ESTIMATION OF PLASMA LEVELS OF PREGNANCY SPECIFIC B_1 GLYCOPROTEIN IN NORMAL PREGNANCY AT DIFFERENT WEEKS OF GESTATION

by

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Having brought maternal mortality down considerably, attention now is focussed entirely on the improvement of perinatal outcome and prevention of its mortality and morbidity.

The evaluation of an indicator for assessing foeto-placental well being is gaining popularity to-day due to small and planned families.

The recent identification of a pregnancy protein, termed as pregnancy, specific B_1 glycoprotein (P.S.B.G.) has created great interest. It was first isolated by Bohn in 1971 and referred by him as SP_1 (*Bohn.* 1971).

SP_1 was detected first by immunochemical methods in sera from pregnant women and in extract from human placentae. The purified protein has a B_1 electrophoretic mobility, has a molecular weight of 90,000 and a sedimentation coefficient of 4.58. It was also detected in formalin fixed tissues of the placentae and trophoblastic tumours (Horne *ea al,* 1977). This SPBG or SP_1 is screted by the epithelial cells of the syncytio-trophoblast as was shown by immuno flouriscent studies (Bonn, 1971).

The concentration of pregnancy specific B_1-glycoprotein increases constantly throughout pregnancy till term with only a small day to-day variation in individual.

This protein SP_1 is found only in the pregnant women, and post-partum this protein disappears from the maternal circulation with a half life of 30 to 40 hours (Towler, 1976).

A trace, amount of SP_1 or SPBG can be detected in the urine of pregnant women, colostrum, amniotic fluid and cord blood. This globulin is not normally detectable in the non-pregnant subjects (Horne *et al,* 1976).

Material and Method

The cases were selected from the Gynaecological out patients' department and from the obstetric indoors as well as from the private Clinics. Levels of B_1 Specific glycoprotein was estimated at different periods of gestation in 70 normal pregnancies. Case notes of all the patients with detailed history, Clinical examination and investigations were maintained.

Plain X-Ray of the abdomen was taken whenever doubt about twin or presenta-

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tion occurred, also sometime to exclude congenital malformation. One ml of blood was drawn and serum was separated at room temperature. The seperated serum was transferred in another test tube and was centrifuged. The supernatant serum was then put in a test-tube by the clean pipette. The samples were then preserved at —20°C after adding a pinch (0.5 mg) of sodium azide, which acts as a preservative.

TABLE I

Serum SP_1 Levels in Normal Pregnancies (mgm 100 ml) (n = 70)

Gestation Week	No. of cases	Mean of PSBG mgm%	Standard S	Deviation 2S	CV (V%)
6	2	0.1	0.1	0.2	100
8	2	0.125	0.125	0.25	100
10	2	2.4	0.0	0.0	0
12	2	2.45	0.05	0.01	2.04
14	2	2.5	0.0	0.0	0
16	3	2.74	0.09	0.018	3.277
18	3	2.43	0.047	0.094	1.934
20	3	6.16	0.235	0.470	3.814
22	4	6.115	0.108	0.216	1.766
24	4	6.075	0.083	0.166	1.316
26	4	9.925	0.083	0.166	0.836
28	5	14.24	0.23	0.46	1.615
30	5	14.30	0.245	0.490	1.713
32	6	15.03	0.09	0.18	0.598
34	7	21.17	0.218	0.50	1.032
36	7	22.274	0.38	0.596	1.706
38	6	24.816	0.72	1.44	2.901
40	3	25.133	0.942	1.884	3.748

Method of Estimation of Immunoglobulins

1. Single radial diffusion method of Mancini *et al* (1965) was used for quantitative determination of pregnancy-specific B_1 glycoprotein.

Priniiples

An agar plate is prepared incorporating specific antigen throughout the agar. The patient's serum is put into small antigen wells. A diffusion into the agar forms rings or antigen-antibody precipitate around the wells. The diameter of precipitation rings reflect the concentration of antibody.

As indicated by the above Table, the pregnancy specific B_1-glycoprotein was earliest detectable at 6 weeks gestation when its amount was only 0.1 mg. In the first two weeks i.e. from 6 to 8 weeks it did not show any rise as shown in the Table (0.1 mg. to 0.125 mg. only).

