

Clinico-Epidemiological Trends of Leprosy in Karaikal District, India After Elimination of Leprosy – A Ten Year Retrospective Study

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Abstract

Leprosy is an age-old chronic infectious disease of mankind. This disease has been infecting humans for at least 100,000 years and still affects millions of people all over the world. India achieved Leprosy “elimination” in December 2005, but the disease remains a major public health concern because India still has the highest leprosy burden in the world. According to the National Leprosy Elimination Program (NLEP), a total of 114451 new cases were detected between 2019 and 2020 and about half that many between 2020 and 2021. So, it is important to understand the trends of leprosy but short-term trends in leprosy are difficult to interpret due to year-to-year fluctuations in program activities and hence Long-term trends are more important to understand the clinic epidemiological trends of leprosy and to monitor the leprosy control activity. In this study we have done a retrospective statistical analysis of data obtained from the health department, Karaikal, India for ten years i.e. from 2012 to 2022. Major key indicators of leprosy burden for both elimination of disease and elimination of

transmission are analyzed to understand the nature and trends of leprosy in a coastal district Karaikal and also to compare it with the clinicoepidemiological trend of India.

Keywords: Leprosy, Epidemiological trend, key indicators, leprosy in Karaikal, retrospective study.

Introduction

Leprosy (*Hansen's disease*) is a chronic infectious granulomatous disease caused by *Mycobacterium leprae*, an acid-fast rod-shaped bacillus which primarily affects the skin, peripheral nerves and mucosa of the upper respiratory tract. If left untreated leprosy can be progressive causing permanent damage and deleterious effect in both physical as well as social wellbeing [1]. Leprosy is highly infective but low pathogenic due to its long incubation period. Despite clinical advances in all aspects, leprosy still continues to be a major public health challenge in countries like India. At present, distribution of leprosy is mainly in tropical and subtropical parts of the world such as Asia, Central America, Africa, and South America; its distribution may be related to warm climate in these areas and has association with poor sanitary conditions. India, achieved Leprosy "elimination" (defined as less than 1 case per 10000 population) in December 2005 but still India has the highest leprosy burden in the world. Major key Indicators to be monitored for Post Elimination Surveillance are classified into two major categories 1. Key indicators for elimination of disease and 2. Key indicators for elimination of transmission [2].

Key indicators of elimination of disease includes 1. New Case Detected- total number of new cases detected in a given population in the reporting year

2. PR – Prevalence Rate - The prevalence rate is to be calculated as a point prevalence as on 31st March, every year and not on monthly basis as below:

$PR = \text{No. of balance} + \text{new cases under treatment as on 31st. March} \times 10,000 / \text{Population as on 31st March}$

3.G2D – Grade II Disability cases - Number of new cases with G2D detected among new cases in a given population in a year [3].

Formula : $\text{Proportion of Grade 2 disability} = \text{No. of Grade 2 disabled cases detected in a year} \times 100 / \text{Total New cases detected in a year}$

4.ANCDR – Annual New Case Detection Rate / 1,00,000- defined as the number of new cases in a district divided by the estimated population of the district during that year expressed per lakh population [4].

Key indicators of elimination of transmission of disease includes

1.MB cases – total number of MB cases among new cases and the (trend in) proportion of MB cases among total new cases detected

Formula : $\text{Number of new MB cases detected} \times 100 / \text{Total number of new cases detected in the reporting period}$ [5].

2.Child Cases and its proportion- $\text{Proportion of child cases} = \text{No. of child cases detected in a year} \times 100 / \text{Total New cases detected in a year}$

3.Female Cases and its proportion - $\text{Proportion of female cases} = \text{No. of female cases detected in a year} \times 100 / \text{Total New cases detected in a year}$

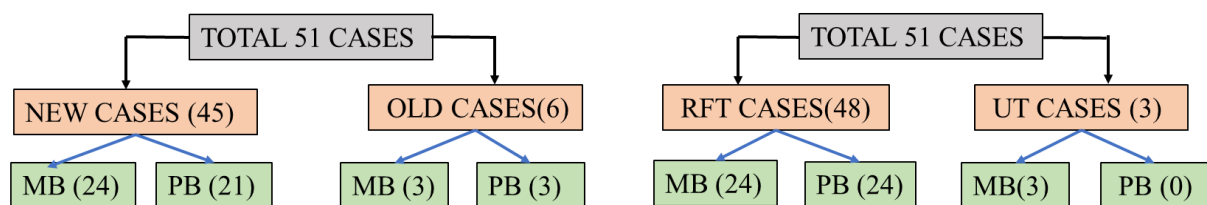
This study was designed primarily to analyze the clinico-epidemiological trends of leprosy in a coastal district Karaikal, India for the past 10 years from 2012 to 2022 by studying the key indicators of leprosy burden such as Prevalence Rate, Annual New Case Detection Rate (ANCDR), Age and sex distribution of leprosy, proportion of female cases and proportion of child cases. And also estimating the distribution based on WHO disease types and Number of Grade 2 disability cases [6].

