A STUDY OF URIC ACID LEVEL IN SERUM AND COLOSTRUM OF NON-TOXAEMIC AND TOXAEMIC PREGNANCY

by

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Introduction and Review

The study of uric acid level in serum and colostrum is an interesting problem, an especially in normal and toxaemic pregnancies. It is well known that blood uric acid concentration is increased in pre-eclampsia and eclampsia with no significant change in normal pregnancy. Till 1956 this was thought to be due to diminished destruction of uric acid in the liver, Stander and Cadden (1934), but Seitchik (1956) has proved that increased uric acid pool and its decreased excretion in toxaemia cases was solely due to renal tubular damage.

As overall pool of uric acid is increased in toxaemic cases, it was postulated that a portion of excess of uric acid should find it's way out via the colostrum also. This led us to estimate uric acid levels in serum and colostrum simultaneously and to establish its true value.

After delivery in the toxaemia cases, blood pressure returns to normal, signs of toxaemia regress and eventually disappear and renal function tests return to normalcy. This was reflected directly by the fall in serum uric acid levels in these cases following delivery. Accordingly a similar change should be present in colostrum uric acid. In view of absence of any definite information it was considered worthwhile to determine the uric acid content in serum and colostrum of non-toxaemic and toxaemic groups.

Mcfarlane (1963) worked on this problem and suggested that high uric acid level in pregnancy is diagnostic of pre-eclamptic toxaemia, but if high blood pressure with normal uric acid level is presented, it is a case of essential hypertension and not of pre-eclampsia. Very high levels in eclampsia are due to excessive muscular activity during convulsions and are not comparable to pre-eclampsia.

Gupta and Kothari (1963) have established the importance of uric acid level as compared to blood urea level. They concluded that blood urea was found to be moderately raised in 70% cases of toxaemia of pregnancy, while uric acid was conspicuously raised in 100% cases.

Ramanathan *et al* (1963) for the first time in India studied the serum and colostrum uric acid levels simultaneously in toxaemia of pregnancy and stated that serum and colostrum uric acid, both, increase in toxaemia of pregnancy but that the increase is comparatively less in colostrum as compared to serum uric acid level.

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Material and Methods

Seventy-five cases were selected from the maternity ward and labour room of Sir Sunder Lal Hospital, attached to the Institute of Medical Sciences, B. H. U. comprising of fifty full term normal pregnancies and delivery cases and twenty-five cases of toxaemia of pregnancy. The latter group included eight cases of eclampsia and seventeen cases of pre-eclampsia. Detailed history of each patient was taken and thorough clinical examination was carried out.

Venous blood samples and colostrum (later on milk) samples were taken, at pre-delivery time, 2nd sample in immediate post-delivery period, third sample on 6th day and last sample at 6th week of delivery.

Serum uric acid was determined by the Method of Brown (1945). For colostrum, the method of precipitation of Erickson (1933) was followed by calorimetric procedure of Brown.

Observation and Analysis

Maximum number of cases (87%) were of age group 20-29 years and majority were primigravidas. It was analysed by present work that among the control group of cases, majority were on low purine diet, while in the toxaemic group, pre-eclampsia and eclampsia cases, 60 and 75% were consuming high purine diet, respectively.

Table I shows uric acid values in serum and colostrum at four different periods in control as well as in toxaemic groups. It was analysed that mean serum uric acid value in control group in pre-delivery phase was 4.17 mg.% ± 1.15, while in toxaemic group the mean value was 7.69 mg.% ± 2.08. (Fig. 1). The colostrum values were slightly lower than the corresponding serum value (3.73 mg.% ± 1.65 in control and 6.67 mg.% ± 1.81 in toxaemia). This difference was insignificant.

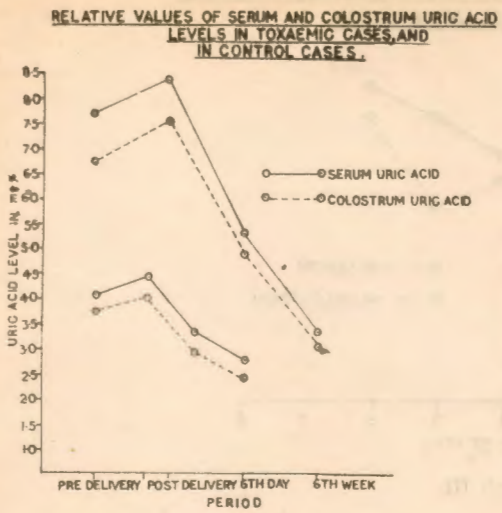
TABLE I

Serum and Colostrum Uric Acid Levels of Normal and Toxaemic Groups at Different Periods

