

## ORIGINAL RESEARCH

# To evaluate the socio-demographic and clinical characteristics of individuals diagnosed with leprosy

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### **ABSTRACT**

**Aim:** To evaluate the socio-demographic and clinical characteristics of individuals diagnosed with leprosy.

**Materials and Methods:** The department of Dermatology conducted a cross-sectional study within a hospital setting to identify deformities and disabilities in patients diagnosed with leprosy. The study encompassed a total of one hundred cases. The study included individuals diagnosed with leprosy, regardless of their age, gender, or treatment status.

**Results:** The study included patients with ages ranging from 10 to 85 years. The average age of the study population was 39.74±3.88 years. Among the sample of 100 patients, the majority (75%) hailed from rural regions, while the remaining minority (25%) were residents of urban areas. The clinical type that was most commonly observed among the patients was borderline tuberculoid leprosy, accounting for 38% of the cases. This was followed by lepromatous leprosy, which was present in 34% of the patients. Borderline lepromatous leprosy was found in 15% of the cases, while pure neural leprosy was observed in 4% of the patients. Both tuberculoid and histoid types were each identified in 3% of the patients. Mid-borderline leprosy was seen in 2% of the cases, and indeterminate leprosy was found in 1% of the patients.

**Conclusion:** Leprosy is recognized for its ability to induce a wide range of physical deformities. Thorough documentation and analysis of the patient's medical history and physical examination upon initial presentation is of paramount significance, particularly in cases involving sensory impairment.

**Keywords:** Leprosy, Deformity, Social Profile, Stigma

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### **Introduction**

Leprosy is a prevalent infectious disease that has afflicted humanity for an extended period of time, with its origins dating back to an indeterminate era. References to leprosy can be traced back to Indian literature as early as 600 BC. The identification of the *Mycobacterium leprae* by Sir Gerhard Henrik Armauer Hansen in 1873 marked a significant advancement in the comprehension of the disease [1]. Leprosy is a persistent granulomatous infection that is primarily caused by the bacterium *Mycobacterium leprae*. The organism in question is a type of bacilli that exhibits a rod-shaped morphology and is characterised by its acid-fast staining properties. Its primary impact is observed in the peripheral nerves and skin, as supported by references [2] and [3]. If the disease is not treated, it can lead to the development of different deformities [4]. The World Health Organisation (WHO) has officially recognised leprosy as a

significant public health concern due to its well-documented association with debilitating physical impairments [5]. Deformities refer to the absence or irregularity of psychological, physiological, or anatomical structure or function [6]. The impairments in question can manifest as either visible or invisible, with corresponding consequences. Disability refers to the condition wherein individuals encounter challenges or are unable to engage in certain activities that were previously feasible, due to physical or mental impairments [6]. The deleterious effects of leprosy-induced deformities lead to significant reductions in workforce productivity and economic detriment to the broader society [7]. Leprosy continues to pose a significant public health concern in a total of fifty-five countries, with thirteen of these countries being responsible for a substantial 94% of all registered cases [8]. India, Brazil, and Indonesia collectively observe an annual

influx of over 10,000 new patients. Globally, a total of 21,389 new cases were identified with Grade 2 deformity, accounting for approximately 6.6% of the overall number of recently diagnosed individuals. This corresponds to an incidence rate of 2.5 cases per million, as reported by the World Health Organisation in 2015 [5]. One of the primary goals of leprosy control programmes is to proactively mitigate the development of deformities (World Health Organisation, 1982; National Leprosy Eradication Programme, 1987). Additionally, these programmes emphasise the significance of monitoring the incidence and proportion of new cases with severe disabilities, as they indicate shortcomings in the case detection system (World Health Organisation, 1985).[9]. There are multiple factors that appear to influence the progression of the disease and the occurrence of deformities. The presence of these deformities, which are identifiable as a consequence of leprosy, gives rise to social stigma.[10]

### Materials and Methods

The department of Dermatology conducted a cross-sectional study within a hospital setting to identify deformities and disabilities in patients diagnosed with leprosy. The study encompassed a total of one hundred cases. The study included individuals diagnosed with leprosy, regardless of their age, gender, or treatment status.

**Method:** Detailed history of the patient was taken in respect to duration of disease and deformity, history of contact, episodes of reactions if any, and treatment. Each patient was subjected to complete cutaneous examination and palpation of peripheral nerves. Presence or absence of deformities were recorded. All patients underwent following steps of clinical examination:

- Detailed inspection of hands, feet, face and eyes for lesions and any visible deformity.
- Examination of peripheral nerves.
- Sensory tests done on hands and feet:
  1. Temperature test with hot and cold water
  2. Pin prick test
  3. Cotton wool test
  4. Semmes Weinstein monofilament test (SWMT)

Slit skin smear and biopsy were carried out in all newly diagnosed cases and in already diagnosed and treated cases whenever indicated to confirm the diagnosis.

