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ORIGINAL RESEARCH

Changing trends of leprosy in the posteradication era – clinicomorphological assesment

[1]Dr. Shalini Suman, [2]Dr. Nausheen Sanaaullah Khan, [3]Dr. Pradeep Tandon, [4]Dr. Deepti Gangwar, [5]Dr. Bushra Khanam

[1,5]Post Graduate Resident, [2]Associate Professor, [3]Professor & Head, [4]Assistant Professor, Department of Pathology, Integral Institute of Medical Sciences and Research, Lucknow, Uttar Pradesh, India

Corresponding Author
Dr. Shalini Suman
Post Graduate Resident, Department of Pathology, Integral Institute of Medical Sciences and Research, Lucknow, Uttar Pradesh, India

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Abstract

Background: Mycobacterium leprae is the causative agent of leprosy known since ancient times, a chronic granulomatous infectious illness that mostly affects the skin and peripheral nerves. Leprosy's clinical symptoms vary and might resemble a number of different skin conditions. Therefore, histological analysis is crucial for early diagnosis and treatment.

Materials and methods: This study is a hospital based cross-sectional study carried out in the Department of Pathology of Integral Institute of Medical Sciences and Research, Hospital, Lucknow. The institutional ethical committee approved the study. From September 2020 to September 2021, skin biopsies from 66 patients who had leprosy lesions that were newly identified and untreated were included.

Results: The results showed the distribution of patients according to demographic profile. It was seen that most of the patients were males (74.2%) between 31-40 years (39.3%) age group and 92.4% patients had no family history of leprosy. It was found that 53% patients had BT (borderline tuberculoid leprosy) followed by 21.2% who had LL (lepromatous leprosy) and the least patients (3%) had BB (mid-borderline) and IL (indeterminate lepromatous). Association of clinical type with age and gender was clinically insignificant.

Conclusion: Clinico-histopathological correlation of leprosy cases plays a crucial role in early diagnosis and accurate case detection. Combining clinical parameters, slit smear analysis, histological features, and bacillary index can improve the diagnostic accuracy.

Keywords: Clinicohistopathological Correlation, Leprosy, Bacillary Index

Introduction

Mycobacterium leprae, an uncultivable pathogen, is the cause of the chronic granulomatous infectious illness leprosy. [1] Despite the fact that the prevalence of Hansen's disease (HD) has significantly decreased since the middle of the 1980s to levels that are close to extinction, new cases continue to appear in some Southeast Asian nations, particularly India and Indonesia, indicating ongoing transmission.[2,3] Leprosy is challenging to clinically diagnose in the early stages due to its clinical diversity and capacity to resemble other skin disorders.[4] Thus, early diagnosis, classification, and treatment to avert permanent nerve injury and severe morbidity depend on histological analysis of skin biopsies.

Ridley-Jopling classification divides it to form a disease spectrum. They are 1. Tuberculoid (TT) 2. Borderline tuberculoid (BT) 3. Borderline (BB) 4. Borderline lepromatous (BL) 5. Lepromatous (LL). Diagnosis of leprosy is based on- different clinical parameters, demonstration of acid-fast bacilli in slit skin smears, good histopathological diagnosis and demonstration of bacilli in histopathological sections [5].

While histopathological classifications are highly defined and contain immunological aspects, clinical categorization primarily recognises the physical appearance of the lesions [6]. Variations in the clinical presentation of the disease and the histological analysis of skin biopsies have been noted [7].

Therefore, the present study was carried out to correlate histological diagnosis of skin biopsies of new and untreated leprosy cases with clinical diagnosis using Ridley Jopling classification.

Materials and methods

This study is a hospital based cross-sectional study carried out in the Department of Pathology of Integral Institute of Medical Sciences and Research, Lucknow. The institutional ethical committee approved the study. From September 2020 to September 2021, skin biopsies from 66 patients who had leprosy lesions that were newly identified and clinically untreated were included.

