SERUM PROTEIN ELECTROPHORESIS IN HEALTHY SUBJECTS

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Abstract

Serum protein electrophoresis in 263 normal subjects (140 males, 123 females) of different age groups is reported. Mean values in males were higher for total proteins, albumin and beta globulin, while in females alpha-I and alpha-2 globulins were significantly high. Differences in total globulin and gama globulin fraction were not significant (JPMA 38: 18, 1988).

INTRODUCTION

Blood plasma contains 90% water and 10% dissolved solids. Seventy percent of' these dissolved solids are proteins, a mixture of simple and con¬jugated proteins which include lipo and glycopro¬teins. The total reported concentration is 6.5—7.5 grams/dl[1]. Albumin forms 50 to 60% of the total, followed by globulin 33% and fibrinogen 7%. Because of their different functions, metabolism and site of origin, plasma albumin and globulin are subjected to different influences and hence their concentration varies independent of one another. Alterations have been described in hepatic, renal, acute and chronic diseases. This study was designed to determine serum protein levels in healthy population of Karachi, and to compare them with similar studies in other parts of the world.

MATERIAL AND METHODS

Aparently healthy adult subjects of different age groups from schools, colleges and relatives accompanying patients to PMRC Research Centre at Jinnah Postgraduate Medical Centre, Karachi were included in the study. Each person was physically examined and his height, weight and blood pressure was recorded. Five milliliters of blood was drawn for haemoglobin determination, erythrocyte sedimentation rate, packed cell volume and protein analysis. For total proteins Abbe hand refractrometer was used and electrophoresis was done by cellulose accetate membrane method.[2]

RESULTS

Two hundred and sixty three healthy subjects (140 males, 123 females) of different age groups were examined. Ages ranged from 10-60 years. Serum protein electrophoresis in males and females (Table I)

TABLE I

Serum Protein Electrophoresis.

Group studied		T. Protein g/dl	Albumin g/dl	α1–glob. g/dl	α2–glob. g/dl	β –glob. g/dl	γ–glob. g/dl
Total	(263)*	7.79 ±0.45**	4.62 ±0.48	0.23 ±0.10	0.74 ±0.18	0.92 ±0.19	1.29 ±0.34
Males	(140)	7.86 ±0.45	4.73 ±0.48	0.21 ±0.10	0.70 ±0.20	0.94 ±0.20	1.29 ±0.36
Females	(123)	7.72 ±0.44	4.51 ±0.46	0.26 ±0.09	0.78 ±0.16	0.89 ±0.19	1.30 ±0.32
		P<0.05	P<0.001	P<0.001	P<0.001	P <0.05	

* Number in parenthesis indicate number of subjects.

** Mean ± SD.

shows that total protein, albumin and beta fraction of globulin were significantly higher in males, while alpha-i and alpha-2 were significantly higher in females. Levels of total globulins and gama globulin though slightly higher in females, were not significantly different from those in males. The highest mean for total protein was found in age group 30-39 years in males and 50 years and above in females (Table II),

TABLE II

Serum Protein Electrophoresis in Males & Females in 10 – 60 Age Groups.

Age Group	T. Protein g/dl (n)	Albumin g/dl (n)	αI–glob. g/dl (n)	α2 –glob. g/dl (n)	β –glob, g/dl (n)	γ – glob. g/dl (n)
Males	7.92 ± 0.59*	4.75 ± 0.49	0.23 ± 0.08	0.71 ± 0.13	0.91 ± 0.18	1.32 ± 0.31
	(38)	(38)	(38)	(38)	(38)	(38)
10 – 19						
Females	7.71 ± 0.46	4.58 ± 0.48	0.26 ± 0.24	0.77 ± 0.13	0.84 ± 0.13	1.26 ± 0.23
	(62)	(62)	(62)	(62)	(62)	(62)
Males	7.82 ± 0.35	4.72 ± 0.46	0.19 ± 0.12	0.69 ± 0.20	0.95 ± 0.21	1.26 ± 0.34
	(56)	(56)	(56)	(56)	(56)	(56)
20 – 29						
Females	7.73 ± 0.34	4.43 ± 0.35	0.22 ± 0.05	0.76 ± 0.11	0.98 ± 0.19	1.34 ± 0.26
	(28)	(28)	(28)	(28)	(28)	(28)
Male	7.98 ± 0.37	4.68 ± 0.48	0.19 ± 0.08	0.72 ± 0.21	0.99 ± 0.22	1.41 ± 0.24
	(25)	(25)	(25)	(25)	(25)	(25)
30 – 39						
Females	7.66 ± 0.35	4.32 ± 0.41	0.28 ± 0.12	0.81 ± 0.17	0.83 ± 0.16	1.41 ± 0.21
	(24)	(24)	(24)	(24)	(24)	(24)
Males	7.69 ± 0.74	4.78 ± 0.39	0.19 ± 0.10	0.78 ± 0.18	0.90 ± 0.13	1.03 ± 0.37
	(8)	(8)	(8)	(8)	(8)	(8)
40 – 49						
Females	7.97 ± 0.07	4.61 ± 0.28	0.25 ± 0.04	0.88 ± 0.13	0.84 ± 0.04	1.37 ± 0.20
	(4)	(4)	(4)	(4)	(4)	(4)
Males	7.88 ± 0.49	4.65 ± 0.35	0.23 ± 0.07	0.70 ± 0.10	0.99 ± 0.11	1.31 ± 0.22
	(16)	(16)	(16)	(16)	(16)	(16)
50 & above						
Females	7.87 ± 0.46	4.28 ± 0.24	0.26 ± 0.11	0.78 ± 0.03	1.12 ± 0.28	1.44 ± 0.09
	(5)	(5)	(5)	(5)	(5)	(5)

* Mean ± S.D.

while the lowest levels were recorded in 45-49 age group amongst males and 30-39 years in females.

DISCUSSION

Serum proteins are responsible for viscosity of blood, regulation and distribution of fluid between blood and tissues, transpoi t of lipids, fat soluble vitamins, bile salts, hormones and some drugs. They are also a source of nutrition, coagulation of blood and production of antibodies. Protein values, albumin, globulin and levels of different globulin fractions vary in many acute and chronic disease states. To ascertain various degrees of alteration in total serum proteins and its fractions, it is necessary that baseline information of normal values should be available for our population. The present results

are higher than similar studies done in England[3], Bangladesh[4] and Karachi[5] (Table III).

TABLE III
Comparison With Other Studies.

	Gilliland (1956) England G/dl	Abdul Rehman (1959) Dhaka G/dl	Zuberi (1978) Karachi G/dl	Present (1987) Karachi G/dl
Total Protein	7.2	7.19	7.38	7.79
Albumin	4.15	3.88	4.35	4.62
Alpha-1	0.29	0.40	0.21	0.23
Alpha-2	0.59	0.58	0.60	0.74
Beta	0.89	0.85	0.80	0.92
Gama	1.40	1.40	1.43	1.29

Our results are more in agreement with Zuberi and Lodi[5], though total proteins are slightly higher, while gama globulin show some decrease.

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