

Immunoglobulines And Protein Profiles In Burn Patients.

Dr. Anupama Arora, M.Sc.
Dr. Satish K. Mehta, Ph. D.
Dr. Kartar Singh, Ph. D.

KEY WORDS

Infection, Values, Susceptibility

ABSTRACT

The Serum immunoglobulines IgG, IgA, and IgM following burns remain subnormal for 7 days and return to normalcy by 14th to 21st day. Infection, infusion of amino acids or antimicrobial agents used, have little effect.

INTRODUCTION

Daniel et al (1974) states, Immunity following thermal injury remains depressed. There is decrease in inflammatory response (Kniseley 1968), reduced phagocytosis (Grogan 1976), generation of circulating inhibitory factors is less, so is T-cell production. There are also deficiencies in complement component, immunoglobulins, and decrease in fibronec-tines and serum proteins (Howard 1979), Ninnemann 1982, and Deitch 1983). Major burn injury also leads to suppression of humoral immunity and causes delayed hypersensitivity reactions which increase susceptibility to infection and mortality in burn patients.

Different workers have reported results on immunoglobulin profiles of the patients, as an initial fall followed by a gradual rise upto normal limits. (Munster 1970, Daniels et al., 1974, Alexander et al 1976, Kagan et al., 1989). The present study undertaken confirms the same.

MATERIAL AND METHOD

Study was carried out on 35 patients of burn, ranging between 15 to 55 T.B.S when 5 ml serum was collected on day 1, 7th, 14th and 21st. This was subjected to total proteins and their albumin globulin ratio by Biuret method Reinhold (1953) and for immunoglobulins by single radial immuno-diffusion method of Mancini's et al (1965).

For this to be possible pre-prepared plates were procured from Hoest India Ltd., which contained noble agar gel mixed with an appropriate concentration of specific anti-immunoglobulins. Stab cultures for culture and sensitivity to micro organisms present in burn wounds was also done.

OBSERVATIONS :

The Serum immunoglobulins i.e. IgG., IgA., and IgM were found invariably decreased on first day through 7th day followed by an increase upto the normal limits in 14th, to 21st day. Fall in Immunoglobulins was conspicuous on the 7th day post burn, by 21st day IgG level was found 96 % near normal and that of IgA and IgM 100 % back to normal. On the basis of % of burns, patients with more than 30 % burns had a very meager increase in their immunoglobulines than in those with less than 30 % burns.

Protein profile in the present study also showed almost similar picture as was observed in the case

