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Frequently Thickened Nerve in Hansen's Disease

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Authors' contributions

This work was carried out in collaboration between both authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Leprosy by definition is a chronic granulomatous infection of the skin and superficial nerves in the skin caused by Mycobacterium leprae and Mycobacterium lepromatosis. [1] It most commonly involves the nose, eyes, throat, and sometimes the testicles. The bacilli are most frequently transmitted via droplets, from the nose during close contact with untreated cases of leprosy. Leprosy was first mentioned in 700BC. Leprosy is common in tropical and subtropical Asia, some Pacific countries, Africa, and South America [2]. It is not known how leprosy is transmitted. Although skin lesions and nerve thickening manifest together, they also appear as separate entities. This study aims to find out the frequently thickened nerves in different spectrums of Hansen's disease.
Objectives: To determine the frequently thickened nerves in different spectrums of Hansen's disease.
Methods: This descriptive study was conducted in Chettinad Hospital and the Research Institute from June 2021 to August 2021. The patients were biopsy-proven Hansen's disease in a different spectrum of the disease, nerve thickening was obtained using palpation method. The Sample size was small due to the prevailing covid situation at the period during which the study was conducted.
Results: The data collected from the examination of the different spectrum of disease, the pattern of frequently thickened nerves were evaluated. A total number of 30 patients were examined by palpation method among which 10 patients showed ulnar nerve thickening,7 patients showed greater auricular nerve thickening, 4 patients showed radial cutaneous nerve thickening, 9 patients

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showed sural nerve thickening.
Conclusion: In our study, the most common thickened nerve was the ulnar nerve, secondary to that was the sural nerve. This study concludes the only examination done by palpation method, further diagnostic studies might increase the accuracy and specificity of the above-collected data.

Keywords: Hansen's disease; Nerve involvement; Mycobacterium leprae; Multibacillary.

1. INTRODUCTION

Hansen's disease (also known as leprosy) is a chronic granulomatous infection caused by slow-onset and late-maturing bacteria called Mycobacterium leprae and Mycobacterium lepromatosis. It mostly affects the nerves, skin, eyes, and lining of the nasal mucosa and sometimes the testicles [1]. Leprosy is common in parts of tropical and subtropical Asia, Africa, Central, and South America, Pacific countries [2]. Though the mode of transmission is not completely understood the bacilli attack the peripheral nerves due to their high affinity and can maintain their viability for 8 months [3]. This can cause the affected areas to lose the ability to sense touch and pain, which can lead to injuries, like cuts and burns [4].

It is thought that leprosy is spread from person to person or through close contact in which respiratory droplets expelled from the nose and mouth when an infected person coughs or sneezes is transmitted to another person [5]. In cases of leprosy in the Pediatric age group under one year of age, the infection may have been transmitted from the mother via the placenta during intrauterine life. Leprosy is highly contagious [6]. The incubation period is thought to be from nine months to over 20 years.

Although skin lesions and nerve thickening manifest together, they can also appear as separate entities. This study aims to determine the frequently thickened nerve in all spectrums of Hansen's disease.

Nerve association is evident in the early stages of leprosy, which can manifest as numbness for which the patient goes to a physician and can be measured through the general decrease in sensation of the lesions found all over the body. Lowering injury to peripheral nerves is of utmost importance and proper investigation of these nerves is paramount to evaluation and approach to the correct diagnosis.

The onset of neuropathy is associated with loss of sensory perception, Paraesthesia with numbness in extremities but in some cases, pain arises as well later on in the path of the disease. [Fig.1][7]. In individuals with the tuberculoid spectrum of disease, depending on the nerves located around the areas of the skin lesion, potential sensory and motor loss could occur. In cases involving lepromatous disease, the damage is more generalized and not specific to one dermatome.

The commonly affected nerves include the ulnar, median nerves, the peroneal nerve, posterior tibial nerve, facial nerve, and the great auricular nerve and the severity of the disease depends on the level of nerve involvement [8].

The patients in the acquired sample size were mainly out-patients, and almost entirely self-reporting, apart from a small number, perhaps 10 percent of the total cases were from Chettinad Hospital and Research Institute who was found to have leprosy as a result of the biopsy and slit skin smear. Table.1.Depicts the Ridley Jopling & WHO Classification upon which the patients are diagnosed.

In India, the number of nerves involved, along with the number of skin lesions, is taken into consideration in the classification of leprosy into PB and MB cases [9]. Subclinical neuropathy seems to be increasingly involved than originally anticipated [10]. Therefore, this study was done to assess the frequently thickened nerve in Hansen's disease.

2. MATERIALS AND METHODS

During the 3 months study from June 2021 to August of 2021, a total of 30 patients were selected who were primarily out-patients, and almost entirely self-reporting, apart from a small number, perhaps 10 percent of the total cases were taken up for the study.

These patients were screened at the outpatient department of Dermatology, Venereology & Leprosy by the principal investigator with detailed clinical assessments were carried out and all the patients were slit skin smear and biopsy-proven criteria were included in the study.

