A study of histopathological spectrum of leprosy

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Abstract

Background: Leprosy is one of the oldest and chronic infectious diseases known

to human being caused by Mycobacterium leprae It is a chronic, debilitating,

granulomatous principally affecting the cooler parts of the body, mainly skin and peripheral nerves; it also involves muscles, eyes, bones, testis and internal organs. Studies 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.[2, 3]

Aims & Objective: (1) to study his to patho logical spectrum of various subtypes of leprosy. (2) to study the age and gender wise incidence of different subtypes of leprosy.

Material and Methods: An Observational study of 142 skin biopsies diagnosed as leprosy over a period of one year from January 2021 to June 2022 at PDU medical college and hospital, Rajkot, Gujarat. Skin biopsies were fixed, processed, stained with Haematoxy line and Eosin (H &E) & modified Fite-Faraco (FF) stain to demonstrate Lepra Bacilli.

Result: In this study, most of cases occurred in age group (31-40) years (26.97%) and showed marked male predo minance with M: F ratio = 2.5:1. Lepromatous leprosy (40.79%) was the most common his to patho logical type of leprosy.

Conclusion: Histopathological examination of skin biopsies and are essential for early & accurate diagnosis and typing of leprosy which is helpful in prevention of deformities and drug resistance by early and appropriate treatment.

Keyword: biopsies, Mycobacterium, prognosis

Introduction

Leprosy is one of the most ancient diseases known to mankind. It is a chronic, debilitating, granulo matous disease caused by My co bacterium leprae principally affecting the cooler parts of the body, mainly skin and peripheral nerves; it also involves muscles, eyes, bones, testis and internal organs. The causative agent of leprosy,

M. leprae, was discovered in 1873 by Arm Auer Hansen.[2,3]

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. The fact remains that India continues to account for 60% of new cases reportedly globally each year.[5] Leprosy may presents as an insignificant skin lesion to extensive disease causing pro found disability/ deformities. Leprosy mainly affects 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 epidemio logical studies can be confirmed his to patho logically. 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 Joplin in 1966. Our aim of present study was histological diagnosis of leprosy and to classify the disease into tuberculoid (TT), borderline tuberculoid (BT), mid borderline (BB), borderline lepromatous (BL) and lepromatous leprosy (LL), based on clinical, immuno logical and his to morpho logical 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 nodule or plaques over apparently normal skin. This article aims to study the various histological types of leprosy in a tertiary care hospital.

Aims & Objective

(1) To study histopathological spectrum of various subtypes of leprosy.

(2) To study the age and gender wise incidence of different subtypes of leprosy

Materials and Methods

The present study was undertaken to study his to morpho logical features of skin biopsy specimens from 152 clinically diagnosed leprosy patients in department of Pathology, in a tertiary care hospital over a period of from January 2021 to June 2022 months. 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.

Inclusion criteria

Skin biopsies with provisional diagnosis or differential diagnosis of leprosy from skin department irrespective of age and gender of the patient were included.

Exclusion criteria

Those cases where leprosy was suspected clinically but not confirmed on biopsies were excluded from the study.

Technique

After receiving, skin 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 Fite-Faraco for identification of the bacilli. His to patho logical features and the bacteriological status were noted and the diagnosis of leprosy was confirmed and classified according to Ridley and Jopling classification.

Data analysis

Statistical analysis will be done after collecting the primary data. Data will be entered in Microsoft excel and analysis will be done in the form of percentages and proportions and it will be represented in tables.

Observations and Results

The present study included 152 skin biopsies from January 2020 to June 2022.The study shows a marked male predominance in cases diagnosed as leprosy (108 cases, 71.05%) as compared to females (44 cases, 28.95%). The male to female ratio was 2.45:1.

His to logical 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 tuber culoid pole.

whereas foamy macrophages with clear sub epidermal grenz zone were more common towards lepromatous pole.
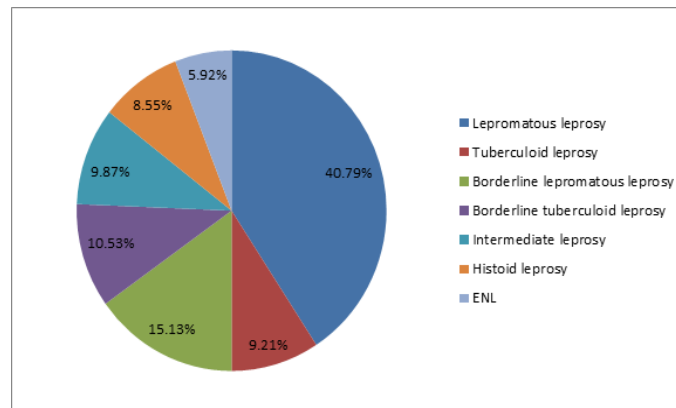

Chart 1: Distribution of lepromatous lesion.

Table 1: Sex wise Distribution of Lepromatous lesions

Lesions	Male	Female	Total cases
Lepromatous leprosy	47 (30.92%)	15 (9.87%)	62 (40.79%)
Tuberculoid leprosy	10 (6.58%)	4 (2.63%)	14(9.21%)
Borderline lepromatous leprosy	18 (11.84%)	5 (3.29%)	23 (15.13%)
Borderline tuber culoid leprosy	8 (5.26%)	8 (5.26%)	16 (10.53%)
Intermediate leprosy	11(7.24%)	4(2.63%)	15 (9.87%)
Histoid leprosy	9 (5.92%)	4 (2.63%)	13 (8.55%)
ENL	5 (3.29%)	4 (2.63%)	9(5.92%)
total	108 (71.05%)	44 (28.95%)	152 (100%)

The most common type seen was lepromatous leprosy comprised of 62 cases (40.79%), followed by borderline lepro matous leprosy with 23 cases (15.13%) and borderline tuberculoid leprosy diagnosed in 16 case (10.53%).

