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Prevalence of Different Histomorphological Types of Leprosy among Patients Attending Era's Lucknow Medical College & Hospital, Lucknow (U.P)

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A B S T R A C T

Leprosy, or Hansen's disease (HD), is a bacterial disease caused by Mycobacterium leprae [1,2] that continues to be a significant health problem in many parts of the world. It produces a chronic infection in humans that affects mainly peripheral nerves and skin but may also affect sites such as eyes, mucous membranes, bones, and testes.2,4 According to National Leprosy Eradication Program India has prevalence of less than 1 case of leprosy per 10,000 population and has reported 1,63,672 new cases in 2021-2023 [5].In the present study, we analyzed the differenthistomorphological patterns of leprosy among patients at Era's Lucknow Medical College and Hospital. Data were collected from the medical records in the Department of Pathology, focusing on 121 clinically diagnosed cases of leprosy from January 2021 to June 2023.By analyzing these different types, the study aims to enhance understanding of leprosy's manifestations in this region, which may aid in improving diagnosis, treatment, and public health strategies for managing the disease.

Keywords: Indeterminate leprosy, Tuberculoid leprosy, Borderline tuberculoid, Borderline lepromatous, Hansen's disease, Histomorphological pattern.

INTRODUCTION

Leprosy (Hansen's Disease) is a chronic, granulomatous infectious disease caused by Mycobacterium leprae [1, 2]. It mainly affects the cooler parts of body i.e. peripheral nerves and skin, apart from it, it may affect eyes, mucous membrane, bones and testes [2, 4]. It is one of the most common cause of non traumatic peripheral neuropathy worldwide [1]. It's transmission is through droplet spread i.e. inhalation of bacilli present in upper airway secretion [3]. Since ancient times, Leprosy has been known as "Kushtaroga." Armauer Hansen discovered the causative agent of leprosy, M. leprae, in 1873 [6].

According to the National Leprosy Eradication Program, India has a prevalence of <1 case of leprosy per 10,000 population [5], but still it is prevalent in so many regions all across the india with varying prevalence, because the root cause is 'stigma' related to this disease, most of the people don't come to the health facilites or even if they come there are so many cases of loss to follow-up.In 2021-2023, 1,63,672 new cases were reported,5which is an important public

health problem.Doubtful cases or lesions that may go ignored in clinical practice, whereas can be confirmed histopathologically which is comprehensive & accurate for confirming a diagnosis and its subtypes.Ridley and Joplingin 1966, defined categories along the spectrum by a combination of clinical, microbiologic, histopathologic and immunologic indices [4]:

- TT (tuberculoid),
- BT (borderline tuberculoid),
- BB (midborderline),
- BL (borderline lepromatous),
- LL (lepromatous).

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.

The bacterial index (BI)— follows Ridley's logarithmic scale (which applies to both skin biopsies and slit skin smears).

- BI = 0:no bacilli observed
- BI = 1:1 to 10 bacilli in 10 to 100 high-power fields (hpf, oil immersion)
- BI = 2:1 to 10 bacilli in 1 to 10 hpf
- BI = 3:1 to 10 bacilli per hpf
- BI = 4:10 to 100 bacilli per hpf
- BI = 5:100 to 1,000 bacilli per hpf
- BI = 6:>1,000 bacilli per hpf

METHODOLOGY

The present study is a cross sectional observational study. Patient data were obtained from the medical records of the Department of Pathology, Era's Lucknow Medical college and Hospital. Record of 121 clinically diagnosed cases of leprosy between January 2021 to June 2023 were analysed after obtaining approval of ethical committee of our institute. In present study patients ranged from 05 years to 80 years of age.All clinically diagnosed cases of leprosy were included in the study. Age, gender, religion, occupation, and socioeconomic status were used to select cases. The dermatologists removed biopsies from representative lesions, and sent to histopathology section in glass or plastic vials containing 10% formalin solution to the histology section. Gathered were a thorough clinical history, examination results showing the indications and symptoms of the skin lesions, and a preliminary clinical diagnosis were collected.Biopsies were grossly examined on the categories of size and general appearance. As soon as feasible, biopsies were fixed in 10% neutral buffered formalin and processed, ideally in a day. After thatissues were fixed, they underwent processing, were embedded in paraffin, and serial sections of 4-5 microns were produced. These sections were then stained with ZeihlNeelsen to identify the bacilli and Hematoxylin and Eosin for morphological evaluation. After noting the bacteriological state and histopathological characteristics, leprosy was diagnosed, verified, and categorised using the Ridley and Jopling classification system. This study included cases of indeterminate leprosy and histoid leprosy, an uncommon variation of lepromatous leprosy. Figure 1 shows the percentage of cases of different types of leprosy.