### Statistical Analysis

The characteristics were summarised in a descriptive manner. Summary statistics such as the sample size (N), mean, and standard deviation (SD) were employed to describe continuous variables. In the data summaries, numerical values and corresponding percentages were employed to represent categorical data. The Chi-square ( $\chi^2$ ) test was utilised to assess

the statistical significance of variations between groups in relation to categorical data. The z-test was utilised to examine the disparity in the proportions of analysis variables. Results were deemed significant if the p-value was less than 0.05. The data were subjected to analysis using the SPSS software version 23.0.

### Results

The study comprised a cohort of 100 individuals diagnosed with leprosy. Out of a sample size of 100 patients, 60 individuals were identified as male, constituting 60% of the total, while the remaining 40 patients were classified as female, accounting for 40% of the cohort. The distribution of ages within a given population. The study included patients with ages ranging from 10 to 85 years. The average age ( $\pm$  standard deviation) of the study population was  $39.74 \pm 3.88$  years. The majority of individuals fell within the age range of 20 to 40 years. Out of the total sample size of 100 individuals, the largest proportion consisted of farmers, accounting for 30% of the participants. Following farmers, housewives constituted the second most prevalent group, comprising 18% of the sample. Labourers and students were the subsequent most common categories, representing 10% and 8% of the participants, respectively. The proportion of daily wage workers was 5%, while both drivers and teachers accounted for 5% each. The remaining proportion of patients, comprising 19% of the sample, were engaged in various other occupations. The majority of patients in the study were found to belong to a lower socioeconomic status (S-E), accounting for 60% of the sample. This was followed by individuals from a middle socioeconomic status, comprising 40% of the sample. Among the sample of 100 patients, the majority (75%) hailed from rural regions, while the remaining minority (25%) were residents of urban areas. A total of 52% of the patients exhibited illiteracy, while the remaining 48% possessed a minimum educational attainment of fourth standard. The clinical type that was most commonly observed among the patients was borderline tuberculoid leprosy, accounting for 38% of the cases. This was followed by lepromatous leprosy, which was present in 34% of the patients. Borderline lepromatous leprosy was found in 15% of the cases, while pure neural leprosy was observed in 4% of the patients. Both tuberculoid and histoid types were each identified in 3% of the patients. Mid-borderline leprosy was seen in 2% of the cases, and indeterminate leprosy was found in 1% of the patients. The distribution of diseases can be categorised according to the World Health Organisation (WHO) classification system. The predominant type of leprosy observed in the patient population was multibacillary, accounting for 91% of cases, while paucibacillary leprosy was identified in 9% of patients. Among the sample of 100 patients, it

was observed that 38% of them had been afflicted with the disease for a duration of 1-2 years. Subsequently, 27% of the patients had a disease duration of less than one year. A quarter of the patients exhibited a disease duration ranging from 3 to 5 years, while a minority of patients (10%)

experienced a disease duration exceeding 5 years. The duration of deformity was found to be less than one year in 62% of the patients. Nineteen percent of the patients experienced deformities for a duration of either 1-2 years or more than 2 years.

**Table 1: Gender distribution of patients with leprosy**

Gender	Number	Percentage
Male	60	60
Female	40	40

**Table 2: Age wise distribution of study subjects**

Age group	Number	Percentage
Below 20	26	26
20-40	35	35
40-60	29	29
60-80	9	9
>80	1	1
Mean Age	39.74±3.88	

**Table 3: Distribution of study subjects based on occupation**

Occupation	Number	Percentage
Farmer	30	30
Housewife	18	18
Labour	10	10
Student	8	8
Daily wage worker	5	5
Driver	5	5
Teacher	5	5
Other	19	19

**Table 4: Distribution of study subjects based on Socio Economic Status**

Occupation	Number	Percentage
Upper	1	1
Upper Middle	12	12
Upper Lower	47	47
Lower Middle	19	19
Lower	21	21

**Table 5: Distribution of study subjects based on Clinical types of Leprosy**

Clinical types of Leprosy	Number	Percentage
Tuberculoid	3	3
Tuberculoid Leprosy	38	38
Lepromatous Leprosy	34	34
Borderline Lepromatous	15	15
Pure Neural	4	4
Histoid	3	3
Mid Borderline	2	2
Intermediate	1	1

**Table 6: Distribution of study subjects based on duration of the disease and deformity**

		Number	Percentage
Duration of Disease In years	<1	27	27
	1-2	38	38
	3-5	25	25
	>5	10	10
Duration of Deformity in years	< 1	62	62
	1-2	19	19
	>2	19	19

## Discussion

Leprosy is a debilitating condition that can result in significant impairment if it is not promptly diagnosed and effectively treated. The 6th report of the WHO Expert Committee on Leprosy has made a recommendation for the effective implementation of measures aimed at preventing and managing impairments and disabilities associated with leprosy. The most effective strategy for mitigating disabilities associated with leprosy involves the timely identification of patients, prompt identification of mild impairments, and the administration of suitable treatment [11,12].

