

# A STUDY OF SERUM PROTEINS IN PRIMARY PYODERMAS

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Primary pyodermas account for 17.1% of the total attendance of skin out patient Department of Sarojini Naidu Hospital, Agra. The frequency of resistant and recurrent cases has increased during the recent years. Conflicting reports appear in the literature as to the value of serum protein determinations in their diagnosis and treatment.

Turanow and Evlewa (1953) reported an increase in gamma globulins with a concomitant decrease of albumin levels of serum in 25 cases of pyodermas. Leinbrock (1957) observed increased gamma globulins along with a decrease in albumin and beta globulin fraction of serum proteins in pyoderma cases. Majority of cases studied by Egorova (1958) also showed a rise in gamma and alpha II globulins and a fall in albumin levels. Studies of Desai, Modi and Shah (1962) in 12 cases of recurrent folliculitis also showed hyperglobulinaemia with hypoalbuminaemia.

Contrary to these reports, Marcus (1956) reported hypogamma globulinaemia in cases of impetigo contagiosa. Mercussen (1955) had also observed decreased levels of gamma globulin in patients of pyoderma gangrenosa. Morginson (1959) again showed levels of gamma globulins below normal in 59 percent cases of pyodermas.

## MATERIAL AND METHODS

131 patients of primary pyodermas were selected from skin out-patient department of Sarojini Naidu Hospital, Agra. These included cases of Furunculosis, folliculitis, impetigo contagiosa and ecthyma. Systemic disease known to affect serum proteins was excluded and cases of combined lesions were not taken. For comparison, 51 normal subjects comprising of 37 males and 14 females ranging in age from 3 to 56 years were studied as controls. These subjects came from the same low socio-economic strata of the society to which our patients of primary pyoderma belonged and included chiefly the relatives and friends of the patients.

Cases were labelled as "acute" when the onset was rapid and the course of the illness was short. "Resistant" cases were those in whom the lesions failed to respond to vigorous treatment for six weeks with antibiotics, sulphonamides, local treatment, good hygiene and diet. Cases of "recurrent" pyoderma gave history of two similar attacks in last one year prior to the present illness.

To assess the relationship between severity of lesions and serum protein changes, the patients were put into three grades. In grade I, the lesions were without ulceration, exudation, and wide apart, separated from each other by a

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distance of about one inch diameter. In grade II, the lesions were closely situated but again without ulceration and exudation. Grade III included lesions which were ulcerating, exudating and crust forming. Only 110 out of 131 cases studied could be clearly graded and out of these 23 cases belonged to grade I, 32 were in grade II and the rest 55 fell in grade III.

In cases of grade II and grade III lesions, the surface area of skin involved was calculated by Lund and Bruders' table, in order to study the correlation between the changes in serum protein and the extent of skin involvement.

Total proteins of the serum, as well as the albumin and globulin fraction were estimated by the Nesslerization technique. Separation into different fractions of the serum proteins was done by low voltage horizontal paper electrophoresis described by Grassman (1958), the staining technique being that of Jenks et al (1955).

#### OBSERVATIONS AND DISCUSSION

Table I shows the distribution of cases according to the type of pyoderma and the course of the disease.

Table No. 1.

#### DISTRIBUTION OF PATIENTS OF PRIMARY PYODERMAS IN DIFFERENT GROUPS.

DISEASE	ACUTE			RESISTANT			RECURRENT			TOTAL
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	
Furunculosis.	20	4	24	13	14	27	14	3	17	68
Folliculitis.	8	1	9	12	-	12	6	1	7	28
Impetigo contagiosa	8	7	15	1	1	2	1	1	2	19
Ecthyma	-	-	-	8	2	10	5	1	6	16
Total	36	12	48	34	17	51	26	6	32	131

The average values of serum proteins and their fractions in normal controls as well as in the groups of patients of pyoderma are given in the Table II.

The values of serum proteins and their fractions in normal controls obtained in the present study closely correspond with those reported earlier by Satoskar (1954) and Mathur et al (1961), except for the higher values of gamma globulin which can be explained by the consumption of vegetable rich diet by poor socio-economic group and the greater antigenic challenge due to their poor hygiene and congested living. No statistical variation was noted in these values according to age and sex. Similar were the observations of Mathur et al (1961).

