Fat Distribution and Differential Effects on Metabolic Liver Fat Infiltration in Young Mexicans in Reynosa, Mexico: A Collaborative Study across the U.S.-Mexico Border

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Metabolic-associated fatty liver disease (MAFLD) is a descriptive term for NAFLD (Non-alcoholic) physiopathology associated with obesity. The age of onset linked to body fat distribution is poorly studied. Therefore, we aimed to assess the body fat effect on liver fat infiltration and stiffness (LSt) mediated by insulin resistance (IR).

After obtaining informed consent, five hundred freshmen from two universities in Reynosa, Mexico (UMAN & UAT) were enrolled in the study. They completed a questionnaire focused on familial cardiometabolic risk and provided anthropometric measurements. In a subset of N=200, we obtained blood samples for biochemical measurements, body fat percentage (BF%) by bioimpedance, LSt (kPa), and fat infiltration (Continued Attenuation Parameter, CAP) by elastography. We used mediation analysis with structural equation models (Stata v16.1) to determine the relationship between BMI, BF%, and abdominal obesity with IR and liver stiffness and fat infiltration. The term "->" means 'explain' or 'cause'.

We found that AO->IR (standardized values b=0.53, p=0.005), AO->CAP (b=0.69, p<0.001) and CAP->IR (b=0.23, p=0.007). BMI did not have an effect on CAP or IR. Also, BMI->LS (b=0.47, p=0.05) but AO->LS was absent. Finally, there was a bidirectional relationship between LS and IR [LS->IR (b=0.18, p=0.001), and IR->LS (b=0.27, p=0.001)].

Our findings suggest the adipose tissue measured as AO or BMI showed different phenotypic effects on liver fat infiltration or stiffness. Visceral fat had a direct effect on IR, meanwhile, subcutaneous adipose tissue was associated with liver stiffness. Our findings suggest that early age interventions should be focused on reducing visceral fat deposition.