

URINARY NEPHRIN - BIOMARKER FOR PREDICTION OF PREECLAMPSIA

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Introduction

Preeclampsia is a multi-system disorder of pregnancy, which is characterized by new onset hypertension (systolic and diastolic blood pressure of ≥ 140 and 90 mm Hg, respectively, on two occasions, at least 6 hours apart) and proteinuria (protein excretion of ≥ 300 mg in a 24 h urine collection, or a dipstick of $\geq 2+$), that develop after 20 weeks of gestation in previously normotensive women. PE is one of the most common complication in pregnancy, affecting 5-7% of all pregnancies. Urinary excretion of podocyte cells and podocyte specific proteins such as nephrin suggesting that podocytopathy have a important role in pathogenesis of PE.

The aim of this study was to test the significance of urinary nephrin in prediction of PE.

Material and methods

In our study were enrolled 101 pregnant women. We divided all pregnant women into three groups: pregnant women with high risk of development of PE (women with high-risk pregnancy) $n=41$, pregnant women with PE $n=30$ and healthy pregnant women $n=30$, as a control group. Half of subjects into groups were in second trimester, half in third trimester of pregnancy. As material we used first morning urine and venous blood. Nephrin in urine was measured by immunoenzyme assay, microalbumin in urine was measured with turbidimetric method and urinary creatinine with photometric method. In blood sera, we measured a few standard biochemical parameters. Statistical analyses were perform using SPSS version 22.

Results

Table 1. Clinical characteristics of pregnant women

	Pregnant women with PE	Women with high risk pregnancy	Healthy pregnant women	p value
Age (years)	27.7 \pm 4.7	29.1 \pm 5.6	29.4 \pm 6.0	0.376
BMI (kg/m ²)	29.3 \pm 4.6	29.9 \pm 3.6	25.7 \pm 3.3	<10 ⁻³
Glucose (mmol/L)	5.2 \pm 0.5	5.9 \pm 1.2	4.6 \pm 0.5	<10 ⁻³
SBP mm/Hg	151.8 \pm 13.8	145.6 \pm 26.6	119 \pm 5.4	<10 ⁻³
DBP mm/Hg	95.1 \pm 7.4	90.1 \pm 13	77.3 \pm 6.0	<10 ⁻³
Total protein (g/L)	67.6 \pm 7.2	69 \pm 6.2	68.3 \pm 5.5	0.562
Albumin (g/L)	34.2 \pm 5.1	35.4 \pm 4.7	39.1 \pm 4.1	0.001
Urea (mmol/L)	5.5 \pm 1.2	6.3 \pm 2.3	5.0 \pm 1.9	0.045
Creatinine (μ mol/L)	70.7 \pm 9.2	69.4 \pm 11.9	56.8 \pm 4.6	<10 ⁻³
eGFR (ml min ⁻¹ 1.73 m ⁻²)	91.3 \pm 15.1	97.5 \pm 26.9	95.5 \pm 9.6	0.372
Nephrin in urine (ng/ml)	1846.7 \pm 1248.2	455.9 \pm 235.4	151.6 \pm 90.1	<10 ⁻³

BMI-body mass index, SBP-systolic blood pressure, DBP-diastolic blood pressure, eGFR-estimated glomerular filtration rate

Table 2. Comparison of concentration of urinary nephrin between pregnant woman with high risk and women with PE in second trimester (II) and in third trimester (III)

	Mean	SD	Median	p value
High risk women (II)	414	192	409	
PE women (II)	1850	1659	1711	<10 ⁻³
High risk women (III)	500	267	546	
PE women (III)	1845	980	2027	<10 ⁻³

Figure 1. Concentration of urinary nephrin between groups of pregnant women

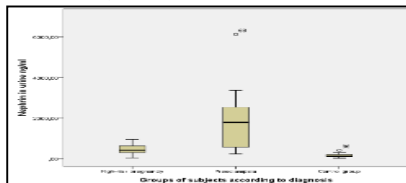


Figure 2. Percent of pregnant women with elevated nephrin in groups

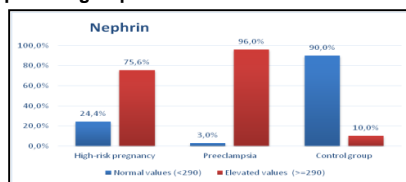


Figure 3. Correlation between urinary nephrin and eGFR ($r = -0.152$; $p=0.129$)

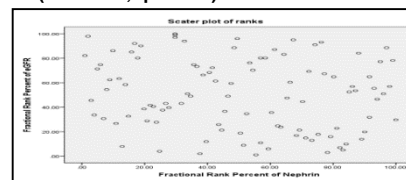


Figure 4. Correlation between urinary nephrin and gestational age ($r = 0.321$; $p=0.001$)

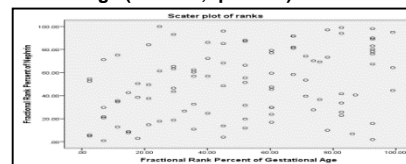
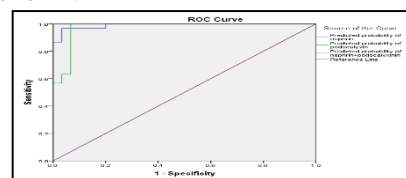


Figure 5. ROC Analysis for urinary nephrin in women with PE



Conclusions

Nephrin could be useful marker for prediction of preeclampsia, due to these findings:

- ✓ high percent of women with PE and women with high risk pregnancy with elevated levels of urinary nephrin,
- ✓ significant differences in concentration of urinary nephrin between groups of women and between groups of women in second and third trimester
- ✓ negative correlation between urinary nephrin concentration and eGFR and positive correlation between urinary nephrin and gestational age
- ✓ high sensitivity and specificity of nephrin and high predicted probability of urinary nephrin in pregnant women with PE.