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Original Article

Epidemiological trends of leprosy in an urban leprosy centre of Delhi : A retrospective study of 16 years

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This study was done by collecting the retrospective data from 1994 to 2009 of patients attending the urban leprosy centre attached to the department of dermatology, STD & leprosy of PGIMER & Dr. R M L Hospital, New Delhi. The data was analysed according to age, sex, type of leprosy, leprosy reactions, deformities and relapse and compared with the national figures by comparison of proportions after taking the national data per 10,000 population. A total of 3659 patients attended our ULC (Urban Leprosy Centre) among which 2741 were male and 945 females (M:F - 3:1). 669 patients (18.2%) were children. The data analysed show a gradual decline in new case detection rate with a marginal rise in 2005 and 2008. Percentage of MB cases was falling consistently till 2005 after which it showed an abrupt rise. The incidence of type 1 reaction varied from 21% in 1994 to 10% in 2009 in PB patients and from 6% in 1994 to 8% in 2009 in MB patients. The trend of type 2 reactions in MB patients showed a slow declining trend. MDT completion rate showed an impressive improvement from 56% in 1994 to 90% in 2009. The number of patients revisiting the ULC with features of relapse also showed a decrease in number. The pattern of visible deformities showed an almost constant trend similar to national figures. Improved MDT completion rate helps in reducing the disease transmission, severity, reactions and disabilities.

Key words : Leprosy, Epidemiology, Reactions, Relapse, Deformities

Introduction

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*. In spite of all measures, leprosy is a major public health problem in India, which affects many people every year and significantly high new case detection rate (Kumar et al 2004). With the introduction of MDT since 1983 as recommended by the WHO study group and the combined efforts of NLEP, ILEP, Sasakawa memorial health foundation, Nippan foundation, Novartis, DANLEP and the World bank, our country has achieved the goal of elimination of leprosy in December 2005 (NIE and ICMR 2005). On the IEC campaign, the year 2008-09 was

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observed on the theme "Leprosy Free India" all over the country. However about 0.87 lac leprosy cases were on hand as on 1st April 2008, with PR 0.74/10,000. Till then 29 States/ UTs had attained the level of leprosy elimination. 482 districts (78.5%) out of total 614 districts also achieved elimination by March 2008. A total of 1.34 lac new cases were detected during the year 2008-09, which gives Annual New Case Detection Rate (ANCDR) of 11.19 per 100,000 populations (NLEP 2009).

As on October 2009, 19 districts in 8 states are having PR > 2/10,000. However Only New Delhi district has recorded PR > 10/10,000 (Kumar et al 2004). This is due to the fact that most of the major hospitals with good diagnostic facilities are located in New Delhi district and it acts as a major catchment area for migrant population especially from Bihar, Uttar Pradesh, Chhattisgarh, & Jharkhand apart from natives of the city itself. The epidemiological trend from 1994 to 2009 of one of the urban leprosy centers of a major hospital located in the heart of New Delhi district has been analyzed and correlated with those of the national parameters.

The aim of this study was to find out the trend in presentations of leprosy patients in an urban leprosy centre (ULC) from 1994 to 2009, their variation from that of national trend and to interpret this data with respect to different epidemiological variables like age, sex, type of disease, deformity, defaulter rate and relapse.

Material & Method

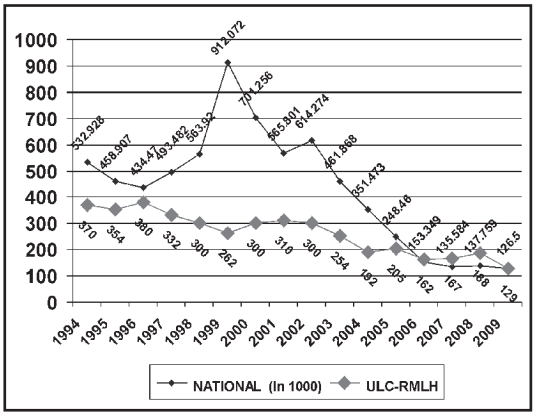
All the patients attending the urban leprosy centre attached to the out patient department of Dermatology, STD & Leprosy of Dr Ram Manohar Lohia hospital with the complaints of diminished sensation, hypopigmented patch, nerve pain and/or other constitutional symptoms and other relevant signs and symptoms of leprosy were examined clinically and thoroughly investigated. The slit-skin smear and histopathological examination were done as supplements for the diagnosis and classification of leprosy. These patients are classified according to Ridely-jopling classification as well as PB & MB types and treated accordingly. The epidemiological and demographic data of all patients (total 3659) who attended the urban leprosy centre during the last 16 years i.e. from 1994 to 2009 were analyzed to observe the various epidemiological trends.

