

Comparative assessment of serum uric acid levels in pregnancy induced hypertension females & normal pregnant females

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Abstract

Pregnancy-induced hypertension — which may also be called pre-eclampsia, toxemia, or toxemia of pregnancy — is a pregnancy complication characterized by high blood pressure, swelling due to fluid retention, and protein in the urine.

Hence from the data reflected from the literature the current study was planned in view of the greater emphasis being placed on maternal and child health. Also the present study was undertaken to consider the influence of fluctuations in serum uric acid level during normal pregnancy, and pregnancy induced hypertension.

The present study was conducted in the Vardhman Institute of medical sciences, Pawapuri, Nalanda, From Oct 2017 to Sept 2018. A total 80 women's were included in the study. 40 normal condition and 40 pregnant women's having hypertension were included in to the study. These are divided in to two groups.

A positive correlation was observed between rise in uric acid and severity of hypertension in pregnancy. Hyperuricemia in patients with hypertensive disorders of pregnancy is a strong risk factor for several maternal and perinatal complications.

Keywords: pre-eclampsia, perinatal outcome, uric acid, PIH

Introduction

Pregnancy-induced hypertension — which may also be called pre-eclampsia, toxemia, or toxemia of pregnancy — is a pregnancy complication characterized by high blood pressure, swelling due to fluid retention, and protein in the urine. Gestational hypertension or pregnancy-induced hypertension (PIH) is the development of new hypertension (systolic above 145 or diastolic above 95 mmHg) in a pregnant woman after 20 weeks' gestation without the presence of protein in the urine or other signs of pre-eclampsia. Hypertension is defined as having a blood pressure greater than 140/90 mm Hg [1].

There exist several hypertensive states of pregnancy:

Gestational hypertension: Gestational hypertension is usually defined as having a blood pressure higher than 140/90 measured on two separate occasions, more than 6 hours apart, without the presence of protein in the urine and diagnosed after 20 weeks of gestation [2].

Pre-eclampsia: Pre-eclampsia is gestational hypertension plus proteinuria (>300 mg of protein in a 24-hour urine sample). Severe pre-eclampsia involves a blood pressure greater than 160/110, with additional medical signs and symptoms. HELLP syndrome is a type of pre-eclampsia. It is a combination of three medical conditions: hemolytic anemia, elevated liver enzymes and low platelet count.

Eclampsia: This is when tonic-clonic seizures appear in a pregnant woman with high blood pressure and proteinuria. Pre-eclampsia and eclampsia are sometimes treated as components of a common syndrome [3].

Preeclampsia is one of the hypertensive (high blood pressure) disorders of pregnancy. It is a major cause of maternal and

perinatal mortality (number of stillbirths and deaths of newborn in the first week of life) and morbidity. Hypertensive disorders of pregnancy occur in about 10% of all pregnant women around the world. Preeclampsia affects 3–5% of pregnancies. Along with preeclampsia, other diseases which are included in the group of hypertensive disorders of pregnancy are eclampsia, gestational hypertension and chronic hypertension.

In Asia and Africa, nearly one tenth of all maternal deaths are associated with hypertensive disorders of pregnancy. In India, the incidence of preeclampsia is reported to be 8-10% among the pregnant women. According to a study, the prevalence of hypertensive disorders of pregnancy was 7.8% with preeclampsia in 5.4% of the study population in India. Preeclampsia is a pregnancy specific hypertensive disease with multisystem involvement. It is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks of gestation and can present as late as 4-6 weeks postpartum (after child birth).

According to the new guidelines given by American Congress of Obstetricians and Gynaecologists (ACOG) in 2013, the diagnosis of preeclampsia does not require the detection of high levels of protein in the urine (proteinuria) along with hypertension. Evidence shows that changes in kidney and liver can occur without signs of proteinuria, and the amount of protein in the urine does not predict how severely the disease will progress. Preeclampsia is now to be diagnosed by persistent high blood pressure that develops during pregnancy or during the postpartum period and is associated with a lot of protein in the urine or the new development of decreased blood platelets, changes in the

kidney or liver function, fluid in the lungs, or signs of brain disorder such as seizures and/or visual disturbances. HELLP syndrome and eclampsia are the serious complications of the preeclampsia. The majority of deaths related to preeclampsia can be prevented by providing timely and effective care to pregnant women presenting with such complications.

The causes of preeclampsia are still unknown, thus effective primary prevention is not possible at this stage. However there are some major risk factors for preeclampsia (such as obesity), and rectification of these factors might result in a decrease in its frequency.

Maternal deaths can occur among severe cases, as the progression from mild to severe can be rapid, unexpected, hence emphasis should be on secondary and tertiary prevention including early detection and proper management of preeclampsia. Proper education of patient and healthcare provider may be the key to the successful detection and management of preeclampsia [4].

Few recommendations provided by World Health Organization (WHO) and ACOG [5]:

- In areas where dietary calcium intake is low, calcium supplementation during pregnancy (at doses of 1.5–2.0 g elemental calcium/day) is recommended for the prevention of preeclampsia in all women, but especially those at high risk of developing preeclampsia.
- Low-dose acetylsalicylic acid (aspirin, 75 mg) is recommended for the prevention of preeclampsia in women at high risk of developing the condition (risk factors: previous preeclampsia; diabetes; chronic hypertension; renal disease; autoimmune disease; and multiple pregnancies).
- Magnesium sulfate is recommended for the prevention of eclampsia in women with severe preeclampsia in preference to other anticonvulsants.
- Diuretics, particularly thiazides, are not recommended for the prevention of preeclampsia and its complications.

