A nutritional program improved lipid profiles and weight in 28 chiropractic patients: a retrospective case series[☆]

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Received 31 October 2007; received in revised form 16 April 2008; accepted 4 May 2008

Key indexing terms:

Cholesterol;
Diet therapy;
Metabolic detoxication,
phase II;
Metabolic detoxication,
phase I;
Chiropractic;
Nutrition therapy;
Lipids

Abstract

Objective: This study retrospectively examined the effects of a 21-day nutritional intervention program, which included fruit and vegetable consumption, energy restriction, and nutritional supplements, on serum lipid measures in 28 chiropractic patients.

Methods: Medical records were reviewed for 28 chiropractic patients who had completed a commercially available 21-day nutritional intervention program between April 2005 and August 2007 and for whom complete serum lipid and weight measures immediately pre- and postintervention were available. The primary outcome was change in serum lipids, and change in body weight was a secondary outcome variable.

Results: Significant reductions in total, low-density lipoprotein, very low-density lipoprotein, and high-density lipoprotein cholesterol, and triglycerides were observed. Serum triglycerides decreased from 116.3 ± 54.6 (mean $\pm$ SD) to 88.6 ± 40.5 mg/dL ($P < .01$). Total cholesterol decreased from 223.3 ± 40.7 to 176.2 ± 30.0 mg/dL ($P < .0001$). Low-density lipoprotein cholesterol decreased from 145.7 ± 36.8 to 110.9 ± 25.3 mg/dL ($P < .0001$). High-density lipoprotein cholesterol decreased from 54.3 ± 14.6 to 47.6 ± 10.5 mg/dL ($P < .001$). Weight for patients decreased from 191.2 ± 38.8 to 182.2 ± 36.3 lb ($P < .0001$).

Conclusions: This retrospective case series supports the hypothesis that a nutritional purification intervention program emphasizing fruit and vegetable consumption, energy restriction, and nutritional supplements reduces serum lipids and weight.

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[☆] Competing interests: JL is employed by Standard Process Inc as the Manager of Outcomes Research, Department of Research and Development. JP sells Standard Process products in his practice and earns income from the sale of these products.

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Introduction

Chiropractors regularly provide preventive health interventions based on lifestyle and nutritional factors (smoking, exercise, diet, etc) to promote the health of their patients, to prevent disease conditions, to provide

symptomatic relief, and to reduce the recurrence of disease conditions.¹ Patients seeking chiropractic care may present with health conditions that put them at higher risk for chronic diseases. For example, high cholesterol and overweight are 2 known risk factors for cardiovascular disease (CVD).

A nutrient-dense diet with energy restriction has been hypothesized to slow aging and extend life span in humans based on experiments in primates and other animals.² In addition, it is well established that a diet rich in fruits and vegetables reduces risk for chronic disease, particularly CVD risk.³⁻⁶ The mechanisms are still being explored, but longitudinal dietary studies show that individuals consuming a whole food diet consisting of unprocessed fruit and vegetables, lean meat, nuts, and healthy oils—as with the Mediterranean diet—have lower rates of all-cause and cause-specific (CVD, cancer) mortality.^{7,8} Conversely, research shows that the modern Western dietary pattern (saturated and *trans*-fat, refined grains, sugar, salt, etc) is associated with increases in CVD mortality.^{9,10}

Nutritional purification refers to optimizing the general health and wellness of patients in certain clinical settings using nutrition as the primary therapeutic modality. It takes many forms and may incorporate several integrative and alternative therapies. Anecdotal reports from practitioners using the Standard Process (SP) Purification Program (Standard Process Inc, Palmyra, WI) for nutritional support have indicated a possible beneficial effect of the program on serum lipid measures. To further investigate potential effects on serum lipids, we conducted a retrospective chart review on 28 chiropractic patients (9 male and 19 female) who had received the 21-day purification program between April 2005 and August 2007 while receiving chiropractic care at our clinic. Primary end points of interest were serum cholesterol and triglyceride measures. Weight reduction was examined as a secondary outcome. The purpose of this study was to retrospectively examine the effects of a 21-day nutritional intervention program on serum lipid measures in 28 chiropractic patients.

Methods

Deidentified case reports for 28 patients were reviewed and analyzed for this case series. The records of patients were selected for inclusion in the chart review if they had recorded lipid panel and weight measures pre- and posttherapy. Patients were selected without regard for body mass index, age, or sex.

Nineteen of the 28 patients were female, and patient age ranged from 25 to 77 years (mean age = 50 ± 11.7). Patients received chiropractic care from our clinic for a variety of musculoskeletal problems while on the nutritional program.

