Original Research Article

A study of histopathological spectrum of leprosy at tertiary care hospital

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ABSTRACT

Background: Leprosy is one of the oldest and chronic infectious diseases known to human being caused by Mycobacterium leprae. Leprosy has been declared eliminated (prevalence rate<1/10,000. population) as an important public health problem in our country on January 1, 2006, still cases are being reported with varying prevalence throughout many areas in India. Role of histopathological study in clinical suspicious cases are very important and definite diagnosis aids to reach confirmatory diagnosis and its subtypes, prognosis, an assessment or regression of the disease in patients. The present research was taken to evaluate the importance of skin biopsy as important diagnostic and spectrum defining tool.
Aim: To evaluate the importance of skin biopsy in detecting and diagnosing and subtyping of leprosy.
Materials and Methods: This was hospital based retrospective and prospective study of 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.
Results: 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.
Conclusion: Histopathology plays an important role in making definite diagnosis of leprosy.

1. Introduction

Leprosy is one of the most ancient diseases known to mankind. It is a chronic, debilitating, granulomatous disease caused by Mycobacterium leprae principally affecting the cooler parts of the body, mainly skin and peripheral nerves; it also involves muscles, eyes, bones, testis and internal organs.[1] Since ancient times Leprosy is known as "Kushtaroga." The causative agent of leprosy, M. leprae, was discovered in 1873 by Armauer Hansen.[2,3] Even though, it was discovered early, it has not been cultured as yet.

Leprosy has been declared eliminated (prevalence rate<1/10,000. population) as an important public health problem in our country on January 1, 2006, still cases are being reported with varying prevalence throughout many areas in India.[4] India has succeeded in bringing down the prevalence rate to 0.66/10,000 in 2016, despite the above successes, the fact remains that India continues to account for 60% of new cases reportedly globally each year and is among the 22 "global priority countries" that contribute 95% of world numbers of leprosy warranting a sustained effort to bring the numbers down.[5]

Physical disabilities caused by leprosy often evoke severe social stigma that leads to prejudice against patients and their families.[6–8] Hence, for control of communicable disease, identifying and destroying or attacking the causative organism is necessary.[6,8]

Leprosy may presents as an insignificant skin lesion to extensive disease causing profound

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disability/deformities.[9,10] Leprosy mainly affects the skin, causing lesions and anesthesia, along with enlarged and thickened peripheral nerves.[6,10]

The Clinical classification describes only the gross appearances of the lesions, while the criteria used in the histopathological classification are well defined, precise and also take into account the immunological manifestations which enable it to successfully bridge the pitfalls in leprosy diagnosis. Suspicious cases which can be missed in clinical practice and epidemiological studies, can be confirmed histopathologically. It is a valuable aid to reach confirmatory diagnosis and its subtypes, prognosis, an assessment or regression of the disease in patient under treatment and also for research purpose.[3,11]

Precise criteria for histological typing of leprosy was laid down by Ridley and Jopling in 1966.[12] our aim of present study was 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. Indeterminate forms include a type that does not fit into any of five categories. Histoid leprosy is an uncommon type of LL that shows nodules or plaques over apparently normal skin. This article aims to study the various histological types of leprosy in a tertiary care hospital over a period of four years.

2. Materials and Methods

The present study was undertaken to study histomorphological features of skin biopsy specimens from 113 clinically diagnosed leprosy patients in department of Pathology, in a tertiary care hospital over a period of from January 2016 to July 2019 months after obtaining approval of ethical committee of our institute. Materials for the study consisted of skin biopsies received in the department of Pathology obtained from subjects who attended the OPD in Dermatology Department and clinically diagnosed to have leprosy.

All the clinically diagnosed cases of leprosy were included in the study. Cases were selected regardless of their age, sex, religion, occupation and socioeconomic status. Inadequate biopsies, inconclusive reports and poorly preserved biopsy were excluded from study.

