

Electrophoretic Patterns of Serum Proteins in Leprosy¹

V. N. Sehgal²

Many reports on the pattern of changes in the serum proteins of leprosy subjects are available in the literature, and there is some uniformity in the types of change seen in the results of various workers (1, 2, 3, 5).

This paper presents an assessment of serum proteins as determined by paper electrophoresis in patients with various types of leprosy in Varanasi, Uttar Pradesh.

MATERIALS AND METHODS

Eighty-seven leprosy patients, comprising 50 cases of tuberculoid, six cases of maculoanesthetic, six cases of primary neuritic, three cases of dimorphous (borderline), and 22 cases of lepromatous leprosy, of all age groups, formed the material for the study. All the cases were collected from the dermatologic outpatient service of the Sir Sunder Lal group of hospitals, Banaras Hindu University. The primary diagnosis in these cases was made on clinical grounds alone; in doubtful cases, however, laboratory procedures were adopted to supplement the clinical impressions. All of the patients were on antileprosy therapy with diaminodiphenyl sulfone (DDS).

For the protein studies 5 ml. of venous blood was collected from each patient and allowed to clot. The serum was then separated and kept in a refrigerator until used.

The various fractions of serum proteins were separated by paper electrophoresis with the use of 0.1 M barbital buffer at pH 8.6. A current of 150 volts was employed for 16 hours on Whatman No. 1 paper strips measuring 40 x 4 cm. The strips were

stained with 0.01 per cent ethanolic solution of bromophenol blue. The optical densities of the various protein fractions were measured by a densitometer having automatic recording device. On the densitograms, thus obtained, the areas under each peak were measured by use of a planimeter. From these areas the percentages of the various fractions were calculated.

The results obtained were compared with those for 27 normal subjects taken as controls.

OBSERVATIONS

Mean values and standard deviations in different types of leprosy and normals are shown in Table 1. Figure 1 shows the relative mean values of various fractions of serum proteins in leprosy patients and normal subjects. It is apparent from the table that the mean value of serum albumin in total leprosy cases is lower than that of normal controls. On analysis of the results statistically, the difference was observed to be highly significant ($P < 0.001$). Alpha₁ and alpha₂ globulins for total leprosy cases, on the other hand, were found to be slightly lower than in normal subjects, but the differences were statistically insignificant. The beta globulin value for all leprosy patients was apparently higher than in normal persons, but the difference was again not significant. Gamma globulin values for total leprosy cases were observed to be very high as compared with normal figures. On analysis of the data statistically the values were found to be highly significant ($P < 0.001$). The total globulins for total leprosy patients were much higher than in the normals and the difference was again highly significant ($P < 0.001$).

In cases of tuberculoid leprosy, a pattern similar to that observed for total leprosy cases was seen.

In the case of maculoanesthetic leprosy, the mean albumin value was observed to

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² V. N. Sehgal, M.D., Reader in Dermatology, Section of Dermatology, College of Medical Sciences, Banaras Hindu University, Varanasi 5, India. Present address: Reader in Dermatology, Section of Dermatology, Department of Medicine, J. N. Medical College, Aligarh Muslim University, Aligarh, India.

TABLE 1. Mean values and standard deviations in normal and leprosy subjects.

Subjects	Sample size	Globulins					
		Albumin	Alpha ₁	Alpha ₂	Beta	Gamma	Total
Normal	27	52.90 ± 8.45	3.60 ±1.22	7.82 ±4.13	10.55 ± 3.37	25.12 ± 6.27	47.09 ± 8.45
Total leprosy	87	41.92 ^a ± 8.05	3.28 ±1.30	7.23 ±3.26	11.43 ± 3.33	36.13 ^a ± 6.63	58.07 ^a ± 8.04
Tuberculoid	50	42.72 ^a ± 7.65	3.40 ±1.34	7.09 ±2.86	11.48 ± 3.13	35.30 ^a ± 6.31	57.27 ^a ± 7.67
Maculoanesthetic	6	45.66 ^b ± 4.78	2.66 ±1.05	7.46 ±2.81	10.97 ± 3.21	33.25 ^b ± 4.86	54.34 ^b ± 4.78
Neuritic	6	42.85 ^c ±10.64	2.82 ±0.986	8.07 ±3.16	11.70 ± 4.11	34.56 ^c ± 7.29	57.15 ^c ±10.64
Dimorphous	3	47.62 ± 4.42	4.12 ±0.73	8.40 ±0.257	10.35 ± 1.60	29.51 ± 5.57	52.38 ± 4.42
Lepromatous	22	38.07 ^a ± 8.23	3.18 ±1.37	7.09 ±4.45	11.53 ± 3.94	40.13 ^a ± 6.14	61.93 ^a ± 8.23

^a Significant at 1.0% level of probability.

^b " " 5% " " "

^c " " 1% " " "

be lower than normal and the difference was significant ($P < 0.05$). Alpha₁, alpha₂, and beta globulin values were slightly different from normal, and hence the differences were not significant. Gamma and total globulin values were higher than in the normal subjects, and in both cases the difference was significant, i.e., $P < 0.01$ and $P < 0.05$ respectively.

In neuritic leprosy cases the albumin value was less than normal. Gamma and total globulin values were greater than normal, and the differences were statistically significant. The rest of the values were not significantly different.

Dimorphous (borderline) cases could not be compared with normal subjects, as the number of samples was very small.