Patients included in the study were not taking any pharmaceutical lipid-lowering or cholesterol medications before or during the 21 days of the nutritional program. Patients who were taking other prescription pharmaceutical medications when they began the nutritional program continued using these medications during the 21 days of the intervention.

A serum lipid panel had been obtained from each patient before starting the nutritional program and was repeated at the conclusion of the 21-day program (between 21-23 days after starting the program). Patient charts were deidentified according to the Health Insurance Portability and Accountability Act Privacy Rule.

Dietary modification in the purification program included an increased intake of raw fruits and vegetables and restriction or elimination of meat, refined oils, and refined carbohydrates (energy reduction) for the duration of the program. Patients were asked to comply with the following dietary modifications for the 21 days of the program: (1) eat vegetables and fruit only; (2) do not eat any salad dressing; (3) drink only water as a beverage, eight 12-oz glasses per day; (4) salads can have unlimited fresh vegetables (red, yellow, and green peppers; onions; tomatoes; mushrooms; spinach; broccoli; mixed greens; etc); (5) no nuts, seeds, beans, or starchy root vegetables (potatoes, yams, turnips, etc); and (6) steamed vegetables are recommended along with salad at dinner (kale, broccoli, Swiss chard, Brussels sprouts, asparagus, red beets, etc).

In addition to dietary modifications with energy restriction, a specific nutritional supplementation regimen was also prescribed for patients. SP Cleanse, GastroFiber, SP Complete (a whey protein-based shake), and SP Green Food, nutritional supplements from Standard Process Inc, were provided to these patients during the 21-day program as described in [Table 1](#) in accordance with dosages described on product labels. Refer to Appendix A for a description of these products.

Because this study was a retrospective chart review on a nonrandom series of selected cases, data were analyzed qualitatively and statistical tests were performed only to document statistically significant change in the selected sample as a whole for serum lipid parameters and weight. A paired *t* test was used to

Table 1 Supplementation regimen during the 21-day purification program

Baseline	Days 1-7	Days 8-14	Days 14-21	Follow-up
Serum Lipid Measures	SP Cleanse: 7 Capsules 3×/d Without Food	GastroFiber: 3 Capsules 3×/d Without Food	GastroFiber: 3 Capsules 3×/d Without Food	Serum Lipid Measures Weight
	GastroFiber: 3 Capsules 3×/d Without Food	SP Green Food: 5 Capsules 2×/d With Food	SP Green Food: 5 Capsules 2×/d With Food	
	SP Complete Nutritional Shakes: 2-3 Shakes/d as Needed; 2 Rounded Scoops of SP Complete Powder + 1 to 1 1/2 cups of fruit + 1/2 to 1 cup of water + 1 TBSP Flaxseed Oil (Suggested)	Continue With SP Complete Shakes: 2-3 Shakes/d as Needed	Continue With SP Complete Shakes: 2-3 Shakes/d as Needed	

See Appendix A for a description of the supplements used. Serum lipids were measured at baseline before patients commenced the purification program. TBSP, Tablespoon.

analyze the changes in relevant measures pre- and posttherapy ($\alpha = .01$).

Results

Pre- and postintervention serum lipid measures for these patients were extracted from their medical charts and analyzed. Total cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very low-density lipoprotein (VLDL) decreased significantly ($P \leq .01$) on average for these patients (Fig 1 and Table 2).

Individually, all patients showed beneficial changes in serum lipids, although the magnitude of the response varied. Average serum triglycerides decreased from 116.3 ± 54.6 mg/dL preintervention to 88.6 ± 40.5 mg/dL postintervention ($P < .01$). Total cholesterol decreased for all patients, as shown in Fig 2. The average total cholesterol for these patients preintervention was 223.3 ± 40.7 mg/dL (mean $\pm$ SD). This decreased to 176.2 ± 30.0 mg/dL postintervention, a 47-point drop on average ($P < .0001$). Low-density lipoprotein cholesterol also decreased for all patients in a similar fashion (data not shown). The average LDL cholesterol decreased from 145.7 ± 36.8 mg/dL preintervention to 110.9 ± 25.3 mg/dL postintervention ($P < .0001$), a 35-point drop. Average HDL cholesterol (“good cholesterol”) decreased from 54.3 ± 14.6 mg/dL preintervention to 47.6 ± 10.5 mg/dL postintervention ($P < .001$), a 7-point drop. Twenty-two patients had decreased HDL postintervention, whereas 4 had slight

increases and 2 were unchanged (Fig 3). In addition, the LDL/HDL ratio and the total cholesterol–HDL ratio both decreased significantly for these patients. The LDL/HDL ratio decreased from 2.9 ± 1.2 to 2.5 ± 0.9 ($P \leq .001$), and the total cholesterol–HDL ratio decreased from 4.4 ± 1.4 to 3.9 ± 1.2 ($P \leq .001$). The statistically significant decrease in the total cholesterol–HDL ratio and the LDL/HDL ratio suggests that the reductions in total and LDL cholesterol contribute most to the hypolipidemic effects of the purification program than do reductions in HDL. The average weight for patients was 191.2 ± 38.8 lb preintervention. This decreased to 182.2 ± 36.3 lb

