BLOOD URIC ACID IN NORMAL NON-PREGNANT WOMEN, NORMAL PREGNANCY AND TOXAEMIC PREGNANCY

by

GURCHARAN KAUR*, M.D., D.G.O.

and

C. PHILLIPS**, M.R.C.O.G. (Lond.)

Pregnancy is a physiological stress in which many changes occur in the mellieu interior of the body. More and more stress is being laid on the biochemical changes which occur in the blood during normal pregnancy and become exaggerated in complications of pregnancy. As for biochemical changes, different views have been expressed by various authors regarding the levels of uric acid in the blood during pregnancy.

William (1912), Killian and Sherwin (1923), Plass (1924) and Crawford (1939) and (1940) recorded no change in the levels of uric acid in the blood throughout pregnancy, while other workers like Harding, Allen and Vanwyeh (1924) recorded a rise in the levels of uric acid in the blood especially in the last few months of pregnancy and this rise was progressive and continued up till delivery.

Nayar (1940) recorded no change in the blood uric acid during pregnancy. But Crawford (1939), Schaffer, Dill and Cadden (1943) observed a rise in the blood uric acid level in toxaemia of pregnancy as compared to the normal pregnant level. Similar observations were recorded by Stander, Duncen and Sisson (1925). They attributed these to the alterations occurring in the uric acid metabolism in toxaemia of pregnancy, although they did not observe any change in the other nitrogenous elements. The other workers have attributed the rise in blood uric acid in toxaemia of pregnancy to be due to the inability of the kidneys to excrete the substance rather than to a failure of hepatic function. As even in acute necrosis no change occurs in the uric acid level in the blood, it was thought worth while to study whether any change occurred in the levels of uric acid is the blood during normal pregnancy, pre-eclampsia, and after delivery.

*Senior Lecturer, Department of Obstetrics & Gynaecology, Medical College, Amritsar.

**Professor of Obstertrics & Gynaecology Medical College, Amritsar.

Received for publication on 10-1-66.

Material and Method

Blood uric acid estimation was carried out in 298 cases, which were selected from amongst the patients attending the in-patient and out-patient departments of Government Hospital for Women, Amritsar. The cases were grouped as follows:—

Group No. I:

Fifty normal non-pregnant women were studied for their blood uric acid content for comparision with blood uric acid in normal and toxaemic pregnancy.

Group No. II:

One hundred and twenty-two cases of normal pregnancy during the various trimesters.

First trimester	4 cases
Second trimester	13 cases
Third trimester	105 cases

Group No. III:

Fifty-seven cases of toxaemia of pregnancy.

Mild pre-eclampsia ..	16 cases
Severe pre-eclampsia ..	20 cases
Eclampsia	21 cases

Group No. IV:

Post-partum	59 cases
After normal delivery ..	50 cases
After delivery in cases of toxaemia	9 cases

Blood uric acid estimation was done in the group IV cases between the 2nd to 5th day of the puerperium.

Method of estimation

Five cc. blood was collected in a sterile syringe and added to the tube containing 10 mgm. of potassium oxalate.

Out of this 2 cc of blood was taken for the test and to it was added 14 cc of water, 2 cc of 10% sodium tungstate and 2 cc of 2/3 N. sulphuric acid. The precipitate was filtered and filtrate collected. In one test tube 5 cc of filtrate was taken and one standard tube was set up for the test. In the test tube 5 cc of filtrate was taken and to it was added 2 cc of 40% sodium cyanide and one cc of uric acid reagent.

In the standard tube instead of the filtrate 5 cc of uric acid standard was used and to it was added all the other reagents as that of the test contents. The test tubes were transferred to a boiling water bath for 20 seconds after which they were allowed to cool and then 2.5 cc of water was added to each of the tubes. Reading was taken in the calorimeter where the standard was fixed on the left side. Reading was taken and blood uric acid was calculated in mgm. percent.

Results and Discussion

Table I shows the blood uric acid averages in normal non-pregnant, normal pregnant, toxaemic pregnancy and the puerperium.

