ORIGINAL RESEARCH

Analysis of Histopathological Spectrum of Leprosy Patients: An Institutional Based Study

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ABSTRACT

Background: Leprosy (Hansen's disease) is caused by infection of susceptible individuals with acid-fast bacilli (AFB) of the Mycobacterium leprae complex (M. leprae and M. lepromatosis). Hence, the present was undertaken to analyzethe histopathological spectrum of leprosy patients.**Materials &Methods:**A total of 100 patients clinically diagnosed with leprosy were included in this study, all of whom underwent skin biopsy. The study materials comprised skin biopsies from individuals confirmed to have leprosy. Following processing, serial sections of the biopsy specimens were prepared, stained with Hematoxylin and Eosin for morphological evaluation, and subjected to Ziehl-Neelsen staining for bacilli identification. Histopathological characteristics were recorded, and the diagnosis of leprosy was confirmed and classified according to the Ridley and Jopling classification system.**Results:** Among the 100 patients evaluated, histopathological spectrum showed that lepromatous and tuberculoid type were seen in 31 percent and 25 percent of the patients respectively. Borderline tuberculoid and Borderline lepromatous type were seen in 18 percent and 13 percent of the patients respectively. Intermediate type, Histoid type and Erythema nodosum leprosum type were seen in 6 percent, 5 percent and 2 percent of the patients respectively. There were 59 males and 41 females. The mean age of the patients was 45.9 years. Non-significant results were obtained while correlating the histopathological types with age-wise and gender-wise distribution. **Conclusion:**It is essential to establish a correlation among clinical, histopathological, and bacteriological characteristics for the accurate diagnosis and classification of leprosy.

Keywords: Leprosy, Hansen' disease.

INTRODUCTION

Leprosy (Hansen's disease) is caused by infection of susceptible individuals with acid-fast bacilli (AFB) of the Mycobacterium leprae complex (M. leprae and M. lepromatosis). M. leprae are slow growing organisms that replicate preferentially in macrophages, endothelial cells, and Schwann cells. They are obligate intracellular organisms and do not grow in artificial media cultures. M. lepromatosis is more recently described as an etiologic agent, though its clinical course may be indistinguishable from infection caused by M. leprae.[1-3] Humans are the primary vector for M. leprae. In the Americas the nine-banded armadillo (Dasypusnovemcinctus) is recognized as a zoonotic reservoir for the bacteria.3 Like humans, armadillos can develop the full clinical presentation of leprosy including extensive peripheral nerve involvement.[4]

Patients with a strong cell-mediated immune reaction had few lesions with low or undetectable mycobacteria and were classified as having tuberculoid forms, whereas patients anergic to M. leprae had multiple lesions with higher loads of mycobacteria and were classified as having lepromatous forms. Where an affected person falls within the classification model depends on their immune response.[5]Leprosy reactions are caused by an immune response between the host and M. leprae. Leprosy reactions are an important consequence of permanent nerve damage during leprosy. Leprosy reactions include acute/subacute inflammatory processes that mainly involve skin and nerves and are

the primary cause of morbidity and neurological disability. They may occur regularly at any stage of the disease, even without treatment.[6] Hence; under the light of above-mentioned data, the present was undertaken to analyzethe histopathological spectrum of leprosy patients.

MATERIALS & METHODS

A total of 100 patients clinically diagnosed with leprosy were included in this study, all of whom underwent skin biopsy. The study materials comprised skin biopsies from individuals confirmed to have leprosy. Comprehensive demographic and clinical information for each participant was collected. Biopsies were obtained from representative lesions and transported to the histopathology laboratory in glass or plastic vials containing formalin solution. Detailed examination findings, including the signs and symptoms of the skin lesions as well as provisional clinical diagnoses, were documented. Gross examinations of the biopsies were conducted, focusing on overall appearance and size. Following processing, serial sections of the biopsy specimens were prepared, stained with Hematoxylin and Eosin for morphological evaluation, and subjected to Ziehl-Neelsen staining for bacilli identification. Histopathological characteristics were recorded, and the diagnosis of leprosy was confirmed and classified according to the Ridley and Jopling classification system. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

Among the 100 patients evaluated, histopathological spectrum showed that lepromatous and tuberculoid type were seen in 31 percent and 25 percent of the patients respectively. Borderline tuberculoid and Borderline lepromatous type were seen in 18 percent and 13 percent of the patients respectively. Intermediate type, Histoid type and Erythema nodosum leprosum type were seen in 6 percent, 5 percent and 2 percent of the patients respectively. There were 59 males and 41 females. The mean age of the patients was 45.9 years. Non-significant results were obtained while correlating the histopathological types with age-wise and gender-wise distribution.

Table 1: Histopathological spectrum

Type	Number	Percentage
Lepromatous	31	31
Tuberculoid	25	25
Borderline tuberculoid	18	18
Borderline lepromatous	13	13
Intermediate	6	6
Histoid	5	5
Erythema nodosum leprosum	2	2
Total	100	100

Table 2: Correaltion of gender-wise distribution with histopathological type

Type	Males	Females	Total
Lepromatous	17	14	31
Tuberculoid	15	10	25
Borderline tuberculoid	10	8	18
Borderline lepromatous	8	5	13
Intermediate	4	2	6
Histoid	3	2	5
Erythema nodosum leprosum	2	0	2
Total	59	41	100
p-value	0.227		

