

# STUDY OF SERUM PROTEIN PROFILES IN BURN PATIENTS

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**KEY WORDS :**

Alfa2 globulins.

**ABSTRACT :**

66 patients of varying degrees of burns were divided in 6 groups on % of total body surface burns. Serum electrophoresis studies on all, were carried out at definite intervals. Total (i) Serum proteins, (ii) Albumin globulin ratio and (iii) Alfa1, Alfa2, Beta and Gamma globulin levels were studied. Levels of Alfa2 globulins in group VI (60% of T.B.S. burns) were found significantly altered and proved to be of prognostic value.

**.INTRODUCTION :**

Burns directly affect skin and its adenexa and indirectly almost each and every organ of the body. Haemodynamic changes affect various systems of the body. Unknown toxic protein products released from burnt tissues are also believed responsible for affecting different systems of the body. Such situation particularly in major burns leads to

multiple organ systems failure and ultimately results in death.

Present study is aimed at identifying such toxic protein products from the serum to reduce high percentage of mortality found in burns.

**MATERIALS AND METHODS :**

Study was carried out in 66 patients of burns ranging between 10% to 100%. T.B.S.A. 35 patients were male and 31 patients were female. Age of the patients varied from 11 years to 65 years, mean age being 28.10 years + 11.10 years. All patients were divided into six groups according to T.B.S.A. as shown in Table Group IV and V patients have been clubbed together, no. of patients in each group being less.

(RA-KT). Serum Albumin was estimated by Green method, modified and adopted for the auto analyzer (RA-KT). Serum Electrophoresis was done by using Cellulose Acetate strips. Bands were quantitated by elution in 0.3 N NaOH and the absorbance was measured at 450 nm.

**OBSERVATIONS :**

**Graph 1-4**

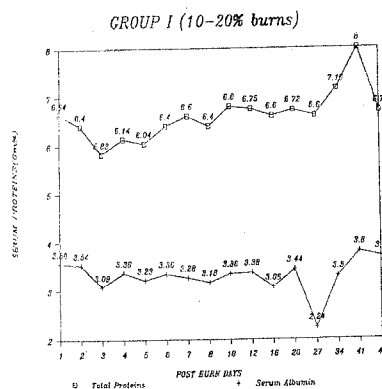


FIG. 1

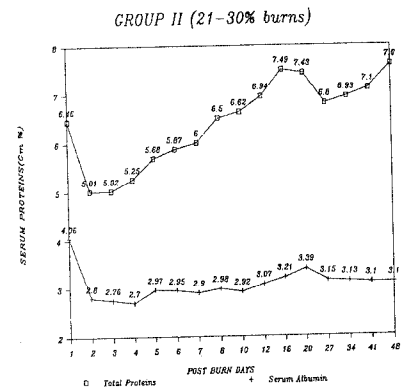


FIG. 2

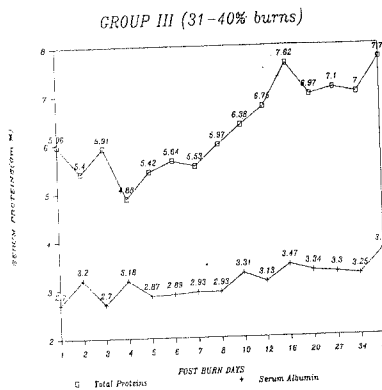


FIG. 3

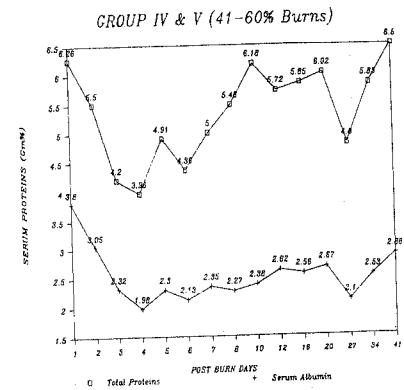


FIG. 4

**Table**  
**GROUPS**

- GROUP i) 10 - 20 % TBSA
- GROUP ii) 21 - 30 % TBSA
- GROUP iii) 31 - 40 % TBSA
- GROUP iv) 41 - 50 % TBSA
- GROUP v) 51 - 60 % TBSA
- GROUP vi) " - 60 % TBSA

Blood samples were drawn every day for the first 8 days and then on 10th, 12th, 16th and 20th day and thereafter every week till the patient remained in the hospital.

