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A STUDY ON HISTOPATHOLOGICAL SPECTRUM OF LEPROSY AT A RURAL TERTIARY HOSPITAL OF HARYANA.

Pathology

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ABSTRACT

Background: Leprosy also known as Hansen's disease, is one of the oldest diseases known to mankind. It is an infective skin disease caused by the organism Mycobacteria Leprae. It is a chronic, granulomatous lesion, most commonly affects the skin and peripheral nerves. Although leprosy was eliminated from India in 2006 it continues to become a public health problem in the country. **Aims and Objectives:** To establish the histological diagnosis and to classify the disease into tuberculoid (TT), borderline tuberculoid (BT), mid borderline (BB), borderline lepromatous (BL) and lepromatous leprosy (LL), based on clinical, immunological and histo-morphological factors. **Material and Methods:** It was a retrospective study conducted in the Department of Pathology, SHKMGMC, Nuh, Mewat, Haryana for 2years (Duration: January 2021 to December 2022). All the necessary clinical details of the patient were taken and skin punch biopsies were processed. Microscopic examination using H&E stain and special stain for AFB using 5% sulphuric acid was done for all cases. Histopathological features and the bacteriological status were noted and the diagnosis of leprosy was confirmed and reported according to Ridley and Jopling classification. **Results and Conclusion:** There was marked male predominance and maximum number of cases was seen in the age group of 21-30 years. The most common type seen was lepromatous leprosy followed by tuberculoid leprosy. Clinical diagnosis of early leprosy lesion is quite difficult because of its clinical diversity; hence histological examination of skin lesion should be done in all leprosy cases.

KEYWORDS

Leprosy, Classification of leprosy, Infective skin lesion, Skin biopsy, Histopathology

INTRODUCTION

Leprosy also known as Hansen's disease, is one of the oldest diseases known to mankind. It is an infective skin disease caused by the organism Mycobacteria Leprae. It is a chronic, granulomatous lesion, most commonly affects the skin and peripheral nerves (1,2). Depending upon the host Immunity, it presents in various different clinicopathologic forms. Since ancient times Leprosy is associated with intense social stigma as it causes debilitating physical deformities and has been called Kushtaroga" resulting in discrimination against the patients and their families. India represents 60% prevalence and 75% of new cases worldwide (3). Although leprosy was eliminated from India in 2006 it continues to become a public health problem in the country (4). Leprosy can be classified clinically as well as histopathologically. The Clinical classification describes only the gross appearances of the lesions, while the histopathological classification is precise and it also include the immunological manifestations which enable it to successfully bridge the pitfalls in leprosy diagnosis. Most suspicious cases which can get missed in clinical practice and epidemiological studies, can be confirmed by histopathology. It is considered as a valuable aid to confirm the diagnosis, its various subtypes, prognosis, response to treatment and also for research purpose (4,5). Ridley and Jopling in 1966 laid the criteria for histological typing of leprosy (6).

Aims and Objectives

To establish the histological diagnosis of leprosy and to classify the disease into tuberculoid (TT), borderline tuberculoid (BT), midborderline (BB), borderline lepromatous (BL) and lepromatous leprosy (LL), based on clinical, immunological and histomorphological factors.

MATERIAL AND METHODS:

Place of Study: This study was conducted in the department of Pathology, Shaheed Hasan Khan Mewati Government Medical College, Nuh, Mewat, Haryana.
Study Design: A Retrospective Study.
Study Period: 2years (Duration: January 2021 to December 2022)

Subject Enrolment

Inclusion Criteria: All the skin biopsies that were received for histopathology examination during the study period at Histopathology Section, SHKM Government Medical College, Mewat.
Exclusion Criteria: Inadequate skin biopsies or incomplete history.

Collection of Samples: Clinical details of the patient including age, gender, sites involved were taken from the requisition forms received in the histopathology laboratory.

Methodology

Skin Punch biopsies from department of dermatology were received in 10% buffered formalin and were processed by routine histopathological techniques. All specimens were subjected to gross and microscopic examination. Sections were cut at 4-5 microns and paraffin blocks were made and then stained with H&E stain. Acid Fast Bacilli using 5% sulphuric acid was done for all cases and examined microscopically.

