

# PROTEINS IN NORMAL PREGNANCY

## (AGAR GEL ELECTROPHORETIC STUDY)

by

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Pregnancy is a physiological stress in which many changes occur in mellieu interior of the body. Proteins have a great role in its maintenance. Study of serum proteins in pregnancy is a problem which has been taken up from time to time by different workers. Before the era of electrophoresis, it was possible to study only gross fractions of proteins i.e. albumin and globulin. But the advent of electrophoresis has made it possible to go into this problem in some further detail.

Langererantz (1945) was the first to draw attention to the changes in globulin fractions in serum proteins during pregnancy. Since then many workers have taken up the study of this problem. A constant observation has been noted by all in albumin level, which has been supported by the work of Coryell et al (1950), Brown (1954-56) Menon et al (1956-59), Wulu (1959) and Kulkarni et al (1960) Kishore and Gupta (1963). Observations on globulin have not been so constant. Majority of the workers (Coryell et al 1950, Brown 1954-56, Wulu 1959, Kulkarni et al 1960) have demonstrated an increase in alpha and beta globulins but Menon et al (1956-59) observed fall in these fractions. Coryell et. al.

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(1950) Menon et al. (1956-59) and Brown (1954-56) observed fall in gamma globulin while Kulkarni et al (1960) found that this fraction remains constant during pregnancy.

### *Technique of Electrophoresis*

Two ml. of liquid purified agar was spread on a clean microslide and allowed to set for 5 minutes. A groove was cut a little to the centre with the help of a specially designed knife and was charged with serum. Electrophoresis was done, using vernol buffer Ph. 8.2 at 40 volts for one hour. Slides were than fixed, dried and stained with amido-black. Different fractions were measured quantitatively by the technique of densimetry.

### *Observations*

Results of electrophoretic studies on serum proteins are given in Table I, showing the results of electrophoretic study of serum proteins in second and third trimesters.

### *Discussion*

Normal total proteins according to our observations were found to be 7.20 gms.%. This figure is comparable to the figure of 7.10 gms.% reported by Purandare (1954). Kulkarni (1960), however, reported a

TABLE I

Showing Average Values of Different Protein Fractions in 2nd and 3rd Trimesters of Pregnancy

Electrophoretic fractions		Second Trimester	Third Trimester
Total proteins	.. Mean	6.25	5.24
Gm %	.. S.E.	0.133	0.095
Albumin	.. Mean	3.22	2.48
Gm %	.. S.E.	0.063	0.060
Alpha <sub>1</sub> Globulin	.. Mean	0.63	0.64
Gm %	.. S.E.	0.052	0.033
Alpha <sub>2</sub> Globulin	.. Mean	0.62	0.62
Gm %	.. S.E.	0.0447	0.036
Beta Globulin	.. Mean	0.96	0.93
Gm %	.. S.E.	0.074	0.045
Gamma Globulin	Mean	0.69	0.57
Gm %	.. S.E.	0.052	0.04

figure of 6.76 gms.% which is significantly lower than our figure. The difference may be due to better nutrition of patients in this part of the country.

Study of different fractions in normals revealed an additional band of pre-albumin which has not been reported by earlier workers. This difference in observation could probably be due to different technique of electrophoresis employed by us. Agar gel micro-electrophoresis allows better separation of fractions due to better homogeneity of the medium.

An analysis of the total protein value in second trimester revealed a fall on an average of 0.95 gms.%. This fall is mainly due to low values of albumin. Another important observation was the disappearance of pre-albumin fraction which was constantly present in normal control

series. Also the level of alpha<sub>1</sub>, alpha<sub>2</sub> and beta globulins showed a rise while gamma globulins did not show any significant change. In the third trimester total proteins show a further fall of about 1.01 gms.%. This fall again is due to fall in albumin fraction. Pre-albumin was absent in this period also. There is no significant change in gamma globulins while alpha<sub>1</sub>, alpha<sub>2</sub> globulins are raised.

Exact significance in alteration of serum proteins during pregnancy is not known. Brown (1956) stated that fall in serum proteins during pregnancy could be due to hydremia. Kishore and Gupta (1963) are not in agreement with this view as this hypothesis does not explain differential rise in the globulin fraction.

Our observations reveal several changes in protein metabolism. Significant is the absence of pre-albumin lowering of proteins in general and alteration in the relative ratios of alpha<sub>1</sub> beta and gamma globulins. These observations indicate that alteration in serum proteins during pregnancy is a complex mechanism. Hypertrophy of adrenals during pregnancy has been reported by different workers ACTH is known to facilitate break-down of proteins into amino acids (Wright). Also during stress all the defensive mechanisms are put into play. Pregnancy being a physiological stress, results in hyperactivity of adrenals which may be responsible for fall in protein level and alteration of protein into globulins which are directly concerned with the defence mechanism. Disappearance of pre-albumin may be a part of this complex process. It is quite possible

that the pre-albumin is metabolised into albumin and some of the albumin is metabolised into other products.

#### Summary and Conclusions

1. Serum proteins in normal subjects and during second and third trimester of pregnancy were studied.

2. An additional fraction pre-albumin was demonstrated in normal serum.

3. Total proteins showed an increasing fall with the advance of pregnancy.

4. Alpha<sub>1</sub>, alpha<sub>2</sub> and beta globulins showed a rise with the advance of pregnancy.

5. Pre-albumin fraction disappeared during second and third trimester of pregnancy.

6. It has been suggested that change in serum proteins could be related to hormone changes during pregnancy.

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