

ELECTROPHORETIC STUDY OF SERUM PROTEINS IN WOMEN USING ORAL CONTRACEPTIVE FOR 1 TO 3 YEARS

by

PUSHPA GUPTA,* M.S.

P. K. SHARMA,** Ph.D.

SURESH BABU SAXENA,*** M.B., B.S.

SUDHA GARG,**** M.S.

and

SOM NATH,***** M.Sc., M.A.M.S.

Studies carried out on the effect of oral contraceptives on liver function tests have shown that there is statically significant rise in the thymol turbidity test, (Pushpa Gupta *et al* 1972; Linthorst 1964; Fawcett & Pederson 1964 Eisalo *et al* 1965; Larsson-Cohn 1967; Pincus *et al* 1959; Bakke 1965 and Thulin 1966). Since thymol turbidity test indicates the alteration in the plasma protein fraction, it was thought desirable to carry on the study of different serum protein fractions electrophoretically in women who were taking oral contraceptive pills for the last 1 to 3 years.

Methods and Material

The women were attending the Family Planning Centre of J. L. N. Medical College Hospital, Ajmer. The pill taken was ovulen (1 mg ethynodiol diacetate & 0.1 mg mastranol). The women were divided into 4 groups.

Group I—10 normal healthy women to act as control.

*Professor in Obstetrics & Gynaecology.

**Reader in Biochemistry.

***Demonstrator in Physiology.

****Lecturer in Obstetrics & Gynaecology.

*****Professor of Physiology.

J.L.N. Medical College, Ajmer.

Received for publication on 3-5-72.

Group II—15 women using oral contraceptive for the last one year.

Group III—15 women using oral contraceptive for the last 2 years.

Group IV—15 women using oral contraceptive for the last 3 years.

Each woman had complete physical examination, including haemoglobin estimation, total R.B.C. and W.B.C. count.

The venous blood was obtained from each patient by a standard aseptic technique, protein was determined by Biuret method (King 1956). Agar gel serum electrophoresis was carried out to differentiate and quantitative estimation of different protein fractions were made by making some modifications to the method described by Nerenberg (1966).

Results

Results of study are given in Fig. 1 & table 1.

Table 1 shows that there was a significant rise in total proteins in groups II, III, and the rise was due to an increase in total globulin content, while total proteins were almost normal in Group IV. The albumin fraction shows no significant alteration. A significant increase in B-globulin fraction (16%) has been found in groups II, III & IV as compared to

TABLE I
Serum Protein Pattern in Groups I, II, III & IV

S. No.	Subject (No. of cases)	Total protein g/100 ml	Albumin g/100 ml	Globulin g/100 ml				
				Total globulin	α_1	α_2	β	γ
1.	Group I	6.4 ± .10	3.72 ± .06	2.68 ± .03	.28 ± .003	.42 ± .06	.80 ± .03	1.18 ± .01
	Control (10)	(5.2-7.2)	(3.15-4.01)	(2.05-3.15)	(.20-.35)	(.25-.50)	(.79-1.01)	(.98-1.34)
2.	Group II	6.8 ± .12	3.94 ± .03	2.86 ± .02	.32 ± .01	.34 ± .01	.99 ± .02	1.21 ± .02
	(15)	(5.8-7.2)	(3.40-4.12)	(2.4-3.2)	(.20-.38)	(.22-.40)	(.82-1.10)	(1.01-1.42)
3.	Group III	6.72 ± .09	3.90 ± .02	2.82 ± .01	.33 ± .001	.33 ± .01	.96 ± .02	1.20 ± .09
	(15)	(5.8-7.2)	(3.20-4.22)	(2.38-3.12)	(.25-.38)	(.28-.42)	(.78-1.20)	(.99-1.42)
4.	Group IV	6.5 ± .18	3.74 ± .02	2.76 ± .03	.30 ± .01	.30 ± .01	.94 ± .01	1.22 ± .03
	(15)	(5.8-7.2)	(3.10-4.20)	(2.1-3.50)	(.22-.35)	(.25-.34)	(.82-1.12)	(1.01-1.38)

Mean values in gram/100 ml, ± S.D. and range in parenthesis.