2.1. Technique

Biopsies were taken from representative lesions by the Dermatologists and sent to histopathology section in glass or plastic vials containing 10% formalin solution. A detailed clinical history, examination findings indicating signs and symptoms of the skin lesions and provisional clinical diagnosis were collected. Gross examinations of biopsies were done under heads of overall appearance and

size. Biopsies were fixed as early as possible by 10% neutral buffered formalin and processed preferably within 24 hours. Following fixation, the tissues were processed, embedded in paraffin and serial sections of 4-5 microns were obtained, which were stained with Hematoxylin and Eosin for morphological assessment and with Zeihl Neelsen for identification of the bacilli. 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 were also included in this study.

3. Observations and Results

The present study included 113 skin biopsies from the patient who were clinically diagnosed as leprosy from January 2016 to July 2019. In present study patients ranged from 11 years to 70 years of age.

The study shows a marked male predominance in cases diagnosed as leprosy (83 cases, 73.45%) as compared to females (30 cases, 26.54%). The male to female ratio was 2.1:1. Maximum number of cases was seen in the age group of 21-30 years (31.85%), followed by 31-40 years(26.52%), followed by 41-50 years age group(17.69%). less numbers of cases seen 11-20 years (7.07%)and 51-60 yrs age group(7.96%). Maximum individual number of female and male patients was between the ages of 21-30 years.

Among total 113 skin biopsies, on histopathological examination, the most common type seen was lepromatous leprosy comprised of 40 cases (35.58%), followed by tuberculoid leprosy with 21 cases (18.58%) and erythema nodosum leprosum (ENL) diagnosed in 1 case (0.88%).

The most common site was determined to be back (37%), followed by the forearm (31%), the leg (13%). Other sites involved were the face, neck, trunk, foot and buttocks among others.

Fite-Faraco staining to identify acid-fast bacilli (AFB) was done in all 113 cases. It was positive in 52(46%) of cases. No bacilli were noted in all cases of TT leprosy, whereas all cases of LL and Histoid types showed presence of acid-fast bacilli.

Histological patterns observed in our study were epidermal changes in the form of thinning and atrophy, followed by normal epidermis and ulcerative changes. Epitheloid cell granuloma and gaint cells were more common towards tuberculoid pole whereas foamy macrophages with clear sub epidermal grenz zone were more common towards lepromatous pole.

4. Discussion

Accurate diagnosis is very important to study all aspects of leprosy epidemiology, treatment and prevention of physical disability. Under diagnosis will lead to continued

Table 1: Distribution of Lepromatous lesions

Lesions	Male	Female	Total cases
Lepromatous leprosy	30 (26.54%)	10 (8.84%)	40 (35.39%)
Tuberculoid leprosy	14 (12.38%)	7 (6.19%)	21 (18.58%)
Borderline tuberculoid leprosy	14 (12.38%)	2 (1.76%)	16 (14.15%)
Borderline lepromatous leprosy	11 (9.73%)	5 (4.42%)	16 (14.15%)
Indeterminate leprosy	7 (6.19%)	3 (2.65%)	10 (8.84%)
Histoid leprosy	6 (5.30%)	3 (2.65%)	9 (7.96%)
ENL	1 (0.88%)	0	1 (0.88%)
Total	83 (73.45%)	30 (26.54%)	113

Table 2: Age wise distribution of Lepromatous lesions

Lesions	11-20yrs	21-30yrs	31-40yrs	41-50yrs	51-60 yrs	61-70yrs	Total
Lepromatous leprosy	3	15	9	7	1	5	40
Tuberculoid leprosy	2	2	6	6	2	3	21
Borderline tuberculoid leprosy	2	7	5	2	0	0	16
Borderline lepromatous leprosy	0	7	1	2	4	2	16
Indeterminate leprosy	1	0	7	2	0	0	10
ENL	0	0	0	0	1	0	1
Histoid leprosy	0	5	2	1	1	0	9
Total	8 (7.07%)	36(31.85%)	30(26.54%)	20(17.69%)	9(7.96%)	10(8.84%)	113(100%)

Table 3: Distribution of FF stain positivity in individual histological type of leprosy cases

Type of leprosy	Number of Fite-Faraco positive cases	Percentage of
LL	36	100%
BL	6	38%
BT	2	12.5%
TT	0	0%
Histioid	9	100%
Total	53	47%

transmission of disease and much needless sufferings of patients. Histopathological examination continues to be an important tool in accurate diagnosis and classification of leprosy and still remains the gold standard.

