

Health Benefits of Nutritional Supplements

Selected Abstracts

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Forward

The importance of nutrition for human health has long been recognized. Prior to 1960, interest in this field largely focused on the etiology and prevention of acute nutrient deficiency diseases such as scurvy, rickets, and pellagra. Some 50 essential nutrients (vitamins, minerals, antioxidants, cofactors, essential amino acids, essential fatty acids) were identified, and recommended daily intakes for those essential nutrients (e.g. Recommended Dietary Allowances or RDAs) were developed. These recommendations, in turn, proved to be valuable in eradicating acute nutrient deficiency diseases.

During the past 20-30 years, attention has shifted to the role of diet and nutrition in the pathogenesis of chronic degenerative diseases. Heart disease, some cancers, osteoporosis, type II diabetes, and macular degeneration are all known to have dietary risk factors, many of which involve chronic nutrient deficiencies. Importantly, these associations have been much more difficult to study, in large measure because of the time frames involved. Chronic degenerative diseases develop over decades (lifetimes), and it is extremely challenging to conduct research programs for such extended periods. Nevertheless, advances in epidemiological and clinical research have helped us learn a great deal about the impacts (positive and negative) of diet and essential nutrient intakes on long-term health.

During the past decade, the scientific and healthcare communities have paid increasing attention to the role of nutritional supplements (as components of diet) in preventing and treating chronic disease. Hundreds of scientific studies have been conducted and published. These studies span a broad range of health issues. They have employed a wide variety of methodologies. And they have produced both positive and negative results. In some areas (e.g. the role of calcium and vitamin D supplements in slowing the progression of osteoporosis, and the role of folic acid supplements in preventing certain birth defects), results have been consistent, and benefits have been well accepted. In other areas (e.g. the role of antioxidant supplementation in preventing heart disease), results have been less consistent, and conclusions remain controversial. In any event, research on the health benefits of nutritional supplements is progressing, and evidence continues to mount that nutritional supplements offer a convenient and cost effective means for promoting health, over both the short- and long-terms.

The following is a collection of abstracts from about 100 scientific papers describing research on the health benefits of nutritional supplements. This collection is not exhaustive. Papers were selected on the basis of scientific merit and relevance to the field. The majority describes positive results, but in some, negative results are reported. Our objective in compiling this list was to provide readers with a good cross section of the scientific literature so that they could develop a sense for the current state of research in this field and draw their own conclusions concerning the role of supplementation in healthcare. References for many more papers are given in our bibliography entitled *Health Benefits of Nutritional Supplements: Selected Readings* .

For convenience, the abstracts have been sorted by health issue; namely Cardiovascular Health, Cancer Prevention, Strong Bones, Healthy Pregnancies/Healthy Babies, Sound Metabolism, Robust Immune Function, Acute Vision, and Other.

Sound Metabolism

Effects of psyllium on glucose and serum lipid responses in men with type 2 diabetes and hypercholesterolemia.

Anderson JW, Allgood LD, Turner J, Oeltgen PR, Daggy BP. 1999.
Am J Clin Nutr 70(4):466-73

BACKGROUND: Water-soluble dietary fibers decrease postprandial glucose concentrations and decrease serum cholesterol concentrations. This study examined the effects of administering psyllium to men with type 2 diabetes. **OBJECTIVE:** The objective was to evaluate the safety and effectiveness of psyllium husk fiber used adjunctively to a traditional diet for diabetes in the treatment of men with type 2 diabetes and mild-to-moderate hypercholesterolemia. **DESIGN:** After a 2-wk dietary stabilization phase, 34 men with type 2 diabetes and mild-to-moderate hypercholesterolemia were randomly assigned to receive 5.1 g psyllium or cellulose placebo twice daily for 8 wk. Serum lipid and glycemic indexes were evaluated biweekly on an outpatient basis and at weeks 0 and 8 in a metabolic ward. **RESULTS:** In the metabolic ward, the psyllium group showed significant improvements in glucose and lipid values compared with the placebo group. Serum total and LDL-cholesterol concentrations were 8.9% ($P < 0.05$) and 13.0% ($P = 0.07$) lower, respectively, in the psyllium than in the placebo group. All-day and postlunch postprandial glucose concentrations were 11.0% ($P < 0.05$) and 19.2% ($P < 0.01$) lower in the psyllium than in the placebo group. Both products were well tolerated, with no serious adverse events related to treatment reported in either group. **CONCLUSION:** The addition of psyllium to a traditional diet for persons with diabetes is safe, is well tolerated, and improves glycemic and lipid control in men with type 2 diabetes and hypercholesterolemia.

Elevated intakes of supplemental chromium improve glucose and insulin variables in individuals with type 2 diabetes.

