Anil K Mandal, J Nephrol Ther 2014, 4:4
http://dx.doi.org/10.4172/2161-0959.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Nephrology & Therapeutics
June 26-27, 2014 Valencia Conference Centre, Valencia, Spain

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Can urine glucose substitute for finger-stick glucose in diabetes care?

Assay of urine glucose is painless and cheaper than finger-stick blood glucose. Validity of urine glucose assays to adjust diabetes therapy has not been widely studied. Our objective was to examine if urine glucose levels relate to blood glucose levels, thus substituting urine glucose for finger-stick blood glucose levels to adjust therapy. Average monthly cost in the US of urine glucose testing, $17.00, is significantly cheaper than finger-stick glucose testing, $78.00. Sixty-six diabetic patients were treated with Glargine insulin twice daily (12 h apart), and regular insulin with meals. Urine samples were collected and tested for glucose (UG) in the fasting state (FUG) and at 2-hour postprandial (2hPPUG), concurrently with blood samples [fasting blood glucose (FBG), 2hPP blood glucose (2hPPG) and fasting hemoglobin (Hgb) g/dL]. Serum creatinine (Scr, mg/dL) and estimated glomerular filtration rate (eGFR, ml/min) were obtained at both time periods (FScr, 2hPPScr and FeGFR, 2hPPeGFR, respectively). UG was determined by chemstrip IOUA (Roche) as 0 (negative), trace (50 mg/dL), 1+ (100 mg/dL), 2+ (250 mg/dL), 3+ (500 mg/dL), 4+ (≥1000 mg/dL). Correlation between parameters was determined using Spearman's nonparametric correlation. $P<0.05$ was considered significant. High correlation was found between FUG and FBG ($P<0.0001$, $r=0.4867$) but not between FUG and FScr or FeGFR ($P=0.8810$ and 0.2638; $r=-0.0193$ and 0.1441 respectively). There was high correlation between 2hPPUG and 2hPPG ($P<0.0001$, $r=0.5228$) but not between 2hPPUG and 2hPP Scr or 2hPPeGFR ($P=0.5002$ and 0.3376; r=--0.0911 and 0.1293, respectively). No correlation was found between fasting Hgb and FUG ($p=0.1816$, $r=0.1691$). These data suggest urine glucose levels are indicative of changes in fasting and 2h postprandial glucose. This association is independent of renal function.

Biography

Anil K Mandal is a native of India and a naturalized citizen of the United States. He is board certified in Internal Medicine and Nephrology (kidney disease and hypertension). He is an author of a dozen books and more than 100 published articles on research in diabetes and kidney disease. He is a two-time Fulbright Scholar and a visiting professor in 23 countries that invited him to lecture on diabetes, high blood pressure, and kidney diseases.

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