Fig 1. Change in serum lipids for 28 chiropractic patients after administration of a nutritional purification protocol for 21 days. Serum total cholesterol, triglycerides, HDL, LDL, and VLDL all decreased significantly on average for 28 patients who completed the 21-day purification program ($P < .0001$). A t test was used to analyze the change in lipid parameters ($\alpha = .01$). Asterisk indicates significant difference between pre- and posttherapy values.

Table 2 Change in average lipid parameters for 28 chiropractic patients after 21 days on the purification program

Total Cholesterol (mg/dL) Mean $\pm$ SD		Triglycerides (mg/dL) Mean $\pm$ SD		HDL (mg/dL) Mean $\pm$ SD		VLDL (mg/dL) Mean $\pm$ SD		LDL (mg/dL) Mean $\pm$ SD	
Before	After	Before	After	Before	After	Before	After	Before	After
223.3 $\pm$ 40.7	176.2 $\pm$ 30 *	116.3 $\pm$ 54.6	88.6 $\pm$ 40.5 *	54.3 $\pm$ 14.6	47.6 $\pm$ 10.5 *	23.3 $\pm$ 10.9	17.8 $\pm$ 8.1 *	145.7 $\pm$ 36.8	110.9 $\pm$ 25.3 *

Patients who completed the 21-day purification program showed significant reductions in all lipid parameters measured, including LDL, HDL, and total cholesterol, and triglycerides.

* $P \leq .01$.

postintervention ($P < .0001$) (Fig 4). Weight decreased for all patients.

Discussion

Our results are comparable with those found in several other studies. O'Dea¹¹ observed temporary reversal of the effects of a Western diet and lifestyle in diabetic Aboriginals who returned to a hunter-gatherer lifestyle for 7 weeks. The 10 individuals showed improvements in several aspects of their carbohydrate

and lipid metabolism linked to insulin resistance, including glucose tolerance, fasting glucose and insulin levels, and serum triglycerides. Triglyceride levels that were highly elevated before the intervention (356 ± 40.7 mg/dL) decreased to normal levels postintervention (101.8 ± 8.6 mg/dL). This parallels our observations for changes in serum triglycerides in response to nutritional purification. Weight loss, a low-fat diet, and increased physical activity all contributed to the observed normalization or near-normalization of end points in these individuals, according to the author.¹¹

Gardner et al¹² compared the hypolipidemic effects of 2 low-fat dietary interventions in normocholesterolemic subjects. Both diets were typical of a low-fat

Fig 2. Change in total cholesterol for 28 chiropractic patients after administration of a nutritional purification protocol for 21 days. Total cholesterol decreased for all 28 patients who completed the 21-day purification program. Total cholesterol decreased an average of 47 points in these patients ($P < .0001$). A t test was used to analyze the change in total cholesterol ($\alpha = 0.01$). Several individual patients with the highest total cholesterol at the start of the program showed the sharpest reductions after completing the program.

Fig 3. Change in HDL cholesterol for 28 chiropractic patients after administration of a nutritional purification protocol for 21 days. High-density lipoprotein cholesterol decreased for 22 of the 28 patients who completed the 21-day purification program. High-density lipoprotein decreased an average of 7 points in these patients ($P < .001$). A t test was used to analyze the change in HDL cholesterol ($\alpha = .01$).

Fig 4. Change in weight for 28 chiropractic patients after administration of a nutritional purification protocol for 21 days. Weight decreased for all 28 patients who completed the 21-day purification program. The average weight for these patients before the program was 191.2 ± 38.8 lb. This decreased significantly to 182.2 ± 36.3 lb ($P < .0001$) after 21 days on the program. A *t* test was used to analyze the change in weight ($\alpha = .01$).