The data obtained from the ULC is compared with national figures on a year wise basis. Graphical presentation of numerical data is done. The number of patients from ULC is taken as primary data and is compared with number of patients per 1000 population from the national data which is taken as secondary data. The data which is expressed in proportion is compared with proportion of patients from the national data.

Statistical techniques used in the study are – Arithmetic mean, Mean and Standard deviation, Coefficient of variation & correlation and Time forecasting.

Observations

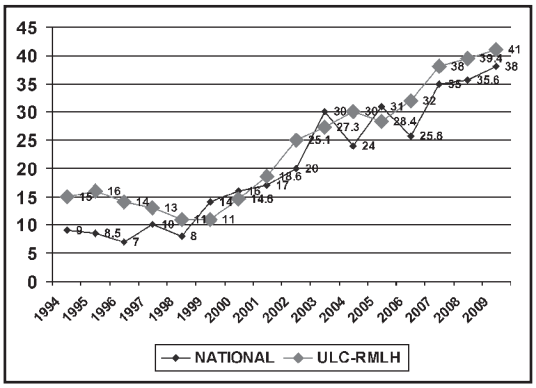
Out of the total 3659 patients who attended the ULC of Dr RML hospital during last 16 years (1994-2009), 2948 patients (80.57%) were among multibacillary group treated with MB MDT while 711 patients (19.43%) were paucibacillary treated with PB MDT.



Graph 1 : Trend of New case Detection

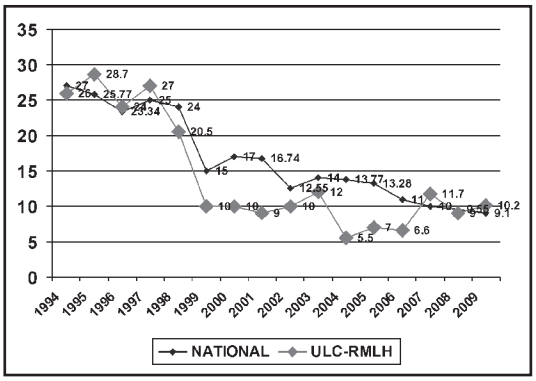
The fall of NCDR (New case detection rate) of national average is from 5.9 new cases per 1000 populations (total 5,32,928 cases) in 1995 to 1.1 new cases per 1000 populations (total 1,26,500 cases) in 2009 (NLEP 2009). In this hospital based study, the total number of new cases was 370 in 1994 and decreased to 129 cases in 2009. The graph of new case detection shows a gradual decline in our set-up with a marginal rise in 2005 and 2008 as compared to the previous years. From 1997 to 2005, there is gap between ULC-RMLH and national data, i.e. while the overall NCDR was increasing in India, the number of new cases were falling in our hospital. This gap was maximum in 1999.

A total of 945 female patients attended our urban leprosy center. The graph-2 shows a continuous increasing proportion of female patients from only 15% in 1995 to around 41% in 2009. This trend is similar to that of national figure where the proportion of female cases increased from 9% from 1994 to 38% in 2009. This rising trend is a very clear indicator of rising female literacy, awareness and changing social perceptive towards importance of female health care.



Graph 2 : Proportion of Female cases

Similarly the graph showing proportion of child cases shows a continuous declining trend from 26% in 1994 to 10.2% in 2009 which is comparable to the national figures (27% in 1994 to 9.1% in 2009). One of reasons of decline might be due to increased proportion of female patients, who are the closest contacts of the children, came forward for treatment that resulted in decrease in transmission of leprosy to children from their mothers.



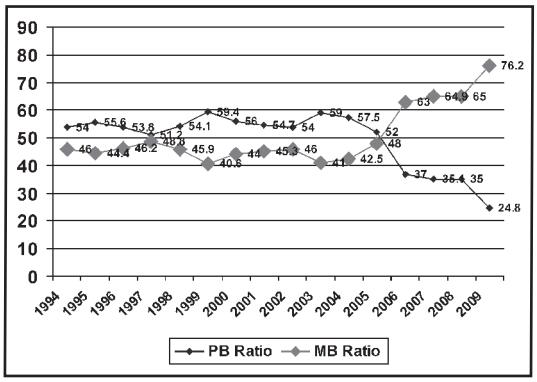
Graph 3 : Proportion of Children

CORRELATION BETWEEN FEMALE AND CHILDREN PATIENTS –

Mean of female patients – 17 $dx = 112$ $dx^2 = 1966$

Mean of children patients – 26 $dy = -28$ $dy^2 = 1682$

Correlation co-efficient (r) = **- 0.81**, i.e. there is negative correlation between Children and female patients.



