ABSTRACT

Title of Abstract : AI-Driven Prediction of Cerebrovascular Risk in Type 2 Diabetes: A Foundation for the I-Stroke Tool
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Cerebrovascular disease (CeVD), encompassing ischemic and hemorrhagic stroke, remains the third leading cause of death in Malaysia and a major complication of Type 2 Diabetes Mellitus (T2DM). In 2019, Malaysia recorded 47,911 incident stroke cases and 19,928 related deaths. Traditional risk models such as the Framingham and UKPDS scores show moderate predictive capacity (C-index 0.60–0.71) but often underestimate CeVD risk among T2DM populations. With the escalating prevalence of T2DM, there is a critical need for an AI-driven, locally calibrated predictive tool. This review synthesizes current evidence to inform the foundation of Malaysia's AI-calibrated cerebrovascular risk scoring tool (I-Stroke).

This review aims to synthesize existing evidence on artificial intelligence (AI)–driven predictive models for cerebrovascular disease (CeVD) among patients with Type 2 Diabetes Mellitus (T2DM). The objective is to identify key predictors, methodological approaches, and model performance metrics that can inform the conceptual design of a localized AI-calibrated cerebrovascular risk scoring tool (I-Stroke) tailored for Malaysia's diabetic population.

A narrative synthesis approach was employed, revie…

The review identified consistent evidence that hypertension, dyslipidaemia, poor glycaemic control (HbA1c > 7%), longer diabetes duration, and coexisting comorbidities such as nephropathy and obesity are the strongest predictors of cerebrovascular disease (CeVD) among patients with Type 2 Diabetes Mellitus (T2DM). Traditional models like Framingham and UKPDS demonstrated moderate predictive performance (C-index 0.60–0.71), while AI-based models using algorithms such as Random Forest, Gradient Boosting, and Support Vector Machine achieved superior discrimination (AUC 0.75–0.84). Models integrating laboratory and demographic data outperformed clinical-only approaches. However, most existing studies lacked external validation and regional calibration, highlighting the need for a Malaysian-specific, AI-driven risk scoring tool such as the I-Stroke model.

AI-based predictive models demonstrate superior performance compared to traditional statistical tools in identifying cerebrovascular disease (CeVD) risk among patients with Type 2 Diabetes Mellitus (T2DM). The synthesis highlights key predictors including age, diabetes duration, HbA1c, hypertension, and dyslipidaemia. However, significant gaps remain in external validation and regional adaptation of existing models. These findings support the development of a Malaysian AI-calibrated cerebrovascular risk scoring tool (I-Stroke) to enhance early detection and guide preventive strategies aligned with the National Strategic Plan for Non-Communicable Diseases (NSP-NCD 2016–2025) and Sustainable Development Goal 3.4.

Keyword : Artificial Intelligence, Calibration, Cerebrovascular Disease, Risk Prediction, I-Stroke