QTc Interval Prolongation Impact on In-hospital Mortality in Acute Coronary Syndromes Patients using Artificial Intelligence and Machine Learning

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AIM:

To apply machine learning (ML) algorithms using QTc interval to predict in-hospital mortality in ACS patients and compare them to the conventional validated risk scores.

METHODS:

A retrospective supervised learning data mining study of a cohort of 500 patients admitted to a specialized cardiac center in Alexandria from September 2018 to August 2020 who presented with ACS. Prediction models for in-hospital mortality after ACS were developed using three ML algorithms, the ensemble learning Random Forest (RF), the Naive Bayes (NB) and the rule-based Projective Adaptive Resonance Theory (PART) models. Models were compared to each other and to the Global Registry of Acute Coronary Events (GRACE) and Thrombolysis In Myocardial Infarction (TIMI) scores.

RESULTS:

Out of the 500 patients included in our study, 164 (32.8%) patients presented with unstable angina, 148 (29.6%) patients with non-ST elevation myocardial infraction (NSTEMI) and 188 (37.6%) patients were having ST elevation myocardial infraction (STEMI). 64 (12.8%) patients died in hospital and the rest survived. Prediction models' performance was measured in an area under the receiver operating characteristic curve (AUC) ranged from 0.83 to 0.93 using all available variables compared to the GRACE score (0.8 SD 0.05) and the TIMI score (0.75 SD 0.02). Using QTc as a standalone variable yielded (0.67 SD 0.02) with a cut off value 450 using Bazett's formula, whereas using QTc in addition to other variables of personal and clinical data and other ECG variables the result was (0.8 SD 0.04)

CONCLUSION:

The proposed method can effectively predict patients at high risk of in- hospital mortality early in the setting of ACS using only clinical and ECG data. Prolonged QTc interval can be used as a risk predictor of in-hospital mortality in ACS patients.

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