1. The average blood uric acid in the normal non-pregnant was 3.35 mgm% with a standard deviation of ± .791 and standard error of mean of 0.1130.
2. In 122 cases of normal pregnancy the blood uric acid contents averaged to 3.34 mgm% with a standard deviation of ± .839 and standard error of mean of 0.0779.
3. In 50 cases after delivery (in the puerperium) the average blood uric acid was 3.74 mgm% with a standard deviation of ± .850 and standard error of mean of .1202.
4. In the toxaemia group studied, 16 cases were mild pre-eclampsia and the average blood uric acid was 4.26 mgm% with a standard deviation of ± 0.9709 and standard error of mean of 0.2927.

In 20 cases of severe pre-eclampsia

TABLE I

Average Blood Uric Acid Levels in non-Pregnant Normal Pregnant Toxaemia of Pregnancy and after Normal Delivery

	No. of Cases	Range	Average MGM%	Standard Deviation	Standard Error of the Mean	Statistically Significant
Non-Pregnant	50	2.2 to 4.4. mgm%	3.35 mgm%	+ .799	0.1130	
Pregnancy	122	2.1 mg to 5.3%	3.34 mgm%	+0.839	0.0779	
Mild pre-eclampsia	16	3.2 to 6.6 mgm%	4.26 mgm%	+0.9709	0.2927	Statistically significant as compared to normal pregnancy.
Severe pre-eclampsia	20	3.2 to 7.3 mgm%	4.56 mgm%	+1.0331	0.2310	Statistically significant as compared to normal pregnancy.
Eclampsia	21	3.2 to 8.8 mgm%	6 mgm %	+1.05934	0.3477	Statistically significant as compared to normal pregnancy.
After normal delivery	50	2.0 to 5.0 mgm%	3.74 mgm%	+ .8505	0.1202	
After delivery in cases of toxaemia of pregnancy	9	3.4 to 6.7 mgm%	4.56 mgm%	+1.2913	0.4304	2nd to 5th day.

blood uric acid concentration averaged to 4.56 mgm% with a standard deviation of ± 1.0331 and standard error of mean of .2310. In the 21 cases of antepartum and intrapartum eclampsia average blood uric acid concentration was 6 mgm% with a standard deviation of ± 1.05934 and standard error of mean 0.3477. In 9 cases of toxaemia of pregnancy after delivery average blood uric acid was 4.56 mgm% with standard deviation of ± 1.2913 and standard error of mean of 4304.

Average blood uric acid concentration in non-pregnant women in the present study is 3,35 mgm% and the blood uric acid concentration during normal pregnancy recorded is 3.34 mgm%. From the above study it is evident that there is no rise in the blood uric acid level during pregnancy. Similar findings have been recorded by Nayer (1940), Hill (1950).

From the above table it is clear that the blood uric acid level is higher in cases of toxaemia of pregnancy both pre-eclampsia and eclampsia and after delivery in these subjects as compared to the normal pregnancy level. Statistical comparison of the blood uric acid level in normal non-

TABLE II

Showing the average blood uric acid level in the non-pregnant women recorded by various authors

Name of the Author	Year	Average	Range
Hawk and Bergeim	1938	2.5 mgm%	
Follin and Swedberg	1930	2.5 mgm%	
Gokhale	1939	3.02 mgm%	2.02 to 3.82
Juvale *et al.*	1964	2.92 mgm%	2.32 to 3.38
Present series	1964-65	3.35 mgm%	2.2 to 4.4

TABLE III

Showing the average blood uric acid in normal pregnant women

Name of the Author	Year	Average	Range
Nayer	1940	3.15 mgm%	
Juvale and Gokhale	1964	2.94 mgm%	
Present series	1964	3.34 mgm%	

TABLE IV

Blood uric acid in toxaemia of pregnancy as reported by various authors

Name of the Author	Year	Pre-eclampsia	Eclampsia after delivery	
Stander	1934	4.5 mgm%	6.5 mgm%	
Nayer	1940		5.3 mgm%	
Juvale and Gokhale	1964	3.46 mgm%		3.2 mgm%
Present series	1964-65	mild 4.26 mgm% severe 4.56 mgm%	6 mgm%	4.56 mgm%

pregnant, normal pregnancy, with toxaemic pregnancy shows that the difference is statistically significant. These finding are in agreement with those recorded by Nayer (1940), Juvalae and Gokhalae (1944). Further analysis of our cases shows that out of 16 cases of mild pre-eclampsia the blood uric acid was above 4 mgm% in 11 cases while in 5 cases the level was not much raised as compared to normal pregnancy level.