In the lepromatous cases also, exactly the same trend was observed as in total cases of leprosy. In this group albumin values were significantly lower than in normals, while gamma and total globulin values were much higher than normal, and the differences were highly significant ($P < 0.001$). Other values, such as those for alpha₁, alpha₂, and beta globulins were not significantly different from the normal.

DISCUSSION

Serum protein studies in the present series revealed a few interesting observations. The pattern of change in serum proteins in different types of leprosy was similar to that for total leprosy cases. The severity of these changes varied with the clinical severity of cases; i.e., the alterations were more marked in lepromatous than in other types of leprosy. Striking findings, however, in total and lepromatous leprosy cases were increase in total globulins and simultaneous decrease in albumin values. The total globulin increase was due mainly to increase in the gamma globulin moiety of serum proteins. My observations with respect to lepromatous leprosy are thus in line with those reported earlier by some workers (1, 2, 3, 4, 5). The abnormal values of serum proteins generally are considered to be due to response of the reticuloendothelial system to leprosy bacilli. This explains to some extent the changes seen in lepromatous leprosy, but not those seen in other types of the disease. Moreover, an increase in gamma and total globulins suggests a good resistance on the part of the host, a strange paradox in lepromatous lep-

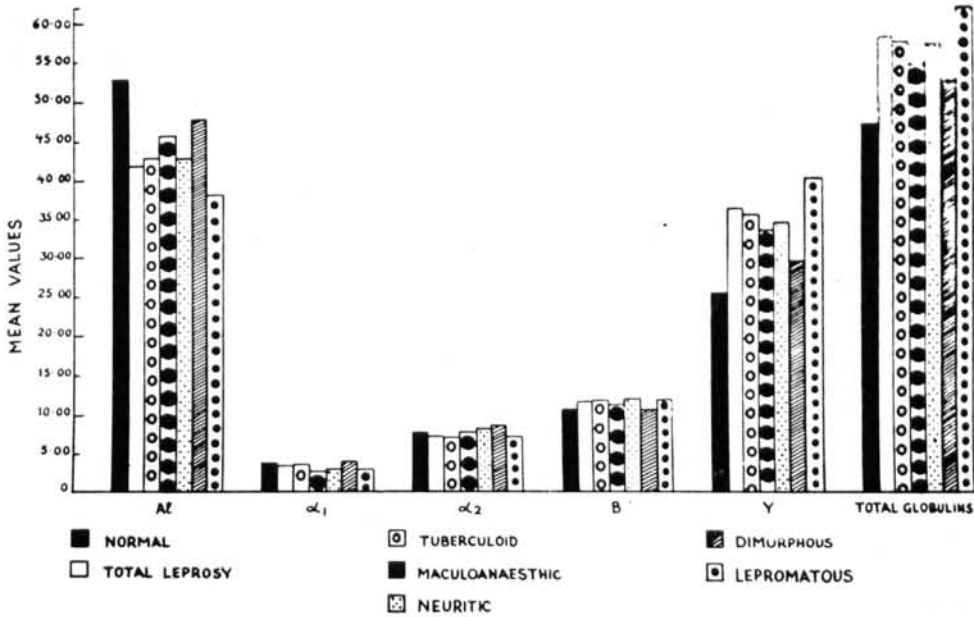


FIG. 1. Relative values of various fractions of serum protein in leprosy and normal subjects.

rosy. There may be some occult factors that bring about such changes; their nature is still poorly understood.

Tuberculoid and other types of leprosy showed a trend like that found in lepromatous and total leprosy patients, i.e., an increase in gamma and total globulins. This observation is conspicuously different from the reports available thus far in the literature. Some workers (^{2, 3}) have pointed out that the pattern of serum protein changes in nonlepromatous cases is not significantly different from that of the normal population. Dhople and Nagar (¹), Ross (⁴) and Thomas and Ananthachari (⁵) observed an increase in the beta globulin fraction in cases of tuberculoid leprosy. No statistically significant elevation of this fraction was seen in our series. I have nothing to offer as a probable explanation for the observations reported here, but they represent to some extent the host response to the lodgement of leprosy bacilli in tuberculoid cases. It is probable that the reticuloendothelial system is implicated in this group also, a possibility needing further elucidation.

SUMMARY

Serum protein studies by paper electro-

phoresis are presented for 87 patients of different types of leprosy in Varanasi, Uttar Pradesh. An increase in gamma and total globulins and a decrease in albumin were seen in all types of leprosy. No essential differences in serum protein patterns in lepromatous and nonlepromatous types of leprosy were observed, except in degree.

RESUMEN

Estudios de las proteínas del suero por medio de electroforesis son presentados en 87 pacientes de diferentes tipos de lepra en Varanasi, Uttar Pradesh. Un aumento en las globulinas gamma y globulinas totales y un descenso en la albúmina fueron observados en todos los tipos de lepra. No se observaron diferencias esenciales en modelo de proteína del suero en formas lepromatosas y nolepromatosas, excepto en grado ligero.

RÉSUMÉ

On rapporte ici des études des protéines du sérum, menées par des techniques d'électrophorèse sur papier, chez 87 malades atteints de divers types de lèpre, à Bénarès (Varanasi), Uttar Pradesh. Dans tous les types de lèpre, on a observé une augmentation des globulines totales ainsi que des gamma-globulines, et une

diminution de l'albumine. Si ce n'est pour des aspects quantitatifs, on n'a noté aucune différence essentielle dans les profils des protéines sériques chez les malades atteints des types lépromateux ou non-lépromateux de lèpre.

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