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A Correlation Study of Serum Uric Acid Level in Normal Pregnancy and Pregnancy Induced Hypertension

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Abstract: ***Hypertension is one of the common complications met with in pregnancy and contributes significantly to the cause of maternal and perinatal morbidity and mortality. The study of uric acid in serum is an interesting problem especially in normal pregnancy and pregnancy induced hypertension (PIH). The study year 2016, the present study was carried out at Biochemistry and Gynaecology Department, shri Vasantrao Naik Government Medical College, Yavatmal on Total 80 subjects. Determination of uric acid was carried out by quantitative estimation on fully auto analyzer method by enzymatic uricase method. Results shows that Serum uric acid levels in both the time (predelivery and post-delivery) were statistically significant in Pregnancy induced hypertension than normal pregnancy. Many patients had predisposing factor to development of preeclampsia like primigravida. It is also evident that severity of proteinuria increases with diastolic blood pressure and Levels of serum uric acid did show a high positive correlation with the severity of Pregnancy induced hypertension in relation to hypertension and proteinuria 65% of patients of PIH.***

Keywords: Pregnancy, Hypertension, Uric Acid

1. Introduction

Modern clinicians depend increasingly on laboratory tests for the management of the patients. Hypertension is one of the common complications met with in pregnancy and contributes significantly to the cause of maternal and perinatal morbidity and mortality.

The study of uric acid in serum is an interesting problem especially in normal pregnancy and pregnancy induced hypertension (PIH). It is well known that serial changes occur in serum uric acid level in normal pregnancy[1] and pregnancy induced hypertension.[2] Pregnancy induced hypertension is an exclusive condition affecting 10% of pregnant women.[3]

The raised levels of uric acid in the pregnancy induced hypertension were considered to be due to its diminished destruction in liver, which was based upon the observation of stander and Cadden, [4] who did not find impairment of uric acid excretion. But, Seitchik[5] showed that there was excessive reabsorption of urate by renal tubules in toxaemic conditions.

There is a positive correlation seen between the raised, serum uric acid level and adverse fetal outcome.[6] severe pre-eclampsia without hyperuricaemia is associated with excellent fetal outcome. However, in the presence of hyper uricaemia with severe pre-eclampsia, the prognosis of fetus is poor, regardless of the maternal blood pressure.

So, in view of the greater emphasis being placed on maternal and child health in present era, the present study was undertaken to consider the influence of fluctuations in serum uric acid level during normal pregnancy, and pregnancy induced hypertension with keeping in mind following aims and objectives.

1) To study the fluctuations of serum uric acid in normal pregnancy.
2) To study the fluctuations of serum uric acid in pregnancy induced hypertension.
3) To compare the changes of serum uric acid in normal and PIH (Pregnancy induced hypertension) patients.
4) To compare the results of present study with the other workers.

2. Materials and Methods

The present study was carried out at Biochemistry and Gynaecology Department, Shri Vasantrao Naik Government Medical College, Yavatmal. Total 80 patients of pregnancy were selected out of which 40 patients were of normal pregnancy and 40 patients were of pregnancy induced hypertension. 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 3 minutes and very small amount of serum is required.

3. Results and Observations

In present study out of 80, maximum number of patients was in age group 21-25 years. The youngest patient was of 19 years whereas the oldest patient was of 36 years of age. In

group of normal pregnancy 37.5% of patients were primigravida and 62.5% of patients were multigravida, while in subject group of pregnancy induced hypertension patients 53% of patients were primigravida. This is in accordance with the theory that preeclampsia is predominantly a disease of 1st pregnancy. As these patients are exposed to the chorionic villi for the first time during pregnancy.

