



COMPARISON OF SERUM PROTEIN IN PRE-ECLAMPTIC WOMEN

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ABSTRACT

The total proteins, albumin, globulin and A: G ratio not significantly change with increase in blood pressure in pre-eclamptic women. The serum proteins, albumin and globulin were decrease from 5.96 ± 0.49 to 5.27 ± 0.44 , 3.13 ± 0.22 to 2.65 ± 0.3 and 2.81 ± 0.37 to 2.52 ± 0.33 respectively with increase in urine albumin with highly significantly while A: G ratio was not statistically significant. Conclusion: Total protein, albumin, globulin and A: G ratio are inversely proportional to the blood pressure and urine albumin.

KEY WORDS: pre-eclampsia, serum protein, albumin, globulin, A: G ratio.

INTRODUCTION

Serum protein changes in the pre –eclampsia syndrome was studied by stud et al (1970). He used the techniques of crossed antigen antibody immune-electrophoresis to compare the serum protein changes of severe pre-eclampsia with changes of normal pregnancy ^[1]. In Pre-eclampsia decreased in the concentrations of serum albumin, transferrin, haemopexin were found, but there was an increased concentration of $\alpha 1$ -glycoprotein, $\alpha 2$ – macroglobulin and β lipoprotein. This gave a serum protein pattern essentially like that of nephrotic syndrome. It is postulated that these changes were a result of urinary loss of proteins of intermediate molecular weight with a compensatory increased in synthesis of protein in liver and retention

in serum of macroglobulins. These macroglobulins are too large to pass through the defective glomerular basement membrane.

Clarke et al (1971) determined serum protein in normal pregnancy and mild pre-eclampsia and found that there was no significant variation in α 1-lipoprotein, hepatoglobulins and hemopexin from normal. The concentration of circulating placental protein-12 (PP-120) and Placental protein – 14 (PP-14) were measured by Howell et al (1989). The level of PP-12 were significantly elevated in patients with severe pre-eclampsia whereas PP-14 level were un-affected ^[2].

Schrock Snadel et al (1992) did a similar study on PP-12 in pregnancy induced hypertensive diseases ^[3].

MATERIAL AND METHODS

In the present study the 30 pre-eclamptic women in 3rd trimester of pregnancy were studied from in-patients and out-patients department of gynecology and obstetrics, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh Uttar Pradesh, India during the period of one year i.e March 2002 to February 2003.

In these cases the blood pressure after 20 weeks of pregnancy was raised to 140/90 mm Hg or more or if they had a mean blood pressure (diastolic +1/3 pulse pressure) of more than 110 mm Hg. This increase in blood pressure had to be present on at least two occasions 6 hours apart. In addition proteinuria of more than 300 mg in 24 hours or 100 mg/dl had to be present ^[4]. The inform consent was taken from all the cases prior to include in the study.

10 ml venous blood from intracubital veins was collected. The blood was allowed to coagulate for 60 minutes in incubator at 37°C, serum was obtained by centrifugation and 2 ml serum was frozen at -20°C. The fresh serum was used for estimation of serum total protein by Biuret method and albumin by BCG method.

Estimation of Total Protein (Biuret Method)

Estimation of Total protein by Biuret Method: ^[5,6,7]

Test principle:

In alkaline medium, peptide bonds of proteins react with cupric ions in Biuret reagent to form a violet coloured complex with an absorption maximum at 546 nm (530-570). Intensity of colour formed is directly proportional to concentration of total protein in sample.

$$\text{Total proteins concentration (gm/ml)} = \frac{\text{Absorbance of test} - \text{Absorbance of blank}}{\text{Absorbance of Standard} - \text{absorbance of blank}} \times 6$$

Estimation of serum Albumin by BCG method: ^[6,8]

Test principle:

Under acidic conditions, albumin present in serum sample binds to bromocresol green to form a green coloured albumin – BCG complex, which is photometrically measured at 628 nm. Intensity of colour formed is directly proportional to albumin concentration in sample.

$$\text{Albumin concentration (gm/ml)} = \frac{\text{Absorbance of test} - \text{Absorbance of blank}}{\text{Absorbance of Standard} - \text{absorbance of blank}} \times 3.48$$

RESULTS

The table 1 depicts the pre-eclamptic women were grouped according to level of mean blood pressure into two groups i.e. (i) group-I between 110-115 mm Hg and (ii) group-II above 115 mm Hg. The controls had mean B.P of less than 110 mm Hg. The subjects in group I (mean B.P 110-115 mm Hg) were 60% (n=18) and those in group II (mean B.P> 115 mm Hg) were 40% (n=12). There were no significant change in total proteins, albumin, globulin and A: G ratio with increase in mean B.P above 115 mm Hg.

