JBI Evid Synth

. 2021 May;19(5):966-1002.

doi: 10.11124/JBISRIR-D-19-00397.

**Effect of Tree Nuts on Glycemic Outcomes in Adults with Type 2 Diabetes Mellitus: A Systematic Review**

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* PMID: **33141798**
* DOI: [10.11124/JBISRIR-D-19-00397](https://doi.org/10.11124/jbisrir-d-19-00397)

**Abstract**

**Objective:** The objective of this review was to synthesize the best available research evidence regarding the effectiveness of tree nuts on glycemic outcomes in adults with type 2 diabetes mellitus.

**Introduction:** There has been an increase in the use of complementary therapy, particularly botanical products, for management of type 2 diabetes mellitus. It has been reported that increasing mono- and polyunsaturated fatty acids in diet effectively lowers the risk of development of type 2 diabetes mellitus. Hence, it was hypothesized that consumption of nuts, which are high in polyunsaturated fatty acids and mono-unsaturated fatty acids, may aid in preventing diabetes and reducing levels of blood glucose by reducing glycemic load by displacing dietary carbohydrates present in diet.

**Inclusion criteria:** This systematic review included randomized controlled trials that compared the consumption of any type and form of tree nut with a placebo or any other intervention in adults with type 2 diabetes mellitus. Trials were included if they measured fasting blood glucose, postprandial blood glucose, and/or glycated hemoglobin. Trials that assessed triglyceride levels and weight postintervention were also considered for inclusion. Trials were restricted to the English language.

**Methods:** A three step search of PubMed, CINAHL, Embase, Trip database, and Cochrane Central Register of Controlled Trials (CENTRAL) was done in July 2019. To find unpublished studies, ClinicalTrials.gov and Google Scholar were searched. Studies from the search were reviewed against the inclusion criteria by two reviewers. The JBI critical appraisal checklist for randomized controlled trials was used to assess the potential studies for methodological quality. A meta-analysis and subgroup analysis was conducted among trials with the same type of intervention and outcome measures. Results are presented in a narrative format where statistical pooling was not possible.

**Results:** Fifteen trials were included with a total sample size of 667. Consumption of pistachios demonstrated a significant reduction in triglyceride levels (mmol/L) at three month or earlier follow-up (mean difference [MD] -0.28; confidence interval -0.33, -0.23; P <0.00001). The meta-analysis including all tree nuts combined showed reduction in both fasting blood glucose and glycated hemoglobin (MD -0.26 mmol/L and -0.11% respectively) at three month or earlier follow-up. The subgroup analysis demonstrated MD of -0.45, -0.16, and -0.90 mmol/L in fasting blood glucose following ingestion of walnuts, almonds, and hazelnuts, respectively, and -0.17% in glycated hemoglobin following ingestion of walnuts at three month or earlier follow-up. Although not clinically significant, these figures give an indication that further research with larger sample sizes and longer follow-up may show encouraging results.

**Conclusions:** The authors found that pistachio consumption for three months or less significantly reduced triglyceride levels. Other tree nuts (walnuts, almonds, and hazelnuts) reduced fasting blood glucose and glycated hemoglobin levels by varying degrees. Further robust randomized controlled trials with power calculation-based sample size, comparing same type, dose, and method of nut intervention, will provide more evidence. For now, clinical decisions should be based on standard practice local guidelines.

KEYWORD: Fasting Blood Glucose , HBA1c , Postprandial Blood Glucose , Tree Nuts , Type 2 Diabetes Mellitus