Histopathological features and the bacteriological status were noted and the diagnosis of leprosy was confirmed and classified according to Ridley and Jopling classification. Indeterminate and Cases of Histoid leprosy- a rare variant of lepromatous leprosy was also included in this study.

Statistical Analysis

For statistical analysis, data were entered into a Microsoft Excel spreadsheet and data analysis was performed using Jamovi 2.5.3. The

study primarily employed descriptive statistics and inferential statistical tests. For categorical variables, frequencies and percentages were calculated and presented in distribution tables.

RESULTS

The present study included 60 skin biopsies from the patients who were clinically diagnosed as leprosy from January 2021 to December 2022. In the present study patients ranged from 10 years to 70 years of age. There was marked male predominance in cases diagnosed as leprosy (45 cases, 75%) as compared to females (15 cases, 25%). The male to female ratio was 3:1. Maximum number of cases was seen in the age group of 21-30 years (40%), followed by 31-40 years (26.66%), followed by 41-50 years age group (15%). less numbers of cases seen 11-20 years (11.67%) and 51-60 yrs age group (3.3%). Maximum individual number of female and male patients was between the ages of 21-30 years. Among total 60 skin biopsies, on histopathological examination, the most common type seen was lepromatous leprosy comprised of 24 cases (40%), followed by tuberculoid leprosy with 12 cases (20%). The least common leprosy was histoid leprosy and comprised of 2 cases (3.3%). The most common site involved were forearm (37%), followed by the back (35%). Other sites involved were the face, neck, trunk, foot and buttocks among others.

Ziehl- Nielson staining to identify acid-fast bacilli (AFB) was done in all 60 cases. It was positive in 29(48.33%) of cases. No bacilli were noted in all cases of TT leprosy, whereas 22out of 24 (91.67%) cases of Lepromatous leprosy and all the Histoid types showed presence of acid-fast bacilli. Histological patterns observed in our study were epidermal changes in the form of thinning and atrophy of epidermis followed by normal epidermis. Epithelioid cell granuloma and giant cells were more common towards tuberculoid pole whereas foamy macrophages with clear sub epidermal grenz zone were more common towards lepromatous pole. Mixed inflammatory infiltrate was also observed in almost all of the cases.

Table 1: Age Wise Distribution of Leprosy Lesions

Lesions	10-20 year	21-30 year	31-40 year	41-50 year	51-60 year	61-70 year	Total
Lepromatous Leprosy	4	12	6	2	0	0	24
Tuberculoid Leprosy	1	5	3	2	1	0	12
Borderline Tuberculoid Leprosy	0	2	2	2	1	1	8
Borderline Lepromatous leprosy	1	3	2	3	0	1	10
Indeterminate Leprosy	1	0	3	0	0	0	4
ENL	0	0	0	0	0	0	0
Histoid Leprosy	0	2	0	0	0	0	2
Total	7	24	16	9	2	2	60

Table 2: Sex-Wise Distribution of Leprosy Lesions

Lesions	Male	Female	Total
Lepromatous Leprosy	18	6	24
Tuberculoid Leprosy	10	2	12
Borderline Tuberculoid Leprosy	6	2	8
Borderline Lepromatous leprosy	7	3	10
Indeterminate Leprosy	2	2	4
ENL	0	0	0
Histoid Leprosy	2		2
Total	45	15	60

DISCUSSION

An accurate and early diagnosis of leprosy is fundamental to understanding its epidemiological trends, ensuring timely treatment, and preventing complications such as physical disabilities. Missed or delayed diagnoses may contribute to the ongoing transmission of the disease and cause avoidable suffering. Histopathological evaluation remains a critical diagnostic modality and continues to be considered the gold standard, particularly for confirming clinical suspicion and classifying the disease.

All the cases analysed in this study involved patients who were clinically diagnosed with leprosy. It is important to note that the age at which leprosy is detected does not always reflect the actual age of disease onset, as leprosy can occur across all age groups—from infancy to old age. Therefore, early detection plays a vital role not only in halting disease transmission but also in minimizing disability.