Total Serum Proteins were estimated by Biuret method modified and adopted for the Auto analyzer

Total Serum Protein values showed a sharp decline for first 3-4 days post burn in all the groups except Group VI (60% T.B.S.). Restoration to normal total Serum Protein levels, varied with the extent of burns, taking minimum of 4-5 days in Group-1, 8 days in Group-II, 10 days in Group-III and 20 days in Group IV and V. (fig 1-4) Albumin values also showed a sharp decline on 3-4 days post

burn. This decline was marked in patients with 40-60% burns.

**Graph 5**  
GROUP VI (>60% Burns)

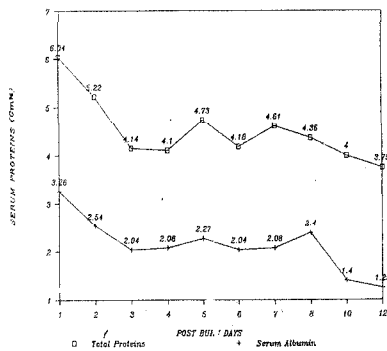
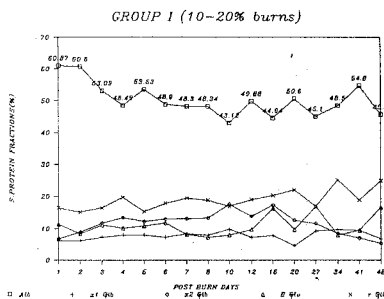


FIG-5

Unlike total proteins which returned to normal levels between 5 to 20 days, albumin values took 40 days to return to normal levels, post burn. In Group-VI (60% burns) there was decline in total proteins and albumins levels for first 3 days as was seen in all other groups but values never returned to normal and decline continued till the end.(fig. 5)

**Graph 6-9**



GROUP III (31-40% burns)

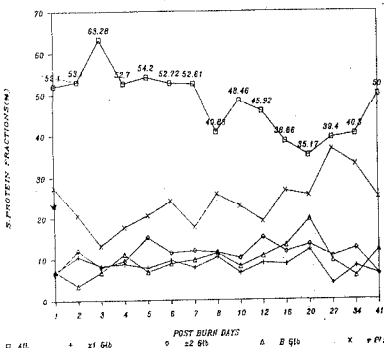
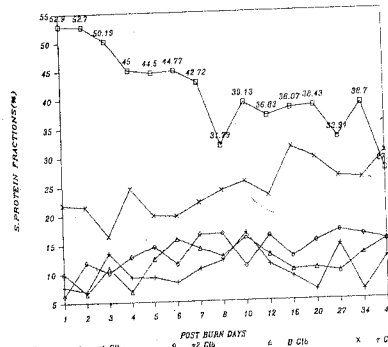


FIG-8

GROUP II (21-30% burns)



GROUP IV & V (41-60% Burns)

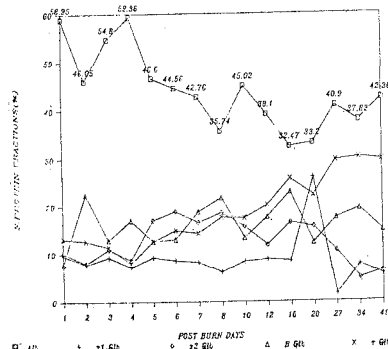


FIG-9

Albumin fraction, as quantitated from Cellulose Acetate Electrophoresis strips, showed the same pattern as was seen from Serum albumin levels done by Green's method. There was sharp decline within 3-4 days post burn and normal values were achieved only after 40 days post burn in all groups except Group-VI which showed persistant fall in albumin levels. (fig. 6-10)

Alfa1 and Beta globulins fractions remained within normal range in Group-I. (fig.6) Alfa1 globulin was slightly increased in group II and III with no change in Beta globulins fractions. (fig. 7,8) Alfa1 and Beta globulin fractions were increased in group (IV & V) and VI. (fig. 9,10) These changes were, however, not significant.

