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Article

Comparison of Point-of-Care Testing and Hospital-Based Methods in Screening for Potential Type 2 Diabetes Mellitus and Abnormal Glucose Regulation in a Dental Setting

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Abstract: This study aimed to compare the screening methods between point-of-care (POC) testing and hospital-based methods for potential type 2 DM and abnormal glucose regulation (AGR) in a dental setting. A total of 274 consecutive subjects who attended the Faculty of Dentistry, Mahidol University, Bangkok, Thailand, were selected. Demographic data were collected. HbA_{1c} was assessed using a finger prick blood sample and analyzed with a point-of-care (POC) testing machine (DCA Vantage®). Hyperglycemia was defined as POC $HbA_{1c} \geq 5.7\%$. Random blood glucose (RBG) was also evaluated using a glucometer (OneTouch® SelectSimple™) and hyperglycemia was defined as RBG $\geq$ 110 mg/dl or $\geq$140 mg/dl. The subjects were then sent for laboratory measurements for fasting plasma glucose (FPG) and HbA_{1c}. The prevalence of AGR (defined as FPG $\geq$ 100 mg/dl or laboratory $HbA_{1c} \geq 5.7\%$) and potential type 2 DM (defined as FPG $\geq$ 126 mg/dl or laboratory $HbA_{1c} \geq 6.5\%$) among subjects was calculated and receiver operating characteristic (ROC) analysis was performed using FPG and HbA_{1c} for the diagnosis of AGR and potential type 2 DM. The prevalence of hyperglycemia defined as POC $HbA_{1c} \geq 5.7\%$, RBG $\geq$ 110 mg/dl, and RBG $\geq$ 140 mg/dl was 49%, 63%, and 32%, respectively. After the evaluation using laboratory measurements, the prevalence of AGR was 25% and 17% using laboratory FPG and HbA_{1c} criteria, respectively. Based on the ROC curves, the performances of POC HbA_{1c} and RBG in predicting FPG-defined potential type 2 DM were high (AUC = 0.99; 95% CI 0.98–0.99 and AUC = 0.94; 95% CI 0.86–1.0, respectively) but lower in predicting AGR (AUC = 0.72; 95% CI 0.67–0.78 and AUC = 0.65; 95% CI 0.59–0.70, respectively). This study suggested that POC testing might be a potential tool for screening of subjects with potential type 2 DM in a dental setting.

Keywords: point-of-care testing; diabetes mellitus; prevalence; dental clinics; hyperglycemia; abnormal glucose regulation

1. Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by chronic hyperglycemia resulting from defects in insulin-producing cells, insulin action, or both [1]. The number of people aged $\geq$20 years estimated to have type 2 DM globally is predicted to increase from 171 million in 2000 to 366 million by 2030 [2]. Undiagnosed type 2 DM are major problems encountered all over the world, and microvascular and macrovascular complications can possibly exist even in patients with prediabetes who had chronic hyperglycemia without any symptoms [2]. According to the data from the Thai National Health Examination