SUCCESSFUL REDUCTION OF HYPERTRIGLYCERIDAEMIA (H.T.G.) BY AMBULATORY DIETARY MANIPULATION IN YOUNG DIALYSED PATIENTS

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Type IV hyperlipoproteinaemia is frequently observed in uraemic dialysed or undialysed patients [1] and is probably related to accelerated atherosclerosis in these patients [2]. The incidence of this metabolic disorder in young dialysis patients has been recently investigated in a small series of children [3]. We have studied 124 young non-nephrotic patients on the haemodialysis programme (44 females, 80 males), aged 13 to 32 years (mean: 20.8); all subjects were dialysed for more than 3 months; 94 (76%) were treated 3 times a week. Fasting plasma triglycerides were tested at least 2 times (after a 12 hours fast) in the same laboratory and with the same analytical methods. The upper limit of normal was 110 mg/100 ml in females and 150 mg/100 ml in males. Ninety-six patients (77.4%, 37 females and 59 males) showed type IV hyperlipoproteinaemia with increased triglycerides and normal or slightly increased cholesterol.

Nine of these patients, aged 18 to 32, had a prominent endogenous type IV hyperlipoproteinaemia. Mean (± S.E.M.) fasting plasma triglycerides levels were 296 ± 18 mg/100 ml; cholesterol 230 ± 7 mg/100 ml; lipids 906 ± 37 mg/100 ml. Beta-lipoproteins were increased to 26 ± 2.42% (normal value < 10%) and slow beta-lipoproteins were found to be 17.3 ± 1.35%. Oral glucose tolerance test showed a diabetic curve with increased insulin release. Post heparin lipoprotein lipase activity was decreased to 0.27 mEq/ml/min (normal : 0.40 mEq/ml/min). However, none of these young patients had clinical features of cardiovascular diseases, extravascular cholesterol deposits, pancreatic disease or body weight excess.

An attempt to reduce hypertriglyceridaemia by dietary manipulation was made on these patients on ambulatory therapy, with low carbohydrate and high polyunsaturated fat diet. Usual home diet of these 9 patients contained 35 calories/kg of body weight per day. The proportion of total calories supplied by proteins was 13%, carbohydrates 51%, and fat 36%, with a polyunsaturated to saturated fat ratio of 0.2.

Isocaloric diet was prescribed during 3 months with strict reduction of carbohydrates, an increased proportion of polyunsaturated fat, and the same
protein intake. This low carbohydrate diet contained: proteins 13%, carbohydrates 25%, lipids 61% with polyunsaturated to saturated fat ratio of 1.0. However during this therapeutic period, diet really followed by the patients was: proteins 14%, carbohydrates 38%, lipids 48% with a polyunsaturated to saturated fat ratio of 1.0. Plasma values of the 3 classes of plasma lipids fell significantly as compared with the levels observed during the control period: lipids $628 \pm 36$ mg/100 ml, cholesterol $178 \pm 7$ mg/100 ml, triglycerides $151 \pm 20$ mg/100 ml (p < 0.001 for the three values).

Following this period, a three months return to spontaneous diet was designed, to test effectiveness of strict low carbohydrate diet. All plasma lipids values rose: lipids $842 \pm 86$ mg/100 ml, cholesterol $195 \pm 14$ mg/100 ml, triglycerides $328 \pm 36$ mg/100 ml (p < 0.001 as compared to strict diet period).

Furthermore, these patients were subsequently submitted to an increased but still low carbohydrate diet, for 7 to 13 months; diet analysis showed a real intake of: proteins 13%, carbohydrates 42%, lipids 45% with polyunsaturated to saturated fat ratio of 1.0. Plasma lipid values again decreased and then remained at: lipids $667 \pm 24$ mg/100 ml; cholesterol $183 \pm 7.8$ mg/100 ml and triglycerides $160 \pm 9$ mg/100 ml (p < 0.001 compared with previous period).

No side effect was observed during these dietetic manipulations, such as pancreatic or gall bladder pain.

Type IV hyperlipoproteinaemia has already been observed in young dialysis patients; Broyer et al found 16 out of 17 dialysed children (aged 4 to 15) with lipid abnormalities [3].

In our series prevalence of hypertriglyceridaemia was at the same rate in our young dialysed adults as in older uraemic patients. It may be noted that carbohydrate intake was higher in children than in our patients (58% vs 51%) or in older patients (50%) [4].

It has been previously demonstrated that endogenous type IV hyperlipoproteinaemia was effectively corrected by dietary modifications (low carbohydrate, polyunsaturated fat diet) in non uraemic patients [5]. Studies in uraemic, non-dialysed adult patients have shown a significant reduction of triglycerides following controlled dietary manipulation, at least during short time [4]; triglyceride values decreased with a low carbohydrate (35%) and polyunsaturated fat (55%) diet; but a long term study was not performed and the results of an ambulatory dietary programme were not explored.

In our 9 young dialysis patients series, we have confirmed the possibility of lowering plasma triglycerides with short term, rigid dietary manipulation. Moreover, we have studied the feasibility of a non rigid, low carbohydrate diet in ambulatory patients to keep triglyceride values low.

In conclusion, ambulatory dietary manipulations with moderate low carbohydrate (42%), high polyunsaturated fat (45% with USF/SF ratio of 1.0) diet corrects hypertriglyceridaemia in young dialysed patients in the long term. This prolonged good result is mainly due to the good acceptance of diet by the patients.
References

1 Bagdade, JD, Porte, D and Bierman, EL (1968) N. Engl. J. Med., 279, 181