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A THREE YEAR STUDY ON THE ELECTROPHORETIC PATTERNS OF SERUM PROTEINS WITH SPECIAL REFERENCE TO VARIOUS GLOBULINOPATHIES IN SAUDIS

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ABSTRACT

Human sera comprising 545 specimens spread over a period of three years were analyzed electrophorctically for proteins. Only 159 samples (29%) exhibited abnormal serum protein patterns. They were in the order of inflammatory disorders (acute/chronic), 60 (37.7%), Polyclonal gammopathies,48 (30.1%), Cirrhosis, 22 (13.8%), Monoclonal gammopathies, 22 (13.8%), Agammaglobulinemia, 3 (1.9%), Nephrosis, 2 (1.2%), Protein-losing enteropathy, 1 (0.6%), Low-alpha 1 —antitrypsin, 1 (0.6%), Inflammatory diseases of various nature, therefore, constitute the major serum protein abnormalities in Riyadh. Moreover, their occurrence varies with age, sex and climatic conditions as elsewhere in the world.

INTRODUCTION

Serum Protein electrophoresis in gel such as cellulose acetate is a valuable technique in the clinical diagnosis of paraproteinemias like multiple myeloma[1,2,3], Nephrosis, cirrhosis and chronic rheumatoid arthritis etc.[1,5,8]. The Central Laboratory and Blood Bank, Riyadh is a referral center for about 60 thousand patients per annum. Majority of the cases (60%) come from the peripheral hospitals, dispensaries and clinics of the Ministry of Health and Private as well. The rest 40% come from the Riyadh Central Hospital. The present study was undertaken with a view to look into the common serum protein abnormalities in the Saudi society which undergoing fat changes in socio-economic status and environmental factors.

PATIENTS AND METHODS

Altogether 545 patients had been referred during the 3 years' period commencing from June 1984 to May 1987. They included 350 males and 195 females. Their age distribution was from 6 years to 82 years. Zone electrophoresis of sera or plasma from these patients was carried out on cellulose acetate as per standard procedure recommended by Messrs. Helena Laboratory, Beaumont, Texas, U.S.A. The plates were then scanned and computed in order to know the relative concentration of each fraction[4] and other such electrophoretic patterns showing clinicopathologic correlations[5,7,12].

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RESULTS AND DISCUSSION

A total of 159 patients were found to be afflicted with various abnormalities affecting serum proteins. The sex distributions in them was, males 92 (57.9%) and females 67 (42.1%); while age distribution was from 6 to 82 years. It is quite clear from such serum protein abnormalities as manifested in various diseases mentioned in this paper, and that male Saudi patients are comparatively more susceptible to these immunoproliferative disorders, and disease involving globulins[7]. Details of patients falling under different types of electrophoretic patterns are given in table 1.

Table 1. Some of the variables among the groups with abnormal electropherogram.

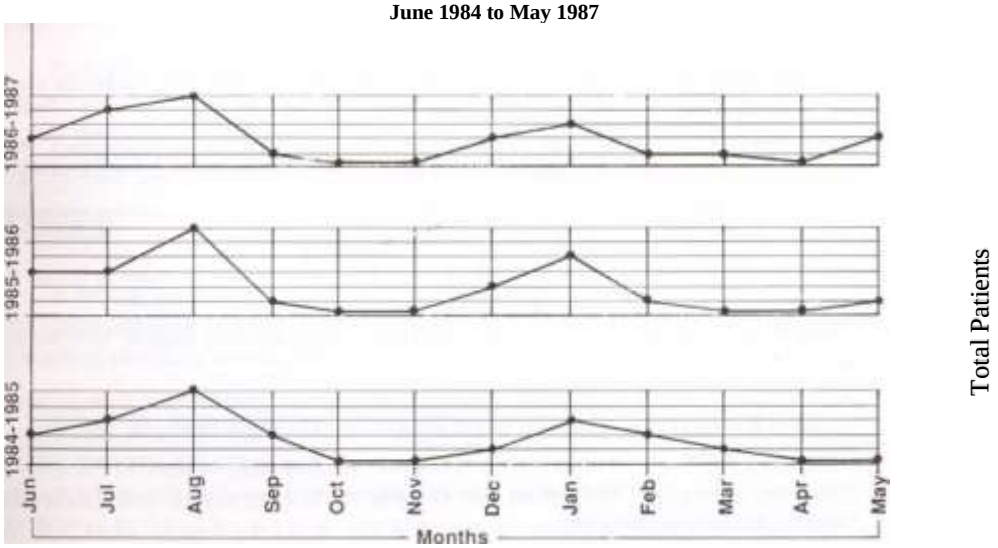
S. No.	Abnormal Electropherogram Type	Total No.	%of Abnormal cases	Number of		Age	
				Males	Females	Lowest	Highest
1.	Inflammatory	60	37.7	34	26	36	82
2.	Polyclonal	48	30.1	29	19	36	68
3.	Cirrhosis	22	13.8	10	12	30	58
4.	Monocolonal	22	13.8	16	6	52	72
5.	Agammaglobulinemia	3	1.9	2	1	6	22
6.	Nephrotic Syndrome	2	1.2		2	8	14
7.	Protein-losing Syndrome	1	0.6	1		14	
8.	Low alpha antitrypsin	1	0.6	—	1	6	—
	Total	**159**		**92**	**97**		

