Case Report

Abdelazim equation: For 24-h urine protein from spot urine sample in preeclampsia

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Abstract

Measurement of 24-h urine protein (UP) is the standard method for detection of proteinuria in preeclampsia (PE). A 24-h urine sampling is time-consuming, inconvenient, and delays the diagnosis of PE. A 29-year-old woman, previous cesarean section (CS), pregnant 37 weeks `+2 days, mild PE, and another 31-year-old woman, primipara, pregnant 34 weeks `+4 days, severe PE, were admitted for control of blood pressure and termination of pregnancy. Studied women were subjected to fetal well-being assessment, routine antenatal, and laboratory investigations to exclude chronic renal diseases, and for 24-h urine sampling. A spot mid-stream urine sample was obtained shortly before the 24-h urine sampling to measure the protein/creatinine (P/C) ratio. The first studied woman had normal serum creatinine and blood urea, 688 mg protein/24-h urine, 86 mg/dL spot UP, 178 mg/dL spot urine creatinine, and 0.48 P/C ratio. The second studied woman had also normal serum creatinine and blood urea, 1199 mg protein/24-h urine, 147 mg/dL spot UP, 133 mg/dL spot urine creatinine, and 1.11 spot P/C ratio. The spot urine sample was suggested by the National Kidney Foundation to detect and monitor proteinuria in adults. Moreover, the 24-h UP can be calculated from the following equation: 24-h UP in g = P/C ratio × 0.81 + 0.3 (Abdelazim equation) without 24-h urine sampling. This report suggests the use of Abdelazim equation (24-h UP in g = P/C ratio × 0.81 + 0.3) for detection of 24-h UP from spot urine sample in PE without 24-h urine sampling.

Keywords: 24-h, abdelazim, PE, protein, spot, urine

Introduction

Preeclampsia (PE) is associated with major fetal and maternal morbidity.[1,2] PE occurs in 2–10% of all pregnancies, and the incidence of PE is greater in developing countries compared to developed countries (1.3% in Africa vs. 0.5% in Europe and UK).[2,3] Ngwenya reported a 1.7% incidence of maternal mortality and 49.6% incidence of perinatal mortality following severe PE.[3] Proteinuria is a standard feature to diagnose PE and its severity.[4,5]

The 24-h urine protein (UP) is the standard method for detection of proteinuria in PE.[4] 24-h urine sampling is not always performed correctly, inconvenient, time-consuming, and thus delays the diagnosis of PE.[4]

A rapid and accurate test that enables prediction of proteinuria in PE would be valuable, and time-saving.[4] Demirci *et al.* concluded that the protein/creatinine (P/C) ratio is a good predictor for significant proteinuria in PE.[4]

Therefore, this report represents Abdelazim equation for detection of 24-h UP from spot urine sample in PE without 24-h urine sampling.

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Case Reports

A 29-year-old woman, previous cesarean section (CS), pregnant 37 weeks`$^{+2\ days}$, mild PE (blood pressure [BP] 150/100 mmHg, and +2 proteinuria by urine dipstick), and another 31-year-old woman, primipara, pregnant 34 weeks`$^{+4\ days}$, severe PE (BP 170/120 mmHg and +3 proteinuria by urine dipstick),[6] were admitted for control of blood pressure, and termination of pregnancy.

Studied women were subjected to fetal well-being assessment (cardiotocography, detailed fetal ultrasound, and umbilical artery Doppler), routine antenatal, and laboratory investigations to exclude chronic renal diseases, and for 24-h urine sampling.

The 24-h urine sampling started on the morning of the next day following hospital admission. Spot urine sample (first morning, mid-stream sample) was obtained before the 24-h urine sampling to measure the P/C ratio.

Urinary tract infection (UTI), microscopic bacteriuria, preexisting chronic renal diseases affecting the urine output (UOP), or UP and/or creatinine excretion were excluded before urine sampling.[4]

Studied women were advised to avoid >1-h heavy exercises and/or >24-h bed rest before or during the day of urine sampling.