Materials and Methods

Retrospective statistical analysis of data obtained from the health department, Karaikal, India from 2012 to 2022. Records of the patients were analyzed and the clinical and demographic variables such as Newly diagnosed, treated cases, WHO disease types, age, gender and grade of disability of victims, as well as disease prevalence and annual new case detection rates were included in this study. The extracted data was analysed by using SPSS and Graph Pad Prism 5.0. tools

Results

As per the observational study of data obtained from health department Karaikal, we infer that a total of 51 cases of leprosy have been recorded in this 10 years study period and is broadly classified into two groups, first group is based on old and new cases i.e. 6 old cases and 45 new cases. The Second group is based on treatment status these 51 cases has been classified into released from treatment - 48 patients and undertreatment cases- 3 patients.



MB- multibacillary cases PB- paucibacillary cases RFT- released from treatment UT- under treatment

Based on age and sex distribution these 51 cases are sub divided into 34 males, 11 females and 6 children. In total, 48 patients were released from treatment and 3 were under treatment. The most common were multibacillary, with a case load of 27 patients, while 24 patients were paucibacillary. Grade II disability was observed in three cases. Leprosy prevalence gradually increased from 0.05% to 0.14%. However, annual new case detection rate dropped from 1.9 to 0.90. An increase in ANCDR was noted between 2015 and 2018 and then gradually decreased.

District	No of cases 51		Male	Female	Child	Gr II Disability		ANCDR per lakh population	PR per 10000 population
	MB	PB							
Karaikal	27	24	34	11	6	3		dropped from 1.9 to 0.90	0.05 to 0.14 (gradually)
						2(17-18)	1(18-19)		

Limitations- Particular district external validity could not be determined.

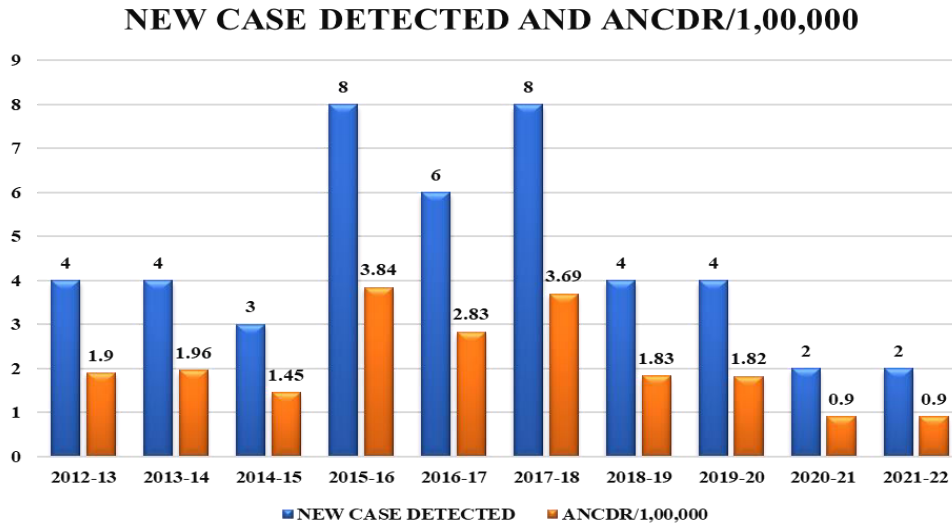


Figure 1 explains the trend of new case detected and Annual New Case Detection Rate- a total of 45 new cases has been detected in this study period. On an average of 4 cases has been detected per year with a highest number is seen in 2015 and 2017. Annual new case detection rate was dropped from 1.9 to 0.90. However, an increase was noted between 2015 to 2018 and then gradually decreased