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Patient records were analysed for demographic, clinical information and histopathology data. Age, sex, location, lesion type, and deformity were all observed clinically. The disease was categorised both clinically and histopathologically using the Ridley-Jopling criterion.

Haematoxylin Eosin and Fite's stains were used on paraffin sections of biopsies. Stained slides were evaluated, histologically categorised using the Ridley-Jopling scale, and then their results were compared to the clinical diagnosis of the relevant cases. The study also included indeterminate leprosy for analysis purposes.

All newly diagnosed leprosy cases who visited the IIMS&R, Lucknow Dermatology OPD had their skin biopsied. The study excluded relapse cases, old follow-up cases, patients receiving leprosy therapy, insufficient biopsies, and nonspecific biopsies.

Statistical analysis

Data was collected and subjected to statistical analysis using SPSS version 24. Chi square test was used to find out the significant difference. The level of significance (p) was set at <0.05.

Results

The results showed the distribution of patients according to demographic profile. It was seen that most of the patients were males (74.2%) between 31-40 years (39.3%) age group and 92.4% patients had no family history of leprosy (table 1).

Table 1: Distribution of Patients According to the Demographic Profile

	No. (n=66)	%
Age in years		
<20	**6**	**9.0**
20-30	**10**	**15.1**
31-40	**26**	**39.3**
41-50	**9**	**13.6**
>50	**15**	**22.7**
Gender		
Male	**49**	**74.2**
Female	**17**	**25.7**
Family history		
Present	**5**	**7.6**
Absent	**61**	**92.4**

Table 2: Distribution of Patients According to The Clinical Profile of Leprosy

Clinical profile	No. (n=66)	%
TT	**6**	**9.09**
BT	**35**	**53.0**
BB	**2**	**3.0**
BL	**7**	**10.6**
IL	**2**	**3.0**
LL	**14**	**21.2**

Table 2 showed the distribution of patients according to the clinical profile of leprosy. It was found that 53% patients had BT, followed by 21.2% who had LL and the least patients (3%) had BB and IL. There were no significant findings seen when the association of clinical type with age and gender was done (table 3).

Table 3: Association of Concordance with Clinical Type with Age and Gender

Age and gender	Total No. of patients	Concordance with clinical type				p-value
		Present (n=29)		Absent(n=11)		
		No.	%	No.	%	
Age in years						
<20	6	1	50.01	1	50.0	0.64
20-30	10	4	57.1	3	42.9	
31-40	26	13	76.9	4	23.1	
41-50	9	7	85.7	1	14.3	
>50	15	4	66.7	2	33.3	
Gender						
Male	49	21	66.7	10	33.3	0.21
Female	17	8	81.8	1	18.2	

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Table 4: Clinical and histopathological correlation

Clinical Diagnosis	Histopathological Diagnosis						
(Clinically Diagnosed Cases)	TT	BT	BB	BL	LL	IL	% PARITY
TT (6)	3	3	0	0	0	0	50
BT (35)	4	20	7	3	1	0	57.1
BB (2)	0	1	0	1	0	0	0
TL (7)	1	2	1	2	1	0	28.6
LL (14)	0	0	0	2	12	0	85.7
IL (2)	0	1	0	0	0	1	50
Total (66)	8	27	8	8	14	1	

Discussion

Leprosy is a chronic disease of the skin and peripheral nerves that also affects the reticuloendothelial system, the eyes, the bone, the joints, the muscles, the testicles, and the adrenals. It has a variety of clinical symptoms that are connected to host immunological reactions. [1,4,8] Any age group can contract leprosy. [9] In a study done by Kumar et al [10], the majority 101 (23.9%) of the cases belonged to the age group of 21-30 years while in the present study, same was revealed in the age range of 31 to 40 years (39.3%). The variable and protracted incubation period of leprosy is to blame for this age distribution.[9] In this study, the ratio of male to female patients with leprosy was 1.5:1. The predominance of men may be explained by their greater exposure potential as a result of increased job-related mobility.[11] The lower percentage of female patients reporting to the hospital could also be explained by social taboos and conventions. In research by Semwal et al., leprosy was more prevalent in men. [12]