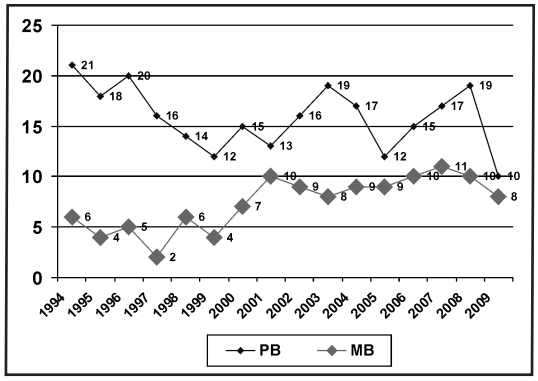
Graph 4 : Ratio of MB & PB cases

Table 1 : Year wise percentage of individual type of leprosy patients

Year	Percentage of cases (%)						
	IND.	TT	BT	BB	BL	LL	PN
1994	7.9	20.9	30.6	12.5	10.7	13	4.4
1995	8.4	14.4	33.4	13	10.1	13.8	6.9
1996	7.9	20.9	30.6	12.5	10.7	13	4.4
1997	10.2	14.2	32.4	14.4	10.7	12.3	5.6
1998	11.3	21.4	30	14.8	9.5	8.0	5.0
1999	11.1	18.8	30.8	14.4	10.4	12.3	2.2
2000	6.4	2.2	54.1	18.5	7.6	7.3	3.9
2001	2.6	5.3	60.4	12.5	4.9	5.7	8.6
2002	1.9	5.6	55.6	14.9	10.8	5.2	6.0
2003	0.4	6.9	50.6	20	7.8	5.7	8.6
2004	1.4	7.0	55.6	16.8	7.0	4.7	7.5
2005	1.0	5.7	57.5	15.1	7.8	6.0	6.9
2006	1.2	4.2	60	17	8.8	6.5	2.3
2007	1.8	2.2	58	16	9.4	3.2	9.4
2008	1.1	3.1	59.4	13.5	10.8	4.8	7.3
2009	1.3	4.3	56.9	16.7	10.5	3.4	6.9

This negative correlation clearly denotes that if the proportion of female patients in the community increases due increased awareness, the incidence of leprosy in children will definitely decrease.

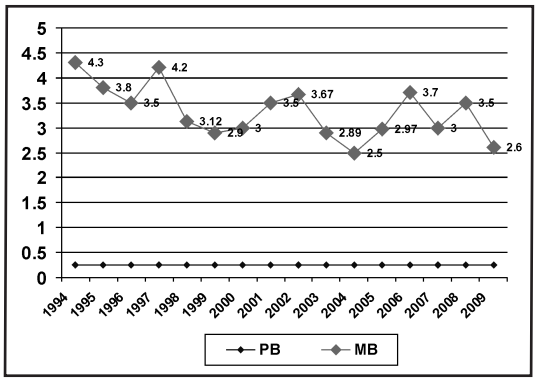
The percentage of MB cases which were falling consistently but very slowly till 2005 abruptly showed an upward trend and reached around 76% of total cases in 2009. This increase in MB patients is a plausible sign of existence of inaccessible pockets of population harboring undiagnosed leprosy patients for a long time. These patients are now coming forward voluntarily for treatment to the medical centers and the hospitals through improved IEC programme of NLEP. The Table-1 showing the percentage of individual type of leprosy patients depicts a fall in the number of cases of tuberculoid, indeterminate & lepromatous spectrum, a rapid increase in the BT spectrum, slow increase in BB spectrum and a more or less constant BL spectrum.



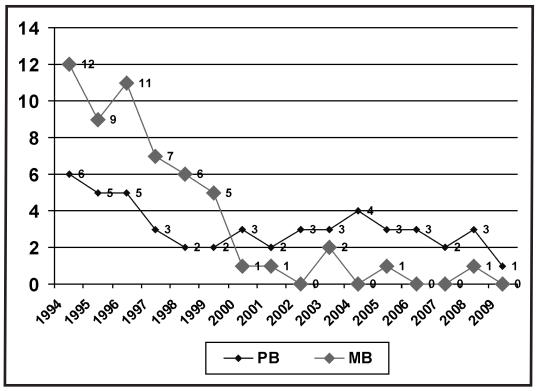
Graph 5 : Percentage of type 1 reaction in MB & PB patients

Incidence of type 1 reaction

The graph-5 shows the incidence of type 1 leprosy reactions among PB & MB patients. In the last 16 years, the incidence varies from 21% to 10% in PB patients and from 6% to 8% among MB patients. More than 50% of the type 1 reactions are observed among the BT patients.