Table 3: Correaltion of age-wise distribution with histopathological type

Type	Age more than 40 years	Age less than 40 years	Total
Lepromatous	20	11	31
Tuberculoid	14	11	25
Borderline tuberculoid	8	10	18
Borderline lepromatous	5	8	13
Intermediate	3	3	6
Histoid	2	3	5
Erythema nodosum leprosum	1	1	2
Total	53	47	100
p-value	0.753		

DISCUSSION

Leprosy is a contagious infection that is caused by Mycobacterium leprae. The disease causes damage to the affected area by targeting the peripheral nerves, which results in the swelling of the affected area. The infection commonly targets the nerves, eyes, skin, and mucosal lining. Thus, the affected area will lose the ability to be sensitive to pain and touch, putting the patient at risk for injuries such as cuts and burns, which can lead to infection. M. leprae is a pathogen that has adapted to a specific environment. Mycobacterium leprae is an intracellular organism that targets nerves and results in clinical symptoms of leprosy. It is weakly acid-fast and has undergone significant genome reduction, leaving it with the smallest genome among mycobacteria and many non-functional pseudogenes.[5- 7]

Clinically, multibacillary lepromatous variants are distinguished from paucibacillary tuberculoid forms. Apart from the various characteristic skin lesions, the condition is marked by damage to the peripheral nervous system. Advanced disease is characterized by disfiguring mutilations. Current treatment options are based on WHO recommendations. Early treatment frequently results in complete remission without sequelae. While paucibacillary forms are treated with rifampicin and dapsone for at least six months, multibacillary leprosy is treated for at least twelve months, additionally requiring clofazimine. Leprosy reactions during therapy considerably aggravate the disease course.[7- 9]Hence; under the light of above-mentioned data, the present study was undertaken to analyzethe histopathological spectrum of leprosy patients.

Among the 100 patients evaluated, histopathological spectrum showed that lepromatous and tuberculoid type were seen in 31 percent and 25 percent of the patients respectively. Borderline tuberculoid and Borderline lepromatous type were seen in 18 percent and 13 percent of the patients respectively. Intermediate type, Histoid type and Erythema nodosum leprosum type were seen in 6 percent, 5 percent and 2 percent of the patients respectively. There were 59 males and 41 females. The mean age of the patients was 45.9 years. Non-significant results were obtained while correlating the histopathological types with age-wise and gender-wise distribution. In a similar study conducted by Patel et al, authors evaluated the importance of skin biopsy as an important diagnostic and spectrum defining tool. They evaluated 113 clinically diagnosed cases of leprosy. Skin biopsies were received, processed and stained by H & E stain followed by Fite-faraco method to classify histopathological types of leprosy. A total 113 cases were studied out of them 73.45% were male and 26.54% were female. Majority of them, 32% belonged to 21 -30 years age group. Lepromatous leprosy was noted maximum in 35.39% cases.[10] Semwal et al performed clinico-histological correlation of skin lesions in all patients with a clinical suspicion of Hansen's disease. Hematoxylin and eosin and Fite-Faraco stained sections of all cases were examined. Corresponding slit-skin smears, if available, were also reviewed. During the study, a total of 116 cases were clinically diagnosed as Hansen's disease. Clinico-histological correlation was obtained in 62.9% of the cases (73/116). The most common histological subtype of Hansen's disease was borderline tuberculoid (TT) (40/116). Seven cases were diagnosed as lepromatous leprosy, five as TT, four as histoid, one as indeterminate, and three cases diagnosed as erythema nodosum leprosum. Fite-Faraco stain was positive in 33/73 cases. Out of 116 cases, slit-skin smears were available for 43 cases and were positive in 23 cases.[11]

As summarized by Naik et al, Histopathologically, Leprosy was classified by Ridley and Jopling in 1960 into five types: Tuberculoid (TT), Borderline Tuberculoid (BT), Mid Borderline (BB), Borderline Lepromatous (BL), and Lepromatous Leprosy (LL).[7] Based on the number of acid-fast bacilli, it is subdivided and expressed on a logarithmic scale by the Bacillary Index (BI). The clinical diagnosis depends on the appearance of the lesions, but it has limitations. The histopathological diagnosis and classification are based on well-defined criteria. It also takes the immunological manifestations of the disease into account.[12] Moorthy BN et al, in another previous studyconducted histopathological correlation of skin biopsies in 372 leprosy patients with clinical diagnosis using Ridley Jopling classification. There was agreement in 62.63% of cases. The correlation was highest in LL (80%) followed by Bl. (70%), BT (66.34%), BB (50%) and TT (46.15%). The other interesting observation was that the number of IL cases diagnosed histopathologically were more when compared to that made clinically.[13] Atram et al in a similar type of research, studied the clinicohistopathological correlation of all suspected cases of Hansen's disease. A retrospective study was conducted on 207 skin biopsies obtained from patients clinically diagnosed as new lesion of leprosy. The male-to-female ratio was 1.5:1. The agreement between histopathological and clinical diagnoses was more than 90% in all the subclasses except for borderline tuberculoid leprosy (BT) and tuberculoid leprosy (TT) which showed an agreement of 86.5% and 88.4%, respectively. The sensitivity of clinical diagnosis ranged from 69.70% for indeterminate to 100% for histoid and neuritic types. The specificity ranged from 90% for BT and TT to 100% for neuritic leprosy.[14]

CONCLUSION

The clinical identification of early leprosy lesions poses significant challenges, even for seasoned dermatologists, due to the varying clinicopathological manifestations that depend on the immune status of the host. Consequently, it is essential to establish a correlation among clinical, histopathological, and

bacteriological characteristics for the accurate diagnosis and classification of leprosy. Given that nerve damage is irreversible, prompt detection and intervention are crucial to avert further disabilities.

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