56 patients (68.3%) in Ridley and Jopling's analysis of 82 patients showed perfect concordance between clinical and histological categories [5]. In their investigation, Mathur et al. [13] came to the conclusion that LL and BT had the highest histopathological association. Clinical diagnosis and histological diagnosis are not correlated, according to Shrestha A et al.'s findings [14]. Maximum correlation, according to Ramesh A. et al. [15], was observed in LL, followed by BT.

In our study, the LL case showed the greatest clinicohistopathological agreement. It was higher in our study because LL has a clearer histological diagnosis than other categories because it is a polar type. BT and TT were found to be in the least accord. Some cases that were clinically identified as TT were histopathologically classified as BT, and vice versa. Given that the clinical and histological characteristics of TT and BT overlapped, this shift in one group is understandable. The histological classification of TT and BT is crucial, though, as it informs the treating clinician of the potential for a type 1 reaction, which is frequent in BT patients receiving treatment. [16,17]

IL is an early and transitory stage of leprosy seen in persons whose immunological status is yet to be determined. It has nonspecific histology, so it becomes difficult to diagnose.[9] The definitive diagnosis of IL depends on demonstration of nerve lesions and AFB can be diagnosed even without finding a single bacillus, if clinical and histopathological features are suggestive, especially in endemic areas. [9]

The chronic form of HL is a bacillary-rich leproma made up of spindle-shaped histiocytes with a tendency towards fibromatosis.[18] In India, the incidence is thought to range from 2.79% to 3.60%.[19] It makes up about 2.64% of all leprosy cases in the current study. HL was first identified in individuals receiving insufficient dapsone medication, but HL can occasionally develop spontaneously. [18]

The lengthy incubation period of leprosy, which can last anywhere from a few weeks to 30 years, is what leads to the appearance of new cases in the post-elimination age. The cases look "hidden" as a result, and the numbers cannot fluctuate wildly.[20] The majority of individuals delay seeking medical care until it is too late due to social stigma, as well. [9] Once problems have developed due to nerve damage, social rehabilitation becomes exceedingly difficult. In India, the percentage of Grade 2 disability (G2D) among newly discovered cases has climbed from 3.10% by 2010-2011 to 4.61% in 2014-2015, despite the fact that the worldwide disability rate decreased from 4.5% to 3.8% [2]. The high G2D incidence among new cases suggests that leprosy is being discovered after it has spread and that there may be unrecognised cases in the neighbourhood.[21] Therefore, early detection and treatment of all types of leprosy is important.

Due to the variety of clinical presentations, even for expert dermatologists, the clinical diagnosis of early leprosy lesions is frequently challenging. Therefore, we emphasised the significance of performing a histological study in all clinically suspected instances of HD in order to provide an early diagnosis and start treatment before any disability develops.

Conclusion

Leprosy prevalence was significantly lower in 2020, at 0.23 per 10,000 people worldwide. Despite this, India had more than 50% of the world's leprosy patients, necessitating the identification of the causes of transmission

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and the adoption of preventative measures to manage the illness. Depending on the state of the host immune system, a leprosy patient can exhibit various clinicopathological manifestations. The majority of leprosy lesions are borderline cases, which require extra care because of their erratic immunological conditions. The histological investigation of skin biopsy is advised in all clinically suspected cases of leprosy for correct diagnosis and treatment as well as to prevent nerve damage and long-term disability due to the significant impact of detecting only one new case of leprosy. Leprosy cases' clinico-histopathological correlation plays a crucial part in early diagnosis and accurate case detection. Combining clinical parameters, slit smear analysis, histological features, and bacillary index can improve the correlation's accuracy.

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