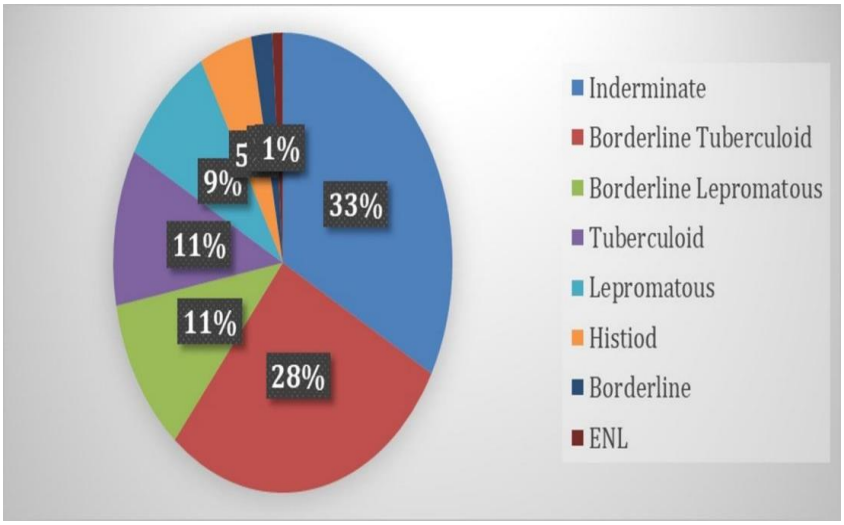

Figure 1: Pie Diagram showing percentage of different types of leprosy cases

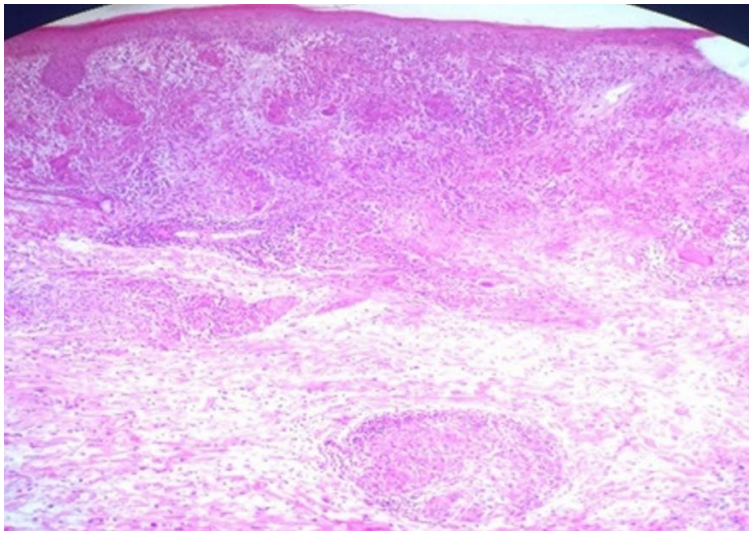

Fig 2(a): Tuberculoid Leprosy (H&E)(4x) showingMultifocal granulomatous infiltrate in the superficial and deep dermis, periadnexal and perineural

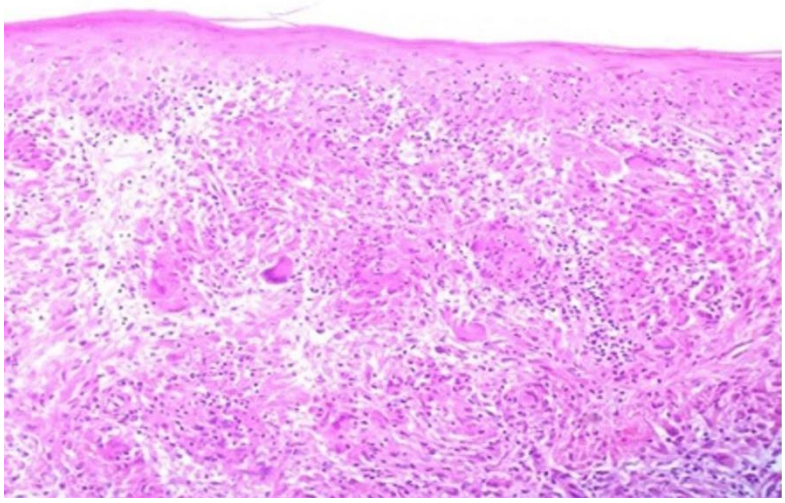

Fig 2(b): Tuberculoid Leprosy (H&E)(10x) showing noncaseating *mature* epithelioid cells and are surrounded by many lymphocytes, Giant cells