Graph 6 : Incidence of type 2 reaction in MB & PB patients



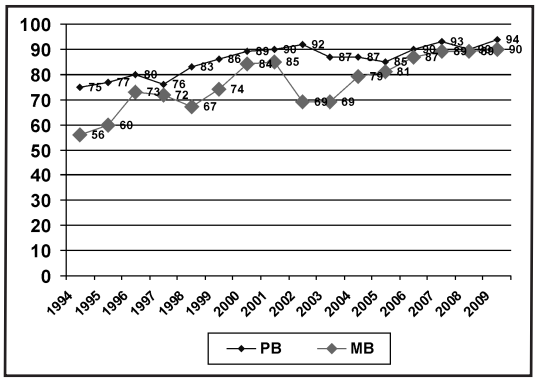
Graph 8 : Number of Relapse in MB & PB patients

Incidence of type 2 reaction

The graph-6 shows that the trend of type 2 reactions in MB patients showed a very slow but constant decline throughout the decade. It was 4.3% in 1994 and came down to 2.6% in 2009.

MDT completion rate

The graph-7 is showing impressive improvement of MDT completion rate over the years. Among PB cases, completion rate improved from 75% (1994) to 94% (2009) where as it increased from 56% (1994) to 90% (2009) among MB cases.



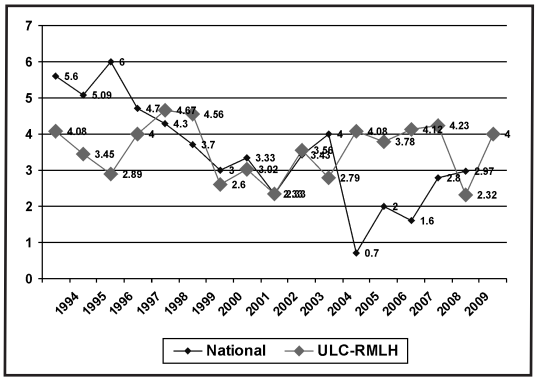
Graph 7 : MDT completion rate in MB & PB patients

Relapse

The graph-8 shows the number of cases revisiting the leprosy clinic (ULC) for relapse after released from treatment, an important indicator of efficiency of MDT programme. There is a rapid decrease in number of relapse cases detected across the years among MB & PB cases. The year wise decrease in number of detected relapse cases might be due to long incubation period of relapse or better drug compliance. The later is clearly indicated in graph-7 (MDT completion rate in PB & MB patients). This increase in MDT completion rate is inversely proportional to number of relapse cases.

Deformity rate

The pattern of visible deformity in graph-9 shows almost a constant trend (in both national and our



Graph 9 : Deformity Trend

figures). There was a declining trend from 2000 to 2004 and then again it started increasing gradually. Although grade II deformities are not a sensitive indicator because the damage has been irreversible done, but even a declining and static trend indicates a high level of community awareness to the leprosy programmes.

Discussion

The coverage of MDT in India was limited before the year 1993-94 due to organizational issues and fear of the disease becoming disclosed and the associated stigma in the society. In order to strengthen the process of elimination of leprosy in the country, the 1st phase of the World Bank supported project on NLEP was started from 1993-94 and was completed in March 2000. To further consolidate the gains, the 2nd phase of World Bank project on NLEP was started in 2001 which ended in December 2004. Decentralization of NLEP to states/UTs and integration of leprosy with general health care system (GHS) was carried out during this phase. The NLEP was being continued with funds from the government of India since January 2005 onwards. Additional support continues to be received from WHO and NLEP organizations. MDT is supplied free of cost by Novartis through WHO. We made an attempt to analyze data of one of ULC of Delhi from 1994 till 2009 for comparison with that of the available national data.

