

A Prospective Comparative Assessment of Serum Uric Acid Level in Normal Pregnancy and Pregnancy Induced Hypertension

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Abstract

Aim: To compare serum uric acid level during normal pregnancy and pregnancy induced hypertension.

Methodology: The present study was carried out at Department of Biochemistry, Jan Nayak Karpuri Thakur Medical College and Hospital, Madhepura, Bihar, India. Total 100 patients of pregnancy were selected out of which 50 patients were of normal pregnancy and 50 patients were of pregnancy induced hypertension. Serum uric acid levels were estimated before delivery and after delivery in cases of pregnancy. Determination of uric acid was carried out by quantitative estimation on colorimetric method by enzymatic uricase method, which has many advantages like Single reagent system, one step procedure, prevents protein precipitation, highly sensitive and specific, Reagent is stable.

Results: In present study out of 100, maximum number of patients was in age group 21-25 years. The youngest patient was of 20 years whereas the oldest patient was of 38 years of age. In group of normal pregnancy, 38% of patients were primigravida and 62% of patients were multigravida, while in subject group of pregnancy induced hypertension patients, 54% of patients were primigravida. Mean serum uric acid level in pregnancy induced hypertension (pre-delivery) was 7.4 ± 0.8 whereas in control group, it was 4.1 ± 0.1 , which is statistically significant ($p < 0.02$). Mean serum uric acid level in pregnancy induced hypertension after delivery was 9.3 ± 1.9 whereas in normal pregnant patients it was 5.0 ± 0.5 which is statistically significant ($p < 0.05$).

Conclusion: The present study concluded that with increase in systolic blood pressure and diastolic blood pressure there is an increase in serum uric acid level. Measurement of serum uric acid has a great diagnostic value in pregnancy induced hypertensive and could be used as a biochemical indicator in PIH. As a result, the condition may be detected early, and its progression can be halted by effective care.

Keywords: Pregnancy, Hypertension, Preeclampsia

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Introduction

Pregnancy-related hypertension is a frequent occurrence. Maternal and neonatal morbidity and death are exacerbated by it. Preeclampsia often manifests itself in the form of gestational hypertension as the initial sign of the disease. Pregnancy-induced hypertension and normal pregnancies are known to have sequential variations in the blood uric acid level [1,2].

Pre-eclampsia (PE) is a well recognised obstetric condition, affects multiple system and organs with uncertain cause [3]. It is a pregnancy special illness of pregnant females which comprises elevation of SBP, joined by proteinuria, oedma or even both. Preeclampsia impacts roughly 2-8 percent of all pregnancies and a numerous sorts of consequences have been described with this condition [4, 5].

Pregnancy induced hypertension is an exclusive condition affecting 10% of pregnant women [6]. According to Stander and Cadden [7], who found no impairment in uric acid excretion, the elevated level of uric acid in pregnancy-induced hypertension is attributable to its reduced breakdown in the liver. But Sieitchik [8] (1956) has shown that renal tubules in toxæmic conditions excessively reabsorb urate. Pregnancy-induced hypertension was caused only by renal dysfunction, according to the researchers. The higher the blood uric acid level, the more likely it is that the foetus will have a poor result [9].

As a result, elevated uric acid levels are an indicator of preeclampsia severity. The uric acid level should be raised if this is the case [10-13] before the illness manifests itself clinically. Preeclamptic pregnancies are characterised by hyperuricemia, one of the first and most persistent symptoms. It is possible that increased levels of circulating uric acid may identify a subpopulation of preeclamptic women who are at greater risk for maternal and foetal morbidity [14].

Since mother and child health is now more important than ever, the current research compared levels of blood uric acid in women who were pregnant normally with those who were pregnant with pregnancy-induced hypertension.

Materials and Methods:

The present study was carried out at Department of Biochemistry, Jan Nayak Karpuri Thakur Medical College and Hospital, Madhepura, Bihar, India for 1 year. Total 100 patients of pregnancy were selected out of which 50 patients were of normal pregnancy and 50 patients were of pregnancy induced hypertension.

Methodology

Serum uric acid levels were estimated before delivery and after delivery in cases of pregnancy. Twenty normal, healthy non-pregnant female volunteers were selected for control study. They were of comparable age, and physical activity. They were non-smoker, not taking tobacco and free from any other metabolic or organic disorders. We had collected necessary information about subject in Performa.

Determination of uric acid was carried out by quantitative estimation on colorimetric method by enzymatic uricase method, which has many advantages like Single reagent system, one step procedure, prevents protein precipitation, highly sensitive and specific, Reagent is stable. It is a very speedy method and one can determine uric acid within 5 minutes and very small amount of serum is required.

Results:

In present study out of 100, maximum number of patients was in age group 21-25 years. The youngest patient was of 20 years whereas the oldest patient was of 38 years of age. In group of normal pregnancy, 38% of patients were primigravida and 62% of patients were multigravida, while in subject group of

pregnancy induced hypertension patients, 54% of patients were primigravida. This is in accordance with the theory that

preeclampsia is predominantly a disease of 1st pregnancy.

