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Uric acid levels: a useful index of the severity of preeclampsia and perinatal prognosis

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1 Introduction

In 1917 SLEMONS and BOGERT [8] were the first to report an association between serum uric acid (SUA) levels and preeclampsia (PE) and in 1934 STANDER and CADDEN [9] first demonstrated a correlation between SUA concentration and the severity of PE. Since then numerous articles have been published which conclude that elevated uricemia in hypertensive pregnancies is associated with poor perinatal results.

The mechanism that produces this elevation of SUA concentration has not been clearly defined yet, but as SAGEN [6] and DUMONT [2] have suggested, it may result from increased blood lactate levels due to anaerobic metabolism of the uteroplacental unit. An increased SUA concentration may also be affected by impaired uric acid clearance caused by maternal hemoconcentration [4].

The aim of our study was to analyze the possible correlation between the highest levels of SUA observed in hypertensive pregnant patients during the third trimester of gestation, the severity of PE and the perinatal outcome.

2 Material and methods

Maximum concentrations of uricemia were selected in 215 hypertensive pregnant women during the third trimester of pregnancy. Of these 215 patients, 100 had mild PE, 25 had severe PE, 70 had essential hypertension (EH) and 20 had EH and superimposed PE (EH + PE). We categorized hypertension in pregnancy as mild in the range

Curriculum vitae

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140/159 torr systolic and 90/99 torr diastolic and as severe if blood pressure equalled or exceeded 160 torr systolic and 100 torr diastolic.

Mean uricemia and the occurrence of SUA levels of 6 mg% or higher were estimated for each group of patients. The results obtained were then correlated with perinatal results.

3 Results

Table I demonstrates mean SUA levels for each group. SUA values were significantly higher in patients with severe PE and with EH + PE when compared with the other groups.

Table I. Mean maximum uricemia values (mg%) during the third trimester of gestation in hypertensive pregnant women.

Preeclampsia		Hypertension	
Mild (N = 100)	Severe (N = 25)	Essential (N = 70)	Essential + preeclampsia (N = 20)
4.845 ± 1.34	6.22 ± 1.30	4.95 ± 1.22	6.091 ± 1.53
Analysis of variance p < 0.05		SP vs MP vs EH EH + PE vs MP vs EH } p < 0.05	

Table II. Occurrence of uricemia ≥ 6 mg% during the third trimester of gestation in hypertensive pregnant women.

Uricemia	Preeclampsia				Hypertension			
	Mild		Severe		Essential		Essential + preeclampsia	
	N	%	N	%	N	%	N	%
≥ 6	18	18	15	60	13	18.6	11	55
< 6	82	82	10	40	57	81.4	9	45
Total	100	100	25	100	70	100	20	100
χ ²	p < 0.05				MP vs SP vs EH + PE EH vs EH + PE } p < 0.05			

Table III. Uricemia in pregnancy hypertension: perinatal results

	Preeclampsia		Hypertension	
	Mild	Severe	Essential	Essential + preeclampsia
Mean gestational age at delivery (weeks)	39.03 ± 1.49	38.23 ± 3.06	39.51 ± 1.36	35.75 ± 3.49
Occurrence of low birth weight	12 (12%)	4 (16%)	6 (8.6%)	8 (40%)
Mean birth weight (g)	3,295 ± 515	3,080.4 ± 757	3,473.43 ± 580	2,149.5 ± 720
For occurrence of low birth weight = MP vs EH + PE p < 0.05 (χ ²) For mean birth weight and gestational age = MP vs SP vs EH + PE SP vs EH vs EH + PE } p < 0.05 analysis of variance EH vs EH + PE				

Table IV. Uricemia in pregnancy hypertension: its relation to low birth weight.

Uricemia	Preeclampsia		Hypertension	
	Mild	Severe	Essential	Essential + preeclampsia
≥ 6	3	2	1	4
< 6	9	2	5	4
Total	12	4	6	8

Independence test p < 0.05 N.S.

The proportion of patients with SUA concentrations of 6 mg% or higher was significantly greater in women with severe PE and with EH + PE than in those with mild PE and EH (table II).

Gestational age at delivery and mean birth weight were found to be significantly lower, and low birth weight for gestational age significantly higher, in the severe PE and EH + PE groups than in the remaining groups (table III).

When the patients in each of the groups were analyzed in terms of uricemia equal to or higher than 6 mg%, no correlation could be found between SUA levels and birth weight (table IV).

4 Discussion

REDMAN et al [5], FADEL et al [3] and VARMA [10] reported that SUA levels for PE patients were markedly elevated as compared with EH women, whose uricemia was in turn higher than in normal pregnant women.

Our study demonstrates that mean SUA concentration is significantly higher in severe PE (6.22 mg% \pm 1.30 mg%) and EH + PE patients (6.09 mg% \pm 1.53 mg%) than in mild PE (4.85 mg%

\pm 1.34 mg%) and EH patients (4.95 mg% \pm 1.22 mg%), where uricemia is higher than in normal pregnancy (3.99 mg% \pm 0.99 mg%) but still well below that in severe PE and EH + PE cases.

