World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:12, No:02, 2018

Identifying Diabetic Retinopathy Complication by Predictive Techniques in Indian Type 2 Diabetes Mellitus Patients

Authors : Faiz N. K. Yusufi, Aquil Ahmed, Jamal Ahmad

Abstract : Predicting the risk of diabetic retinopathy (DR) in Indian type 2 diabetes patients is immensely necessary. India, being the second largest country after China in terms of a number of diabetic patients, to the best of our knowledge not a single risk score for complications has ever been investigated. Diabetic retinopathy is a serious complication and is the topmost reason for visual impairment across countries. Any type or form of DR has been taken as the event of interest, be it mild, back, grade I, II, III, and IV DR. A sample 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 DR. Cox proportional hazard regression is used to design risk scores for the prediction of retinopathy. Model calibration and discrimination are assessed from Hosmer Lemeshow and area under receiver operating characteristic curve (ROC). Overfitting and underfitting of the model are checked by applying regularization techniques and best method is selected between ridge, lasso and elastic net regression. Optimal cut off point is chosen by Youden's index. Five-year probability of DR is predicted by both survival function, and Markov chain two state model and the better technique is concluded. The risk scores developed can be applied by doctors and patients themselves for self evaluation. Furthermore, the five-year probabilities can be applied as well to forecast and maintain the condition of patients. This provides immense benefit in real application of DR prediction in T2DM.

Keywords : Cox proportional hazard regression, diabetic retinopathy, ROC curve, type 2 diabetes mellitus
Conference Title : ICBBI 2018 : International Conference on Biostatistics and Medical Informatics
Conference Location : Dublin, Ireland
Conference Dates : February 15-16, 2018