Anderson RA, Cheng N, Bryden NA, Polansky MM, Cheng N, Chi J, Feng J. 1997.
Diabetes 46(11):1786-91

Chromium is an essential nutrient involved in normal carbohydrate and lipid metabolism. The chromium requirement is postulated to increase with increased glucose intolerance and diabetes. The objective of this study was to test the hypothesis that the elevated intake of supplemental chromium is involved in the control of type 2 diabetes. Individuals being treated for type 2 diabetes (180 men and women) were divided randomly into three groups and supplemented with: 1) placebo, 2) 1.92 micromol (100 microg) Cr as chromium picolinate two times per day, or 3) 9.6 micromol (500 microg) Cr two times per day. Subjects continued to take their normal medications and were instructed not to change their normal eating and living habits. HbA1c values improved significantly after 2 months in the group receiving 19.2 pmol (1,000 microg) Cr per day and was lower in both chromium groups after 4 months (placebo, 8.5 +/- 0.2%; 3.85 micromol Cr, 7.5 +/- 0.2%; 19.2 micromol Cr, 6.6 +/- 0.1%). Fasting glucose was lower in the 19.2-micromol group after 2 and 4 months (4-month values: placebo, 8.8 +/- 0.3 mmol/l; 19.2 micromol Cr, 7.1 +/- 0.2 mmol/l). Two-hour glucose values were also significantly lower for the subjects consuming 19.2 micromol supplemental Cr after both 2 and 4 months (4-month values: placebo, 12.3 +/- 0.4 mmol/l; 19.2 micromol Cr, 10.5 +/- 0.2 mmol/l). Fasting and 2-h insulin values decreased significantly in both groups receiving supplemental chromium after 2 and 4 months. Plasma total cholesterol also decreased after 4 months in the subjects receiving 19.2 micromol/day Cr. These data demonstrate that supplemental chromium had significant beneficial effects on HbA1c, glucose, insulin, and cholesterol variables in subjects with type 2 diabetes. The beneficial effects of chromium in individuals with diabetes were observed at levels higher than the upper limit of the Estimated Safe and Adequate Daily Dietary Intake.

Chromium in the prevention and control of diabetes.

Anderson RA. 2000
Diabetes Metab 26(1):22-7

Chromium is an essential nutrient involved in the metabolism of glucose, insulin and blood lipids. Suboptimal dietary intake of chromium is associated with increased risk factors associated with diabetes and cardiovascular diseases. Within the past five years, chromium has been shown to improve glucose and related variables in subjects with glucose intolerance and type 1, type 2, gestational and steroid-induced diabetes. Severe neuropathy and glucose intolerance of a patient on total parenteral nutrition, who was receiving currently recommended levels of chromium, were reversed by additional supplemental chromium. Chromium increases insulin binding to cells, insulin receptor number and activates insulin receptor kinase leading to increased insulin sensitivity. Additional studies are urgently needed to elucidate the mechanism of action of chromium and its role in the prevention and control of diabetes.

Low-dose guar improves diabetic control.

Jones DB, Slaughter P, Lousley S, Carter RD, Jelfs R, Mann JI. 1985.
J R Soc Med 78(7):546-8

Twenty diabetic outpatients (12 non-insulin-treated and 8 insulin-treated) were given guar granulate in a dose of 10 g daily for two months in order to study the effect on glycaemic control and lipid levels. Mean glycosylated haemoglobin levels (HbA1c%) fell from 11.1 +/- 2.0% pre-guar to 10.5 +/- 2.2% (P less than 0.001) after one month on guar and to 10.1 +/- 2.3% (P less than 0.0001) after two months. Following discontinuation of guar, HbA1c% rose to 11.1 +/- 2.5% (P less than 0.002). However, there were no significant changes in fasting blood glucose, 1 h postprandial blood glucose following a test meal, 24 h urinary glucose excretion or in lipid levels. Gastrointestinal side effects occurred in 4 patients during treatment with guar. Four patients reduced their dose of insulin and 2 patients reduced their dose of sulphonylurea therapy during this time because of symptoms suggestive of hypoglycaemia. We suggest that the low dose of guar used in this study may help improve glycaemic control in diabetic patients and that this may be achieved with a low incidence of gastrointestinal side effects.

Beneficial effects of palatable guar and guar plus fructose diets in diabetic children.

Paganus A, Maenpaa J, Akerblom HK, Stenman UH, Knip M, Simell O. 1987.
Acta Paediatr Scand 76(1):76-81

This randomized cross-over study evaluates the effects of extended, guar and guar + fructose diets on the metabolic balance of children with insulin-dependent diabetes mellitus (IDDM). We studied 22 children; mean age 12.2 years, mean duration of diabetes 4.4 years. The diet was supplemented for three weeks with guar in palatable form (5% of daily carbohydrate intake) and with guar + fructose (1 g of fructose/kg body weight, max 30 g/d) for another three weeks. A control group (8 children, mean age 12.3, duration of diabetes 4.3 years) followed the same experimental protocol without guar supplementation. The metabolic balance was assessed by glucosuria index (per cent of tests with less than 1% glucosuria from all urine tests) and measurements of red cell glycohaemoglobin A1c (HbA1c). Serum total and HDL-cholesterol, C-peptide, pancreatic and enteroglucagon were also measured. HbA1c decreased during guar (p less than 0.001) and guar + fructose diet (p less than 0.001). The glucosuria index improved (p less than 0.02) and the serum total cholesterol concentration decreased (p less than 0.02) during the experimental guar diets. Guar in acceptable form and quantity in the diet appears to improve metabolic control of diabetic children.