Visceral adiposity, anthropometric and liver function indexes for identifying metabolic dysfunction associated steatotic liver disease (MASLD) in adolescents with obesity: which performs better?

L. Mari, S. Lazzer, A. Gatti, M. D'Alleva, S. Zaccaron, J. Stafuzza, E. Rejc, M. Vandoni, A. Bondesan, D. Caroli, F. Frigerio, L. Abbruzzese, E. Ventura, A. Sartorio

Journal of Clinical Medicine 14: 2085, 2025.

Background: Metabolic Dysfunction Associated Steatotic Liver Disease (MASLD) is the accumulation of fat in the liver without excessive alcohol consumption or other known liver diseases. MASLD is the most common liver disease in adolescents with obesity. The aims of this study were as follows: (i) to determine which index (waist circumference BMI, WHtR, VAI, METS-IR, METS-VF, HSI, FLI, or MetS_zscore) best explains the prevalence of MASLD in adolescents with obesity; (ii) to determine whether there was a specific index that was most strongly associated with MASLD; (iii) to assess which liver function indexes were most strongly correlated with MASLD.

Methods: A total of 758 adolescents with severe obesity (BMI z-score > 2) admitted at the Division of Auxology, Istituto Auxologico Italiano, IRCCS, Piancavallo-Verbania for a 3-week multidisciplinary body weight reduction program were selected. Anthropometric parameters (stature, body mass, BMI, and waist and hip circumference) were collected, and body composition (lean and fat mass) was determined using the tetrapolar bioimpedance analysis (BIA) technique. Aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl transferase (gamma GT), alkaline phosphatase (ALP), bilirubin, glucose, total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), very lowdensity lipoprotein cholesterol (VLDL-C), triglycerides (TG), and C-reactive protein (CRP) were measured using standard techniques. MASLD was diagnosed based on abdominal ultrasound results.

Results: WHtR (65.76%) was the most sensitive compared with other indexes. The HSI (AUC: 0.67 (0.63-0.71, 95% CI), *p*-value < 0.05) showed the best performance in predicting MASLD, with the threshold for having MASLD considered at 48.22. The indexes that showed the worst performance in predicting MASLD were the MetS z-score (AUC: 0.56 (0.52-0.60)) and the VAI (AUC: 0.57 (0.52-0.61)). ALT (OR: 2.92 (2.29-3.77); 95% CI) and AST (OR: 2.52 (2.03-3.20)) were the parameters with a stronger correlation with MASLD.

Conclusions: The most sensitive index for diagnosing MASLD was the WHtR, based exclusively on anthropometric parameters. HSI was the index that correlated the most with MASLD, while the parameters of liver function (ALT and AST) were the most strongly correlated with the disease and its severity.

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