During the study period of two years, a total of 586 skin biopsies were received, among which 113 skin biopsies were of leprosy, which constituted (40.08%) of the total skin biopsies. All the biopsies were from patients who were clinically diagnosed with as leprosy. Disease occurrence in leprosy is often related to age at detection rather than age at the onset of disease. It is known to occur at all ages ranging from early infancy to very old age. To stop new infections and prevention of disability accurate diagnosis of leprosy is necessary.

In the present study, Ridley-Jopling classification was used to classify leprosy histopathologically in all cases.[12] Indeterminate and histioid types of leprosy were also included in present study for analysis.

Present study showed most common affected age group was 21-30 years age group (31.82%). Similar results were seen in study done by S Shivaani, Mandhar et al, R Perona et al, Sindhu Shree et al, Maya et al and P Chintal et al.[8,11,13–16] Although exact reason cannot be given for this age distribution but variable and long incubation period may be considered as possible mechanism.

Present study showed male predominance (75.45%), with a male to female ratio of 2.76:1, which is similar to findings made by other researchers like Vahini et al, Veena et al, Shivani Soni et al, Perona Roy et al and Shindu Shree et al showing male predominance with 72.5%, 82% 60, 97%, 68.97% and 82% respectively.[6–8,13,14] Male predominance may be because of many factors like heavy industrialization, urbanization and more opportunities for contact in males, social customs and taboos may account for the smaller

number of females reporting for treatment to the hospital.

The most commonly encountered type of leprosy by histopathology was LL type in 40 cases (30%), second common type was TT type 21 biopsies (26.66%), Bl and BT accounts for 16 cases. Study done by P Chinta et al, Bhatia et al, Agarewal A et al showed LL was the most common histological type with 30%, 91% and 33% of cases respectively, [16–18] While in study done by Mandhar et al, P Kumar et al, S Shivani et al and S Shrrseta et al showed Tuberculoid leprosy was commonest type with 63.15%., 66%,19.51%, and 41.67% of cases respectively in their study. [8,11,19,20] Study done by Maya et al, Nadia et al, Erbenez et al. and Tiwari Met al showed Boderline tubercoild was commonest Lepromatous lesion with 56.7%, 72.5%, 34.5% 36% and 41% cases respectively. [15,21–23]

According to many observers features of both tuberculoid and LL can occur in a same section or in serial sections or in different lesions of the same borderline cases. Most commonly encountered type in our study was LL type, it may be due to more precise criteria laid down in histopathology, confirming that lesions were easy to diagnose towards lepromatous pole clinically as well as histopathologically. An immunological instability is seen in the borderline cases, which with treatment, moves towards the tuberculoid pole and without treatment towards the lepromatous pole. [13,14] If the disease is recognized at an early stage the biopsies taken will have features of the BT stage and if recognized late they have the features of BL stage. Increased awareness of the people due to many national programs makes them to present them at an earlier stage to clinicians, which may contribute to increased number of borderline leprosy. [16]

Classification of leprosy patients into multibacillary and paucibacillary determines the duration of their treatment. Misclassification leads to increased risk of relapse due to insufficient treatment if a multibacillary patient is classified as paucibacillary. This also prolongs the time the patient is infective. In clinical practice in peripheral government set up, as well as private practice, leprosy is classified based on number of lesions and split skin smears. The cell mediated immune response and bacterial load is determined by bacteriological index. However the diagnosis cannot be made only on the basis of bacteriological index as it can vary in various type of leprosy. In the present study, we used skin biopsies for accurate histopathological classification in all the patients. High Bacteriological index (5+-6+) was seen in HL and LL type. Our findings were similar to study of Chintal et al and Anusha et al [16,24]

5. 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 prevelence, transmission of disease, diagnosis, prophylactic intervention and management. In depth clinicohistopathological 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 quiet 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.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

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