This cross-sectional study focused on deformities and disabilities in leprosy within a hospital setting, encompassing a total of 1100 cases. The study encompassed a wide range of ages, with patients ranging from 10 to 85 years old. The average age ( $\pm$  standard deviation) of the study population was  $39.74 \pm 3.88$  years. The majority of individuals fell within the age range of 20 to 40 years.

The study conducted by Jain et al. [13] revealed that the mean age of disease onset was 35.73 years, with a range spanning from 6 to 75 years. Singh et al. have documented the age distribution of individuals afflicted with leprosy in their research, revealing a range spanning from 7 to 80 years, with a mean age of 36.5 years. Out of a sample size of 100 patients, 60 individuals were identified as male, accounting for 60% of the total, while the remaining 40 patients were classified as female, representing 40% of the cohort. Although there was a higher prevalence of deformities among male patients compared to females, the correlation between deformities and patient gender did not reach statistical significance ( $p=0.41$ ). In a similar vein, Kumar et al. [15] and Jain et al. [13] have documented a greater prevalence of deformities in male patients relative to females within their respective study populations ( $p < 0.0001$ ).

While leprosy can impact individuals of both genders, it is observed that males are more commonly affected than females in many regions, often at a ratio of 1.5:1. The disproportionate prevalence of leprosy among males has been documented in various countries, including India, the Philippines, Hawaii, Venezuela, and Cameroon. The comparatively lower incidence of leprosy among females could potentially be attributed to various environmental or biological factors. The epidemiological characteristics of leprosy exhibit similarities to numerous other communicable diseases, wherein males demonstrate a higher frequency of affliction compared to females [16]. Indian society exhibits a prevailing male dominance. Typically, individuals assume the occupational responsibilities, resulting in a higher level of extroversion. This renders males more susceptible to increased proximity with the environment and other individuals afflicted with leprosy compared to females. Individuals who experience trauma related to their occupation may be

at an increased risk of developing deformities. In the Indian context, it is observed that males, being the primary earners in households, are generally perceived as privileged and consequently exhibit a higher frequency of seeking healthcare services [16]. In the present study, a total of 60 patients, constituting 60% of the sample, were identified as belonging to a lower socio-economic status. Furthermore, it was observed that a majority of these patients exhibited deformities affecting their hands and feet. There was a statistically significant correlation between deformity and socio-economic status, as indicated by a  $p$ -value of 0.007. A comparable discovery was made in an epidemiological investigation on leprosy carried out in Agra by Kumar et al [15]. The predominant occupational group among patients afflicted with disease and deformities consisted of individuals engaged in farming activities. According to Sarkar et al. [17], there is a notable disparity in the prevalence of disabilities among agricultural workers compared to individuals in different occupational fields. The higher prevalence of leprosy among individuals of low socioeconomic status can likely be attributed to factors such as larger family sizes and smaller, poorly ventilated households. These conditions often lead to overcrowding, increasing the likelihood of disease transmission within the family unit. Furthermore, individuals with a limited level of literacy exhibit a delayed comprehension of disease manifestations, resulting in a higher prevalence of deformities. A significant portion of these individuals rely on daily wage labour and are compelled to engage in manual labour despite experiencing numbness in their hands and feet. The manifestation of trophic ulcers renders their previously imperceptible deformities perceptible. The lack of access to medical care resulting from occupational demands and financial limitations contributes to the neglect of symptoms and subsequent development of motor deformities. This phenomenon gives rise to social stigma and psychological distress, thereby exacerbating the frequency of negative responses and establishing a self-perpetuating cycle.

Research findings indicate that households with individuals affected by lepromatous leprosy have a significantly higher risk of disease acquisition, ranging from 8 to 10 times greater compared to the general population. Similarly, households with individuals affected by tuberculoid disease have a risk that is 2 to 4 times higher. These results have been documented in various studies [18,19]. According to a study conducted by Anjum et al. [20], it was found that 27.6% of individuals who were recently diagnosed with leprosy had a family member, specifically either parents or siblings, who also had the disease. A total of seven patients, accounting for 12.9% of the sample, exhibited multiple index cases within their family.

Additionally, social contacts were identified in fourteen cases.

### Conclusion

Leprosy is recognised for its ability to induce a wide range of physical deformities. Thorough documentation and analysis of the patient's medical history and physical examination upon initial presentation is of paramount significance, particularly in cases involving sensory impairment. Failure to provide appropriate anaesthesia to limbs can result in the advancement of deformities, ultimately leading to unfavourable outcomes. This study facilitates the identification of diverse abnormalities in patients, encompassing both minor disruptions in sensory functions and severe disfigurement of the hands, feet, and face. The timely identification of anaesthesia in the extremities can facilitate patient education on limb care and the identification of associated risk factors. This study encompassed both individuals already undergoing treatment for leprosy as well as those who had recently received a diagnosis. As a result, efforts were made to identify and monitor individuals who had close contact with the affected individuals, with a particular focus on children. Additionally, patients were provided with education regarding the nature of the disease.

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