Although there were not many patients in the pediatrics group. The abnormal patterns such as those indicating polyclonal gammopathy, cirrhosis and inflammatory disorders were less or practically nil among children, while other maladies such as nephrotic syndrome, low-alpha 1 — antitrypsin[7], protein-losing enteropathy[16] and agammaglobulinemia or hypogammaglobulinemia[14,15] were found, though less in number, only amongst children. The high incidence of inflammatory diseases (37.7%) among the patients with abnormal electropherogram is indicative of the prevalence of the disease in adult Saudis. It is interestingly noticeable that the occurrence of inflammatory disorders in Riyadh area has a male to female ratio of approximately 3: 2. While in developed countries such ratio is 1:3[6] i.e. inflammatory diseases are less predominant among Saudi females in Riyadh (table 1). the reason may possibly be their less exposure to climatic conditions as compared to Saudi males and also to females in the developed countries. Moreover, the overall percentage of annual incidence of such diseases is also low here[6]. The higher number of distribution during the acute climatic conditions such as summer and winter reflects the influence of environmental factors in precipitating the disease and it is less so in winter, than summer for obvious reasons.

Various types of inflammatory diseases influence the synthesis and degradation of acute phase

reactants such as alpha$_1$-acid glycoprotein and alpha1—antitrypsin[9],[13,19] and they have a definite role in inflammation[13]. In inflammatory processes the electrophero- gram of the sera of afflicted patients revealed a typical increase in alpha$_1$ — and/or alpha$_2$-globulins. While the albumin fractions showed a slight to moderate decrease in concentration[18]. The elevated level of alpha$_1$- globulins was mostly attributable to alpha$_1$-acid glycoprotein and alpha$_1$-antitrypsin while alpha$_2$-globulins consist mainly of haptoglobin and alpha$_2$-macroglobulin[17]. Electrophoresis of the plasma of these patients also showed a light to moderate increase in the level of fibrinogen. Some of them (20%) revealed elevated levels of serum uric acid which, if of endogenous origin, is an index of the nucleoproteins breakdown. This in turn throws light on the degenerative process associated with tissue damage in some patients suffering from certain inflammatory ailments. It is apparent that such degeneration of tissue may be influenced by environmental factors such as climate. In adult population the cause becomes quite decisive as there is less compensation for this process of degeneration as compared to adolescents. The cause is also amplified by the extreme climate alongwith food habits and nature of physical activity. Regarding other electrophoretic patterns such as cirrhosis, the results were further supported by liver function tests.

Figure **1. Distribution of Inflammatory Diseases June 1984 to May 1987**



In Polyclonal gammopathy 40 cases were observed with an increase in IgG while 5 were due to an elevation in IgA and IgM, and 3 were because of IgG and IgM. Nephrotic syndrome observed in two children had high scrum cholesterol, low serum albumin[17] with a manifestation of albuminuria of high degree.

These samples of serum which exhibited monoclonal gammopathy were subjected to further study for typing for heavy and light chains. Their urine specimens were analyzed for Bence Jones proteinuria and other types of proteinuria including Ig typing. The results of these findings will be reported in a separate communication.

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