At 10 weeks it shows a sudden rise to 2.4 mg. per cent. Again till 14 weeks the rise in PSB_1G level was negligible, that is, 2.5 mg. percent.

From 18-20 weeks it showed a sudden rise. However, the mean value continued to rise from 6.16 mg. per cent to a maximum level of 25 mg. per cent at term.

The mean value of pregnancy specific B_1 glycoprotein increases continuously from 20th week of gestation to reach a

plateau at week 37, which persisted to week 40. In this study of 70 normal cases at different weeks of gestation thus documented a steady rise of serum SP_1 (Pregnancy specific B_1 Glycoprotein), concentration with progressing pregnancy with a plateau towards the end of gestation.

Discussion

The human placenta is an endocrine organ which produces and secrets a number of biologically active proteins, hormones and enzymes which are in turn necessary for the maintainance of pregnancy and for the development of the foetus.

A number of pregnancy and placental proteins have been detected and characterised by Bohn (1971), two of them apparently are specific to the placenta, namely the so called pregnancy specific B_1-glycoprotein SP_1 and a placental protein PP5. The knowledge on most of these immunologically defined placental antigens is still very poor. SP_1 and PP5 are the best characterised proteins of this group and the only ones which so far have been isolated in pure form.

By using an indirect immunoflourscent staining method SP_1 or pregnancy specific B_1-glycoprotein were found to be localised mainly in the epithelial cells of the syncytiotrophoblast.

The present study was primarily undertaken with a view to detect plasma SP_1 at the earliest possible period of gestation and then to determine its rising value throughout the normal pregnancy till term. Bohn (1971) showed SP_1 concentration of about 1 mg/100 ml between 8-12 weeks of gestation in a follow up study in sera from eight pregnant women using the same radial immuno-diffusion method. However, the difference in the level of SP_1 is probably the less number of patients included in our work and may be the different standard PSBG preparation was used.

The immunoprecipitation assays are relatively insensitive and do not permit detection of SP_1 in sera before 8 weeks of gestation with a specific and highly sensitive radioimmunoassay it was possible to detect SP_1 in sera from pregnant baboona as early as, 18 days after conception and in sera at pregnant human within 7-14 days of probable ovulation and fertilization. With a radioimmunoassay SP_1 has also been quantitated in a preliminary investigation in breast milk, amniotic fluid, cord blood and plasma of women with ectopic gestation (Grandzinkas *et al,* 1977). The pregnancy specific B_1 glycoprotein was earliest detected at 6 weeks gestation when its amount was only 0.1 mg. In the first 2 weeks that is from 6 to 8 weeks it did not show any rise (0.1 mg to 0.125 mg. per cent) whereas at 10 weeks a sudden rise at 2.4 mg. per cent was noticed. Again till 14 weeks the rise in PSBG level was negligible that is 2.5 mg./100 ml of plasma.

In all these 70 normal, subjects, serum SP_1 showed a steady rise with the advancing pregnancy most remarkable after the 20th week gestation till 36 weeks followed by a platau which persisted till term.

Tatraet *al al* (1974) showed a mean rise of 3.35 mg. per cent of SP_1 at the 20th week with insignificant variation in SP_1 concentration between 24 and 26 weeks. He found a sudden rise (6.30 mg%) to reach the highest level (15.03 mg/100%).

Studies on various pregnancy cases has shown that SP_1 does not correlate with the foetal sex or weight (Gordon *et al,* 1977). We did not make any such observation.

Although unfortunately due to the non-availability of the Tripartigen immuno-diffusion plates, our series of cases are small but the detection of this substance in serum opens a vast area of study, since this is a direct indication or parameter of placental function.

It may become valuable as a new "Pregnancy test" especially in those situations in which the earliest possible detection is necessary for example, in infertility ovulation in duction and menstrual regulation (Bohn, 1978).

SP_1 being specific only to pregnancy may serve as a basis for the development of a "Contraceptive Vaccine" or "Vaccine for fertility regulation" Bohn, 1975. Third international symposium on Immunology reproduction).

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