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Serum Beta$_2$-microglobulin in Burkitt's Lymphoma: A Preliminary Report

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Summary

Onyemelukwe GC, Taqi A, Mohammed I and Oyeyinka G. Serum Beta$_2$-microglobulin in Burkitt's Lymphoma: A Preliminary Report. *Nigerian Journal of Paediatrics* **1985: 12:125.** Serum beta$_2$-microglobulin, IgG, IgA, IgM and C-reactive protein were determined in 5 children with Burkitt's lymphoma (BL) and in 5 controls. The mean serum beta$_2$-microglobulin of 5.5±0.9mg/L (range 4.2–6.6mg/L) in the BL patients was significantly greater than the mean of 2.8±0.5mg/L (range 2.3–3.6mg/L) in the controls ($p<0.001$). Similarly, the C-reative protein level was significantly greater in BL patients than in controls ($p<0.001$). However, mean serum IgG, IgM, IgA were not significantly different between patients and controls. It is suggested that serum B_2-microglobulin estimation can serve as a predictive test for relapse and for central nervous system invasion in cases of BL.

Introduction

HUMAN beta$_2$-microglobulin which forms the light chain of the histocompatibility antigen[1] on cell surfaces of nucleated cells and platelets[2], is detectable in sera in values which increase with age, with falling glomerular filtration rate and in those with adenocarcinoma and lymphoma[3 5]. The invasion of the central nervous system by lymphomas and leukaemia may be detected by monitoring the cerebrospinal fluid levels of beta$_2$-microglobulin[6].

The present paper presents a preliminary report on the serum levels of beta$_2$-microglobulin in Burkitt's lymphoma.

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Materials and Methods

The subjects consisted of 5 children with Burkitt's lymphoma (2 males, 3 females; mean age 7 years; range, 6-8 years). Four of them had abdominal disease and one had stage IV disease with paraparesis; clinical staging was according to the criteria of Berard *et al*[7]. Five age and sex-matched apparently healthy children (controls) were also studied. Five to ten millilitres of venous blood was obtained from each subject and control. Serum samples obtained from the blood specimens were stored at -20°C until analysed. Blood urea

and creatinine were determined routinely. Beta$_2$-microglobulin was determined by radio-immunoassay using *Phadebas* kit (*Pharmacia, Sweden*). Serum IgA, IgG, IgM and C-reactive protein were determined by radial immunodiffusion technique[8]. C-reactive protein values are expressed as the percentage of high level C-protein sera pooled from patients with typhoid fever. Statistical analysis was done using the student t test.

Results

The Table shows a significant elevation of mean serum beta$_2$-microglobulin in BL patients compared to controls ($p < 0.001$). Serum IgM and IgA were higher in controls (323.3$\pm$ 78.3 iu/ml and 93.3$\pm$ 19 iu/ml respectively) than in BL patients (294.4 $\pm$ 29.0 iu/ml and 77.2 $\pm$ 24.6 iu/ml respectively) but these differences were not significant ($p>0.5$ and >0.1 respectively). Conversely, serum IgG was non-significantly higher in BL patients (219.4$\pm$ 119.5 iu/ml) than in controls (182.1 $\pm$ 72.2 iu/ml) ($p>0.5$). C-reactive protein was significantly higher in patients (39.2 $\pm$ 2.4%) than in controls (17.6 $\pm$ 2.6%) ($p<0.001$). Blood urea and creatinine were normal in both patients and controls.

Discussion

Serum beta$_2$-microglobulin was found to be elevated in BL patients in the present preliminary study which involved too few patients for valid conclusions to be drawn. Nevertheless, the results suggest a trend which, if confirmed in studies involving larger numbers, may be of importance in the management of BL.

In Hodgkin's lymphoma, serum beta$_2$-microglobulin increases with advancing clinical staging and in non-Hodgkin's lymphoma other than BL, its rise has been associated with poor prognosis[4,5]. The confirmation of central nervous system involvement in leukemia and the lymphomas by the finding of elevated beta$_2$-microglobulin in cerebrospinal fluid has also been reported[6]. The findings in the present study would therefore, suggest that the relapse of BL could be predicted by the findings of an elevated serum beta$_2$-microglobulin value in patients who have completed courses of therapy and are apparently in remission, while elevation of cerebrospinal fluid beta$_2$-microglobulin could signify central nervous system involvement. Further evaluation of its prognostic value is currently under investigation.

The cost of beta$_2$-microglobulin determination by radioimmunoassay as carried out in the present study, may be minimised by the adoption of radial immunodiffusion or ELISA technique for beta$_2$-microglobulin which could then become financially attainable in teaching hospitals in Nigeria and other African countries.

Although serum IgA and IgM were lower in patients than in controls, the higher level of serum IgG suggests that humoral immunity and B lymphocyte function were preserved in these patients. Burkitt's lymphoma is a multifocal B-cell neoplasia in which peripheral lymph node and splenic involvement is rare and in which intracytoplasmic immunoglobulin is not usually detected within tumour cells[10]. The serum immunoglobulins in BL may include specific anti-EB (Epstein-Barr) virus and anti-malarial antibodies since aetiological postulate suggests that chronic malaria stimulation and subsequent infection with EB virus may lead to the development of BL[9,10]. The higher though non-significant level of IgG in BL patients in this study may be contributed to by such antibodies. The higher serum C-reactive protein level in BL patients in the present study is not surprising since C-reactive protein is an acute phase protein which is usually elevated in instances of inflammation, infections, cancer or during pregnancy and may play an important role in modulating lymphocyte function and lymphokine production[11] by mechanisms yet to be classified in these conditions, including Burkitt's lymphoma.

TABLE

Mean serum Beta$_2$-microglobulin, Immunoglobulins and C-reactive Protein Levels

	BL Patients $n = 5$ *Mean ± SD*	*Controls* $n = 5$ *Mean ± SD*	*P*
B_2-microglobulin (mg/L)	5.8 ± 0.9 (4.2–6.6)*	2.8 ± 0.5 (2.3–3.6)	< 0.001
IgM (iu/ml)	294.4 ± 29.0 (254–322)	323.3 ± 78.3 (244–428)	> 0.5
IgG (iu/ml)	219.4 ± 119.5 (104–384)	182.1 ± 72.2 (86–317)	> 0.5
IgA (iu/ml)	77.2 ± 24.6 (49–113)	93.3 ± 19 (70–124)	> 0.1
C-reactive Protein %	39.2 ± 2.4 (21–60)	17.6 ± 2.6 (5–25)	< 0.001

BL = Burkitt's lymphoma
SD = Standard deviation
*Figures in parentheses represent ranges.

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