

Changing Profile of Disease in Leprosy Patients Diagnosed in a Tertiary Care Centre during Years 1995- 2000

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Abstract

A hospital based retrospective study was carried out to determine change in the profile of disease in leprosy patients taking 1995 as baseline and compared with the profile seen in year 2000. A total of 2149 and 1703 cases were studied respectively of year 1995 and 2000. Male to female ratio slightly increased from 2.95: 1 in year 1995 to 3.4: 1 in year 2000. Majority of patients were of borderline type in both years. Proportion of cases with MB leprosy was nearly same in females (60.8%) and males (63.1%) in year 1995 and in year 2000 (64.8% females and 67.6% males). Proportion of highly bacillary cases has decreased over the years in females (from 20.95% in 1995 to 11.7% in year 2000, $p=0.03$) as well as in males (from 25% in 1995 to 15.5% in year 2000, $p=0.001$). Incidence of total reactions increased from 27.6% to 35.4% over the years which is significant ($p<0.01$). Proportion of type 1 reactions were more in reproductive age group in females in both years ($p<0.05$) and of type 2 reactions were significantly ($p\geq 0.05$) more in males in both years. Incidence of disability (both grade 1 and grade 2) was significantly more in males than in females in both years ($p\geq 0.04$). Grade 1 disability has significantly increased over years in females from 10.11% to 14.8% ($p<0.03$) as well as in males from 13.27% to 21.3% ($p<0.001$).

Onset of reactions was associated with pregnancy / lactation in 62% of cases and with menopause in 21 % of cases in 2000, which suggests strong correlation with hormonal imbalance. To conclude while leprosy incidence has declined after MDT, recognition and management of reactions in women around changes in their hormonal levels should be properly monitored for early and effective management.

Key words: Leprosy, Type 1 and 2 reactions, Disability, Pregnancy/lactation

Introduction

Widespread implementation of Multi drug therapy (MDT) has made management

of leprosy cases rational, efficient and of shorter duration and has thus improved patient's compliance and reduced case load

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(Selvaraj et al 1998). It has also led to substantial fall in overall prevalence of the disease (Noordeen 2006). A change in profile and attitude to disease has been observed in the community (Ramu 2000). Women bear responsibility for the health of their families and thus make a substantial impact on disease status in family and in community. The proportion of female leprosy patients is reported to be lower than that of males. It had been reported that most of the female patients manifest their disease during puberty and/or during pregnancy and lactation and there is high incidence of reactions in them (Dharmendra 1985). While some background information is available, most of the studies done are old and of the dapsone monotherapy era. So, the study of profile of leprosy in women was carried out retrospectively in MDT era for the years 1995 and 2000 to observe any changes in the disease profile in them and was compared with profile in males.

Patients and Methods

The records of all new female and male patients attending OPD (Medical unit I) in the year 1995 and 2000 were screened and analyzed. The patients of 1995 formed group I and those of 2000 formed group II. From the OPD records details were noted on age, type and duration of disease, past treatment,

presentation of disease, deformity status, presence of reactions and bacteriological status of the patients. Diagnosis and classification (as per IAL) of disease was based on the clinical assessment of number and nature of patches and for AFB smears were taken from 4 sites; one from each ear lobe and two from sites of lesions/active disease. All the patients were put on MDT as per standard MDT regimen. PB cases included smear negative indeterminate, TT and BT (with ≤ 5 patches) cases; while MB cases included BT cases (with > 5 patches or ≤ 5 patches with a positive skin smear) and BB, BL and LL cases (WHO 2000). Mononeuritic smear negative cases were treated with PB MDT while polyneuritic cases were treated with MB MDT (WHO 1998). For MB patients 3 drug MDT was continued until smear negativity or for at least 2 years and PB patients received the standard PB MDT for 6 months or till inactivity (WHO 1982).

Results

Among 2149 new cases attending OPD in year 1995, 544 (25.31 %) were females and 1605 (74.7%) were males whereas in year 2000, total number of cases decreased to 1703 with 387 (22.72%) females and 1316 (77.3%) males. There was slightly increase in the ratio of male: female (2.95 and 3.4 respectively) from 1995 to 2000. Data was analyzed by statistical software STATA7,

Table 1: Distribution of cases according to age

Age-group (Years)	Female (%) 1995	Male (%) 1995	Female (%) 2000	Male (%) 2000
1-15	14.52	19.73	14.72	18.75
16-34	43.38	36.81	43.41	34.06
35-49	31.61	25.15	28.68	25.29
≥ 50	10.47	17.81	13.17	21.59
Total	544	1605	387	1316

Stata Corporation, 4905 Lakeway Drive College Station, Texas 77845 USA. Observations are as follows:

- a. **Age distribution** : Table 1 shows age wise distribution of cases in both years. Majority of cases belonged to 16-34 years age-group i.e. reproductive active age-group in both years. It was observed that proportion of cases in age-group of less than 15 years and >50 years were significantly less in females than in males in both years ($p < 0.05$) whereas in 16-34 years and 35-49 years age group proportion of female cases was significantly more than in male cases in both years ($p < 0.05$).
- b. **Distribution of cases according to type of disease** : Majority of patients significantly belonged to borderline group, in both males and females in both years ($p < 0.01$) (Table 2). Among total cases of both years, borderline cases (BB/BL) were significantly more in females ($p < 0.05$) and LL cases were more in males ($p < 0.05$). 60.8 % (in year 1995) and 64.8% (in year 2000) females belonged to 'MB' disease whereas 63.17% (in 1995) and 67.62 % (in 2000) males belonged to 'MB' group. There is rise in proportion of MB cases over the years though statistically not significant (Fig 1).

- c. **Bacillary index** : There was reduction in proportion of smear positive cases among new cases over the years from 1995 to year 2000 in both females (from 20.95% in 1995 to 11.7% in year 2000, $p = 0.03$) as well as in males (25.04% in 1995 to 15.5% in year 2000, $p = 0.0001$) (Table 3).
- d. **Proportion of new cases presenting with disability** : Incidence of disability (both grade 1 and grade 2) was significantly more ($p \leq 0.05$) in males than in females in both years (Table 4). No significant difference in the proportion of cases with grade 2 deformities was found between years 1995 and 2000 (22.28% and 23.13% resp.) though proportion of cases with grade 1 deformity has significantly increased over years in females from 10.11% to 14.8% ($p < 0.03$) as well as in males from 13.27% to 21.3% ($p < 0.001$).

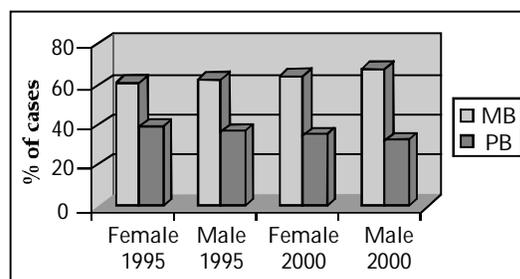


Fig 1 : Proportion of MB cases in new cases

Table 2 : Distribution of cases as per type of disease

Type of disease	1995		2000	
	Female %	Male %	Female %	Male %
Indeterminate	2.2	1.68	1.80	1.36
TT	4.41	3.98	1.03	1.29
BT	29.77	29.28	27.13	27.43
BB/BL	48.15	45.73	51.62	45.28
LL	11.58	13.89	11.36	15.42
Neuritic	3.86	5.42	6.97	9.19
Total cases	544	1605	387	1316

Table 3 : Bacteriological index (BI) of patients

BI	Female 1995	Female 2000	p-Value	Male 1995	Male 2000	p-Value
Smear neg	430(79%)	342(88.37%)	0.002	1203(75%)	1112(84.5%)	0.401
≤ 3+	48 (8.82%)	15 (3.9%)	0.003	159(9.9%)	75 (5.7%)	0.0001
> 3+	66(12.13%)	30 (7.8%)	0.03	242(15.14%)	129(9.8%)	0.0001
Total patients	544	387		1605	1316	

Table 4 : Disability status of patients

Disability status	Female 1995	Female 2000	p-Value	Male 1995	Male 2000	p-Value
Grade 1	55 (10.11%)	213 (13.27%)	0.05	57 (14.8%)	280 (21.3%)	0.005
Grade 2	96 (17.7%)	383 (23.9%)	0.002	74 (19.12%)	320 (24.31%)	0.04
No disability	393 (72.3%)	1009 (62.9%)		256 (66.14%)	716 (54.4%)	
Total case	544	1605		387	1316	

Table 5 : Proportion of reactions in male and female patients

	Number of cases with reactions			
	1995		2000	
	Female	Male	Female	Male
Type 1 reaction	92(71.88%)	265(56.99%)	95(74.80%)	321(67.44%)
Type 2 reaction	36(28.13%)	200(43.01%)	32(25.20%)	155(32.56%)
Total reactions	128	465	127	476

- e) **Incidence of reactions :** Total incidence of reactions has increased from 23.53% (year 1995) to 32.8% (year 2000) in females and from 28.97% (year 1995) to 36.17% (year 2000) in males ($p < 0.05$). Proportion of type 1 reactions were significantly more than of type 2 reactions in both groups in both years ($p < 0.001$) (Table 5). Among total reaction cases proportion of type 1 reactions were more in females in both years i.e. 74.8%

