

ESTIMATION OF SERUM URIC ACID AND URIC ACID CLEARANCE IN NORMAL AND TOXAEMIAS OF PREGNANCY

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SUMMARY

Serum uric acid and uric acid clearance was done in 885 cases. In non-pregnant women mean uric acid level was 2.46 mg. In pre-eclamptic cases the level was higher than in non-pregnant women. The level was higher in eclampsia cases compared to pregnant and pre-eclamptic toxaemia cases.

Introduction

Pregnancy is a physiological stress in which many changes occur in the milieu 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 complication of pregnancy like toxaemia.

Uric acid is one of the important end product of protein metabolism and its study during pregnancy is useful in detecting early metabolic disorders. The endogeneous sources of uric acid are the break down of the tissues nucleo-protein and oxidation of hypoxanthine of the muscles.

Different views have been expressed by various authors regarding the level of uric acid in blood during pregnancy.

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Harding, Allen and Vanwjel in 1924 have recorded a rise in its level in the blood particularly in the last month of pregnancy.

Kishore and Tandon (1965) observed an increase in the serum uric acid level in toxaemic condition.

Pregnancy brings about certain physiological changes in renal function and metabolic processes of the mother. The changes are often exaggerated in abnormal condition of pregnancy like toxaemia. To an obstetrician early diagnosis and management of toxaemias of pregnancy remains of paramount importance today. Serum uric acid estimation and uric acid clearance in blood has proved to be good diagnostic measure in recognising the disorder. With this view in mind, we have studied the uric acid concentration and uric acid clearance in normal and toxaemic pregnancy.

Material and Methods

Serum uric acid and uric acid clearance were done in a total of 85 women,

collected from out patient department, antenatal clinics and labour room Jan. 1982 to Jan. 1983.

Selection of Cases—(1) Twenty normal and nonpregnant women.

(2) Sixty five pregnant women were studied for estimation of serum uric acid level and uric acid clearance ratio.

(i) Non pregnant—20 women as control.

(ii) Normal pregnancy—(1) 1st trimester 5 cases. (2) 2nd trimester—10 cases. (3) 3rd trimester—11 cases.

(iii) Pregnancy with pre-eclamptic toxæmia. (1) 2nd trimester 5 cases. (2) 3rd trimester—10 cases.

(iv) Intra-partum eclampsia—10 cases.

(v) Post-partum eclampsia—5 cases.

(vi) Pregnancy with essential hypertension—5 cases. (1) 2nd trimester—2 cases. (2) 3rd trimester 3 cases.

Serum uric acid and uric acid clearances were measured by Caraway's method (1955).

Observation

The above Table shows very significant rise in uric acid during pregnancy when compared to non-pregnant women.

The rise in serum uric acid in cases of toxæmias was found to be directly proportional to severity of condition. In essential hypertension the rise of serum uric acid is minimum.

Table III shows that serum uric acid level in P.E.T. were found to be much higher in 3rd trimester of pregnancy than in 2nd trimester.

In essential hypertension such a difference in uric acid level in advanced gestation was not found.

There is gradual decline to normal uric acid level within 5 days of delivery. Uric acid estimation was done in primigravida multigravida and different age group and we found no changes.

The above Table shows that in normal pregnancy the clearance rate is more than 8 ml/min.

TABLE I

Comparative Value of Serum Uric Acid Concentration in Non-pregnant—Normal Pregnancy and Toxaemic Patients

Type of Cases	Case No.	Range in mgm%	Mean mgm%
Non-pregnant	20	2.1-3.0	2.46
Normal Pregnant	30	2.3-3.0	2.7
Toxaemic cases	15	3.6-7.5	4.91

TABLE II

Serum Uric Acid Estimation in Different Types of Toxaemias

Type of Cases	No. of Cases	Ranges in mgm %	Mean mgm %
Mild P.E.T.	10	3.6 -4.9	4.16
Severe P.E.T.	5	5.09-7.5	6.43
Intra-Partum Ecl	10	5.4 -9.0	7.1
Post-partum	5	3.6 -7.0	6.2
Pregnant with essential hypertension	5	2.4 -4.1	3.52

TABLE III

Comparison of Serum Uric Acid Level in 2nd and 3rd Trimesters of Pregnancy in Cases of P.E.T. and Essential Hypertension

Type of Cases	No. of Cases	Serum Uric Acid in mgm per 100 C.C.			
		2nd trimester		3rd trimester	
		Range	Mean	Range	Mean
P. E. toxæmias	15	3.6-4.4	3.98	3.6-7.5	5.88
Essential hypertension	5	3.2-4.1	3.66	2.9-4.1	3.43