Group I. However, a slight increase in α_1 globulin fraction and an decrease in α_2 fraction has also been found in II, III & IV groups in comparison to control values.

Discussion

Alteration in the concentration of serum proteins and their fraction following administration of oestrogens to non pregnant as well as pregnant individuals are well documented (Mendenhall, 1969 and Doe *et al* 1967). The oral pills in which the ovarian steroids are present in different combinations has also been found to produce alterations in the protein fraction of serum. In the present study results indicate that the total proteins in the subjects using oral contraceptives are significantly increased. This initial rise in the serum proteins level may be accounted for either as an anabolic effect of steroid hormones or parenchymal liver damage which may produce a rise in the globulin fraction, thereby increasing the total protein content. Since there is significant increase in the β -globulin fraction, it might be the reason for increase in total globulin fraction of group II, III & IV. Besides this the increase in α_1 -globulin is compensated by a consequent decrease in α_2 -globulin. The increase in globulin fraction in our study is corroborated by other workers. Robertson (1967) observed increase in α_1 -globulin in sera of 33 women taking different combinations of oral contraceptives. Similarly, Mendenhall (1969) has also observed a rise of globulin fraction in women taking oral pills from 12 months to 7 years.

In the present study, however, the increase in α_1 -fraction is not so significant as increase in β -globulin fraction as reported also by Robertson (1967). The finding is also supported by an increase in the values of thymol turbidity test

which is specific for alterations in β -globulin fraction. As there is no significant alteration in the γ -globulin fraction the only possibility for increased values of thymol turbidity test may be the increased β -globulin fraction. The increase in β -globulin is justified due to the increase in circulating hormones in the subjects using oral contraceptives, thus maintaining a constant increased level of steroid hormones.

Summary

(1) Effect of oral contraceptive on serum proteins and its fractions in subjects taking oral contraceptives upto three years duration has been studied.

(2) There is a significant rise in total proteins using pill upto 2 years duration. The rise is not significant in subjects using oral contraceptives for 3 years.

(3) There is a highly significant rise in β -globulin factor in all subjects of all groups on oral contraceptive. However, a slight rise in α_1 -globulin and a slight decrease in α_2 -globulin has been found.

Acknowledgements

The authors are thankful to the Principal and Controller, Jawahar Lal Nehru Medical College and hospital, Ajmer, for permitting to carry out the work and for its publication.

References

1. Bakke, J. L.: Brit. Med. J. 1: 631, 1965.
2. Doe, R. P., Mellinger, G. T., Swaine, W. R. and Seal, U. S.: J. Clin. Endocr. 27: 1081, 1967.
3. Eisalo, A., Jarvinen, P. and Luukkainen, T.: Brit. Med. J. 1: 1416, 1965.
4. Fawcett, J. W. and Pederson, D. L.: Brit. Med. J. 2: 755, 1964.
5. King, E. J. and Wootten, I. D. P.: "Microanalysis in Medical biochemistry" III. Ed. London, 1956, J & A

Churchill Ltd. p. 50.

6. Linthorst, G.: *Brit. Med. J.* 2: 920, 1964.

7. Mendenhall, H. W.: *Surg. Forum.* 20: 404, 1969.

8. Nerenberg, S. T.: "Electrophoresis—a practical, Laboratory Manual" F A. Davis Company, Philadelphia" p. 91, 1966.

9. Pincus, G., Garcia, C. R., Rock, J., Paniagua, M., Pendleton, A., Laraqne, F., Nicolas, R., Barno, R. and Pean, V.: *Science.* 130: 81, 1959.

10. Pushpa Gupta & P. K. Sharma: *Journal Obst. & Gynec. Ind.* 22: 562, 1972.

11. Robertson, G. S.: *Lancet*, 1: 232, 1967.

12. Thulin, K. E.: *Brit. Med. J.* 1: 584, 1966.

See Fig. on Art Paper IX