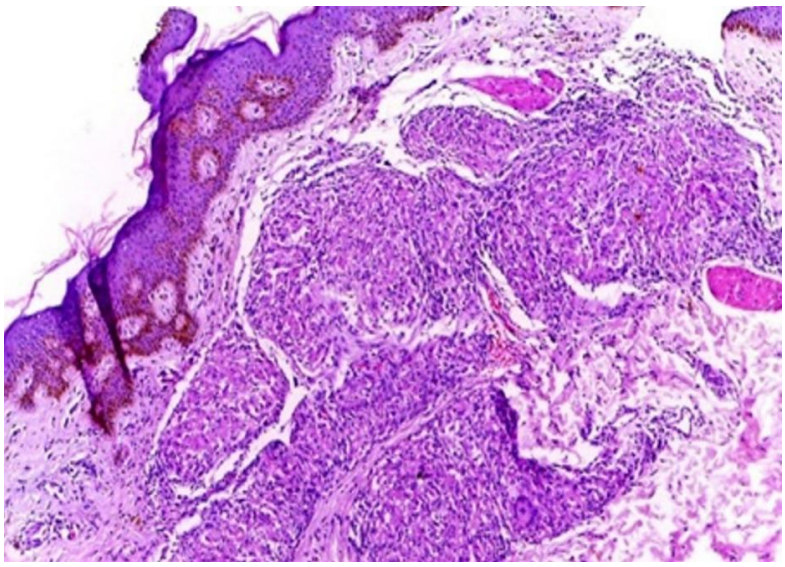

Fig 3: Borderline Tuberculoid Leprosy (H&E)(10x) showing Epithelioid granulomas in the dermis & reduction in the number of appendages

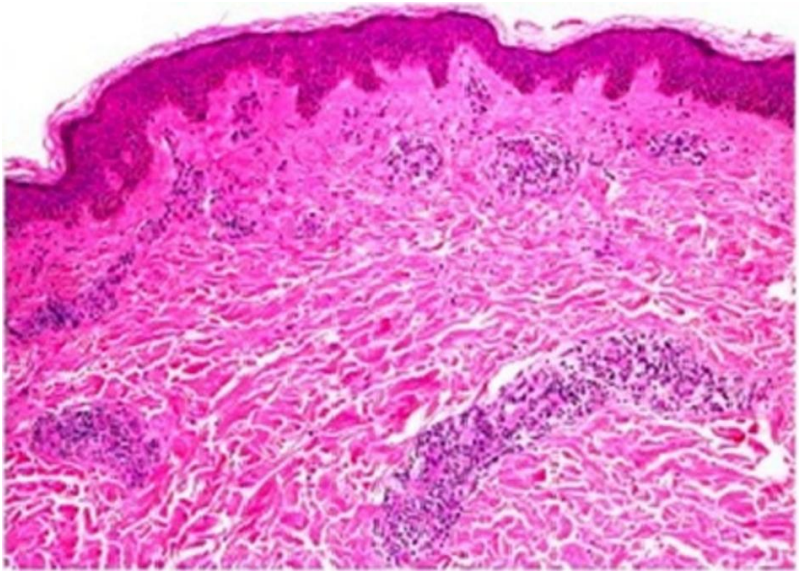

Fig 4: Borderline Lepromatous Leprosy (H&E)(10x) showing lymphocytes predominate over macrophages in the dermis

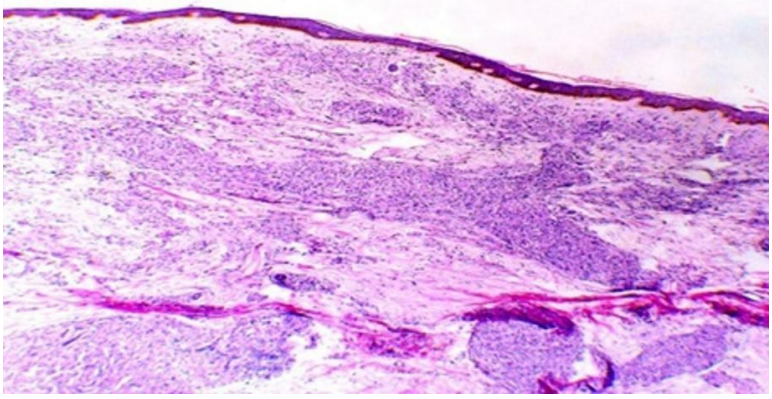

Fig 5(a): Lepromatous Leprosy (H&E) (4x) showing Epidermal atrophy & multiple inflammatory dermal infiltration composed of mainly macrophages