Results shows that mean serum uric acid level in control group was 3.97 ± 0.08 and in normal pregnant patient 4.6 ± 0.42 which was statistically not significant ($p > 0.1$). 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 (123.5 ± 4.85, 163 ± 323.13) and diastolic blood pressure (80 ± 2.60, 108.52 ± 8.74) is highly significant ($p < 0.001$). Mean serum uric acid level in pregnancy induced hypertension (pre-delivery) was 76 ± 0.76 where as in control group; it was 3.9 ± 0.08, which is statistically significant. ($p < 0.02$)

As shown in Table 1 mean serum uric acid in pregnancy induced hypertension at pre-delivery was 7.6 ± 0.76 whereas in normal pregnancy it was 4.6 ± 0.42 which is statistically significant ($p < 0.02$). Mean serum uric acid level in pregnancy induced hypertension after delivery was 9.1 ± 1.74 whereas in normal pregnant patients it was 4.9 ± 0.36 which is statistically significant ($p < 0.05$).

Table 1 shows that with increase in systolic blood pressure more than 180 mm Hg there is also increase in serum uric acid level. Same way Table 2 shows that 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 blood pressure and serum uric acid level.

4. Discussion

Serum uric acid is one of the parameters used in early diagnosis of pregnancy induced hypertension. It has been reported that hyperuricaemia correlates with the severity of the hypertension and distinguishes reliably between pregnancy induced hypertension and chronic hypertension.[2] Hyperuricaemia in Pregnancy induced hypertension is a result primarily of decreased renal clearance of uric acid, a decrease that exceeds the reduction in glomerular filtration rate and creatinine clearance.[7] The data also indicate that women with pregnancy induced hypertension, measurements of serum uric acid is a better indicate of fetal prognosis than the levels of blood pressure. Other than our study like Bhatt and barfiwala[8], Ghose and das, [9] Sibai etal, [10] Bhattacharya and pukayastha11 also confirm that preeclampsia / eclampsia show a high preponderance of patients less than 25 years

Table 1: Comparative values of serum uric acid levels in normal pregnancy and pregnancy induced hypertension

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

Table 2: Relationship between diastolic blood pressure and serum uric acid in pregnancy induced hypertension

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

Of age. This may be explained by the fact that pre-eclampsia is predominantly a disease of primigravida. So this may be reflected in young age group of patients. It may be due to the fact that primigravida patients are exposed to chorionic villi for the first time. In the present study, mean value of serum uric acid in normal pregnancy was 4.6 mg/dl in pre-delivery and 4.9 mg/dl post delivery. The results are comparable to authors mentioned above. Also values obtained in the study were similar to that reported by others.[4, 12]

Our study indicates that following delivery, the levels had not returned to normal. While study of Musthaphi etal[2] conclude showed that it usually comes to normal after 7 days of delivery. From above study one might be permitted to conclude that the defective kidney function as far as uric acid reabsorption or excretion concern, kidney, continued to operate defectively eventhough the patients clinically appears normal and uric acid level becomes equal to control cases at the end the end of the puerperium.

In present study, 65% of patients with Pregnancy induced hypertension (PIH) had significant proteinuria (> 2+). There was also positive correlation between the diastolic blood pressure and the proteinuria i.e. severity of proteinuria increases with the increase in the diastolic blood pressure. Similar observations were seen in study of Mac Gillivry[13] and Mustaphi etal.[2] Present study showed that as the diastolic pressure increased, the level of serum uric acid also increased. So there was a positive correlation between diastolic blood pressure and serum uric acid level. Mustaphi etal[2] also reported similar findings.

5. Conclusion

For the last two decades, there have been various conflicting reports in the literature regarding usefulness of serum uric acid estimation in the women with pregnancy induced hypertension (PIH). Present study show that uric acid is one of the most studied laboratory tests for the investigation of pre-eclampsia. Non only hyperuricaemia is one of the most reliable indicators for the diagnosis of pre-eclampsia. Serum concentrations also are good indicator of severity of the disease. There is positive correlation between high serum uric acid levels and high diastolic blood pressure.

As 20% of circulating uric acid is bound to serum albumin. In patients of pregnancy induced hypertension, because of proteinuria, there is gradually fall in serum protein concentration resulting in high uric acid level. So, in Pregnancy induced hypertension (PIH) - a disease that is bearing such a large number of maternal death and fetal death is a preventable. The importance of continuous antenatal surveillance and thereof uric acid by laboratory test in early identification of suspected and established cases of hypertension in pregnancy is thus evident. The disease can be

identified early and its deterioration prevented by proper management.

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