TABLE IV

Changes of Pattern in Serum Uric Acid Concentration Immediately After Delivery of 5 Cases of eclampsia

Sl. No.	During Labour	Follow up Cases after delivery in mgm%				
		1st day	2nd day	3rd day	4th day	5th day
1.	9.0	7.0	6.7	5.2	4.5	3.9
2.	5.4	3.0	3.0	2.8	2.7	2.6
3.	6.8	5.0	4.8	4.1	3.4	2.8
4.	8.0	6.2	5.4	5.3	4.8	4.0
5.	8.0	5.2	5.0	4.4	3.7	3.5

In all cases convulsion stopped after delivery.

TABLE V

Uric Acid Clearances Value in Control and Normal Pregnancies

Group	No. of Cases	Range ml./min.	Mean ml./min.
Control	20	8.9-16	12.04
1st trimester	5	7.0-15.0	11.00
2nd trimester	10	5.0-20.7	12.08
3rd trimester	15	5.0-18.4	11.01

TABLE VI

Uric Acid Clearance Value in Toxaemia of Pregnancy

Group	No. of Cases	Range ml./min.	Mean ml./min.
Normal Pregnancy third trimester	15	5.0-18.4	12.07
Mild P.E.T.	10	3.1-7.4	5.02
Severe P.E.T.	5	3.0-6.0	4.5
Intrapartum Ecl.	10	2.2-5.0	3.06
Pregnancy with hypertension	5	9.0-18.0	13.5

Table VI shows the uric acid clearance rate decreases in all groups of toxæmias except in cases of essential hypertension.

Discussion

The mean uric acid level in normal non-pregnant cases in our series was 2.46

mgm%, whereas Luvale and Gokhale (1964) and Naval Kishore and Tandon (1964) reported it to be 2.02 and 3.02 mgm% respectively. The slightly lower value of serum uric acid in our group could be explained by the fact that in majority of cases the diet was poor in purine content. The method of estimation of uric acid also varied in different series of cases.

We did not find any significant rise in the mean uric acid level in pregnancy when compared with non-pregnant value.

Purandare in 1959 showed progressive rise of serum uric acid level from 2.6 to 3.1 mgm% in normal pregnancy from 4th month onwards. Kishore and Tandon (1965) observed the rise in serum uric acid level only in 3rd trimester of normal pregnancy.

In pre-eclamptic toxæmia the mean serum uric acid level was higher in comparison to non-pregnant and pregnant women as shown in Table I. Our observation shows that in mild pre-eclamptic toxæmia the mean serum uric acid was slightly less than that found by Gupta et al (1969) and Kishore et al (1965). In severe cases the serum uric acid level was almost same as that found by Gupta and Kothari (1969) and Kishore and Tandon (1965).

Chesley and Laura in 1945 showed a reduction in clearance rate of uric acid in pre-eclampsia and eclampsia because of increased tubular reabsorption of uric acid from glomerular filtration and decrease in rate of glomerular filtration. According to them the rise in uric acid level in toxæmia of pregnancy was due to diminished uric acid clearance and not due to impaired destruction in liver. Uric acid clearance rate helps in the diag-

nosis of pre-eclampsia even before the appearance of clinical feature.

A progressive rise of serum uric acid level was observed with the increasing severity of toxæmia. The direct relation between serum uric acid content and severity of toxæmia indicates that the estimation of uric acid would be of great value in diagnosing the severity of the disease.

It is seen that mean serum uric acid level is appreciably higher in the toxæmic group of patients when compared with normal pregnancy at the equivalent period of gestation.

Mean serum uric acid level in eclampsia was found to be increased in comparison to normal pregnancy and pre-eclamptic toxæmia of both mild and severe type.

Further 5 of the intrapartum eclamptic cases were followed up to 5th post partum day and estimation of uric acid was done up to 5th day to observe the change after the fits had ceased to occur. It is seen that uric acid level showed a gradual decline to normal level.

Various causes have been attributed for the rise of serum uric acid in P.E.T. and eclampsia. The precise mechanism which leads to accumulation of uric acid in the blood is still uncertain, although its impaired renal excretion, diminished destruction by the liver and excessive formation associated with muscular exertion during convulsion, all have got some place.

In essential hypertension the glomerular and basement membrane are not much affected as in P.E.T. This may show no rise of serum uric acid and no decrease of uric acid clearance.

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