Alfa2 and Beta globulin fractions showed significant changes, Alfa2 globulins showed an initial increase at 7-10 days post burn followed by gradual decline to normal levels in all groups (Figs 6-9) within 40-50 days post burn. In Group VI (60% burns), however, normal levels never returned. (fig. 10) Beta globulins fraction remained well above the normal range in all groups.

An observation of considerable significance was made and that in group IV and V (40-60% burns) out of a total of ten patients, four patients expired and all the four patients showed persistently low total serum protein values and high Alfa2 globulin fractions. In study of relationship of total Serum protein levels to surgery it was noticed, that there

Graph 10

GROUP VI (&gt;60% Burns)

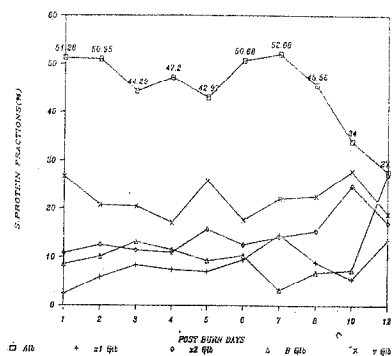


FIG. 10

was an initial decline for one to two days and was followed by rise in their levels to normal.

A total of eight patients also showed abnormal bands on Cellulose acetate Electrophoresis strips on different post burn days. These bands were seen in one patient each in Groups I, II, III and VI while these were also seen in four patients in Group (IV & V). There was no uniform pattern of these bands and they varied from prealbumin, between Alfa and albumin to between Beta and Gamma globulins. Days of appearance of bands also varied from post burn day, one to 41 in different patients.

#### DISCUSSION :

Total serum proteins and serum albumin levels have shown an initial decline followed by restoration to normal levels over a period of time. These observations correlate with those of Prendergast et al (1952), Lanchantin et al (1958), Ritzmann et al (1973) and Daniels et al (1974).

Alfa1 and Beta globulin fractions do not show any significant changes. Alfa2 globulin shows rise in early post burn period. Rise in Alfa2 globulin levels has also been documented by Prendergast et al (1952), Ritzmann et al (1973) and Daniels et al (1974). Rise in Alfa2 globulin levels reflects an

increase in Serum Haptoglobin levels (Ritzmann et al, 1973). Haptoglobin is thought to be acting as an acute phase reactant, levels of which increase in response to stress of thermal injury (Miskulin et al 1978). Another explanation given for rise of Haptoglobin levels is its decreased removal resulting from reticuloendothelial system blockade caused by tissue debris in acutely burned patients.

Gamma globulin fraction remained well above the normal range in all the groups throughout the period of study. Prendergast (1952) had also reported similar findings. However, Ritzmann et al (1973) and Daniels et al (1974) who have carried out their study in children have reported hypogamma globulinemias. Rise in gamma globulin levels in adults of all groups can be due to stimulation of immune system or may be as a result of lymph transported gamma globulin like material formed in the burn wounds (Prendergast, 1952).

#### CONCLUSION :

Persistently low protein values and high Alfa2 globulin levels seen in patients who expired in group IV & V, indicate that close monitoring of total Serum Protein values and Alfa2 globulin can be of considerable prognostic significance and Electrophoresis done at regular intervals can be helpful in detecting poor risk patients.

Extra abnormal bands on electrophoresis strips seen in some of the patients might be representing toxic protein products released from burnt tissues into circulation. No such bands have been reported by earlier workers. These need further investigation.

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