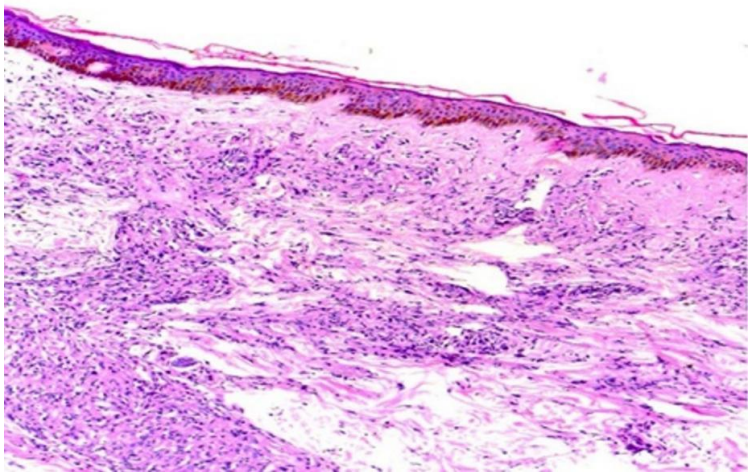

Fig 5(b): Lepromatous Leprosy (H&E)(10x) showing Clear grenz zone in superficial dermis

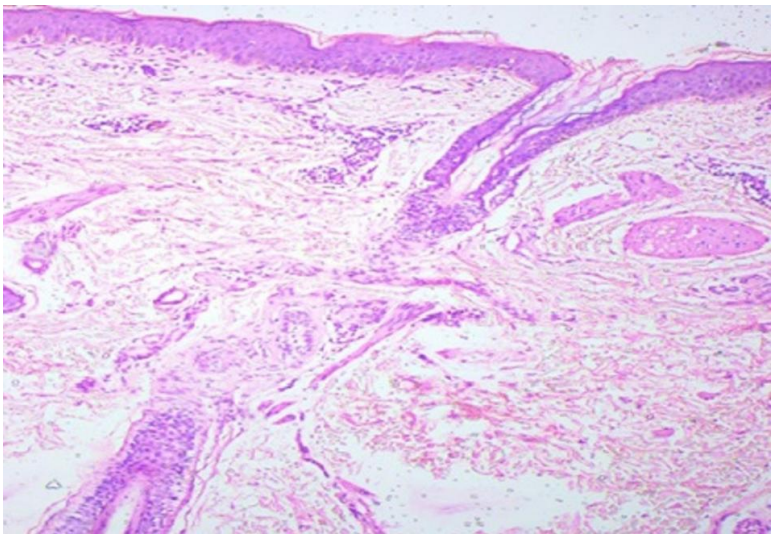

Fig 6: Indeterminate Leprosy (H&E)(10x) showing lymphohistiocytic infiltration in the dermis & around appendages

