Background

Currently no data are available for the effects of ketogenic diet on the development of atherosclerosis and/or cardiovascular disease. The aim of this prospective study is to investigate the effect of a 6-month-long ketogenic diet on carotid intima-media thickness, carotid artery, and aortic vascular functions.

Materials and Methods

Twenty-three drug resistant epileptic patients who were treated with ketogenic diet at the pediatric neurology clinic were enrolled in this prospective study. Fasting total cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglycerides, total cholesterol and glucose concentrations were measured and echocardiography was performed in all patients before the beginning of ketogenic diet and after the sixth month of treatment. Carotid intima-media thickness and aortic/carotid diameter at systole and diastole were measured after conventional echocardiographic examination. Aortic strain, aortic distensibility, aortic stiffness index and aortic elastic modulus were calculated using the current formulas.

All children were started on a standardized 3:1 ketogenic diet with a non-fasting gradual initiation protocol. During the diet’s initiation, patients were closely monitored for any acute adverse effects for the first week, and blood glucose and ketones were measured twice daily. The recipes were planned in-house and calculated considering the families and the child’s preferences and cultural differences. Patients who had medically refractory epilepsy, who had more than 4 seizures per week despite the appropriate use of at least two AEDs, and who continued treatment for at least six months were identified.

Results

A total of 23 patients (13 male and 10 female) with median age of 52 months ranging from 13 to 156 months were included in the study. The body weight, height, serum levels of triglyceride, total cholesterol and LDL showed significant increases at 6th month of therapy when compared to baseline values. Systolic and diastolic diameters of the carotid artery and the aorta systolic diameter increased significantly at month 6 when compared to baseline measures (p<0.05). Carotid intima media thickness, elastic properties of the aorta and carotid artery did not change at the sixth months of therapy compared to baseline values (Table 1 and Table 2).

Discussion

In the present study, we have shown that a 6-month-long ketogenic diet had no deleterious effect on carotid intima-media thickness and elastic properties of the carotid artery and the aorta. However, in the present study, carotid intima-media thickness and elastic properties of the carotid artery and the aorta did not change during the ketogenic diet treatment, although cholesterol and triglycerides increased significantly during study period. This may be, at least in part, attributed to the Mediterranean food pattern of the ketogenic diet. The fat requirements of the diet are traditionally met by a combination of heavy cream, other dietary fats, and occasionally oils. In our study, however, we used Mediterranean ketogenic diet in which olive oil constituted most of the fat in the diet. Indeed the Mediterranean diet is increasingly recognized as a cardioprotective food pattern.

In conclusion, a six-month long ketogenic diet has no effect on carotid intima-media thickness and elastic properties of the carotid artery and the aorta. Further studies with larger samples and longer follow-up periods are needed to clarify the effects of ketogenic diet on carotid intima-media thickness and elastic properties of the carotid artery and the aorta.