Endogenous L-carnitine levels and their correlation of lipid profiles between vegetarians and omnivores

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Background: Plant-based diet has been associated with lower risk of cardiovascular diseases (CVDs) and mortality, partly due to its effect on serum lipid profiles. L-carnitine (L-Car) is a conditionally essential nutrient that plays a vital role in energy production, carbohydrates and fatty acids metabolism. However, the levels of L-Car have less elucidated either in vegetarians and omnivores. This study aimed to compare the levels of L-Car and their correlation with blood glucose, lipid profiles and some CVDs risk factors (i.e. L-homocysteine, L-Hcy and trimethylamine N-oxide, TMAO) among vegetarians and omnivores.

Methods: A total of 56 healthy male (vegetarians, n=9; omnivores, n=16) and female (vegetarians, n=15; omnivores, n=16) were recruited. Fasting blood samples were collected for biochemical testing and simultaneously analyzed of CVD biomarkers by using LC-MS.

Results: There was no significant difference in age (average 45 years old), body mass index, blood glucose, total cholesterol (TCH), triglyceride (TG) high-density lipoprotein cholesterol (HDL-C), methylmalonic acid (MMA), L-Hcy and TMAO among vegetarians and omnivores. The vegetarians had significantly higher concentration of L-Car (p=0.026) and ascorbic acid (p=0.010) than in omnivores. In parallel, the vegetarians had significantly lower low-density lipoprotein cholesterol (LDL-C, p=0.045) and 3-methylhistidine (3-MH, p=0.039) than in omnivores. Interestingly, L-Car was demonstrated the negative correlation with TG (r=-0.4617, p=0.040) and positive correlation with HDL-C (r=0.5680, p=0.011) in vegetarians. In omnivores, L-Car was indicated the strong negative correlation with TCH (r=-0.9524, p<0.001), LDL-C (r=-0.9236, p<0.001) and positive correlation with blood glucose (r=0.7538, p=0.004).

Conclusions: Higher levels of L-Car in the vegetarians might be associated with the higher endogenous L-Car than in omnivores as the compensation for lower carnitine levels obtained from the diet. Our results also suggested that endogenous L-Car might be playing as a CVDs protection factor both in vegetarians and omnivores through different influence on blood lipids.