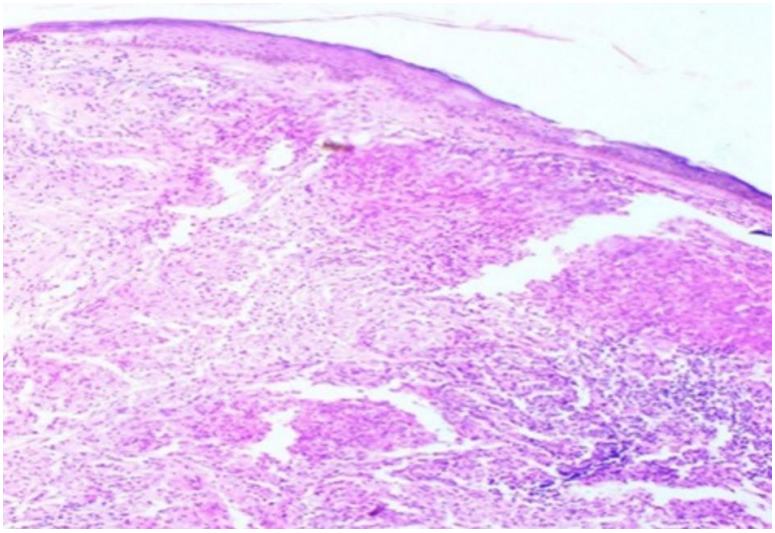

Fig 7: Histoid Leprosy (H&E)(10x) showing Spindle cell proliferation

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 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.A total of 121 skin biopsies were received throughout the course of the January 2021 to June 2023 study period, of which 100 were related to leprosy. Every biopsy came from a patient who had received a leprosy clinical diagnosis. Age at diagnosis, as opposed to age at illness onset, is frequently associated with the occurrence of leprosy. It has been documented to happen at every age, from very early birth to advanced age. Accurate leprosy diagnosis is required to prevent impairment and to halt future infections.The current study classified leprosy histopathologically in every instance using the Ridley-Jopling classification [4].Histioid and indeterminate forms of leprosy were also analysed in the current investigation. The study shows a marked male predominance in cases diagnosed as leprosy (65 cases, 65%) as compared to females (35 cases, 35%), with male to female ratio was 1.8:0.5. which is similar to findings made by other researchers like Vahini*et al*., Veena*et al*., ShivaniSoni*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 [12-16]. The lower number of female patients seeking hospital treatment may be explained by societal taboos and customs, as well as the effects of heavy industry, urbanisation, and increased opportunities for male contact.Maximum number of cases was seen in the age group of 21-40 years (51%). 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*., [14-19]. Indeterminate leprosy(33%) was the most common type encountered by histopathology followed by borderline tuberculoid (28%), borderline lepromatous (11%), tuberculoid (11%), lepromatous(9%), histoid(5%), borderline (2%), ENL (1%). 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 [19-21], 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 [17,22,23]. The reason for this is considered to be more awareness and self image among the patients. Adults, 21-40 yrs are affected predominantly in our study followed by 41-60 yrs of age. Our study also showed male preponderance which is in concordance with Bhat RM *et al*., [1] and Sousa *et al*., [7]. The reason for this is generally the increased risk of exposure.

In borderline instances, there is an immunological instability that shifts towards the tuberculoid pole with treatment and towards the lepromatous pole in the absence of treatment [15, 16]. The most prevalent kind in our analysis was the indeterminate type; this could be because of the more exacting standards established by histopathology, which confirmed that lesions were easily diagnosed towards the lepromatous pole both histopathologically and clinically. The biopsies obtained will have characteristics of the BT stage if the disease is identified early, and the BL stage if it is identified later. Due to several national programmes, people are more aware of one another and come to physicians at an earlier age, which may increase the number of cases with borderline leprosy [19]. The duration of treatment for leprosy patients is determined by their classification into multibacillary and paucibacillary groups. If a multibacillary patient is mistakenly labelled as paucibacillary, this could result in inadequate therapy and a higher chance of relapse. This also extends the patient's infectious period. The number of lesions and split skin smears are used to classify leprosy in both private and peripheral government healthcare practices. The bacteriological index determines both the bacterial burden and the cell-mediated immune response. However, because the bacteriological index varies throughout leprosy types, a diagnosis cannot be made solely based on it. In the current study, skin biopsies were utilised to accurately classify each patient's histopathology. For the HL and LL types, a high Bacteriological Index (5+-6+) was observed.

Table 1: Showing number of acid fast bacilli (AFB) positive cases

Histological subtypes of leprosy	Number of Acid Fast Bacilli positive cases	Percentage
Indeterminate Leprosy	0/33	0
Borderline Tuberculoid	9/28	32
Borderline Lepromatous	9/11	81
Tuberculoid Leprosy	0/11	0
Lepromatous Leprosy	9/9	100
Histoid	3/5	60
Midborderline	0/2	0
ENL	1/1	100
Total	31	

RESULT AND 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.The result of this study states that leprosy is still prevalent in our society. There is a need for increased awareness among the people. The findings indicate a male predominance in leprosy cases, with the highest incidence among adults aged 21–40 years. The indeterminate type emerged as the most common histomorphological variant, suggesting early detection influenced by heightened awareness and national health initiatives. The study underscores the importance of classifying patients into multibacillary and paucibacillary groups to determine the appropriate treatment duration and reduce relapse risk. Comprehensive leprosy management must continue to emphasize accurate diagnosis, particularly in borderline cases, to prevent disability, enhance patient outcomes, and support effective public health strategies.

Conflict of Interest: No

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