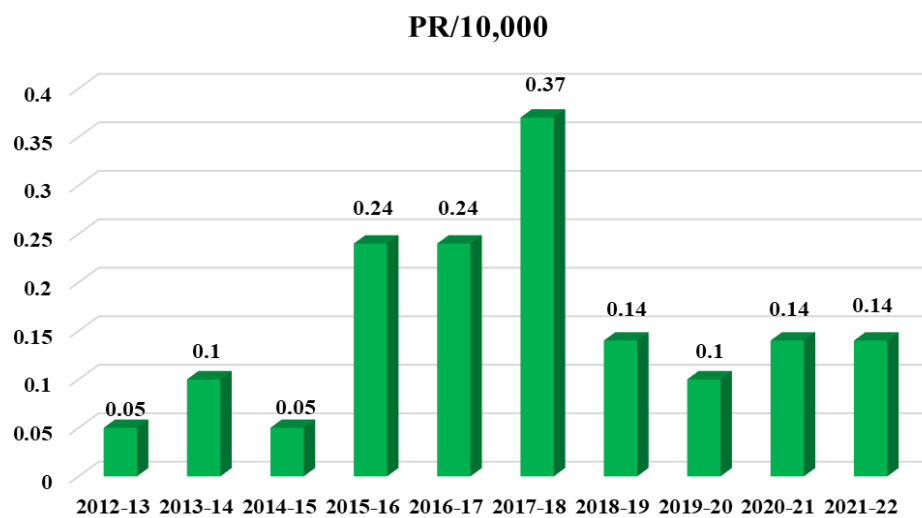


Figure 2 explains about the trend of prevalence rate in this population for 10 years study period gradually rises from 0.05 attains maximum in 2017 then declined and maintains at 0.14 for the last 2 years.

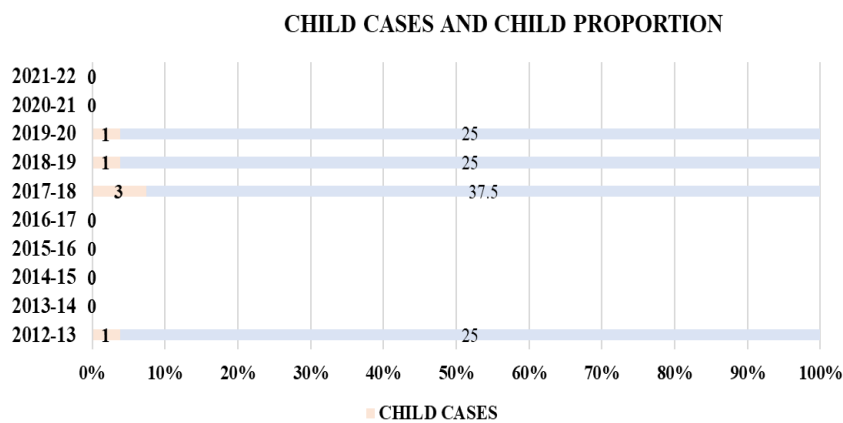
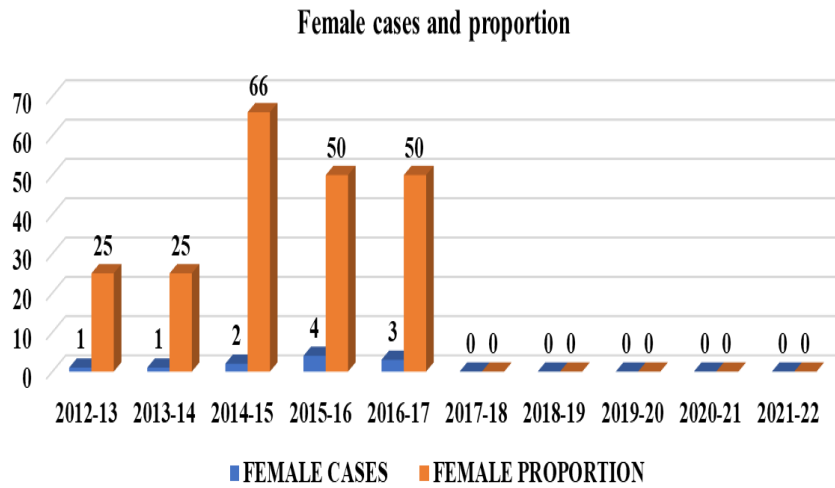


Figure 3 and 4 explains about the trend of age and sex distribution of leprosy in this study population. A total of 6 cases has been recorded and the maximum number of cases - 3 cases out of 6 cases nearly 50% was recorded in the year 2017. A total 11 female cases has been reported with a maximum number of cases has been reported in the year 2015 and 2016. No female cases been reported for the past five years.

