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Novel non-invasive procedures for early detection of diabetes mellitus in community-based samples

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Objective: To standardize non-invasive methods for detection of diabetes mellitus, and to assess these for feasibility, acceptability and concordance with traditional laboratory measures, with the ultimate goal of validating these non-invasive methods as markers of health status for widespread, community use.

Design and Methods: One hundred and twenty-six adult patients with diagnosed Type 2 diabetes (DM) from the Penal Health Centre and 40 family members without previously diagnosed diabetes (NDM) completed a study visit at a centralized community location in Penal, Trinidad. Data collection included: interview-administered questionnaire, blood pressure, weight, height, waist circumference, urine and blood samples. Non-invasive markers used were: photos of skin pigmentation for Acanthosis nigricans and finger joint angles for limited joint mobility.

Results: Participants were 56 ± 14 years of age, 65.5% female and 74.7% East Indian. Body mass index (BMI) was 29.7 ± 6.7 for the DM group and 31.1 ± 9.1 for the NDM group. Urinary glucose correlated with elevated HbA_{1c} for the DM group. Skin hyperpigmentation increased $9.97\% − 23.6\%$ and $17.5 − 29.4\%$ for NDM and DM groups, respectively, with rising HbA_{1c} values from $< 6.5\%$ to $> 9\%$. Limited joint mobility was found in 22.9% of the sample. Compared with the DM group, the NDM group was less comfortable with the traditional invasive procedures; blood draws rated least comfortable. Overall, 75% of DM and NDM were very comfortable with non-invasive methods.

Conclusion: These non-invasive methods are more acceptable than blood draws to persons with DM and those at risk across the lifespan. Preliminary results show promising correlations between skin hyperpigmentation and HbA_{1c}.

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Cross-sectional evaluation of the Finnish Diabetes Risk Score as a screening tool for undetected Type 2 diabetes and dysglycaemia in Aruba

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Objective: To evaluate the performance of the Finnish Diabetes Risk Score (FINDRISC) questionnaire as a screening tool for undiagnosed Type 2 diabetes (T2D) and dysglycaemia in Aruba.

Design and Methods: We used data from the World Health Organization (WHO) STEPwise Approach to Surveillance of chronic disease and their risk factors (STEPS) conducted in Aruba in 2006. Among the total study population (n = 1565), fasting plasma glucose (FPG) test results were available for 646 (41.3%) participants from which FINDRISC questionnaire could be completed. Finnish Diabetes Risk Score performance was cross-sectionally evaluated using the area under the receiver operating characteristic (AUROC) curve method.

Results: Fasting plasma glucose revealed the presence of unknown T2D in 12 (1.9%), impaired fasting glucose (IFG) in 31 (4.8%) and dysglycaemia (T2D + IFG) in 43 (6.7%) participants. The mean risk-score was 9.5 ± 4.0 with a significant higher score ($p = 0.013$) for women (9.8 $\pm$ 3.9) *versus* men (9.0 ± 4.0). Women had significantly higher mean risk-scores than men ($p < 0.002$) for normal glycaemia (9.6 ± 3.9), dysglycaemia (12.8 ± 2.8), and T2D (13.1 ± 2.9). The AUROC curve for detecting unknown diabetes was 0.732 (95% CI: 0.587, 0.876). For any dysglycaemia, the AUROC curve was 0.686 (0.603, 0.770). The optimal cut-off values for detecting unknown T2D and any dysglycaemia were a FINDRISC greater or equal to 14 (50.5% sensitivity and 86.8% specificity) and 13 (53.5% sensitivity and 75.1% specificity), respectively. Of 1434 non-diabetic and age-adjusted participants, 8.8% will develop T2D within 10 years.

Conclusions: The FINDRISC questionnaire performed well as a screening tool for the cross-sectional detection of unknown T2D in the Aruban population.