In cases of pyodermas taken as a whole, the values of total serum proteins were slightly lower than those in the controls but the difference was statistically insignificant ( $P > 0.01$ ). The values of serum albumin were significantly lower ( $P < 0.01$ ) in hypoderma cases and those of serum globulins were higher ( $P < 0.01$ ) as compared to normal controls. A statistically significant rise in alpha-I, alpha-II

Table No. 2  
 AVERAGE VALUES  $\pm$  SD OF MEAN OF SERUM PROTEIN FRACTIONS IN NORMAL CONTROLS  
 AND IN GROUPS OF DIFFERENT PRIMARY PYODERMAS

GROUPS	% Gram per cent					% of total serum proteins		
	Total Protein	Albumin	Globulin	Alpha I	Alpha II	Beta	Gamma	
Normal controls	6.5 $\pm$ 1.22	3.4 $\pm$ 0.67	3.1 $\pm$ 0.66	3.7 $\pm$ 0.94	7.7 $\pm$ 2.34	11.3 $\pm$ 2.63	24.3 $\pm$ 4.13	
Gurunculosis Ac.	6.1 $\pm$ 1.13	2.4 $\pm$ 0.65	3.7 $\pm$ 1.19	7.4 $\pm$ 2.28	16.0 $\pm$ 3.72	15.1 $\pm$ 3.32	25.7 $\pm$ 3.62	
Resistant.	6.0 $\pm$ 1.18	2.3 $\pm$ 0.5	3.7 $\pm$ 0.97	10.4 $\pm$ 2.74	13.5 $\pm$ 3.59	18.1 $\pm$ 2.59	23.1 $\pm$ 3.88	
Recurrent	6.14 $\pm$ 1.13	2.5 $\pm$ 0.64	3.4 $\pm$ 0.99	9.6 $\pm$ 3.06	12.9 $\pm$ 3.31	16.0 $\pm$ 2.77	20.8 $\pm$ 4.14	
Folliculitis Ac.	7.1 $\pm$ 1.37	2.7 $\pm$ 0.84	4.3 $\pm$ 1.29	7.1 $\pm$ 2.7	129.0 $\pm$ 3.61	15.8 $\pm$ 3.69	26.0 $\pm$ 3.06	
Resistant.	6.5 $\pm$ 1.13	2.5 $\pm$ 0.89	3.9 $\pm$ 0.99	10.6 $\pm$ 2.80	14.1 $\pm$ 3.2	17.1 $\pm$ 3.47	20.5 $\pm$ 7.09	
Recurrent.	6.5 $\pm$ 1.13	2.5 $\pm$ 0.89	3.9 $\pm$ 0.99	10.6 $\pm$ 2.80	14.1 $\pm$ 3.2	17.1 $\pm$ 3.47	20.3 $\pm$ 3.09	
Imp. Cent agiosa Acute,	6.6 $\pm$ 1.26	2.8 $\pm$ 0.87	3.7 $\pm$ 0.93	6.6 $\pm$ 1.40	10.2 $\pm$ 2.37	13.7 $\pm$ 2.83	27.0 $\pm$ 4.66	
Resistant	6.2 $\pm$ 0.7	2.8 $\pm$ 0.70	3.4 $\pm$ 0.02	8.4 $\pm$ 1.79	14.5 $\pm$ 1.2	17.5 $\pm$ 3.8	15.8 $\pm$ 1.60	
Recurrent,	6.1 $\pm$ 0.8	2.7 $\pm$ 0.56	3.4 $\pm$ 0.08	7.8 $\pm$ 2.7	10.4 $\pm$ 1.4	19.7 $\pm$ 1.97	25.4 $\pm$ 1.60	
Ecthyma Resistant	6.1 $\pm$ 1.40	2.3 $\pm$ 0.77	3.8 $\pm$ 0.75	9.7 $\pm$ 1.17	13.4 $\pm$ 3.12	16.7 $\pm$ 2.82	22.02 $\pm$ 3.03	
Recurrent,	5.8 $\pm$ 1.16	2.5 $\pm$ 0.33	3.4 $\pm$ 0.59	8.0 $\pm$ 2.59	11.6 $\pm$ 2.37	17.8 $\pm$ 3.79	21.4 $\pm$ 2.66	

and later globulins was also noted in all the pyodermas. Similar rise in alpha and beta globulins in pyodermas has been reported by Rasiewicz (1958), Morginson (1959), Turanow (1953) Leinbrock (1957), Desai., Shah and Modi (1962).

