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Epidemiology of Disability in Leprosy

2. Factors Associated with Low Disability[1]

H. Srinivasan and S. K. Noordeen[2]

Epidemiologic information on disability among male leprosy patients above 15 years of age was presented in Part 1 (1). The study was based on a survey in which 465 patients were interviewed and examined under field conditions. That study showed that relatively low disability was associated with certain factors. These were (1) young age of the patient, (2) short duration of the disease, (3) nonlepromatous type of leprosy, (4) agricultural occupation, (5) absence of treatment for leprosy and (6) the Harijan caste status. The influence of age, and duration and type of leprosy on disability can be explained. The patients in younger age groups had less disability mainly because they had disease of shorter duration, which in its turn was associated with low disability. It is reasonable to expect that patients with shorter duration of disease will have less advanced disease and so have less chance of having disability. It is also reasonable to expect a low disability rate among nonlepromatous cases, as the disease among them is more often localized, less progressive and likely to regress spontaneously. But the influence of the other three factors, viz., agricultural occupation, Harijan caste and "no treatment" status, cannot be similarly explained. These factors are examined in detail in this paper.

Before considering the possibility that any one of these three factors has a specific influence in lowering the disability rate, it is necessary to establish that their association with low disability is real and not due to factors other than the one under discussion. It is possible that the groups under consideration, by chance, could have contained more persons with characteristics known to have a lowering influence on disability. In that case the association between that group and the low disability rate will be only an apparent one and not real. If the low disability rate in that group cannot be thus explained by its intrinsic composition, then the association may be deemed real; i.e., the specific characteristic of that group is truly associated with a low disability rate. The three specific characteristics found to be associated with a low disability rate, viz., agricultural occupation, Harijan caste and "no treatment" status are discussed below.

AGRICULTURAL OCCUPATION

As mentioned earlier, patients engaged in agricultural work had a lower disability rate than the rest of the patient population (29.3% and 40.1% respectively). This was statistically significant ($t = 2.44$; $p < 0.02$). As discussed earlier, it was necessary to exclude the possibility that this difference was due to the intrinsic composition of this group. It was found that the group did not differ from the general patient population with reference to its composition as respects age, type of leprosy, duration of disease, and treatment status. But there was a definite difference with regard to its caste composition. Harijans, who were found to have a relatively low disability rate, formed 57.0 per cent of this agricultural group as compared with 28.6 per cent in the general patient population. This

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[2]H. Srinivasan, M.B., F.R.C.S. (Eng. & Edin.), and S. K. Noordeen, M.B., B.S., D.P.H., M.P.H. (Michigan), Central Leprosy Teaching and Research Institute, Chingleput, Madras, S. India.

excessive representation of Harijans could have lowered the disability rate in this group of agricultural workers and introduced a bias. In order to eliminate this bias, the disability rate among non-Harijans engaged in agricultural work was compared with that of non-Harijans engaged in other occupations. When such a comparison was made, i.e., between non-Harijan agricultural workers and non-Harijan nonagricultural workers, no significant difference in disability rates could be found. This indicates that agricultural occupation, by itself, had no specific lowering influence on disability rate, and the low disability rate seen in this group of agricultural workers studied was due to an increased proportion of Harijans.

HARIJAN CASTE

The disability rate among Harijans, as already indicated, was lower than that in the rest of the patient population (25.6% as compared with 39.5%). This was statistically significant ($t = 3.01$; $p < 0.01$). This group of Harijans was, therefore, examined with respect to composition that might have caused the lowered disability rate. It was found that the composition of this group as respects age, type, and duration of disease was not different from that of the general population. The group differed significantly in its composition regarding occupation and treatment status. Eighty-five and seven-tenths per cent of Harijans were found to be agricultural workers, as compared with 42.6 per cent in the general population. This could not have lowered the disability rate among Harijans for reasons mentioned above regarding agricultural occupation and disability. Therefore this is only an incidental finding, indicating that the majority of Harijans were agricultural workers and *vice versa*.

With regard to treatment status (Table 1), Harijans had a higher proportion of patients without treatment (39.1%) compared with the general population (28.4%). As "no treatment" status was seen to be very strongly associated with a low disability rate, the over-representation of patients with no treatment in this Harijan group by itself could explain the lowered disability rate among Harijans. When patients without treatment were excluded and the disability rates among treated Harijans and treated general population were compared, no significant difference between the two was found. This suggests that Harijan caste, by itself, could not have lowered the disability and that the low disability rate found among Harijans was due to an increased proportion of patients without treatment in this group.

