Association between e-NOS gene Polymorphisms and Cardiac Anomaly in Children with Down Syndrome

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Background: Down syndrome (DS) is a genetic disorder that results in extra genetic material from chromosome 21 and seen in patients with congenital heart defects (CHD). Approximately 40%-50% of patients with Down syndrome have a heart defect. CHD affects 6–8 babies in every 1000 live births and connect to fetal loss. It was reported that the frequencies of CHD were ranging from 16-65% in DS.

The gene which encoding the endothelial isoform of nitric oxide synthase (eNOS) is placed in the long arm of chromosome 7 and includes 26 exons spanning 21 kb of genomic DNA. Nitric oxide (NO) is synthesized from L-arginine by eNOS. To the best of our knowledge there is no study to determine the relation between CHD and eNOS polymorphisms in DS cases. So, we aim to investigate the relationship between eNOS polymorphisms (exon 894 G/T, promoter -786T/C and intron G10T) and cardiac lesions to determine whether this polymorphism was associated with CHD in cases with DS.

Material and Methods: 50 DS cases (22 girls and 28 boys) were included in the current study. The study was confirmed by local ethics committee. In all participants, trans-thoracic M-mode, two-dimensional, pulsed-wave, continuous-wave and color Doppler echocardiographic examinations were performed using a General Electric Vingmed Vivid 7 (GE Vingmed Ultrasound AS, Horten, Norway) using 2.5–3.5MHz transducers. Blood samples were collected in tubes containing ethylenediamine tetra-acetic acid (EDTA) and total DNA was isolated via phenol-chloroform extraction methods. The genomic DNA. Nitric oxide (NO) is synthesized from L-arginine by eNOS. To the best of our knowledge there is no study to determine the relation between CHD and eNOS polymorphisms in DS cases. So, we aim to investigate the relationship between eNOS polymorphisms (exon 894 G/T, promoter -786T/C and intron G10T) and cardiac lesions to determine whether this polymorphism was associated with CHD in cases with DS.

Results: eNOS single nucleotide polymorphisms (SNPs) were detected by PCR-RFLP methods. Blood samples were collected in tubes containing ethylenediamine tetra-acetic acid (EDTA) and total DNA was isolated via phenol-chloroform extraction methods. The eNOS promoter -786T/C polymorphism (p<0.001) was significantly lower in the obese than in the non-obese group. FMD values were significantly lower, whereas cIMT values were significantly higher in obesity than in non-obese subjects. FMD negatively correlated with WC, BMI-Z score, serum insulin level, HOMA, systolic BP, total cholesterol, low density lipoprotein (LDL) cholesterol concentration was significantly lower in the obese than in the non-obese group. FMD values were significantly lower, whereas cIMT values were significantly higher in obesity than in non-obese subjects. FMD negatively correlated with WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride but positively with HDL-cholesterol. cIMT positively correlated with WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride but negatively with HDL-cholesterol.

Conclusions: Increased WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride and decreased HDL-cholesterol in obese children contribute to endothelial dysfunction and early subclinical atherosclerosis compared to their normal weight peers.

Echocardiography

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Effect of Obesity on Endothelial Function and Subclinical Atherosclerosis in Children

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Backgrounds: We aimed to measure flow-mediated dilation (FMD), carotid intima-media thickness (cIMT), and to evaluate the effects of waist circumference (WC), and body mass index Z (BMI-Z) score on these parameters in obese children.

Methods: This case-control cross-sectional study included 70 obese and 40 non-obese children aged 7-14 years who presented with various complaints and had no concomitant diseases. FMD and cIMT were measured in all subjects and correlated with anthropometric and biochemical factors.

Results: WC, BMI-Z score, systolic and diastolic blood pressure (BP), triglyceride (TG) and insulin concentrations, and homeostatic model assessment (HOMA) index were significantly higher, whereas high density lipoprotein (HDL) cholesterol concentration was significantly lower in the obese than in the non-obese group. FMD values were significantly lower, whereas cIMT values were significantly higher in obesity than in non-obese subjects. FMD negatively correlated with WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride but positively with HDL-cholesterol. cIMT positively correlated with WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride but negatively with HDL-cholesterol.

Conclusions: Increased WC, BMI-Z score, serum insulin level, HOMA, systolic BP, triglyceride and decreased HDL-cholesterol in obese children contribute to endothelial dysfunction and early subclinical atherosclerosis compared to their normal weight peers.