

DIABETES MELLITUS ; SERUM PROTEINS & IMMUNOGLOBULINS

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ABSTRACT

Ninety subjects, 60 diabetic patients and 30 healthy controls were included in this study. Total serum proteins, protein fractionation by electrophoresis and immunoglobulins by immunoelectrophoresis were done in all the subjects. The mean \pm SD values of total proteins, albumin, and globulins in diabetics were comparable ($P > 0.1$) with those of controls. However, the immunoglobulins depicted variable pattern in diabetics thereby suggesting that humoral immune mechanism may be implicated in diabetes mellitus, as indicated by the above results.

INTRODUCTION

Clinical diabetes mellitus represents a syndrome with disordered metabolism and inappropriate hyperglycaemia due to either an absolute deficiency of insulin secretion or a reduction in its biologic effectiveness or both^{1,2}.

The overall prevalence of diabetes mellitus in Pakistan has been estimated to be 3.96 per cent for both sexes; 3.63 per cent in males and 4.36 per cent in females³.

Serum protein levels in diabetes mellitus have been reported to be comparable with normal healthy subjects with no change in electrophoretic pattern⁴. Hypoproteinemia, on the other hand, has been thought to be responsible for the diminished resistance to infections in diabetes mellitus⁵. Among the

immunoglobulins, higher levels of immunoglobulin G (IgG), immunoglobulin M (IgM) and immunoglobulin A (IgA) have been reported in diabetics⁶. Higher levels of IgG have been shown to be correlated with hereditary type of diabetes⁷.

Enormous work has been done in detecting islet cell antibodies (ICA) that are of the IgG class⁸. Furthermore, isolation of IgG-ICA-producing B lymphocytes from peripheral blood of type 1 diabetics has also been reported⁹. Both, thyroid microsomal & thyroglobulin autoantibodies have also been found in diabetic patients which indicate its coexistence with autoimmune thyroid disease^{10,11}.

This study was aimed to determine the levels of serum proteins as well as immunoglobulins (IgG, IgM and IgA) in Pakistani adult diabetic patients.

PATIENTS AND METHODS

Sixty adult Pakistani patients were included in the study. Diabetes mellitus was diagnosed clinically based on WHO criteria¹² and diagnosis was confirmed by glucose tolerance test (GTT). There were 40(66.7%) males and 20(33.3%) females with an age range of 31 to 60 years (Table I). Thirty age and sex matched non diabetic subjects served as the control group.

Total serum proteins were measured by the modified Biuret method¹³ and electrophoretic fractionation of serum proteins was done on cellulose acetate membrane in barbital buffer at pH 8.6¹⁴. The results were read on scanning densitometer. Immunoglobulin (IgG, IgM and IgA) levels were measured semi-quantitatively by immunoelectrophoresis on agar gel¹⁵. Anti-IgG, anti-IgM and IgA) levels were measured semiquantitatively by immunoelectrophoresis on agar gel¹⁵, anti-IgG, anti-IgM and anti-IgA were obtained from Ortho Diagnostics, USA. The data obtained was expressed as mean \pm SD and the P value was obtained using the student's "t" test.

RESULTS AND DISCUSSION

Total serum proteins, serum albumin and different electrophoretic fractions of serum proteins are significantly comparable in diabetic and control groups (Table II), as also reported by Fernandez et al⁴.

However alpha-1 and alpha-2 globulin fractions were found to be non-significantly raised. Others also reported same type of finding¹⁶.

Table I. Age and sex distribution of diabetic and control subjects.

Age Group	Diabetic Subjects		Control Subjects	
	Male	Female	Male	Female
31-40 Years	14(35%)	8(40%)	7(35%)	1(40%)
41-50 Years	10(25%)	4(20%)	5(25%)	2(20%)
51-60 Years	16(40%)	8(40%)	8(40%)	4(40%)
All Subjects	40(66.7%)	20(33.3%)	20(66.7%)	10(33.3%)

Among the diabetic subjects, 38.3 per cent showed raised levels of IgG while the rest had almost normal levels (Table III). These results are in conformity with others who also observed raised levels of IgG in a fair number of cases^{6,7,17}.

IgG levels were raised in 37.5 per cent of untreated and 45.8 per cent of diabetics on oral hypoglycemic drugs and were decreased in only 3.1 per cent of untreated diabetics, an observation in disagreement with Earle et al¹⁷ who observed almost normal levels of IgG in patients on oral hypoglycemic drugs and found decreased levels in untreated diabetics. The reason for this observation probably be the ethnic and racial difference of the population studied.

Table II. Serum protein levels in diabetic and control subjects.

(The results are expressed as mean values in grams/dl. The figures in parenthesis represent the range).

Subjects	Total Proteins	Albumin	Globulins			
			Alpha-1	Alpha-2	Beta	Gamma
Diabetic (n=60)	7.5 (5.7-8.5)	4.3 (1.8-5.8)	0.31 (0.1-0.7)	0.84 (0.3-1.55)	0.8 (0.12-1.4)	1.33 (0.6-2.66)
Control (n=30)	7.3 (5.9-8.4)	4.8 (3.3-5.9)	0.18 (0.08-0.36)	0.59 (0.27-0.9)	0.77 (0.44-1.14)	1.3 (0.59-2.66)

Statistical Analysis: Patients vs Controls. (P>0.1 all)

Among the untreated diabetic patients, IgM levels were raised in 31.2 per cent, normal in 56.3 per cent and decreased in 12.5 per cent of cases. Of the

diabetics treated with oral hypoglycemic agents or diet control, 45.8 per cent had raised levels, 45.8 per cent had normal levels and 8.4 per cent patients had

decreased levels. However, all the diabetics (100%) who were treated with both oral hypoglycemic agents and insulin had normal serum levels of IgM. The pattern of IgM levels in diabetics is not as yet explicable. 21.8 per cent of untreated and 12.5 per

cent of diabetics on oral hypoglycemic therapy had raised levels of IgA. Overall IgA levels were normal in most diabetics and raised in 18.3 per cent of the cases. These observations are comparable with the previous reports^{18,19}.

Table III. Immunoglobulin levels in diabetic patients.

Immunoglobulin Type	Untreated Diabetic	Diabetics treated with oral hypoglycemics/diet	Diabetics treated with oral hypoglycemics & insulin	All subjects
IgG				
Increased	12(35.5%)	11(45.8%)	--	23(38.3%)
Similar	19(59.4%)	11(45.8%)	4(100%)	34(56.7%)
Decreased	1(3.1%)	2(8.4%)	--	3(5.0%)
IgM				
Increased	10(31.2%)	11(45.8%)	--	21(35.0%)
Similar	18(56.3%)	11(45.8%)	4(100%)	33(55.0%)
Decreased	4(12.5%)	2(8.4%)	--	6(10.0%)
IgA				
Increased	7(21.8%)	3(12.5%)	1(25%)	11(18.3%)
Similar	23(71.9%)	20(83.3%)	3(75%)	46(76.7%)
Decreased	2(6.3%)	1(4.2%)	--	3(5%)

The results are expressed as increased, similar or decreased as compared to normal healthy and control subjects.

The variable pattern of immunoglobulin levels in diabetes suggests that humoral immune mechanism is involved in diabetes mellitus and selective long-term follow-up studies on both untreated and treated diabetics are necessary to infer the exact role and significance of immunoglobulins in patients suffering from diabetes mellitus.

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*The artist does not see things
as they are, but as he is.*

Alfred Tonnelle