# FREE FATTY ACIDS AND LIPOPROTEINS LEVELS IN ANTEPARTUM AND POST PARTUM STAGES IN NORMAL PARTURATING WOMEN

by

S. M. Gupte,

A. V. Potnis,*

and

B. N. Purandare**

Free fatty acids exist in plasma primarily as anions. They are transported mainly in combination with albumin in plasma forming alpha lipoprotein portion of the lipoprotein complex. The rate of turnover of free fatty acids is very rapid. Under normal physiological conditions, about 3 molecules of fatty acids combine with each molecule of albumin. But as many as 30-50 fatty acid molecules can at a time combine with a single molecule of albumin. Armstrong *et al* (1961) showed that the free fatty acid turnover was directly related to plasma free fatty acid concentrations and that they have half time of 2 to 3 minutes with a turnover time of about 30 minutes. Free fatty acids are utilized for energy production when carbohydrates are not available.

Many workers have studied the transplacental passage of free fatty acids (Brown *et al* 1959; Burt 1960; Chen *et al* 1965; Patil *et al* 1965; Whaley *et al* 1966; Gruson and Etili 1968). However, whether the placenta is permeable to fatty acids remains a matter of controversy.

With reference to the above information, the present study has been undertaken to observe the effect of parturition on relative changes of these two lipid fractions.

*Material and Methods*

All subjects were selected from the patients who were admitted for the delivery in Nowrosjee Wadia Maternity Hospital, Bombay. These subjects were normal in all respects and had full term delivery. They were belonging to either lower or middle socio-economic class. All of them had normal menstrual cycles before the conception and had no evident hormonal deficiency.

Blood samples were withdrawn during the first labour stage. At the time of delivery cord blood alone was collected. In order to draw a comparison, postpartum blood collection was done before completion of 24 hours from the parturition time, thereby the same patient could be studied in antepartum and postpartum stage.

Sera were separated immediately and fresh serum samples were used to analyze free fatty acids by the method of Mossinger (1965). Paper electrophoresis was

*Post-graduate Teacher and Research Guide, Seth G.S. Medical College & K.E.M. Hospital, Bombay 400 012.

**Dean, Nowrosjee Wadia Maternity Hospital, Parel, Bombay 400 012.

Accepted for publication on 10-3-77.

carried out in order to estimate lipoprotein percentage differentiation. A method described by Gradwhol was followed.

*Results*

Table I describes mean serum free fatty acid levels in various groups. Differences between groups are statistically significant to the extent of $P < 0.001$. They show an elevation of 95.5 per cent at first stage of labour. Following delivery the level drops by 35 per cent of the antepartum value. However, it is still higher than that in normal non-pregnants by 44 per cent.

TABLE I
*Mean Levels of Serum Free Fatty Acids*

| Groups | Serum Free Fatty Acids MEq./Lit. | | | |
|---|---|---|---|---|
| | Normal Non-pregnant | Antepartum | Postpartum | Cord |
| No. of subjects | 40 | 77 | 76 | 59 |
| Mean ± S.D. | 612 ± 43.8 | 1197 ± 224 | 884.5 ± 154 | 678 ± 114 |

Table II describes the mean percentage of Alpha and Beta lipoproteins in different groups of subjects with standard deviation. All differences between the groups are statistically significant to the extent of $P < 0.001$.

TABLE II
*Mean Percentage of Alpha and Beta Lipoproteins*

| | Percentage of lipoproteins | | | |
|---|---|---|---|---|
| | Normal non-pregnant | Antepartum | Postpartum | Cord |
| No. of subjects | 40 | 75 | 69 | 54 |
| Percent of alpha | 42.41 ± 2.5 | 31.30 ± 2.7 | 34.91 ± 2.4 | 45.38 ± 3.0 |
| Percent of beta (100—) | 57.59 ± 2.5 | 68.70 ± 2.7 | 65.09 ± 2.4 | 54.62 ± 3.0 |

*Discussion*

It is observed from Table I that there is a certain fall in free fatty acids (from 1197 meq./lit. to 884.5 meq./lit.) from antepartum to postpartum period. At the same time the values of cord blood are not raised. This contradicts the concept of placental permeability to free fatty acids. However, the authors are of the opinion that free fatty acids are permeable but the amount transported is very small. The authors support the concept expressed by Whaley *et al* (1966) and Fairweather (1965) so far as the permeability is concerned. The concentration of beta lipoprotein does not appear to be much altered on parturition. However, statistical difference between antepartum and postpartum periods is significant to the extent of $P < 0.001$.

Values of alpha lipoproteins have been observed to be significantly higher in cord blood than those in pregnant or non-pregnant subjects ($P < 0.001$). This confirms the observations made by Brown *et al* (1959). This may be due to the estrogens taken up from umbilical vein by fetus. Administration of estrogens have been

shown to elevate alpha lipoproteins in humans (Adlersberg 1957; Reboud *et al* 1963). Brown *et al* (1959) had suggested the possibility of synthesis of this lipoprotein fraction by fetal liver itself.

In conclusion, the authors may state that the placenta may have a selective permeability of fatty acids.

*Summary and Conclusion*

(1) Estimation of serum free fatty acids and lipoproteins were carried out in 77 antepartum and 76 postpartum cases. Cord blood also has been analysed and the values have been reported.

(2) Serum free fatty acids as well as percentage of beta lipoproteins in antepartum stage were significantly higher than those in postpartum stage ($P < 0.001$).

(3) Transplacental passage of free fatty acids has been discussed and has been attributed to selective permeability through placental barrier.

*Acknowledgement*

The authors thank Dr. C. K. Deshpande, Dean, Seth G.S. Medical College and K.E.M. Hospital for the facilities extended to them and also thank the staff of Nowrosjee Wadia Maternity Hospital for their co-operation.

*References*

1. Adlersberg, D.: Amer. J. Med. **23**: 769, 1957.
2. Armstrong, D. T., Steele R., Altszuler, N., Dunn., Bishop, J. S. and debodo, R. C.: Amer. J. Physiol. **201(3)**: 535, 1961.
3. Brown, D. F., McGandy, R. B., Gillie, E. and Doyle, J. T.: Amer. J. Obst. & Gynec. **77**: 556, 1959.
4. Burt, R. L.: Obst. & Gynec. 15: 460, 1960.
5. Chen, C. H. and Adam, P. A. J., Laskowaski, D. E., McCann, M. L. and Schwartz, R.: Pediatrics. **36**: 843, 1965.
6. Fairweather, D. V. I.: J. Obst. & Gynec. British. C'wlth. **72**: 408, 1965.
7. Gradwhol, R. B. H.: 'Clinical laboratory methods and diagnosis Vol. 6th Edition. C. V. Mosby and Company.
8. Gruson, C. T. and Etili, L.: Arch. Dis. Childh. **43**: 679, 1968.
9. Mossinger, F.: J. Lip. Res.: **6**: 157, 1965.
10. Patil, K. P., Mehta, R. C. and Satoskar, R. S.: Ind. J. Med. Sci. **19**: 583, 1965.
11. Reboud, P., Groulade, J., Groslambert, P. and Colomb, M.: Amer. J. Obst. & Gynec. **86**: 820, 1963.
12. Whaley, W. H., Zuspan, F. P. and Nelson, G. H.: Correlation between maternal and fetal plasma levels of glucose and free fatty acids. Amer. J. Obst. & Gynec. **94**: 419, 1966.