

Prevention of diabetic cardiomyopathy in pediatrics

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Background

The development of Diabetic cardiomyopathy (DCM) is multifactorial and several pathophysiologic mechanisms have been proposed to explain structural and functional changes associated with DCM. α -lipoic acid (ALA) a powerful antioxidant may have a protective role in diabetic cardiac dysfunction

Aim of the work:

This study aimed to assess the potential role of oxidative stress, inflammatory cytokines, apoptosis and fibrosis in diabetic cardiac insult. It also investigated the possible protective role of α -lipoic acid on diabetic left ventricular (LV) dysfunction in type 1 diabetic children and adolescents

Subjects & Methods:

30 patients were randomized to receive insulin treatment (n=15) or insulin plus α -lipoic acid 300 mg twice daily (n=15). Age and sex matched healthy control children and adolescents (n=15) were also included. Patients were evaluated with conventional 2-dimensional echocardiographic examination (2D), pulsed tissue Doppler (PTD), and 2-dimensional longitudinal strain echocardiography (2DS) before and after therapy. 3D strain (longitudinal, circumferential, area and radial strain) were estimated. Plasma level of glutathione, malondialdehyde (MDA), nitric oxide, tumor necrosis factor- α (TNF- α), Fas Ligand (Fas-L), matrix metalloproteinase-2 (MMP-2) and troponin-I were determined before and after treatment

Results:

Diabetic patients had significant lower level of glutathione and significant higher levels of malondialdehyde (MDA), nitric oxide, tumor necrosis factor- α (TNF- α), Fas Ligand (Fas-L), matrix metalloproteinase-2 (MMP-2) and troponin-I than control subjects. Increased expression of transforming growth factor- β (TGF- β) mRNA in peripheral blood mononuclear cells was also observed in diabetic patients. 2D global longitudinal strain and 3D longitudinal, circumferential and area strain were significantly decreased in diabetic children. α -lipoic acid

significantly increased glutathione level and significantly decreased MDA, nitric oxide, TNF- α , Fas L, MMP-2, troponin I levels and TGF- β gene expression levels. Moreover, α -lipoic acid significantly increased mitral e/a ratio, ventricular global peak systolic strain in diabetic patients. There were significant negative correlation between Global peak systolic strain (G) and glutathione and significant positive correlations between G and MDA, NO, TNF- α and Fas-L. In addition, a significant positive correlation between e/a ratio and glutathione (r=0.515) and significant negative correlations between e/a and MDA, NO, TNF- α and Fas-L were also observed.

Conclusion:

These data suggest that oxidative stress, inflammatory cytokines such as TNF- α , apoptosis and fibrosis play a role in the development of diabetic cardiac dysfunction and that α -lipoic acid may have a beneficial role in the management of type 1 diabetic patients as a cardioprotective therapy and prevention of development of diabetic cardiomyopathy.

Biography

Osama A Tolba El Razaky had completed MD Pediatrics from Tanta University. He has obtained Post-doctoral studies in cardiac deformation. He is a Head of Egyptian Pediatric Cardiology Association and a member of Egyptian Universities promotion committee (Professor of Pediatrics). He is currently a Professor of Pediatric (Cardiology Unit) in Tanta University. He has published 20 papers in international journals and has been serving as a Reviewer for Acta Pediatric. He was a supervisor of 100 MS and 25 MD theses in Pediatrics. He is working as echographer in Pediatrics since 25 years. His main interest is TDI, STI and 3D Strain.