Detection of Cardiomyopathy in Egyptian Children and Adolescents with Longstanding Obesity using cardiac marker NT-pro PNB and Speckled Tracking Echocardiography

Mona Hafez a, Noha Musa a, Fatma Elmouse b, Antoine Fahery c, Halaa Elshennawy a

a Department of Cardiology, Cairo University, Egypt
b Department of Pediatric Cardiology, Cairo University, Egypt
c Department of Endocrinology and Metabolism Pediatric Unit, Cairo University, Egypt

Abstract

Background
Obesity is considered a major risk factor for developing cardiovascular morbidity and mortality. Obesity affects the structure and function of the heart mainly by causing increased blood volume, elevated cardiac output, left ventricular (LV) hypertrophy, and LV diastolic dysfunction. All of which can play a role in causing heart failure.

Objective
This cross-sectional study aimed to evaluate the effect of longstanding obesity on cardiac functions resulting in cardiomyopathy, to correlate the level of plasma NT-pro BNP biomarker to echocardiographic findings and to compare these values to apparently healthy normal controls.

Methods
A total of 80 obese children and adolescents above 8 years old with long standing obesity were included in the study. Patients with original cardiac disease or concomitant illness affecting the heart, those on medications known to affect cardiac functions and/or cases with syndromic obesity were excluded from the study. Study group were subjected to full history taking including age, sex, birth weight, onset of obesity, dietary habits, exercise habits, cardiac manifestations (palpitation, chest pain, dyspepsia, easy fatiguability, etc), family history of diabetes, hypertension or cardiac diseases. Thorough physical examination was done including anthropometry, blood pressure (BP) assessment as well as detailed cardiac examination. Biochemical evaluation included fasting lipid profile, HbA1c as well as the cardiac biomarker NT-pro BNP. Echocardiographic evaluation of the study group included conventional echo-doppler measures, tissue velocity imaging (TVI) measure and 3D speckle tracking echocardiography (STE). Study population were compared to 40 non-obese healthy age and sex matched controls regarding NT-pro BNP level, tissue velocity imaging and speckle tracking echocardiography findings.

Results
The study showed statistically significant difference between cases and controls regarding plasma NT-Pro BNP and echocardiographic findings (tricuspid annular E'/A’, left ventricular e/e’, left ventricular GLS) (p <0.001). Regarding echocardiography, 90% had LV systolic dysfunction, 67% had RV diastolic dysfunction and 100% had LV diastolic dysfunction within the study group. A statistically significant positive correlation was found between plasma levels of NT-pro BNP and ventricular dysfunction (GLS) (p=0.001, r=0.888). ROC curve showed that plasma NT-pro BNP level had a sensitivity of 84.7% and specificity of 87.5% in the diagnosis of cardiomyopathy using GLS as an echocardiographic parameter.

Conclusion
Longstanding obesity was associated with cardiomyopathy as evidenced by elevated levels of NT-proBNP and speckle tracking echocardiography (impaired ventricular systolic and diastolic functions). NT-pro BNP levels correlated significantly with LV systolic dysfunction.

Bibliography

4. Authors declare no conflict of interest