ABSTRACT

Bariatric surgery is an efficient treatment for the excess body weight in patients with severe obesity and resolving obesity-related comorbidities, including Type 2 Diabetes (T2D). Sleeve gastrectomy (SG) is the most common method among bariatric surgery procedures worldwide, including in Poland. SG is less complicated, safer, and delivers comparable weight-loss rates compared to other procedures. However, not all SG patients with T2D experience remission after surgery, so patient selection is valuable in clinic. Most prediction models were mainly built for procedures other than SG and used mainly clinical variables. There is increasing interest in using microRNAs (miRNAs) as biomarkers. Studies have shown differential changes of miRNA profile after bariatric surgery and associations between miRNA with weight loss after surgery. However, there are no studies so far on the predictive value of miRNA for T2D remission after bariatric surgery.

The aim of this doctoral dissertation is to profile pre-surgery serum miRNA from sleeve gastrectomy patients with T2D and develop prediction models using baseline clinical and miRNA data to predict T2D remission after surgery.

Before SG, clinical data and fasting serum samples were collected from 46 T2D patients. Serum miRNAs were profiled using the Serum/Plasma miRCURY LNA miRNA Focus PCR Panel (QIAGEN), and two patients were excluded due to sample hemolysis. Remission status was determined 12 months after SG. Six patients with unclear remission status were set aside for model evaluation. Model building was done with the remaining 38 patients. Variable selection was done using different approaches, including Least Absolute Shrinkage and Selection Operator (LASSO). LASSO was also used for model building. Prediction models were compared and then assessed in the validation set.

A total of 26 out of 38 patients achieved T2D remission 12 months after SG. The prediction model with only clinical variables misclassified two patients, which were correctly classified using miRNAs. Two miRNA-only models achieved an accuracy of one but performed poorly for the validation set. The best miRNA model was a mixed model (accuracy: 0.974) containing four miRNAs (hsa-miR-32-5p, hsa-miR-382-5p, hsa-miR-1-3p, and hsa-miR-21-5p) and four clinical variables (T2D medication, sex, age, and fasting blood glucose). These miRNAs are involved in pathways related to obesity and insulin resistance.

The results suggest that four serum miRNAs might be predictive biomarkers for T2D remission 12 months after SG, but further validation studies are needed.