Hence from the data reflected from the literature the current study was planned in view of the greater emphasis being placed on maternal and child health. Also the present study was undertaken to consider the influence of fluctuations in serum uric acid level during normal pregnancy, and pregnancy induced hypertension.

Methodology

The present study was conducted in the Vardhman Institute of medical sciences, Pawapuri, Nalanda, From Oct 2017 to Sept 2018. A total 80 women’s were included in the study. 40 normal condition and 40 pregnant women’s having hypertension were included in to the study. These are divided in to two groups.

Group I: 40 normal condition pregnant women’s

Group II: 40 women’s having pregnancy induced hypertension (PIH)

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Inclusion Criteria: Pregnant women’s diagnosed with the

Exclusion Criteria: Females which are non-smoker, not taking tobacco and free from any other metabolic or organic disorders.

The diagnosis of PIH was based on the definition of American College of Obstetrics & Gynecologist, systolic

blood pressure greater than 140 mm of Hg or a rise of at least 30 mm of Hg or diastolic blood pressure greater than 90 mm of Hg or a rise of at least 15 mm of Hg (manifested on two occasion atleast 6 hrs apart) & proteinuria of 300 mg or greater in a 24 hrs urine collection or protein concentration of 1 gm/l (on two occasion at least 6 hrs apart).

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 & Discussion

The data from the total 80 females were collected and compared as below to get the idea of the different parameters in the pregnancy.

Table 1: Comparison of Clinical Findings

Group	Group I:	Group II:
Cases of	Control : Normal pregnant women’s	Case: PIH Women’s
No, of Cases	40	40
Age	22-35	24-38
Systolic Blood Pressure (mmHg)	110- 125	112 – 123
Diastolic Blood Pressure (mmHg)	72- 80	92- 101
Haemoglobin (gm %)	11.3 – 13.5	10.8 – 13.9

Table 2: Case Distribution

Control	No. of Cases
Control : Normal pregnant women’s	40
Case: PIH Women’s	40
Mild PIH	8
Severe Preclampsia	28
Eclampsia	4

Table 3: Case Distribution

Control	No. of Cases	Serum Uric Acid mg/dl
Control : Normal pregnant women’s	40	
Case: PIH Women’s	40	4.32 – 4.95
Mild	8	5.11-5.83
Severe Preclampsia	28	5.89 – 6.92
Eclampsia	4	6.65 – 9.23

Table 4: Perinatal outcome

Uric Acid Level	More than ≥6 mg/dl
Intra Uterine Growth Retardation	4
Still birth	6
Alive	22
NICU	5
Preterm	3
Total Cases	40

Uric acid is a terminal metabolite of the degradation of nucleotides. It is influenced by diet (i.e. high protein and fructose), alcohol consumption, increased cell turnover, enzymatic defects in purine metabolism or altered kidney function [6]. In pregnancy uric acid concentrations initially fall 25-35% due to the effects of estrogen, expanded blood volume and increased glomerular filtration rate [7]. However, concentrations slowly rise to those observed in nonpregnant women by term gestation (4-6mg/dl) [8].

However in preeclampsia uricemia occurs, it most likely

results from reduced uric acid clearance from diminished glomerular filtration, increased tubular reabsorption and decreased secretion^[9]. It was once thought to result solely from reduced renal clearance but increase in uric acid levels are now also thought to be due to increased uric acid produced and caused by trophoblast breakdown, cytokine release and ischemia^[10]. Uric acid clearance is a key feature of preeclampsia. The serum level of uric acid rises as preeclampsia progresses; a level >5.5 mg/dl is a strong indicator of the disease and a level >7.8 mg/dL is associated with significant maternal morbidity^[11].

This study indicated that in pregnant women with hypertension, measurement of serum uric acid is a better indicator of fetal consequences of preeclampsia than measurement of blood pressure itself. In an established preeclampsia case, the diagnosis is usually clinically evident and elevation of serum uric acid will simply confirm the diagnosis. But since urate retention is an early feature of the disorder, serum uric acid measurement is of the greatest value where the diagnosis is in doubt.

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^[12]. 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^[13]. The data also indicate that women with pregnancy induced hypertension, measurements of serum uric acid is a better indicator of fetal prognosis than the levels of blood pressure. Other than our study like Bhatt and Barfiwala^[14], Ghose and Das^[15], Sibai et al,^[16] Bhattacharya and Pukayastha^[17] also confirm that preeclampsia/eclampsia show a high preponderance of patients less than 25 years 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.

Krishna S et al,^[18] Thanna et al,^[19] Yalamati P et al,^[20] concluded that high serum uric acid level could be a useful indicator of the maternal and fetal complication which is comparable to our study. Hawkins TL et al [21], studied of hypertensive pregnant women (those with pre-eclampsia or gestational hypertension) the risk of adverse maternal outcome and adverse fetal outcome increased with increasing concentration of uric acid which is compared to our study.

Conclusion

A positive correlation was observed between rise in uric acid and severity of hypertension in pregnancy. Hyperuricemia in patients with hypertensive disorders of pregnancy is a strong risk factor for several maternal and perinatal complications.

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