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FILE: ▪Psyllium
▪Type 2 Diabetes
▪Glycemic Actions

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RE: Psyllium Improves Glycemic Control and Dyslipidmia in Type 2 Diabetes

Sierra M, Garcia JJ, Fernandez N, Diez MJ, Calle AP, the Farmafibra Group. Therapeutic effects of psyllium in type 2 diabetic patients. *European Journal of Clinical Nutrition* 2002;56:830–842.

High-fiber diets appear to be beneficial for people with diabetes. Dietary fiber, particularly soluble fiber, was found to lower blood glucose and lipid levels and to promote weight reduction in diabetics. The specific types of fiber that are most effective with regard to carbohydrate metabolism include guar gum, psyllium, and pectin; these fibrous substances are water-soluble and they form gels when combined with liquids.

Psyllium is also called ispaghula husk; it is the husk of the seeds from the plant *Plantago ovata*. For many years psyllium has been used to treat constipation. Recent studies have shown that psyllium may have other uses as well. Specifically, consumption of psyllium was found to reduce blood concentrations of glucose, insulin, and cholesterol in previous studies.

In the current study, the authors evaluated the therapeutic effect of psyllium on glycemic control (blood glucose control) and other biochemical parameters in 8 women and 12 men with type 2 diabetes. The mean ages were 66.0 and 67.4 years for the women and men, respectively (range: 50–80 years). The duration of diabetes in the study patients ranged from 2 to 30 years, and all patients were being treated with the oral hypoglycemia drug glibenclamide (a sulphonylurea medication) and conventional dietary restrictions.

This outpatient study included 3 phases, and each subject served as his or her own control. Phase 1 was a 1-week period when the patients followed their usual regimen of dietary restrictions and sulphonylurea medication. Phase 2 was a 6-week treatment period during which patients took 3.5 g psyllium four times/day (total of 14 g/day) and continued their

usual diet and sulphonylurea. The psyllium product was Plantaben® (Madaus, S.A., Spain), an orange-flavored, sugar-free fiber that the patients mixed with water and consumed before each meal. Phase 3 was a 4-week period similar to phase 1; patients followed their usual regimen of dietary restrictions and sulphonylurea medication. Between phases 2 and 3, there was a 2-week washout period. At the end of each phase, the patients underwent a clinical examination after fasting overnight and eating a standard test breakfast at the study clinic. After the standard breakfast, blood samples were drawn at frequent intervals for measurement of glucose and insulin. Additional biochemical parameters were measured in blood samples obtained at time 0, and a 24-hour urine sample was collected and analyzed for glucose and C-peptide.

The results showed that mean glucose absorption (area under the curve for serum glucose over time) was significantly reduced by approximately 12% during phase 2, when the patients consumed psyllium 4 times/day, compared with phases 1 and 3, which were similar to each other. "The extent of glucose absorption decreased in the presence of psyllium when mean values were considered…differences in mean concentrations at different sampling times were significant," the authors report. The C_{max} (maximum glucose concentration) was almost 10% lower in phase 2 than in phases 1 and 3. However, the reduction in glucose absorption was not associated with a significant change in insulin concentrations, which decreased by a mean of 5%.

There were large interindividual variations in glucose concentrations, with coefficients of variation ranging from 18.7% to 31.9%. Thus, the authors note that it was important to examine the glucose curves for individual patients, in addition to the mean curves. "In 10 patients, glucose concentrations and AUC values were clearly lower at the end of phase 2 than at the end of phases 1 and 3, with AUC decreases up to 34%," the authors state. In 5 patients, the glucose curves for phases 1, 2, and 3 were very similar, and in another 5 patients, values were higher in phase 1 than in phases 2 and 3.

During phase 2 (psyllium supplementation), there were nonsignificant reductions in hemoglobin A_{1C}, C-peptide, and 24-hour urinary glucose excretion (reductions of 3.8%, 14.9%, and 22.5%, respectively). Psyllium supplementation was also associated with significant decreases in total cholesterol, LDL cholesterol, and uric acid (7.7%, 9.2%, and 10%, respectively). The psyllium was well tolerated, without any significant side effects; this finding was consistent with other previous studies.

Finally, the authors report that the psyllium did not have adverse effects on postprandial blood concentrations (after the test breakfast) of the vitamins or minerals tested, which included calcium, phosphorus, potassium, magnesium, iron, and vitamins A and E. The one exception was the sodium concentration, which was significantly higher after phase 2 than after phases 1 and 3.

In summary, psyllium supplementation caused significant mean reductions in postprandial blood glucose concentrations in patients with type 2 diabetes. This same beneficial effect was found in several previous studies of type 1 and 2 diabetics and healthy volunteers; different preparations and dosages of ispaghula husk were used in the different studies.

The authors conclude that "the results obtained indicate a beneficial therapeutic effect of psyllium (Plantaben) in the metabolic control of type 2 diabetics as well as in lowering the risk of coronary heart disease."

—Christina Chase, MS, RD

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