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Evaluation of cardiac functions in the children with type 1 diabetes mellitus

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Introduction: Several studies have pointed out the existence of cardiac dysfunction in patients with type 1 diabetes mellitus (DM) even in the absence of ischemic, valvular or hypertensive heart disease. The purpose of this study is aimed to evaluate cardiac dysfunction and the relationship between severity of disease and degree of cardiac dysfunction in children with type 1 DM.

Methods: In this prospective study, 31 patients with type 1 DM and sex- and age-matched 33 healthy children were evaluated with conventional and tissue Doppler echocardiography. A correlation was examined between cardiac functions and HbA1C.

Results: According to conventional echocardiography, all parameters reflecting cardiac functions did not differ between patients with type 1 DM and healthy children. However, in tissue Doppler echocardiography, mitral valve early diastolic annular peak flow rate (E'), mitral valve systolic flow rate (S'), ratio of mitral valve early diastolic peak flow rate to mitral valve early diastolic annular peak flow rate (E/E'), and left ventricle myocardial performance index (MPI) were found higher and left ventricle ejection time (ET) was found shorter in patients with type 1 DM ($p<0.05$). In addition, tricuspid valve E' and right ventricle MPI were found higher, right ventricle ET and tricuspid E/E' were found lower in patients with type 1 DM compared to healthy children ($p<0.05$) by tissue Doppler echocardiography. It was shown that mitral E', tricuspid E', and right ventricle ET had a positive correlation with HbA1C level in patients with type 1 DM.

Conclusions: This study showed that although there was no difference between patients with type 1 DM and healthy children by conventional echocardiography, tissue Doppler echocardiography showed dysfunctions of both ventricles. This influence was closely related with the control degree of blood glucose level. These findings signify the diagnostic value of tissue Doppler echocardiography in the early detection of cardiac effects among patients with type 1 DM.

Key words: cardiac function; children; tissue Doppler echocardiography; type 1 diabetes mellitus.