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

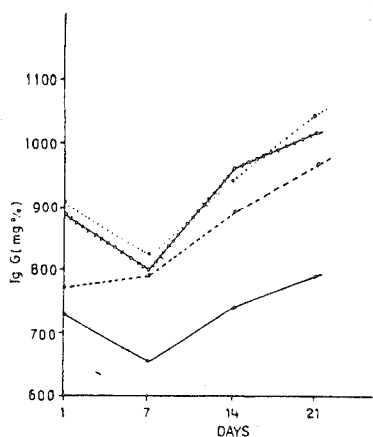


FIGURE 2(i) Ig G PROFILE ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

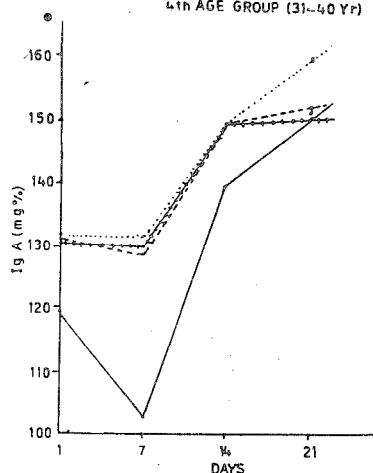


FIGURE 2(ii) Ig A PROFILE ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

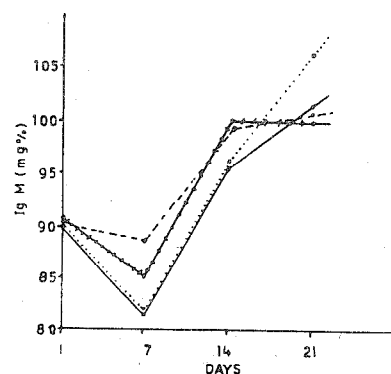


FIGURE 2(iii) Ig M PROFILE ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

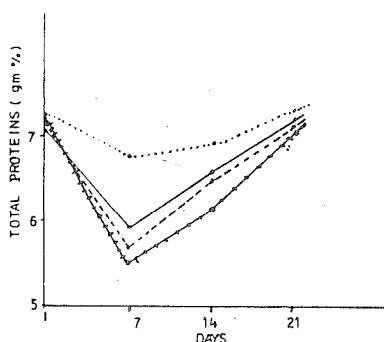


FIGURE 3(i) TOTAL PROTEIN CONCENTRATION ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

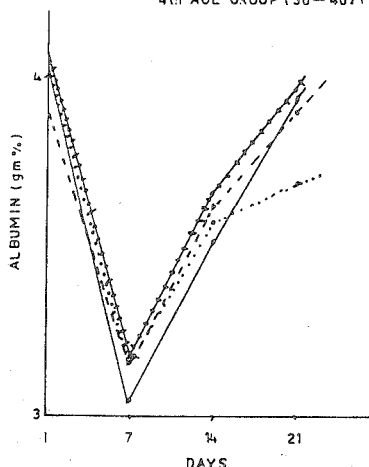


FIGURE 3(ii) ALBUMIN CONCENTRATION ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

1st AGE GROUP (<10Yr)
2nd AGE GROUP (11-20Yr)
3rd AGE GROUP (21-30Yr)
4th AGE GROUP (31-40Yr)

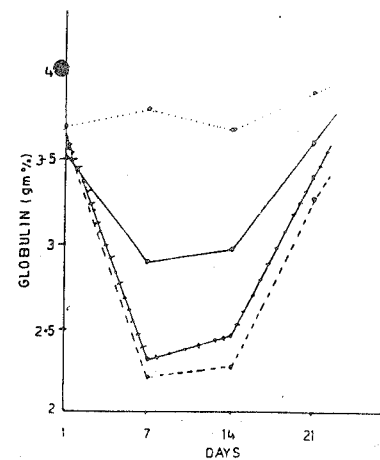


FIGURE 3(iii) GLOBULIN CONCENTRATION ON DIFFERENT DAYS ACCORDING TO THEIR AGE GROUPS

of immunoglobulins. Their total proteins, albumin and globulin showed a decrease immediately after burn. These values in turn increased gradually on 14th to 21st days. All burn patients irrespective of % of T.B.S. gave same values. Similarly, data analysed on the basis of infection did not reveal an appreciable difference between the two groups in the present study.

DISCUSSION :

It has become clear from above findings that patient is at risk most, in the first 15 days post burn, due to all levels of defences being lower.

There was also no marked difference in the levels of immunoglobulins recorded in the patients with increase in % of burns. However, workers have reported more diminished levels of Immunoglobulins with the increase in the severity of thermal burns. (Arturson 1969, Kohn and Cort 1969., Munster 1970., Birke 1968., Daniels 1974., Alexander 1978).

The apparent alterations in different protein fractions occur due to decreased synthesis, increased catabolism, consumption during inflammation and losses from the burn wounds. Serum proteins interact as non specific factors in host defence function (Stratta et al 1968). With the exception of acute-phase reactant proteins, most serum proteins display a 'square roote' pattern characterized by an initial sharp depletion followed by a precipitous rebound to normal levels. (Stratta et al 1968). Another interesting finding of the present study was the age independence as regards the serum proteins and their fractions. Previous studies support this finding (Daniels et al., 1974).

Studies of the serum transport proteins revealed several different age independent patterns, the clinical correlation of which are still to be elucidated (Ritzmann et al 1973).

