

VOLUME 39, NUMBER 6
June 2022

ISSN 0189 - 160X

WAJM

WEST AFRICAN JOURNAL OF MEDICINE

ORIGINALITY AND EXCELLENCE IN MEDICINE AND SURGERY



OFFICIAL PUBLICATION OF
THE WEST AFRICAN COLLEGE OF PHYSICIANS *AND*
WEST AFRICAN COLLEGE OF SURGEONS



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Sex Hormone-Binding Globulin Level Enhances Prediction of Gestational Diabetes Mellitus in a Sub-Saharan African Population

Le Taux de Globuline Liant les Hormones Sexuelles Améliore la Prédiction du Diabète Gestationnel dans une Population d'Afrique sub-Saharienne

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ABSTRACT

BACKGROUND: The burden of Gestational Diabetes Mellitus (GDM) in the Sub-Saharan African region has been on the rise despite increased diagnosis and treatment. Current risk factor-based prediction approaches in the region lack strong predictive value, hence the need for effective early prediction and preventive interventions.

AIM: The aim of this study was to assess the diagnostic improvement in prediction of GDM by the addition of Sex Hormone-Binding Globulin (SHBG) assay to current approaches which assess early pregnancy maternal clinical risk factors in the study population.

METHODS: This was a multi-centre hospital-based prospective observational study carried out over a period of 18 months in which serum SHBG levels were assayed and maternal clinical risk factors for GDM evaluated in a cohort of 271 pregnant women at 9 to 16 weeks gestational age. These participants were subsequently tested for GDM using a diagnostic 75g oral glucose tolerance test (OGTT) at 24 to 28 weeks of gestation.

RESULTS: Clinical risk factor-based prediction approach had a diagnostic sensitivity of 59.6%, specificity of 69.4% and an area under the ROC curve of 0.758 (95% CI = 0.686, 0.830; $p < 0.001$). Following addition of SHBG assay to the maternal risk factors as predictors of GDM, the diagnostic sensitivity increased to 70.2%, specificity to 76.3% and there was a significant increase in the area under the ROC curve of 0.061 (95% CI = 0.006, 0.117; $p = 0.030$).

CONCLUSION: Current maternal clinical risk factor-based GDM prediction approach in early pregnancy lacks strong predictive value in the study population. Thus, addition of biochemical predictors like SHBG may improve early prediction of GDM and enable timely intervention. **WAJM 2022; 39(6): 580–587.**

Keywords: Gestational age, Gestational diabetes, Maternal clinical risk factors, Prediction, Sex Hormone-Binding Globulin (SHBG), Sub-Saharan Africa.

RÉSUMÉ

CONTEXTE: Le fardeau du diabète sucré gestationnel (DG) dans la région de l'Afrique subsaharienne est en augmentation malgré l'augmentation des diagnostics et des traitements. Les approches actuelles de prédiction basées sur les facteurs de risque dans la région ont des performances médiocres, d'où la nécessité d'une prédiction précoce efficace et d'une intervention préventive.

OBJECTIF: L'objectif de cette étude était d'évaluer l'amélioration diagnostique de la prédiction du DG par l'ajout du dosage de la globuline liant les hormones sexuelles (SHBG) à l'approche actuelle qui évalue les facteurs de risque cliniques maternels en début de grossesse dans la population étudiée.

METHODES: Il s'agissait d'une étude observationnelle prospective multicentrique en milieu hospitalier menée sur une période de 18 mois au cours de laquelle les taux sériques de SHBG ont été dosés et les facteurs de risque cliniques maternels de DG évalués dans une cohorte de 271 femmes enceintes de 9 à 16 semaines d'âge gestationnel. Ces participants ont ensuite été testés pour le DG à l'aide d'un test de diagnostic oral de tolérance au glucose (OGTT) de 75 g entre 24 et 28 semaines de gestation.

RESULTATS: L'approche de prédiction basée sur les facteurs de risque clinique avait une sensibilité diagnostique de 59.6 %, une spécificité de 69.4 % et une aire sous la courbe ROC de 0.758 (IC à 95 % = 0.686, 0.830 ; $p < 0.001$). Suite à l'ajout du test SHBG aux facteurs de risque maternels en tant que facteurs prédictifs de DG, la sensibilité diagnostique est passée à 70.2 %, la spécificité à 76.3 % et il y a eu une augmentation significative de l'aire sous la courbe ROC de 0.061 (IC à 95 % = 0.006, 0.117 ; $p = 0.030$).

CONCLUSION: L'approche actuelle de prédiction du DSG basée sur les facteurs de risque cliniques maternels en début de grossesse a de faibles performances dans la population étudiée. Ainsi, l'ajout de prédicteurs biochimiques comme SHBG peut améliorer la prédiction précoce du DG et permettre une intervention rapide. **WAJM 2022; 39(6): 580–587.**

Mots-clés: Âge gestationnel, Diabète gestationnel, Facteurs de risque cliniques maternels, Prédiction, Sex hormone-binding globulin (SHBG), Afrique subsaharienne.

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Abbreviations: AUC, Area Under the Curve; BMI, Body Mass Index; BSUTH, Benue State University Teaching Hospital; DM, Diabetes Mellitus; FMC, Federal Medical Centre; GDM, Gestational Diabetes Mellitus; IL-6, Interleukin 6; iNOS, Inducible Nitric Oxide Synthase; OGTT, Oral Glucose Tolerance Test; ROC, Receiver Operating Characteristic; SHBG, Sex Hormone-binding Globulin; T2DM, Type 2 Diabetes Mellitus.