Development and Validation of a Coronary Heart Disease Risk Score in Indian Type 2 Diabetes Mellitus Patients

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Abstract : Diabetes in India is growing at an alarming rate and the complications caused by it need to be controlled. Coronary heart disease (CHD) is one of the complications that will be discussed for prediction in this study. India has the second most number of diabetes patients in the world. To the best of our knowledge, there is no CHD risk score for Indian type 2 diabetes patients. Any form of CHD has been taken as the event of interest. A sample of 750 was determined and randomly collected from the Rajiv Gandhi Centre for Diabetes and Endocrinology, J.N.M.C., A.M.U., Aligarh, India. Collected variables include patients data such as sex, age, height, weight, body mass index (BMI), blood sugar fasting (BSF), post prandial sugar (PP), glycosylated haemoglobin (HbA1c), diastolic blood pressure (DBP), systolic blood pressure (SBP), smoking, alcohol habits, total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), physical activity, duration of diabetes, diet control, history of antihypertensive drug treatment, family history of diabetes, waist circumference, hip circumference, medications, central obesity and history of CHD. Predictive risk scores of CHD events are designed by cox proportional hazard regression. Model calibration and discrimination is assessed from Hosmer Lemeshow and area under receiver operating characteristic (ROC) curve. Overfitting and underfitting of the model is checked by applying regularization techniques and best method is selected between ridge, lasso and elastic net regression. Youden's index is used to choose the optimal cut off point from the scores. Five year probability of CHD is predicted by both survival function and Markov chain two state model and the better technique is concluded. The risk scores for CHD developed can be calculated by doctors and patients for self-control of diabetes. Furthermore, the five-year probabilities can be implemented as well to forecast and maintain the condition of patients.

Keywords : coronary heart disease, cox proportional hazard regression, ROC curve, type 2 diabetes Mellitus

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