TABLE 1. *"Treatment status" distribution among Harijans and the total population.*

Treatment	Harijans		Total population	
	No.	%	No.	%
Regular	40	30.1	185	39.8
Irregular	41	30.8	148	31.8
None	52	39.1	132	28.4
Total	133	100.0	465	100.0

"NO TREATMENT" STATUS

Information on treatment status was collected from the patients themselves and also from the records of the Mobile Treatment Unit of The Central Leprosy Institute. The treatment referred to is treatment with DDS under "field" conditions. The disability rate in the "no treatment" group was very much lower than that in the "treatment" groups, viz., 9.8 per cent as compared with 45.7 per cent ($t = 9.50$; $p < 0.001$). This 9.8 per cent disability rate was the lowest for any of the variables studied so far. As in the other instances, this lowered disability rate could have been due to over-representation of certain variables. None of the variables studied, however, could, individually, have caused this gross reduction in disability rate, because all of them were individually associated with a disability rate very much higher than the one present in this group. But the additive effects of disability-reducing characteristics could lower the disability rate when such characteristics occur together, and this was examined. It was found that this "no treatment" group was over-represented in such a manner regarding three such characteristics and in the other respects it was representative of the total population studied. The "no treat-

ment" group had an excess of Harijans as compared to the total population (Table 2). It contained nearly all nonlepromatous cases (Table 3). It also had an excess of patients with leprosy of short duration, i.e., 0-5 years, as compared with the total population (Table 4).

TABLE 2. *Caste status distribution in "no treatment" group and total population.*

	"No treatment"		Total population	
Caste	No.	%	No.	%
Harijans	52	39.4	133	28.6
Non-Harijans	80	60.4	332	71.4
Total	132	100.0	465	100.0

TABLE 3. *Type distribution in "no treatment" group and total population.*

	"No treatment"		Total population	
Type of disease	No.	%	No.	%
Nonlepromatous	126	95.5	343	73.8
Lepromatous	1	0.8	102	21.9
Intermediate	5	3.7	20	4.3
Total	132	100.0	465	100.0

TABLE 4. *"Duration of disease" distribution in "no treatment" group and total population.*

Duration of disease	"No treatment"		Total population	
in years	No.	%	No.	%
0 - 2	21	15.9	46	9.9
3 - 5	75	56 8	198	42.6
6 - 9	13	9.8	85	18.3
10 & over	23	17.5	136	29.2
Total	132	100.0	465	100.0

With allowances for such over-representations in this group, the expected disability rate for patients with no treatment was worked out and found to be about 17 per cent. But the actual disability rate for this group was only 9.8 per cent. This fact shows that, although the "no treatment" group was over-represented to some extent with variables that can reduce the disability rate, the over-representation present was not great enough to account for the gross reduction observed. This means that the association between "no treatment" status and low disability rate was real and not an apparent one due to the intrinsic composition of the group.

Since a real association appears established between "no treatment" and "low disability" (which is the same as association between treatment and high disability), it is relevant to inquire into the nature of this association. The possibilities are that:

(a) increased disability was the result of treatment,

(b) more patients were induced to take treatment because of disability,

(c) both the above possibilities occurred to varying degree, and

(d) disability and treatment occurred together as a result of a third common cause.

The best way to establish which of the above possibilities are true will be to have an experiment where the variables are studied in time-sequence. The present study was not such, and was only a cross-sectional study. Within limitations, this study is also capable of indicating broadly which of the above possibilities are likely to be true.

Among the four possibilities, the last one, viz., that both treatment and disability were only incidentally associated with each other and might have been due to a common third factor appears to be highly improbable.

The possibility (c) that both disability and treatment are causal to varying degrees, will hold good if possibilities (a) and (b) are both true.

With regard to possibility (a), where treatment is the cause, and possibility (b), where disability is the cause, it can be stated that, from the available data, it is not possible to prove any one possibility to the exclusion of the other. However, it may be possible to state which of two possibilities is more likely to be true. This is determined in the following manner by comparing the strength of association of possibility (a) with that of possibility (b).

In possibility (b), disability is the cause and treatment the effect. If this were true,

more patients with disability should take treatment. Comparing treatment rates between disabled and nondisabled, we find that among disabled 92.1 per cent took treatment and among nondisabled only 60.4 per cent took treatment, a difference of 1½ times.

In possibility (a), treatment is the cause and increased disability the effect. If this were true, more patients who take treatment should have disability. Comparing the disability rates between the treated and the untreated, we find that among the treated 45.6 per cent and among the untreated only 9.8 per cent had disability, a difference of about 4½ times.