REFERENCES :

1. Alexander, J.W., Ogle, C.K., Stinnett, J.D. and Macmillan, B.G. : A sequential prospective analysis of immunologic abnormalities and infection following major thermal injury. *Ann. Surg.*, 188 : 809 - 816, 1978.
2. Arturson, G., Johansson, S.G.O., Hogman, C.F. and Kiljandes, J. : Changes in immunoglobulin levels in severely burned patients. *Lancet*. 1 : 546 - 548, 1969.
3. Baar, S. : Serum and plasma proteins in thermally injured patients treated with plasma, its admixture with albumin or serum alone. *Ann. Surg.* 161 : 112 - 126, 1965.
4. Birke, G., Liljedahl, S.O., Plantin, L.O. : Distribution and losses of Plasma proteins during the early stage of severe burns. *Ann. NY Acad. Sci.* 150 : 895-905, 1968.
5. Daniels, J.C., Larson, D.L., Abston, S. and Ritzmann, S.E. : Serum protein profiles in thermal burns : II. Protease inhibitors, complement factors and C-reactive protein. *J. Trauma* 14 : 153-162, 1974.
6. Deitch, E.A. : Review of the effect of stress and trauma on plasma fibrinogen and the reticuloendothelial system. *J. Burn Care Rehab.* 4 : 334-352, 1983.
7. Grogan, J.B. : Altered phagocytic function in burn patients. *J. Trauma*. 16 : 985, 1976.
8. Howard, R.J. : Effect of burn injury, mechanical trauma and operation on immune defense. *Surg. Clin. No. Amer.*, 59 : 199-211, 1979.
9. Kagan, R.J., Bratescu, A., Jonasson, O., Matsuda, T. and Teodorescu, M. : The relationship between the percentage of circulating B cells, corticosteroid levels and other immunologic parameters in thermally injured patients. *J. Trauma*. 29 : 208-213, 1989.
10. Knisely, M.H. : Enforced postponement of selective phagocytosis following burns. A contribution to the biophysics of diseases. *Ann. N.Y., Acad. Sci.* 150 : 510 - 527, 1968.
11. Kohn, J. and Cort, D.F. : Immunoglobulins in burned patients. *Lancet*. 1 : 836-837, 1969.
12. Kohn, S. : Abnormal immune reponse in burns. *Postgrad. Med.J.* 48 : 335-337, 1972.
13. Lemperle, G. : Reticuloendothelial system in the burned rats. *Infect. Dis.* 117: 7-14, 1967.
14. Mancini, G., Carbanara, O. and Herimanna, J.F. : Immunochemical quantitation of antigens by single radial immunodiffusion. *Int. J. Immuno. Chem.*, 235-254, 1965.
15. Mehdiratta, N.L. and Singh, H.P. : Immunoglobulins and thermal burn infections. *Ind. J. Plastic Surg.* 20 : 18-22, 1987.
16. Munster, A.M. : Alterations of the host defense mechanism in burns. *Surg. Clin. No. Amer.*, 50 : 1217-1234, 1970.
17. Ninnemann, J.L. : Immunologic defenses against infection : Alterations following thermal injuries. *J. Burn care Rehab.* 3 : 355-366, 1982.
18. Reinhold, J.G. : Standard methods of clinical chemistry, edited by Reiner Academic Press, New York and London, 1 : 88, 1953.
19. Ritzmann, S.E., Cobb, E.K., Larson, D.L. Abston, S. and Goldman, A.S. : Immunoglobulins in burned patients. *Lancet*. 1 : 1152-1153, 1969.
20. Ritzmann S.E., Daniels, J.C. and Larson D.L. : Diagnostic interpretation of serum protein abnormalities in thermal burns. *Am. J. Clin. Pathol.*, 60 : 135-144, 1973.
21. Sengupta, S.R., Sukhtankar, A.Y., Dhole T.N., and Dubey, K.P. : Humoral immunity in burn. *Proceedings, Fourth National Congress of Medical Microbiologists.*, 4 : 94-97, 1980.
22. Stratta, R.J., Saffle, J.R., Ninnemann, J.L. and Warden, G.D. : Immunologic parameters in burned patients : Effect of therapeutic interventions. *J. Trauma*, 26 : 7-17, 1986.

AUTHOR'S NAME AND ADDRESS :

1. Anupama Arora. M.Sc.,
2. Satish K Mehta. Ph.D.,
3. S.K. Mehta.

Department of Biochemistry,
Medical College, Amritsar.