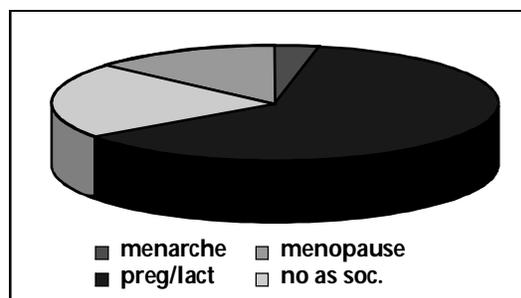
**Fig 2 : Relation of reactions with hormonal physiology**

Table 6 : Age wise distribution of cases with reactions

	Female 1995		Male 1995		Female 2000		Male 2000	
Age gp	Type 1	Type 2	Type 1	Type 2	Type 1	Type 2	Type 1	Type 2
0-15	3	5	15	3	6	1	23	3
16-34	36	14	108	87	44	11	151	66
35-49	44	9	89	58	38	13	71	46
>49	9	8	53	52	7-	7	76	40
No. of reaction	92	36	265	200	95	32	321	155

females: 67.4% males in 2000 and 71.8% females: 56.9% males in 1995 ($p < 0.05$). Type 2 reactions were significantly more in males in both year 1995 ($p < 0.001$) and year 2000 ($p = 0.05$). Type 1 reactions were significantly ($p < 0.03$) more in reproductive age group in females in comparison to males, in both years (Table 6). In female reaction cases of year 2000, onset of reactions was associated with onset of menarche in 3% of cases with pregnancy/lactation in 62% of cases and with menopause in 21% of cases in 2000 (Fig 2).

- f. **Distribution of cases as per duration of disease**: 54.2% of female and 65% of male cases came within 2 years of onset of disease in year 1995 in comparison to 69.7% females and 69.9% males in year 2000. Over the years, there is rise in number of females reporting earlier in comparison to males, though it is statistically marginally significant ($p = 0.05$).

Discussion

With widespread use of MDT the numbers of advanced MB cases are decreasing. In this study, the change in trend of disease was analyzed. Females have a different exposure to disease and infection. The diseases may have different impact on

women. Traditionally, male: female ratio is reported to have shown preponderance of males from sulfone to MDT era (Norman et al 2006). In our hospital based retrospective study too, preponderance of males was seen with low proportion of females (25.31% in 1995 and 22.72% in 2000). Perhaps, it is due to difference in health seeking behaviour of males and females as females are slow to self report (Richardus et al 1999). There was a decline in total number of cases from 2149 in year 1995 to 1703 in year 2000 which is consistent with decline in annual case detection rate parallel to decline in prevalence reported in other studies (Selvaraj et al 1998) as a result of continuation of MDT and timely completion of treatment of large number of cases. In earlier studies, a bimodal peak was observed between 10-14 years and 30-40 years (Rao et al 1972, Dharmendra 1985) whereas in MDT era incidence rate has been reported to rise between 10-20 years of age (WHO 1988) and 20-35 years age-group was reported as peak age of onset with average onset of age 31.92 (Wu et al 2000). Child proportion in leprosy has declined and been reported as 16-18% (Rao and Jayakumar 2006); 16.3% (WHO 2000); 15-32% (Norman et al 2006); 8-10% (Casabianca 2006); 17.3% (Pandey et al 2006). In our study, proportion of cases in less than 16 years age group (14% females and 19% males) is consistent with trend in other

studies. A gradual increase in the mean age of patient at the onset of disease has been reported (WHO 1988, Norman et al 2006) over the years from dapsone to MDT era. Majority of patients were of reproductive age group in our study and among them proportion of females was significantly more than of males ($p < 0.05$). Since, it is linked to physiological changes of pregnancy/ puerperium etc., this could be related to hormonal imbalance. Peak incidence observed in females in reproductive age group has been reported in other studies (Lockwood and Sinha 1999); but peak in perimenopausal group is significant suggesting some links with hormonal status. Borderline cases are more common in MDT era as reported in other studies (Norman et al 2006) in comparison to polar types i.e. LL and TT in dapsone era (Ramu 2000, Norman et al 2006). In our study too, majority of patients belonged to borderline group, in both males and females in both years. As the borderline lesions are more apparent, so perhaps it may be a reason for more patients self reporting with borderline form of leprosy. Decreased proportion of cases in early polar form of disease may be due to increase of herd immunity in the community and CMI in the individual at one end or at the other end perhaps patients still tend to hide their inapparent/early lesions due to fear and stigma. There are 63-69% cases of multibacillary group which is higher than that reported in some studies (WHO 2000, Kumar et al 2004, Pandey et al 2006) and consistent with report of other study (Mahajan et al 2003). Increase proportion of multibacillary cases is important as they represent major source of infection and they are at greater risk of reactions (Kumar et al 2004) and consequent nerve damage which may succumb to preventable disability (van Brakel and Khawas 1996). There is decline in number of smear positive cases in year 2000 depicting that patients are

