Ceramide risk score in the evaluation of metabolic syndrome: an additional or substitutive biochemical marker in the clinical practice?

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Ceramide risk score (CERT1, ceramide test 1), based on specific ceramides (Cers) and their corresponding ratios in the plasma, has been reported as a promising biochemical marker for primary and secondary prediction of cardiovascular disease (CVD) risk in different populations of patients. Thus far, limited attention has been paid to metabolic syndrome, a condition considered at high CVD risk. The aim of the present study was to evaluate CERT1 in a group of obese subjects without (OB-MetS-) and with (OB-MetS+) metabolic syndrome (according to the International Diabetes Federation (IDF) diagnostic criteria), compared to an age- and sex-matched normal-weight (NW) group. In all participants, plasma levels of Cer 16:0, Cer 18:0, Cer 24:1, and Cer 24:0 were measured, and the corresponding ratios Cer 16:0/24:0, Cer 18:0/24:0, and Cer 24:1/24:0 were calculated together with CERT1. Subjects with obesity showed higher CERT1 values than the NW group ($p < 0.05$), with no difference between OB-MetS- and OB-MetS+ groups. Waist circumference (WC), homeostatic model assessment of insulin-resistance (HOMA-IR) (surrogates of IDF diagnostic criteria for metabolic syndrome), and C reactive protein (CRP) (a marker of inflammation) were predictors of CERT1 ($p < 0.05$), with the contribution of the other IDF criteria such as arterial hypertension and dyslipidemia being negligible. Adjustment for WC resulted in a loss of the difference in CERT1 between OB-MetS- and NW subjects, with the combination of WC and HOMA-IR or CRP as covariates being necessary to yield the same effect for the difference in CERT1 between OB-MetS+ and NW subjects. Importantly, an association was found between CERT1 and vascular age (VA) ($p < 0.05$). Proportions of NW, OB-MetS- and OB-MetS+ subjects appeared to be distributed according to the CERT1-based risk groups (i.e., low, moderate, increased, and high risk; $p < 0.05$), with some OB-MetS- subjects included in the increased/high-risk group and some OB-MetS+ in the low/moderate-risk one. In conclusion, the clinical diagnosis of metabolic syndrome seems to be inaccurate to assess CVD risk in the obese population; however, further studies are needed before considering CERT1 as an additional or substitutive biochemical marker in clinical practice.