Table 1: Type of pregnancy

Type of pregnancy	Normal pregnancy (n=50)	Pregnancy induced hypertension (n=50)
Primigravida	19 (38%)	27 (54%)
Multigravida	31 (62%)	23 (46%)

Table 2: Comparative values of serum uric acid levels in normal pregnancy and pregnancy induced hypertension

Period	Normal pregnancy (Mean \pm SD) (n=40)	Pregnancy induced hypertension (Mean \pm SD) (n=40)	P value
Pre-delivery	4.6 \pm 0.42	7.6 \pm 0.76	P < 0.02
Post delivery	4.9 \pm 0.36	9.1 \pm 1.74	P < 0.05

Results shows that mean serum uric acid level in control group was 3.82 \pm 0.10 and in normal pregnant patient 4.8 \pm 0.51. There are not significant differences of different blood pressure level found between normal healthy subjects and normal pregnancy patients (p > 0.1). In

both the cases of normal pregnancy and pregnancy induced hypertension patients, difference between the systolic blood pressure (126.5 \pm 4.95, 168 \pm 5.75) and diastolic blood pressure (78 \pm 3.1, 106.43 \pm 9.25) is highly significant (p < 0.001).

Table 3: Relationship between diastolic blood pressure and serum uric acid in pregnancy induced hypertension

Diastolic blood pressure (mmHg)	5-7	7.1-9	9.1-11	>11
90-100	10	5	1	0
102-110	8	2	5	1
> 110	3	4	6	5

Mean serum uric acid level in pregnancy induced hypertension (pre-delivery) was 7.4 \pm 0.8 whereas in control group, it was 4.1 \pm 0.1, which is statistically significant (p < 0.02). Mean serum uric acid level in pregnancy induced hypertension after delivery was 9.3 \pm 1.9 whereas in normal pregnant patients it was 5.0 \pm 0.5 which is statistically significant (p < 0.05).

With increase in systolic blood pressure more than 180 mm Hg, there is also increase in serum uric acid level. With increase in the diastolic blood pressure there is also increase in serum uric acid level. So, there is a positive correlation between the diastolic and systolic blood pressure and serum uric acid level.

Discussion:

Pregnancy induced hypertension is a major health problem in pregnant women despite of advancements in the field of medical sciences. There are many biochemical tests have reported as an indicator of the preeclampsia development, including maternal serum uric acid [5]. The level of uric acid depends up on various factors like altered kidney function as well as enzymatic defects in purine metabolism [14]. During pregnancy, level uric acid level reduced initially because of numerous factors like impacts of estrogen and increased glomerular filtration rate (GFR) [15]. However, the level of uric acid slowly increases in non-pregnant women with time of gestation [11].

In this study systolic blood pressure significantly increased in both normal and PIH subjects. While elevation of diastolic blood pressure is significant in pregnancy induced hypertensive subjects so, there is a positive correlation between diastolic blood pressure and serum uric acid level. Mustaphietal [2], Redman [16], Verma [17] also reported similar findings.

In present study Mean serum uric acid level in pregnancy induced hypertension (pre-delivery) was 7.4 ± 0.8 whereas in control group, it was 4.1 ± 0.1 , which is statistically significant ($p < 0.02$). Mean serum uric acid level in pregnancy induced hypertension after delivery was 9.3 ± 1.9 whereas in normal pregnant patients it was 5.0 ± 0.5 which is statistically significant ($p < 0.05$). Mustaphi [2] and Redman [16] also found elevation of serum uric acid in pregnancy induced hypertensive subjects.

According to Redman [16] serum uric acid level concentration also predicts pre-eclampsia and perinatal outcome & is one of the most consistent and earliest detectable change in pre-eclampsia. He also stated that serum uric acid level was better indicator than blood pressure levels in predicting fatal prognosis. Chesely and Williams stated that in pregnancy induced hypertension there was impaired tubular reabsorption of uric acid leads to impaired uric acid clearance. However, Pollak and Nettles [18] reported that decreased uric acid clearance was the result of enhanced tubular reabsorption or inhibited tubular secretion or both. Uric acid is a metabolite of the degradation of nucleotides which increases their blood levels in patients with pre-eclampsia and eclampsia. Its synthesis increasing by damage and death of trophoblastic cell and decreased urinary excretion due to lower glomerular filtration rate and increased absorption in the proximal tubule [19,20].

Conclusion:

The present study concluded that with increase in systolic blood pressure and

diastolic blood pressure there is an increase in serum uric acid level. Measurement of serum uric acid has a great diagnostic value in pregnancy induced hypertensive and could be used as a biochemical indicator in PIH. As a result, the condition may be detected early, and its progression can be halted by effective care.

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