

BLOOD UREA AND URIC ACID IN TOXEMIAS OF PREGNANCY

by

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It is now well recognised that in the management of the toxemias of pregnancy an early diagnosis is of vital importance and may make all the difference in the outcome of the treatment. However, in the early stages, it is often difficult to differentiate pre-eclampsia from other conditions, not peculiar to pregnancy, like essential hypertension, primary renal disease and congestive heart failure, which may have very similar presenting symptoms. This has led to an extensive search for some simple and reliable laboratory test for substantiating the diagnosis of pre-eclampsia. An interesting observation in this context was made by Stander, Ashton and Cadden in 1932, when they reported that blood uric acid tends to be elevated in the toxemias of pregnancy. Moshe Lancet and Fisher (1956) extended

the work and suggested some definite diagnostic criteria. The present investigation was undertaken to study the blood levels of urea and uric acid in cases of pregnancy toxemias so as to evaluate the diagnostic significance of these biochemical determinations.

Material and Method

Subjects for study were selected from the Zenana Hospital attached to the S. M. S. Medical College, Jaipur, and were placed in the following three groups:

- a. Normal non-pregnant — 16 healthy adult women from amongst the staff of the hospital.
- b. Normal pregnant — 20 healthy pregnant women, in the third trimester, attending ante-natal clinics.
- c. Toxemic — 34 cases of toxemia admitted to the indoor wards of the hospital.

The patients with toxemia included 6 cases of mild pre-eclampsia, 19 of severe pre-eclampsia and 9 of eclampsia. They were clinically differentiated by the usual criteria of

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blood-pressure, albuminuria, convulsions etc. All the subjects taken for study belonged to Rajasthan and were from nearly the same socio-economic strata.

Blood urea was estimated by Karr's method (1924) in which ammonia liberated from urea by the action of urease is made to react with Nessler's reagent to give a yellowish colour which is compared with a standard solution on a photo-electric colorimeter. Uric acid was determined by the method of Brown (1945) which involves the use of a special uric acid reagent and urea-cyanide solution followed by photo-colorimetry.

Results

Blood levels of urea and uric acid for the various groups of subjects are shown in Table I.

In the control group there appears to be a slight difference between the values for the non-pregnant and pregnant subjects but this has not been found to be statistically significant. Applying the Student's 't' test the calculated value of 't' has come out to be 1.66 for urea and 1.81 for uric acid suggesting that in all probability (P. 0.05) this is a chance variation only.

In the toxemic group both urea and uric acid are appreciably raised above normal; the relative change is shown graphically in Fig. I. Table II indicates the number of patients whose values fall within the normal range. It brings out the significant fact that uric acid is consistently raised in every case of toxemia, unlike urea which is normal in nearly 30%.

TABLE I
Blood Urea and Uric Acid Values in Different Groups of Subjects

Group	Urea mgm%		Uric acid mgm%	
	Mean	Range	Mean	Range
<i>Control</i>				
1. Normal non-pregnant	19.4 ± 1.81	17.0 — 22.3	3.0 ± 0.19	2.8 — 3.3
2. Normal pregnant	21.1 ± 1.96	19.2 — 25.7	3.2 ± 0.24	2.9 — 3.6
<i>Toxaemic</i>				
1. Mild pre-eclampsia	29.3 ± 3.66	25.1 — 36.5	5.5 ± 1.08	4.1 — 6.6
2. Severe pre-eclampsia	27.3 ± 4.15	21.3 — 36.1	6.2 ± 0.90	4.2 — 7.9
3. Eclampsia	27.6 ± 6.08	21.4 — 37.0	6.7 ± 0.98	4.6 — 8.5

TABLE II
Number of Cases with Normal Urea and Uric Acid

Group	No. of cases	Normal urea	Normal uric acid
1. Mild pre-eclampsia	6	1	0
2. Severe pre-eclampsia	19	6	0
3. Eclampsia	9	3	0
Total	34	10 (29.4%)	0

