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File: ■ Aloe Vera (*Aloe vera*, Xanthorrhoeaceae)
■ Diabetes
■ Systematic Review/Meta-analysis

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RE: Aloe Vera Shows Promise in Lowering Blood Glucose and Reducing Other Symptoms of Prediabetes

Zhang Y, Liu W, Liu D, Zhao T, Tian H. Efficacy of aloe vera supplementation on prediabetes and early non-treated diabetic patients: a systematic review and meta-analysis of randomized controlled trials. *Nutrients*. June 23, 2016;8(7). pii: E388. doi: 10.3390/nu8070388.

Diabetes is characterized partly by elevated blood glucose and is a serious disease that may lead to potentially devastating health complications. Standard medications for diabetes often cause adverse side effects; thus, botanicals may be an effective and less expensive option for lowering blood glucose. Aloe vera (*Aloe vera*, Xanthorrhoeaceae) is used to treat many health concerns, but the research on its potential use for diabetes is conflicted. This systematic review and meta-analysis focused on randomized clinical trials (RCTs) investigating potential hypoglycemic activity of aloe vera.

The authors searched PubMed, Embase, and Cochrane Central Register of Controlled Trials, from each database's origin to January 28, 2016. The search terms used were extensive, including "hyperglycemia," "impaired glucose tolerance," "diabetes mellitus," and "aloe vera," among others. Publications in any language were considered. The American Diabetes Association and World Health Organization criteria for prediabetes and type 2 diabetes mellitus were used. Studies included were RCTs, with or without lifestyle interventions, used aloe vera alone, included patients that were not using hypoglycemic medication and did not have heart disease or other serious health problems, and had glucose and/or lipid status as primary outcomes. The studies were evaluated on quality, with the terms "adequate, inadequate, and unclear," to describe randomization, allocation concealment, blinding, and intention-to-treat (ITT) analysis.

The search yielded 282 publications and was narrowed down to five RCTs, published from 1996 to 2016, with 415 patients. It was found that of the five studies, two reported randomization methodology, and no RCTs had adequate blinding. Three RCTs had adequate patient withdrawal and dropout data, and ITT analysis occurred in one study. Patients were overweight or obese as reported in four RCTs, and study length was six to 12 weeks.

There was significant heterogeneity for fasting blood glucose in patients across the five RCTs (P<0.00001). Aloe vera performed better than placebo in reducing fasting blood glucose concentrations (P=0.02). No effect was noted on insulin concentrations, but heterogeneity was reported in the two RCTs with this outcome (P<0.00001). Glycated hemoglobin (HbA1c, a long-term glucose metric) was measured in two RCTs and was significantly decreased by aloe vera usage (P<0.00001) with no significant heterogeneity.

Of the RCTs, four investigated aloe vera in comparison to placebo for triglyceride and total cholesterol (TC) concentrations. It was found that aloe vera was more effective than placebo in decreasing triglyceride (P=0.0001) and TC concentrations (P<0.00001); however, heterogeneity in both metrics was observed (P<0.00001 for both). Also, aloe vera was found to better increase high-density lipoprotein (HDL) cholesterol (P=0.04) and decrease low-density lipoprotein (LDL) cholesterol (P<0.00001) as compared with placebo. Both outcomes had significant heterogeneity (P=0.0008 and P<0.00001, respectively).

In summary, the authors conclude that aloe vera treatment impacted fasting blood glucose concentrations, HbA1c, and triglyceride, TC, and LDL and HDL cholesterol concentrations, despite heterogeneity across RCTs. Discussed possible mechanisms include potentiation of glucose transport, attenuation of cholesterol gut absorption, and modulation of gene expression. Stated limitations include the finite RCT sample size, discrepancy of patient background, publication bias, variation in form and dose of aloe vera (studies included used capsules, powder, or juice), and lack of available data for certain outcomes. Additionally, some methodology was not reported. Larger and more rigorous trials to establish the efficacy and safety of aloe vera in this population are recommended.

—Amy C. Keller, PhD

Referenced article can be accessed at http://www.mdpi.com/2072-6643/8/7/388.