Tuesday, August 2, 9:30 am – 5:00 pm

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Graves disease: Patients with hyperthyroid status have a higher risk of developing type 2 diabetes

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Background. Graves’ disease (GD) is a multi-systemic autoimmune disorder caused by thyroid stimulating antibodies that bind to and activate the thyroid stimulating hormone (TSH) receptor on thyroid cells (TRAb). Common findings are low serum concentration of TSH, positive TRAbs, and high concentrations of anti-thyroid peroxidase antibodies (ATPO). In insulin-dependent diabetics, hyperthyroidism may aggravate glucose intolerance by multiple mechanisms, decreasing responsiveness to insulin. An association between type 1 diabetes mellitus (DM) and autoimmune thyroiditis (ATPO, TSH and insulin concentrations was determined in euthyroids (TSH = 1.10 to 9.00 µU/mL) and hyperthyroids (TSH between 0.01 and 0.44 µU/mL). TRAbs were measured by second generation thyrotropin-binding inhibitor immunoglobulin (TBII) assay (DiaMetra, Italy). The cut-off for positive TRAbs was 1.50 UI/L. ATPO, TSH and insulin concentrations were determined by chemiluminescent microparticle immunoassay (CMIA) using a Advia Centaur TRAbs was 1.50 UI/L. ATPO, TSH and insulin concentrations were determined by chemiluminescent microparticle immunoassay (CMIA) using a Advia Centaur

Results: In this study we found overall of 17% prevalence in DM cases with Thyroid disorders and amongst this, 11.76% with Primary Hypothyroidism, 76.48% with Sub clinical Hypothyroidism and 11.76% with Sub clinical hyperthyroidism. A statistical significant difference was noted between cases-DM and controls with respect to BMI (p<0.000), arm circumference (p<0.000), FT3 (p<0.004), TSH (p<0.000), FBS (p<0.000), PIP (p<0.000), HaA1C (p<0.000), TC (p<0.000), TG (p<0.005) and LDL (p=0.018) respectively. In this study, the mean±SD of FT3, FT4 and TSH in control and DM were found to be (2.43±0.64 and 2.67±0.93 with p-value 0.044), (1.06±0.27 and 1.15±0.31 with p-value 0.31) and (2.62±1.42 and 3.70±1.53 with p-value 0.00). Analysis between serum FT3, FT4 and TSH with respect to baseline characteristics and biochemical parameter of the study subjects showed negative significant correlation (p<0.05) between FT3 with region in DM, positive significant correlation between FT4 with Age in DM, positive significant correlation (p<0.05) between TSH with TC in DM.

Conclusion: This study confirms that thyroid dysfunctions is also common among Nepalese type II DM patients. Our study also reveal that prevalence of thyroid dysfunction is more common in type II DM. It is thus recommended that these group of population should be routinely screened for asymptomatic thyroid dysfunctions besides their usual treatment.

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Serum adiponectin levels in overweight and obese women; Discrimination between insulin resistance and abdominal obesity

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Introduction

Insulin resistance and abdominal obesity are both associated with lower serum adiponectin concentrations. Since insulin resistance and abdominal obesity are related, the extent to which the association of adiponectin with insulin resistance is dependent on its relationship with abdominal obesity is not clear. The present study investigated the association between insulin resistance and abdominal obesity in its relationship with serum adiponectin.

Methods

Eighty-eight overweight or obese women (BMI>23) in the age group 35-65 years were enrolled. Anthropometric measurements, blood pressure were recorded and a fasting blood sample was obtained for biochemical parameters. Insulin resistance (IR) was quantified by homeostasis model assessment of insulin resistance (HOMA-IR). Abdominal obesity was assessed by waist circumference (WC). Subjects were divided according to WC quartiles: Q1) WC < 89cm (n = 21); Q2) WC 89-96cm (n = 21); Q3) WC 97-102cm (n = 25); and Q4) WC > 102cm (n = 21) and on the basis of insulin resistance. Data were analysed by SPSS 16.0.
Validation of a new glycated serum protein assay on Siemens Vista analyzer


Introduction: Glycated Serum Protein (GSP) or fructosamine, estimates the average blood glucose over a 2-3 week period versus over a 3-4 months period for HbA1c. GSP may be used to monitor diabetes with hemoglobinopathies or have conditions that affect RBC (red blood cell) lifespan. HbA1c is falsely decreased when the RBC lifespan is less than 120 days, while GSP is not affected. Fructosamine assay is widely used as an alternate test for certain diabetes patients with hemoglobinopathies and for pregnant woman. However, most of the fructosamine assays that are currently in the market are nitro blue tetrazolium (NBT) based colorimetric assays and they suffer from a variety of interferences like vit-c, bilirubin, glutathione which lead to inaccurate results. These analytical issues led us to investigate for an alternate assay that could be adapted to our existing Siemens Vista analyzer.

Study Objectives: The objective of this study is to evaluate and validate a user-defined application protocol for glycated serum protein (GSP) assay from Stanbio Laboratory - an EKF Diagnostics company on Siemens Vista chemistry analyzer. In addition to the method validation, we also established the specimen stability and adult reference ranges for GSP.

Materials and Methods: GSP from Stanbio Laboratory was analyzed on Siemens Vista chemistry analyzer using open channel method. Performance of the assay was evaluated for inter and intra assay precision, accuracy, linearity, reference ranges and specimen stability.

