SHORT REPORTS

Serum cholesterol and triglyceride levels in Australian adolescent vegetarians

Vegetarians consume a diet free of or low in animal meat but containing, in addition to vegetable products, eggs and milk and their derivatives. The diet is low in saturated fats and high in polyunsaturated fats; it is also relatively high in beans and fibre, which may actively reduce serum cholesterol. Such diets would be expected to produce blood lipid levels lower than those found in the average population, and this has been confirmed in a few studies.[1-3] Such studies have not been performed on adolescents or children. We report the results of a preliminary study of blood lipid levels in 183 Seventh Day Adventist (SDA) adolescents and compare them with the results of a previous study of adolescents from the general Australian population.[4 5]

Method and results

The children, aged 12-17 years (89 girls and 94 boys), were from an SDA high school in a suburb of Sydney. They were fairly equally distributed in all age groups except for the highest, in which numbers were small. The children voluntarily completed a questionnaire, indicating the type of food in their regular diet and the approximate amount consumed each week. They were then divided into two groups: 78 who occasionally or regularly ate animal meat, fish, or fowl (MFF), and 105 whose protein was entirely from dairy and vegetable sources (non-MFF). Fasting serum cholesterol and triglyceride levels were estimated by means of an AutoAnalyzer. Assay methods and quality control procedures have been reported.[4 5]

The table summarises the results of this and the previous studies.[4 5] The mean serum cholesterol level was 4·2 ± SD 0·73 mmol/l (161 ± 28 mg/100 ml) in the vegetarians and 5·2 ± 0·83 mmol/l (199 ± 32 mg/100 ml) in the "free-living" control group ($P<0·001$). The difference in mean cholesterol levels between the MFF and non-MFF groups was also highly significant ($P<0·001$).

Mean fasting serum cholesterol and triglyceride levels (± SD) in vegetarian and free-living adolescents

Adolescent group	No in group	Serum cholesterol (mmol/l)	Serum triglyceride (mmol/l)
Vegetarian	183	4·2 ± 0·73	0·76 ± 0·36
MFF	78	4·4 ± 0·73	0·78 ± 0·36
Non-MFF	105	4·0 ± 0·70	0·73 ± 0·36
Free-living	1456	5·2 ± 0·83	0·81 ± 0·41

Conversion: SI to traditional units—Cholesterol: 1 mmol/l ≈ 38·6 mg/100 ml. Triglyceride: 1 mmol/l ≈ 88·5 mg/100 ml.

Discussion

The children in both studies came from a similar area of the Sydney suburbs and represented the various socioeconomic strata of Australian society.[4] This study was primarily undertaken to determine whether the vegetarian diet of adolescents has a significant effect on blood lipid levels when compared with those in adolescents consuming a free diet. The vegetarian children had a significantly lower (19%) mean serum cholesterol level but only a slightly lower serum triglyceride level. The mean serum cholesterol level also differed significantly with the degree of vegetarianism—that is, between the MFF and non-MFF groups. In contrast, the vegetarian diet had no effect on the fasting serum triglyceride level in normal adolescents. The dietary information provided by the questionnaire indicated that there was no difference in carbohydrate intake between the vegetarian children and normal controls.

West and Hayes,[3] in a more-detailed study of vegetarian adults versus free-living people, also found that the serum cholesterol level correlated with the degree of vegetarianism, but mainly over the age of 35. Kirkeby[1] found that serum cholesterol levels in vegetarians were significantly lower in the age groups studied, ranging from 18 to above 60 years of age. Walden *et al*[2] found the adult serum cholesterol levels in SDAs to be 5-30% lower than in the free-living population and found no striking difference in the triglyceride levels. Our results (19% lower) are consistent with these findings.

Many epidemiological studies have shown that the blood cholesterol level is influenced by the dietary lipid intake and that raised levels carry a major risk for coronary heart disease. The lower incidence and later emergence of coronary heart disease among SDA communities is consistent with these findings. The results in adolescent vegetarians compared with those in free-living Australian adolescents, of whom 12% have a serum cholesterol level of 6·2 mmol/l (240 mg/100 ml)[4 5] or greater, may have implications in planning preventive programmes for coronary heart disease.

1 Kirkeby, K, *Acta Medica Scandinavica*, 1966, **179**, suppl No 443.
2 Walden, R T, *et al*, *American Journal of Medicine*, 1964, **36**, 269.
3 West, R O, and Hayes, O B, *American Journal of Clinical Nutrition*, 1968, **21**, 853.
4 Hickie, J B, *et al*, *Medical Journal of Australia*, 1974, **1**, 825.
5 Hickie, J B, *et al*, *Medical Journal of Australia*, 1975, **1**, 429.

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Cell-mediated immunity and transfer factor in Crohn's disease

It has been debated whether or not patients with Crohn's disease have depressed cell-mediated immunity.[1 2] We studied several patients with histologically proved Crohn's disease and confirmed depressed T-cell function. We then attempted to see whether the lymphocyte extract known as transfer factor could restore the T-cell function in these patients.

Patients, methods, and results

Thirteen patients with histologically proved Crohn's disease who were not on steroids or immunosuppressive agents agreed to take part in the study. There were five men and eight women. Their mean age was 34 years (range 20-65 years). Lymphocytes were harvested by leukapheresis from healthy donors who gave strong positive reactions on tuberculin tests. Transfer factor was prepared from the lymphocytes by the method of Lawrence.[3] Tuberculin tests (1/1000 purified protein derivative (PPD)) were performed before each injection of transfer factor and repeated one month later. The patients' spouses acted as controls. Induration of an area over 5 mm in diameter at 48 hours was read as positive. The phytohaemagglutinin (PHA) stimulation test was performed using a whole-blood micromethod.[4] Each experiment was done in sextuplicate and the uptake of ^{125}I-deoxyuridine by the dividing cells measured in a gamma-counter. Results were expressed in counts per minute (cpm) per 1000 lymphocytes.

Nine of the patients were married and their spouses all gave a positive response to the tuberculin test to at least 1/1000 PPD. Only one of the 13 patients had a positive tuberculin reaction; the rest showed virtually no induration at 48 hours. The 12 patients with negative tuberculin skin tests were each given transfer factor prepared from 3×10^9 lymphocytes, after which three developed a positive reaction on the tuberculin test. Mean lymphocyte response to phytohaemagglutinin stimulation (±SD) in the 13 patients was 4415±3712 cpm/1000 lymphocytes. This was significantly lower than the results from 20 healthy adults (10 330±3210 cpm/1000 lymphocytes; $P<0·01$). After receiving transfer factor the patients' mean response rose to 10 170±5990 cpm/1000 lymphocytes, significantly higher than before ($P<0·01$) and not significantly different from the values in healthy controls ($P<0·05$).