American diet, but 1 intervention emphasized increased fruit and vegetable consumption. Subjects eating the latter diet had significantly decreased LDL and total cholesterol compared with subjects on the basic low-fat diet, supporting the concept that inclusion of nutrient-dense plant-based foods in the diet favorably affects serum lipids. After 4 weeks, the low-fat-only group had a total cholesterol reduction of -9.2 mg/dL vs -17.6 mg/dL for the low-fat plus fruit/vegetables group ($P = .01$). The LDL cholesterol reductions were -7.0 mg/dL for the low-fat-only group and -13.8 mg/dL for the low-fat-plus group ($P = .02$). These trends parallel the results of our retrospective analysis, with similar magnitude. However, the 2 diet groups did not differ significantly in HDL cholesterol and triglyceride level reduction, which differs from our findings.

Jenkins et al¹³ found that a 1-month dietary intervention containing foods and food constituents known to decrease cholesterol (plant sterols, viscous fiber, soy protein, and nuts) was just as effective as statin drugs in lowering cholesterol in 46 healthy, hypercholesterolemic subjects. The randomized controlled trial provided all foods except fruits and vegetables to the participants, allowing the researchers to monitor the amount and type of foods being eaten and subject compliance. The statin drug was double blinded with a placebo. Dietary compliance was estimated at 93% to 95% for all 3 intervention groups. The experimental diet group showed a 28.6% decrease

in LDL cholesterol and a 23.5% decrease in LDL/HDL ratio after 4 weeks, significantly greater than the control diet group (8% decrease in LDL cholesterol; 3% increase in LDL/HDL ratio), but essentially equal to the control diet plus statin drug group (30.9% decrease in LDL cholesterol; 28.4% decrease in LDL/HDL ratio). Total cholesterol decreased from 268.0 mg/dL at baseline to 208.9 mg/dL after 4 weeks in the experimental diet group, significantly more than in the control group ($P < .005$). In the statin drug group, total cholesterol decreased similarly, from 256.4 mg/dL at baseline to 196.5 mg/dL after 4 weeks, compared with control group ($P < .005$). The serum cholesterol reductions were not significantly different between the statin drug and experimental diet groups. Again, triglycerides did not change significantly in this study, contrary to our findings. However, the trend was for an increase in triglycerides for the control group and a decrease in both the experimental diet and statin drug groups; so these authors may simply have not had sufficient power to resolve statistically significant effects. C-reactive protein and 10-year coronary heart disease risk estimates also significantly decreased in the statin drug and experimental diet intervention groups, but not in the control diet group. The magnitude of total cholesterol decrease in this study was greater than what we observed, but our nutritional intervention did not focus on specific lipid-lowering foods. The increase in dietary fruits and vegetables in our patients during the intervention should have increased intake of such foods overall, as many of them are plant-based. The magnitude of effect of specific food types on serum lipids is an area for further examination.

This retrospective case series adds to the sparse but accumulating data on the short-term effectiveness of energy-restricted nutritional interventions for lowering serum lipids in hyperlipidemic patients. The high consumption of nutrient-dense fruits and vegetables appears to contribute to the hypolipidemic effects observed in the current study. Because of the retrospective nature of this analysis and the holistic, intent-to-treat approach of the clinician, we were not able to elucidate the independent effects of the nutritional and supplemental intervention components on the outcome measures. This is a limitation of the current study and a valid question to be addressed in future investigations. It should be noted that the purification program used in this study is marketed as a holistic, integrative therapy with synergy between the diet and supplement components. Thus, a reductionist analysis of the individual

intervention components may lack external validity from a clinical perspective.

A recent meta-analysis of studies of cholesterol and CVD risk, with a combined total of 97861 human participants, estimated that a 39-mg/dL decrease in LDL cholesterol reduced risk for several CVD end points (coronary mortality, nonfatal myocardial infarction, the combination of coronary mortality and nonfatal myocardial infarction, stroke, and any vascular event) between 22% and 27%.¹⁴ Our participants achieved an average 35-point drop in LDL cholesterol, suggesting that this intervention could substantially decrease patient risk for CVD if LDL reductions were maintained over time. However, our analysis did not examine long-term compliance of patients with program diet and supplement components after completion of the 21-day intervention. This is a limitation of the current study. Although it does not negate the observed effects of the acute intervention, the long-term compliance of patients is an important question with respect to health outcomes and warrants further study. It should be noted that the patients in this study were well aware of the changes in their lipid and weight measures after the intervention and it was educational for many of them. Nonetheless, the diet and lifestyle modifications required by the intervention are stringent; and it is reasonable to question whether such behavior changes are lasting.