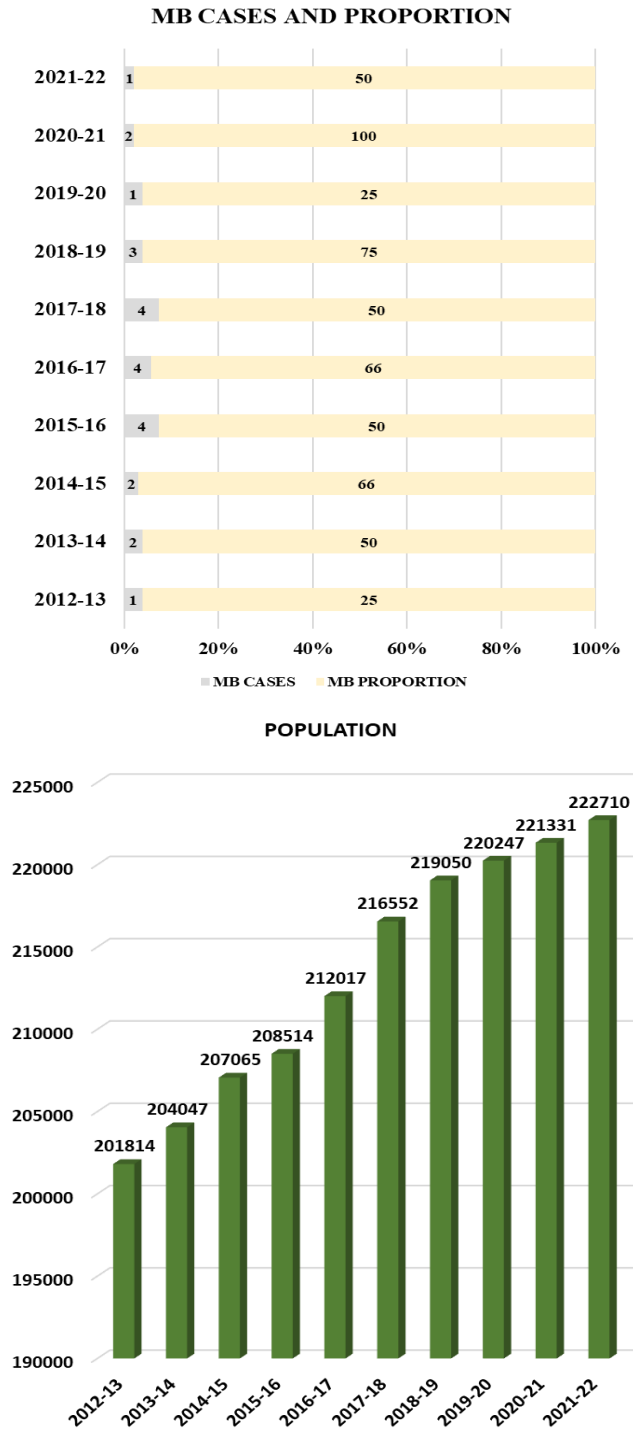


Figure 5 explains about the trend base on WHO disease types – a total 27 multibacillary case been reported in this study period with a maximum number of cases reported between 2015 and 2018. Among these 27 cases 24 patients were released from treatment and 3 were undertreatment. Figure 6 explains about the increasing trend of population in Karaikal district for the past 10 years Population gradually increased from 201814 to 222710.

Discussion

As per the Retrospective statistical analysis of data obtained from the health department, Karaikal, India from 2012 to 2022. Population gradually increased from 2.01Lakhs to 2.22Lakhs [7].

Various key indicators used in our study and its interpretation are as follows

1.Key indicators of elimination of disease in our study such as

i.New Case Detected- a total of 45 new cases has been recorded in this 10 years study period which reflects more accurately burden & transmission of leprosy

ii.PR – Prevalence Rate -gradually increased from 0.05% to 0.14% -The Prevalence Rate is not a good indicator for use, where the elimination of leprosy has been achieved as a public health problem.

iii.G2D – Grade II Disability cases– a total of 3 cases has been recorded in our study.The proportion of grade 2 disability amongst new cases detected in a year, gives a rough indication of how early the leprosy cases are coming forward for diagnosis.

iv.ANCDR – Annual New Case Detection Rate - dropped from 1.9 to 0.90. This indicator is assessed on 31st March every year. To have useful information from this indicator,the definition of new case should be strictly followed, which is “A case with signs of leprosy, who has never being treated before”[8].

