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Immunoglobulin Levels in Some Myeloproliferative and Lymphoproliferative Disorders in Enugu, Nigeria

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Abstract: Immunoglobulin (IgG, IgM, IgE) levels, total protein, albumin and globulin levels as well as serum protein electrophoresis were done in 20 adult patients aged between 16 and 65 years with various lymphoproliferative and myeloproliferative disorders. Immunoglobulin M levels were significantly increased in the newly diagnosed untreated patients but were found to be normal in patients on chemotherapy. Patients with lymphoproliferative disorders had significantly lower IgE levels than the control subjects. Immunoglobulin G levels were lower in all the patients than the control subjects. In patients on chemotherapy, the total protein levels were significantly low compared with the controls.

Key words: Immunoglobulin levels, myeloproliferative disorders, lymphoproliferative disorders, Nigeria

INTRODUCTION

The aetiology of myeloproliferative and lymphoproliferative disorders involve a complex interaction of multiple factors including environmental factors, host resistance, genetic factors and somatic mutation. Certain malignancies have been associated with some hereditary defects of the immune system and it has been postulated that survival of the malignant cell requires some defect in immune surveillance.

Reports of serum immunoglobulin concentrations in childhood leukaemia are contradictory. Mckelsey and Carbone (1965) showed significantly low IgA levels in all 34 children with acute lymphoblastic leukaemia before treatment while Ragab *et al.* (1970) found no significant difference between pretreatment levels of immunoglobulins in children with childhood leukaemia and those of control group of children. Gooch and Fenbach (1971) reported a decrease of all 3 serum immunoglobulins (IgG, IgA, IgM) in only one of 19 patients. Low serum immunoglobulin G concentration in acute lymphoblastic leukaemia has been associated with bad prognosis (Kiran and Cross, 1969). In Nigeria, most works on immunoglobulin levels in leukaemias have been done in Western Nigeria. Okpala and Salimonu (1991) reported from Ibadan, Nigeria that there were decreased immunoglobulin G levels and raised immune complexes in acute lymphoblastic leukaemia.

Decreased immunoglobulin G and raised immune complex levels reduce the ability to mount immune responses and therefore imply bad prognosis. In their study, total serum protein and albumin levels were normal in both patient and control groups ruling out protein-energy malnutrition. Hypogammaglobulinemia has been reported as a common finding in Chronic Lymphocytic Leukaemia (CLL) and usually persists through the course of the disease (Ultman *et al.*, 1959). There may be a selective decrease of one of the immunoglobulin classes though usually, the serum levels of all of them are low. In CLL, there is decreased level of serum immunoglobulins due to decreased B-cell function. The cells are intrinsically defective and are unable to differentiate into immunoglobulin producing plasma cells. Since immunological defects have been associated with various haemopoietic stem cell disorders, it is important to assess immunoglobulin levels to determine if they can be used as tools for prognostication, treatment and also to detect associated dysfunctions of the immune system. This was the basis of this study.

MATERIALS AND METHODS

Twenty adults consisting of 8 males and 12 females aged between 16 and 65 years with various myeloproliferative and lymphoproliferative disorders were included in this study. Six of these patients were newly diagnosed and had not yet been started on any form of treatment. Twelve apparently healthy individuals matched for age and sex with the patients served as controls.

Immunoglobulin levels (IgG, IgM, IgE), total protein, albumin, globulin and serum protein electrophoresis were

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Table 1: Mean standard deviation of immunoglobulin levels (Igm, Igg, Ige) total protein, albumin globulin and total white cell count of untreated patients

Subjects	Total protein g L^{-1}	Albumin g L^{-1}	Globulin g L^{-1}	Igm g L^{-1}	Igg g L^{-1}	Ige g L^{-1}	Wbc×10^{9} L^{-1}
Control n = 12	77±4.27	50±4.74	28±5.54	200±70.23	2058.25 ±1731.91	108.91±55.62	5.4±1.67
Untreated patients ± 40.97 n = 7	71±10.41	48±4.03	28±7.36	293.33 ±82.60	1438.83 ±541.66	50.33±69.40	65.2
p-value	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05
Patients on chemo-therapy n = 13	73±3.83	50±8.46	23±8.49	205±8.49	1359.54 ±337.27	62.08 ±65.46	98.6±106.13
p-value	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05
Lymphopro-liferative disorders n = 9	72±8.78	47±7.72	28±7.88	258±91.70	1428.67 ±446.92	54.33 ±59.93	52.8±37.7
p-value	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05
Myelopro-liferative disorder n = 11	73±3.20	52±6.36	21±7.77	217±52.01	1355.72 ±352.06	71.64±74.76	115.2±94.04
p-value	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05	p<0.05

done on the patients and controls. IgG and IgM were determined by tubidimetric assay while IgE was estimated using an enzyme immunoassay method. Total protein, albumin and globulin were determined by colorimetric methods. Cellulose acetate method was used for the serum protein electrophoresis.