Analysis of the values according to the type of pyoderma i. e. furunculosis-folliculitis, impetigo contagiosa, ecthyma, did not reveal any significant difference in the various groups. No definite pattern of serum protein changes characteristic of any one type of pyoderma was thus found.

Analysis of the results according to the course of the disease, revealed significant findings.

Statistical analysis suggests that in all pyodermas changes in serum proteins were more marked and significant in resistant and recurrent primary infections of the skin as compared to those in acute. This was more marked in alpha-I, gamma, beta and alpha-II globulins in descending order.

The pattern of changes in total proteins, serum albumin and total globulins did not show significant difference in acute, resistant and recurrent courses of the primary pyodermas.

On comparing the changes of serum proteins in resistant and recurrent infections of the skin, statistical analysis showed a significant decrease of serum gamma globulins in resistant folliculitis as compared to recurrent cases ( $P < 0.01$ ). Resistant cases of impetigo contagiosa also showed a marked fall in gamma globulins as compared to recurrent cases but statistical significance could not be attached to this finding because of small number of cases. There was no statistically significant difference between protein changes of resistant and recurrent cases of furunculosis and ecthyma. It was therefore inferred that serum protein changes are most marked in resistant cases, less so in recurrent cases and least in acute cases of primary pyodermas.

An attempt has also been made to correlate the surface area of the skin involved, as measured by Lund and Bruder's table, with serum proteins by finding out the co-efficient of correlation ('r'). Our observations revealed that increase in the surface area brings out a decrease in serum total proteins serum albumins as well as serum gamma globulins in cases of grade III as well as grade II. Decrease in serum albumin in cases of grade II and grade III bears a high correlation with increase in surface area involved (value of 'r' being 0.49 for grade II and 0.51 for grade III). More striking was the observation of significant correlation in decrease of gamma globulins level of the serum with increase of surface area in resistant and recurrent cases of grade II and grade III (value of 'r' being 0.55 and 0.52 respectively). Morginson (1959) also stressed that with the severity of primary pyodermas there is a definite tendency to show below normal readings of gamma globulins. Increasing fall in albumin level of the serum with increase in surface area can be explained on the basis of exudation and increased catabolism.

There is no satisfactory explanation for this decrease in gamma globulins noticed by us. Theories of acquired hypogammaglobulinaemia as reviewed by Janaway (1957) are very controversial.

#### SUMMARY

A study of serum protein patterns in 131 cases of furunculosis, folliculitis, impetigo contagiosa and ecthyma has been undertaken. No pattern characteristic of any one type of pyoderma was found. The course of the disease showed profound influence on serum protein changes. In cases of acute pyoderma there was a slight fall in total proteins, a marked fall in serum albumin level and a marked increase in alpha-I, alpha-II, and beta globulin levels. Gamma globulins in acute primary pyoderma did not show significant change except in impetigo contagiosa where they were elevated.

Resistant and recurrent pyodermas showed a significant fall in albumin level of the serum. Levels of alpha-I, and alpha-II and beta globulins were raised. Gamma globulin levels of the serum in resistant and recurrent cases showed a significant decrease. Changes in serum protein fractions were most marked in resistant cases, less so in recurrent and least in acute cases.

Surface area of the lesions bears a significant correlation with serum albumin and gamma globulins. Increase in surface area has a direct correlation with decrease in serum albumin in the cases of grade II and III of primary pyodermas. A significant correlation was also found between decrease in gamma globulin levels of serum with increase in surface area of lesions of grade II and III in resistant and recurrent cases of primary pyodermas.

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