Several authors [1, 3, 4, 5, 6, 7, 10] have stated that hyperuricemia associated with a hypertensive pregnancy increases the incidence of intrauterine growth retardation, low birth weight and severe fetal distress.

VARMA [10] noted that in mild hypertension the prognosis for the fetus is affected. Our findings, when mean SUA levels and mean birth weight in all the groups were considered together, agreed with those reported by VARMA. When SUA levels and birth weight were studied within each group, no significant correlation was found. In our study, hyperuricemia was closely related to the severity of hypertension, and we did not find high SUA levels in women with mild hypertension.

We conclude that the determination of uric acid levels for the clinical screening of pregnancy complicated by hypertension is an easy and inexpensive method useful for the evaluation of perinatal results which are associated with the severity of the preeclamptic syndrome.

Summary

Maximum serum uric acid (SUA) levels during the third trimester of pregnancy were selected in 215 hypertensive pregnant women: 100 with mild preeclampsia (PE), 25 with severe PE, 70 with essential hypertension (EH) and 20 with EH with superimposed PE (EH + PE). The increase in SUA levels was statistically significant in women with severe PE (6.22 mg% \pm 1.30 mg%) and with EH + PE (6.09 mg% \pm 1.53 mg%) when compared with values in mild PE and EH women (4.85 mg% \pm 1.34 mg% and 4.95 mg% \pm 1.22 mg%, respectively).

Keywords: Clinical study, preeclampsia, uric acid levels.

Zusammenfassung

Der Harnsäurespiegel als brauchbarer Parameter für den Schweregrad einer Präeklampsie und seine prognostische Bedeutung

Bei 215 hypertonen Schwangeren im letzten Trimenon wurden die Maxima der Harnsäurespiegel in Beziehung zum Grad der Eklampsie gesetzt. Dabei lagen bei 100 Frauen eine leichte und bei 25 eine schwere Präeklampsie vor. 70 Frauen hatten eine essentielle Hypertonie und 20 eine essentielle Hypertonie mit Pfortpfegestose. Der Anstieg des Harnsäurespiegels war bei den Frauen mit

A significant decrease in average gestational age at delivery and a greater percentage of small-for-gestational age newborns were observed in women with severe PE and EH + PE, compared with patients with mild PE and EH. No correlation within the groups was found between SUA levels and fetal weight.

To conclude, the determination of SUA concentration for the clinical screening of a pregnancy complicated by hypertension is an easy and inexpensive method for the prediction of perinatal results associated with severe PE.

schwerer Präeklampsie sowie mit essentieller Hypertonie plus Pfortpfegestose signifikant (6.22 mg% \pm 1.30 mg% bzw. 6.09 mg% \pm 1.53 mg%). Bei den Frauen mit leichter Präeklampsie und essentieller Hypertonie betrug die Maxima 4.85 mg% \pm 1.34 mg% bzw. 4.95 mg% \pm 1.22 mg%. Bei schwerer Präeklampsie und essentieller Hypertonie plus Pfortpfegestose war das durchschnittliche Schwangerschaftsalter bei Entbindung geringer und der Prozentsatz der Small-for-date-Kinder größer als in den beiden anderen Gruppen. Innerhalb der Gruppen gab

es keine Korrelation zwischen Harnsäurespiegel und fetalem Gewicht.

Wir meinen, daß die Bestimmung der Harnsäure im Screening bei Schwangerschaften mit erhöhtem RR eine

einfache und billige Methode darstellt, um perinatale Probleme im Zusammenhang mit einer schweren Präeklampsie zu erkennen.

Schlüsselwörter: Harnsäurespiegel, klinische Studie, Präeklampsie.

Résumé

Taux d'acide urique: une donnée utile pour déterminer la sévérité du syndrome prééclampsique et du pronostic périnatal

On a choisi les taux maximum d'acide urique sérique pendant le troisième trimestre de la grossesse chez 215 femmes enceintes hypertendues. Parmi les 215, 100 avaient une pré-éclampsie (P.E.) légère, 25 avaient une P.E. sévère, 70 présentaient une hypertension essentielle (HE) et les autres 20: HE avec PE surajoutée (HE + PE). L'augmentation des taux d'acide urique a été statistiquement significative chez les femmes avec une PE sévère (6,22 mg% \pm 1,30 mg%) et chez les femmes avec HE + PE (6,09 mg% \pm 1,53 mg%), comparée avec les valeurs chez les femmes atteintes d'une PE légère et HE

(4,85 mg% \pm 1,34 mg% et 4,95 mg% \pm 1,22 mg% respectivement). Il a été observé une diminution remarquable de l'âge de gestation moyen au moment de l'accouchement, ainsi qu'une plus grande incidence de nouveaux-nés petits par leur âge de gestation chez les femmes souffrant d'une PE sévère et de HE + PE, en comparaison avec celles avec une PE légère et HE. Aucune corrélation n'a été trouvée entre les taux sériques d'acide urique et le poids fœtal dans tous les groupes. On en déduit que la détermination du taux d'acide urique pour l'étude clinique de la grossesse, compliquée d'hypertension, est une méthode facile et de coût faible pour prédire les résultats périnataux associés à la PE sévère.

Mots-clés: Acide urique, étude clinique, prééclampsie.

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