A fuzzy logic based approach for the adjustment of insulin dosage for type 1 diabetes patients

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Abstract

The primary goal of this study is to calibrate the total daily insulin dosage for type 1 diabetes patients undergoing insulin treatment regimens using a fuzzy logic based system. Three patient-related factors (PRFs), i.e. patient weight, body mass index (BMI), and average daily carbohydrate intake were identified and limned as crucial to this study. Data was collected for these three PRFs for a sample of 25 arbitrary type 1 diabetes patients and was used to develop rules for a fuzzy-based system using MATLAB. This system then generated an output insulin dose which was in turn compared to the prescribed insulin doses recommended by the patients’ personal physicians. The fuzzy-based dosing system was observed to bring about better regulation to the insulin treatment regimen for a particular patient in comparison to the traditional non-fuzzy based methods which calculate total daily insulin dose based on each PRF separately. The upshot of the study was that this system suggested better control on patient blood glucose levels for type 1 diabetes patients just as it did in type 2 diabetes patients in a previous study conducted by this group. In this study, the utilization of a fuzzy-based system allows for fewer instances of hyper and hypoglycemic events among type 1 diabetes patients as was the case for type 2 diabetes patients in our previous study.