Correlation of plasma homocysteine levels with other cardiovascular disease factors in healthy male vegetarians and omnivores

D Li, NJ Mann, FD Kelly, L Abedin, AK Wilson, AJ Sinclair

Department of Food Science, RMIT, Melbourne, VIC, 3001

Many epidemiologic studies have identified that elevated concentrations of plasma homocysteine (Hcy) is an independent risk factor for athrosclerotic and thrombotic diseases (1). The aim of this study was to investigate the association of plasma homocysteine with cardiovascular disease (CVD) factors in healthy male vegetarian and omnivore subjects.

One hundred and thirty nine healthy male subjects aged 20-55 years were recruited and divided into four groups: vegan (n=18), ovolacto vegetarian (n=43), moderate-meat-eaters (n=60, <300g meat /day) and high-meat-eaters (n=18, >300g meat/day). Each volunteer completed a semi-quantitative food frequency questionnaire and gave a blood sample. Plasma Hcy levels were determined by HPLC method, serum B_{12}, folate, alpha-tocopherol and retinol, plasma and platelet phospholipid fatty acids, plasma lipoprotein lipids and haemostatic factors were determined by standard methods.

Plasma Hcy levels showed a significant trend to decrease from vegan to ovolacto to moderate meat to high meat eaters. However, serum vitamin B_{12} levels showed the opposite trend to Hcy. There was no correlation between Hcy and serum folate levels.

	Standard Error	Standardized Coefficient
Intercept	5.173	30.510
Hgb (g/L)	.034	-.153
HDL(mM/L)	1.195	-.127
Vit B_{12} (pg/mL)	1.948E-3	-.356
FIB (g/L)	.389	.147
Protein (% of E)	.113	-.181
$R^2 = 0.358$, P<0.0001		

The table shows the five most important factors influencing the plasma Hcy concentration which were selected in stepwise forward selection entry regression model ($R^2 = 0.358$ and $P < 0.0001$) from 14 independent variables which were found to have significant association with plasma Hcy concentration in age-adjusted bivariate analysis with accepted $P<0.05$.

Plasma Hcy concentration was strongly negatively correlated with serum vitamin B_{12} levels with –0.356 of standardized coefficient (Std. Coeff.), and significantly negatively associated with dietary protein intake (% of energy) (Std. Coeff. -0.181) and haemoglobin (Hgb) concentration (Std. Coeff. -0.153) and HDL-C concentration (Std. Coeff. -0.127), and significantly positively associated with plasma fibrinogen (FIB) concentration (Std. Coeff. 0.147). These data indicate there is a cluster of risk factors (high Hcy, low HDL-C, high FIB) in this population, although we are not suggesting a cause and effect relationship between Hcy and the other factors.

Our findings add further epidemiologic evidence to the hypothesis that elevated plasma Hcy is an independent risk factor for both of atherosclerotic and thrombotic diseases. This result also indicates that high Hcy levels could reflect vitamin B_{12} deficiency in Australian vegetarian populations. Vitamin B_{12} supplements may be needed to reduce Hcy in order to minimize the risk of vascular endothelial damage for vegetarians, especially for vegans.

1. Ubbink JB. Homocysteine—an atherogenic and a thrombogenic factor? Nutr Rev 1995;53(11):323-325.