# TyG index correlation with surrogate measures of visceral obesity, insulin resistance and non-alcoholic fatty liver disease

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## Background and objective

Recently introduced as a surrogate marker of insulin resistance, TyG is intensely investigated as predictor of the metabolic syndrome and related pathologies, cardiovascular disease, non-alcoholic fatty liver disease, colon cancer, and even all cause mortality, in various populations.

Different formula use reported, heterogenous non-standardized cut-off values, foundation on highly variable parameters, and lack of validation limit evidence for its application.

Nonetheless, investigations are motivated by the potential it represents, especially in the primary care setting or epidemiological studies, as an inexpensive non-insulin based approach for risk stratification that may reflect lipo- and glucotoxicity, from a single sample and routinely performed assays.

## Method

We investigated Tyg calculated as ln[TG(mg/dl)xFG(mg/dl)/2] in relationship with conventional surrogate markers of insulin resistance (HOMA,QUICKI), visceral obesity (W,WHR) and non-alcoholic fatty liver disease (FLI), in 223 IDF criteria-diagnosed metabolic syndrome patients and healthy controls of 58.55+/-11.9ys from central Romania.

## Results

In the control and patient group, TyG differed significantly (8.66+/-0.63 vs 9.25+/-0.65, p<0.0001), and correlated with all fasting insulin/glucose-based estimates of insulin resistance and the fatty liver index calculated where liver disorder of other known etiology was excluded.

Demographic and metabolic characterization of the study groups

| | MS+ | MS- |
|---|---|---|
| Males/Females (%)* | 43.64/56.36 | 43.94/56.06 |
| Body Mass Index (kg/m$^2$)** | | |
| • Males | 30.62±4.8 | 25.52±5.12 |
| • Females | 31.04±5.76 | 25.57±4.39 |
| Waist Circumference (cm)** | | |
| • Males | 107.79±12.95 | 94.37±13.65 |
| • Females | 94.06±13.64 | 85.09±11.58 |
| Systolic Blood Pressure (mmHg)** | 145.07±22.69 | 125±15.56 |
| Diastolic Blood Pressure (mmHg)** | 85.97±13.08 | 78.12±11.6 |
| Fasting Glucose (mg/dL)** | 120.8±41.8 | 94.79±11.03 |
| Triglyceride (mg/dL)** | 213.39±135.12 | 137.18±78.02 |
| HDL-Cholesterol (mg/dL)** | | |
| • Males | 46.95±14.89 | 49.87±11.86 |
| • Females | 49.9±17.54 | 62.16±16.67 |
| Total Cholesterol*** | 209.39±53.08 | 205.95±41.55 |

*p>0.05; **p<0.01; ***p<0.05

TyG correlation with metabolic parameters*

| | MS+ | | MS- | |
|---|---|---|---|---|
| | r | p | r | P |
| Waist circumference | 0.22 | 0.005 | 0.32 | 0.05 |
| Total cholesterol | 0.22 | 0.006 | 0.461 | 0.002 |
| HOMA-IR | 0.397 | 0.002 | 0.436 | 0.02 |
| IRI (1/QUICKI) | 0.36 | 0.0001 | 0.42 | 0.02 |
| IR | 0.4 | 0.04 | 0.486 | 0.009 |
| FLI | 0.47 | 0.0001 | 0.56 | 0.007 |

*Pearson correlation

## Conclusion

In our middle-aged study population, TyG correlated moderately but significantly and consistently with surrogate markers of insulin resistance and non-alcoholic fatty liver disease, both in presence but especially absence of the metabolic syndrome.

Investigation by methods considered gold standards could bring valuable information necessary for clarification of clinical utility and standardization.