In our research, the Ridley-Jopling classification was applied for histopathological categorization (6). The age group most commonly affected was 21–30 years, accounting for 40% of the cases. These findings are in line with observations from several other studies, including those conducted by S. Shivaani, Mandhar et al., R. Perona et al., Sindhu Shree et al., Maya et al., and P. Chintal et al (5, 7, 8-11). Although a definitive explanation for this age pattern remains elusive, the long and variable incubation period of the disease might partially explain the distribution.

A male predominance was observed in the present study, with males constituting 75% of the cases (a male-to-female ratio of 3:1). This gender distribution is consistent with previous research findings from Vahini et al., Veena et al., Shivani Soni et al., Perona Roy et al., and Sindhu Shree et al., who also reported a higher prevalence in males (ranging from 60% to 97%) (1, 7-9, 12). This disparity may be influenced by factors such as occupational exposure, urbanization, greater social mobility among men, and underreporting or delayed healthcare-seeking among women due to social taboos.

Histopathologically, the most frequently identified subtype was lepromatous leprosy (LL), seen in 40% of cases. Tuberculoid leprosy (TT) was the second most common, identified in 20% of biopsies. Borderline lepromatous (BL) and borderline tuberculoid (BT) subtypes were found in 10 and 8 cases, respectively. Similar patterns have been reported in studies by P. Chinta et al., Bhatia et al., and Agarwal A. et al., where LL was the predominant subtype (11, 13-14). Conversely, studies by Mandhar et al., P. Kumar et al., S. Shivani et al., and S. Shresta et al. reported TT as the most common form (5, 7, 15-16), while Maya et al., Nadia et al., Erbenez et al., and Tiwari M. et al. observed borderline tuberculoid (BT) as the leading subtype (10, 17-19).

This variation in subtype prevalence could be due to several factors, including differences in diagnostic criteria or timing of diagnosis. For instance, early detection may capture more BT lesions, whereas delayed diagnosis might reveal features consistent with the BL or LL spectrum. Additionally, borderline forms of leprosy may exhibit characteristics of both poles—tuberculoid and lepromatous—either within the same tissue section or in different lesions of the same patient, reflecting the immunological instability of these cases. The predominance of LL in our study could be attributed to clearer histopathological criteria and more distinct clinical features at the lepromatous end of the spectrum.

Immunologically, borderline leprosy represents an unstable form that can shift toward either pole—tuberculoid with treatment or lepromatous in the absence of it (8, 9). Public awareness programs may have improved early presentation and diagnosis, leading to an apparent increase in borderline cases (11).

Classifying patients into multibacillary (MB) and paucibacillary (PB) categories is essential, as it determines the appropriate treatment duration. Incorrect classification, especially underestimating a multibacillary case as paucibacillary, can result in inadequate treatment, increased risk of relapse, and prolonged infectivity. In most peripheral and private clinical settings, classification is typically based on lesion count and slit-skin smear results. While the bacteriological index (BI) helps assess bacterial load and immune status, it should not be the sole criterion for classification, as it can vary significantly among subtypes.

In the current study, all patients underwent histopathological evaluation through skin biopsy to ensure accurate classification. Higher BI scores (5+ to 6+) were predominantly observed in histologically confirmed LL and HL types, aligning with results from studies by Chintal et al. and Anusha et al., further emphasizing the utility of biopsy-based diagnosis in clinical settings (11, 20).

CONCLUSION

Leprosy though considered to be eliminated from India, is still prevalent in many areas. Thus, in attempting to eradicate the disease, there is still the necessity to study and research this disease for better understanding the pattern of the disease occurrence and prevalence,

transmission of disease, diagnosis, prophylactic intervention and management. In depth clinico-histopathological studies are still required to reassess clinical findings and histopathologic parameters, in relation to the diagnosis of the different types of leprosy. Clinical diagnosis of early leprosy lesion is quite difficult because of its clinical diversity, hence histological examination of skin lesion should be done in all leprosy cases and to correlate biopsy results with those of clinical diagnosis in order to improve classification and prognosis especially in the current post elimination era. The Ridley-Jopling classification is based on clinical, histopathological, bacteriological and immunological features and it is most helpful for classifying leprosy. Correlation of clinical and histopathological features along with bacteriological index is more useful for accurate typing of leprosy than considering single parameter alone. This helps the clinicians for better care and management of disease and thus to decrease the burden of the disease of the society.

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