Proceedings of the Nutrition Society (2012), **71 (OCE2)**, E126 doi:10.1017/S0029665112001838

Summer Meeting hosted by the Irish Section, 16–19 July 2012, Translational nutrition: integrating research, practice and policy

Homocysteine and vitamin B12 status of vegetarians as compared to omnivores: a potential health hazard?

D. Obersby, D. C. Chappell and A. A. Tsiami

School of Psychology, Social Work and Human Sciences, University of West London, Brentford, Middlesex, TW8 9GA, UK

There is strong evidence indicating that elevated plasma homocysteine levels are a major independent biomarker and/or a contributor to chronic conditions, such as cardiovascular disease (CVD)[1,2]. It has been shown that a deficiency of vitamin B12 can elevate homocysteine[3]. Vegetarians are a group of the population who are potentially at greater risk of vitamin B12 deficiency than omnivores, brought about by a dietary inadequacy or absence of animal produce, the only normal source of vitamin B12. There is no vitamin B12 synthesized by any plant, nor does any plant use or store vitamin B12[4].

The object of the present study is to stratify a range of acceptable cohort studies that compare the homocysteine and vitamin B12 status of vegetarians and omnivores and to compile a systematic review and meta-analysis of which to-date there is no record of any publication. A further object is to investigate the relationship between levels of plasma tHcy and the associated risk of developing CVD.

Search methods employed in the present study have identified 244 entries from which by screening, using set inclusion and exclusion criteria revealed sixteen eligible cohort case study publications from 1999 to 2010 that compared concentrations of plasma total homocysteine (tHcy) and serum vitamin B12 of omnivores, lactovegetarians or lactoovovegetarians (LV-LOV's) and vegans.

Of the sixteen studies (2958 participants) which were identified; only two studies reported that vegan concentrations of plasma tHcy and serum vitamin B12 did not differ from omnivores, which appears to be due to confounding circumstances. The meta-analysis confirmed that an inverse relationship exists between plasma tHcy and serum vitamin B12.

	Plasma tHcy				Serum vitamin B12			
Diet	**Mean (μmol/L)**	**SD (μmol/L)**	***n***	***P***	**Mean (pmol/L)**	**SD (pmol/L)**	***n***	***P***
Omnivores	10.9	3.1	13		303	76	12	
LV-LOV's	14.0	3.2	13	<0.025	198	39	13	<0.005
Vegans	16.4	4.8	9	<0.005	172	59	9	<0.005

Values are mean, standard deviation, and significant difference value *P* of LV-LOV's and vegans from omnivores for plasma tHcy and serum vitamin B12 calculated levels, of the selected cohort studies.

The Table above summarises the results from the calculated values of the selected cohort case studies indicating that vegans have the highest plasma tHcy and the lowest serum vitamin B12 concentrations. LV-LOV's were second highest plasma tHcy and second lowest plasma vitamin B12, from which it is reasonable to conclude that the usual dietary source of vitamin B12 is from animal products and those who choose to omit or restrict these products are destined to become vitamin B12 deficient, which can consequently result in elevated plasma tHcy and a potential increased risk of developing CVD.

1. Humphrey LL, Fu R, Rogers K, Freeman M (2008) *Mayo Clin Proc* **83**(11): 1203–1212.
2. Ubbink JB (2001) *Cam Uni Press* 485–90.
3. Selhub J (1999) *Ann Rev Nutr* **19**, 217–46.
4. Herbert V (1994) *Am J Clin Nutr* **59**, 1213S–1222S.