The most common site was determined to be back (42.76%), followed by the forearm (20.39%), the leg (9.21%). Other sites involved were the face, neck, trunk, abdomen, foot and buttocks among others.

Table 2: Age wise distribution of Lepromatous lesions

Lesions	0-10	11-20	21-30	31-40	41-50	51-60	61-70	>70	Total
LL	0	4	14	20	8	7	6	3	62
TT	2	2	4	2	2	1	1	0	14
BL	0	4	7	9	3	0	0	0	23
BT	0	5	3	3	0	1	4	0	16

IL	0	1	5	3	3	1	2	0	15
HL	0	1	2	2	4	2	2	0	13
ENL	0	3	1	2	1	1	1	0	9
Total	2 1.32%	20 13.16%	36 23.68%	41 26.97%	21 13.82%	12 7.89%	16 10.53%	3 1.97%	152 100%

[Tuber culoid (TT), Borderline tuberculoid (BT), Mid-border line (BB), Border line lepro matous (BL), Lepro matous (LL), Histoid (HL), Lepro matous leprosy with Erythema nodosum lepro sum (LL with ENL)]

Maximum number of cases was seen in the age group of 31-40 years (26.97%), followed by 21-30 years (23.68%), followed by 41-50 years age group (13.82%). less numbers of cases seen >70 (1.97%), 1-10 years age group (2.60%) and 51-60 years (7.89%). Maximum individual number of female and male patients was between the ages of 21-30 and 31-40 years. Among total 152 skin biopsies, on his to patho logical examination

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

Type of leprosy	Total cases	Number of Fite-Faraco positive cases	Percentage of
Lepromatous leprosy	62	75	91.94%
Tuberculoid leprosy	14	2	14.28%
Borderline lepromatous leprosy	23	18	78.26
Borderline tuberculoid leprosy	16	0	0%
Intermediate leprosy	15	2	13.33%
Histoid leprosy	13	13	100%
ENL	09	6	66.67%
total	152	116	76.32%

Fite-Faraco staining to identify acid-fast bacilli (AFB) was done in all 152 cases. It was positive in 116 (76.32%) of cases.

No bacilli were noted in all cases of BT leprosy, whereas cases of LL (91.94%) and all cases of Histoid types showed presence of acid-fast bacilli.

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 transmission of disease and much need less sufferings of patients.

His to patho logical examination continues to be an important tool in accurate diagnosis and classification of leprosy and still remains the gold standard.

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 his to patho logically in all cases. Indeterminate and his tioid types of leprosy were also included in present study for analysis.

Present study showed most common affected age group was 31-40 years age group (26.97%).

Table 4: Comparison of spectrum of leprosy of present study with various studies.

Type of leprosy	Present study 152 cases	Patel et al.	Prerona et al. 50 cases
LL	62 (40.79%)	40 (35.39%)	6 (12%)
TT	14(9.21%)	21 (18.58%)	8(16%)
BT	23 (15.13%)	16 (14.15%)	18 (36%)
BL	16 (10.53%)	16 (14.15%)	4 (8%)
IL	15 (9.87%)	10 (8.84%)	4 (8%)
HL	13 (8.55%)	9 (7.96%)	4 (8%)
ENL	9(5.92%)	1 (0.88%)	6 (12%)

[Tuber culoid (TT), Border line tuber culoid (BT), Mid-border line (BB), Border line lepro matous (BL), Lepro matous (LL), Histoid (HL), Lepro matous leprosy with Erythema no dosumleprosum (LL with ENL)]

Although exact reason cannot be given for this age distribution but variable and long incubation period maybe considered as possible mechanism. Present study showed male predominance (71.43%), with a male to female ratio of 2.45:1 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 62 cases (40.79%), second common type was BT type 23 biopsies (15.13%), TT and BL accounts for 14(9.21%) and 16(10.53%) cases. Study done by Patel et al, Bhatia et al, Agarwal A et al showed LL was the most common histological type, While in study done by Prerona et al and Tiwari Metal showed Borderline Tuber culoid leprosy was commonest Lepro matous lesion.

According to many observers features of both tuber culoid 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 his to pathology, confirming that lesions were easy to diagnose towards lepromatous pole clinically as well as his to patho logically.

An immuno logical instability is seen in the borderline cases, which with treatment, moves towards the tuber culoid pole and without treatment towards the lepro matous pole.

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.

Classification of leprosy patients into multi bacillary 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 bacterio logical index.

However, the diagnosis cannot be made only on the basis of bacterio logical index as it can vary in various type of leprosy.

In this study, highest percentage of positivity of FF stain seen in HL (100%) and LL (91.94%), according to Prerona Roy et al [and] Patel et al also highest percentage of positivity of FF stain in HT (100%) and LL (100%).

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 Patel et al.

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, trans mission of disease, diagnosis, prophy lactic intervention and management.

In depth clinico his to patho logical studies are still required to reassess clinical findings and his to patho logic 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, his to patho logical, bacteriological and immuno logical features and it is most helpful for classifying leprosy.

Correlation of clinical and his to patho logical features along with bacterio logical 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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