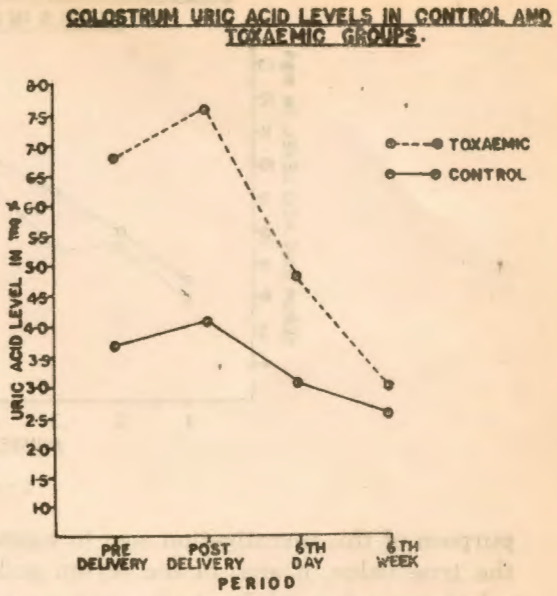
Period	Control group				Toxaemia group			
	Serum uric acid		Colostrum uric acid		Serum uric acid		Colostrum uric acid	
	Mean	S.D	Mean	S.D.	Mean	S.D.	Mean	S.D.
Pre-delivery	4.17 mg.%	1.15	3.73 mg.%	1.65	7.69 mg.%	2.08	6.75 mg.%	1.81
Immediate post-delivery	4.50 mg.%	1.2	4.11 mg.%	1.35	8.43 mg.%	2.46	7.58 mg.%	2.44
Sixth day puerperium	3.43 mg.%	0.87	3.03 mg.%	0.80	5.28 mg.%	1.63	4.85 mg.%	2.06
Sixth week puerperium	2.89 mg.%	0.78	2.50 mg.%	0.32	3.35 mg.%	0.21	3.02 mg.%	0.24

During labour the serum and colostrum uric acid levels were raised (as seen in Table 1). Following delivery, in the control group, the serum and colostrum uric acid values both fell to non-pregnant value as seen on the 6th day and the 6th week after delivery.

In toxaemic group, following delivery



Graph I



Graph II

the impaired renal function returns to normal and signs of toxaemia regress. This is reflected by gradual fall of raised uric acid level in these cases, till it becomes equal to control cases uric acid level at the end of puerperium.

In eclampsia group, the rise was comparatively more than in pre-eclampsia due to added factor of muscular activity during eclamptic fits. This is shown in Table II.

A further detailed study of eclamptic cases shows that the rise was directly to the number of fits, as shown in Fig. 3.

Discussion

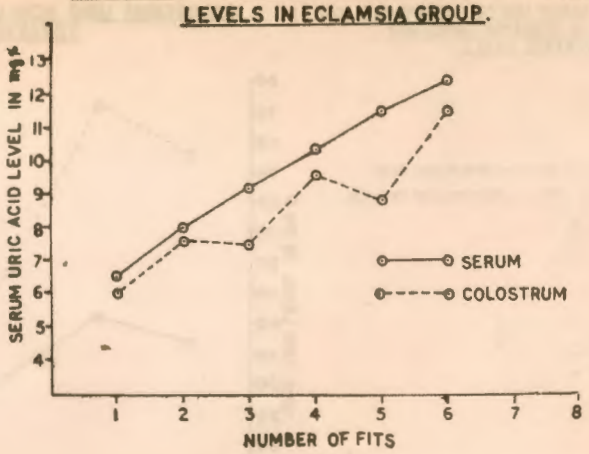
It would be easy to re-establish diagnostic criteria for toxaemia of pregnancy by fixing an arbitrary uric acid level. The

TABLE II

Comparative Values of Pre-Eclampsia and Eclampsia Cases at Different Periods

Period	Pre-eclampsia		Eclampsia	
	Mean serum uric acid in mg.%	Mean colostrum uric acid in mg.%	Mean serum uric acid in mg.%	Mean colostrum uric acid in mg.%
Pre-delivery	7.06	6.09	9.82	8.62
Post-delivery	7.72	7.00	9.92	9.21
6th day puerperium	5.34	5.04	5.08	4.81
6th week puerperium	3.22	2.90	3.60	3.33

EFFECT OF FITS ON SERUM AND COLOSTRUM URIC ACID LEVELS IN ECLAMSIA GROUP.