This intervention was given to patients in a chiropractic care setting. The advantage of a nutritional intervention in this setting is that patients often present with risk factors for chronic diseases before such diseases are manifest and when nutritional and lifestyle interventions can slow or possibly even reverse progression toward overt disease. Future chronic disease incidence in populations can be predicted by the prevalence of certain risk factors such as elevated serum lipids, overweight, or other measures. Another advantage of interventions targeting risk factors is that it is possible to observe changes in these risk factors over very short time intervals as a result of therapy, whereas chronic diseases may take months or years to manifest.

High-density lipoprotein cholesterol decreased in these patients as a result of the intervention, along with other measured lipid parameters. Because HDL cholesterol level is inversely correlated to CVD risk,¹⁵ we were concerned that significant decreases in HDL might negate the protective effects of lowering LDL cholesterol and triglyceride levels during the intervention. However, both LDL/HDL

and total cholesterol–HDL ratios decreased significantly in these subjects, indicating that reductions in total and LDL cholesterol were of greater magnitude than that of HDL cholesterol. In addition, it has been shown that the total cholesterol–HDL ratio may be a better predictor of cardiovascular morbidity and mortality than absolute lipid parameter values alone.^{15,16} Thus, the overall effect of this intervention on lipid measures of CVD risk appears to be positive.

Another limitation of this case series is the small sample size. The 28 subjects were selected from among all patients in the care of the Powell Chiropractic Clinic on the basis of specific inclusion criteria—they completed the purification program, and they had pre- and postintervention serum lipid measures recorded in their medical records. Compliance with the purification program was gauged qualitatively with verbal self-reporting by patients. Future analyses of this type should examine compliance with greater stringency. Nonetheless, this case review is relevant to generating hypotheses for future studies and for recommending nutritional purification in patients with elevated serum lipids. An additional limitation is that the reduction of blood lipids may have been the result of other factors or other components of the overall chiropractic treatment that could not be controlled.

Conclusions

In this retrospective case review, 28 patients who completed a commercially available 21-day purification program for nutritional support while receiving chiropractic care showed secondary beneficial changes in their serum lipids and weight. The observed effect was similar to that observed in previous reports and was comparable with what is observed with statin treatment. Whether these beneficial changes can be sustained over time remains to be determined.

Because serum total and LDL cholesterol levels and serum triglycerides are independent risk factors for CVD, nutritional interventions that show beneficial effects on these markers may help reduce the risk for CVD later in life. This is relevant to chronic disease prevention efforts in chiropractic care and warrants further study. Randomized, double-blind, controlled clinical trials of such interventions are required before any conclusive treatment recommendations can be considered.

Appendix A

The nutritional supplements used in this trial are described below.

SP Complete shake contains whey protein powder, flax meal powder, brown rice protein powder, calcium citrate, magnesium citrate, buckwheat juice powder, Brussels sprouts (whole plant), kale, choline bitartrate, inositol, barley grass, alfalfa juice powder, soybean lecithin powder, grape seed extract (includes Masque-lier OPC-85, with 98% total phenolic compounds, and 65% proanthocyanidins), carrot powder, and red wine extract (95% total phenolics). A serving size is 2 rounded tablespoons, and contains 377 J. Containing unrefined, dehydrated whole foods, this supplemental shake mix supports the energy-restricted diet by providing bioavailable protein as well as phytochemical micronutrients, vitamins, and minerals (particularly calcium).

SP Cleanse contains juniper berry powder, red clover powder, collinsonia root powder, apple pectin, burdock root powder, barley grass powder, dandelion leaf, Spanish black radish root, Oregon grape root powder, cayenne pepper powder, fenugreek seed powder, choline bitartrate, inositol, globe artichoke leaf, fennel seed, oat flour, beet leaf juice powder, beet root powder, milk thistle (80% silymarin), wildcrafted tillandsia powder, carrot powder, broccoli powder, and kale powder. A serving size is 7 capsules.

This product contains 20 different whole food and botanical ingredients (dehydrated) intended to help the human body eliminate metabolic and environmental toxins via the liver, kidneys, gastrointestinal (GI) tract, skin, and lymph system.

GastroFiber contains psyllium husk powder, collinsonia root powder, apple pectin, fennel seed, and fenugreek seed powder. A serving size is 3 capsules.

This product supplies significant dietary fiber to support healthy GI function. The ingredients are intended to help cleanse and lubricate the GI tract, while promoting proper pH and the growth of beneficial gut flora.

SP Green Food contains Brussels sprout powder (whole plant), kale powder, alfalfa sprout powder, buckwheat juice powder, and barley grass juice powder. A serving size is 2 capsules.

This product is rich in cruciferous vegetables (dehydrated kale and Brussels sprouts) intended to

support liver phase I and phase II detoxification systems, while also providing some important phytochemical micronutrients and trace minerals.

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