Table 1. Ridley Jopling & WHO classification

Ridley Jopling Classification (1996)	WHO Classification (1981)
Tuberculoid leprosy (TT)	Paucibacillary leprosy
Borderline Tuberculoid (BT)	Up to 5 skin lesions SSS negative on all sites
Borderline borderline (BB)	Multibacillary leprosy
Borderline lepromatous (BL)	6 or more skin lesions
lepromatous leprosy (LL)	SSS positive at any site

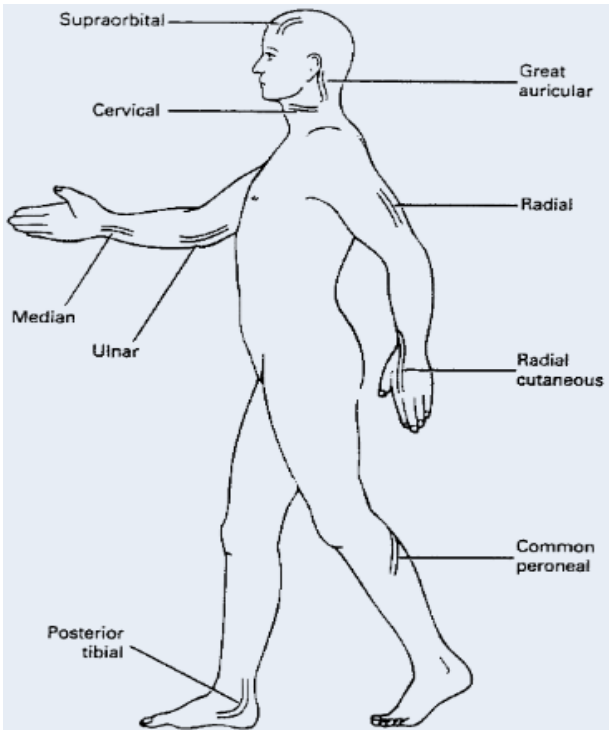

Fig. 1.The commonly involved nerves in a leprosy patient.

The patients were examined using the palpation method by the principal investigator to find the frequently involved nerve thickening, examination of nerves with any degree of enlargement was considered as a "nerve lesion".

2.1 Statistical Analysis

- The total sample size was 30. In which 9 cases were Tuberculoid (TT),8 were Borderline-Tuberculoid (BT), 6 were Borderline (BB), 3 were Borderline-Lepromatous (BL),4 were Lepromatous (LL).
- The diagnosis was achieved by a slit skin smear from bilateral ear lobes and a biopsy taken from the appropriate lesion.
- Only 3 out of 30 patients had slit skin smear and biopsy done in the Chettinad Hospital & Research Institute, other outpatients had already been slit skin and biopsy-proven leprosy cases from previous institutions.
- Pregnant women and geriatric patients were excluded from the selected sample.
- Defaulters and previously treated leprosy patients were excluded from the study.

Table 2. Spectrum of patients reviewed

Type of Leprosy	Number of Patients
Tuberculoid (TT)	9
Borderline-Tuberculoid (BT)	8
Borderline (BB)	6
Borderline-Lepromatous (BL)	3
Lepromatous (LL)	4

Fig. 2. Depicts downgrading borderline leprosy and median nerve examination

3. RESULTS

The data collected from the examination of the different spectrum of disease, the pattern of frequently thickened nerves were evaluated.Fig. 2. A total number of 30 patients were examined by palpation method by the principal investigator among which 10 patients showed Ulnar nerve thickening,7 patients showed greater auricular nerve thickening, 4 patients showed radial cutaneous nerve thickening, 9 patients showed sural nerve thickening.

Table 3. Frequently thickened Nerve

Ulnar Nerve	10
Greater auricular nerve	7
Radial cutaneous nerve	4
Sural nerve	9

4. DISCUSSION

The study was conducted with slit skin smear and biopsy-proven leprosy cases as the gold standard for the sample selection. Apart from this Palpation method was used by the principal investigator for clinical assessment to find out the frequently thickened nerve and to indirectly find any correlations between the nerve and type of leprosy.

The different clinical types of leprosy are under host response. The pathogenesis of nerve injury is due to localization of the M. leprae to Schwan cell infection in the nerve and axonal atrophy, accompanied by edema and characteristic inflammation. Mononeuritis is the most common manifestation of leprosy, and the nerves in the upper limbs are more commonly involved than those in the lower.

The most commonly involved nerves are the ulnar, median, posterior auricular, superficial radial, common fibular, superficial fibular, and posterior tibial. The inflammatory process causes an increase in nerve thickness size. They become usually enlarged and painful upon palpation [11].

The palpation method of nerve examination is an effective way of finding nerve thickness in leprosy patients, in our study of 30 patients 10 exhibited ulnar nerve thickening, which begs the question does the location and proximity to joints play a crucial role for the bacilli to inhabit the superficial nerves in particular affinity.

Neurological involvement is present throughout every spectrum of leprosy, some authors postulate that leprosy should be regarded as a chronic neurologic condition rather than a dermatological disease.

2. CONCLUSION

The findings of this report concluding the frequently thickened nerves were recorded during the first visit for evaluation and treatment. The point of concern about the invasion of nerves by Mycobacterium leprae in particular to superficial nerves needs to be further evaluated.

The point of interest from this study concerns the classification of those patients, who were worst affected neurologically. The present data, taken from the experience of one investigator only.

Further study with ultrasonography for evaluation of peripheral neuropathy could bring in more depth to as why the bacilli prefer superficial nerves.

ETHICAL APPROVAL

This project was found to be under the ethical principles and the national norms and standards for conducting Medical Research in India and approved by the research ethics committee.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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