will show clinical manifestations in young adulthood or productive age. [5]

In this study, based on the type of leprosy, it was found that the multibacillary was the most type, as many as 16 people (76%), and the rest was the paucibacillary type of 5 people (24%). In the epidemiology study of leprosy in Indonesia by WHO in 2015, it was reported that multibacillary leprosy was 83.4% of all new leprosy cases. This is related to the high transmission of multibacillary type leprosy (WHO, 2015). In a study in Brazil, multibacillary cases of leprosy increased with age. About 10% of multibacillary type leprosy was identified before the age of 10 years and increased to more than 50% in patients aged >60 years. In addition, the number of lesions >5 is one of the diagnostic criteria for multibacillary type leprosy, and patients tend to go to a health center when the number of skin lesions is significant, that is why multibacillary type of leprosy is more easily detected in the community compared to paucibacillary type leprosy.

All patients with multibacillary type MH had abnormal ENMG. Only 1 patient with paucibacillary type MH had normal ENMG results. We found 20 patients (95.2%) had abnormalities on ENMG result. 4 patients with demyelinating type polyneuropathy (19%), 7 patients with axonal type polyneuropathy (33.3%), and 9 patients with mixed type polyneuropathy (42.8%). The most common nerve involved were the tibial, median, and peroneus nerve. In the nested case-control study conducted by Lima, examining 166 neuropathy leprosy patients using ENMG. It was reported that 128 patients showed sensory nerve abnormalities or sensory nerve action potential (SNAP). And motor nerves or compound muscle action potential (CMAP) on the ENMG examination showed mononeuropathy (31.3%), multiple mononeuropathy (47.7%), and polyneuropathy (4.7%). The nerves that involved were ulnar nerve (40.3%), fibularis nerve (30.7%), sural nerve (30.1%), posterior tibial nerve (27.1%), median nerve (22.8%), and radial nerves (7.8%).[7]

Conclusion

This study showed that the majority of Morbus Hansen patients had abnormal ENMG results. With mixed type polyneuropathy as the most common, followed by the axonal and demyelinating type. The most affected age group was the productive age, which would affect the quality of life of the patient and their families. The most affected nerve distribution was the tibial nerve, followed by the median nerve and peroneus nerve. Patients with MH should undergo an ENMG examination at the early onset of the disease to detect asymptomatic neuropathy, to reduce the severity and progression of the disease.

Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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