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BMI and ratio of triglycerides to HDL are most predictive of insulin resistance in a drug naive population with type 2 diabetes

R. Patwardhan, X. Lin, A. Zambanini, S. Eslava and the ADOPT Study Group;
GlaxoSmithKline, King of Prussia, United States.

Background and aims: Insulin resistance (IR) is recognised as one of the key abnormalities contributing to the development of type 2 diabetes (T2D). Furthermore identifying IR in T2D patients may aid physicians in the selection of the most appropriate antidiabetic therapy. The aim of this analysis was to identify severe IR patients using easily assessed clinical parameters and insulin sensitivity (%S) as determined by the homeostatic model assessment (HOMA-S) in recently diagnosed ($\leq$ 3 years duration) drug-naive patients with T2D.

Methods: The clinical measures included were age, gender, race, blood pressure, serum triglycerides (TG), HDL-cholesterol, ratio of TG:HDL, waist-hip ratio, waist and hip circumference, and urinary albumin:creatinine ratio. These data were acquired from baseline data in drug-naïve T2D patients recruited into the ADOPT (A Diabetes Outcome Prevention Trial) study (n=4092). For predicting IR, four different methods were used: neural network, CART (Classification and Regression Tree), multiple linear regression and random forest.

Results: All statistical methods were congruent in identifying BMI and TG:HDL ratio as the two factors that consistently predicted incident Insulin Sensitivity with R^2 =0.26 (Table).

Importance Order	Neural Networks	CART	Linear Regression	Random Forest
1	BMI	BMI	BMI	BMI
2	TG:HDL	TG:HDL	TG:HDL	TG:HDL
3	Waist Cir.		Waist Cir.	Waist Cir.
4	Race		Gender	Hip Cir.

Furthermore, a simple algorithm that utilised BMI and TG:HDL ratio, was successful in predicting severe IR (defined as %HOMA-S <30) with a 75% sensitivity & 65% specificity in the following groups:

(i) Non-obese (BMI<29 kg/m^2) with TG:HDL ratio >8 or

(ii) Overweight or obese (BMI 29-35 kg/m^2) with TG:HDL ratio> 3 or

(iii) Severe obesity (BMI>35 kg/m^2) with any TG:HDL ratio

Conclusions: In a population of recently diagnosed patients with T2DM, BMI and TG:HDL ratio correlate most strongly with insulin resistance. A simple algorithm comprising of these two easily assessable clinical factors can be used to identify severe insulin resistance and could be of use to physicians for selecting the most appropriate treatment regimens for patients.