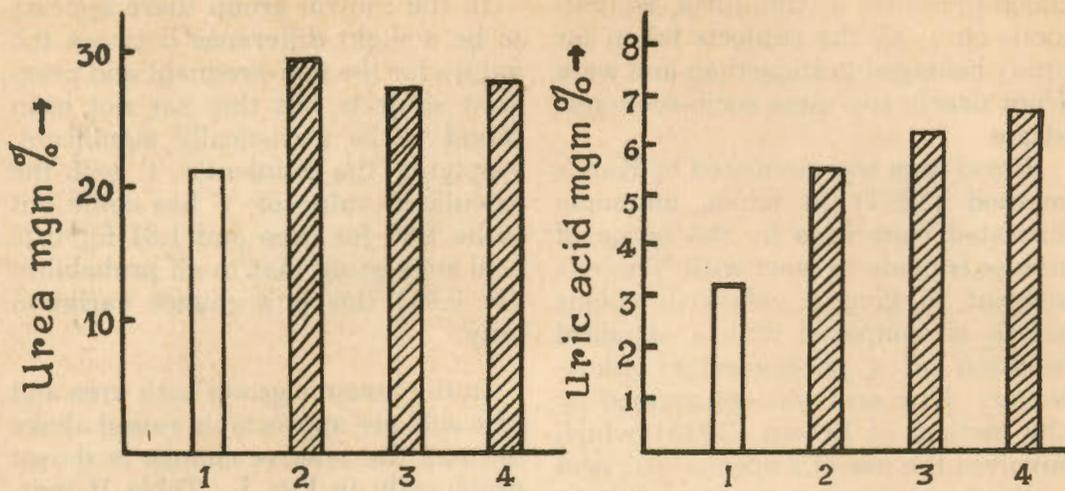


Fig. 1

Showing relative changes in urea and uric acid; 1. Normal pregnancy, 2. Mild pre-eclampsia, 3. Severe pre-eclampsia, & 4. Eclampsia.

Discussion

Blood urea and uric acid values in normal pregnancy have been found to be essentially the same as in a control group of healthy adult women. In the case of uric acid, several other workers have also reported no significant change (Crawford, 1941; Prabhavati, 1957). However, for urea it is generally believed that its concentration in the blood diminishes, to some extent, during pregnancy although no definite cause has been established. Dieckmann (1952) has stated, on the basis of several reports, that the mean concentration of urea in blood during pregnancy is about 22.5 mgm%. This agrees closely with our own value of 21.1 mgm%, but then this is not significantly different from the mean value of 19.4 mgm% obtained for the non-pregnant group.

In pregnancy, complicated by toxemia, there has been an appreciable rise in the blood levels of both urea

and uric acid. It appears that uric acid is much more important in this context, since its increase is of greater magnitude and is evident in 100% cases. Thus, the mean value has risen from 3.2 mgm% in normal pregnancy to 6.7 mgm% in eclampsia. Urea has shown a less consistent change with normal figures in nearly 30% of cases as indicated in Table II.

Hyperuricemia in toxemias of pregnancy has been reported earlier by several workers, notably by Stander et al (1932), Moshe Lancet and Fisher (1956), Prabhavati (1957). The precise mechanism which leads to this accumulation of uric acid in the blood is still uncertain, although impaired renal excretion, diminished destruction by the liver and excessive formation associated with muscular exertion during convulsions have all been suggested as likely possibilities.

Whatever be the cause, a high uric acid value, clearly above the normal

range, was found in all the 34 cases of toxemia studied at present. This can, therefore, be taken as a reliable diagnostic aid and blood uric acid estimation can be recommended as a routine procedure in all suspected cases. The following attributes can be listed in its favour, as borne out by the present investigation:

1. It is reliable; normal or borderline values have not been seen in any case.
2. It gives a fair indication of the severity of the disease; the mean values for mild pre-eclampsia, severe pre-eclampsia and eclampsia are 5.5, 6.2 and 6.7 mgm% respectively.
3. It is a simple test and can be carried out as a routine procedure with no hazard even to the seriously ill patient.

The only pitfall can be a case of primary renal failure and oliguria, where the blood uric acid may be raised but the parallel increase in blood urea should easily reveal the true nature of the condition.

From these observations it may be concluded that in any individual patient suspected to be a case of pregnancy toxemia a blood uric acid level above 4.0 mgm% with urea below 40.0 mgm% should be taken as definite support for the diagnosis.

Summary

Blood urea and uric acid have been estimated in 16 normal non-pregnant and 20 normal pregnant women, as well as in 34 cases of pregnancy toxemias.

No significant difference was observed between the non-pregnant

and pregnant groups. In pregnancy complicated by toxemia urea is moderately high in nearly 70% cases while uric acid is conspicuously raised in 100% cases. The mean values for uric acid in mild pre-eclampsia, severe pre-eclampsia and eclampsia are 5.5, 6.2 and 6.7 mgm% respectively as compared to 3.2 mgm% in normal pregnancy. The value of blood uric acid determination in the diagnosis of toxemias of pregnancy has been discussed.

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