2.Key indicators of elimination of transmission of disease in our study includes

Age & Sex	Male		Female		Child		Total	
No. of cases	34		11		6		51	
WHO types	MB (21)	PB (13)	MB (5)	PB (6)	MB (1)	PB (5)	MB- (27)	PB- (24)

i.MB cases and PB cases–Patients with leprosy due to recent infection are

more likely to have PB disease an increase in MB% might indicate decline/ interruption in transmission and signifies that the detection is late, quantum of infection in the community is high. It is a useful guide to know that the risk of complications is also high.

ii. Child Cases and its proportion- Represents recent transmission; indicates effectiveness of detection & diagnosis. High proportion of children among new cases indicates high transmission. If the transmission of leprosy is being reduced in an area, it is expected that the proportion of children affected will also decrease [9].

iii. Female Cases and its proportion -Indicates whether the women have adequate access to diagnostic services. The ratio of 2 males to every 1 female is commonly seen. Very low proportion of female cases needs some action to improve access.

Previous articles

1. 2006 - Epidemiological trends of leprosy elimination in CLTRI rural field operation area, Tamil Nadu, India

They analysed computerized data of patients in our Rural Field Operation Area (Kunrathur Taluk, Kancheepuram District, Tamil Nadu) and inferred that new case-detection rate has declined significantly from 27.3 in 1987 to 2.4/10000 in 2005 ($y = -1.6x + 2325.1$, $p = < 0.05$). The age-specific cumulative detection rates calculated showed highest case-detection at 10-14 years for total, 10-14 years for PB, 50-54 for MB, and 10-14 for both males and females. MB percentage was more among new cases in the last three years as compared to the initial three years, and this difference was found to be statistically significant, but there was no significant difference between the first three and the last three-year periods in child, male and disability rates (grade +/-2) among new cases.

Comparing this with our study showed similarities like declining trend in new case detection and slight increase in MB case load [10].

2. Trends in leprosy over fifty years in Gudiyatham Taluk, Vellore, Tamil Nadu

This paper presents epidemiological trends over a fifty-year period observed in a defined population served by the Schieffelin Leprosy Research and Training Centre (SLR & TC), Karigiri, Vellore District in Tamil Nadu. **Prevalence rates** have declined steadily from 125 per 10,000 population at the time of introduction of MDT in 1982 to 5 per 10,000 at the time of integration in 1997 to less than 1 per 10,000 in 2005. The male: female ratio showed a preponderance of males almost throughout the reference period. **MB rates** that were high initially, declined steadily during monotherapy and stabilized between 10% and 12% during the vertical MDT programme and is showing an increase in the post-integration-period. The proportion of cases with **Grade 2 disability** at registration showed a gradual decline. Comparing this with our study showed similarities like declining trend in prevalence rate, and a slight increase in MB case load and in our study 3 grade 2 disability cases have been recorded [11].

3. Global epidemiology of leprosy from 2010 to 2020: A systematic review and meta-analysis of the proportion of sex, type, grade 2 deformity and age

Computer retrieval of the study on the epidemiology of leprosy from 2010 to 2020 in Web of Science, PubMed, and SCOPUS databases were summarized. The meta-analysis included 30 studies totaling 11,353 cases. The global pooled proportion of male to female subjects with leprosy was 63% (95% CI 59%, 66%) to 37% (95% CI 34%, 41%), respectively. The pooled multibacillary proportion and paucibacillary proportion were 69% (95% CI 62%, 76%) and 31% (95% CI 24%, 38%), respectively. The pooled grade 2 deformity (G2D) proportion was 22% (95% CI 15%, 30%). Among age groups, the pooled children proportion was 11% (95% CI 8%, 13%), and the pooled adult proportion was 89% (95% CI 87%, 92%). Comparing this with our study showed similarities like male predominance, slight increase in MB case load and higher number of cases seen in adults compared to child cases [12].

Conclusion- Epidemiology of leprosy remains complicated because of the specific characteristics of *Mycobacterium leprae*. The *M. leprae* is a slow growing obligate intracellular parasite with long incubation period and it can't be cultured; it exhibits resistance to many antibiotics which are used in effective chemotherapy regimens. However, there is no vaccine or cure for leprosy; this renders treatment extremely difficult and leaves patients with severe disabilities that can last for life. Despite the statistical elimination of leprosy, detection of new cases continues. The impact of population explosion versus leprosy, a disease of extremely long incubation period, (leprosy) has been callously overlooked. Therefore, a need to continue leprosy control activities with full vigor to achieve the "Leprosy Free India" vision by the year 2030

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