Urinary proteins were measured by the Biuret colorimetric method (Cobas Integra Analyzer, Basel, Switzerland).[4] Urine creatinine was measured by the Jaffe test (Hitachi, Autoanalyzer, Japan).[4]

The first studied woman had normal serum creatinine (0.57 mg/dL), blood urea (8.8 mg/dL), 688 mg protein/24-h urine, 86 mg/dLspot UP, 178 mg/dL spot urine creatinine, and 0.48 P/C ratio.

The second studied woman had also normal serum creatinine (0.86 mg/dL), blood urea (11.7 mg/dL), 1199 mg protein/24-h urine, 147 mg/dL spot UP, 133 mg/dL spot urine creatinine, and 1.11 P/C ratio.

Both studied women delivered by CS after BP stabilization. The second studied woman was given dexamethasone[7,8] and $MgSO_4$ for induction of fetal lung, and brain maturity, respectively before the CS.[7] Both studied women had an uneventful postoperative hospital stay and discharged from the hospital in good general condition.

This report was approved for publication by the obstetrics and gynecology department's ethical committee and informed written consent taken from the studied women to publish their data in a case report.

Discussion

PE is defined as hypertension, and proteinuria developed after 20 weeks of pregnancy and regressed completely within 6 weeks after delivery.[2] Hypertension defined as BP ≥140/90 mmHg measured on ≥2 consecutive occasions (4 h apart).[2] Significant proteinuria is defined as >300 mg protein/24-h urine, after exclusion of UTI, microscopic bacteriuria, preexisting chronic renal diseases affecting the UOP, or UP and/or creatinine excretion.[4]

The gestational age calculated from the last menstrual period and confirmed by ultrasound done ≤20 weeks`.[9,10]

The first studied woman had normal serum creatinine and blood urea, 688 mg protein/24-h urine, 86 mg/dL spot UP, 178 mg/dL spot urine creatinine, and 0.48 P/C ratio. The second studied woman had also normal serum creatinine and blood urea, 1199 mg protein/24-h urine, 147 mg/dL spot UP, 133 mg/dL spot urine creatinine, and 1.11 spot P/C ratio.

UTI, microscopic bacteriuria, and preexisting chronic renal diseases affecting the UOP or UP and/or creatinine excretion were excluded before urine sampling.[4] In addition, studied women were advised to avoid >1-h heavy exercises and/or >24-h bed rest before or during the day of urine sampling.

Demirci *et al.* found the P/C ratio of 0.45 corresponds to 300 mg UP/24 h with 74.4 sensitivity, 94.2 specificity, 98.1 PPV, and 47.6 NPV, and the P/C ratio of >0.9 corresponds to 1,000 mg UP/24 h with 91% sensitivity, 95.4 specificity, 95.2 PPV, and 91.2 NPV.[4]

The spot urine samples were suggested by the National Kidney Foundation to detect and monitor proteinuria in adults.[11]

Moreover, 24-h urine sampling is not always performed correctly, inconvenient and time-consuming.[4] A rapid and accurate test that enables prediction of proteinuria in PE would be valuable, and time-saving. In addition, Morales *et al.* reported that the potential error in detecting proteinuria was similar when either spot urine or 24-h urine sample was collected.[12]

Moreover, the 24-h UP can be calculated from the following equation: 24-h UP in g = P/C ratio × 0.81 + 0.3 (Abdelazim equation) without 24-h urine sampling. P/C ratio = Spot UP mg/dL ÷ Spot urine creatinine mg/dL. UTI, bacteriuria on urine microscopy, preexisting chronic renal diseases affecting the UOP or UP, and/or creatinine excretion should be excluded before urine sampling. In addition, >1-h heavy exercises and/or >24-h bed should also be excluded before urine sampling.

Therefore, this report represents Abdelazim equation for detection of 24-h UP from spot urine sample in PE without 24-h urine sampling.

Conclusion

This report suggests the use of Abdelazim equation (24-h UP in g = P/C ratio × 0.81 + 0.3) for detection of 24-h UP from spot urine sample in PE without 24-h urine sampling.

Ethical approval

This report was approved for publication by the obstetrics and gynecology department ethical committee and informed written consent taken from the studied women to publish their data as a case report.

Acknowledgments

The author is grateful to the studied women, who agreed and gave consent to publish their data in this report.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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