Out of 20 cases of severe pre-eclampsia in only two cases was the blood uric acid level not significantly raised. In 29 cases of eclampsia in only two cases the blood uric acid level was not raised. From the above study it appears that although the rise in blood uric acid is statistically significant as compared to the normal pregnancy, but estimation of uric acid alone cannot be taken as the sole criteria in judging the severity of the toxaemia in all cases, as in two cases of eclampsia even almost normal values have been recorded. The blood uric acid level taken in combination with the clinical picture of the case gives a fairly good idea of the severity of the disease.

Summary and Conclusions

Blood uric acid was determined in 298 cases.

1. 50 non-pregnant.
2. 122 normal pregnancy.
3. 57 toxaemia of pregnancy.
4. 50 after normal delivery.
5. 9 toxaemia cases after delivery.

1. The blood uric acid level in normal non pregnant women was 3.35 mgm% ± .79.
2. During normal pregnancy 3.34 mgm% ± .839.
3. Toxaemia of pregnancy .. ..
   Mild pre-eclampsia 4.26 mgm% ± .970
   Severe pre-eclampsia .. .. 4.56 mgm% ± 1.0
   Eclampsia .. 6.0 mgm% ± 1.59
4. After normal delivery .. .. 3.74 mgm% ± .85
5. After delivery in toxaemia cases .. 4.56 mgm% ± 1.29

The results showed that blood uric acid level is not affected in normal pregnancy. In toxaemia of pregnancy pre-eclampsia and eclampsia blood uric acid is raised as compared to the normal pregnancy level and difference is statistically significant.

Acknowledgments

The authors are grateful to Dr. N. L. Chitkara, M.D., D.I.P. Bac., Professor of Pathology Medical College, Amritsar, for the facilities provided by him in his department for the work.

References

1. Crawford, M. D.: J. Obst. & Gynec. Brit. Emp. **46**: 549, 1939.
2. Folin, O. and Svedberg, A: J. Biol. Chem. **88**: 715, 1930.
3. Gokhale, S. K.: I.J.M.R. **26**: 675, 1939.
4. Hawk, P. B. and Bergeim, O. R.: Cited by Juvale, K. R. and Gokhale, S. K.: J. Obst. & Gynec. India. **14**: 645, 1964.
5. Harding, V. D., Allen, K. I. and Van Wyek, H. B.: J. Obst. & Gynec. Brit. Emp. **31**: 595, 1924.
6. Killian, J. A. and Sherwin, C. P.: cited by Juvale, K. R. and Gokhale, S. D.: J. Obst. & Gynec. India. **14**: 645, 1964.

7. Nayer, A. S.: J. Obst. & Gynec. Brit. Emp. **47:** 404, 1940.
8. Plass, E. D.: J.A.M.A. **82:** 266, 1924.
9. Schaffer, N. K., Dill, L. V. and Cadden: cited by Juvale, K. R. and Gokhale, S. K.: J. Obst. & Gynec. India. **14:** 645, 1964.
10. Stander, H. J.: Am. J. Obst. & Gynec. **23:** 273, 1932.
11. Stander, H. J. and Cadden, J. F.: Am. J. Obst. & Gynec. **26:** 856, 1934.
12. Stander, H. J., Duncan, E. E. and Sission, E. E.: Cited by Juvale, K. R. and Gokhale, S. K.: J. Obst. & Gynec. India. **14:** 645, 1964.
13. William, J. L.: Cited by Juvale, K. R. and Gokhale, S. K.: J. Obst. & Gynec. India. **14:** 645, 1964.