The retrograde study of 3659 leprosy patients who attended the ULC attached to Dr RML hospital in the last 16 years (1994-2009) provided a reasonable amount of information regarding the trend of the disease particularly with respect to type of leprosy and incidence of new case detection, leprosy reactions, deformity rate, relapse rate and defaulters. In this ULC, we noticed a conspicuous decreasing trend in new case detection rate from 370 cases in 1999 to 188 cases in the year 2009. This was similar to the data observed from national figures (Graph-1). It was found that the fall of NCDR (New case detection rate) of national average is from 5.9 new cases per 10000 populations (total 5,32,928 cases) in 1995 to 1.1 new cases per 10,000 populations (total 1,26,500 cases) in 2009 (NLEP 2009). The trend of female patients attending our ULC is also similar to the national figures (NLEP 2009). Mahajan et al in 2003 also found in their study from Himachal Pradesh that the disease was commoner in males with an increasing trend in females. The statistically significant negative correlation ($r = -0.81$) between female and children patients clearly depicts that all public awareness programmes should specially target female population in the community. By increasing the proportion of female patients, we can automatically keep a vigil over the proportion of children getting the infection. The yearly variation in number of paucibacillary and multibacillary patients is similar to that of the national data. The percentage of multibacillary patients which was less than that of paucibacillary cases until the year 2005 (average 45% MB against 55% PB cases) suddenly started to rise and reached to around 65% MB cases against 35% PB cases by the end of 2009 (Graph-4). In our ULC every patient was thoroughly investigated including histopathological examination of skin specimen and BI/MI from slit skin smear and finally patients were categorized according to Ridley-Jopling classification. Therefore the percentage of wrongly classified MB cases was minimized. The possible reason of higher MB cases might be the presence of inaccessible geographical pockets inside this state particularly in J.J colonies with more number of multibacillary patients and their close contacts. The second possible reason might be constant migration of the people from other states to this state, which hindered them to come to the health centre for check up at its earliest. Since, the present leprosy elimination programme only inculcates voluntary reporting,

the patients often present late when they have overt manifestations of deformities with borderline or even lepromatous picture. Many of these patients present only when they develop features of leprosy reactions and neuritis. Therefore the present IEC strategies should be modified taking into account of the present situation both in urban and rural area where we expect 100% voluntary reporting of cases at the earliest. As per the Ridley Jopling classification, In our study, maximum number of patients are in borderline spectrum with majority of BT cases. This was similar to the observations made by Mahajan et al in 2003 from Himachal Pradesh and Singh et al in 2009 at their rural leprosy center in Wardha. The number of Indeterminate and tuberculoid (TT) patients in our study show consistent fall throughout the study period. A similar fall is also seen in lepromatous cases. However the proportion of patients in the borderline spectrum (BT, BB & BL) shows an increasing trend. The less number of patients presenting in tuberculoid stage may be due to the fact that single lesions of TT can be easily missed and spontaneously regressed due to good CMI and that too in persons of low socio-economic condition who are less cosmetically concerned. This late presentation of tuberculoid cases automatically leads to detection of more patients in BT and BB spectrum. The graphs on leprosy reactions shows that more number of type 1 reaction were seen in paucibacillary patients. The other important observation was that among these paucibacillary patients more than 50% of type 1 reaction was seen in BT leprosy. Similar incidence of reversal reaction was seen in a study by Van Brakel et al (1994) in west Nepal. They also found that the incidence of type 1 reaction was >50% in BT and BB cases. In the study by Kumar et al (2004) from north India, 30.9% of patients present with signs of type 1 reaction at the first visit. The study of leprosy reaction in field by Desikan et al (2007) also shown that 74% of total type 1 reaction occurred in BT cases. Even in multibacillary patients, the incidence of type 1 reaction is increasing which may be attributed to early institution of multidrug therapy in these patients leading to reversal reactions. Contrary to increased incidence of reversal reaction, the percentage of multibacillary patients presenting with ENL reactions was almost constant throughout the study period. This might be due to reduction of lepromatous patients and MB cases with comparatively lower bacillary load due to early diagnosis. This may be the reason of less percentage of multibacillary patients presenting with type 2 reactions.

The other important observation was the revisit of few RFT cases with features of relapse which was also further decreased significantly over the period. This could be due to improvement of MDT compliance over the years (graph-7). However this observation is not an absolute indicator of low relapse rate, since it was purely a voluntary reporting by patients with features of relapse. The another possibility for the gradual decrease in number of reported cases could be presentation of less and less number of relapse cases over the years from 1994 to 2009.

There are a number of factors which can be attributed to the decline in new case detection rate – a) rising health consciousness among general public, b) uninterrupted availability of MDT at health centers, c) patient satisfaction with treatment leading to better drug compliance, d) rising socioeconomic condition and e) better voluntary post RFT monitoring. Similarly the rising trend of proportion of female patients may be interpreted as a marker of various socio-economic indicators like - rising female literacy, changing social customs, better transportation facilities etc and hence better access to health care services.

The new case detection rate among children is also a very sensitive indicator of socio-economic strata and health care delivery system. The increasing number of mothers presenting to health centre automatically diminishes the incidence of mother to child transmission of disease and thus reduces the incidence of new case detection in children.

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