reporting early and cases with less advanced form of disease are coming now. Leprosy is still considered as a contagious and unclean disease, therefore patients particularly females tend to hide their disease and delay their treatment at that time when they could have been easily cured. In this study, 54-69% of cases reported within 2 years of onset of disease and there is rise in number of cases especially in females, coming earlier within 2 years of onset of disease but this lag period must be further reduced to prevent disease complications. Leprosy has been a feared and stigmatised disease mainly because of the deformities associated with it. In sulphone era, deformity rate had been reported to range from 35.5% to 43% in same population (Noordeen and Srinivasan 1966, Rao et al 1970) and reported to be more common in men than in women (Enna 1974). Though widespread use of MDT has made a sea change in the profile of the disease nevertheless, disabilities continue to be a major problem (Srinivasan 2000). In MDT era, various studies have reported disability rate to vary as 22.3% (Saha and Das 1993); 24.3% (Selvaraj et al 1998); 7.9% (Casabianca 2006); 20-25% (Norman et al 2006); 22-27% (Rao and Jayakumar 2006) respectively. In this study, disability rate among new cases (34% in females and 45.6% in males) is higher than reported in other studies as being a tertiary care hospital where many referred cases also come and proportion of cases with disability (both grade 1 and grade 2) is significantly more ($p < 0.05$) in males than in females in both years. This male preponderance in disability incidence has been also reported in other studies (Mishra et al 1988, Saha and Das 1993, Richardus et al 1999). While no significant difference in the proportion of cases with grade 2, disability was found between years 1995 and 2000; there is significant increase in cases with grade 1 disability over the years in females as well in males. It shows that

increased number of grade 1 disability associated with or developed after occurrence of reactions is a compelling reason for patients to be referred or to self report to this hospital. Early diagnosis of grade 1 disabilities is important because they are at serious risk of developing grade 2 disability which can be prevented by appropriate management.

After the introduction of dapsone the incidence of reactions has increased and developed in more than half of the patients (Cochrane 1964). After MDT, reactions continued to occur during treatment (Prabhavalkar and Ansari 1997) although the number of ENL-type reactions in MB patients taking treatment has diminished due to the suppressive effect of the clofazimine used in MDT (Post et al 1994). It had been observed that incidence of type 1 reactions has increased and those of type 2 has decreased in MDT era (Kumar et al 2004). Various studies have reported reactions in a high percentage (41.3%, 30.9%) of their patients at the time of presentation (Lienhardt and Fine 1994, Kumar et al 2004) which show that many patients seek treatment only when they develop reactional lesions or painful symptoms of neuritis due to reaction. Our data shows, 27.6% cases (in 1995) and 35.4% cases (in 2000) presenting with reactions which is consistent with other studies. Increasing incidence of reactions over years perhaps shows increasing awareness in patients for reactions forcing them to seek treatment from a hospital rather than field based clinics.

Out of total female cases presenting with reactions higher proportion of patients (71.8% in 1995 and 74.8% in year 2000) were having type 1 reactions whereas proportion of type 2 reactions were more in males in both years. Higher incidence of type 1 reactions among women than in men is particularly

significant since overall incidence of leprosy and of reactions is greater for men than in women. Higher risk of type 1 reactions in females has been reported earlier too (Scollard et al 1994, Kumar et al 2004). Association of onset of reactions with pregnancy/lactation has been reported in sulphone era (Duncan and Pearson 1982) and in MDT era (Lienhardt and Fine 1994). In our study too, association of reactions with menarche, pregnancy/lactation and menopause is observed. Relation between pregnancy / lactation and leprosy reactions could not be statistically analyzed in the present study due to lack of complete information in the records. Association of disease onset and reactions with menopause suggests some hormonal imbalance which needs to be further evaluated in a planned detailed prospective study.

As this was a hospital-based study, results may not reflect status of disease in a community and also being a tertiary care centre most of the cases belong to geographic area away from local population. So this study may not reflect general population but it depicts the general trend of disease. Decreased proportion of female cases is a cause of concern and there is a need to develop gender-sensitive health education strategy to encourage female patients for self-reporting. Decreasing incidence of smear positive cases and higher incidence of reactional and deformity cases shows that although implementation of MDT has been effective in reducing infectivity and disease transmission, there is a need for emphasis on assessment of reactions and disability at diagnosis so that those at particular risk can be recognized and managed appropriately.

Conclusion

In the current MDT era, there is preponderance of leprosy patients in reproductively active age groups and of

borderline type. There is increase in cases with grade 1 disability which requires timely treatment for prevention of deformities. There is decline in proportion of highly smear positive cases, rise in number of patients coming earlier and rise in total incidence of reactions over the years. Increased incidence of reversal reactions in cases of reproductive age group particularly in females and its association with pregnancy, lactation or menopause needs to be further evaluated in a detailed prospective study for planning preventing measures.

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