Results and Discussion: In-run imprecision was 6.5% for control 1 (mean=264 µmol/L) and 3.7% for control 2 (mean=715 µmol/L). Between-run precision with 17 days were 4.2% (mean=267 µmol/L) and 2.5% (mean = 728µmol/L). Analytical measurement range was verified using 5 level calibrators and acceptable across the range (40-1185 µmol/L). Accuracy and recovery of the assay was acceptable with a mean recovery of 100.5% across the analytical measurement range (AMR). All values were considered acceptable. Comparisons between laboratory assay and vendor predicted assay on Stanbio Sirius clinical chemistry analyzer compared well (r-square=0.996, slope=1.0 and intercept=+1.49). Stability studies proved that samples stored at 2-4 °C are stable up to 7 days with no significant variations. Lab also verified (r-square=0.996, slope=1.0 and intercept=-1.49). Stability studies proved that samples stored at 2-4 °C groups, IR<2.5, IR>2.5, IR=2.5, IR=2.5-2.5, IR<2.5 and IR>2.5. Significance tests were performed using age, sex, HbA1c, race and hospital discipline to predict repeat testing within different time frames.

Conclusion: The user defined application for GSP assay enhances the versatility of the Vista system for specialized glycemic monitoring for a specific diabetic subpopulations where the patient has either a genetic variant of hemoglobin (hemoglobinopathy) or a condition or treatment that affects RBC turnover. Furthermore, this application provides laboratories with a simple, sensitive, fast, and convenient alternative glycemic monitoring test with no endogenous substance interference that are typically observed in NBT based colorimetric fructosamine assays.

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Free thyroid hormone measurements in pregnancy: Comparisons of immunoassays and mass spectrometry

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Background: Second trimester maternal thyroid deficiency has been associated with adverse neurological development in children and a high rate of subsequent permanent hypothyroidism in the mother (1). Accurate assessment of thyroid hormone concentrations during pregnancy is therefore essential. In pregnancy, measurement of free thyroxine (FT4) and free triiodothyronine (FT3) is complicated by increased binding protein levels. Ultrafiltration or equilibrium dialysis followed by tandem mass spectrometry (MS) is a recommended method for improved sensitivity of FT4 concentrations; however, these techniques are expensive and laborious. The present study compares multiple immunoassay methods for FT4 and FT3 with MS to determine suitability of automated assays for large population-based studies in pregnancy. Previously, MS results for FT4 and FT3 have been compared to a limited number of immunoassay methods.

Methods: Residual sera (n=60) for the comparative study were collected, aliquoted, and distributed by the Women and Infants (WHI) laboratory; TSH concentrations were within the reference interval (0.3-5.0 µIU/mL) in 50 samples, elevated in 8 samples, and low in 2. Ultrafiltration followed by liquid chromatography-tandem mass spectrometry was performed as previously described (2). Immunoassay platforms for FT4 and FT3 testing included the Abbott Architect i2000sa, Roche cobas e602, Beckman Coulter DxI, and Siemens Immulite 2000. Formal pairwise method comparisons were performed, after logarithmic transformation. This study was approved by the WHI IRB.

Results: Of the 60 samples, one failed MS quality control for FT4 (hypothyroid) and 18 for FT3 (14 euthyroid and 4 hypothyroid); 41 samples remained. FT4 correlations between the four immunoassays ranged between 0.82 and 0.93; correlations between MS and the four immunoassays, however, were lower (r values: 0.74, 0.74, 0.66, and 0.71 for Architect, cobas, DxI, and Immulite, respectively). Among the three samples with TSH elevations, all four immunoassays ordered the FT4 results the same as MS. FT3 correlations between the four immunoassays ranged between 0.46 and 0.89; correlations between MS and the immunoassays were low (r values: 0.27, 0.40, 0.37, and 0.18, respectively).

Conclusions: FT4 immunoassay measurements appear to be a reasonable surrogate for MS in pregnant euthyroid patients. Agreement between immunoassays for FT4 are high. MS was usable to reliably determine FT3 in 18 pregnancy samples, and agreement between the remaining 41 FT3 MS results with immunoassays was poor. Agreement was also poor between FT3 immunoassays. These results generate concern regarding the reliability and usefulness of FT3 assays in samples from pregnancy. The measurement of total T3 as an alternative to FT3 is currently under investigation.

Inappropriate Inpatient Hba1c Repeat Testing

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Background: There is presently much interest in reducing waste in health care. In laboratory medicine, unnecessary repeat testing is such a focus and Hba1c measurement with its known biological half-life and monitoring requirements is a good model test. This study examined the pattern of repeat Hba1c testing in inpatients at a 1400 bed general hospital in Singapore (note that Hba1c is not used for diagnosis of diabetes mellitus in Singapore). Methods: Anonymous details of all Hba1c testing (Beckman Coulter DxC-800 immuno/membranographic assay) for 2014 were extracted from the laboratory information system for analysis in Excel. Inappropriate repeat testing was defined as a retest interval < 60 days (Association of Clinical Biochemistry UK Minimum Retesting Interval guidelines). Logistic regression analysis was performed using age, sex, Hba1c, race and hospital discipline to predict repeat testing within different time frames. Results: There were 13875 tests (38 per day). 1152 (9%) were repeat samples (1012 duplicates, 127 triplicates, 13 quadruplicates). The cumulative distribution of the repeat tests was: 8.5% within 3 days of the initial test, 11.1% within 7 days, 13.7% within 14 days, 15.6% within 21 days, 18.3% within 30 days, 29% within 60 days and 42.9% within 90 days. The significant predictors...