RESULTS

There were 11 patients with myeloproliferative disorders (Chronic Myeloid Leukaemia, CML and polycythaemia rubra vera) and 9 patients with lympho-proliferative disorders (chronic lymphocytic leukaemia, CLL, CLL-PL and lymphoma). All the patients were 12 females and 8 males. Table 1 shows the mean values of the immunoglobulin fractions (IgM, IgG, IgE), total protein, albumin, globulin in the untreated patients compared with the controls. In the patients on chemotherapy, there were no significant differences between the patients and the controls in the immuno-globulin levels but the total protein levels were significantly lower in the patients compared with the controls. The table also shows the immunoglobulin levels in the patients with lymphoproliferative disorders. These patients had significantly lower IgE levels than the control subjects. In patients with CLL in particular, the IgE levels were significantly lower than in the control group but there were no statistically significant differences in the IgM and IgG levels.

In patients with myeloproliferative disorders, the total protein level was significantly lower than in the control subjects. The mean globulin level was also observed to be significantly lower in the patients.

DISCUSSION

Immunoglobulin M levels were significantly higher in the untreated patients but for those on chemotherapy, the levels were not significantly different. This leads us to ask if IgM levels can be used to monitor patients on chemotherapy. However, we do know that IgM is produced as a primary immune response to antigenic stimulation and is usually short-lived. The IgE levels were significantly lower in the patients with lymphoproliferative disorders compared with the controls. This finding is very interesting because it has since been noted that normally, Africans have high IgE levels because of repeated parasitic infections and allergic reactions (Rowe, 1975). Immunoglobulin E is known to protect against parasitic infections. The low level of IgE is partly responsible for the overwhelming infections which is a common phenomenon in chronic lymphoproliferative disorders. In the patients with myeloproliferative disorders, there were no significant differences in the immunoglobulin levels compared with the controls. Four out of the 6 patients with Chronic Lymphocytic Leukaemia (CLL) had decreased total globulin levels. Hypogammaglobulinenia is a feature of CLL and usually persists throughout the course of the disease (Fernandez *et al*., 1983).

In all the studies, IgG levels were higher in the control groups than in the patients although with no significant statistical difference. IgG constitutes the major immunog-lobulin in serum after repeated or prolonged exposure to antigen. It activates complement, kills bacteria by attachment to macrophage and promotes opsonization. It is also active in viral neutralization. Reduced levels of IgG in various neoplastic conditions is partly responsible for increased susceptibility to infections in these patients.

CONCLUSION

We found in this study significantly increased 1 gM levels in newly diagnosed untreated patients which gradually declined as treatment continued. Patients with lymphoproliferative disorders had significantly lower IgE levels than the control subjects. We also noticed that IgG levels were lower in all the patients compared with the controls although there were no significant statistical differences. In patients on chemotherapy, the total protein levels were significantly lower compared with the control subjects.

REFERENCES

Fernandez, L.A., J.M. Macsween and G.R. Langly, 1983. Immunoglobulin secretory function of B-cells from untreated patients with chronic lymphocytic leukaemia and hypogammaglobulinemia; Role of T cells. Blood, 62: 767-774.

Gooch, W.M. and D.J. Fernbach, 1971. Immunoglobulins during the course of acute leukaemia in children. Effects of various clinical factors. Cancer, 28: 984-989.

kiran, O. and S. Cross, 1969. The G-Immunoglobulins in acute leukaemia in children. Haematologic and immunologic relationships. Blood, 33: 198-206.

Mckelvey, E. and P.P. Carbone, 1965. Serum immune globulin concentrations in acute leukaemia during intensive chemotherapy. Cancer, 18: 1292-1296.

Okpala, I.E. and L.S. Salimonu, 1991. The prognostic value of serum immunoglobulin G and immune complex levels in acute lymphoblastic leukaemia. Cent. Afr. J. Med., 37: 153-156.

Ragab, A.H., K.J. Lindqvist, T.J. Vietti, S.C. Choi and C.K. Osterland, 1970. Immunoglobulin pattern in childhood leukaemia. Cancer , 26: 890-894.

Rowe, D.S., 1975. Immunoglobulins, Clinical aspects of immunology. Gell PGH, Coombs RA, Lachmann PJ (Eds). Blackwell Scientific, pp: 285-306.

Ultman, J.E., W. Fish, E. Osserman and A. Gellhorn, 1959. The clinical implications of hypogammaglobulinaemia in patients with chronic lymphocytic leukaemia and lymphocytic lymphosarcoma. Ann. Int. Med., 51: 501-516.