Graph III

purpose of this investigation was to asses the true value, if any, of the serum and colostrum uric acid levels in pregnancy, pre-eclampsia and eclampsia. It will be evident from the present work that uric acid level will really serve a diagnostic as well as prognostic guide in these cases.

The value of serum uric acid reported is variable according to each worker. The lowest value reported was 2.4 mg.% Verma, (1969) and highest was 4.9 mg.% Ramnathan, (1963), thus the value obtained in the present series has been found to be in between the reported values.

In the present series, among the control group the serum uric acid level in immediate post-delivery phase was higher than the pre-delivery value. This shows that labour causes rise in uric acid level and that the rise depends upon the duration of labour Verma, (1969), Kaur and Phillips, (1966). Crawford (1944) has discussed very clearly that labour causes rise in uric acid level in normal well as in toxaemic subjects, but the rise is less marked in toxaemia because the duration of labour is short in these cases.

Colostrum uric acid follows the same trend as that of serum in all four periods, but the increase and decrease are less than that of serum. The difference between the serum and colostrum uric acid levels was insignificant ($p = < 0.1$). Serum and colostrum uric acid levels return to non-pregnant level by the end of puerperium (Fig. 2).

It is well emphasised that the raised uric acid level is diagnostic of pre-eclampsia and eclampsia. In the present series, the pre-delivery serum and colostrum uric acid were found to be slightly on higher side as compared to previous work, but Verma (1969) reported a value still higher (7.96 mg.%) than this. We feel that this is due to the fact that our hospital cases were more of severe pre-eclampsia group. The post-delivery value shows that there was slight rise during labour. In puerperal phase disturbed metabolic state of body returns to normal and therefore, the serum and colostrum uric acid levels also fall within normal range.

In eclampsia group of cases, the value was higher than other groups even in pre-delivery phase due to the added factor of fits (Table—II). In immediate post-

delivery phase of eclampsia cases three factors affect the uric acid level, labour, disturbed metabolic state and convulsions, perhaps the last one shows the maximum effect (Crawford, 1941). The values obtained in the present series were higher (9.92 mg.%) than the previously reported values by different authors.

The rise of uric acid level is directly proportional to the number of fits (Fig. 3). This is shown in the present series and is supported by the work of Crawford, Stander and Cadden. In puerperal phase disturbed metabolic state returns to normal, fits are controlled, the effect of labour is absent and, therefore, the raised uric acid in serum and colostrum of eclampsia cases fall within normal range.

Widholm and Kuhlback (1965) considered the fact that if the pre-delivery uric acid levels in toxaemia cases rises above 7.9 mg.%, these cases deliver prematurely with a poor foetal prognosis. Very high levels of uric acid were noticed in the present work which resulted into poor foetal as well as maternal prognosis.

Prabhawati (1957) found a contradictory finding. In pre-eclampsia the uric acid level was higher than in eclampsia cases, while in our cases we have always observed a higher value in eclampsia than in pre-eclampsia.

Summary and Conclusion

1. In normal pregnancy cases serum and colostrum uric acid levels were within normal range.

2. In pre-eclampsia cases, as a result of disturbed uric acid metabolism, the serum and colostrum uric acid levels were high. Labour causes slight rise in already raised level, but in puerperal phase the disturbed metabolic state returns to normal, signs of toxaemia regress and uric acid levels in serum and colostrum return to normal.

3. In eclampsia cases the serum and colostrum uric acid levels were still higher than in pre-eclampsia due to the added factor of convulsions. In post-partum eclampsia very high values were observed even in the puerperal phase.

4. After considering the above factors is can be concluded that high uric acid level is of diagnostic value in all toxaemia cases. Higher values of uric acid level (more than 10 mg.%) indicate poor prognosis for the mother as well as for the foetus. Rise in uric acid level was directly proportional to the severity of toxaemia. Fall in the raised level of uric acid in these cases of toxaemia is a sign of recovery and good prognosis during treatment.

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