EVALUATION OF THE ROLE OF FIBRINOGEN AND ANAEMIA IN ALTERING ERYTHROCYTE SEDIMENTATION RATE IN PREGNANCY

by

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Introduction

It is reported (Patwardhan *et al*, 1973) that erythrocyte sedimentation rate rises during different trimesters of pregnancy and falls in post-partum period. The fibrinogen level also rises till term with little fall in post-partum period. The present investigation has been undertaken to extend the study further in vitro to evaluate the role of fibrinogen and anaemia in altering erythrocyte sedimentation rate during different trimesters of pregnancy.

Material and Method

Twenty-five healthy pregnant women attending the antenatal clinic of the Department of Gynaecology, Medical College, Nagpur, were investigated along with twenty-five healthy non-pregnant women attending the same department who acted as control.

Ten ml. of blood from each subject was collected in oxalated bottle. Four test tubes were taken and one ml. of the blood was put in each of them. One test tube was kept as control and in the remaining three, one, two and three mgms of fibrinogen were added respectively and tubes were gently shaken after addition of fibrinogen (obtained from Nutritional Biochemical Corporation, Cleveland, Ohio) and erythrocyte sedimentation rate was determined of the sample from each tube at the end of one hour (Wintrobe 1967).

Similarly, for studying the role of anaemia in altering erythrocyte sedimentation rate blood sample was taken in four different test tubes and 0.25 ml., 0.5 ml. and 0.75 ml. of plasma was incorporated in the three tubes keeping the fourth as normal control and E.S.R. of the samples so obtained was determined at the end of 1 hour.

Results and Comments

In controls and pregnant females difference of E.S.R. before addition and after addition of 1 mgm. fibrinogen is 11.56 mm. and 5.32 mm. respectively. On addition of 1 mgm. of fibrinogen and 2 mgm. of fibrinogen in controls and pregnant females difference of E.S.R. is 10.52 mm. and 4.24 mm. respectively. The difference of E.S.R. on addition of 2 mgm. of fibrinogen and 3 mgm. of fibrinogen in controls and pregnant females is 8.64 mm and 4.48 mm respectively. It is observed that the E.S.R. is raised after addition of fibrinogen in control as well

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as in samples obtained from pregnant women. To ascertain the significance of rise in E.S.R. a student 't' test was used and the results are presented (Table I).

TABLE I

Student 't' Test in Relation with Difference of E.S.R. After Addition of Fibrinogen in Normal Controls and Pregnant Females

		Difference in mean of E.S.R.	't'	DF	P(t)	Remarks
Control sample and after addition of 1 mgm. of fibrinogen	Control	11.56	20	24	<0.01	Highly significant
	Pregnant	5.32	33.08	24	<0.01	Highly significant
After addition of 1 mgm and 2 mgm of fibrinogen	Control	10.52	13.18	24	<0.01	Significant
	Pregnant	4.24	27.30	24	<0.01	Highly significant
After addition of 2 mgm and 3 mgm of fibrinogen.	Control	8.64	20.66	24	<0.01	Highly significant
	Pregnant	4.48	29.09	24	<0.01	Highly significant

The addition of fibrinogen to the control blood samples and the blood samples obtained from the pregnant women has resulted into a statistically significant rise in the erythrocyte sedimentation rate values (Table II). It is therefore, concluded that though in vivo studies the level of fibrinogen has significant effect on erythrocyte sedimentation rate only at 10% level, in vitro studies it has got a highly significant effect. This may possibly be due to various compensatory mechanisms operating in intact body which are neutralising the effects of fibrinogen on erythrocyte sedimentation rate.

To evaluate the role of anaemia, a known volume of plasma was added to the blood samples obtained from controls and pregnant females and its effect on E.S.R. was observed (Table III). It is observed that the difference of E.S.R. in controls and pregnant females before addition and after addition of 0.25 ml.

TABLE II

Effect of Addition of Different Amounts Fibrinogen to the Blood on Erythrocyte Sedimentation Rate

Amount of fibrinogen added/ml. of blood	Sample of Blood	
	Control group Mean ± S.D. E.S.R.	Pregnant group Mean ± S.D. E.S.R.
No addition	16.12 ± 6.8	18.24 ± 4.4
1 mgm.	27.68 ± 5.9	23.56 ± 4.1
2 mgms.	38.2 ± 5.5	27.8 ± 4.0
3 mgms.	46.84 ± 5.2	31.24 ± 4.1

TABLE III

Effect of Dilution of Blood with Own Plasma on Erythrocyte Sedimentation Rate

Volume of plasma added/ml. of blood	Sample of Blood	
	Control group Mean ± S.D. E.S.R.	Pregnant group Mean ± S.D. E.S.R.
No addition	10.8 ± 1.3	11.0 ± 1.4
0.25 ml.	16.08 ± 6.8	17.04 ± 6.5
0.5 ml.	29.52 ± 5.2	29.76 ± 5.2
0.75 ml.	41.48 ± 4.8	41.96 ± 5.3

of plasma is 6.04 mm. and 6.04 mm. respectively. On addition of 0.25 ml. of plasma and 0.5 ml. of plasma in controls and pregnant females difference of E.S.R. is 13.4 mm. and 12.73 mm. respectively. The addition of 0.5 ml. of plasma and 0.75 ml. of plasma in controls and pregnant females difference of E.S.R. is 11.96 mm. and 12.20 mm. respectively (Table IV).

TABLE IV

Student 't' Test in Relation with Difference of E.S.R. after Addition of Plasma in Normal Controls and Pregnant Females

		Difference in Mean E.S.R.	't'	DF	P(t)	Remarks
Control sample and after addition of 0.25 ml. plasma	Control	6.04	4.48	24	<0.01	Significant
	Pregnant	6.04	5.4	24	<0.01	Significant
After addition of 0.25 ml. of 0.5 ml. of plasma	Control	13.4	21.52	24	<0.01	Highly significant
	Pregnant	12.72	20.6	24	<0.01	Highly significant
After addition of 0.5 ml. and 0.75 ml. of plasma	Control	11.96	20.6	24	<0.01	Highly significant
	Pregnant	12.20	16.19	24	<0.01	Highly significant

Gram (1921) has suggested that the principal cause of the difference in sedimentation between the blood of the sexes must be sought in the different averages of the cell volume. In the present work it is observed that E.S.R. is raised by addition of plasma i.e. by experimental anaemia. The degree of variations in the E.S.R. after addition of plasma are found to be statistically significant. The results of student 't' test applied are presented (Table IV). The normal erythrocyte has a surface of lecitho-globulin or lecitho-fibrinogen. This surface becomes dehydrated in the presence of more than the normal amounts of the homologous proteins in plasma (plasma factor) and rouleaux agglutination occurs (Hirschboeck 1947).

The alterations of E.S.R. observed in the present work after addition of plasma

(artificial anaemia) can be explained on the basis of a change in the ratio of this lecithoprotein surface of erythrocytes and plasma factor.

Summary

A study of the sedimentation behaviour of red cells in artificially diluted blood and effect of different concentrations of fibrinogen on erythrocyte sedimentation rate is presented for twenty-five healthy non-pregnant women and twenty-five pregnant women free from any clinical disorder attending the gynaecological out-patient department of the Medical College Hospital, Nagpur.

It is observed that in vitro studies fibrinogen has a highly significant effect in altering erythrocyte sedimentation rate.

The highly significant rise in the erythrocyte sedimentation rate after addition of plasma (artificial anaemia) has been observed and explained.

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