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The association and diagnostic importance of NT-proBNP and hsCRP in Type 2 diabetics in Trinidad

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Objectives: To investigate the association and diagnostic importance of N-terminal pro-brain natriuretic peptide (NT-proBNP) and high sensitivity C-reactive protein (hsCRP) among Type 2 diabetic patients in Trinidad.

Design and Methods: This was a cross-sectional study that included 160 participants of which 67 were diabetic patients, selected from various clinics in Trinidad. Blood samples collected were analysed for NT-proBNP, hsCRP, fasting blood glucose, total serum cholesterol, triglyceride, high-density lipoproteins (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol and insulin.

Results: N-terminal pro-brain natriuretic peptide was found to be significantly different in the diabetic sample (128 ± 20.32) when compared to non-diabetics (70.13 ± 6.57; $p < 0.043$). In diabetic patients, both diastolic and systolic blood pressure significantly correlated with NT-proBNP ($p = 0.497$ and 0.287, respectively). Both systolic and diastolic blood pressures were found to be higher in diabetics and significantly correlated with hsCRP. Glucose was significantly correlated with hsCRP in diabetic patients ($R = 0.264$). Insulin was found to be significantly different in persons with high-levels of hsCRP.

Conclusion: Elevated NT-proBNP and hsCRP levels correlate with traditional risk factors for cardiovascular diseases among Type 2 diabetic patients and may be a useful diagnostic tool for those at risk for cardiovascular diseases.

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Minimal improvement in management of diabetes in primary care in Jamaica, over two decades: A clinical audit

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Objectives: To compare the quality of care received by patients with diabetes in public primary care clinics in Jamaica in 2012 to the care reported in 1995.

Design and Methods: An audit of patient records was conducted over six weeks in 2012 at six Type III Health Centres randomly selected from 22 eligible clinics in the South East Region of Jamaica.

Results: A total of 242 patient records were audited in 2012 compared with 185 in 1995. In 2012, 88% of patients were weighed within the last year compared with 43% in 1995. Documentation of advice given on physical activity increased from 1% to 60% and on dietary practices from 6% to 79%. No patient had done the HBA_{1c} test in 1995 compared to 38% of patients in 2012. In 1995, 66% had their blood glucose measured at a laboratory in the last year while in 2012, 60% had a laboratory test and 90% were tested at the clinic by glucometer. In 1995, sulphonylureas were used more often (88%) while in 2012 the metformin was more common. Blood pressure was well monitored in both time periods and control increased from 19% in 1995 to 41% in 2012. Poor glucose control was recorded among 61% of patients in 1995 compared to 68% in 2012.

Conclusions: Compared to the 1995 audit, there was no improvement in diabetes control among patients in public primary care clinics despite the dissemination of disease specific guidelines, the availability of newer medications and better monitoring.

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The association of age, gender, ethnicity, family history, obesity and hypertension with Type 2 diabetes mellitus in Trinidad

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Objective: To assess the impact of risk factors such as age, gender, ethnicity, family history, body mass index (BMI), waist circumference and hypertension, on the development of Type 2 diabetes mellitus (T2DM) in the Trinidadian population.

Methods: A cross-sectional case control study involving 146 non-diabetics and 147 Type 2 diabetics ≥ 18 years of age, from the North Central, South West and Eastern regions of Trinidad was done. All measurements were made using standardized procedures.

Results: Cross tabulations revealed a significant difference between T2DM and age ($p < 0.01$), and between T2DM and family history, ethnicity, waist circumference

and hypertension ($p < 0.05$). Logistic regression showed age to be the most influential risk factor. *Via t*-test, systolic blood pressure was statistically significantly different ($p < 0.05$), with non-diabetics and Type 2 diabetics having mean values of 130.6 ± 2.1 and 141.4 ± 2.3 mmHg, respectively. No significant difference was observed between T2DM and gender and BMI.

Conclusions: Age was the most significant risk factor for Type 2 diabetes. Additionally, family history, ethnicity, waist circumference and hypertension, but not BMI and gender, are significant risk factors for T2DM in the Trinidadian population.