The table 2 shows the pre-eclamptic patient were grouped according to presence of albumin in urine into two groups (i) urine albumin +1, +2 (n=16) and (ii) Urine albumin +3, +4 (n=14). Albumin was absent in urine of control group. Urine albumin was determined by dipstick method and results were incorporated as follows ^[9].

Trace	-	1-10 mg/dl
+1	-	15-30 mg/dl
+2	-	40-100 mg/dl
+3	-	150-400 mg/dl
+4	-	> 500 mg/dl

TABLE 1: Serum protein concentration in women grouped according to their mean blood pressure.

	Group I (PET) 110-115 mm Hg	Group II (PET) >115 mm Hg
Total proteins (gm/dl)	5.71 ± 0.58	5.54 ± 0.58
Albumin (gm/dl)	2.96 ± 0.37	2.82 ± 0.36
Globulin (gm/dl)	2.71 ± 0.36	2.61 ± 0.42
A:G ratio	1.10 ± 0.12	1.10 ± 0.22

TABLE II: Pre-Eclamptic patient were grouped according to presence of albumin in urine

	Urine albumin in +1; +2	Urine albumin in +3; +4
Total proteins (gm/dl)	5.96 ± 0.49	5.27 ± 0.44***
Albumin (gm/dl)	3.13 ± 0.22	2.65 ± 0.30**
Globulin (gm/dl)	2.81 ± 0.37	2.52 ± 0.33*
A:G ratio	1.12 ± 0.14	1.07 ± 0.20

Total serum proteins decreased from 5.96±0.49 to 5.27±0.44 with increase in urine albumin. This decrease was highly significant ($P<0.001$). Serum albumin also decreased significantly from 3.13±0.22 to 2.65±0.3 with increase in urine albumin ($P<0.01$). Serum globulin decreased significantly from 2.81±0.37 to 2.52±0.33 with increase in urine albumin ($P<0.05$). A:G ratio was 1.12 ± 0.14 in group (i) and 1.07 ± 0.2 in group (ii). This change in A:G ratio was not statistically significant.

DISCUSSIONS

The present study shows that serum concentration of total protein, albumin and A: G ratio was significantly reduced in Pre-eclampsia, while the change in level of globulin was not significant. These changes were not related to age, parity and mean arterial blood pressure. The study demonstrated that proteinuria of +3 and +4 i.e. more than 150 mg/dl was associated with significant decrease in total protein, albumin and globulin, but leaving A:G ratio unaltered.

The Observation by stud et al (1970) showed difference in serum proteins level in some Pre-eclampsia compared to normal pregnancy and these changes are to some degree dependent upon the molecular weight of serum proteins ^[1].

The decrease in levels of serum albumin during pregnancy and Pre-eclampsia is well known [1,10] but Honger (1967) had shown that the intravascular mass of albumin is unchanged in normal pregnancy and that the sustained hypoalbuminemia is due to hemodilution [11].

Studd and Blainey (1969) had suggested that Pre-eclamptic toxemia is the most common cause of nephrotic syndrome [12] but DeWardener (1967) did not agree that Pre-eclampsia fits the definition of nephrotic syndrome because he claimed that plasma proteins are relatively normal and proteinuria is never more than 5 gm/dl [13].

CONCLUSION

Present study demonstrates that the considerable changes in serum proteins that occur in pre-eclampsia can be a result of heavy proteinuria. The observation indicated that total proteins, albumin and globulin are inversely proportional to the blood pressure and urine albumin except A:G ratio in pre-eclamptic women.

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