It can be seen that the treatment rate among the disabled was only 1½ times that among the nondisabled, whereas the disability rate among the treated was 4½ times that among the untreated. This indicates that possibility (a) is more likely to be true than possibility (b). That is, it is more likely that treatment caused increased disability than *vice versa.*

In addition to the above, the finding on the low disability rate among patients belonging to Harijan caste also lends indirect support to the above contention. It may be recalled that the low disability among Harijans was attributed to a comparatively large proportion of this caste group not taking treatment. If treatment had no bearing on disability, the low disability among Harijans will have to be explained by some characteristic, other than treatment status, specific to this group, since the possibility of the intrinsic composition of this group, other than treatment status, influencing the disability rate had already been ruled out. As mentioned earlier, Harijans, as a caste group, were not found to possess any such specific characteristic which could account for their low disability rate. Therefore, the low disability among Harijans can be attributed only to the fact that a large proportion of them went without treatment.

The above findings would suggest that treatment for leprosy, given under "field" conditions, could possibly result in increased disability in the patient population. The field conditions prevailing in this study are not likely to be very different from field conditions where leprosy is treated through mass campaigns. Under these conditions, treatment is carried out on a mass scale and on a routine basis, where facilities for individualizing treatment, for management of complications, and for satisfactory follow-up, are not as near to adequate as in an institution. "Field" conditions are mentioned here in order to specify the conditions under which the study was conducted and not necessarily to explain the findings; for if a study similar to that here reported were to be conducted under the very different conditions found in an institution, the result might or might not be similar to the one found here. But such data as those presented here would have been very difficult to collect from situations other than field conditions, for it would be difficult to have two groups of patients where DDS treatment could be withheld deliberately from one group.

From the data available in the present study it was not possible to "prove" whether disability followed or preceded treatment. The present study, it must be emphasized, was only a cross-sectional one-time study, and as such can only indicate the various links in the causative chain leading to disability. Only a longitudinal study giving the sequence of events can prove the soundness of these links or causes. Since this study indicates the disturbing possibility that the present treatment for leprosy given under "field" conditions could possibly lead to increased disability among the patients, this matter warrants further well planned prospective studies taking time-sequence into consideration.

SUMMARY

Three groups associated with low disability rates were identified and analyzed among male leprosy patients above 15 years of age. These groups were (1) agricultural workers, (2) Harijans, and (3) patients who had not taken treatment for leprosy. In the case of agricultural workers the low disability rate was due to an increased proportion of Harijans among them. In the case of Harijans the low disability rate was found to be due to an increased proportion

of patients with no treatment. In the case of patients with no treatment, their association with low disability was found to be real. On the basis of certain indirect evidences it is suggested that DDS treatment under field conditions could possibly lead to increased disability. The matter warrants further planned prospective studies.

RESUMEN

Entre pacientes masculinos leprosos mayores de 15 años de edad, fueron identificados y analizados tres grupos asociados con niveles de baja incapacidad. Estos grupos fueron (1) trabajadores agrícolas, (2) Harijan, y (3) pacientes que no tuvieron tratamiento para la lepra. En el caso de los trabajadores agrícolas, el bajo nivel de incapacidad fué debido a una aumentada proporción de Harijans entre ellos. En el caso de los Harijans el bajo nivel de incapacidad se encontró que se debe a un aumento proporcionado de pacientes sin tratamiento. En el caso de pacientes sin tratamiento, su asociación con baja incapacidad se encontró que era real. Sobre la base de ciertas evidencias indirectas, el tratamiento DDS en un amplio campo, pueda posiblemente llevar a un aumento de la incapacidad. Este asunto merece estudios prospectivos planificados.

RÉSUMÉ

Trois groupes présentant des taux peu élevés d'invalidité ont été identifiés parmi des malades de la lèpre du sexe masculin âgés de 15 ans ou plus. Ces groupes ont été analysés. Ils sont constitués par: (1) des travailleurs agricoles, (2) des Harijans, (3) des malades qui n'ont pas été soumis à un traitement contre la lèpre. Dans le cas des travailleurs agricoles, le taux peu élevé d'invalidité parmi eux était du à une proportion augmentée d'Harijans dans ce groupe. Dans le cas des Harijans, il a été observé que le taux peu élevé d'invalidité était du à une proportion augmentée de malades sans traitement. Dans le cas des malades sans traitement, on a trouvé que l'association avec un taux peu élevé d'invalidité était rèelle. Sur la base de certaines évidences indirectes, on suggère que le traitement par le DDS dans les conditions existant sur le terrain pourrait peut-être mener à une augmentation de l'invalidité. Cette question mérite que soient organisées des études prospectives ultérieures.

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